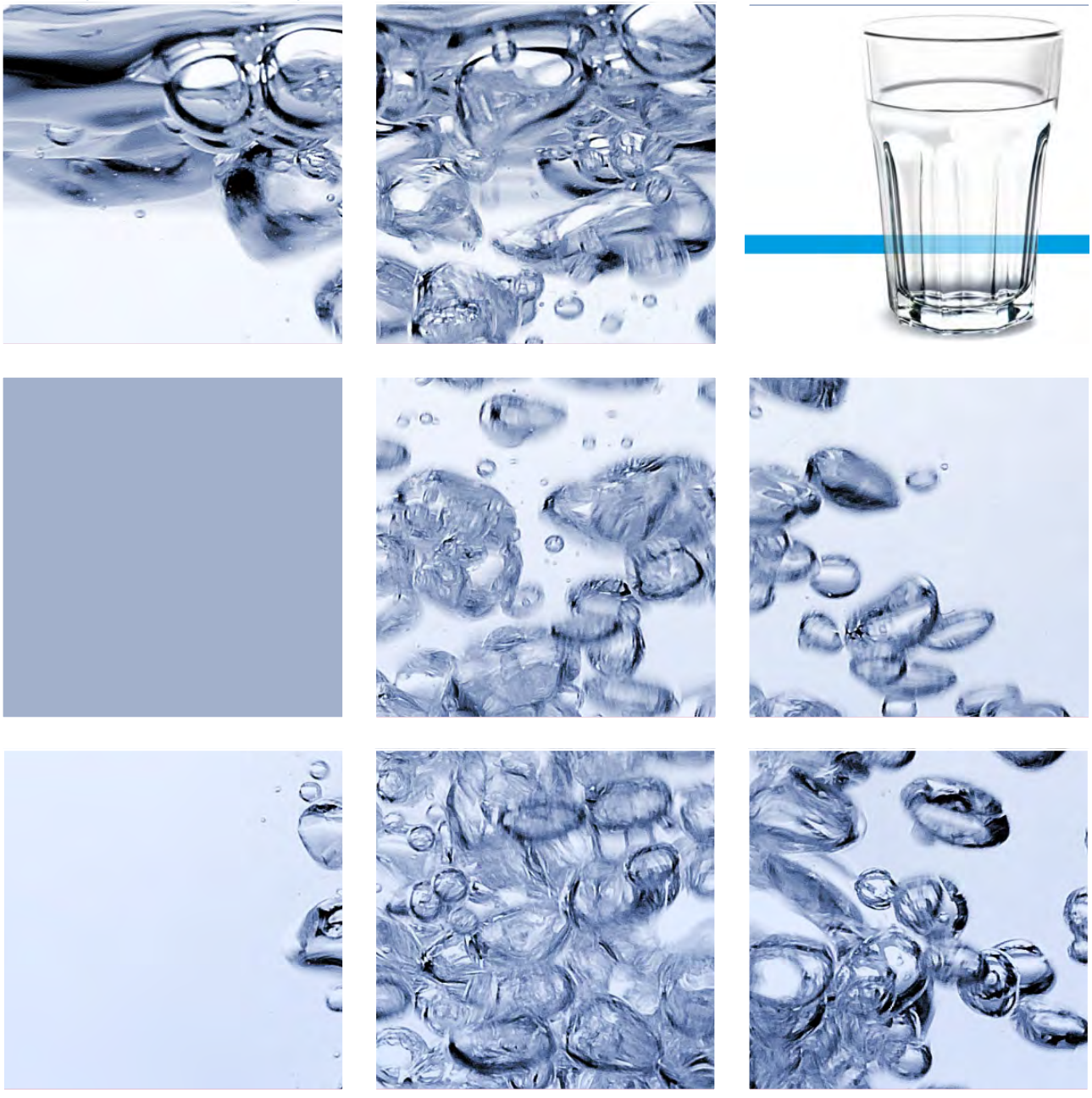
Uisce Éireann - Lead in Drinking Water Mitigation Plan

Screening for Appropriate Assessment

036 Clonakilty RWSS WTP (Jones Bridge WTP) - Zone 1 Clonakilty Regional WSZ (0500PUB4301)



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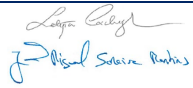
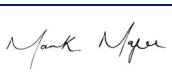
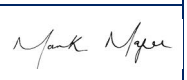
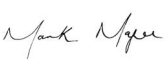
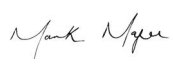
F04	Final	4th June 2019	LC JM		LC		GJG	
F05	Final	14th Jun 2023	AW		MM		MM	
F06	Final	12th Jan 2024	AW		MM		MM	

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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 Uisce Éireann (UE) to undertake Screening for Appropriate Assessment (AA) for the proposed orthophosphate dosing (herein referred to as the proposed project) of drinking water supplied by Clonakilty Regional Water Supply Scheme (RWSS) Water Treatment Plant (WTP) (Jones Bridge WTP), Lisselane, 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

Uisce Éireann, as the national public water utility, prepared a Lead in Drinking Water Mitigation Plan (LDWMP) in 2016 (here after referred to as the Plan). The Plan provides a framework of measures for implementation to effectively address the currently elevated levels of lead in drinking water experienced by some UE 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 UE'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 (UE, 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 UE's ownership in private properties (UE, 2016). Lead can be dissolved in water as it travels through lead supply pipes and internal lead plumbing. When lead is in contact with water it can slowly dissolve, a process known as

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

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 UE 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 (UE, 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. UE 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 UE. 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.

UE 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 UE will be required to add to treated water is between 0.5 mg/l to 1.5 mg/l. At Clonakilty RWSS WTP orthophosphate will be added at a rate of 0.6 mg/l, with seasonal variation in the proposed dose, as set out within the Preliminary Design Report for the proposed dosing.

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 18 European Sites with potential hydrological or hydrogeological connectivity to the WSZ:

- SAC sites: Clonakilty Bay SAC; Lough Hyne Nature Reserve and Environs SAC; Roaringwater Bay and Islands SAC; Barley Cove to Ballyrisode Point SAC; Kilkeran Lake and Castlefreke Dunes SAC; Courtmacsherry Estuary SAC; Bandon River SAC; Myross Wood SAC; Castletownshend SAC and Ardmore Head SAC; and
- SPA sites: Old Head of Kinsale SPA; Cork Harbour SPA; Clonakilty Bay SPA; Sovereign Islands SPA; Sheep's Head to Toe Head SPA; Galley Head to Duneen Point SPA; Seven Heads SPA and Courtmacsherry Bay 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.

2.1 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.

2.2 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.

2.3 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 UE, RPS, NPWS, IFI, EPA etc. as part of Plan development.

- Information provided by UE as part of the project;
- Environmental Protection Agency – Water Quality www.epa.ie and www.catchments.ie;
- Geological Survey of Ireland – Geology, Soils and Hydrogeology www.gsi.ie;
- Information on the conservation status of birds in Ireland (Colhoun & Cummins 2013);
- National Parks and Wildlife Service – online Natura 2000 network information www.npws.ie;
- National Biodiversity Action Plan 2017 - 2021 (DCHG 2017);
- Article 17 Overview Report Volume 1 (NPWS, 2019a);
- Article 17 Habitat Conservation Assessments Volume 2 (NPWS, 2019b);
- Article 17 Species Conservation Assessment Volume 3 (NPWS, 2019c);
- EPA Qualifying Interests database, (EPA, 2015) and updated EPA Characterisation Qualifying Interests database (EPA/RPS, September 2016);
- River Basin Management Plan for Ireland 2018 - 2021 - www.housing.gov.ie;
- Ordnance Survey of Ireland – Mapping and Aerial photography www.osi.ie;
- National Summary for Article 12 (Cummins et al., 2019); and
- Format for a Prioritised Action Framework (PAF) for Natura 2000 (2014) www.npws.ie/sites/default/files/general/PAF-IE-2014.pdf.

2.4 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: https://www.housing.gov.ie/water/water-quality/river-basin-management-plans/river-basin-management-plan-2018-2021-0

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

UE is proposing to install orthophosphate treatment at the existing Clonakilty RWSS WTP (Jones Bridge WTP) in Lisselane, Co. Cork. Clonakilty RWSS WTP (Jones Bridge WTP) supplies rural areas to the south of County Cork. The daily production is 7,460 m^3/day (50% of which is accounted for) serving a population in excess of 12,496 and the non-domestic demand is 24% of the distribution input. There are a number of wastewater treatment plant (WWTP) agglomerations serving the area. Clonakilty and Rosscarbery / Owenhincha are licensed in accordance with the requirements of the Waste Water Discharge (Authorisation) Regulations 2007 (as amended) and the potential impact of the orthophosphate dosing on the emission limit values and the receiving water body downstream of the point of discharge are assessed. There are smaller agglomerations with a population equivalent (P.E.) of less than 500 i.e. Courtmacsherry, Ring, Shannonvale and Timoleague and the estimated additional load from these plants from the orthophosphate dosing are considered at the water body level via the surface water pathways. There are an estimated 2,875 properties across the WSZ that are serviced by domestic waste water treatment systems (DWWTS) (see **Appendix C**).

Clonakilty RWSS WSZ and WTP (Jones Bridge WTP) lie in the vicinity of the Argideen River in the Bandon-Ilen catchment. The EAM process identified 18 European Sites with potential hydrological or hydrogeological connectivity to the WSZ:

- SAC sites: Clonakilty Bay SAC; Lough Hyne Nature Reserve and Environs SAC; Roaringwater Bay and Islands SAC; Barley Cover to Ballyrisode Point SAC; Kilkeran Lake and Castlefreke Dunes SAC; Courtmacsherry Estuary SAC; Bandon River SAC; Myross Wood SAC; Castletownshend SAC and Ardmore Head SAC, and;
- SPA sites: Old Head of Kinsale SPA; Cork Harbour SPA; Clonakilty Bay SPA; Sovereign Islands SPA; Sheep's Head to Toe Head SPA; Galley Head to Duneen Point SPA; Seven Heads SPA and Courtmacsherry Bay SPA.

3.2 CONSTRUCTION OF CORRECTIVE WATER TREATMENT WORKS

The corrective water treatment works at Clonakilty RWSS WTP will involve the provision of orthophosphate dosing and associated safety equipment.

There are two possible locations for the orthophosphate dosing system at Clonakilty RWSS WTP both of which will be located within the confines of the existing WTP boundary. The surrounding landscape is dominated by agricultural grassland. The orthophosphate dosing system will be located within the confines of the existing WTP boundary. The location of the works is shown in **Figure 3-1**.

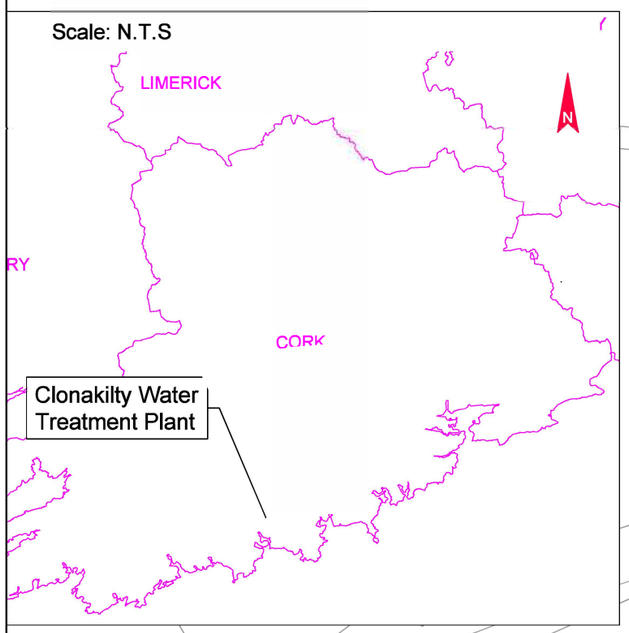
The implementation of orthophosphate dosing at the Clonakilty RWSS WTP will require the following elements:

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

CO. CORK

Clonakilty Water Treatment Plant

Scale: N.T.S



Distribution Pumping

Proposed Location 3 of Orthophosphate Dosing Facilities

Lime MAke-up and Dosing Area (Final Water Sump Underneath)

Storage Shed

Sludge Drying Beds

Fluoride Bulk Storage

Sludge Drying Bed

Palisade Fencing

Proposed Orthophosphate Dosing Point Urban and Rural Distribution Mains

Pipe yard

Phase 2 Clarifiers

NaOCl Bulk Storage

Lisselane Bridge

Proposed Location 1 of Orthophosphate Dosing Facilities

Phase 2 Filters

Proposed Location 2 of Orthophosphate Dosing Facilities

Phase 1 Clarifiers

Phase 1 Filters

10m SCALE 1:500

R:\MDW0766_Lead Mitigation Plan\8.0 Drawings\SK\MDW0766SK0000 Series.dwg

Client: Uisce Éireann Irish Water

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No.	Date	Orig.	Amendment / Issue	App
F01	APR 19	JR BR	ISSUED FOR INFORMATION	GJG
D01	AUG 18	JR BL	DRAFT	DC

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Drawn	JR
Checked	BR
Approved	DC
Date	25/04/2019
Scale	1:500 @ A1 1:1,000 @ A3
Job No.	MDW0766
File Ref.	MDW0766SK0000 Series.dwg
Drg. No.	SK0036 WTP
Rev.	F01

Project: **LEAD MITIGATION PLAN**

Figure 3.1 CLONAKILTY RWSS WATER TREATMENT PLANT - SITE LAYOUT

The bulk storage tanks (2 no. tanks, each with a working volume of 500l) will sit 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 3-4**).

Each storage tank will be self-bunded to accommodate greater than 110% of the tank working volume. The tanks shall conform to Uisce Éireann design guidelines and will 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 shall be compatible with 75% phosphoric acid.

A stable pH is critical to facilitate effective plumbosolvency control. With implementation of orthophosphate dosing it is necessary to ensure a stable pH of the final water. There is an existing pH correction system at the Clonakilty RWSS WTP and no further works are required. There is a recommendation to change from using lime to caustic for final pH correction.

Dosing pipelines, carrier water pipework and electrical cables shall be installed within 100mm diameter ducts, placed in trenches constructed within existing made ground at the Clonakilty RWSS WTP. The ducts will be installed at approximately 700mm below ground level and following installation the trench will be backfilled and the surface reinstated to match the existing surface. Where pipework and cables are routed through existing structures, they shall be surface mounted within trunking. All spillages / leaks from storage tanks, valve connections and dosing pumps shall be contained within bunded areas.

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

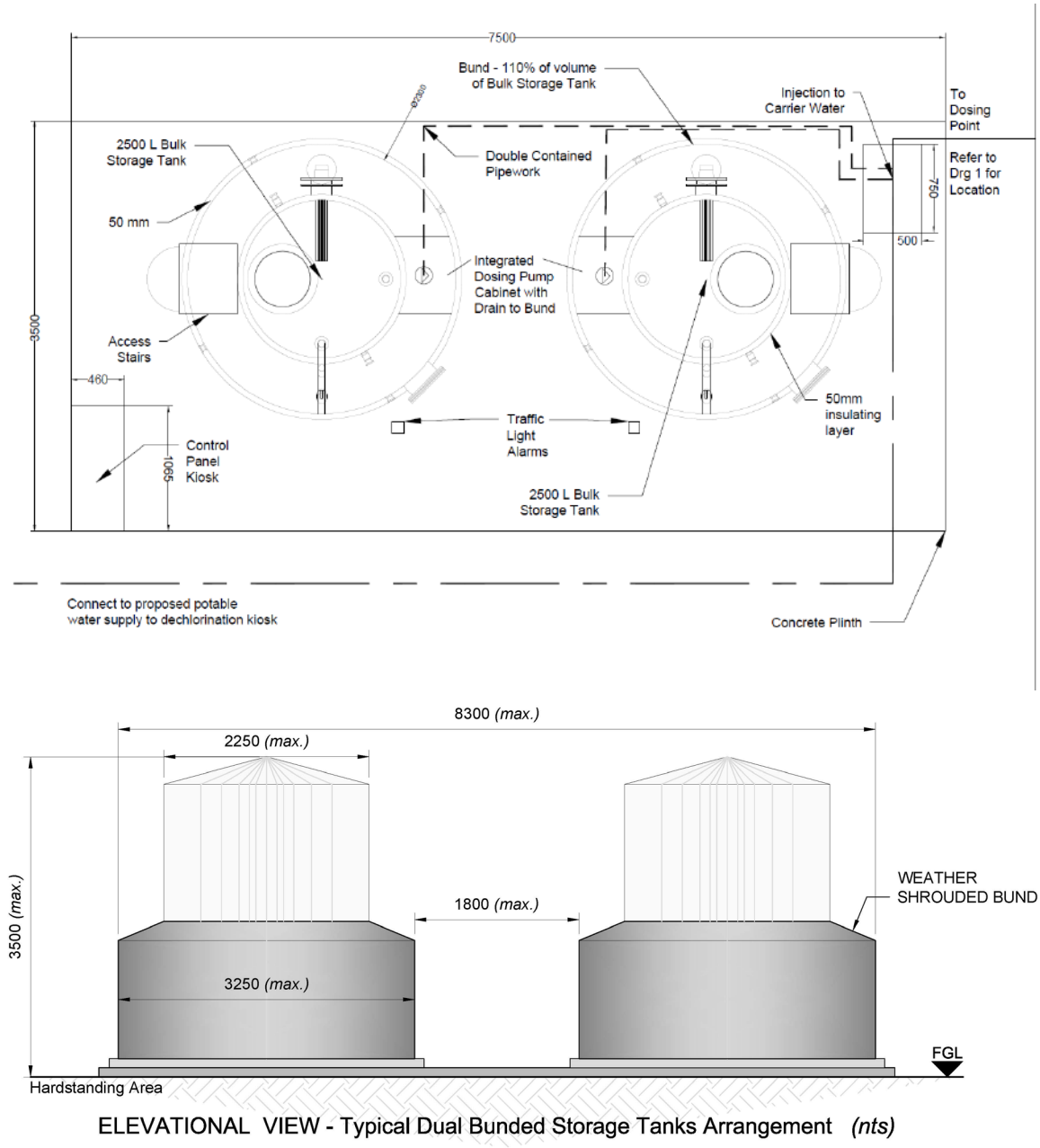


Figure 3-2 Plan and Elevation Drawings of a typical Orthophosphate Dosing Unit

3.3 CONSTRUCTION METHODOLOGY

The proposed works will be carried out by suitably qualified contractors. The proposed dosing unit will be located within the bounds of the existing Clonakilty RWSS 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 Clonakilty RWSS 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 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, UE 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, UE 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.

Depending on the potential impacts identified, appropriate measures may be built into the project proposal, as part of an iterative process to avoid / reduce those potential impacts for the orthophosphate treatment being proposed. Project measures adopted within the overall design proposal may include selected placement of the orthophosphate treatment point within the WSZ; enhanced wastewater treatment (to potentially remove equivalent phosphorus levels related to the orthophosphate treatment at the WTP); reduced treatment rate; and water network leakage control. The EAM will be the basis of the decision support matrix to inform any programmes developed as part of the LDWMP. Further detail on the model is presented in **Section 3.5.2** below.

3.5.2 Environmental Assessment Methodology

The EAM has been developed based on a conceptual model of P transfer (see **Figure 3-3**), 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 3-4** 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.

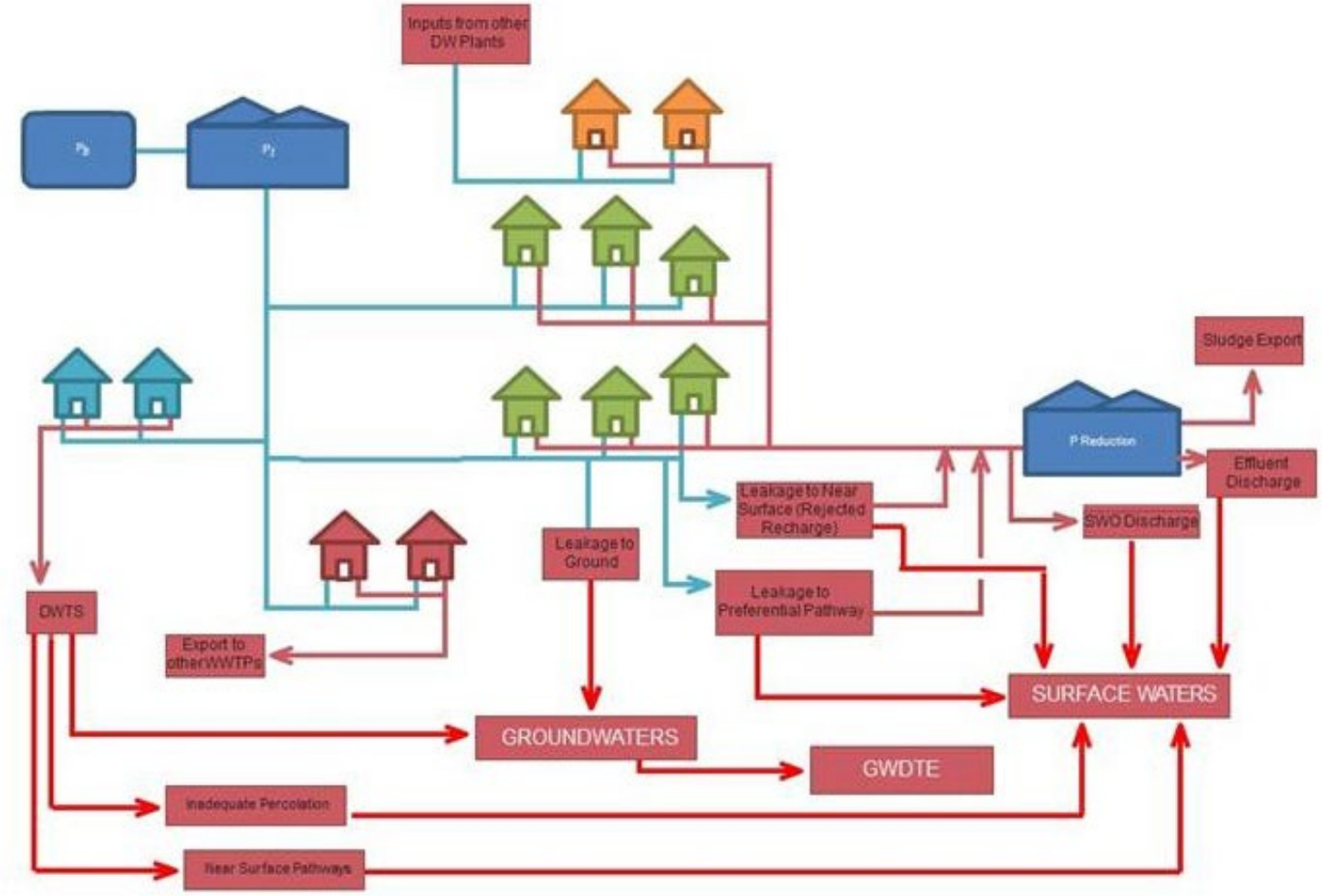


Figure 3-3: Conceptual Model of P Transfer

(Diagrammatic layout of P transfers from drinking water source (top left), through DW distribution (blue), wastewater collection (brown) and treatment systems to environmental receptors (red). P transfers that by-pass the WWTP (leakages, storm overflows, discharges to ground, and misconnections) are also indicated.)

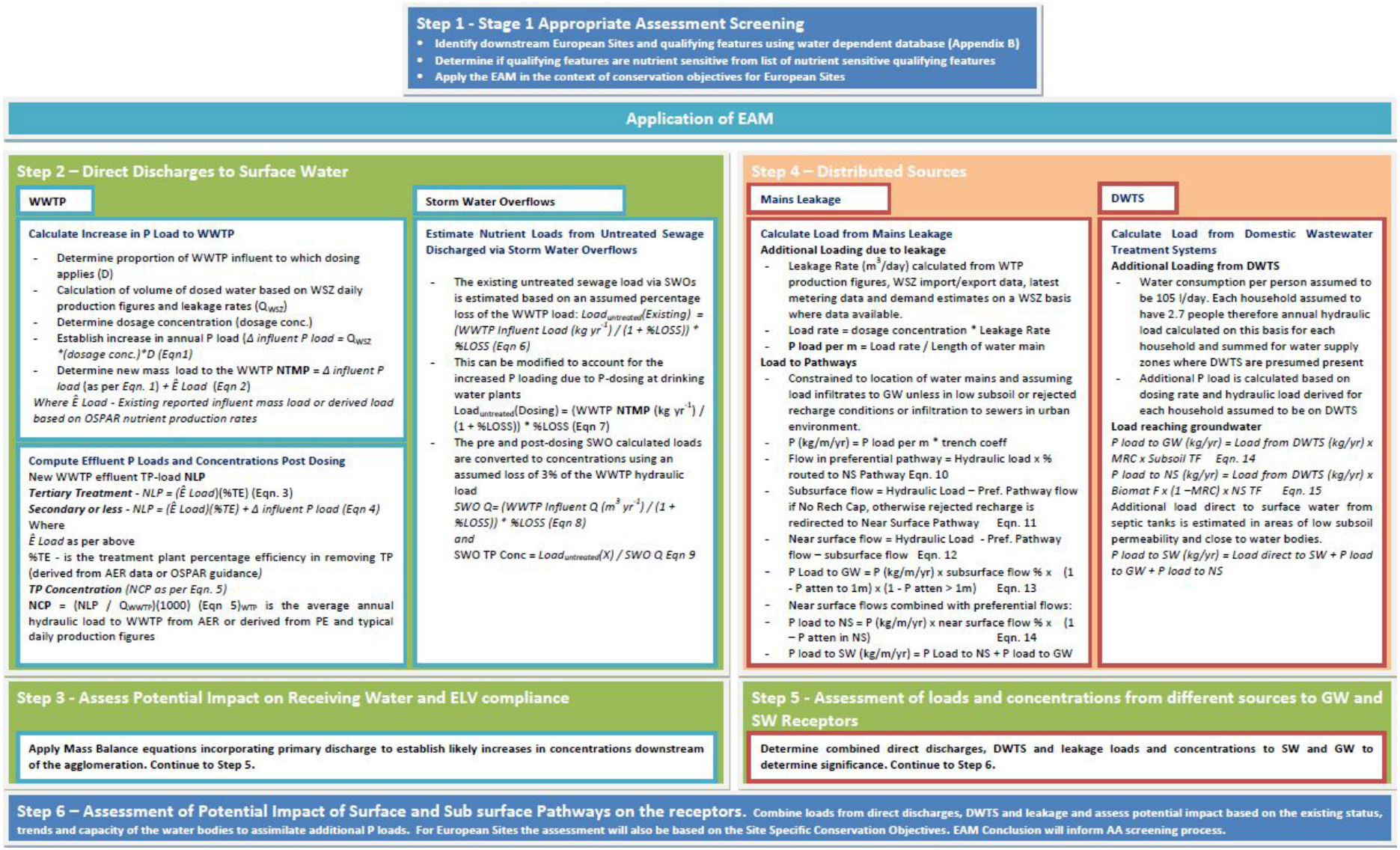


Figure 3-4: Stepwise Approach to the Environmental Assessment Methodology

4 PROJECT CONNECIVITY 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 Clonakilty RWSS 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 Clonakilty RWSS 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	Ground-water Connectivity[4]	Potential Source Pathway Receptor
1	Courtmacsherry Estuary SAC	001230	No	Yes	Yes- RWB (Argideen)	Yes (Skibbereen-Clonakilty)	Yes
2	Courtmacsherry Bay SPA	004219	No	Yes	Yes- RWB (Argideen)	Yes (Skibbereen-Clonakilty)	Yes
3	Seven Heads SPA	004191	No	Yes	Yes- RWB (Argideen)	Yes (Skibbereen-Clonakilty)	Yes
4	Old Head of Kinsale SPA	004021	No	Yes	Yes- RWB (Argideen)	Yes (Skibbereen-Clonakilty)	Yes
5	Clonakilty Bay SAC	000091	No	Yes	No	Yes (Skibbereen-Clonakilty)	No
6	Lough Hyne Nature Reserve and Environs SAC	000097	No	Yes	No	Yes (Skibbereen-Clonakilty)	No
7	Barley Cove to Ballyrisode Point SAC	001040	No	Yes	No	Yes (Skibbereen-Clonakilty)	No
8	Kilkeran Lake and Castlefreke Dunes SAC	001061	No	Yes	No	Yes (Skibbereen-Clonakilty)	No
9	Myross Wood SAC	001070	No	Yes	No	Yes (Skibbereen-Clonakilty)	No

[4] Clonakilty RWSS WTP overlies the Skibbereen-Clonakilty (IE_SW_G_085) groundwater body. All European sites overlying or supporting connectivity to this groundwater body have been assessed to determine potential source pathway receptors. This groundwater body comprises poorly productive bedrock and flow direction is expected to mimic the surface water pattern flowing radially out towards the coast. As a result, potential interactions between the WTP site and the groundwater body can only be conveyed via the Argideen River which provides connectivity with sites 1-4 only.

	Site Name	SAC / SPA Code	Direct Impact	Water Dependent Species / Habitats	Surface Water Connectivity	Ground-water Connectivity[4]	Potential Source Pathway Receptor
10	Courtmacsherry Estuary SAC	001230	No	Yes	No	Yes (Skibbereen-Clonakilty)	No
11	Castletownshend SAC	001547	No	Yes	No	Yes (Skibbereen-Clonakilty)	No
12	Roaringwater Bay and Islands SAC	0000101	No	Yes	No	Yes (Skibbereen-Clonakilty)	No
13	Clonakilty Bay SPA	004081	No	Yes	No	Yes (Skibbereen-Clonakilty)	No
14	Sheep's Head to Toe Head SPA	004156	No	Yes	No	Yes (Skibbereen-Clonakilty)	No
15	Galley Head to Duneen Point SPA	004190	No	Yes	No	Yes (Skibbereen-Clonakilty)	No

4.1.2 Operational Phase

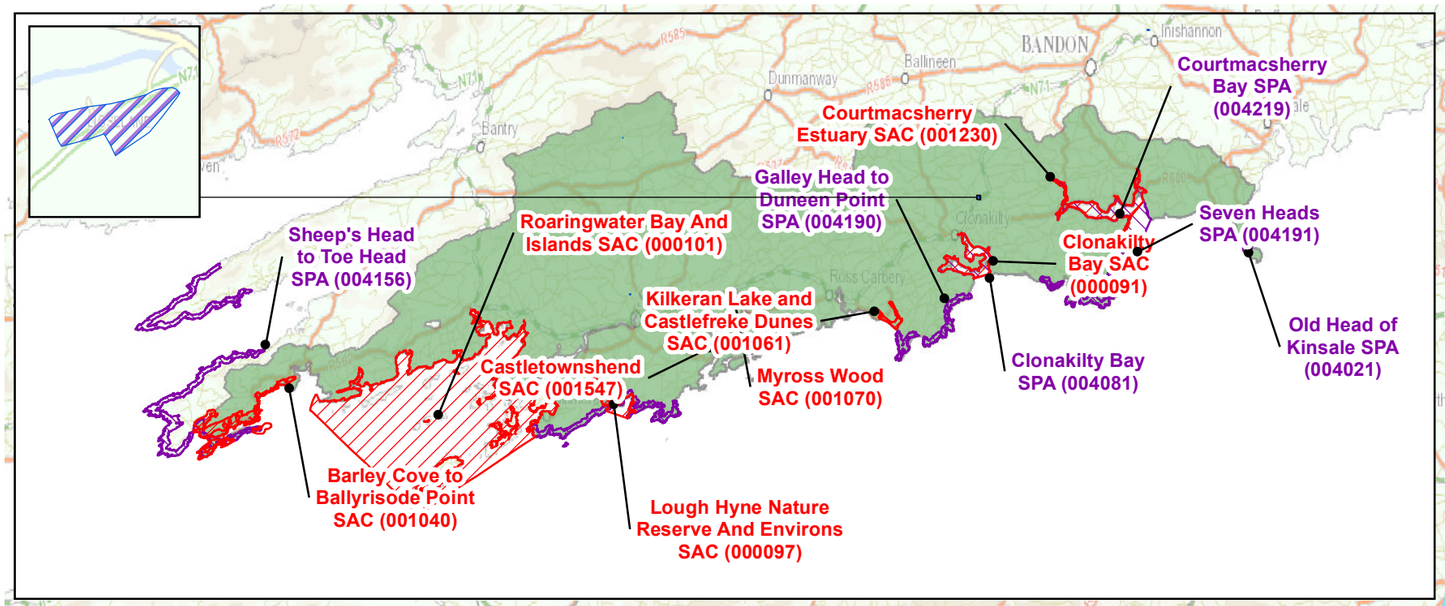
The ZoI for the operational phase of the proposed project was determined by establishing the potential for hydrological and hydrogeological connectivity between the Clonakilty RWSS WTP (Jones Bridge WTP) and associated WSZ and European Sites. The ZoI was therefore defined by the surface and groundwater 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 intersecting the WSZs are also included in the ZoI. European Sites within the ZoI are listed in **Table 4-2** and are displayed in **Figure 4-1.**

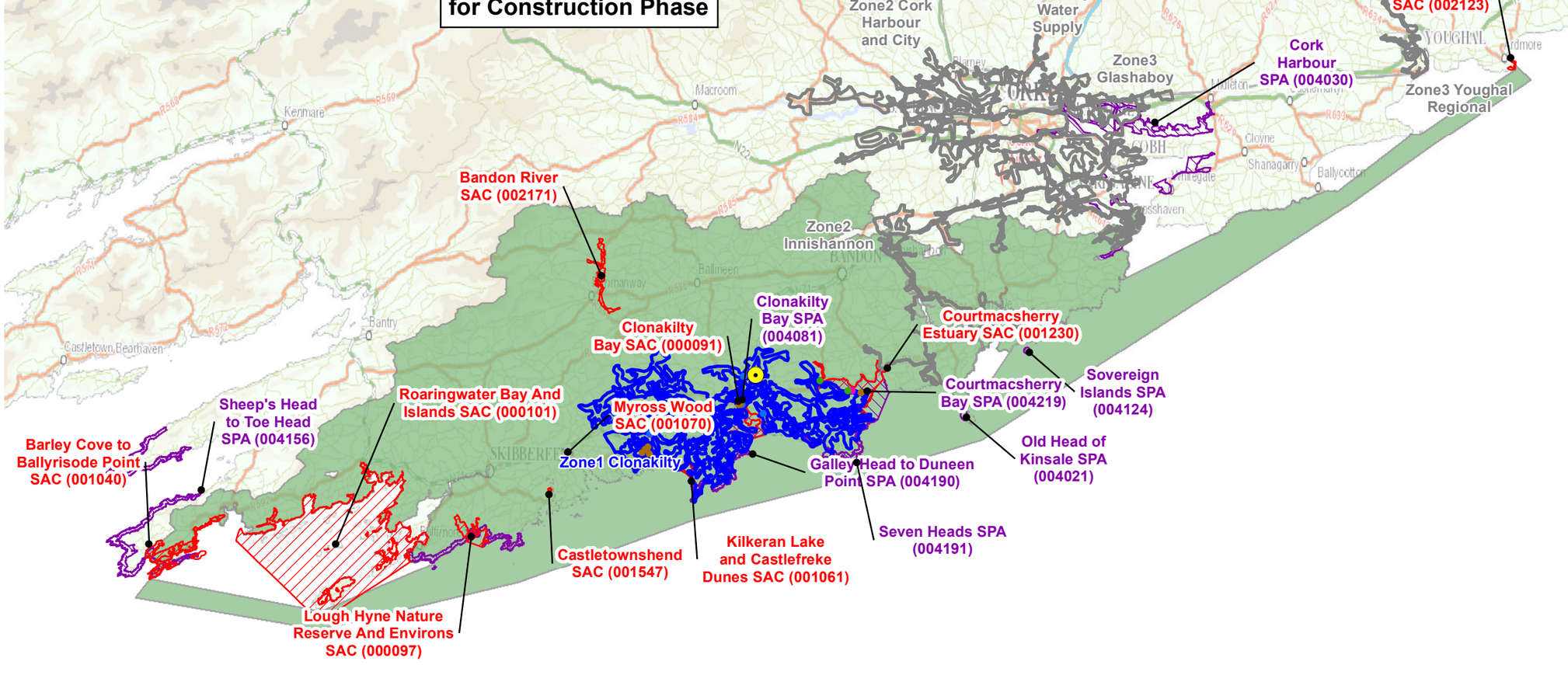
Table 4-2: European Sites within the ZoI of the Proposed Project – Operational Phase

	Site Name	SAC / SPA Code	Water Dependent Species / Habitats	Nutrient Sensitive	Surface Water Connectivity	Groundwater Connectivity	Potential Source Pathway Receptor
1	Bandon River	SAC 002171	Yes	Yes	No	No	No
2	Clonakilty Bay	SAC 000091	Yes	Yes	Yes - RWB	Yes (Skibbereen-Clonakilty)	Yes
3	Lough Hyne Nature Reserve and Environs	SAC 000097	Yes	Yes	Yes - CWB Western Celtic Sea	Yes (Skibbereen-Clonakilty)	Yes
4	Roaringwater Bay & Islands	SAC 000101	Yes	Yes	Yes - CWB Western Celtic Sea	No	Yes

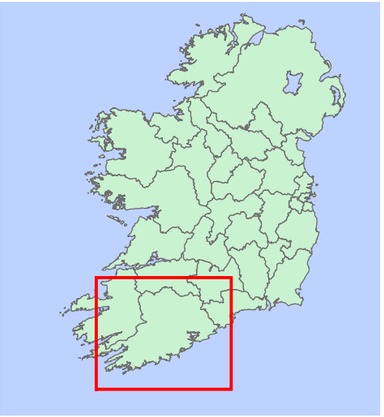
	Site Name	SAC / SPA Code	Water Dependent Species / Habitats	Nutrient Sensitive	Surface Water Connectivity	Groundwater Connectivity	Potential Source Pathway Receptor
5	Barley Cove to Ballyrisode Point	SAC 001040	Yes	Yes	Yes - CWB Western Celtic Sea	Yes (Skibbereen-Clonakilty)	Yes
6	Kilkeran Lake and Castlefreke Dunes	SAC 001061	Yes	Yes	Yes - RWB	Yes (Skibbereen-Clonakilty)	Yes
7	Myross Wood	SAC 001070	Yes	Yes	Yes – via Glandore Harbour	Yes (Skibbereen-Clonakilty)	Yes
8	Courtmacsherry Estuary	SAC 001230	Yes	Yes	Yes - RWB	Yes (Skibbereen-Clonakilty)	Yes
9	Castletownshend	SAC 001547	Yes	Yes	Yes – CWB Rosscarbery Bay	Yes (Skibbereen-Clonakilty)	Yes
10	Ardmore Head	SAC 002123	Yes	Yes	Yes - CWB Western Celtic Sea	No	Yes
11	Old Head of Kinsale	SPA 004021	Yes	Yes	Yes – CWB Courtmacsherry Bay	Yes (Skibbereen-Clonakilty)	Yes
12	Cork Harbour	SPA 004030	Yes	Yes	Yes - CWB Western Celtic Sea	No	Yes
13	Clonakilty Bay	SPA 004081	Yes	Yes	Yes - RWB	Yes (Skibbereen-Clonakilty)	Yes
14	Sovereign Islands	SPA 004124	Yes	Yes	Yes - CWB Western Celtic Sea	No	Yes
15	Sheep's Head to Toe Head	SPA 004156	Yes	Yes	Yes - CWBs Western Celtic Sea & Rosscarbery Bay	Yes (Skibbereen-Clonakilty)	Yes
16	Galley Head to Duneen Point	SPA 004190	Yes	Yes	Yes - CWB Western Celtic Sea	Yes (Skibbereen-Clonakilty)	Yes
17	Seven Heads	SPA 004191	Yes	Yes	Yes - CWB Western Celtic Sea	Yes (Skibbereen-Clonakilty)	Yes
18	Courtmacsherry Bay	SPA 004219	Yes	Yes	Yes - RWB	Yes (Skibbereen-Clonakilty)	Yes



Zone of Influence (ZoI) for Construction Phase



Zone of Influence (ZoI) for Operational Phase



Legend

LEMA Emission Type

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

Data Source:
Irish Water
NPWS (Jan. 2019)
EPA

N

0 5 10 20 Kilometres

Client

Uisce Éireann Irish Water

Project Lead Mitigation Plan
Corrective Water Treatment Works

Title

Zone 1 Clonakilty

European Sites within the ZoI of the Proposed Project

RPS

Scale: 1:500,000 @ A3	**Date:** 07/06/2019
File Ref: MDW0766Arc0012aF01	**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. Those included, are detailed in **Table 4-3** and are displayed in **Figure 4-2.** Twelve sites are included for further assessment for the operational phases and four sites are included for the construction phase, with justification provided below.

The construction phase of the proposed project will take place within the confines of the existing Clonakilty RWSS WTP. There is potential for surface water connectivity to the Courtmacsherry Estuary SAC, Courtmacsherry Bay SPA, Seven Heads SPA and Old Head of Kinsale SPA. The WTP overlies the Skibbereen-Clonakilty (IE_SW_G_085) groundwater body and the potential hydrogeological connectivity between the proposed development site and European Sites have been ruled out in **Table 4-1** above.

For the operational phase of the project, the Bandon River SAC is connected to the WSZ via a groundwater pathway only i.e. the groundwater body Bandon IE_SW_G_086. The extent to which this groundwater body is intersected by the WSZ is very small, and there is no surface water connection between this SAC and the WSZ. In addition, the EAM results show that the potential increase in orthophosphate as a result of dosing at Clonakilty WTP to the Bandon groundwater body is undetectable (0.0000 mg/l) (see **Table 5-2** below). There is therefore no risk to the indicative quality of this groundwater body and by extension, the post-dosing orthophosphate contribution to the Bandon River SAC. On this basis, this site is excluded from further assessment.

A large coastal water body i.e. the Western Celtic Sea (IE_SW_010_0000) lies downstream of the WSZ. However, the WSZ discharges directly into Rosscarbery Bay (IE_SW_110_0000), Clonakilty Bay (IE_SW_100_0000) and Courtmacsherry Bay (IE_SW_090_0000) coastal water bodies predominately, which lie between the WSZ and the Western Celtic Sea (IE_SW_010_0000). The WSZ also lies directly adjacent to the Western Celtic Sea (IE_SW_010_0000) coastal water body along two short stretches of coastline and therefore may be impacting directly on this coastal water body through subsurface pathways e.g. between Galey Head and Ringlea Point, and between Dunworly Point and Leganagh Point. As a result, the following twelve SACs / SPAs are included for further assessment in Section 5 and Section 6:

- SAC sites: Kilkeran Lake and Castlefreke Dunes SAC, Clonakilty Bay SAC, Courtmacsherry Estuary SAC; and
- SPA sites: Courtmacsherry Bay SPA, Galley Head to Duneen Point SPA, Clonakilty Bay SPA, and Seven Heads SPA and Old Head of Kinsale SPA.

The EAM results demonstrate that the potential increase in orthophosphate to the Western Celtic Sea (IE_SW_010_0000) coastal water body as a result of dosing at Clonakilty WTP is undetectable (0.0000 mg/l) (see **Table 5-2** below); there is therefore no risk to the indicative quality of this large coastal water body or its WFD objectives. The following nine sites are excluded from further assessment on this basis: Roaringwater Bay and Islands SAC, Barley Cove to Ballyrisode Point SAC, Ardmore Head SAC, Lough Hyne Nature Reserve and Environs SAC, Myross Wood SAC, Castletownshend SAC, Cork Harbour SPA, Sheep's Head to Toe Head SPA and Sovereign Islands SPA, as there is no potential for likely significant effect to these SACs and SPA.

The WSZ intersects two groundwater bodies – Skibbereen-Clonakilty IE_SW_G_085 and Bandon IE_SW_G_086 (**Table 3, Appendix C**). For European Sites which are hydrogeologically connected (via

groundwater) to the WSZ an assessment was made on the direction of flow in the groundwater body forming the connection. 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 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[5], and was consulted in making the assessment.

The area of the Bandon IE_SW_G_086 intersected by the WSZ is very small. The following European Sites overlay or intersect the Bandon IE_SW_G_086; Bandon River SAC and Cork Harbour SPA. The Bandon River SAC has been discussed above. There is no surface water connection between this SAC and the WSZ. In addition, the EAM results show that the potential increase in orthophosphate as a result of dosing at Clonakilty WTP to the Bandon groundwater body is undetectable (0.0000 mg/l) (see **Table 5-2** below); there is therefore no risk to the indicative quality of this groundwater body and by extension, the Bandon River SAC. On this basis, this site was screened out. Cork Harbour SPA does not intersect the WSZ, and is indirectly connected to the proposed works via the Bandon IE_SW_G_086 and the Western Celtic Seas (IE_SW_010_0000) coastal water body. Both of these water bodies show an undetectable increase (0.0000 mg/l) in potential orthophosphate due to dosing, therefore there will be no impact on the indicative quality of these water bodies which are good and unknown respectively, and by extension, the Cork Harbour SPA. On this basis, this site was excluded from further assessment.

The Clonakilty RWSS WSZ lies within the Skibbereen-Clonakilty IE_SW_G_085 groundwater body. This GWB is hydrogeologically connected to the following European Sites: Barley Cove to Ballyrisode Point SAC, Castletownshend SAC, Clonakilty Bay SPA, Courtmacsherry Estuary SAC, Kilkeran Lake and Castlefreke Dunes SAC, Lough Hyne Nature Reserve and Environs SAC, Myross Wood SAC, Roaringwater Bay and Islands SAC, Clonakilty Bay SPA, Courtmacsherry Bay SPA, Galley Head to Duneen Point SPA, Old Head of Kinsale SPA, Seven Heads SPA and Sheep's Head to Toe Head SPA (**Table 3, Appendix C**).

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 relatively big 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[6]. Both of these water bodies show an undetectable increase (0.0000 mg/l) in potential orthophosphate due to dosing, therefore there will be no impact on the indicative quality of these water bodies which are good, and by extension, the connected European Sites listed above.

On this basis, four 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. Courtmacsherry Estuary SAC, Courtmacsherry Bay SPA, Seven Heads SPA, Old Head of Kinsale SPA. Eight sites has been included for further assessment for the operational phase in Sections 5 and 6 below i.e. Kilkeran Lake and Castlefreke Dunes SAC, , Clonakilty Bay SAC, Courtmacsherry Estuary SAC, Courtmacsherry Bay SPA, Galley Head to Duneen Point SPA, Clonakilty Bay SPA, Seven Heads SPA and Old Head of Kinsale SPA.

[5] https://www.gsi.ie/en-ie/programmes-and-projects/groundwater/activities/understanding-ireland-groundwater/Pages/Groundwater-bodies.aspx
[6] https://jetstream.gsi.ie/iwdds/delivery/GSI_Transfer/Groundwater/GWB/BandonGWB.pdf

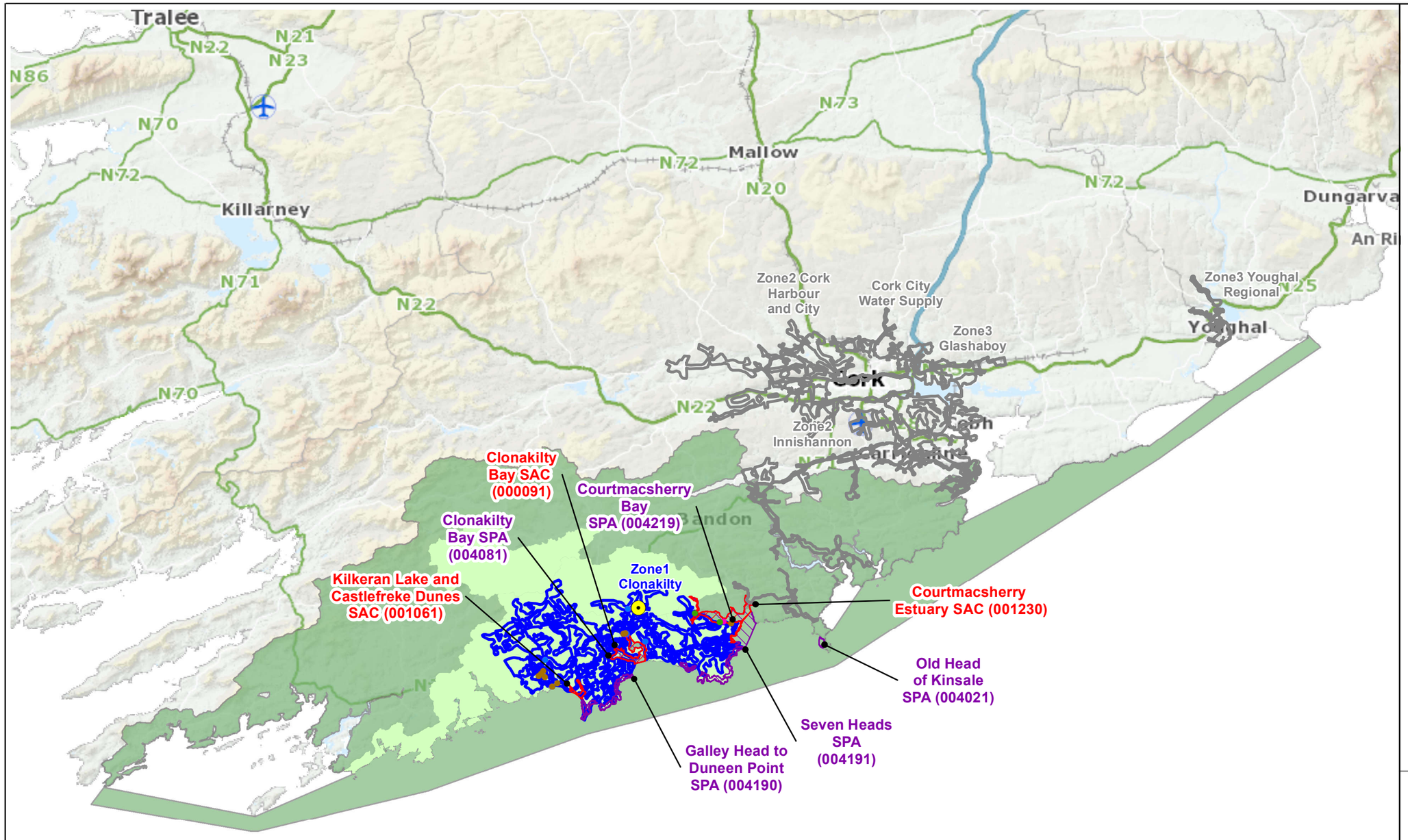
Table 4-3: European Sites Hydrologically or Hydrogeologically Connected to or Downstream of the WTP and WSZ

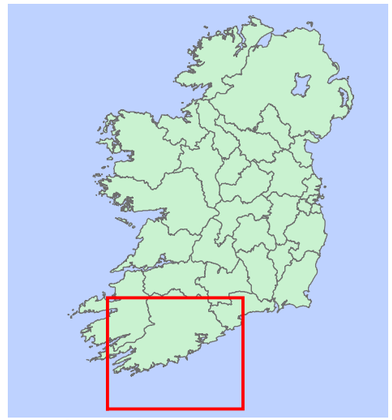
Site Name	Code	Conservation Objectives Establishment Date	Feature Code	Qualifying Interests	Water Dependent Species / Habitats	Nutrient Sensitive Species / Habitats	Potential Hydrological/ Hydrogeological Connectivity	Potential Source Pathway Receptor
Construction and Operation Phase								
Courtmacsherry Estuary SAC	SAC 001230	09th Jul 2014 Version 1	1130	Estuaries	Yes	Yes	Yes	Yes
			1140	Mudflats and sandflats not covered by seawater at low tide	Yes	Yes		
			1210	Annual vegetation of drift lines	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 maritime*)	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		
Courtmacsherry Bay SPA	SPA 004219	03rd Oct 2014 Version 1	A003	Great Northern Diver (*Gavia immer*)	Yes	Yes	Yes	Yes
			A048	Shelduck (*Tadorna tadorna*)	Yes	Yes		
			A050	Wigeon (*Anas penelope*)	Yes	Yes		
			A069	Red-breasted Merganser (*Mergus serrator*)	Yes	Yes		
			A140	Golden Plover (*Pluvialis apricaria*)	Yes	Yes		
			A142	Lapwing (*Vanellus vanellus*)	Yes	Yes		

Site Name	Code	Conservation Objectives Establishment Date	Feature Code	Qualifying Interests	Water Dependent Species / Habitats	Nutrient Sensitive Species / Habitats	Potential Hydrological/ Hydrogeological Connectivity	Potential Source Pathway Receptor
			A149	Dunlin (*Calidris alpina alpina*)	Yes	Yes		
			A156	Black-tailed Godwit (*Limosa limosa*)	Yes	Yes		
			A157	Bar-tailed Godwit (*Limosa lapponica*)	Yes	Yes		
			A160	Curlew (*Numenius arquata*)	Yes	Yes		
			A179	Black-headed Gull (*Chroicocephalus ridibundus*)	Yes	Yes		
			A182	Common Gull (*Larus canus*)	Yes	Yes		
			A999	Wetlands and Waterbirds	Yes	Yes		
Seven Heads SPA	SPA 004191	21st Feb 2018 Version 6	A346	Chough (*Pyrrhocorax pyrrhocorax*)	Yes	Yes	Yes	Yes
Old Head of Kinsale SPA	SPA 004021	21st Feb 2018 Version 6	A188	Kittiwake (*Rissa tridactyla*)	Yes	Yes	Yes	Yes
			A199	Guillemot (*Uria aalge*)	Yes	Yes		
Operation Phase Only								
Kilkeran Lake & Castlefreke Dunes SAC	SAC 001061	07th Dec 2016 Version 1	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		
Clonakilty Bay SAC	SAC 000091	27th May 2014 Version 1	1140	Mudflats and sandflats not covered by seawater at low tide	Yes	Yes	Yes	Yes
			1210	Annual vegetation of drift lines	Yes	Yes		
			2110	Embryonic shifting dunes	Yes	Yes		

Site Name	Code	Conservation Objectives Establishment Date	Feature Code	Qualifying Interests	Water Dependent Species / Habitats	Nutrient Sensitive Species / Habitats	Potential Hydrological/ Hydrogeological Connectivity	Potential Source Pathway Receptor
			2120	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)	Yes	Yes		
			2130	Fixed coastal dunes with herbaceous vegetation (grey dunes)*	Yes	Yes		
			2150	Decalcified dune heath*	Yes	Yes		
Galley Head to Duneen Point SPA	SPA 004190	21st Feb 2018 Version 6	A346	Chough (*Pyrrhocorax pyrrhocorax*)	Yes	Yes	Yes	Yes
Clonakilty Bay SPA	SPA 004081	17th Oct 2014 Version 1	A048	Shelduck (*Tadorna tadorna*)	Yes	Yes	Yes	Yes
			A149	Dunlin (*Calidris alpina alpina*)	Yes	Yes		
			A156	Black-tailed Godwit (*Limosa limosa*)	Yes	Yes		
			A160	Curlew (*Numenius arquata*)	Yes	Yes		
			A999	Wetlands and Waterbirds	Yes	Yes		

*Indicates a priority habitat under the habitats directive.
**While this habitat is determined to be non-water dependent, it is incuded in the assessment sections below in terms of flood risk.





Legend

LEMA Emission Type

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

Data Source:
Irish Water
NPWS (May 2023)
EPA

N

0 5 10 20 Kilometres

Client

Uisce Éireann
Irish Water

Project Lead Mitigation Plan
Corrective Water Treatment Works

Title

Zone 1 Clonakilty

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

RPS

Scale: 1:500,000 @ A3	**Date:** 13/06/2023
File Ref: MDW0766Arc0012bF02	**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 Clonakilty RWSS 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 Clonakilty RWSS 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 orthophosphate 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 Clonakilty RWSS WTP (Jones Bridge WTP).

5.3.1 Construction Phase

There are two possible locations for the orthophosphate dosing system both of which will be located 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 entire Clonakilty RWSS WTP into account and therefore included both possible locations. The assessment of impacts associated with the construction of the corrective water treatment works at Clonakilty 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 Clonakilty RWSS 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
Courtmacsherry Estuary SAC (001230)	Argideen_030 (IE_SW_20A020100)	RWB	The construction works will be located within the confines of the existing Clonakilty RWSS WTP. Clonakilty RWSS WTP is not located within or directly adjoins a European Site. **Surface water** There are no surface water bodies within the confines of Clonakilty RWSS WTP. However the footprint of the WTP adjoins the Argideen River (Argideen_030 IE_SH_27F010600 & Argideen_40 IE_SW_20A020200). The Argideen River flows east of the WTP site into Courtmacsherry Bay 7.2km downstream. Courtmacsherry Bay is designated as part of Courtmacsherry Bay SPA and Courtmacsherry Estuary SAC. Courtmacsherry Bay is situated within the Argideen Estuary transitional water body IE_SW_090_0200. Courtmacsherry Bay and the Argideen Estuary transitional water body adjoin the Courtmacsherry Bay coastal water body (IE_SW_090_0000) which supports Seven Heads SPA and the Old Head of Kinsale SPA >25km downstream the WTP. The proximity of the proposed construction works to the Argideen River results in the potential for remote connectivity to European Sites downstream of the Argideen River in Courtmacsherry Bay and its associated transitional and coastal water bodies.
	Argideen_040 (IE_SW_20A020200)	RWB	
	Argideen Est uary (IE_SW_090_0200)	TWB	
	Skibbereen / Clonakilty (IE_SW_G_085)	GWB	
Courtmacsherry Bay SPA (004219)	Argideen_30 (IE_SW_20A020100)	RWB	
	Argideen_40 (IE_SW_20A020200)	RWB	
	Argideen Estuary IE_SW_090_0200	TWB	
	Courtmacsherry Bay IE_SW_090_0000	CWB	
	Skibbereen / Clonakilty IE_SW_G_085	GWB	
Old Head of Kinsale SPA (004021)	Argideen_030 (IE_SW_20A020100)	RWB	
	Argideen_040 (IE_SW_20A020200)	RWB	
	Argideen Estuary IE_SW_090_0200	TWB	
	Courtmacsherry Bay IE_SW_090_0000	CWB	
	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
Seven Heads SPA (004191)	Argideen_30 (IE_SW_20A020100)	RWB	However, the proposed construction works are small scale in nature and will be undertaken within the confines of the existing built infrastructure associated with Clonakilty RWSS WTP. There will be no aspects of the proposed works that will result in the release of potential impacts sources identified in **Section** Error! Reference source not found.**.** 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 (7km to >25km downstream) there is no potential for likely significant effects upon Courtmacsherry Bay SPA, Courtmacsherry Estuary SAC, Old Head of Kinsale SPA and Seven Heads SPA 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].
	Argideen_040 (IE_SW_20A020200)	RWB	
	Argideen Estuary IE_SW_090_0200	TWB	
	Courtmacsherry Bay IE_SW_090_0000	CWB	
	Skibbereen / Clonakilty IE_SW_G_085	GWB	

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

Site Name (Code)	Contributing WB Code_Name	WB Type[7]	Evaluation of Potential Significant Effects
			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 screened in for further assessment, as a result of the construction of the corrective water treatment works at Clonakilty RWSS WTP.

5.3.2 Operational Phase

In the case of the additional orthophosphate load due to dosing at Clonakilty RWSS 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 the 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 inputting water bodies or pressures acting 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 the indicative quality 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.

[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.

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, if 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.

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)	Total Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Increase in Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
Kilkeran Lake and Castlefreke Dunes SAC (001061)	IE_SW_110_0000 Rosscarbery Bay	CWB	High (S) Far	0.005	0.019	*47.8*	*0.0000*	0.005	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
			High (W) Far	0.015	0.019			0.015	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20H070690 Haye's Cross Roads_010	RWB	*Moderate*	0.046	0.051	13.6	0.0005	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*	*2.8*	*0.0000*	*0.018*	No risk of deterioration in the Ortho P indicative quality or of preventing the

[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)	Total Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Increase in Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
									achievement of WFD objectives.
Clonakilty Bay SAC (000091)	IE_SW_100_0000 Clonakilty Bay	CWB Summer	High (S) None Far	0.003	0.019	39.2	0.0001	0.003	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
		CWB Winter	High (W) Downwards Near	0.020	0.019			0.020	The post dosing conc. exceeds the 75% upper indicative quality threshold; however this is due to the baseline ortho P conc. The modelled conc. is 0.0001mg/l therefore there is no risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_100_0100 Clonakilty Harbour	TWB Summer	High (S) Downwards Near	0.020	0.019	16.5	0.0000	0.020	The post dosing conc. exceeds the 75% upper indicative quality threshold; however this is due to the baseline ortho P conc. The modelled conc. is 0.0000mg/l therefore there is no risk of deterioration in the Ortho P indicative quality or of preventing the

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)	Total Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Increase in Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
									achievement of WFD objectives.
		TWB Winter	Good (W) Downwards Far	0.030	0.045			0.030	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_100_0200 Inchydoney	CWB	*Good*	*0.045*	*0.053*	*0.2*	*0.0009*	*0.046*	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_100_0300 White's Marsh	CWB	*Good*	*0.045*	*0.053*	*0.0*	*0.0001*	*0.045*	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_100_0400 Clogheen Strand	CWB	*Good*	*0.045*	*0.053*	*13.9*	*0.0019*	*0.047*	The modelled conc. exceeds the 5% High / Good orthophosphate indicative quality boundary, but the post-dosing conc. is less than the 75% indicative quality threshold. 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)	Total Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Increase in Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
	IE_SW_20C050300 Clonakilty Stream_010	RWB	*Moderate*	*0.046*	0.051	11.2	0.0004	0.046	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20C060300 Carhoo_010	RWB	*Good*	*0.030*	0.033	*13.9*	0.0004	0.031	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20N100620 North Ring Curraghgrane_010	RWB	*Moderate*	*0.046*	*0.051*	*5.1*	*0.0003*	*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*	*2.8*	*0.0000*	*0.018*	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
Courtmacsherry Estuary SAC (001230)	IE_SW_090_0000 Courtmacsherry Bay	CWB Summer	High (S) None Far	0.003	0.019	30.7	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 (W) Downwards Near	0.021	0.019			0.021	The post dosing conc. exceeds the 75% upper indicative quality threshold; however this is due to the baseline ortho P conc. The

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)	Total Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Increase in Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
									modelled conc. is 0.0000mg/l therefore there is no risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_090_0200 Argideen Estuary	TWB Summer	High (S) Upwards Far	0.016	0.019	22.0	0.0001	0.016	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
		TWB Winter	Good (W) Downwards Far	0.032	0.047			0.032	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20A020045 Argideen_010	RWB	High Upwards Far	0.015	0.019	6.8	0.0002	0.015	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20A020060 Argideen_020	RWB	Good Upwards Far	0.026	0.033	7.7	0.0001	0.026	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20A020100 Argideen_030	RWB	High Downwards Far	0.015	0.019	11.2	0.0001	0.016	No risk of deterioration in the Ortho P indicative quality or of preventing the

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)	Total Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Increase in Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
									achievement of WFD objectives.
	IE_SW_20A020200 Argideen_040	RWB	High Upwards Far	0.018	0.019	12.2	0.0001	0.018	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20B940880 Barreragh_010	RWB	*Good*	*0.030*	0.033	8.7	0.0003	0.030	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20E050970 East Cruary_010	RWB	*Good*	*0.030*	0.033	9.9	0.0004	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*	*2.8*	*0.0000*	*0.018*	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
Courtmacsherry Bay SPA (004219)	IE_SW_090_0000 Courtmacsherry Bay	CWB Summer	High (S) None Far	0.003	0.019	30.7	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 (W) Downwards Near	0.021	0.019			0.021	The post dosing conc. exceeds the 75%

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)	Total Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Increase in Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
									orthophosphate indicative quality threshold; however this is due to the baseline ortho P conc. The modelled conc. is undetectable, 0.000mg/l; therefore no risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_090_0200 Argideen Estuary	TWB Summer	High (S) Upwards Far	0.016	0.019	22.0	0.0001	0.016	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
		TWB Winter	Good (W) Downwards Far	0.032	0.047			0.032	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20A020045 Argideen_010	RWB	High Upwards Far	0.015	0.019	6.8	0.0002	0.015	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20A020060 Argideen_020	RWB	Good Upwards Far	0.026	0.033	7.7	0.0001	0.026	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)	Total Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Increase in Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
	IE_SW_20A020100 Argideen_030	RWB	High Downwards Far	0.015	0.019	11.2	0.0001	0.016	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_100_0000 Clonakilty Bay	CWB Summer	High (S) None Far	0.003	0.019	39.2	0.0001	0.003	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
		CWB Winter	High (W) Downwards Near	0.020	0.019			0.020	The post dosing conc. exceeds the 75% upper indicative quality threshold; however this is due to the baseline ortho P conc. The modelled conc. is 0.0001mg/l therefore there is no risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20B940880 Barreragh_010	RWB	*Good*	*0.030*	0.033	8.7	0.0003	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*	*2.8*	*0.0000*	*0.018*	No risk of deterioration in the Ortho P indicative quality or of preventing the

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)	Total Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Increase in Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
									achievement of WFD objectives.
Galley Head to Duneen Point SPA (004190)	IE_SW_010_0000 Western Celtic Sea (HAs 18;19;20)	CWB	*High*	*0.013*	*0.019*	*117.7*	*0.0000*	*0.013*	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_100_0000 Clonakilty Bay	CWB Summer	High (S) None Far	0.003	0.019	39.2	0.0001	0.003	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
		CWB Winter	High (W) Downwards Near	0.020	0.019			0.020	The post dosing conc. exceeds the 75% upper indicative quality threshold; however this is due to the baseline ortho P conc. The modelled conc. is 0.0001mg/l therefore there is 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 Summer	High (S) Far	0.005	0.019	*47.8*	*0.0000*	0.005	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)	Total Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Increase in Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
		CWB Winter	High (W) Far	0.015	0.019			0.015	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20H070690 Haye's Cross Roads_010	RWB	*Moderate*	*0.046*	0.051	13.6	0.0005	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*	*2.8*	*0.0000*	*0.018*	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
Clonakilty Bay SPA (004081)	IE_SW_100_0000 Clonakilty Bay	CWB Summer	High (S) None Far	0.003	0.019	39.2	0.0001	0.003	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
		CWB Winter	High (W) Downwards Near	0.020	0.019			0.020	The post dosing conc. exceeds the 75% upper indicative quality threshold; however this is due to the baseline ortho P conc. The modelled conc. is 0.0001mg/l therefore there is no risk of deterioration in the Ortho P indicative quality or of preventing the

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)	Total Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Increase in Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
									achievement of WFD objectives.
	IE_SW_100_0100 Clonakilty Harbour	TWB Summer	High (S) Downwards Near	0.020	0.019	16.5	0.0000	0.020	The post dosing conc. exceeds the 75% upper indicative quality threshold; however this is due to the baseline ortho P conc. The modelled conc. Is not detectable, 0.0000mg/l. therefore there is no risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
		TWB Winter	Good (W) Downwards Far	0.030	0.045			0.030	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_100_0200 Inchydoney	CWB	*Good*	*0.045*	*0.053*	*0.2*	*0.0009*	*0.046*	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_100_0300 White's Marsh	CWB	*Good*	*0.045*	*0.053*	*0.0*	*0.0001*	*0.045*	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)	Total Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Increase in Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
	IE_SW_100_0400 Clogheen Strand	CWB	*Good*	*0.045*	*0.053*	*13.9*	*0.0019*	*0.047*	The modelled conc. exceeds the 5% High / Good orthophosphate indicative quality boundary, but the post-dosing conc. is less than the 75% indicative quality threshold. No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20C050300 Clonakilty Stream_010	RWB	*Moderate*	*0.046*	0.051	11.2	0.0004	0.046	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20C060300 Carhoo_010	RWB	*Good*	*0.030*	0.033	13.9	0.0009	0.031	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20N100620 North Ring Curraghgrane_010	RWB	*Good*	*0.030*	0.033	5.1	0.0003	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*	*2.8*	*0.0000*	*0.018*	No risk of deterioration in the Ortho P indicative quality or of preventing the

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)	Total Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Increase in Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
									achievement of WFD objectives.
Seven Heads SPA (004191)	IE_SW_010_0000 Western Celtic Sea (HAs 18;19;20)	CWB	*High*	*0.013*	*0.019*	*117.7*	*0.0000*	*0.013*	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_090_0000 Courtmacsherry Bay	CWB Summer	High (S) None Far	0.003	0.019	30.7	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 (W) Downwards Near	0.021	0.019			0.021	The post dosing conc. exceeds the 75% orthophosphate indicative quality threshold; however this is due to the baseline ortho P conc. The modelled conc. is undetectable, 0.0000mg/l; therefore there is no risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_100_0000 Clonakilty Bay	CWB Summer	High (S) None Far	0.003	0.019	39.2	0.0001	0.003	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)	Total Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Increase in Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
		CWB Winter	High (W) Downwards Near	0.020	0.019			0.020	The post dosing conc. exceeds the 75% orthophosphate indicative quality threshold; however this is due to the baseline ortho P conc. The modelled conc. is 0.0001mg/l; therefore there is no risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_20B940880 Barreragh_010	RWB	*Good*	*0.030*	0.033	8.7	0.0003	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*	*2.8*	*0.0000*	*0.018*	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
Old Head of Kinsale SPA (004021)	IE_SW_090_0000 Courtmacsherry Bay	CWB Summer	High (S) None Far	0.003	0.019	30.7	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 (W) Downwards Near	0.021	0.019			0.021	The post dosing conc. exceeds the 75% orthophosphate indicative

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)	Total Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Increase in Conc.[15] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[16]	Evaluation
									quality threshold; however this is due to the baseline ortho P conc. The modelled conc. is undetectable, 0.0000mg/l; therefore 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*	*2.8*	*0.0000*	*0.018*	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.

‡ Load from WWTP / SWO following treatment added.
‡‡ Load to these coastal lagoons based on the areal loading from their imputing water bodies.
NB: Cumulative load assessment using 2014 baseline data has confirmed that the water bodies are not at Risk of failing WFD Objectives.

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 **Table 5-5)**.

Table 5-3: Vollenweider assessment of lakes within the WSZs

Site Name (Code)	ContributingWB Code_Name	WB Type	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/m^2/yr)	Est. Post Dosing Areal Loading Based on Vollenweider (mg/m^2/yr)	Lc – Critical Load (mg/m^2/yr)	Increase %
Kilkeran Lake and Castlefreke Dunes SAC (001061)	IE_SW_110_0100 Kilkeran Lake	TWB (Coastal lagoon)	*Moderate*	*0.041*	4.8	3008.90	3035.25	855	0.87%

[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.
[18] Distance to Threshold.
[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 (**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.

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 **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.

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)	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*
Clonakilty Primary Discharge	2 (TP)	Existing	643.4	0.245	0.196	0.334
		Post Dosing	643.4	0.245	0.196	0.334
Clonakilty SWOs (2 no.)	n/a	Existing	5.4	2.510	2.008	3.414
		Post Dosing	5.9	2.759	2.207	3.752
Rosscarbery	n/a	Existing	1456.8	1.546	1.237	2.102
		Post Dosing	1477.5	1.568	1.254	2.132
	n/a	Existing	123.6	2.318	1.854	3.152

Agglom. and Discharge Type	ELV 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*
Rosscarbery SWOs (6 no.)		Post Dosing	124.8	2.340	1.872	3.182

Table 5-5: Mass balance assessment based on 0.6 mg/l dosing using available background concentrations and mean flow information.

Agglom.	RWB Name / Code for Primary Discharge	Background Conc. (mg/l)[21]	Modelled conc. Existing (mg/l)	Modelled conc. Post Dosing (mg/l)	% Inc
Clonakilty	Clonakilty Harbour IE_SW_100_0100	0.0300	0.0307	0.0307	0.00
Rosscarbery	Rosscarbery Harbour IE_SW_110_0200	0.0770	0.1028	0.1031	0.36

Clonakilty Agglomeration

Clonakilty agglomeration discharges into Clonakilty Harbour (IE_SW_100_0100) which is hydrologically connected to the coastal and marine European Sites: Clonakilty Bay SAC, Clonakilty Bay SPA, Galley Head to Duneen Point SPA and Seven Heads SPA. Clonakilty receives tertiary treatment, i.e. chemical dosing for nutrient removal. Tertiary treatment is assumed to remove any additional load in the effluent due to orthophosphate dosing.

The plant was compliant with ELV for TP within the 2017 AER. The modelled concentrations for post dosing scenarios are compliant with total phosphorus ELVs set in WWDL. When mean flows are taken into account the increase in the receiving water is 0.00% in the receiving water (**Table 5-5**). Therefore, there is no risk of failing WFD objectives for IE_SW_100_0100 Clonakilty Harbour as a result of dosing at Clonakilty RWSS WTP (Jones Bridge WTP), and its hydrologically connected coastal and marine European Sites.

Rosscarbery Agglomeration

Rosscarbery agglomeration discharges into Rosscarbery Harbour (IE_SW_110_0200) transitional water body, which is upstream of Rosscarbery Bay 9 IE_SW_110_0000) which is hydrologically connected to Castletownshend SAC, Kilkeran Lake and Castlefreke Dunes SAC, Galley Head to Duneen Point SPA and Sheep's Head to Toe Head SPA. There are no phosphorus ELVs in the WWDL for Rosscarbery. Rosscarbery agglomeration only provides primary treatment (septic tank) with limited nutrient reduction. However, when mean flows are taken into account account the increase in the receiving water is negligible (0.36%) (**Table 5-5**). Therefore, there is no risk of failing WFD objectives for Rosscarbery Harbour (IE_SW_110_0200) as a result of dosing at Clonakilty RWSS WTP (Jones Bridge WTP), and its hydrologically connected European Sites.

[21] Annual mean from AER u/s monitoring point or assumed indicative quality for unassigned Rosscarbery Harbour.

5.3.4 Assessment of Potential 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 surface water bodies from sub-surface pathways (**Appendix C**). The increases in concentration of orthophosphate for all river water bodies in the ZoI are insignificant as they are less than 0.00125 mg/l (i.e. <5% of the High / Good orthophosphate indicative quality boundary).

The highest modelled load (13.9 kg/yr, **Table 4A, Appendix C**) via subsurface pathways is seen in the river water body IE_SW_20C060300 Carhoo_010 which results in a modelled 0.0009 mg/l additional increase in orthophosphate concentration post-dosing. However, it does not exceed 5% of the Good / High boundary (<0.00125 mg/l), therefore there will be no deterioration in the indicative quality of this river water body, which is currently moderate.

Modelled increases in concentration of orthophosphate in transitional and coastal water bodies are insignificant, except for Clogheen Strand (IE_SW_100_0400), where the increase is 0.0019 mg/l (this is a conservative estimate as no tidal flows are available in this water body). In all cases, the increase in concentration does not cause the existing or potential baseline (post loading) to exceed 75% of the upper threshold for orthophosphate indicative quality.

Therefore ,there will be no risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives within waterbodies hydrologically/ hydrogeologically connected surface water bodies due to orthophosphate dosing.

5.3.4.2 Groundwater Assessment

The groundwater bodies Skibbereen-Clonakilty (IE_SW_G_085) and Bandon (IE_SW_G_086) have modelled additional concentrations which are undetectable following dosing (0.0000 mg/l), as shown in **Table 3 of Appendix C**.

Therefore, there is no risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives within the hydrogeologically connected groundwater bodies due to orthophosphate dosing as indicated in **Table 3, Appendix C**.

5.3.5 Combined Assessment

Table 4A of Appendix C provides details of the combined orthophosphate inputs to river water bodies connected to the WSZ from direct discharges, DWWTSs and leakage loads. There are no river water bodies with predicted concentrations above 5% of the Good / High indicative quality boundary (0.00125 mg/l) following the assessment of combined loads. The baseline and potential baseline (post loading) concentrations for all river waterbodies do not exceed 75% of the upper orthophosphate indicative quality threshold (<0.00125mg/l). The dosing therefore poses no risk of deterioration in orthophosphate indicative quality of the river water bodies identified in **Table 5-2**, or of preventing their achievement of WFD objectives**.**

Clogheen Strand (IE_SW_100_0400) has a post-dosing concentration of 0.0019 mg/l (**Table 4B, Appendix C**) which exceeds 5% of the Good / High indicative quality boundary, however the water

body post-dosing is within 75% of the upper indicative quality threshold and therefore there is no risk of deterioration in indicative quality which is Moderate surrogate indicative quality[22]. The dosing therefore poses no risk of deterioration in the orthophosphate indicative quality of the coastal and transitional water bodies identified in **Table 5-2**, or of preventing their achievement of WFD objectives. The other transitional and coastal waterbodies all exhibit modelled concentration increases which do not exceeds 5% of the Good / High indicative quality boundary with the largest modelled increase being 0.0009mg/l for (IE_SW_110_0000) Inchydoney. (IE_SW_100_0100) Clonakilty Harbour in summer, (IE_SW_090_0000) Courtmacsherry Bay during winter and (IE_SW_100_0000) Clonakilty Bay during winter all exhibit post dosing concentrations which exceed the 75% of the upper indicative quality threshold. However, this is due to the baseline concentration of each waterbody. For Clonakilty Harbour and Courtmacsherry Bay, the modelled concentration increase is not detectable at 0.0000mg/l, whilst Clonakilty Bay had a modelled concentration increase of 0.0001mg/l. Therefore the dosing poses no risk of deterioration in orthophosphate indicative quality of the river water bodies identified in Table 5-2, or of preventing their achievement of WFD objectives.

Table 5 of Appendix C provides details of the combined orthophosphate inputs to a transitional water body (coastal lagoon), Kilkeran Lake (IE_SW_110_0100), from direct discharges, DWWTSs and leakage loads. Historically the water body has had eutrophication issues and the existing loading to the lake is already in excess of the areal loading threshold. Kilkeran Lake (IE_SW_110_0100) is at moderate indicative Total Phosphorus (TP) indicative quality; however, the ecological status is classified as poor and the macrophyte condition is bad. An assessment of the loading from surface and subsurface pathways suggests that there will be an insignificant impact as a result of the orthophosphate dosing as demonstrated in **Table 5 of Appendix C** with an increase of 0.87%, which will not result in any deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body. Therefore there will be no likely significant effect to the receiving water bodies as a result of dosing at Clonakilty RWSS WTP.

5.3.6 Assessment of cumulative impacts from other WSZs

The cumulative loads to the Lee, Cork Harbour and Youghal Catchment (HA19) and the Bandon-Ilen catchment (HA20) associated with the orthophosphate dosing have been assessed with the Zone 1 Clonakilty Regional WSZ. The common water bodies that are impacted by the WSZs supplied by these WTPs have been summarised in **Table 5-6** below

- 004 Lee Road WTP - Cork City Water Supply (0400PUB1001)
- 006 Inniscarra WTP - Zone 2 Cork City and Harbour (0500PUB3401)
- 026 Glashaboy WTP - Zone 3 Glashaboy (0500PUB3303)
- 030 Innisshannon WTP - Zone2 Innishannon (0500PUB3501)
- 059 Glendine WTP - Zone 3 Youghal Regional (0500PUB2510)

The baseline concentration for the following transitional water bodies; Lee (Cork) Estuary Lower (IE_SW_060_0900) in summer, Lee (Cork) Estuary Upper (IE_SW_060_0950) in winter Lee (Cork) and the following coastal waterbodies Courtmacsherry Bay (IE_SW_090_0000) in winter and Clonakilty Bay (IE_SW_100_0000) in winter exhibit baseline sample concentrations above 75% of the upper orthophosphate indicative quality

[22] Where existing monitoring data not available, a surrogate indicative quality is derived from ecological status of the WB or Ortho P / Ecological status of neighbouring WBS, the mid-range of that indicative quality is used as Baseline Concentration.

threshold. The modelled post dosing concentration is either undetectable (0.0000mg/l) for Courtmacsherry Bay, insignificant (0.0001mg/l) for Clonakilty Bay or insignificant for Lee (Cork) Estuary Lower (0.0002mg/l) and Lee (Cork) Estuary Upper (0.0003mg/l). All other water bodies listed exhibit modelled concentration increases of <5% of the Good / High indicative quality boundary (<0.00125mg/l) and baseline concentration values which do not exceed 75% of the upper orthophosphate indicative quality threshold.

The impact to the remaining receiving waters is also not significant as outlined in **Table 5, Appendix C** and **Table 5-6** below given that predicted increased in orthophosphate as a result of dosing are all <5% of the Good / High indicative quality boundary i.e. (<0.00125mg/l) and will not cause a deterioration in the orthophosphate indicative quality or prevent the achievement of the WFD objectives of the water bodies.

Table 5-6: Cumulative assessment of the increased loading and concentrations to transitional and coastal water bodies impacted by more than WSZ in the Lee, Cork Harbour and Youghal catchment and Bandon-Ilen catchment.

NAME / EU_CD	Period	Ortho P Indicative quality and Trends (distance to threshold) Surrogate quality indicated in *italic*	Baseline Year 2014 and Conc. Surrogate Conc given in *italic* mg/l	75% of Indicative quality threshold mg/l	Cumulative Ortho P load to SW from leakage, DWWTS & agglomerations kg/yr	Conc. using 30%ile flows mg/l	PO4 Potential Baseline Conc. following dosing mg/l	Note
IE_SW_090_0000 Courtmacsherry Bay	CWB Summer	High (S) None Far	0.003	0.019	46.1	0.0000	0.003	‡
	CWB Winter	High (W) Downwards Near	0.022	0.019		0.0000	0.021	‡
IE_SW_100_0000 Clonakilty Bay	CWB Summer	High (S) None Far	0.003	0.019	44.3	0.0001	0.003	
	CWB Winter	High (W) Downwards Near	0.020	0.019			0.020	
IE_SW_110_0000 Rosscarbery Bay	CWB Summer	High (S) Far	0.005	0.019	204.5	0.0000	0.005	
	CWB Winter	High (W) Far	0.015	0.019			0.015	
Lough Mahon IE_SW_060_0750	TWB Summer	High (S) Downwards Far	0.012	0.020	6489.1	0.0001	0.012	‡
	TWB Winter	Good (W) Downwards Far	0.032	0.045			0.032	‡
Lee (Cork) Estuary Lower IE_SW_060_0900	TWB Summer	High (S) Downwards Near	0.021	0.020	376.4	0.0002	0.021	‡

	TWB Winter	Good (W) Downwards Far	0.035	0.045			0.035	‡
Lee (Cork) Estuary Upper IE_SW_060_0950	TWB Summer	High (S) Downwards Far	0.013	0.019	376.4	0.0003	0.013	‡
	TWB Winter	High (W) Downwards Near	0.026	0.019			0.026	‡
Cork Harbour IE_SW_060_0000	CWB Summer	High (S) Downwards Far	0.006	0.019	8478.8	0.0000	0.006	‡
	CWB Winter	High (W) Downwards Near	0.024	0.019			0.024	‡
Outer Cork Harbour IE_SW_050_0000	CWB Summer	High (S) Downwards Far	0.003	0.019	8559.6	0.0000	0.003	‡
	CWB Winter	High (W) Downwards Far	0.016	0.019			0.016	‡
IE_SW_060_1200 Owenboy Estuary	CWB	*High*	*0.013*	*0.019*	*105.4*	0.0000	*0.013*	‡
IE_SW_010_0000 Western Celtic Sea (HAs 18;19;20)	CWB	*High*	*0.013*	*0.019*	*9694.9*	*0.0001*	*0.013*	‡

‡ Load from WWTP / SWO following treatment added

5.3.7 Conclusions

None of the river water bodies have a modelled increase in concentration above 5% of the Good / High indicative quality boundary (0.00125 mg/l) following dosing at Clonakilty RWSS WTP (Jones Bridge WTP).

None of the listed river waterbodies have an existing baseline concentration that exceeds 75% of the upper orthophosphate indicative quality boundary (**Table 4A, Appendix C**). Therefore, there will be no risk of deterioration in the orthophosphate indicative quality of the river water bodies or of preventing the achievement of their WFD objectives.

Clogheen Strand (IE_SW_100_0400) is a transitional waterbody that has a post-dosing concentration of 0.0019 mg/l which exceeds 5% of the Good / High indicative quality boundary. However the waterbody post-dosing concentration is within 75% of the upper indicative quality threshold and the dosing therefore poses no risk of deterioration in the orthophosphate indicative quality of the coastal and transitional water bodies identified in **Table 5-2**, or of preventing their achievement of WFD objectives.

The other transitional and coastal waterbodies all exhibit modelled concentration increases which do not exceed 5% of the Good / High indicative quality boundary with the largest modelled increase being 0.0009mg/l for Inchydoney (IE_SW_110_0000). Clonakilty Harbour (IE_SW_100_0100) in summer, Courtmacsherry Bay (IE_SW_090_0000) during winter and Clonakilty Bay (IE_SW_100_0000) during winter all exhibit post dosing concentrations which exceed 75% of the upper indicative quality threshold. However, this is due to the baseline concentration of each waterbody. For Clonakilty Harbour and Courtmacsherry Bay, the modelled concentration increase is not detectable at 0.0000mg/l, whilst Clonakilty Bay had a modelled concentration increase of 0.0001mg/l. Therefore,

the dosing poses no risk of deterioration in orthophosphate indicative quality of the river water bodies identified in Table 5-2, or of preventing their achievement of WFD objectives. All other transitional and coastal waterbodies exhibit baseline Ortho P concentrations that do not exceed 75% of the Ortho P upper indicative quality threshold.

The groundwater bodies, Skibbereen-Clonakilty (IE_SW_G_085) and Bandon (IE_SW_G_086) have modelled concentrations of 0.0000 mg/l, which are undetectable. Therefore there will be no risk of deterioration in the orthophosphate indicative quality of these ground water bodies or of preventing the achievement of their WFD objectives.

All remaining river, transitional and coastal water bodies are within the 5% of the Good / High indicative quality boundary threshold following dosing.

Assessment of Clonakilty RWSS WTP (Jones Bridge WTP) suggests minimal impact on the receiving water bodies due to orthophosphate dosing. The modelled loads and concentrations to both groundwater and surface water receptors are within thresholds established. Assessment of the coastal lagoon (Kilkeran Lake) has determined that it is already exceeding the critical P loading thresholds. It is noted that historically there have been issues with eutrophication in this water body; however, it is deemed that the impact of the orthophosphate levels resulting from the proposed dosing will result in an increase of 0.87%, which will not result in any deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

The cumulative assessment of dosing at Clonakilty RWSS 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 orthophosphate 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

Clonakilty RWSS WTP is not located within or directly adjacent to the boundary of any European Site. The WTP is adjacent to Argideen_030 (IE_SH_27F010600) and Argideen_040 (IE_SW_20A020200) river water bodies. The Argideen River flows east of the WTP site into Courtmacsherry Bay and is hydrologically connected to Courtmacsherry Estuary SAC, Courtmacsherry Bay SPA, Seven Heads SPA and Old Head of Kinsale SPA via Argideen Estuary (IE_SW_20A020200) and Courtmacsherry Bay (IE_SW_090_0000) coastal water body. The WTP is located approximately 7 km upstream of Courtmacsherry Bay SPA and the Courtmacsherry Estuary SAC and >25 km upstream of Seven Heads SPA and Old Head of Kinsale SPA. The proposed construction 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.

In addition, the WTP overlies the Skibbereen – Clonakilty (IE_SW_G_085) groundwater body. This is a large groundwater body and intersects the following 15 European Sites; Courtmacsherry Estuary SAC, Courtmacsherry Bay SPA, Seven Heads SPA, Old Head of Kinsale SPA, Clonakilty Bay SAC, Lough Hyne Nature Reserve and Environs SAC, Barley Cove to Ballyrisode Point SAC. Kilkeran Lake and Castlefreke Dunes SAC, Myross Wood SAC, Castletownshend SAC, Clonakilty Bay SPA, Galley Head to Duneen Point SPA Sheep's Head to Toe Head SPA, Roaringwater Bay and Islands SAC. Owing to the the distance and flow path direction potential source impact pathways have been ruled out for; Clonakilty Bay SAC, Lough Hyne Nature Reserve and Environs SAC, Barley Cove to Ballyrisode Point SAC. Kilkeran Lake and Castlefreke Dunes SAC, Myross Wood SAC, Castletownshend SAC, Clonakilty Bay SPA, Galley Head to Duneen Point SPA Sheep's Head to Toe Head SPA, Roaringwater Bay and Islands SAC. 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 Clonakilty RWSS WTP, individually or in combination with other plans or projects, will not to have a 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 and the potential to impact upon the qualifying interests (habitats and species) identified in **Table 4-2** 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 Kilkeran Lake and Castlefreke Dunes SAC 001061

6.2.1.1 [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[23]). There is a single coastal lagoon, Kilkeran Lake, listed for the SAC with a conservation assessment of '*Unfavourable-Bad*'. There is a channel approximately 400m 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 COs supporting document for coastal lagoons for the site (NPWS, 2016[24]) 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 0.1mg/L. target is based on Roden and Oliver (2013[25]). 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 Clonakilty RWSS WTP (Jones Bridge WTP):

- The river water body hydrologically connected to the site is Haye's Cross Roads_010 (IE_SW_20H070690).
- The groundwater body hydrogeologically connected to the site is Skibbereen-Clonakilty (IE_SW_G_085).

[23] NPWS 2016 Kilkeran Lake and Castlefreke Dunes SAC 001061 Conservation Objectives
[24] NPWS 2016 Kilkeran Lake and Castlefreke Dunes SAC (site code: 001061) Conservation Objectives Supporting Document - Coastal Lagoons
[25] 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.

- The transitional water body hydrologically connected to the SAC is Kilkeran Lake[26] (IE_SW_110_0100) and the coastal water body hydrologically connected to the site is Rosscarbery Bay (IE_SW_110_0000).

The EAM has assessed the potential for impact on water quality and nutrient conditions and has based this assessment on a conservative basis using all available riverine and tidal flows. Full details of the assessment are provided in **Appendix C**.

The transitional water body Kilkeran Lake (IE_SW_110_0100) forms the coastal lagoon habitat in Kilkeran Lake and Castlefreke Dunes SAC. Historically, the water body has eutrophication issues and the existing loading to the lake is already well in excess of the areal loading threshold. The ecological status of this lake is classified as Poor, but the macrophyte condition is assessed as Bad. The orthophosphate indicative quality is Moderate but it is possible that the orthophosphate is being assimilated into the biomass very quickly, with reference to the macrophyte status which is Bad. The increase in the areal loading as a result of dosing at Clonakilty RWSS WTP (Jones Bridge WTP) is very low (0.87%) and therefore the impact of the orthophosphate levels is considered to be insignificant and will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

The river waterbody, Haye's Cross Roads_010 (IE_SW_20H070690), has a modelled increase in concentration of 0.0005 mg/l. As the concentration 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 Moderate (surrogate), as identified in **Table 5-2**. The baseline concentration also does not exceed 75% of the Ortho P upper indicative quality threshold (<0.00125mg/l) and therefore will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

Rosscarbery Bay (IE_SW_110_0000), the coastal water body connected to the habitat via the 400 m long channel, has a post-dosing concentration of 0.0000 mg/l and therefore is not at risk of deterioration in the Good indicative quality (surrogate) of the water body as a result of dosing. The baseline concentration also does not exceed 75% of the Ortho P upper indicative quality threshold (<0.00125mg/l) and therefore will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

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 change to the Good indicative quality of the water body as a result of dosing. The baseline concentration also does not exceed 75% of the Ortho P upper indicative quality threshold (<0.00175mg/l) and therefore will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Clonakilty RWSS WTP (Jones Bridge 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.

[26] Kilkeran Lake is a coastal lagoon and for large parts of the year there is no water exchange with the adjacent waterbody due to a sand bar at the outlet preventing the exchange of water with the open sea, therefore it behaves more like a lake and has been assessed through the application of the Vollenweider equation in **Table 5-3.**

6.2.1.2 [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[23]). 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[23]) 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 Clonakilty RWSS WTP (Jones Bridge WTP):

- The river water body hydrologically connected to the site is Haye's Cross Roads_010 (IE_SW_20H070690).
- The groundwater body hydrogeologically connected to the site is Skibbereen-Clonakilty (IE_SW_G_085).
- The transitional water body hydrologically connected to the SAC is Kilkeran Lake (IE_SW_110_0100) and the coastal water body hydrologically connected to the site is Rosscarbery Bay (IE_SW_110_0000).

According to the CO supporting document for coastal habitats in Kilkeran Lake and Castlefreke Dunes SAC (NPWS, 2016[27]), 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[28]. 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[27]. 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).

[27] 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.
[28] 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 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 river water body Haye's Cross Roads_010 (IE_SW_20H070690), and the transitional water body Kilkeran Lake (IE_SW_110_0100), both of which ultimately discharge to the coastal water body Rosscarbery Bay (IE_SW_110_0000).

The EAM has assessed the potential for impact on water quality and nutrient conditions and has based this assessment on a conservative basis using all available riverine and tidal flows. Full details of the assessment are provided in **Appendix C**.

The transitional water body Kilkeran Lake (IE_SW_110_0100) forms the coastal lagoon habitat in Kilkeran Lake and Castlefreke Dunes SAC. Historically, the water body has eutrophication issues and the existing loading to the lake is already well in excess of the areal loading threshold. The ecological status of this lake is classified as Poor, but the macrophyte condition is assessed as Bad. The orthophosphate indicative quality is Moderate but it is possible that the orthophosphate is being assimilated into the biomass very quickly, with reference to the macrophyte status which is Bad. The increase in the areal loading as a result of dosing at Clonakilty RWSS WTP (Jones Bridge WTP) is very low (0.87%) and therefore the impact of the orthophosphate levels is considered to be insignificant and will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

The river waterbody, Haye's Cross Roads_010 (IE_SW_20H070690), has a modelled increase in concentration of 0.0005 mg/l. As the concentration 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 Moderate (surrogate), as identified in Table 5-2. The baseline concentration also does not exceed 75% of the Ortho P upper indicative quality threshold (<0.00125mg/l) and therefore will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

Rosscarbery Bay (IE_SW_110_0000), the coastal water body connected to the habitat via the 400 m long channel, has a post-dosing concentration of 0.0000 mg/l and therefore is not at risk of deterioration in the Good indicative quality (surrogate) of the water body as a result of dosing. The baseline concentration also does not exceed 75% of the Ortho P upper indicative quality threshold (<0.00125mg/l) and therefore will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

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 change to the Good indicative quality of the water body as a result of dosing. The baseline concentration also does not exceed 75% of the Ortho P upper indicative quality threshold (<0.00175mg/l) and therefore will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Clonakilty RWSS WTP (Jones Bridge 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.

6.2.2 Clonakilty Bay SAC 000091

6.2.2.1 [1140] Mudflats and sandflats not covered by seawater at low tide

The habitat area within this site is 313ha[29]. The habitat mudflats and sandflats not covered by seawater at low tide, spans almost the full extent of the SAC, (Clonakilty Harbour and Muckruss Strand) with the exception of the Cloheen Strand Intake. Although the habitat does not receive direct discharges from the proposed works, eight affected water bodies are hydrologically connected to the SAC. The attributes and targets that will maintain the favourable conservation condition of this habitat in the Clonakilty Bay 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[29]). The COs supporting document for Marine habitats (NPWS, 2014[30]) does require that proposed activities or operations that cause significant disturbance to the community 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 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Clonakilty Bay SAC and will receive inputs from the proposed orthophosphate dosing at Clonakilty RWSS WTP (Jones Bridge WTP):

- The river water bodies hydrologically connected to the site include: Clonakilty Stream_010 (IE_SW_20C050300), Carhoo_010 (IE_SW_20C060300) and North Ring Curraghgrane_010 (IE_SW_20N100620).
- The groundwater body hydrogeologically connected to the site is Skibbereen-Clonakilty (IE_SW_G_085).
- The transitional water body hydrologically connected to the SAC is Clonakilty Harbour (IE_SW_100_0100).
- The coastal water bodies hydrologically connected to the site include: Clonakilty Bay (IE_SW_100_0000), White's Marsh (IE_SW_100_0300), Inchydoney (IE_SW_100_0200) and Clogheen Strand (IE_SW_100_0400).

The habitat is found throughout the transitional water body Clonakilty Harbour (IE_SW_100_0100) and in the inner section of the coastal water body Clonakilty Bay (IE_SW_100_0000). It is located downstream of the river water bodies Clonakilty Stream_010 (IE_SW_20C050300), Carhoo_010 (IE_SW_20C060300) and North Ring Curraghgrane_010 (IE_SW_20N100620), and the coastal water bodies Clogheen Strand (IE_SW_100_0400), Inchydoney (IE_SW_100_0200) and White's Marsh (IE_SW_100_0300).

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

[29] NPWS 2014 Clonakilty Bay SAC 000091 Conservation Objectives
[30] NPWS 2014 Clonakilty Bay SAC (site code 000091) Conservation Objectives Supporting Document - Coastal Habitats

The modelled concentrations in the river water bodies hydrologically connected to the SAC have the following post-dosing concentrations: Clonakilty Stream_010 (IE_SW_20C050300) 0.0004 mg/l, Carhoo_010 (IE_SW_20C060300) 0.0009 mg/l and North Ring Curraghgrane_010 (IE_SW_20N100620) 0.0003 mg/l and therefore, as the concentrations do not exceed the 5% Good / High boundary, dosing does not pose a risk of deterioration in the indicative quality of the water bodies which are currently Moderateor Good , as identified in **Table 5-2**. The baseline concentrations also do not exceed 75% of the Ortho P upper indicative quality threshold (<0.00125mg/l) and therefore will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for these waterbodies.

The modelled post-dosing concentration in the transitional water body Clonakilty Harbour (IE_SW_100_0100) was 0.0000 mg/l; therefore there will be no risk of deterioration in the current indicative quality of the water body (High / Good) following dosing at Clonakilty RWSS WTP (Jones Bridge WTP). The baseline concentration exceeds the 75% Ortho P upper indicative quality threshold during summer. However as modelled concentration does not exceed the 5% Good / High boundary, dosing does not pose a risk of deterioration in the indicative quality of the waterbody.

The coastal water bodies that are hydrologically connected to the site include: Clonakilty Bay (IE_SW_100_0000), White's Marsh (IE_SW_100_0300), Inchydoney (IE_SW_100_0200) and Clogheen Strand (IE_SW_100_0400). Clonakilty Bay and White's Marsh had modelled increases in concentration of 0.0001 mg/l. Inchydoney had a modelled increase in concentration of 0.0009 mg/l while Clogheen Strand had a modelled increase in concentration of 0.0019 mg/l. The latter exceeds the 5% Good / High boundary threshold (0.00125 mg/l); however, the baseline concentration does not exceed 75% of the upper indicative quality threshold. The modelled increase in the Clogheen Strand is a conservative estimate as no tidal flows are available in this water body. The QI habitat is not located with Clogheen Strand and a causeway between this and Clonakilty Bay marks the boundary of this habitat. Clogheen Strand is connected to Clonakilty Bay via a tidal flap and the modelled post-dosing concentration within this water body is insignificant (0.0001 mg/l). Although, the baseline concentration at Clonakilty Bay exceed the 75% upper indicative quality threshold during winter due to the insignificant modelled increase there will be no risk of deterioration in the current indicative quality of any coastal water body following dosing at Clonakilty RWSS WTP (Jones Bridge WTP) which are all at High indicative quality with the exception of Clogheen Strand which is Moderate surrogate[31] or of the achievement of WFD objectives.

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 change to the Good indicative quality of the water body as a result of dosing. The baseline concentration also does not exceed 75% of the Ortho P upper indicative quality threshold (<0.00175mg/l) and therefore will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

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

[31] Where existing monitoring data not available, a surrogate indicative quality is derived from ecological status of the WB or Ortho P / Ecological status of neighbouring WBS, the mid-range of that indicative quality is used as Baseline Concentration.

6.2.2.2 [1210] Annual vegetation of drift lines, [2110] Embryonic shifting dunes, [2120] Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes), [2130] Fixed coastal dunes with herbaceous vegetation (grey dunes), [2150] Atlantic decalcified fixed dunes (*Calluno-Uliecetea*)

The overall objective for Annual vegetation of drift lines, Embryonic shifting dune, Shifting dunes along the shoreline and Atlantic decalcified fixed dunes (*Caulluno-Uliecetea*) is to maintain the favourable conservation condition of the habitats (NPWS, 2014[29]). 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 Clonakilty Bay 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, 2014[30]) does not outline any objectives in relation to water quality and nutrient requirements for the habitats. It does however, outline the following with regard to nutrient development on the dunes systems - decaying detritus in the tidal litter 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. The supporting document also 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 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Clonakilty Bay SAC and will receive inputs from the proposed orthophosphate dosing at Clonakilty RWSS WTP (Jones Bridge WTP):

- The river water bodies hydrologically connected to the site include: Clonakilty Stream_010 (IE_SW_20C050300), Carhoo_010 (IE_SW_20C060300) and North Ring Curraghgrane_010 (IE_SW_20N100620).
- The groundwater body hydrogeologically connected to the site is Skibbereen-Clonakilty (IE_SW_G_085).
- The transitional water body hydrologically connected to the SAC is Clonakilty Harbour (IE_SW_100_0100). The coastal water bodies hydrologically connected to the site include: Clonakilty Bay (IE_SW_100_0000), White's Marsh (IE_SW_100_0300), Inchydoney (IE_SW_100_0200) and Clogheen Strand (IE_SW_100_0400).

According to the CO supporting document for coastal habitats (NPWS, 2014[30]) in Clonakilty SAC, all dune habitats are found at the sub-site Inchydoney within the SAC. The total area of Annex I sand dune habitats at Inchydoney has increased due to accretion of 2110 Embryonic shifting dunes and 2120 Marram dunes (white dunes). 1210 Annual vegetation of drift lines were no longer present during the SDM[27].

The habitat area for 1210 Annual vegetation of drift lines is difficult to measure due to its dynamic nature. Based on data from the Coastal Monitoring Project (CMP)[28], the habitat represented approximately 0.25 ha of the site; however the habitat was not recorded as part of the Sand Dunes Monitoring Project (SDM). This was the result of natural succession and did not appear to be associated with human activity and reflects the dynamic nature of the habitat, which is found on beaches along the high tide mark where tidal litter (marine algae, marine fauna and seeds)

accumulates. The decaying detritus releases nutrients into what would otherwise be a nutrient-poor environment, resulting in the growth of annual species.

The habitat 2110 Embryonic shifting dunes were mapped to the south and east of the site in three distinct areas and were the most seaward habitat recorded during the SDM. The two largest areas of the habitat were separated by a small headland known as Virgin Mary's Point. The area of the habitat increased from 0.05ha during the CMP to 1.62 ha during the SDM as a result of accretion.

The habitat 2120 Marram dunes (white dunes) were mapped to the west, south and east of the site, in four distinct areas. The two largest areas are also separated by the headland (Virgin Mary's Point) as with Embryonic shifting dunes. The area if 2120 Marram dunes (white dunes) in the west of the site is the most seaward habitat, while the other three are fronted by 2110 Embryonic shifting dunes. The area of the habitat increased from 0.42 ha during the CMP to 0.78 ha during the SDM. Although maps suggest that the site occupied a greater area in the past, there is no clear link with human activity.

The habitat *2130 Fixed dunes (grey dunes) represent the most extensive habitat at Inchydoney, with the largest area found in the east of the site. The rare fungus *Tulostoma brumales* was found in this habitat and its presence should be treated as a feature of interest. The area of the habitat decreased slightly from 19.11 ha during the CMP to 19.06 ha during the SDM.

The habitat area for 2150 Decalcified dune heath is difficult to measure due to its dynamic nature. No area was mapped for this habitat by either the CMP or the SDM but it is potentially present as evidenced by the occurrence of European Gorse (*Ulex europaeus*).

The dune habitats surveyed as part of the Sand Dunes Monitoring Project[27] are located at the Inchydoney sub-site (small site located 3 km southeast of Clonakilty) and also includes a dune system to the west of Virgin Mary's Point that is largely outside the SAC. Clonakilty Stream_010 (IE_SW_20C050300), Inchydoney (IE_SW_100_0200) and North Ring Curraghgrane_010 (IE_SW_20N100620) enter Clonakilty Harbour (IE_SW_100_0100) from the northeast of the SAC and flow south past Virgin Mary's Point. Carhoo_010 (IE_SW_20C060300) enters Clogheen Strand (IE_SW_100_0400) which then joins Clonakilty Bay (IE_SW_100_0000) from the northwestern point of the SAC along with discharge from White's Marsh (IE_SW_100_0300), all flowing south to Virgin Mary's Point.

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

The modelled concentrations in the river water bodies hydrologically connected to the SAC have the following post-dosing concentrations: Clonakilty Stream_010 (IE_SW_20C050300) 0.0004 mg/l, Carhoo_010 (IE_SW_20C060300) 0.0009 mg/l and North Ring Curraghgrane_010 (IE_SW_20N100620) 0.0003 mg/l and therefore, as the concentrations do not exceed the 5% Good / High boundary, dosing does not pose a risk of deterioration in the indicative quality of the water bodies which are currently Moderateor Good , as identified in Table 5-2. The baseline concentrations also do not exceed 75% of the Ortho P upper indicative quality threshold (<0.00125mg/l) and therefore will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for these waterbodies.

The modelled post-dosing concentration in the transitional water body Clonakilty Harbour (IE_SW_100_0100) was 0.0000 mg/l; therefore there will be no risk of deterioration in the current indicative quality of the water body (High / Good) following dosing at Clonakilty RWSS WTP (Jones Bridge WTP). The baseline concentration exceeds the 75% Ortho P upper indicative quality threshold during summer. However as modelled concentration does not exceed the 5% Good / High boundary, dosing does not pose a risk of deterioration in the indicative quality of the waterbody.

The coastal water bodies that are hydrologically connected to the site include: Clonakilty Bay (IE_SW_100_0000), White's Marsh (IE_SW_100_0300), Inchydoney (IE_SW_100_0200) and Clogheen Strand (IE_SW_100_0400). Clonakilty Bay and White's Marsh had modelled increases in concentration of 0.0001 mg/l. Inchydoney had a modelled increase in concentration of 0.0009 mg/l while Clogheen Strand had a modelled increase in concentration of 0.0019 mg/l. The latter exceeds the 5% Good / High boundary threshold (0.00125 mg/l); however, the baseline concentration does not exceed 75% of the upper indicative quality threshold. The modelled increase in the Clogheen Strand is a conservative estimate as no tidal flows are available in this water body. The QI habitat is not located with Clogheen Strand and a causeway between this and Clonakilty Bay marks the boundary of this habitat. Clogheen Strand is connected to Clonakilty Bay via a tidal flap and the modelled post-dosing concentration within this water body is insignificant (0.0001 mg/l). Although, the baseline concentration at Clonakilty Bay exceed the 75% upper indicative quality threshold during winter due to the insignificant modelled increase there will be no risk of deterioration in the current indicative quality of any coastal water body following dosing at Clonakilty RWSS WTP (Jones Bridge WTP) which are all at High indicative quality with the exception of Clogheen Strand which is Moderate surrogate or of the achievement of WFD objectives.

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 change to the Good indicative quality of the water body as a result of dosing. The baseline concentration also does not exceed 75% of the Ortho P upper indicative quality threshold (<0.00175mg/l) and therefore will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Clonakilty RWSS WTP (Jones Bridge WTP), it has been demonstrated that the potential for likely significant effect on these dune habitats can be excluded. Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of the habitats.

6.2.3 Courtmacsherry Estuary SAC 001230

6.2.3.1 [1130] Estuaries

The attributes and targets that will maintain favourable conservation condition of this habitat do not make specific reference to water quality or nutrient conditions (NPWS, 2014[32]); however, there is a requirement to conserve community types in their natural conditions. The COs supporting document for Marine habitats[33] 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

[32] NPWS 2014 Courtmacsherry Estuary SAC 001230 Conservation Objectives
[33] NPWS (2014) Courtmacsherry Estuary SAC (site code: 1230) Conservation objectives supporting document - marine habitats Version 1.

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 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Courtmacsherry Estuary SAC and will receive inputs from the proposed orthophosphate dosing at Clonakilty RWSS WTP (Jones Bridge WTP):

- The river water bodies hydrologically connected to the site include: Argideen_010 (IE_SW_20A020045), Argideen_020 (IE_SW_20A020060); Argideen_030 (IE_SW_20A020100), Argideen_040 (IE_SW_20A020200), Barreragh_010 (IE_SW_20B940880) and East Cruary_010 (IE_SW_20E050970).
- The groundwater body hydrogeologically connected to the site is Skibbereen-Clonakilty (IE_SW_G_085).
- The transitional water body hydrologically connected to the SAC is the Argideen Estuary (IE_SW_090_0200).
- The coastal water body connected to the site is Courtmacsherry Bay (IE_SW_0 90_0000).

The extent of habitat area in this SAC is estimated as 490 ha, and uses Water Framework Transitional water body delineation to define extent. The habitat spans the majority of the SAC site. The habitat overlaps with one transitional water body located in the project ZoI, the Argideen Estuary (IE_SW_090_0200). The habitat encompasses the Annex I habitat of Mudflats and sandflats not covered by seawater at low tide. It does not receive direct discharges from the proposed works; however, six affected river water bodies are hydrologically connected to the habitat (IE_SW_20A020045 Argideen_010; IE_SW_20A020060 Argideen_020; IE_SW_20A020100 Argideen_030 IE_SW_20A020200 Argideen_040, IE_SW_20B940880 Barreragh_010 and IE_SW_20E050970 East Cruary_010).

The EAM has assessed the potential for impact on water quality and nutrient conditions and has based this assessment on a conservative basis using all available riverine and tidal flows. Full details of the assessment results are provided in **Appendix C** and discussed in **Table 5-2**.

The modelled concentrations in all six river water bodies hydrologically connected to the SAC are within 5% Good / High boundary: Argideen_010 (0.0002 mg/l), Argideen_020 (0.0001 mg/l), Argideen_030 (0.0001 mg/l), Argideen_040 (0.0001 mg/l), Barreragh_010 (0.0003 mg/l), East Cruary_010 (0.0004 mg/l) and therefore, dosing does not pose a risk of deterioration in the indicative quality of the water bodies. The baseline concentrations also do not exceed 75% of the Ortho P upper indicative quality threshold (<0.00125mg/l) and therefore the negligible and insignificant increases in concentrations modelled will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for these waterbodies.

Currently, Argideen_010, Argideen_030, Argideen_040 are at High indicative quality; Argideen_020, Barreragh_010 and East Cruary_010 are at Good indicative quality as identified in **Table 5-2**.

In the case of the transitional water body Argideen Estuary (IE_SW_090_0200), the post-dosing baseline concentration is 0.0001 mg/l which is negligible and does not exceed 5% of the Good / High indicative quality boundary (0.00125 mg/l) therefore there will be no risk of deterioration of the indicative quality to the water body as a result of dosing at Clonakilty RWSS WTP (Jones Bridge WTP). The baseline concentration also does not exceed 75% of the Ortho P upper indicative quality threshold (<0.00125mg/l) and therefore the negligible increases in concentrations modelled will not result in a

deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

There is no risk of deterioration in the orthophosphate indicative quality of the coastal water body Courtmacsherry Bay (IE_SW_090_0000) as a result of dosing with a predicted increase in concentration of 0.0000 mg/l, or risk to the achievement of WFD objectives. Although, the baseline concentration of this waterbody during winter exceeds the 75% upper indicative quality threshold, with the modelled increase being undetectable, there will not be any deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

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 in the current Good indicative quality of the water body as a result of dosing. The baseline concentration also does not exceed 75% of the Ortho P upper indicative quality threshold (<0.00175mg/l) and therefore the undetectable increase in concentrations modelled will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

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

6.2.3.2 [1140] Mudflats and sandflats not covered by seawater at low tide

The attributes and targets that will maintain the favourable conservation condition of this habitat in the Courtmacsherry Estuary SAC do not make specific reference to water quality or nutrient condition (NPWS, 2014[32]). There is however, a target for this habitat to conserve the community type of sandy mud to mixed sediment in its natural condition. The CO supporting document for Marine habitats states that proposed activities or operations that cause significant disturbance to the community 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 (NPWS, 2014[33]).

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Courtmacsherry Estuary SAC and will receive inputs from the proposed orthophosphate dosing at Clonakilty RWSS WTP (Jones Bridge WTP):

- The river water bodies hydrologically connected to the site include: Argideen_010 (IE_SW_20A020045), Argideen_020 (IE_SW_20A020060), Argideen_030 (IE_SW_20A020100), Argideen_040 (IE_SW_20A020200), Barreragh_010 (IE_SW_20B940880) and East Cruary_010 (IE_SW_20E050970).
- The groundwater body hydrogeologically connected to the site is Skibbereen-Clonakilty (IE_SW_G_085).
- The transitional water body hydrologically connected to the SAC is Argideen Estuary (IE_SW_090_0200).
- The coastal water body hydrologically connected to the site is Courtmacsherry Bay (IE_SW_090_0000).

The habitat area within this site is 442ha. The habitat spans a large proportion of the SAC, primarily in the Argideen Estuary (IE_SW_090_0200) but also in parts of Courtmacsherry Bay (IE_SW_090_0000). Although the habitat does not receive direct discharges from the proposed works, six affected river water bodies are hydrologically connected to the SAC.

The EAM has assessed the potential for impact on water quality and nutrient conditions and has based this assessment on a conservative basis using all available riverine and tidal flows. Full details of the The modelled concentrations in all six river water bodies hydrologically connected to the SAC are within 5% Good / High boundary: Argideen_010 (0.0002 mg/l), Argideen_020 (0.0001 mg/l), Argideen_030 (0.0001 mg/l), Argideen_040 (0.0001 mg/l), Barreragh_010 (0.0003 mg/l), East Cruary_010 (0.0004 mg/l) and therefore, dosing does not pose a risk of deterioration in the indicative quality of the water bodies. The baseline concentrations also do not exceed 75% of the Ortho P upper indicative quality threshold (<0.00125mg/l) and therefore the negligible and insignificant increases in concentrations modelled will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for these waterbodies.

Currently, Argideen_010, Argideen_030, Argideen_040 are at High indicative quality; Argideen_020, Barreragh_010 and East Cruary_010 are at Good indicative quality as identified in Table 5-2.

In the case of the transitional water body Argideen Estuary (IE_SW_090_0200), the post-dosing baseline concentration is 0.0001 mg/l which is negligible and does not exceed 5% of the Good / High indicative quality boundary (0.00125 mg/l) therefore there will be no risk of deterioration of the indicative quality to the water body as a result of dosing at Clonakilty RWSS WTP (Jones Bridge WTP). The baseline concentration also does not exceed 75% of the Ortho P upper indicative quality threshold (<0.00125mg/l) and therefore the negligible increases in concentrations modelled will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

There is no risk of deterioration in the orthophosphate indicative quality of the coastal water body Courtmacsherry Bay (IE_SW_090_0000) as a result of dosing with a predicted increase in concentration of 0.0000 mg/l, or risk to the achievement of WFD objectives. Although, the baseline concentration of this waterbody during winter exceeds the 75% upper indicative quality threshold, with the modelled increase being undetectable, there will not be any deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

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 in the current Good indicative quality of the water body as a result of dosing. The baseline concentration also does not exceed 75% of the Ortho P upper indicative quality threshold (<0.00175mg/l) and therefore the undetectable increase in concentrations modelled will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

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

6.2.3.3 [1310] Salicornia and other annuals colonising mud and sand; [1330] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*); [1410] Mediterranean salt meadows (*Juncetalia maritimae*)

There are no nutrient specific targets in the SSCOs for this habitat; there is a target to maintain the favourable conservation condition of the habitats and to maintain the range of coastal habitats. The conservation objectives supporting document on coastal habitats for Courtmacsherry Estuary SAC (NPWS, 2014[34]) was reviewed, and the objectives are based on an assessment of the recorded condition of the habitat under a range of attributes and targets (area, range, structure and function). While there are no nutrient specific targets set for this habitat, the location, character and dynamic behaviour of saltmarshes are governed by sediment supply, tidal regime, wind-wave climate and sea level change. A target has been set (under structure and function) to maintain the physical structure and flooding regime of the habitats. 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 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Courtmacsherry Estuary SAC and will receive inputs from the proposed orthophosphate dosing at Clonakilty RWSS WTP (Jones Bridge WTP):

- The river water bodies hydrologically connected to the site include: Argideen_010 (IE_SW_20A020045), Argideen_020 (IE_SW_20A020060), Argideen_030 (IE_SW_20A020100), Argideen_040 (IE_SW_20A020200), Barreragh_010 (IE_SW_20B940880) and East Cruary_010 (IE_SW_20E050970).
- The groundwater body hydrogeologically connected to the site is Skibbereen-Clonakilty (IE_SW_G_085).
- The transitional water body hydrologically connected to the SAC is Argideen Estuary (IE_SW_090_0200).
- The coastal water body hydrologically connected to the site is Courtmacsherry Bay (IE_SW_090_0000).

All three habitats are primarily located in Garranefeen Strand in Courtmacsherry Bay IE_SW_090_0000. There are areas of the SAC in Argideen Estuary IE_SW_090_0200 which have potential to contain the habitats but these sites are un-confirmed. For the habitat *Salicornia and other annuals colonising mud and sand* the SMP[35] has documented an estimated area of 1.18ha. Further unsurveyed areas may be present within the site.

The habitat Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) located in swathes throughout the site, has an estimated area of 32.38ha. Further unsurveyed areas may be present within the site.

The habitat Mediterranean salt meadows (*Juncetalia maritimae*) present in small pockets scattered throughout the site, has an estimated area of 6.84ha[35]. Further unsurveyed areas may be present within the site.

[34] NPWS 2014 Courtmacsherry Estuary SAC (site code 1230) Conservation Objective Supporting Document - Coastal Habitats
[35] https://www.npws.ie/sites/default/files/publications/pdf/McCorry_2007_Saltmarsh_survey.pdf

As the saltmarsh habitats may be present in unsurveyed areas throughout the SAC it is assumed, on a precautionary basis, that all water bodies identified in **Table 5-2** as hydrologically/ hydrogeologically connected to the site have the potential to impact the habitats.

The EAM has assessed the potential for impact on water quality and nutrient conditions and has based this assessment on a conservative basis using all available riverine and tidal flows. Full details of the assessment are provided in **Appendix C**.

The modelled concentrations in all six river water bodies hydrologically connected to the SAC are within 5% Good / High boundary: Argideen_010 (0.0002 mg/l), Argideen_020 (0.0001 mg/l), Argideen_030 (0.0001 mg/l), Argideen_040 (0.0001 mg/l), Barreragh_010 (0.0003 mg/l), East Cruary_010 (0.0004 mg/l) and therefore, dosing does not pose a risk of deterioration in the indicative quality of the water bodies. The baseline concentrations also do not exceed 75% of the Ortho P upper indicative quality threshold (<0.00125mg/l) and therefore the negligible and insignificant increases in concentrations modelled will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for these waterbodies.

Currently, Argideen_010, Argideen_030, Argideen_040 are at High indicative quality; Argideen_020, Barreragh_010 and East Cruary_010 are at Good indicative quality as identified in Table 5-2.

In the case of the transitional water body Argideen Estuary (IE_SW_090_0200), the post-dosing baseline concentration is 0.0001 mg/l which is negligible and does not exceed 5% of the Good / High indicative quality boundary (0.00125 mg/l) therefore there will be no risk of deterioration of the indicative quality to the water body as a result of dosing at Clonakilty RWSS WTP (Jones Bridge WTP). The baseline concentration also does not exceed 75% of the Ortho P upper indicative quality threshold (<0.00125mg/l) and therefore the negligible increases in concentrations modelled will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

There is no risk of deterioration in the orthophosphate indicative quality of the coastal water body Courtmacsherry Bay (IE_SW_090_0000) as a result of dosing with a predicted increase in concentration of 0.0000 mg/l, or risk to the achievement of WFD objectives. Although, the baseline concentration of this waterbody during winter exceeds the 75% upper indicative quality threshold, with the modelled increase being undetectable, there will not be any deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.
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 in the current Good indicative quality of the water body as a result of dosing. The baseline concentration also does not exceed 75% of the Ortho P upper indicative quality threshold (<0.00175mg/l) and therefore the undetectable increase in concentrations modelled will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

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

6.2.3.4 [1210] Annual vegetation of drift lines, [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 Annual vegetation of drift lines, Embryonic shifting dune, Shifting dunes along the shoreline and Fixed coastal dunes with herbaceous vegetation is to maintain the favourable conservation condition of the habitats. There are no nutrient specific targets for these habitats in the SSCOs for the Courtmacsherry Estuary SAC (NPWS, 2014[36]). 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, 2014[34]) does not outline any objectives in relation to water quality and nutrient requirements for the habitats. It does however, outline the following with regard to nutrient development on the dunes systems - decaying detritus in the tidal litter 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. The supporting document also 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 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Courtmacsherry Estuary SAC and will receive inputs from the proposed orthophosphate dosing at Clonakilty RWSS WTP (Jones Bridge WTP):

- The river water bodies hydrologically connected to the site include: Argideen_010 (IE_SW_20A020045), Argideen_020 (IE_SW_20A020060), Argideen_030 (IE_SW_20A020100), Argideen_040 (IE_SW_20A020200), Barreragh_010 (IE_SW_20B940880) and East Cruary_010 (IE_SW_20E050970).
- The groundwater body hydrogeologically connected to the site is Skibbereen-Clonakilty (IE_SW_G_085).
- The transitional water body hydrologically connected to the SAC is Argideen Estuary (IE_SW_090_0200).
- The coastal water body hydrologically connected to the site is Courtmacsherry Bay (IE_SW_090_0000).

According to the CO supporting document for coastal habitats (NPWS, 2014[34]) in Courtmacsherry Estuary SAC, all of the dune habitats are found at the sub-site Harbour View (Garranefeen Strand) within the SAC. The dominant habitat types in Courtmacsherry Estuary SAC are intertidal sand and mudflats, with estuarine channels. However, the site has been selected predominantly for the presence of fixed dunes and other Annex I sand dunes habitats, including Embryonic shifting dunes, Marram dunes (white dunes) and dune heath (which is found on Inchydoney Island).

The habitat area for 1210 Annual vegetation of drift lines is difficult to measure due to its dynamic nature. Based on data from the Coastal Monitoring Project (CMP)[37], the habitat represented approximately 0.14 ha of the site. This was confined to a small patch on the southern end of the site approximately 100 m in length which was on the seaward side of narrow bands of both mobile and embryonic dunes. The habitat is found on beaches along the high tide mark where tidal litter (marine

[36] NPWS 2014 Courtmacsherry Estuary SAC 001230 Conservation Objectives

algae, marine fauna and seeds) accumulates. The decaying detritus releases nutrients into what would otherwise be a nutrient-poor environment, resulting in the growth of annual species.

The habitat 2110 Embryonic shifting dunes is found in three locations within the SAC, and the Coastal Monitoring Project (CMP)[37] has documented an estimated area of 0.65 ha for the habitat. Further unsurveyed areas may be present within the site. The habitat consists of a narrow strip along the seaward edge of the dunes for most of the length of the strand.

The habitat Shifting dunes along the shoreline with *Ammophila arenaria* is found in two locations within the SAC and the CMP has documented an estimated area of 0.14ha for the habitat. Further unsurveyed areas may be present within the site. As with the Embryonic shifting dunes, this habitat consists of a narrow strip along most of the length of the strand, along the seaward side of the fixed dunes.

The habitat *2130 Fixed coastal dunes with herbaceous vegetation is found in in one relatively large area within the SAC, with both embryonic dunes and shifting dunes along the shoreline with *Ammophila arena* along the periphery. The CMP has documented an estimated area of 4.31ha for the habitat. Further unsurveyed areas may be present within the site. On the western side, the dunes form transitional habitat with the adjacent saltmarsh.

All of the dune habitats are present in Garranefeen Strand within Courtmacsherry Bay (IE_SW_090_0000), which is approximately 12 km southwest of Bandon and 3 km southwest of Kilbrittain, and is in the northernmost projection of Courtmacsherry Estuary. The sand dune system, which contains a significant area of the priority fixed dune habitat, and a number of other Annex I sand dune habitats, developed on a spit formed across the mouth of the Kilbrittain River where it enters the sea at Coolmain Bay. This is located downstream of the river water bodies Argideen_010 (IE_SW_20A020045), Argideen_020 (IE_SW_20A020060); Argideen_030 (IE_SW_20A020100), Argideen_040 (IE_SW_20A020200), Barreragh_010 (IE_SW_20B940880) and East Cruary_010 (IE_SW_20E050970) which discharge into the transitional water body Argideen Estuary (IE_SW_090_0200), entering from the northwestern projection of the Courtmacsherry Estuary SAC.

The EAM has assessed the potential for impact on water quality and nutrient conditions and has based this assessment on a conservative basis using all available riverine and tidal flows. Full details of the assessment are provided in **Appendix C**.

The modelled concentrations in all six river water bodies hydrologically connected to the SAC are within 5% Good / High boundary: Argideen_010 (0.0002 mg/l), Argideen_020 (0.0001 mg/l), Argideen_030 (0.0001 mg/l), Argideen_040 (0.0001 mg/l), Barreragh_010 (0.0003 mg/l), East Cruary_010 (0.0004 mg/l) and therefore, dosing does not pose a risk of deterioration in the indicative quality of the water bodies. The baseline concentrations also do not exceed 75% of the Ortho P upper indicative quality threshold (<0.00125mg/l) and therefore the negligible and insignificant increases in concentrations modelled will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for these waterbodies.

[37] 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.

Currently, Argideen_010, Argideen_030, Argideen_040 are at High indicative quality; Argideen_020, Barreragh_010 and East Cruary_010 are at Good indicative quality as identified in **Table 5-2**.

In the case of the transitional water body Argideen Estuary (IE_SW_090_0200), the post-dosing baseline concentration is 0.0001 mg/l which is negligible and does not exceed 5% of the Good / High indicative quality boundary (0.00125 mg/l) therefore there will be no risk of deterioration of the indicative quality to the water body as a result of dosing at Clonakilty RWSS WTP (Jones Bridge WTP). The baseline concentration also does not exceed 75% of the Ortho P upper indicative quality threshold (<0.00125mg/l) and therefore the negligible increases in concentrations modelled will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

There is no risk of deterioration in the orthophosphate indicative quality of the coastal water body Courtmacsherry Bay (IE_SW_090_0000) as a result of dosing with a predicted increase in concentration of 0.0000 mg/l, or risk to the achievement of WFD objectives. Although, the baseline concentration of this waterbody during winter exceeds the 75% upper indicative quality threshold, with the modelled increase being undetectable, there will not be any deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

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 in the current Good indicative quality of the water body as a result of dosing. The baseline concentration also does not exceed 75% of the Ortho P upper indicative quality threshold (<0.00175mg/l) and therefore the undetectable increase in concentrations modelled will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

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

6.2.4 Courtmacsherry Bay SPA 004219

The Courtmacsherry Bay SPA is located approximately 12km south of Bandon and immediately east of the village of Timoleague in west Co. Cork. The site, which is largely estuarine in nature, consists of the drowned valley of the Argideen River which is now filled with sediments, resulting in extensive mudflats and areas of saltmarsh. The estuary of the Kilbrittain River in the north-east of the site holds an area of well-developed saltmarsh. The seaward boundary for the site stretches from Coolmain Point to Barry Point, and includes Coolmain Bay and Broadstrand Bay (NPWS, 2010[38]).

The site is a SPA under the E.U. Birds Directive, of special conservation interest for the following species: Great Northern Diver, Shelduck, Wigeon, Red-breasted Merganser, Golden Plover, Lapwing, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Black-headed Gull and Common Gull. The E.U. Birds Directive pays particular attention to wetlands, and as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds[39].

[38] NPWS 2010 Courtmacsherry Bay SPA 004219 Site Synopsis
[39] NPWS 2014 Courtmacsherry Bay SPA 004219 Conservation Objectives

According to the CO supporting document for Courtmacsherry SPA (NPWS, 2014[39]) the pressures upon the system are listed as point source pollutants (WWTP), combined sewer overflows and treatment plant overflows. One of the major pressures upon water quality of Courtmacsherry Estuary is inadequate waste water treatment. A new sewerage scheme has been proposed for Timoleague and Courtmacsherry. The proposed route of the sewerage scheme will follow the R601 road linking Timoleague and Courtmacsherry. The sewerage system of Timoleague will be upgraded and a pumping station built in the village. This will link to sewerage pipes installed along the roadway to Courtmacsherry, where a WWTP will be installed. Currently, untreated waste is released from four point sources in Timoleague and waste is discharged from a septic tank overflow in Courtmacsherry on the receding tide.

Improvements in WWTP treatment are aimed at meeting objectives of the Urban Waste Water Treatment Regulations and the Water Framework Directive (2000/20/EC as transposed by the European Communities (Water Policy) (Amendment) Regulations, 2010)). However, a reduction in organic and nutrient loading to an estuary may have various consequences for the ecology of the estuarine system. For example, there could be a reduction in the abundance of benthic invertebrate prey species particularly those invertebrates that thrive (proliferate) in organically-enriched sediments. This could therefore have subsequent knock-on effects upon waterbird foraging distribution, prey intake rates, and ultimately upon survival and fitness.

Given that sustained high levels of macroalgal growth is linked to organic enrichment, there is a potential for a reduction in macroalgal abundance as a result of improvements to sewage discharges (also refer to previous section). While exerting many influences upon the estuarine system, algal mats can have both negative and positive effects upon waterbird foraging ecology. Some waterbird species avoid them or may be negatively affected by lowered invertebrate abundances beneath them while on the other hand, herbivores such as Light-bellied Brent Geese and Wigeon benefit from the algae being a source of food. Although such factors are complex and may operate over the long-term, it is advised that they be considered in future assessments of waterbird distribution patterns at this site (NPWS, 2014).

Of the 12 SCIs in Courtmacsherry SPA, all are considered nutrient sensitive (see **Appendix B**). The SSCOs for Courtmacsherry Bay SPA (NPWS, 2014[39]) list targets for each species, specifically:

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

There is also a target for the wetland habitat that supports the SPA in which the permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 1,299 hectares, other than that occurring from natural patterns of variation.

It is noted that this SPA overlaps with Courtmacsherry Estuary SAC (001230) and adjoins Seven Heads SPA (004191). The COs for this site should be used in conjunction with those for overlapping and adjacent sites as appropriate.

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[40]) 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 Courtmacsherry Estuary SPA and will receive inputs from the proposed orthophosphate dosing at Clonakilty RWSS WTP (Jones Bridge WTP):

- River water bodies within the WSZ which are hydrologically connected to this site are: Argideen_010 (IE_SW_20A020045), Argideen_020 (IE_SW_20A020060), Argideen_030 (IE_SW_20A020100), Argideen_040 (IE_SW_20A020200), Barreragh_010 (IE_SW_20B940880) and East Cruary_010 (IE_SW_20E050970).
- There is one transitional water body connected to the site, the Argideen Estuary (IE_SW_090_0200).
- One groundwater body is hydrogeologically connected to the site, Skibbereen-Clonakilty (IE_SW_G_085).
- One coastal water body is connected to the site, Courtmacsherry Bay (IE_SW_090_0000).

The EAM has assessed the potential for impact on water quality and nutrient conditions and has based this assessment on a conservative basis using all available riverine and tidal flows. Full details of the assessment are provided in **Appendix C**.

The modelled concentrations in all six river water bodies hydrologically connected to the SAC are within 5% Good / High boundary: Argideen_010 (0.0002 mg/l), Argideen_020 (0.0001 mg/l), Argideen_030 (0.0001 mg/l), Argideen_040 (0.0001 mg/l), Barreragh_010 (0.0003 mg/l), East Cruary_010 (0.0004 mg/l) and therefore, dosing does not pose a risk of deterioration in the indicative quality of the water bodies. The baseline concentrations also do not exceed 75% of the Ortho P upper indicative quality threshold (<0.00125mg/l) and therefore the negligible and insignificant increases in concentrations modelled will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for these waterbodies.

Currently, Argideen_010, Argideen_030, Argideen_040 are at High indicative quality; Argideen_020, Barreragh_010 and East Cruary_010 are at Good indicative quality as identified in **Table 5-2**.

In the case of the transitional water body Argideen Estuary (IE_SW_090_0200), the post-dosing baseline concentration is 0.0001 mg/l which is negligible and does not exceed 5% of the Good / High indicative quality boundary (0.00125 mg/l) therefore there will be no risk of deterioration of the indicative quality to the water body as a result of dosing at Clonakilty RWSS WTP (Jones Bridge WTP). The baseline concentration also does not exceed 75% of the Ortho P upper indicative quality threshold (<0.00125mg/l) and therefore the negligible increases in concentrations modelled will not result in a

[40] 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

deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

There is no risk of deterioration in the orthophosphate indicative quality of the coastal water body Courtmacsherry Bay (IE_SW_090_0000) as a result of dosing with a predicted increase in concentration of 0.0000 mg/l, or risk to the achievement of WFD objectives. Although, the baseline concentration of this waterbody during winter exceeds the 75% upper indicative quality threshold, with the modelled increase being undetectable, there will not be any deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

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 in the current Good indicative quality of the water body as a result of dosing. The baseline concentration also does not exceed 75% of the Ortho P upper indicative quality threshold (<0.00175mg/l) and therefore the undetectable increase in concentrations modelled will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

In light of the EAM assessment which has determined that there is no risk of deterioration in the orthophosphate indicative quality of the water bodies that support the structure and function of the SPA, or of preventing their 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; either in terms of individual bird species or wetland habitats.

6.2.5 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[41]).

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[42]).

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[40]) the risk assessment carried out by the EPA for these water dependent European Site protected areas has

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

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 Clonakilty RWSS WTP (Jones Bridge WTP):

- There is one river water body within the WSZ which is hydrologically connected to this site, Haye's Cross Roads_010 (IE_SW_20H070690).
- One groundwater body is hydrogeologically connected to the site, Skibbereen-Clonakilty (IE_SW_G_085).
- The coastal water bodies connected to the site include: Western Celtic Sea (HAs 18; 19; 20) (IE_SW_010_0000), Clonakilty Bay (IE_SW_100_0000) and Rosscarbery Bay (IE_SW_110_0000).

The EAM has assessed the potential for impact on water quality and nutrient conditions and has based this assessment on a conservative basis using all available riverine and tidal flow data. Full details of the assessment are provided in **Appendix C**.

The modelled post-dosing concentration in the river water body hydrologically connected to the SAC, Haye's Cross Roads (IE_SW_20H070690), is 0.0005 mg/l and therefore, as the concentration does not exceed the 5% Good / High boundary, dosing does not pose a risk of deterioration in the indicative quality of the water body which is currently at Moderate (surrogate), as identified in **Table 5-2**. The baseline concentration also does not exceed 75% of the Ortho P upper indicative quality threshold (<0.00125mg/l) and therefore will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

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 concentration of 0.0000 mg/l while Clonakilty Bay (IE_SW_100_0000) had a post-dosing concentration of 0.0001 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 of the coastal water bodies which is currently at High in Clonakilty Bay (IE_SW_100_0000), the Western Celtic Sea (IE_SW_010_0000), and in Rosscarbery Bay (IE_SW_110_0000). The baseline concentration for Clonakilty Bay exceeds the 75% upper indicative quality threshold during winter. However, with a negligible modelled increase in concentration, there will be no deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

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 in the indicative quality of the water body which is currently at Good, as a result of dosing. The baseline concentration also does not exceed 75% of the Ortho P upper indicative quality threshold (<0.00175mg/l) and therefore will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

In light of the EAM assessment which has determined that there is no risk of deterioration in the orthophosphate indicative quality of the water bodies that support the structure and function of the SPA, or of preventing their 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 SCI.

6.2.6 Clonakilty Bay SPA 004081

The Clonakilty Bay SPA, which is located in west Co. Cork, is a wetland complex that stretches from the town of Clonakilty to the open sea. It comprises two small estuarine bays, Clonakilty Harbour and Muckruss Strand, separated by Inchydoney Island and its empoldered isthmus. Several small rivers flow into the site, notably the Fealge River (Clonakilty Stream_010). At low tide, substantial areas of sand and mud flats are exposed. The construction of a causeway across the inner part of Muckruss Strand created an extensive wetland complex known as Cloheen Strand Intake (NPWS, 2014[43]).

The site is a SPA under the E.U. Birds Directive, of special conservation interest for the following species: Shelduck, Dunlin, Black-tailed Godwit and Curlew. The E.U. Birds Directive pays particular attention to wetlands, and as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds[44]. All species and the wetland are considered to be both water dependent and nutrient sensitive (see **Appendix B**). The Clonakilty Bay SPA is of high ornithological importance, particularly for its internationally important population of Black-tailed Godwit. In addition, there are three species with populations of national importance. The presence of the E.U. Birds Directive Annex I species, Golden Plover, Bar-tailed Godwit, Little Egret and Short-eared Owl is of note.

The SSCOs for the SPA (NPWS, 2014[44]) outline the attributes and targets of population trend and distribution for each SCI as follows:

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

There is also a target for the wetland habitat that supports the SPA in which the permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 508 hectares, other than that occurring from natural patterns of variation.

It is noted that this SPA overlaps with Clonakilty Bay SAC (000091). The COs for this site should be used in conjunction with those for overlapping and adjacent sites as appropriate.

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[40]) 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

[43] NPWS 2014 Clonakilty Bay SPA 004081 Site Synopsis
[44] NPWS 2014 Clonakilty Bay SPA 004081 Conservation Objectives

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 Clonakilty Bay SPA and will receive inputs from the proposed orthophosphate dosing at Clonakilty RWSS WTP (Jones Bridge WTP):

- River water bodies within the WSZ which are hydrologically connected to this site are: Clonakilty Stream_010 (IE_SW_20C050300), Carhoo_010 (IE_SW_20C060300) and North Ring Curraghgrane_010 (IE_SW_20N100620).
- There is one transitional water body connected to the site, Clonakilty Harbour (IE_SW_100_0100).
- One groundwater body is hydrogeologically connected to the site, Skibbereen-Clonakilty (IE_SW_G_085).
- The coastal water bodies hydrologically connected to the site include: Clonakilty Bay (IE_SW_100_0000), White's Marsh (IE_SW_100_0300), Inchydoney (IE_SW_100_0200) and Clogheen Strand (IE_SW_100_0400).

The EAM has assessed the potential for impact on water quality and nutrient conditions and has based this assessment on a conservative basis using all available riverine and tidal flow data. Full details of the assessment are provided in **Appendix C**.

The modelled concentrations in the river water bodies hydrologically connected to the SAC have the following post-dosing concentrations: Clonakilty Stream_010 (IE_SW_20C050300) 0.0004 mg/l, Carhoo_010 (IE_SW_20C060300) 0.0009 mg/l and North Ring Curraghgrane_010 (IE_SW_20N100620) 0.0003 mg/l and therefore, as the concentrations do not exceed the 5% Good / High boundary, dosing does not pose a risk of deterioration in the indicative quality of the water bodies which are currently Moderateor Good , as identified in Table 5-2. The baseline concentrations also do not exceed 75% of the Ortho P upper indicative quality threshold (<0.00125mg/l) and therefore will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for these waterbodies.

The modelled post-dosing concentration in the transitional water body Clonakilty Harbour (IE_SW_100_0100) was undetectable (0.0000 mg/l); therefore there will be no risk of deterioration in the current indicative quality of the water body (High / Good) following dosing at Clonakilty RWSS WTP (Jones Bridge WTP). The baseline concentration exceeds the 75% Ortho P upper indicative quality threshold during summer. However as modelled concentration does not exceed the 5% Good / High boundary, dosing does not pose a risk of deterioration in the indicative quality of the waterbody.

The coastal water bodies that are hydrologically connected to the site include: Clonakilty Bay (IE_SW_100_0000), White's Marsh (IE_SW_100_0300), Inchydoney (IE_SW_100_0200) and Clogheen Strand (IE_SW_100_0400). Clonakilty Bay and White's Marsh had modelled increases in concentration of 0.0001 mg/l. Inchydoney had a modelled increase in concentration of 0.0009 mg/l while Clogheen Strand had a modelled increase in concentration of 0.0019 mg/l. The latter exceeds the 5% Good / High boundary threshold (0.00125 mg/l); however, the baseline concentration does not exceed 75% of the upper indicative quality threshold. The modelled increase in the Clogheen Strand is a conservative estimate as no tidal flows are available in this water body. The QI habitat is not located with Clogheen Strand and a causeway between this and Clonakilty Bay marks the boundary of this habitat. Clogheen Strand is connected to Clonakilty Bay via a tidal flap and the modelled post-dosing

concentration within this water body is insignificant (0.0001 mg/l). Although, the baseline concentration at Clonakilty Bay exceed the 75% upper indicative quality threshold during winter due to the insignificant modelled increase there will be no risk of deterioration in the current indicative quality of any coastal water body following dosing at Clonakilty RWSS WTP (Jones Bridge WTP) which are all at High indicative quality with the exception of Clogheen Strand which is Moderate surrogate or of the achievement of WFD objectives.

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 change to the Good indicative quality of the water body as a result of dosing. The baseline concentration also does not exceed 75% of the Ortho P upper indicative quality threshold (<0.00175mg/l) and therefore will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

In light of the EAM assessment which has determined that there is no risk of deterioration in the orthophosphate indicative quality of the water bodies that support the structure and function of the SPA, or of preventing their 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; either in terms of individual bird species or wetland habitats.

6.2.7 Seven Heads SPA 004191

The Seven Heads SPA is situated to the south-west of the town of Courtmacsherry, Co. Cork. It encompasses the sea cliffs of the Seven Heads peninsula north-east to Barry's Point and also the cliffs of Dunworly Bay and Barry's Cove. The site includes the sea cliffs, which rise to over 50m, notably south of Barry's Point, 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; similar rocks of Carboniferous age also occur at the eastern and western ends of the site (NPWS, 2015[45]).

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 an internationally important population of breeding Chough, a Red Data Book species that is listed on Annex I of the E.U. Birds Directive. A survey in 2002 recorded a number of breeding seabirds at the site, including: Fulmar, Herring Gull, Great Black-backed Gull and Cormorant. The site is also used by Peregrine which is an Annex I species of particular significance.

There are no SSCOs for the site (NPWS, 2018[46]); however, there is an overall objective to maintain or restore the favourable conservation condition of the bird species listed as SCIs for the SPA. It is noted also that this SPA adjoins Courtmacsherry Bay SAC (004219) and that the COs for this site should be used in conjunction with those for overlapping and adjacent sites as appropriate.

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[40]) 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

[45] NPWS 2015 Seven Heads SPA 004191 Site Synopsis
[46] NPWS 2018 Seven Heads SPA 004191 Conservation Objectives

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 Seven Heads SPA and will receive inputs from the proposed orthophosphate dosing at Clonakilty RWSS WTP (Jones Bridge WTP):

- There is one river water body within the WSZ which is hydrologically connected to this site, Barreragh_010 (IE_SW_20B940880).
- One groundwater body is hydrogeologically connected to the site, Skibbereen-Clonakilty (IE_SW_G_085).
- The coastal water bodies connected to the site include: Western Celtic Sea (HAs 18; 19; 20) (IE_SW_010_0000), Clonakilty Bay (IE_SW_100_0000) and Courtmacsherry Bay (IE_SW_090_0000).

The EAM has assessed the potential for impact on water quality and nutrient conditions and has based this assessment on a conservative basis using all available flow data. Full details of the assessment are provided in **Appendix C**.

The modelled concentrations in the river water body hydrologically connected to the SAC, Barreragh_010 (IE_SW_20B940880) was 0.0003 mg/l and therefore, as the concentration did not exceed the 5% Good / High 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**. The baseline concentration also does not exceed 75% of the Ortho P upper indicative quality threshold (<0.00125mg/l) and therefore will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

In the coastal water bodies the Western Celtic Sea (HAs 18; 19; 20) (IE_SW_010_0000) and Courtmacsherry Bay (IE_SW_090_0000) both had a post-dosing concentration of 0.0000 mg/l while Clonakilty Bay (IE_SW_100_0000) had a post-dosing concentration of 0.0001 mg/l. As all concentrations are within 5% of the Good / High indicative quality boundary, there will be no deterioration in the current indicative quality of the water bodies which is High for all three coastal water bodies. Although, Clonakilty Bay and Courtmacsherry Bay have baseline concentrations which exceed the 75% upper indicative quality threshold. However, with negligible and not detectable modelled increases in concentration respectively there will not be any deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

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 in the indicative quality of the water body which is currently at Good, as a result of dosing. The baseline concentration also does not exceed 75% of the Ortho P upper indicative quality threshold (<0.00175mg/l) and therefore will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

In light of the EAM assessment which has determined that there is no risk of deterioration in the orthophosphate indicative quality of the water bodies that support the structure and function of the SPA, or of preventing their 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 SCI.

6.2.8 Old Head of Kinsale SPA 004021

The Old Head of Kinsale SPA lies approximately 110 km south of the town of Kinsale in Co. Cork, and is a 5 km long headland formed of steeply inclined beds of rock. The site comprises a section of the cliffs on the western side of the narrow isthmus leading to the Head and a 500 m seaward extension. These are vertical rock cliffs providing optimum habitat for ledge nesting seabirds. Maritime grassland and heath occurs above the steep cliffs (NPWS, 2014[47]).

The site is a SPA under the E.U. Birds Directive, of special conservation interest for Kittiwake and Guillemot, which are considered nutrient sensitive (see **Appendix B**). The Old Head is the largest seabird colony on the south coast between the Bull Rock and the Saltee Islands. The SPA is of high ornithological importance for its breeding seabird populations, two species of which occur in nationally important numbers. The presence of Chough and Peregrine, two species listed on Annex I of the E.U. Birds Directive is also of note. Owing to the importance of the bird populations, the site was designated as a Refuge for Fauna in 1989.

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 draft RBMP (2018-2021) (DHPLG, 2018[40]) 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 Old Head of Kinsale SPA and will receive inputs from the proposed orthophosphate dosing at Clonakilty RWSS WTP (Jones Bridge WTP):

- One groundwater body is hydrogeologically connected to the site, Skibbereen-Clonakilty (IE_SW_G_085).
- One coastal water body is connected to the site, Courtmacsherry Bay (IE_SW_090_0000).

The EAM has assessed the potential for impact on water quality and nutrient conditions and has based this assessment on a conservative basis using all available riverine and tidal flow data. Full details of the assessment are provided in **Appendix C**.

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

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

There is no significant change in the orthophosphate concentration of the coastal water body Courtmacsherry Bay (IE_SW_090_0000) as a result of dosing with a predicted increase in concentration of 0.0000 mg/l. As the concentration does not exceed 5% of the Good / High boundary (0.00125 mg/l) there will be no risk of deterioration to the High indicative qulaity of the water body. Although, the baseline concentration for the Courtmacsherry in winter exceeds the 75% upper indicative quality threshold. However, with a not detectable modelled increase in concentration there will not be any deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

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 in the indicative quality of the water body which is currently at Good, as a result of dosing. The baseline concentration also does not exceed 75% of the Ortho P upper indicative quality threshold (<0.00175mg/l) and therefore will not result in a deterioration in the current indicative quality or prevent the achievement of the WFD objectives for this water body.

In light of the EAM assessment which has determined that there is no risk of deterioration in the orthophosphate indicative quality of the water bodies that support the structure and function of the SPA, or of preventing their 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 SCI.

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 within 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 Team's 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 realignment 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
Cork County Development Plan 2022-2028[49] The plan outlines under WM 11-8: 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	▪ 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 Draft RBMP 2018-2021), and emphasises compliance with environmental objectives. There is no potential for cumulative impacts with these plans.

[49] 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
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 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 waters in Ireland 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.	▪ 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.

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects and Mitigation
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.		
Catchment based Flood Risk Assessment and Management (CFRAM) Programme, under the Floods Directive The Office of Public Works (OPW) is responsible for the implementation of the Floods Directive 2007/60/EC which is being carried out through a Catchment based Flood Risk Assessment and Management (CFRAM) Programme. As part of the directive Ireland is required to undertake a Preliminary Flood Risk Assessment, to identify areas of existing or potentially significant future flood risk and to prepare flood hazard and risk maps for these areas. Following this, flood risk management plans are developed for these areas setting objectives for managing the flood risk and setting out a prioritised set of measures to achieve the objectives. The CFRAM programme is currently being rolled out and Draft Flood Risk Management Plans have been prepared. These plans have been subject AA.	▪ Habitat loss or destruction; ▪ Habitat fragmentation or degradation; ▪ Alterations to water quality and/or water movement; ▪ Disturbance; ▪ In-combination impacts within the same scheme.	CFRAM Studies and their product Flood Risk Management Plans will each undergo appropriate assessment. Any future flood plans will have to take into account the design and implementation of water management infrastructure as it has the potential to impact on hydromorphology and potentially on the ecological status and favourable conservation status of water bodies. The establishment of how flooding may be contributing to deterioration in water quality in areas where other relevant pressures are absent is a significant consideration in terms of achieving the objectives of the WFD. The AA of the plans will need to consider the potential for impacts from hard engineering solutions and how they might affect hydrological connectivity and hydromorphological supporting conditions for protected habitats and species. There is no potential for cumulative impacts with the CFRAMS programme as no infrastructure is proposed as part of this project.
Foodwise 2025	▪ Land use change or intensification; ▪ Water pollution;	Foodwise 2025 was subject to its own AA[50].

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

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects and Mitigation
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.	▪ Nitrogen deposition; ▪ Disturbance to habitats / species.	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, 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-	▪ Overgrazing; ▪ Land use change or ▪ intensification; ▪ Water pollution; ▪ Nitrogen deposition; ▪ Disturbance to habitats / species.	The RDP for 2014 – 2020 has been subject to SEA[51], and AA[52]. The AA assessed the potential for impacts from the RDP measures e.g. for the GLAS scheme to result in inappropriate management prescriptions; minimum stocking rates under the Areas of Natural Constraints measure leading to overgrazing in sensitive habitats with dependent species, and TAMS supporting intensification. Mitigation included project specific AA for individual building, tourism or agricultural reclamation projects, consultations with key stakeholders during detailed measure development, and site-based monitoring of the effects of RDP measures. With such measures in place, it was concluded that there would be no significant in-combination impacts on Natura 2000 sites.

[51] https://www.agriculture.gov.ie/media/migration/ruralenvironment/ruraldevelopment/ruraldevelopmentprogramme2014-2020/StrategEnvironmAssessSumState090615.pdf
[52] 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
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.		
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** **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.**	▪ Land use change or intensification; ▪ Water pollution; ▪ Nitrogen deposition; ▪ Disturbance to habitats / species.	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. 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

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects and Mitigation
		recommendations in these documents and incorporation into the 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 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.	▪ Habitat loss or destruction; ▪ Habitat fragmentation or degradation; ▪ Water quality changes; ▪ Disturbance to species.	Ireland's Forestry Programme 2014 – 2020 has undergone AA[53]. 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.
Water Services Strategic Plan (WSSP, 2015) Uisce Éireann has prepared a Water Services Strategic Plan (WSSP, 2015), under Section 33 of the Water Service No. 2 Act of 2013 to address the delivery of strategic objectives which will contribute towards improved water quality and WFD requirements. The WSSP forms the highest tier of asset management plans (Tier 1) which Uisce Éireann prepare and it sets the overarching	▪ Habitat loss and disturbance from new / upgraded infrastructure; ▪ Species disturbance; ▪ Changes to water quality or quantity;	The overarching strategy was subject to Appropriate Assessment 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.

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

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects and Mitigation
framework for subsequent detailed implementation plans (Tier 2) and water services projects (Tier 3). The WSSP sets out the challenges we face as a country in relation to the provision of water services and identifies strategic national priorities. It includes Uisce Éireann's short, medium and long term objectives and identifies strategies to achieve these objectives. As such, the plan provides the context for subsequent detailed implementation plans (Tier 2) which will document the approach to be used for key water service areas such as water resource management, wastewater compliance and sludge management. The WSSP also sets out the strategic objectives against which the Uisce Éireann Capital Investment Programme is developed. The current version of the CAP outlines the proposals for capital expenditure in terms of upgrades and new builds within the Uisce Éireann owned asset and this is a significant piece of the puzzle in terms of the expected improvements from the RBMP.	▪ Nutrient enrichment /eutrophication.	
National Wastewater Sludge Management Plan (2016) The National Wastewater Sludge Management Plan was prepared in 2015, outlining the measures needed to improve the management of wastewater sludge.	▪ Habitat loss and disturbance from new / upgraded infrastructure; ▪ Species disturbance; ▪ Changes to water quality or quantity; ▪ Nutrient enrichment /eutrophication.	The plan was subject to both AA and SEA and includes a number of mitigation measures which were identified in relation to transport of materials, land spreading of sludge and additional education and research requirements. This plan does not specifically address domestic wastewater loads, only those relating to Uisce Éireann facilities. In relation to the plan as it stands, no in-combination effects are expected with the implementation of proposed mitigation measures.
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 Uisce Éireann 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

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects and Mitigation
		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 number of planning applications pending or recently approved in Cork County. The applications are predominantly for the construction of new infrastructure or renovations to existing infrastructure in the Clonakilty/Rosscarbery/Courtmacsherry areas. In the wider area there are planning applications for renewable energy infrastructure i.e. wind farms and associated ancillary works.	▪ 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 2022-2028 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 There are four IPC licensed facilities within the Clonakilty WSZ. Licensed activities include poultry farming, intensive agriculture, food and drink and waste. Under the Industrial Emissions Directive 2010/75/EU and Environmental Protection Agency Act, 1992 (as amended) certain agricultural activities (e.g. pig and poultry farms) 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.	▪ Changes to water quality or quantity; ▪ Nutrient enrichment /eutrophication.	The EPA is responsible for monitoring emissions and 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 Natura 2000 sites.

7 SCREENING CONCLUSION STATEMENT

This Screening to inform the AA process has considered whether the proposed construction works and orthophosphate dosing at the Clonakilty RWSS WTP (Jones Bridge WTP), within the Zone 1 Clonakilty Regional 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 Clonakilty RWSS WTP, the potential for direct, indirect and cumulative impacts affecting European Sites within the ZoI (i.e. Courtmacsherry Estuary SAC, Courtmacsherry Bay SPA, Seven Heads SPA, Old Head of Kinsale 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: Courtmacsherry Estuary SAC, Courtmacsherry Bay SPA, Seven Heads SPA, Old Head of Kinsale SPA. Twelve sites has been included for further assessment for the operational phase in Sections 5 and 6 below i.e. Kilkeran Lake and Castlefreke Dunes SAC, Lough Hyne Nature Reserve and Environs SAC, Myross Wood SAC, Castletownshend SAC, Clonakilty Bay SAC, Courtmacsherry Estuary SAC, Courtmacsherry Bay SPA, Galley Head to Duneen Point SPA, Clonakilty Bay SPA, Seven Heads SPA, Old Head of Kinsale SPA, and Sheep's Head to Toe Head SPA have been assessed. Due to the low orthophosphate inputs following dosing at Clonakilty RWSS 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 it is not 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 Clonakilty RWSS 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- Conservation Objectives

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
Kilkeran Lake and Castlefreke Dunes SAC (001061)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001061.pdf
Lough Hyne Nature Reserve and Environs SAC (000097)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000097.pdf
Myross Wood SAC (001070)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001070.pdf
Castletownshend SAC (001547)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001547.pdf
Clonakilty Bay SAC (000091)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000091.pdf
Courtmacsherry Estuary SAC (001230)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO001230.pdf
Courtmacsherry Bay SPA (004219)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004219.pdf
Galley Head to Duneen Point SPA (004190)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004190.pdf
Clonakilty Bay SPA (004081)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004081.pdf
Seven Heads SPA (004191)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004191.pdf
Old Head of Kinsale SPA (004021)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004021.pdf
Sheep's Head to Toe Head SPA (004156)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004156.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

Code	Qualifying Interest	Water dependant	GWDTE	Nutrient sensitive
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
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

Code	Qualifying Interest	Water dependant	GWDTE	Nutrient sensitive
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

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

Code	Species of special conservation interest	Water dependant	Nutrient sensitive
A140	Golden Plover (*Pluvialis apricaria*)	Yes	Yes
A141	Grey Plover (*Pluvialis squatarola*)	Yes	Yes
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

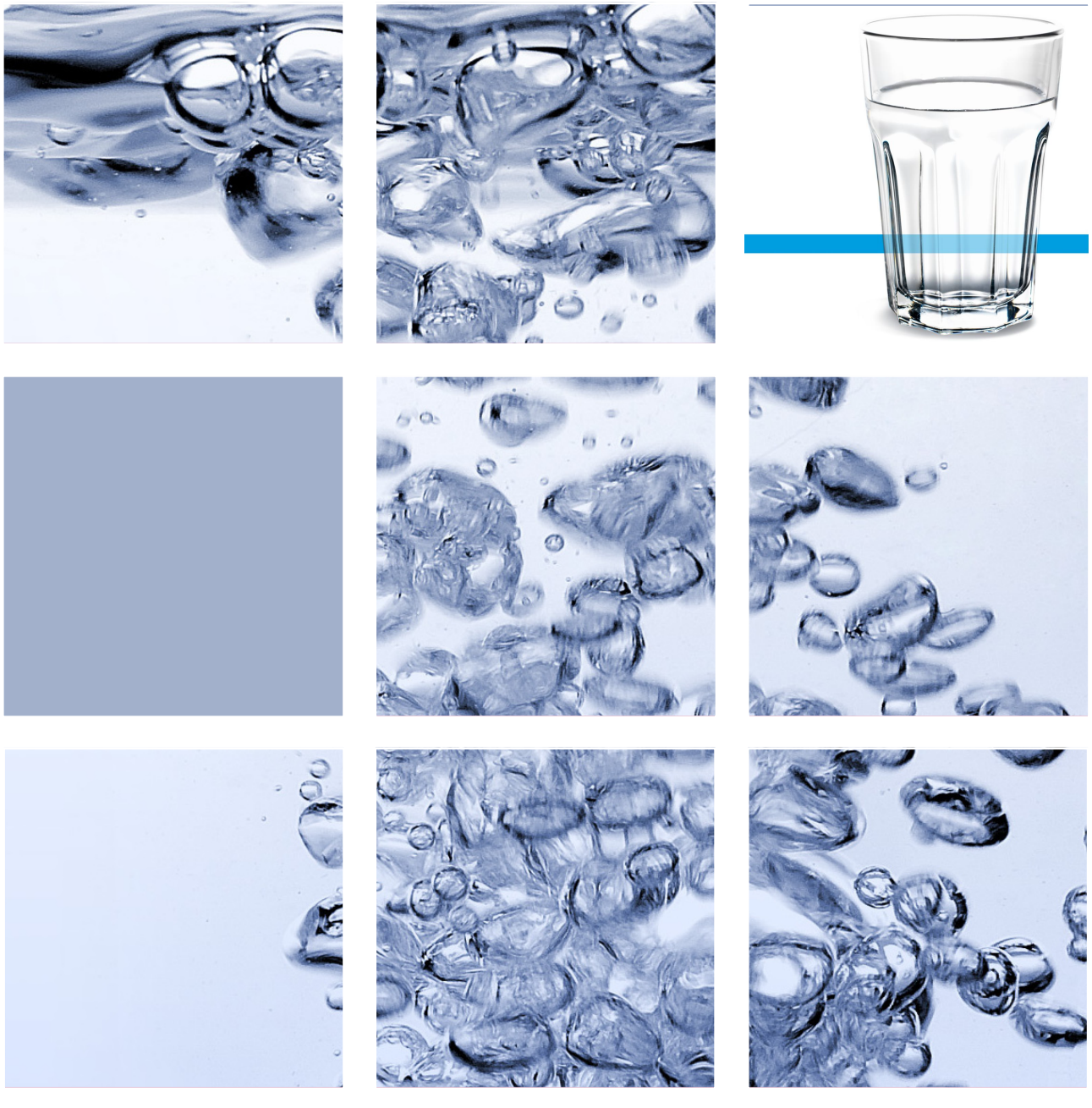
APPENDIX C

EAM Summary Report

Uisce Éireann - Lead in Drinking Water Mitigation Plan

Environmental Assessment Methodology (EAM) Summary Report

036 Clonakilty RWSS WTP (Jones Bridge WTP) - Zone 1 Clonakilty (0500PUB4301)



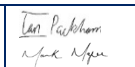
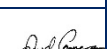
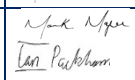
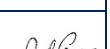
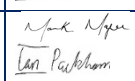
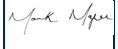
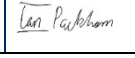
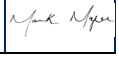
National Lead in Water Mitigation Strategy

Environmental Assessment Methodology Report: 036 Clonakilty RWSS WTP (Jones Bridge WTP) – Zone 1 Clonakilty (0500PUB4301)

Document Control Sheet

Client:	Uisce Éireann
Project Title:	National Lead in Water Mitigation Strategy
Document Title:	Environmental Assessment Methodology Report: 036 Clonakilty RWSS WTP (Jones Bridge WTP) – Zone 1 Clonakilty (0500PUB4301)
Document No:	MDW0766RP_5.1_EAM_036_Clonakilty_F04

Text Pages:	10	Appendices:	-

Rev.	Status	Date	Author(s)		Reviewed By		Approved By	
A03	Review	16th Aug 2018	YE		MJM, IP		DC	
F01	Final	16th Aug 2018	YE		MJM, IP		DC	
F02	Final	11th Sep 2018	YE		MJM, IP		DC	
F03	Final	21st May 2019	MH		IP		MJM	
F04	Final	6th June 2023	YE		IP		MJM	

036 Clonakilty RWSS WTP (Jones Bridge WTP) – Zone 1 Clonakilty (0500PUB4301)

Supporting spreadsheet: 036 Clonakilty RWSS WTP (Jones Bridge WTP) - Zone1 Clonakilty V29

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

Clonakilty WTP supplies rural areas to the South of County Cork. The distribution input for Zone 1 Clonakilty is 7460 m^3/day (50% of which is accounted for, with the remainder assumed to be lost through leakage) serving a population of approximately 13,000. The non-domestic demand is 24% of the distribution input. The area is served by the Clonakilty (D0051-01) and Rosscarberry/Owenhincha (D0172-01) agglomerations which are all 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 are smaller agglomerations with a population equivalent of less than 500 at Courtmacsherry, Ring, Shannonvale and Timoleague and the estimated additional load from these plants from the orthophosphate dosing is considered at the water body level via the surface water pathways. There are an estimated 2,875 properties across the WSZ that are serviced by a DWWTS.

This assessment has been undertaken for the WSZ in isolation however should corrective water treatment be proposed for WTPs in the same catchment area, then the cumulative impact from the combined loads to downstream water bodies should be assessed.

<table>
<tr><td>Water Treatment Plant</td><td colspan="2">Clonakilty RWSS WTP (Jones Bridge WTP)</td></tr>
<tr><td>Water Supply Zone(s)</td><td colspan="2">Zone1 Clonakilty (0500PUB4301)
See Figure 4.1 / 4.2 of the AA Screening for a map of the WSZ and ZoI</td></tr>
<tr><td rowspan="6">Step 1 Appropriate Assessment Screening</td><td colspan="2">European Sites within the Zone of Influence</td></tr>
<tr><td colspan="2">SAC</td></tr>
<tr><td>Clonakilty Bay SAC
Lough Hyne Nature Reserve And Environs SAC
Roaringwater Bay And Islands SAC
Barley Cove To Ballyrisode Point SAC
Kilkeran Lake And Castlefreke Dunes SAC</td><td>Courtmacsherry Estuary SAC
Bandon River SAC
Myross Wood SAC
Castletownshend SAC
Ardmore Head SAC</td></tr>
<tr><td colspan="2">SPA</td></tr>
<tr><td>Old Head of Kinsale SPA
Cork Harbour SPA
Clonakilty Bay SPA
Sovereign Islands SPA</td><td>Sheep's Head to Toe Head SPA
Galley Head to Duneen Point SPA
Seven Heads SPA
Courtmacsherry Bay SPA</td></tr>
<tr><td colspan="2">Appropriate Assessment Required – see AA screening report for details</td></tr>
</table>

Step 2 – Direct Inputs to Surface Water

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

Agglom. 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***
Clonakilty Primary Discharge	2 (TP)	Existing	643.4	0.245	0.196	0.334
		Post Dosing	643.4	0.245	0.196	0.334
Clonakilty SWOs (2 no.)	n/a	Existing	5.4	2.510	2.008	3.414
		Post Dosing	5.9	2.759	2.207	3.752
Roscarberry	n/a	Existing	1456.8	1.546	1.237	2.102
		Post Dosing	1477.5	1.568	1.254	2.132
Roscarberry SWOs (6 no.)	n/a	Existing	123.6	2.318	1.854	3.152
		Post Dosing	124.8	2.340	1.872	3.182

**TP – Total Phosphorus ELV*

Note – Clonakilty WWTP (D0051-01) is modelled as compliant with total phosphorus ELVs set in WWDL for both existing and post dosing concentrations. There are no Phosphorus ELVs for Rosscarbery agglomeration.

As Clonakilty receives tertiary treatment, i.e. chemical dosing for nutrient removal, the EAM assumes that the additional P loading to the plant can be dealt with and managed within the treatment process therefore there is no impact on the existing effluent quality.

Rosscarberry WWTP (D0172-01) has only primary treatment (septic tank) and discharges to Rosscarberry Harbour with limited treatment reduction, all the additional load from the orthophosphate dosing is assessed in Roscarberry Harbour.

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 mean flow information

Agglom.	RWB Name / Code for Primary Discharge	Background Conc. (mg/l) (annual mean from AER u/s monitoring point or assumed indicative quality for unassigned Rosscarberry Harbour)	Modelled Conc. existing (mg/l)	Modelled Conc. Post Dosing (mg/l)	% Inc.
Clonakilty	Clonakilty Harbour / IE_SW_100_0100	0.0300	0.0307	0.0307	0.00
Rosscarberry	Rosscarbery Harbour / IE_SW_110_0200	0.0770	0.1028	0.1031	0.36

Surface Assessment

Clonakilty (IE_SW_20C050300) – The effluent concentrations were non-compliant with its ELV for Total Phosphorus on three occasions in the 2021 AER. This is reported as due to shock load discharges into the network, which resulted in the non compliance of the final effluent discharge. It has been assumed that this is not a regular occurrence and therefore tertiary treatment can be adjusted to remove any additional orthophosphate loads due to dosing. The impact due to SWOs is negligible as shown by the mass balance assessment in Table 2.

Rosscarbery (IE_SW_110_0200) – There are no phosphorus ELVs in the WWDL for Rosscarbery. The WWTP only provides primary treatment with limited nutrient reduction however the dosing will not result in a significant increase in the orthophosphate loads above the existing effluent loads and the impact on Rosscarberry Harbour results in a 1% increase in the concentration, based on an assumed indicative quality of moderate, as this is a currently unassigned water body.

Step 4 Distributed Inputs to Surface Water Bodies

Subsurface Assessment

The increments of concentrations of Ortho P for river water bodies in the zone are insignificant as they are smaller than 0.00125 mg/l (5% of the concentration boundary for High/Good). The highest increase is 0.0009 mg/l, taking place in IE_SW_20C060300 Carhoo_010.

Modelled increments in concentration of Ortho P in transitional and coastal waterbodies are negligible (less than 0.0001 mg/l), except for IE_SW_110_0100 Kilkeran Lake, IE_SW_110_0200 Rosscarbery Harbour and IE_SW_100_0400 Clogheen Strand (0.0004, 0.0003 and 0.0019 mg/l respectively). In all cases, the increase in concentration does not cause the existing baseline to exceed 75% of the upper threshold for Ortho P Indicative Quality, so there is no risk of impact from orthophosphate dosing due to near surface and subsurface pathways.

Step 5 and 6: Combined Inputs to Ground Water Bodies

Groundwater Bodies as receptors connected to WSZ

Table 3 shows that the predicted concentrations to groundwater bodies are undetectable (0.0000 mg/l). There is no risk of impact due to orthophosphate dosing.

Table 3: Increased loadings and concentrations in Groundwater bodies (*note where existing monitoring data not available, a surrogate indicative quality is derived from ecological status of the GWB or Ortho P / Ecological status of the Group GWBS, 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 Conc. *[Surrogate Conc. given in italic mg/l]*	75% of indicative quality upper threshold mg/l	Ortho P load to GW due to dosing 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_085 Skibbereen-Clonakilty	*Good*	*0.018*	*0.026*	*2.8*	*0.0000*	*0.018*	
IE_SW_G_086 Bandon	*Good*	*0.018*	*0.026*	*0.0*	*0.0000*	*0.018*	

Step 5 and 6: Combined Inputs to Surface Water Bodies

Combined Assessment

Table 4-A gives the loads and modelled concentrations for the combined assessment to rivers. The increased loads due to orthophosphate dosing are predicted to be not significant.

Table 4-B gives the loads and modelled concentrations for the combined assessment to transitional and coastal waters. The increased loads due to orthophosphate dosing are predicted to be not significant.

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

EU_CD / NAME River Water Bodies	Ortho P Indicative Quality and Trends (distance to threshold) *[Surrogate indicative quality given in italic]*	Baseline Year 2014 Ortho P Conc. mg/l *[Surrogate Conc. given in italic]*	75% of indicative quality upper threshold mg/l	Cumulative Ortho P load to SW from leakage, DWWTS & Agglomerations kg/yr	Potential increase in Ortho P Conc. using flows (30%ile or gauged) mg/l	Potential Baseline for Ortho P Conc. following dosing mg/l	Notes
IE_SW_20A020045 ARGIDEEN_010	High Upwards Far	0.015	0.019	6.8	0.0002	0.015	
IE_SW_20A020060 ARGIDEEN_020	Good Upwards Far	0.026	0.033	7.7	0.0001	0.026	
IE_SW_20A020100 ARGIDEEN_030	High Downwards Far	0.015	0.019	11.2	0.0001	0.016	‡
IE_SW_20A020200 ARGIDEEN_040	High Upwards Far	0.018	0.019	12.2	0.0001	0.018	‡
IE_SW_20B020400 BANDON_040	*Good*	*0.030*	0.033	0.0	0.0000	0.030	
IE_SW_20B940880 BARRERAGH_010	*Good*	*0.030*	0.033	8.7	0.0003	0.030	
IE_SW_20C020810 CASHEL (CORK)_010	*Moderate*	*0.046*	0.051	1.8	0.0002	0.046	
IE_SW_20C050300 CLONAKILTY STREAM_010	*Moderate*	*0.046*	0.051	11.2	0.0004	0.046	
IE_SW_20C060300 CARHOO_010	*Good*	*0.030*	0.033	13.9	0.0009	0.031	
IE_SW_20E050970 East Cruary_010	*Good*	*0.030*	0.033	9.9	0.0004	0.030	
IE_SW_20G020400 GLASHAGLORAGH (CORK)_010	*High*	*0.013*	0.019	0.4	0.0000	0.013	

IE_SW_20H070690 Hayes' Cross Roads_010	*Moderate'*	*0.046*	0.051	13.6	0.0005	0.046	
IE_SW_20N100620 North Ring Curraghgrane_010	*Good*	*0.030*	0.033	5.1	0.0003	0.030	‡
IE_SW_20O010600 OWENKEAGH_020	*Good*	*0.030*	0.033	0.5	0.0000	0.030	
IE_SW_20O030400 OWNAHINCHY_010	*Moderate*	*0.046*	0.051	6.9	0.0003	0.046	
IE_SW_20R020800 ROURY_010	*Moderate*	*0.046*	0.051	4.7	0.0002	0.046	
IE_SW_20R021000 ROURY_020	*Good*	*0.030*	0.033	8.5	0.0002	0.030	
IE_SW_20T020050 TINNEEL STREAM_010	*Moderate*	*0.046*	0.051	7.9	0.0005	0.046	

‡ Load from WWTP / SWO following treatment added

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

EU_CD / NAME Transitional / Coastal Water Bodies	Ortho P Indicative Quality and Trends (distance to threshold) *[Surrogate indicative quality given in italic]*	Baseline Ortho P Conc. mg/l *[Surrogate Conc. given in italic]*	75% of indicative quality threshold mg/l	Cumulative Ortho P load to SW from leakage, DWWTS & Agglomerations kg/yr	Potential increase in Ortho P Conc. using flows (30%ile or gauged) mg/l	Potential Baseline for Ortho P Conc. following dosing mg/l	Notes
IE_SW_090_0200 Argideen Estuary	High (S) Upwards Far	0.016	0.019	22.0	0.0001	0.016	‡
	Good (W) Downwards Far	0.032	0.047			0.032	
IE_SW_100_0100 Clonakilty Harbour	High (S) Downwards Near	0.020	0.019	16.5	0.0000	0.020	‡
	Good (W) Downwards Far	0.030	0.045			0.030	
IE_SW_110_0200 Rosscarbery Harbour	*Poor*	*0.077*	*0.087*	*18.9*	*0.0007*	*0.077*	‡‡
IE_SW_010_0000 Western Celtic Sea (HAs 18;19;20)	*High*	*0.013*	*0.019*	*117.7*	*0.0000*	*0.013*	‡

IE_SW_090_0000 Courtmacsherry Bay	High (S) None Far	0.003	0.019	30.7	0.0000	0.003	
	High (W) Downwards Near	0.021	0.019			0.021	
IE_SW_100_0000 Clonakilty Bay	High (S) None Far	0.003	0.019	39.2	0.0001	0.003	‡
	High (W) Downwards Near	0.020	0.019			0.020	
IE_SW_100_0200 Inchydoney	*Good*	*0.045*	*0.053*	*0.25*	*0.0009*	*0.046*	‡‡
IE_SW_100_0300 White's Marsh	*Good*	*0.045*	*0.053*	*0.01*	*0.0001*	*0.045*	‡‡
IE_SW_100_0400 Clogheen Strand	*Good*	*0.045*	*0.053*	*13.9*	*0.0019*	*0.047*	
IE_SW_110_0000 Rosscarbery Bay	High (S) Far	0.005	0.019	*47.8*	*0.0000*	0.005	‡
	High (W) Far	0.015	0.019			0.015	

‡ Load from WWTP / SWO following treatment added
‡‡ Load to these coastal lagoons based on the areal loading from their inputting water bodies
(S) = Summer monitoring period, (W) = Winter monitoring period

There are two coastal lagoons/marshes IE_SW_100_0200, Inchydoney and IE_SW_100_0300 White's Marsh, the exchange between the larger coastal water bodies and these lagoons is unknown therefore a conservative approach has been taken in that the exchange of water will be based on a period of months rather than days or weeks in estimating the flushing of these water bodies.

It would be unreasonable to assume that all the load for the inputting water bodies to White's Marsh and Inchydoney. i.e. Clonakilty Harbour and Clonakilty Bay will input to these lagoons. On this basis the areal loading to Clonakilty Harbour and Clonakilty Bay ($kg/km^2/yr$) has been calculated and then factored by the area of the small coastal lagoons/marsh to get an estimate of loads to these water bodies.

The impact on the concentrations of these lagoons has been assessed on the basis of the flushing of the lagoon (based on the 0.05 exchange factor and an estimate of the volume of water in the lagoons) and the loading to the lagoon. In both cases the impacts on the phosphorus levels is not significant as demonstrated in Table 4B.

Kilkeran Lake is a coastal lagoon and for large parts of the year there is no water exchange due to a sand bar at the outlet preventing the exchange of water with the open sea, therefore it behaves more like a lake and has been assessed through the application of the Vollenweider equation in Table 5.

Table 5: Vollenweider assessment of Lakes within the WSZs

EU_CD /NAME	Parameter	TP Indicative Quality and Trends (Distance to Threshold. *Surrogate indicative quality in italic*	Baseline Conc. *Surrogate Conc. given in italic mg/l*	TP Total 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)	Critical loading - Lc (mg/m²/yr)	Percentage increase
IE_SW_110_0100 Kilkeran Lake	TP	*Moderate*	*0.041*	4.8	3008.90	3035.25	855	0.87%

Historically it has eutrophication issues and the existing loading to the lake is already well in excess of the areal loading threshold. The ecological status of this lake is classified as poor but the macrophyte condition is assessed as bad. The supporting Phosphorus conditions are moderate, so the assumed TP indicative quality is also moderate, but it is possible that the P is being assimilated into the biomass very quickly as the macrophyte status is bad. The increase in the areal loading is very low (0.87%) and therefore the impact of the orthophosphate levels is considered to be insignificant and will not result in a deterioration in the indicative quality or prevent the achievement of the WFD objectives for this water body.

Summary and Mitigation Proposed

Assessment of Clonakilty WTP in isolation suggests minimal impact on the receiving waterbodies due to orthophosphate dosing. The modelled load and increase in concentrations to both groundwater and surface water receptors is insignificant.

Assessment of the coastal lagoon (Kilkeran Lake) has determined that it is already exceeding the critical P loading thresholds. It is noted that historically there have been issues with eutrophication in this waterbody, however, it is deemed that the impact of the orthophosphate levels, resulting from the proposed corrective water treatment, will be insignificant based on the Vollenweider assessment, where the increase in Areal loading to the lake is 0.87%".

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

The cumulative impacts on Shannon Catchment (HA 19) associated with phosphate dosing from following additional WTPs are summarised in Table 6 below:

- 004 Lee Road WTP - Cork City Water Supply (0400PUB1001)
- 006 Inniscarra WTP - Zone 2 Cork City and Harbour (0500PUB3401)
- 026 Glashaboy WTP - Zone 3 Glashaboy (0500PUB3303)
- 030 Innisshannon WTP - Zone2 Innishannon (0500PUB3501)
- 059 Glendine WTP - Zone 3 Youghal Regional (0500PUB2510)

Table 6: Cumulative assessment of the increased loading and concentrations to transitional water bodies impacted by more than WSZ in the Bandon-Ilen catchment ***(note: where existing monitoring data not available, a surrogate indicative quality is derived from ecological status of the WB or Ortho P / Ecological status of neighbouring 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 quality indicated in *italic*	Baseline Conc. Surrogate Conc. given in *italic* mg/l	75% of indicative quality upper threshold mg/l	Cumulative Ortho P load to SW from leakage, DWWTS & agglomerations kg/yr	Conc. using 30%ile, gauged or tidal flows mg/l	PO4 Potential Baseline Conc. following dosing mg/l	Notes
Courtmacsherry Bay IE_SW_090_0000	High (S) None Far	0.003	0.019	46.1	0.0000	0.003	
	High (W) Downwards Near	0.022	0.019			0.021	
IE_SW_100_0000 Clonakilty Bay	High (S) None Far	0.003	0.019	44.3	0.0001	0.003	‡
	High (W) Downwards Near	0.020	0.019			0.020	‡
IE_SW_110_0000 Rosscarbery Bay	High (S) Far	0.005	0.019	204.5	0.0000	0.005	ǂ
	High (W) Far	0.015	0.019			0.015	‡
Lough Mahon IE_SW_060_0750	High (S) Downwards Far	0.012	0.020	6489.1	0.0001	0.012	‡
	Good (W) Downwards Far	0.032	0.045			0.032	‡
Lee (Cork) Estuary Lower IE_SW_060_0900	High (S) Downwards Near	0.021	0.020	376.4	0.0002	0.021	‡
	Good (W) Downwards Far	0.035	0.045			0.035	‡
Lee (Cork) Estuary Upper IE_SW_060_0950	High (S) Downwards Far	0.013	0.019	376.4	0.0003	0.013	‡
	High (W) Downwards Near	0.026	0.019			0.026	‡
Cork Harbour IE_SW_060_0000	High (S) Downwards Far	0.006	0.019	8478.8	0.0000	0.006	‡
	High (W) Downwards Near	0.024	0.019			0.024	‡

Outer Cork Harbour IE_SW_050_0000	High (S) Downwards Far	0.003	0.019	8559.6	0.0000	0.003	‡
	High (W) Downwards Far	0.016	0.019			0.016	‡
Owenboy Estuary IE_SW_060_1200	*High*	*0.013*	*0.019*	*105.4*	0.0000	*0.013*	‡
Western Celtic Sea (HAs 18;19;20) IE_SW_010_0000	*High*	*0.013*	*0.019*	*9694.9*	*0.0001*	*0.013*	‡

‡ Load from WWTP / SWO following treatment added
(S) = Summer monitoring period, (W) = Winter monitoring period

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

MITIGATION OPTION – none required

RAG STATUS – GREEN

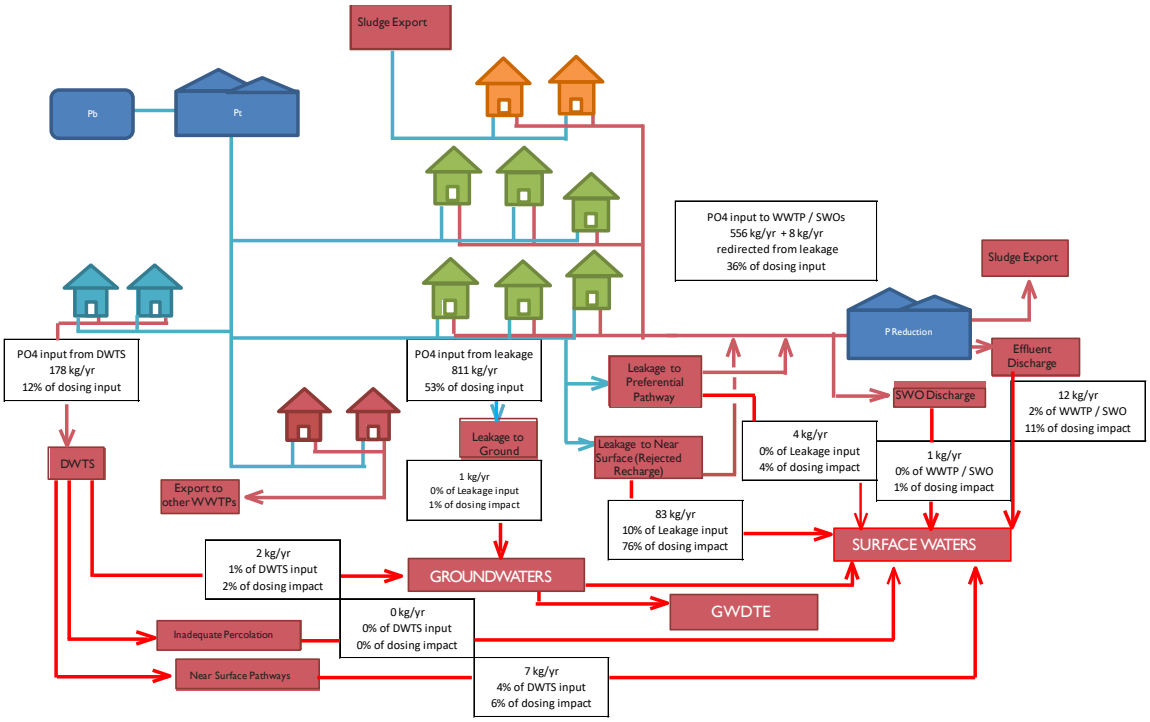
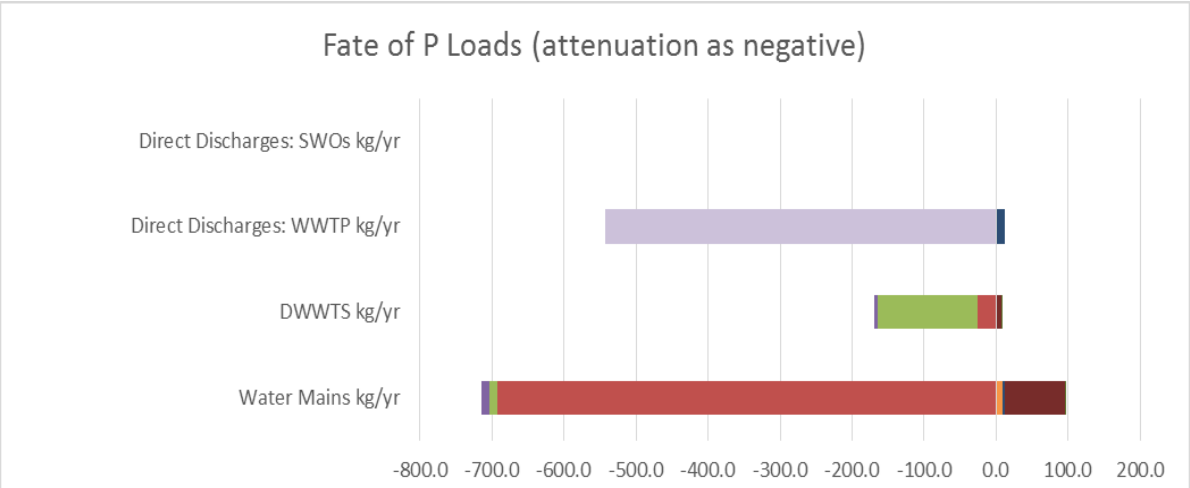


Figure 1 – Source Pathway Receptor model for Clonakilty RWSS WTP (Jones Bridge WTP) illustrating key sources and pathways to the associated WSZs.



	Water Mains kg/yr	DWWTS kg/yr	Direct Discharges: WWTP kg/yr	Direct Discharges: SWOs kg/yr
Load attenuated in Preference (inadequate percolation) pathway	-0.2	0.0		
Load attenuated in Near Surface Pathway	-693.3	-25.8		
Load attenuated in 1m below trench	-10.6	-138.0		
Load attenuated in Subsurface Pathway	-11.1	-6.1		
Load intercepted by gravity main in Preference Pathway	0.0			
Load intercepted by gravity main in Near Surface Pathway	8.4			
Load reaching SW direct or via Preference (inadequate percolation) Pathway	4.0	0.0	11.9	0.9
Load reaching SW via Near Surface Pathway	82.8	6.8		
Load reaching SW via Subsurface Pathway	0.9	1.9		
Load treated in WWTP			-543.6	

Figure 2 – Fate of orthophosphate loads modelled for Clonakilty WSZ impacting on the Western Celtic Sea (via Courtmacsherry Bay, Clonakilty Bay and Rosscarbery Bay) due to dosing by source type, indicating levels of attenuation in pathways and relative impact on the surface water receptor.