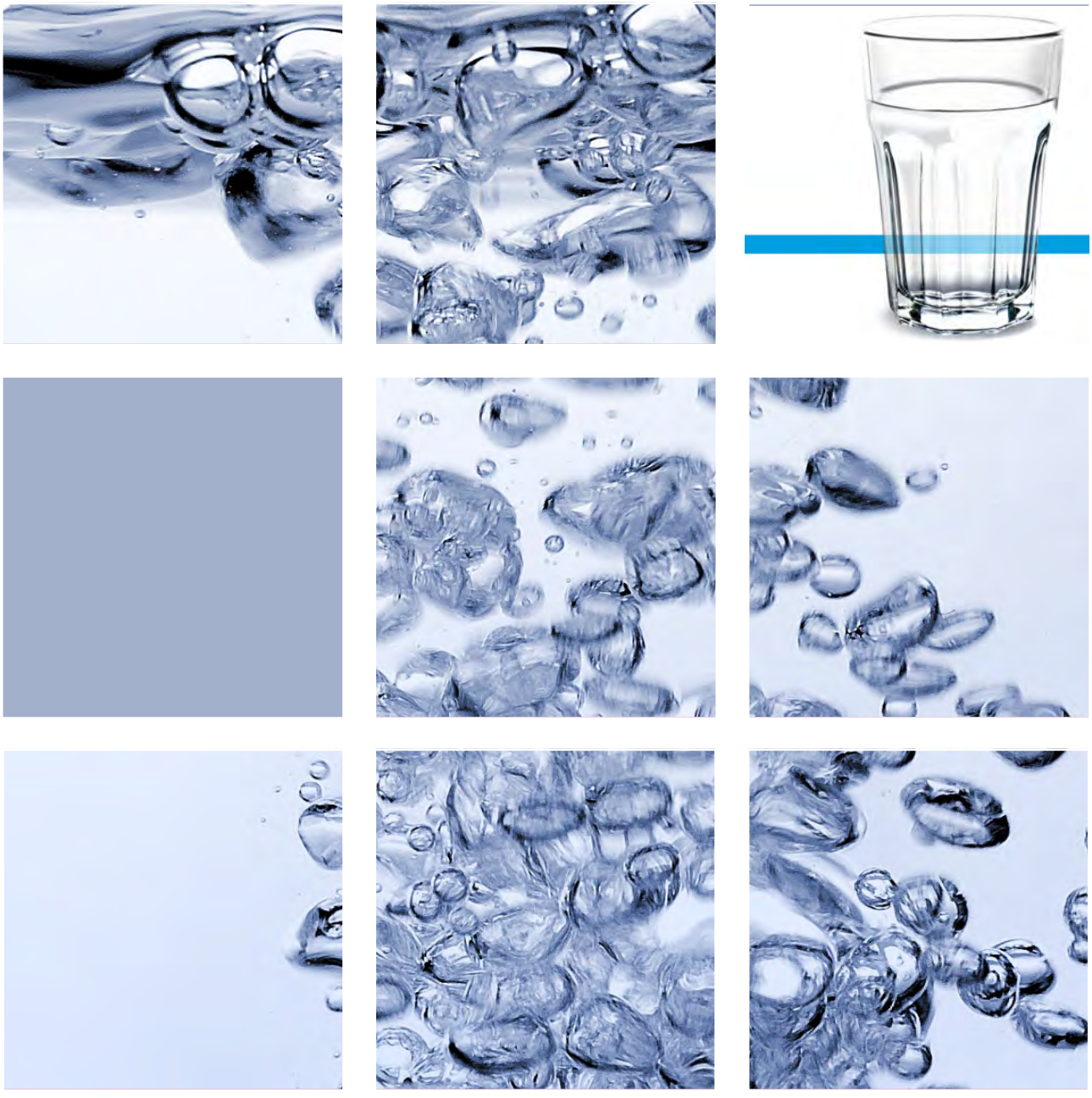
Uisce Éireann - Lead in Drinking Water Mitigation Plan

Screening for Appropriate Assessment

008 Central Kerry Regional Water Supply Scheme - Scart Reservoir WSZ



Lead in Drinking Water Mitigation Plan Screening for Appropriate Assessment: 008 Central Kerry Regional Water Supply Scheme – Scart Reservoir WSZ

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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 Lough Guitane Headworks, Co. Kerry.

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 initially assessed 400 water treatment plants for the introduction of corrective water treatment. Following this process 138 priority plants have been identified and corrective water treatment will be rolled out during the Lead in Drinking Water Mitigation 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 1.0 mg/l. At Scart Reservoir orthophosphate will be added at a rate of 0.95 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 0.9 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/AA Screening process identified 58 European Sites with potential hydrological or hydrogeological connectivity to the WSZ:

- SAC sites: Lower River Shannon SAC, Ballyseedy Wood SAC, Tralee Bay And Magharees Peninsula, West To Cloghane SAC, Slieve Mish Mountains SAC, Akeragh, Banna and Barrow Harbour SAC, Magharee Islands SAC, Kerry Head Shoal SAC, Mount Brandon SAC, Blasket Islands SAC, Castlemaine Harbour SAC, Killarney National Park, Macgillycuddy's Reeks And Caragh River Catchment SAC, Valencia Harbour/Portmagee Channel SAC, Ballinskelligs Bay And Inny Estuary SAC, Kenmare River SAC, Cleanderry Wood SAC, Mucksna Wood SAC, Old Domestic Building Dromore Wood SAC, Cloonee and Inchiquin Loughs, Uragh Wood SAC, Glengarriff Harbour And Woodland SAC, Sheep's Head SAC, Farranamanagh Lough SAC, Reen Point Shingle SAC, Dunbeacon Shingle SAC, Three Castle Head To Mizen Head SAC, Barley Cove To Ballyrisode Point SAC, Moanveanlagh Bog SACMullaghanish Bog SAC; Old Domestic building, Curraglass Wood SAC; Lough Yganavan and Lough Nambrackdarrig SAC; Ballymacoda (Clonpriest and Pillmore) SAC; Ardmore Head SAC and

- SPA sites: Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA; Tralee Bay Complex SPA; Magharee Islands SPA; Kerry Head SPA; River Shannon and River Fergus Estuaries SPA; Loop Head SPA; Dingle Peninsula SPA; Blasket Islands SPA; Castlemaine Harbour SPA; Iveragh Peninsula SPA; Puffin Island SPA; Skelligs SPA; Deenish Island and Scariff Island SPA; Beara Peninsula SPA; The Bull and The Cow Rocks SPA; Sheep's Head to Toe Head SPA; Ballycotton Bay SPA; Cork Harbour SPA; Sovereign Islands SPA; Old Head of Kinsale SPA;

Courtmacsherry Bay SPA; Seven Heads SPA; Galley Head to Duneen Point SPA; Clonakilty Bay SPA; Illauninearaun SPA; Erik Bog SPA and Killarney National Park SPA.

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

2 APPROPRIATE ASSESSMENT METHODOLOGY

2.1 LEGISLATIVE CONTEXT

Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora better known as the "Habitats Directive" provides legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of Community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000. These are Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Conservation of Wild Birds Directive (79/409/ECC) as codified by Directive 2009/147/EC.

The obligation to undertake appropriate assessment derives from Articles 6(3) and 6(4) of the Habitats Directive and both involve a number of steps and tests that need to be applied in sequential order. Article 6(3), which is concerned with the strict protection of sites, establishes the requirement for AA:

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

Article 6(4) states:

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

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

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

2.2 GUIDANCE FOR THE APPROPRIATE ASSESSMENT PROCESS

The assessment completed has had regard to the following legislation and guidance documents:

European and National Legislation:

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

Guidance / Case Law:

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

Departmental/NPWS Circulars:

- *Appropriate Assessment under Article 6 of the Habitats Directive: Guidance for Planning Authorities.* Circular NPWS 1/10 and PSSP 2/10. (DEHLG, 2010);
- *Appropriate Assessment of Land Use Plans*. Circular Letter SEA 1/08 & NPWS 1/08;
- *Water Services Investment and Rural Water Programmes – Protection of Natural Heritage and National Monuments*. Circular L8/08;
- *Guidance on Compliance with Regulation 23 of the Habitats Directive.* Circular Letter NPWS 2/07; and

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

2.3 STAGES OF THE APPROPRIATE ASSESSMENT PROCESS

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

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

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

Stage 1: Screening for a likely significant effect

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

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

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

Stage 3: Assessment of Alternative Solutions

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

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

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

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

2.4 INFORMATION SOURCES CONSULTED

To inform the assessment for the project and preparation of this Screening report, the following key sources of information have been consulted, however it should be noted that this is not an exhaustive list and does not reflect liaison and/ or discussion with technical and specialist parties from 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 (NPWS, 2013d); and
- Format for a Prioritised Action Framework (PAF) for Natura 2000 (2014) www.npws.ie/sites/default/files/general/PAF-IE-2014.pdf.

2.5 EVALUATION OF THE RECEIVING ENVIRONMENT

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

in Ireland are conserved and restored, delivering benefits essential for all sectors of society and that Ireland contributes to efforts to halt the loss of biodiversity and the degradation of ecosystems in the EU and globally".

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

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

2.5.1 Identification of European Sites

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

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

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

[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

2.5.2 Conservation Objectives

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

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

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

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

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

For SACs:

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

For SPAs:

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

Favourable Conservation status of a habitat is achieved when:

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

Favourable Conservation status of a species is achieved when:

- Population dynamics data on the species concerned indicate that it is maintaining itself on a long term basis as a viable component of its natural habitats;

- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future; and
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long term basis.

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

It is proposed to introduce orthophosphate dosing at Central Kerry Regional Water Supply Scheme - Scart Reservoir, that boosts the supply from Lough Guitane Headworks in Killarney. Scart Reservoir supplies the following water supply zones (WSZs): Fenit PWSS 037D, Ardfert South PWSS 004F, Camp PWS 020D, Inch PWS 044D. In addition, 15 Group Water Schemes have been identified in the region that the Scart Reservoir supplies. The distribution input from Scart Reservoir to the WSZs is estimated to be 24,990m^3/day (63% of which is accounted for, with the remainder assumed to be lost through leakage), serving a population of approximately 45,000. Non-domestic demand is 24% of the distribution input. Estimated statistics are taken from figures supplied for the Lough Guitane Headworks, distributed pro-rata by the length of watermain assumed to be supplied by Scart Reservoir.

A dosing rate of 0.95 mg/l is used in this assessment.

The WSZ boundaries cover a large rural area and towns that are served by agglomerations, including Tralee (D0040), Abbeydorney (D0417), Castleisland (D0180), Lixnaw (D0462), Ardfert (D0282), Fenit (D0284), Firies (D0460) and Milltown (D0331) WWTPs which are licenced in accordance with the requirements of the Waste Water Discharge (Authorisation) Regulations 2007 as amended. The impact of the orthophosphate dosing on the emission limit values and the receiving water body downstream of the point of discharge are assessed. There are also a smaller WWTP with a population equivalent of less than 500, namely Kilfenora (A0022), Kilflynn (A0027), Farranfore (A0073) and Castlemaine (A0013). 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 10,389 properties across the WSZ that are serviced by a DWWTS. (See **Appendix C** for the EAM).

The Central Kerry - Scart Reservoir WSZ is large encompassing a number of catchments and with many water bodies intersecting it. The EAM/AA Screening process identified 58 European Sites with hydrological or hydrogeological connectivity to the WSZ:

- SAC sites: Lower River Shannon SAC, Ballyseedy Wood SAC, Tralee Bay And Magharees Peninsula, West To Cloghane SAC, Slieve Mish Mountains SAC, Akeragh, Banna and Barrow Harbour SAC, Magharee Islands SAC, Kerry Head Shoal SAC, Mount Brandon SAC, Blasket Islands SAC, Castlemaine Harbour SAC, Killarney National Park, Macgillycuddy's Reeks And Caragh River Catchment SAC, Valencia Harbour/Portmagee Channel SAC, Ballinskelligs Bay And Inny Estuary SAC, Kenmare River SAC, Cleanderry Wood SAC, Mucksna Wood SAC, Old Domestic Building Dromore Wood SAC, Cloonee and Inchiquin Loughs, Uragh Wood SAC, Glengarriff Harbour And Woodland SAC, Sheep's Head SAC, Farranamanagh Lough SAC, Reen Point Shingle SAC, Dunbeacon Shingle SAC, Three Castle Head To Mizen Head SAC, Barley Cove To Ballyrisode Point SAC, Moanveanlagh Bog SAC; Mullaghanish Bog SAC; Old Domestic building, Curraglass Wood SAC; Lough Yganavan and Lough Nambrackdarrig SAC; Ballymacoda (Clonpriest and Pillmore) SAC; Ardmore Head SAC and

- SPA sites: Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA; Tralee Bay Complex SPA; Magharee Islands SPA; Kerry Head SPA; River Shannon and River Fergus Estuaries SPA; Loop Head SPA; Dingle Peninsula SPA; Blasket Islands SPA; Castlemaine Harbour SPA; Iveragh Peninsula SPA; Puffin Island SPA; Skelligs SPA; Deenish Island and Scariff

Island SPA; Beara Peninsula SPA; The Bull and The Cow Rocks SPA; Sheep's Head to Toe Head SPA; Ballycotton Bay SPA; Cork Harbour SPA; Sovereign Islands SPA; Old Head of Kinsale SPA; Courtmacsherry Bay SPA; Seven Heads SPA; Galley Head to Duneen Point SPA; Clonakilty Bay SPA; Illauninearaun SPA; Erik Bog SPA and Killarney National Park SPA.

3.2 CONSTRUCTION OF CORRECTIVE WATER TREATMENT WORKS

The Scart Reservoir site is located south of Farrenfore village surrounded by agricultural lands. The corrective water treatment works at Scart will involve the provision of orthophosphate dosing, pH control works and associated safety equipment. The orthophosphate dosing system at Scart Reservoir will be located within the confines of the existing WTP boundary.

Since the Water Treatment Plant at Lough Guitane has been commissioned the requirement of chlorine boosting at Scart Reservoir has significantly reduced. Previously, Scart would use 1,000 litres of Sodium Hypochlorite per week. Which required the need for two 3,500 litre bunded storage tanks. The storage requirement for sodium hypochlorite has therefore reduced significantly and one of these bulk storage tanks will be removed and replaced with the equipment required for corrective water treatment including the bunded bulk phosphoric acid storage tank and the dosing pumps and electrical controlshoused in the same large Chlorine room. Phosphoric acid will be pumped to the clear water tank, where water from the old filters and new filters is combined and where pH is adjusted by the addition of lime, prior to distribution to the water network.

Therefore the installation of the corrective water treatment equipment will use predominantly existing infrastructure and there will be limited construction works, i.e. minor works associated with the retrofitting of the existing infrastructure on site.

The surrounding landscape is dominated by agricultural grassland and the river water body Maine_040 is located 60m to the north. The grounds of the WTP consist of built infrastructure, amenity grassland which is surrounded by treeline and fencing.

The implementation of orthophosphate dosing at the Scart Reservoir will require the following elements:

- Bulk storage tank for phosphoric acid which will using existing infrastructure on site including the sodium hypochlorite bunding and pipework;
- Dosing pumps, and;
- Associated electrical installations.

3.3 CONSTRUCTION METHODOLOGY

The proposed works will be carried out by suitably qualified contractors. The proposed dosing unit will be located within the existing large chlorine room along with the bunded storage tank. As outlined above the ducting is already in place to facilitate delivery of the phosphoric acid to the clear water tank and therefore there would be minimal requirements for construction and no significant excavation.

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 Scart Reservoir, orthophosphate will be added to treated water at a rate of 0.95 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 Workflow 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 is 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 tier 1 preliminary 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 3-1**), 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 are 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 3-2** 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.

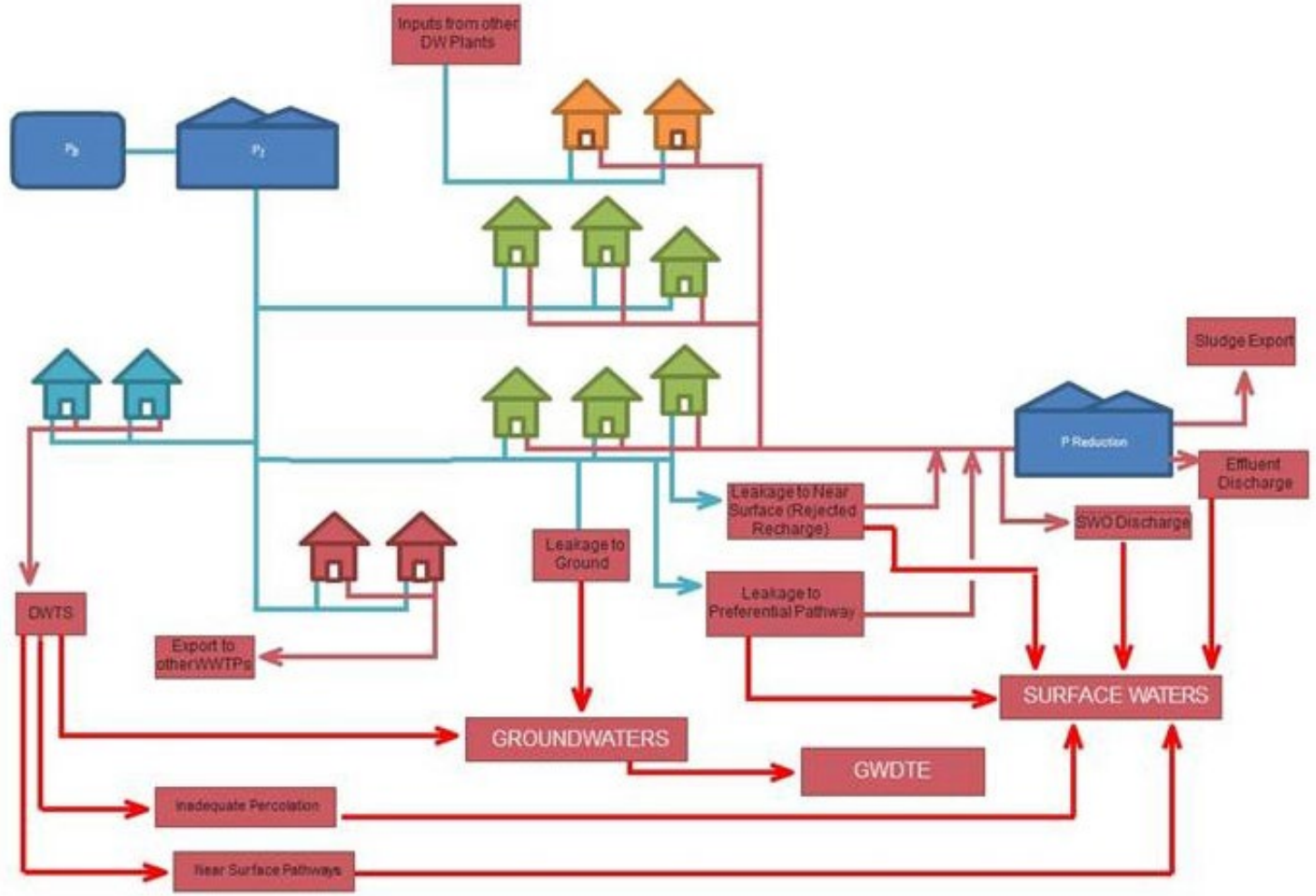


Figure 3-1: Conceptual Model of P Transfer

(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.)

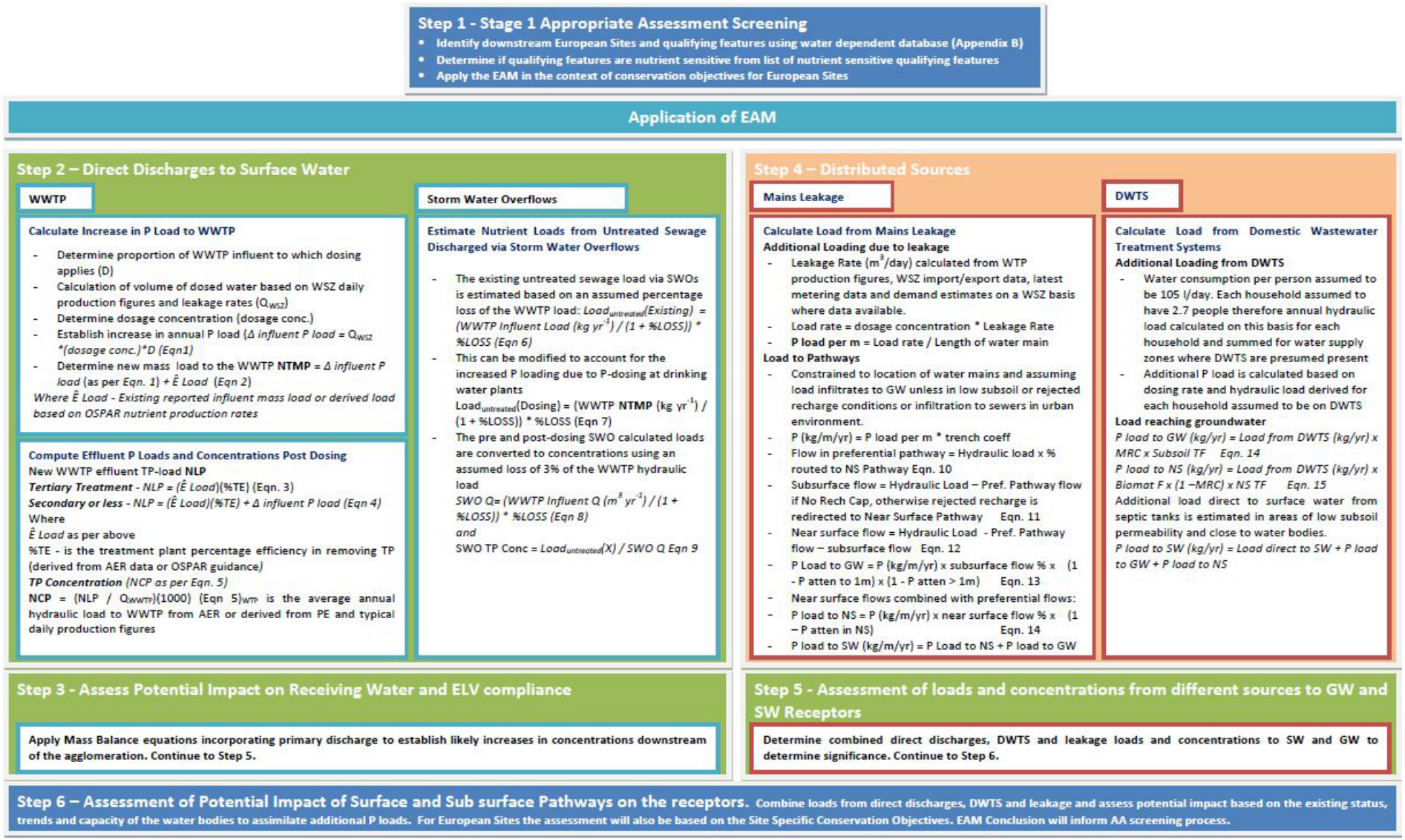


Figure 3-2: Stepwise Approach to Environmental Assessment Methodology

4 PROJECT CONNECTIVITY TO EUROPEAN SITES

4.1 OVERVIEW OF THE PROJECT ZONE OF INFLUENCE

4.1.1 Construction Phase

The construction phase of the proposed project will take place within the confines of the existing Scart Reservoir facility. The reservoir 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 Scart Reservoir followed by a review of hydrological and hydrogeological connectivity between the proposed development site and European Sites. The ZoI for the construction phase of the project are listed in **Table 4-1** and displayed in Figure 4.1**.**

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

	Site Name	SAC / SPA Code	Direct Impact	Water Dependent Species / Habitats	Surface Water Connectivity	Groundwater Connectivity	Potential Source Pathway Receptor
1	Castlemaine Harbour SAC	SAC 000343	No	Yes	Yes – Maine_040	Yes (Scartaglin)	Yes
2	Castlemaine Harbour SPA	SPA 004029	No	Yes	Yes – Maine_040	Yes (Scartaglin)	Yes
3	Killarney National Park, McGillycuddy's Reeks and Caragh River Catchment SAC	SAC 000365	No	Yes	No	Yes (Scartaglin)	Yes
4	Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA	SPA 004161	No	Yes	No	Yes (Scartaglin)	Yes

4.1.2 Operational Phase

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

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

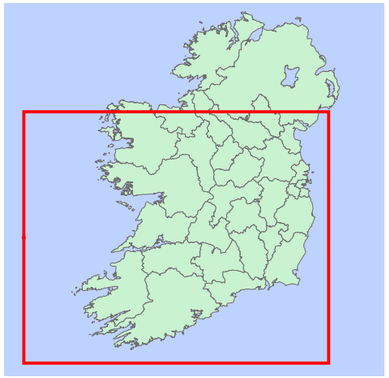
Table 4-2: European Sites within the ZoI of the Proposed Project – Operational Phase

	Site Name	SAC / SPA Code	Water Dependent Species / Habitats	Nutrient Sensitive	Surface Water Connectivity	Groundwater Connectivity	Potential Source Pathway Receptor
1	Lower River Shannon	SAC 002165	Yes	Yes	Yes – RWB/TWB [Brick, Mountcoal, Upper Feale Estuary]	Yes - Kerry Head, Ballybunnion, Abbeyfeale	Yes
2	Ballyseedy Wood	SAC 002112	Yes	Yes	Yes – RWB [Lee (Tralee)]	Yes - Tralee	Yes
3	Tralee Bay & Magharees Peninsula, West to Cloghane	SAC 002070	Yes	Yes	Yes – RWB [Lee (Tralee)], CWB [Outer Tralee Bay]	Yes – Spa, Tralee, Brandon Head	Yes
4	Slieve Mish Mountains	SAC 002185	Yes	Yes	Yes – RWB [Lee (Tralee), Maine]	Yes - Brandon Head, Dingle	Yes
5	Akeragh, Banna & Barrow Harbour	SAC 000332	Yes	Yes	Yes – RWB [Ardfert Oughter, Tyshe], CWB [Outer Tralee Bay]	Yes - Ardfert	Yes
6	Magharee Islands	SAC 002261	Yes	Yes	Yes – CWB [Outer Tralee Bay]	No	Yes
7	Kerry Head Shoal	SAC 002263	Yes	Yes	Yes – CWB [Southern Atlantic Seaboard (HA 23)]	No	Yes
8	Mount Brandon	SAC 000375	Yes	Yes	Yes – CWB [Southern Atlantic Seaboard (HA 23)]	Yes - Brandon Head, Dingle	Yes
9	Blasket Islands	SAC 002172	Yes	Yes	Yes – CWB [Southern Atlantic Seaboard (HA 23)]	No	Yes
10	Castlemaine Harbour	SAC 000343	Yes	Yes	Yes – RWB [Maine]	Yes - Dingle	Yes
11	Killarney National Park, Macgillycuddy's Reeks & Caragh River Catchment	SAC 000365	Yes	Yes	Yes – CWB [South Western Atlantic Seaboard (HAs 21;22)]	Yes - Scartaglin	Yes
12	Valencia Harbour / Portmagee Channel	SAC 002262	Yes	Yes	Yes – CWB [South Western Atlantic Seaboard (HAs 21;22)]	No	Yes
13	Ballinskelligs Bay & Inny Estuary	SAC 000335	Yes	Yes	Yes – CWBs [South Western Atlantic Seaboard (HAs 21;22), Ballinskelligs Bay]	No	Yes
14	Kenmare River	SAC 002158	Yes	Yes	Yes – CWBs [South Western Atlantic Seaboard (HAs 21;22), Outer Bantry Bay]	No	Yes
15	Cleanderry Wood	SAC 001043	Yes	Yes	Yes – CWBs [South Western Atlantic Seaboard (HAs 21;22), Outer Kenmare River]	No	Yes
16	Mucksna Wood	SAC 001371	No	Yes	Yes – CWBs [South Western Atlantic Seaboard (HAs 21;22), Outer Bantry Bay] TWB [Inner Kenmare River]	No	No

	Site Name	SAC / SPA Code	Water Dependent Species / Habitats	Nutrient Sensitive	Surface Water Connectivity	Groundwater Connectivity	Potential Source Pathway Receptor
17	Old Domestic Building, Dromore Wood	SAC 000353	No	Yes	Yes – CWBs [South Western Atlantic Seaboard (HAs 21;22), Outer Kenmare River]	No	No
18	Cloonee & Inchiquin Loughs, Uragh Wood	SAC 001342	Yes	Yes	Yes – CWBs [South Western Atlantic Seaboard (HAs 21;22), Outer Kenmare River]	No	Yes
19	Glengarriff Harbour & Woodland	SAC 000090	Yes	Yes	Yes – CWBs [South Western Atlantic Seaboard (HAs 21;22), Outer Bantry Bay]	No	Yes
20	Sheep's Head	SAC 000102	Yes	Yes	Yes – CWBs [South Western Atlantic Seaboard (HAs 21;22), Dunmanus Bay]	No	Yes
21	Farranamanagh Lough	SAC 002189	Yes	No	Yes – CWBs [South Western Atlantic Seaboard (HAs 21;22), Dunmanus Bay]	No	Yes
22	Reen Point Shingle	SAC 002281	Yes	No	Yes – CWBs [South Western Atlantic Seaboard (HAs 21;22), Dunmanus Bay]	No	Yes
23	Dunbeacon Shingle	SAC 002280	Yes	Yes	Yes – CWB [South Western Atlantic Seaboard (HAs 21;22)]	No	Yes
24	Three Castle Head To Mizen Head	SAC 000109	Yes	Yes	Yes – CWB [South Western Atlantic Seaboard (HAs 21;22)]	No	Yes
25	Barley Cove To Ballyrisode Point	SAC 001040	Yes	Yes	Yes – CWB [South Western Atlantic Seaboard (HAs 21;22)]	No	Yes
26	Moanveanlagh Bog	SAC 002351	Yes	Yes	No	Yes - Abbeyfeale	Yes
27	Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle	SPA 004161	Yes	Yes	Yes – RWB [Brick, Big River Tralee]	Yes – Abbeyfeale, Spa, Scartaglin	Yes
28	Mullaghanish Bog	SAC 001890	Yes	Yes	No	Yes- Cahersiveen	Yes
29	Old Domestic building, Curraglass Wood	SAC 002041	No	Yes	No	Yes- Cahersiveen	No
30	Lough Yganavan and Lough Nambrackdarrig	SAC 000370	Yes	Yes	No	Yes- Laune Muckross	Yes
31	Ballymacoda (Clonpriest and Pillmore) SAC	SAC 000077	Yes	Yes	Yes – CWB [Youghal Bay]	No	Yes
32	Ardmore Head	SAC 002123	Yes	Yes	Yes – CWB [Youghal Bay]	No	Yes
33	Ballycotton Bay	SPA 004022	Yes	Yes	Yes – CWB [Ballycotton Bay]	No	Yes

	Site Name	SAC / SPA Code	Water Dependent Species / Habitats	Nutrient Sensitive	Surface Water Connectivity	Groundwater Connectivity	Potential Source Pathway Receptor
34	Cork Harbour	SPA 004030	Yes	Yes	Yes – CWB [Outer Cork Harbour]	No	Yes
35	Sovereign Islands	SPA 004124	Yes	Yes	Yes- CWB [Western Celtic Sea Has 18,19,20]	No	Yes
36	Old Head of Kinsale	SPA 004021	Yes	Yes	Yes- CWB [Western Celtic Sea Has 18,19,20]	No	Yes
37	Courtmacsherry Bay	SPA 004219	Yes	Yes	Yes- CWB [Courtmacsherry Bay]	No	Yes
38	Seven Heads	SPA 004191	Yes	Yes	Yes- CWB [Courtmacsherry Bay]	No	Yes
39	Galley Head to Duneen Point	SPA 004190	Yes	Yes	Yes- CWB [Courtmacsherry Bay]	No	Yes
40	Clonakilty Bay	SPA 004081	Yes	Yes	Yes- CWB [Clonakilty Bay]	No	Yes
41	Illaunineraun	SPA 004114	Yes	Yes	Yes- CWB [Shannon Plume HAs 27;28]	No	Yes
42	Erik Bog	SPA 004108	Yes	Yes	No	Yes - Cahersiveen	Yes
43	Tralee Bay Complex	SPA 004188	Yes	Yes	Yes – RWBs [Lee (Tralee), Pinure], CWBs [Inner Tralee Bay, Outer Tralee bay]	Yes - Kerry Head, Ardfert, Spa, Tralee, Brandon Head	Yes
44	Magharee Islands	SPA 004125	Yes	Yes	Yes – CWB [Outer Tralee Bay]	No	Yes
45	Kerry Head	SPA 004189	Yes	Yes	Yes – CWB [Mouth of the Shannon (HAs 23;27)]	Yes - Kerry Head	Yes
46	River Shannon & River Fergus Estuaries	SPA 004077	Yes	Yes	Yes – CWB [Mouth of the Shannon (HAs 23;27)]	No	Yes
47	Loop Head	SPA 004119	Yes	Yes	Yes – CWB [Mouth of the Shannon (HAs 23;27)]	No	Yes
48	Dingle Peninsula	SPA 004153	Yes	Yes	Yes – CWB [Southern Atlantic Seaboard (HA 23)]	Yes - Brandon Head, Dingle	Yes
49	Blasket Islands	SPA 004008	Yes	Yes	Yes – CWB [South Western Atlantic Seaboard (HAs 21;22)]	No	Yes
50	Castlemaine Harbour	SPA 004029	Yes	Yes	Yes – CWB [Outer Dingle Bay]	Yes - Dingle	Yes
51	Iveragh Peninsula	SPA 004154	Yes	Yes	Yes – CWBs [South Western Atlantic Seaboard (HAs 21;22), Outer Dingle Bay]	No	Yes
52	Puffin Island	SPA 004003	Yes	Yes	Yes – CWB [South Western Atlantic Seaboard (HAs 21;22)]	No	Yes
53	Skelligs	SPA 004007	Yes	Yes	Yes – CWB [South Western Atlantic Seaboard (HAs 21;22)]	No	Yes
54	Deenish Island & Scariff Island	SPA 004175	Yes	Yes	Yes – CWB [South Western Atlantic Seaboard (HAs 21;22)]	No	Yes

	Site Name	SAC / SPA Code	Water Dependent Species / Habitats	Nutrient Sensitive	Surface Water Connectivity	Groundwater Connectivity	Potential Source Pathway Receptor
55	Beara Peninsula	SPA 004155	Yes	Yes	Yes – CWB [South Western Atlantic Seaboard (HAs 21;22), Outer Bantry Bay]	No	Yes
56	The Bull & The Cow Rocks	SPA 004066	Yes	Yes	Yes – CWB [South Western Atlantic Seaboard (HAs 21;22)]	No	Yes
57	Sheep's Head to Toe Head	SPA 004156	Yes	Yes	Yes – CWBs [South Western Atlantic Seaboard (HAs 21;22), Dunmanus Bay, Outer Bantry Bay]	No	Yes
58	Killarney National Park	SPA 004038	Yes	Yes	No	Yes - Scartaglin	Yes



Legend

- wReservoir_clp *Scart Reservoir*

LEMA Emission Type

- Primary Discharge Point
- Storm Water Overflow
- Waste Water Treatment Plant
- 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 (August 2019)
EPA

N

0 10 20 40 Kilometres

Client

Uisce Éireann Irish Water

Project Lead Mitigation Plan
Corrective Water Treatment Works

Figure 4.1

Central Kerry RWSS Scart Reservoir WSZ

European Sites within the ZoI of the Proposed Project

RPS

Scale: 1:1,200,000 @ A3	Date: 03/12/2021
File Ref: MDW0766Arc0082aF02	Map Projection: Irish National Grid (TM65)

Zone of Influence (ZoI) for Operational Phase

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.** Two sites are included for further assessment for the construction phase and 13 sites are included for further assessment for the operational phase, with justification provided below.

The construction phase of the proposed project will take place within the confines of the existing Scart Reservoir. There is potential for surface water connectivity to the Castlemaine Harbour SAC and SPA via the Maine_040 which is located 60m north of the reservoir. The Reservoir is located within the Scartaglin groundwater body (IE_SW_G_073), All European sites overlying or supporting connectivity to this groundwater body have been assessed to determine potential source pathway receptors.

Scartaglin groundwater body is predominantly a poorly productive bedrock aquifer. Groundwater flow paths are generally short, typically 30-300 m, with groundwater discharging to small springs, or to the streams and rivers that traverse the aquifer. Flow directions are expected to approximately follow the local surface water catchments. The Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA is only connected to the Reservoir via this groundwater body but is located up gradient and therefore is excluded from further assessment given there are no pathways for impacts. Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC is also only connected to this reservoir via this groundwater body but again this SAC is excluded from further assessment given that flow paths are short and this SAC is 8.5km from the reservoir. Flow is likely toward the Maine_040 which is not connected to this SAC.

The WSZs for the operational phase include a number of agglomerations and cover a large area encompassing the entirety of the town of Tralee, in addition to extensive areas to the north and some areas to the south which support a number of river sub-catchments flowing into the Tralee Bay and the Castlemaine Harbour. As a result, 11 European Sites are located within or intersect the WSZ via river pathways i.e. the Lower River Shannon SAC, Ballyseedy Wood SAC, Tralee Bay and Magharees Peninsula, West to Cloghane SAC, Slieve Mish Mountains SAC, Akeragh, Banna and Barrow Harbour SAC, Castlemaine Harbour SAC, Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC, **,** Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA, Tralee Bay Complex SPA, Killarney National Park SPA and Castlemaine Harbour SPA and are included for further assessment in **Sections 5** and **Section 6.**

The WSZ also intersects thirteen groundwater bodies – Dingle (IE_SW_G_033), Brandon Head (IE_SH_G_044), Tralee (IE_SH_G_226), Scartaglin (IE_SW_G_073), Spa (IE_SH_G_223), Abbeyfeale (IE_SH_G_001), Ballybunnion (IE_SH_G_027), Kerry Head (IE_SH_G_118) Ardfert (IE_SH_G_008), Cahersiveen (IE_SW_G_022) and Castlemaine (IE_SW_G_026) (**Table 3, Appendix C**). The following 20 European Sites overlay or intersect these groundwater bodies – Lower River Shannon SAC, Ballyseedy Wood SAC, Tralee Bay and Magharees Peninsula, West to Cloghane SAC, Slieve Mish Mountains SAC, Akeragh, Banna and Barrow Harbour SAC, , Mount Brandon SAC, , Castlemaine Harbour SAC, Killarney National Park Macgillycuddy's Reeks and Caragh River Catchment SAC, Moanveanlagh Bog SAC, Sheheree (Ardagh) Bog SAC, Mullaghanish Bog SAC, Old Domestic building, Curraglass Wood SAC; Lough Yganavan and Lough Nambrackdarrig SAC, Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA, Tralee Bay Complex SPA, Kerry Head SPA, Dingle Peninsula SPA, , Castlemaine Harbour SPA, Erik Bog SPA and Killarney National Park SPA.

Of these sites a number have already been included for further assessment as they are located within or they intersect the WSZ. For the remaining 9 European Sites which have potential hydrogeological connections, i.e. Mount Brandon SAC, Moanveanlagh Bog SAC, Sheheree (Ardagh) Bog SAC, , Mullaghanish Bog SAC, Old Domestic building, Curraglass Wood SAC; Lough Yganavan and Lough Nambrackdarrig SAC, , Kerry Head SPA, Dingle Peninsula SPA and Erik Bog SPA.

Groundwater flows through voids such as connected pore spaces in sand and gravel aquifers and through fissures, faults, joints and bedding planes in bedrock aquifers. Regional groundwater flows tend to follow the regional topography and generally discharge towards main surface water bodies including rivers, lakes and coastal water bodies. In areas of karstified limestones, high permeability zones give rise to rapid groundwater velocities with more complex flow directions, which may vary seasonally and are difficult to predict with certainty. In this case, the assumption is that groundwater flow direction is from areas of higher elevations to lower elevations, unless groundwater specific information indicates otherwise. Groundwater body specific information relating to flow and discharge is available from the GSI[4], and was consulted in making the assessment.

Dingle IE_SW_G_033, Brandon Head IE_SH_G_044, Scartaglin IE_SW_G_073, Spa IE_SH_G_223, Abbeyfeale IE_SH_G_001, and Kerry Head IE_SH_G_118 are all poorly productive bedrock aquifers, while Tralee IE_SH_G_226, Ardfert IE_SH_G_00, Castlemaine (IE_SW_G_026) and Ballybunnion IE_SH_G_027 are karst aquifers. The WSZs lie predominately within the Tralee IE_SH_G_226 Spa, IE_SH_G_223, Abbeyfeale IE_SH_G_001, Castlemaine (IE_SW_G_026) and Ballybunnion IE_SH_G_027 groundwater bodies with smaller sections overlying Dingle IE_SW_G_033, Brandon Head IE_SH_G_044, Scartaglin IE_SW_G_073, Kerry Head IE_SH_G_118) and Ardfert IE_SH_G_00 groundwater bodies.

Lough Yganavan and Lough Nambrackdarrig SAC over lies the Laune Muckross GWB and is located 23 km west of the WSZ. Laune Muckross is karstic groundwater body with a conduit flow occurring through joints and faults and flow paths can be several kilometres long although may be significantly shorted in areas where the water table is close to the surface[5]. Groundwater discharges to Lough Leane and to the rivers and streams crossing the GWB. The River Laune is likely to be the primary discharge line. Although ground water flow paths may be several kilometres this WSZ is located to the east of the Laune River while this SAC is west of the river. As groundwater discharges to the Laune it is considered that pathway for impact are not present. Therefore, this site has been excluded from further assessment.

Dingle Peninsula SPA lies approximately 8.6 km to the south-west of the WSZ, Mount Brandon SAC lies 4.3 km to the west of the WSZ, both of these sites intersect the Dingle (IE_SW_G_033) and Brandon Head (IE_SH_G_044) GWBs. For both these GWBs, the main discharges are to the gaining rivers and streams, and groundwater will discharge to the coast. Flow paths are relatively short, typically 30 – 300m, and flow directions are expected to approximately follow the local surface water catchments[6,7]. Both these European Sites are located >4km upgradient from the WSZ with groundwater flow discharging to the rivers within the WSZ. On this basis it is not considered that hydrogeological connectivity between the WSZs and Mount Brandon SAC and Dingle Peninsula SPA.

Moanveanlagh Bog SAC is located approximately 10.5 km to the north-east of the WSZ at the northern extent; Kerry Head SPA lies approximately 6 km to the north of the WSZs at their northernmost extent.

[4] https://www.gsi.ie/en-ie/programmes-and-projects/groundwater/activities/understanding-ireland-groundwater/Pages/Groundwater-bodies.aspx
[5] https://secure.dccae.gov.ie/GSI_DOWNLOAD/Groundwater/Reports/GWB/LauneMuckrossGWB.pdf
[6] http://spatial.dcenr.gov.ie/GSI_DOWNLOAD/Groundwater/Reports/GWB/DingleGWB.pdf
[7] http://spatial.dcenr.gov.ie/GSI_DOWNLOAD/Groundwater/Reports/GWB/BrandonHeadGWB.pdf

These sites intersect the Abbeyfeale and Kerry Head groundwater bodies respectively. Both of these groundwater bodies comprise poorly productive bedrock aquifers supporting short flow paths (30-300m) which typically follow similar courses to the adjacent surface water bodies[8,9]. Both these European Sites are located >6km upgradient from the WSZ with groundwater flow discharging to the rivers within the WSZ. For this reason, both sites are excluded from further assessment on the basis of hydrogeological connectivity.

Mullaghanish Bog SAC, Old Domestic building, Curraglass Wood SAC and Erik Bog SPA overly the Cahersiveen GWB. This is a poorly productive groundwater body with short groundwater flow paths (30-300m)[10]. Mullaghanish Bog SAC and Old Domestic building, Curraglass Wood SAC are located approximately 14km and 6km to the south of the WSZ respectively and both are located on the opposite side of the Macgillycuddy Reeks Mountain range to the WSZ. Erik bog SAC is located up gradient 14km south west of the WSZ within the Macgillycuddy Reeks. Therefore, these sites have been excluded from further assessment.

A number of coastal water bodies i.e. Inner Tralee Bay (IE_SH_050_0000), Outer Tralee Bay (IE_SH_040_0000), Southwestern Atlantic Seaboard (HA 23) (IE_SH_010_0000), Mouth of the Shannon (Has 23;27) (IE_SH_060_0000), Outer Dingle Bay (IE_SW_230_0000) and Youghal Bay (IE_SW_020_0000) lie downstream of the WSZ. Rivers intersecting the WSZ first discharge into a number of transitional water bodies – Upper Feale Estuary (IE_SH_060_0200), Cashen (IE_SH_060_0100), Lee K Estuary (IE_SH_050_0100) and Castlemaine Harbour (IE_SW_230_0200), before entering the coastal water bodies.

The EAM results demonstrate that the modelled additional increase from dosing at Scart Reservoir become undetectable (0.0000mg/l) in the following water bodies: Mouth of the Shannon (Has 23; 27) (IE_SH_060_0000) and Southwestern Atlantic Seaboard (HA23) (IE_SH_010_0000). Therefore, the ZoI has been deemed to terminate at these water bodies. For this reason, all European Sites downstream of the ZoI have been excluded from further assessment as it is considered there is no pathway for impact, including: Kerry Head Shoal SAC, Mount Brandon SAC, Blasket Islands SAC, Valencia Harbour/Portmagee Channel SAC, , Castlemaine Harbour SAC, Ballinskelligs Bay and Inny Estuary SAC, Kenmare River SAC, Cleanderry Wood SAC, Mucksna Wood SAC, Old Domestic Building, Dromore Wood SAC, Cloonee and Inchiquin Loughs, Uragh Wood SAC, Glengariff Harbour and Woodland SAC, Sheep's Head SAC, Farranamanagh Lough SAC, Reen Point Shingle SAC, Dunbeacon Shingle SAC, Three Castle Head to Mizen Head SAC, Barley Cove To Ballyrisode Point SAC, River Shannon and Fergus Estuaries SPA, Loop Head SPA, Dingle Peninsula SPA, Blasket Islands SPA, Iveragh Peninsula SPA, Puffin Island SPA, Skelligs SPA, Deenish Island and Scariff Island SPA, Beara Peninsula SPA, The Bull and The Cow Rocks SPA and Sheep's Head to Toe Head SPA.

On this basis, two of sites identified in Table 4.1 within the ZoI for the construction stage 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. Castlemaine Harbour SAC and Castlemaine Harbour SPA. Thirteen of the sites listed in Table 4.2 within the ZoI for the operational stage have been included for further assessment in order to evaluate the significance of the potential effects arising during the operational phase in Sections 5 and 6 below i.e. Lower River Shannon SAC, Ballyseedy Wood SAC, Tralee Bay and Magharees Peninsula, West to Cloghane SAC, Slieve Mish Mountains SAC, Akeragh, Banna and Barrow Harbour SAC, Magharee Islands SAC, Castlemaine Harbour SAC, Killarney National Park Macgillycuddy's Reeks and Caragh River Catchment SAC, , , Killarney National Park SPA, Stack's

[8] http://spatial.dcenr.gov.ie/GSI_DOWNLOAD/Groundwater/Reports/GWB/AbbeyfealeGWB.pdf
[9] http://spatial.dcenr.gov.ie/GSI_DOWNLOAD/Groundwater/Reports/GWB/KerryHeadGWB.pdf
[10] https://secure.dccae.gov.ie/GSI_DOWNLOAD/Groundwater/Reports/GWB/CahersiveenGWB.pdf

to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA, Tralee Bay Complex SPA, Magharee Islands SPA and Castlemaine Harbour SPA. These sites are listed in Table 4.3 below and displayed in Figure 4.2.

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

Site Name	SAC / SPA Code	Conservation Objectives Establishment Date	Feature Code	Qualifying Interests / Special Conservation Interests	Water Dependent Species / Habitats	Nutrient Sensitive	Potential Hydrological / Hydrogeological Connectivity	Potential Source Pathway Receptor
Operational Phase								
Tralee Bay and Magharees Peninsula, West to Cloghane SAC	SAC 002070	11 Feb 2014 Version 1	1130	Estuaries	Yes	Yes	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		
			1210	Annual vegetation of drift lines	Yes	Yes		
			1220	Perennial vegetation of stony banks	Yes	Yes		
			1310	Salicornia and other annuals colonising mud and sand	Yes	Yes		
			1330	Atlantic salt meadows (*Glauco-pucinellietalia maritimae*)	Yes	Yes		
			1410	Mediterranean salt meadows (*Juncetalia maritimi*)	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		

Site Name	SAC / SPA Code	Conservation Objectives Establishment Date	Feature Code	Qualifying Interests / Special Conservation Interests	Water Dependent Species / Habitats	Nutrient Sensitive	Potential Hydrological / Hydrogeological Connectivity	Potential Source Pathway Receptor
			2170	Dunes with Salix repens spp. Argentea (*Salicion arenariae*)	Yes	Yes		
			2190	Humid dune slacks	Yes	Yes		
			6410	*Molinia* meadows on calcareous, peaty or clayey-silt laden soils (*Molinion caeruleae*)	Yes	Yes		
			91E0	Alluvial forests with *Alnus glutinosa and Fraxinus excelsior* (*Alno-padion, Alnion incanae, Salicion albae*)*	Yes	Yes		
Tralee Bay Complex SPA	**SPA 004188**	22 Apr 2014 Version 1	A048	Whooper Swan (*Cygnus cygnus*)	Yes	Yes	Yes	Yes
			A046	Light-bellied Brent Goose (*Branta bernicla hrota*)	Yes	Yes		
			A048	Shelduck (*Tadorna tadorna*)	Yes	Yes		
			A050	Wigeon (*Anas penelope*)	Yes	Yes		
			A052	Teal (*Anas crecca*)	Yes	Yes		
			A053	Mallard (*Anas platyrynchos*)	Yes	Yes		
			A054	Pintail (*Anas acuta*)	Yes	Yes		
			A062	Scaup (*Aythya marila*)	Yes	Yes		
			A130	Oystercatcher (*Haemotopus ostralegus*)	Yes	Yes		

Site Name	SAC / SPA Code	Conservation Objectives Establishment Date	Feature Code	Qualifying Interests / Special Conservation Interests	Water Dependent Species / Habitats	Nutrient Sensitive	Potential Hydrological / Hydrogeological Connectivity	Potential Source Pathway Receptor
			A137	Ringed Plover (*Charadrius hiaticula*)	Yes	Yes		
			A140	Golden Plover (*Pluvialis apricaria*)	Yes	Yes		
			A141	Grey Plover (*Pluvialis squatarola*)	Yes	Yes		
			A142	Lapwing (*Vanellus vanellus*)	Yes	Yes		
			A144	Sanderling (*Calidris alba*)	Yes	Yes		
			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		
			A162	Redshank (*Tringa totanus*)	Yes	Yes		
			A169	Turnstone (*Arenaria interpres*)	Yes	Yes		
			A179	Black-headed Gull (*Chroicocephalus ridibundus*)	Yes	Yes		
			A182	Common Gull (*Larus canus*)	Yes	Yes		
			A999	Wetlands	Yes	Yes		

Site Name	SAC / SPA Code	Conservation Objectives Establishment Date	Feature Code	Qualifying Interests / Special Conservation Interests	Water Dependent Species / Habitats	Nutrient Sensitive	Potential Hydrological / Hydrogeological Connectivity	Potential Source Pathway Receptor
Lower River Shannon SAC	SAC 002165	7 August 2012 Version 1.0	1110	Sandbanks which are slightly covered by sea water all the time	Yes	Yes	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		
			1220	Perennial vegetation of stony banks	Yes	Yes		
			1230	Vegetated sea cliffs of the Atlantic and Baltic coasts	Yes	Yes		
			1310	Salicornia and other annuals colonising mud and sand	Yes	Yes		
			1330	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	Yes	Yes		
			1410	Mediterranean salt meadows (*Juncetalia maritimi*)	Yes	Yes		
			3260	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation	Yes	Yes		
			6410	*Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)	Yes	Yes		

Site Name	SAC / SPA Code	Conservation Objectives Establishment Date	Feature Code	Qualifying Interests / Special Conservation Interests	Water Dependent Species / Habitats	Nutrient Sensitive	Potential Hydrological / Hydrogeological Connectivity	Potential Source Pathway Receptor
			91E0	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)	Yes	Yes		
			1029	Freshwater Pearl Mussel (*Margaritifera margaritifera*)	Yes	Yes		
			1095	Sea Lamprey (*Petromyzon marinus*)	Yes	Yes		
			1096	Brook Lamprey (*Lampetra planeri*)	Yes	Yes		
			1099	River Lamprey (*Lampetra fluviatilis*)	Yes	Yes		
			1106	Salmon (Salmo salar)	Yes	Yes		
			1349	Common Bottlenose Dolphin (*Tursiops truncatus*)	Yes	Yes		
			1355	Otter (*Lutra lutra*)	Yes	Yes		
Ballyseedy Wood SAC	SAC 002112	21 Feb 2018 Version 1	91E0	Alluvial forests with *Alnus glutinosa and Fraxinus excelsior* (*Alno-padion, Alnion incanae, Salicion albae*)*	Yes	Yes	Yes	Yes
Slieve Mish Mountains SAC	SAC 002185	21 Feb 2018 Generic	4010	Northern Atlantic wet heaths with *Erica tetralix*	Yes	Yes	Yes	Yes
			4030	European dry heaths	Yes	Yes		
			4060	Alpine and boreal heaths	Yes	Yes		
			8110	Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galieopsietalia ladani*)	Yes	Yes		

Site Name	SAC / SPA Code	Conservation Objectives Establishment Date	Feature Code	Qualifying Interests / Special Conservation Interests	Water Dependent Species / Habitats	Nutrient Sensitive	Potential Hydrological / Hydrogeological Connectivity	Potential Source Pathway Receptor
			8210	Calcareous rocky slopes with chasmophytic vegetation	Yes	Yes		
			8220	Siliceous rocky slopes with chasmophytic vegetation	Yes	Yes		
Akeragh, Banna and Barrow Harbour SAC	SAC 000332	27 Jan 2017 Version 1	1210	Annual vegetation of drift lines	Yes	Yes	Yes	Yes
			1310	Salicornia and other annuals colonising mud and sand	Yes	Yes		
			1330	Atlantic salt meadows (*Glauco-pucinellietalia maritimae*)	Yes	Yes		
			1410	Mediterranean salt meadows (*Juncetalia maritimi*)	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		
			2190	Humid dune slacks	Yes	Yes		
			4030	European dry heaths	Yes	Yes		
Magharee Islands SAC	SAC 002261	13 Dec 2013 Version 1	1170	Reefs	Yes	Yes	Yes	Yes
Castlemaine Harbour SAC	SAC 000343	19 Jul 2011 Version 2	1095	Sea lamprey (*Petromyzon marinus*)	Yes	Yes	Yes	Yes

Site Name	SAC / SPA Code	Conservation Objectives Establishment Date	Feature Code	Qualifying Interests / Special Conservation Interests	Water Dependent Species / Habitats	Nutrient Sensitive	Potential Hydrological / Hydrogeological Connectivity	Potential Source Pathway Receptor
			1099	River lamprey (*Lampetra fluviatilis*)	Yes	Yes		
			1106	Atlantic salmon (*Salmo salar*) (only in fresh water)	Yes	Yes		
			1130	Estuaries	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	Yes		
			1310	Salicornia and other annuals colonising mud and sand	Yes	Yes		
			1330	Atlantic salt meadows (*Glauco-pucinellietalia maritimae*)	Yes	Yes		
			1355	Otter (*Lutra lutra*)	Yes	Yes		
			1395	Petalwort (*Petalophyllum ralfsii*)	Yes	Yes		
			1410	Mediterranean salt meadows (*Juncetalia maritimi*)	Yes	Yes		
			2110	Embryonic shifting dunes	Yes	Yes		
			2120	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)	Yes	Yes		

Site Name	SAC / SPA Code	Conservation Objectives Establishment Date	Feature Code	Qualifying Interests / Special Conservation Interests	Water Dependent Species / Habitats	Nutrient Sensitive	Potential Hydrological / Hydrogeological Connectivity	Potential Source Pathway Receptor
			2130	Fixed coastal dunes with herbaceous vegetation (grey dunes)*	Yes	Yes		
			2170	Dunes with Salix repens spp. Argentea (*Salicion arenariae*)	Yes	Yes		
			2190	Humid dune slacks	Yes	Yes		
			91E0	Alluvial forests with *Alnus glutinosa and Fraxinus excelsior* (*Alno-padion, Alnion incanae, Salicion albae*)*	Yes	Yes		
Killarney National Park Macgillycuddy's Reeks and Caragh River Catchment SAC	**SAC 000365**	23 Oct 2017 Version 1	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)	Yes	Yes	Yes	Yes
			3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea	Yes	Yes		
			3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation	Yes	Yes		
			4010	Northern Atlantic wet heaths with Erica tetralix	Yes	Yes		
			4030	European dry heaths	No	Yes		
			4060	Alpine and Boreal heaths	No	No		
			5130	Juniperus communis formations on heaths or calcareous grasslands	No	No		
			6130	Calaminarian grasslands of the Violetalia calaminariae	No (flood risk)*	Yes		
			6410	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)	Yes	Yes		
			7130	Blanket bogs (* if active bog)	Yes	Yes		
			7150	Depressions on peat substrates of the Rhynchosporion	Yes	Yes		

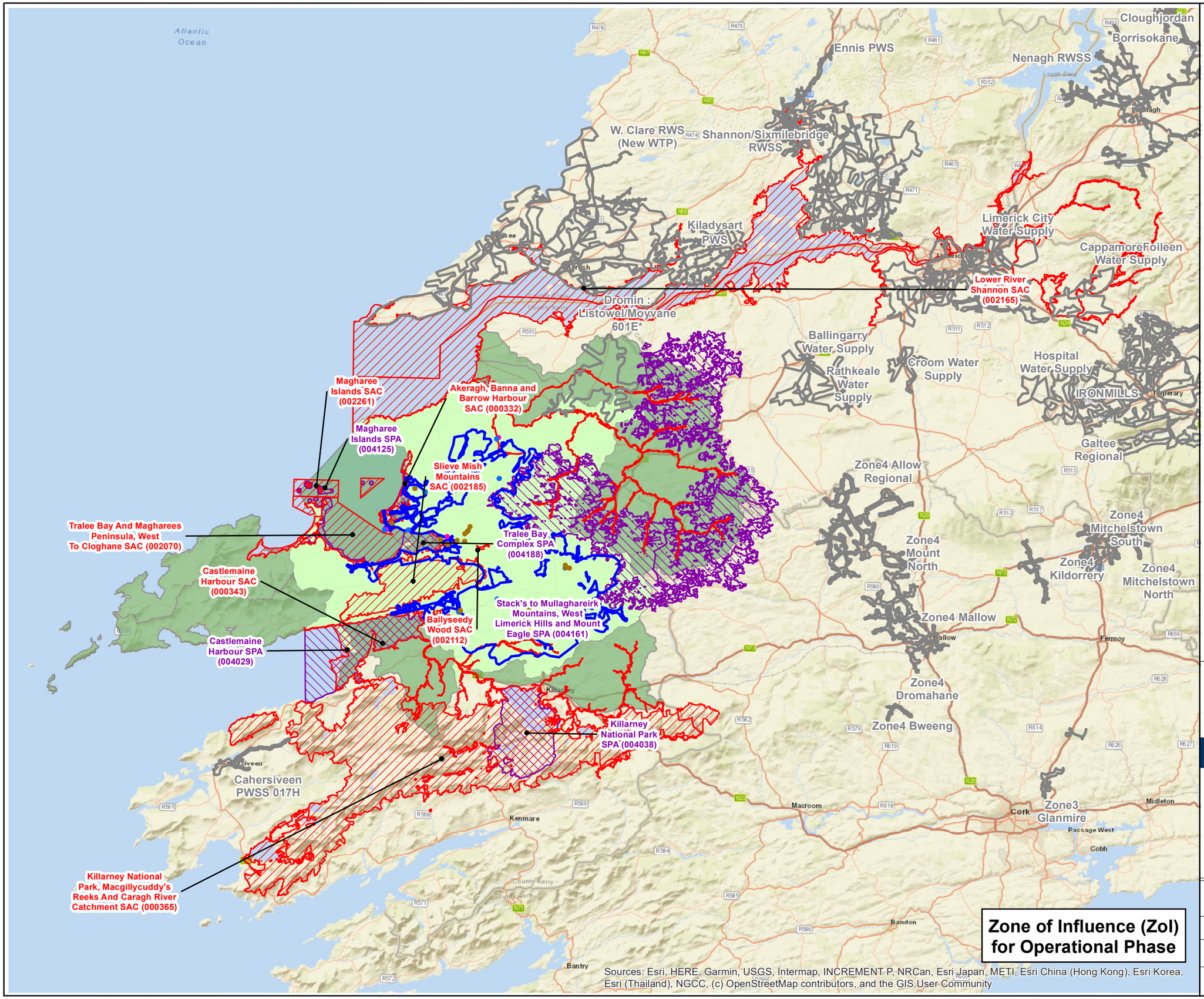
Site Name	SAC / SPA Code	Conservation Objectives Establishment Date	Feature Code	Qualifying Interests / Special Conservation Interests	Water Dependent Species / Habitats	Nutrient Sensitive	Potential Hydrological / Hydrogeological Connectivity	Potential Source Pathway Receptor
			91A0	Old sessile oak woods with Ilex and Blechnum in the British Isles	No	Yes		
			91E0	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae)	Yes	Yes		
			91J0	Taxus baccata woods of the British Isles	No	No		
			1024	Kerry Slug *Geomalacus maculosus*	No	Yes		
			1029	Freshwater Pearl Mussel *Margaritifera margaritifera*	Yes	Yes		
			1065	Marsh Fritillary *Euphydryas aurinia*	Yes	No		
			1095	Sea Lamprey *Petromyzon marinus*	Yes	Yes		
			1096	Brook Lamprey *Lampetra planeri*	Yes	Yes		
			1099	River Lamprey *Lampetra fluviatilis*	Yes	Yes		
			1106	Salmon *Salmo salar*	Yes	Yes		
			1303	Lesser Horseshoe Bat *Rhinolophus hipposideros*	No	Yes		
			1355	Otter *Lutra lutra*	Yes	Yes		
			1421	Killarney Fern *Trichomanes speciosum*	Yes	Yes		
			1833	Slender Naiad *Najas flexilis*	Yes	Yes		
			5046	Killarney Shad Alosa fallax killarnensis	Yes	Yes		
			7120	Degraded raised bogs still capable of natural regeneration	Yes	Yes		

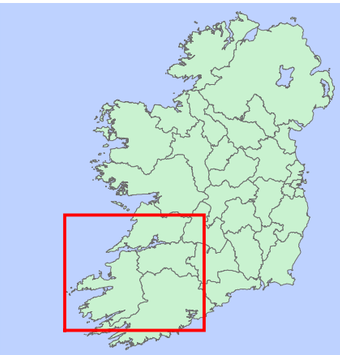
Site Name	SAC / SPA Code	Conservation Objectives Establishment Date	Feature Code	Qualifying Interests / Special Conservation Interests	Water Dependent Species / Habitats	Nutrient Sensitive	Potential Hydrological / Hydrogeological Connectivity	Potential Source Pathway Receptor
Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA	**SPA 004161**	21 Feb 2018 Generic	A082	Hen Harrier (*Circus cyaneus*)	Yes	Yes	Yes	Yes
Magharee Islands SPA	SPA 004125	21 Feb 2018 Generic	A014	Storm Petrel (*Hydrobates pelagicus*)	Yes	Yes	Yes	Yes
			A018	Shag (*Phalacrocorax aristotelis*)	Yes	Yes		
			A045	Barnacle Goose (*Branta leucopsis*)	Yes	Yes		
			A182	Common Gull (*Larus canus*)	Yes	Yes		
			A193	Common Tern (*Sterna hirundo*)	Yes	Yes		
			A194	Arctic Tern (*Sterna paradisaea*)	Yes	Yes		
			A195	Little Tern (*Sterna albifrons*)	Yes	Yes		
Castlemaine Harbour SPA	SPA 004029	19 Jul 2011 Version 2	A001	Red-throated Diver (*Gavia stellata*)	Yes	Yes	Yes	Yes
			A017	Cormorant (*Phalacrocorax carbo*)	Yes	Yes		
			A046	Light-bellied Brent Goose (*Branta bernicla hrota*)	Yes	Yes		
			A050	Wigeon (*Anas penelope*)	Yes	Yes		
			A053	Mallard (*Anas platyrynchos*)	Yes	Yes		

Site Name	SAC / SPA Code	Conservation Objectives Establishment Date	Feature Code	Qualifying Interests / Special Conservation Interests	Water Dependent Species / Habitats	Nutrient Sensitive	Potential Hydrological / Hydrogeological Connectivity	Potential Source Pathway Receptor
			A054	Pintail (*Anas acuta*)	Yes	Yes		
			A062	Scaup (*Aythya marila*)	Yes	Yes		
			A130	Oystercatcher (*Haemotopus ostralegus*)	Yes	Yes		
			A137	Ringed Plover (*Charadrius hiaticula*)	Yes	Yes		
			A144	Sanderling (*Calidris alba*)	Yes	Yes		
			A157	Bar-tailed Godwit (*Limosa lapponica*)	Yes	Yes		
			A162	Redshank (*Tringa totanus*)	Yes	Yes		
			A164	Greenshank (*Tringa nebularia*)	Yes	Yes		
			A169	Turnstone (*Arenaria interpres*)	Yes	Yes		
			A346	Chough (*Pyrrhocorax pyrrhocorax*)	Yes	Yes		
			A999	Wetlands and Waterbirds	Yes	Yes		
Killarney National Park	SPA 004038	21 Feb 2018 Generic	A098	Merlin (*Falco columbarius*)	Yes	Yes	Yes	Yes
			A395	Greenland White-fronted Goose (*Anser albifrons flavirostris*)	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

- Primary Discharge Point
- Storm Water Overflow
- Waste Water Treatment Plant
- wReservoir_clp *Scart Reservoir*
- Additional WSZ considered for dosing
- Water Supply Zone Boundary (WSZ)
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)
- Subcatchments intersecting Water Supply Zone(s) related to the WTP
- 1300PUB1016_002 *Zone of Influence*

Data Source:
Irish Water
NPWS (August 2019)
EPA

N

0 5 10 20 Kilometres

Client

Uisce Éireann Irish Water

Project Lead Mitigation Plan
Corrective Water Treatment Works

Figure 4.2

Central Kerry RWSS Scart Reservoir WSZ European Sites within the ZoI which are hydro(geo)logically connected

RPS

Scale: 1:550,000 @ A3	**Date:** 03/12/2021
File Ref: MDW0766Arc0082bF02	**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 Scart Reservoir. 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** Error! Reference source not found. below) the construction phase may not give rise to these effects.

- 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;

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 Scart Reservoir. 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 Scart Reservoir.

5.3.1 Construction Phase

The dosing system will be located within the confines of the existing WTP boundary and use predominantly existing infrastructure as outlined in Section 3.2. The assessment of impacts associated with the construction of the corrective water treatment works at Scart Reservoir is presented in **Table 5-1** and is based on a desktop study using the following information:

- Design descriptions for the proposed corrective water treatment at Scart Reservoir;
- 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[11]	Evaluation of Potential Significant Effects
Castlemaine Harbour SAC & Castlemaine Harbour SPA	Maine_04 IE_SW_22M010700	RWB	The construction phase of the proposed project will take place within the confines of the existing Scart Reservoir. There is potential for surface water connectivity to the Castlemaine Harbour SAC and SPA via the Maine_040 which is located 60m north of the reservoir. The Reservoir is located within the Scartaglin groundwater body (IE_SW_G_073). All European sites overlying or supporting connectivity to this groundwater body have been assessed to determine potential source pathway receptors. As outlined in Section 4.2 Castlemaine Harbour SAC and SPA are the only European Sites that have a potential source pathway receptor linkage. **Surface Water** The WTP is separated from the Maine_040 River by agricultural grassland. The Castlemaine Harbour SAC (000343) is situated approximately 15 km west of the Reservoir. The Castlemaine Harbour SPA is located approximately 19.6km west of the WTP. Scart Reservoir is surrounded by agricultural grassland. The WTP ground consists of built infrastructure, amenity grassland and scrub. These features comprise a boundary of separation, isolating any surface water pathway from the works area to the European Sites and Maine_040 River. Owing to the small scale nature of the proposed works with limited excavation required (if any), the significant distance between the Reservoir and European Sites, absence of hydrological connections as well as existing natural and built barriers there is no potential for likely significant effects on these sites through sediment laden run-off, dust emissions or environmental incidents. **Groundwater** Scart Reservoir overlies the Scartaglin (IE_SW_G_073) groundwater body. All European Sites overlying or supporting connectivity to this Groundwater Body have

[11] Monitoring period is annual unless specified.

Site Name (Code)	Contributing WB Code_Name	WB Type[11]	Evaluation of Potential Significant Effects
			been assessed to determine potential source pathway receptors. This groundwater body comprises poorly productive bedrock and flow is generally unconfined[12]. Local groundwater flow is towards the rivers and streams and the flow path will not usually exceed a few hundred metres in length. As a result, sites 3 and 4 ( ) are considered to have no connectivity to the Reservoir as they are located > 8.5 km upgradient from the Reservoir. For site 1 and 2 (Castelmaine Harbour SAC/SPA), the impact pathway would be via the Maine_040 river which is between the Reservoir and the SAC and any potential groundwater flow from the Reservoir site will join the surface water pathway as discussed. Owing to the small scale nature of the proposed works with limited excavation required (if any), the significant distance between the Maine_040 and European Sites, as well as existing natural and built barriers there is no potential for likely significant effects on these sites through environmental incidents. Therefore, there is no potential for likely significant effects on the Castlemaine Harbour SAC/SPA as a result of the construction of the corrective water treatment works at Scart Reservoir.

5.3.2 Operational Phase

In the case of the additional orthophosphate load due to dosing at Scart Reservoir, 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;

[12] https://jetstream.gsi.ie/iwdds/delivery/GSI_Transfer/Groundwater/GWB/GlenvilleGWB.pdf

- 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.

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. 0.00125 mg/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 water body is unassigned and therefore 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 water body but the more conservative freshwater orthophosphate limits for the different indicative quality bands are applied[13].

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

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

[13] 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.

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 orthoP 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. For surface water bodies, the environmental significance is evaluated until 2021 in the WFD App.

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 for 2021 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 0.95 mg/l.

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 2015 - 2017 concentrations for a river water body are available, the 2015 – 2017 average can be used instead of the 2014 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[14]	Ortho P Indicative Quality[15] and Trends[16]	Baseline[17] Ortho P Conc.[18] (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.[19] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[20]	Evaluation
Lower River Shannon SAC	IE_SH_23B030300 Brick_010	RWB	*Moderate*	*0.046*	0.051	24.9	0.0008	0.046‡	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23B030400 Brick_020	RWB Multiple Monitoring Points	*Bad*	0.168	-	62.8	0.0012	0.1692‡ **	Modelled additional conc. just below >5% High/Good indicative quality boundary but is within 75% of the upper indicative quality threshold therefore there is no risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives given the undetectable modelled increase in orthophosphate.
			Poor	0.068	0.087			0.069‡ *	The modelled additional concentration is just below >5% High/Good indicative quality boundary but is within 75% of the upper indicative quality threshold therefore there is no risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives

[14] Monitoring period is annual unless specified.
[15] Surrogate Indicative Quality in italic.
[16] Distance to threshold.
[17] Baseline year is 2017 for surface water bodies and 2015 for groundwater bodies unless otherwise stated.
[18] Surrogate concentration is given in italic mg/l
[19] 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.
[20] 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[14]	Ortho P Indicative Quality[15] and Trends[16]	Baseline[17] Ortho P Conc.[18] (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.[19] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[20]	Evaluation
	IE_SH_23B030500 Brick_030	RWB	Moderate	0.046	0.051	75.1	0.0011	0.047‡	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23B030700 Brick_040	RWB Multiple Monitoring Points	Poor Upwards Far	0.064	0.087	89.4	0.0007	0.065‡**	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
			Poor Upwards Far	0.063	0.087			0.064‡**	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23M440980 Mountcoal_010	RWB	High	0.013	0.019	0.0	0.0000	0.013	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23K120820 Knoppoge South_010	RWB	*Good*	*0.030*	0.033	89.4	0.0008	0.031	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_060_0200 Upper Feale Estuary	TWB Summer	High Upwards Far	0.013	0.019	0.0	0.0000	0.013	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
		TWB Winter	High Downwards Far	0.018	0.019			0.018	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_060_0100 Cashen	TWB Summer	High Upwards Far	0.011	0.022	99.8	0.0000	0.011‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
		TWB Winter	High Downwards Near	0.022	0.019			0.022‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.

Site Name (Code)	Contributing WB Code_Name	WB Type[14]	Ortho P Indicative Quality[15] and Trends[16]	Baseline[17] Ortho P Conc.[18] (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.[19] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[20]	Evaluation
	IE_SH_060_0000 Mouth of the Shannon (HAs 23;27)	CWB Summer	High Upwards Far	0.010	0.019	99.8	0.0000	0.010‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
		CWB Winter	Good Upwards Near	0.040	0.037			0.040‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_G_027 Ballybunnion	GWB	Good Downwards Far	0.008	0.026	19.6	0.0006	0.009	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_G_118 Kerry Head	GWB	Good	0.018	0.026	0.1	0.0000	0.018	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_G_001 Abbeyfeale	GWB	Good	0.018	0.026	4.6	0.0000	0.018	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
Ballyseedy Wood SAC	IE_SH_23L010030 Lee (Tralee)_010	RWB	Moderate Upwards Far	0.040	0.051	11.8	0.0006	0.041†† **	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives
	IE_SH_23L010050 Lee (Tralee)_020	RWB	Moderate	0.040	0.051	22.8	0.0006	0.041**	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23L010100 Lee (Tralee)_030	RWB	Good Upwards Near	0.033	0.033	62.0	0.0007	0.034*	Existing baseline conc. is just the 75% of indicative quality upper threshold. However as modelled post-dosing increase is < 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.

Site Name (Code)	Contributing WB Code_Name	WB Type[14]	Ortho P Indicative Quality[15] and Trends[16]	Baseline[17] Ortho P Conc.[18] (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.[19] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[20]	Evaluation
	IE_SH_G_226 Tralee	GWB	Good	0.018	0.026	27.7	0.0016	0.019	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
Tralee Bay & Magharees Peninsula, West to Cloghane SAC	IE_SH_23P160880 Pinure_010	RWB	Good	0.030	0.033	11.2	0.0007	0.031	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23L010030 Lee (Tralee)_010	RWB	Moderate Upwards Far	0.040	0.051	11.8	0.0006	0.041†† **	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives
	IE_SH_23L010050 Lee (Tralee)_020	RWB	Moderate	0.040	0.051	22.8	0.0006	0.041**	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23L010100 Lee (Tralee)_030	RWB	Good Upwards Near	0.033	0.033	62.0	0.0007	0.034*	Existing baseline conc. is just over the 75% of indicative quality upper threshold. However as modelled post-dosing increase is < 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23L010200 Lee (Tralee)_040	RWB	Good	0.030	0.033	111.7	0.0010	0.031	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives
	IE_SH_23B040150 Big River (Tralee)_010	RWB	*Poor Downwards Far*	*0.069*	0.087	28.8	0.0023	0.072**	The modelled increase in conc. exceeds 5% of the High / Good indicative quality boundary. However, this does not cause the post-dosing baseline to exceed 75% of the indicative quality upper threshold, therefore there is no risk

Site Name (Code)	Contributing WB Code_Name	WB Type[14]	Ortho P Indicative Quality[15] and Trends[16]	Baseline[17] Ortho P Conc.[18] (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.[19] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[20]	Evaluation
									of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23A060890 Annagh 23_010	RWB	*Good*	*0.030*	0.033	7.2	0.0003	0.030^	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives
	IE_SH_23K130870 Knockglass_Beg_010	RWB	*Good*	*0.030*	0.033	2.0	0.0002	0.030	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23F030400 Finglas (Tralee Bay)_010	RWB	*Good*	*0.030*	0.033	4.8	0.0002	0.030	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23C190920 Carrigaha_010	RWB	*Good*	*0.030*	0.033	2.2	0.0002	0.030	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23D420880 Derryquay River_010	RWB	*Good*	*0.030*	0.033	2.3	0.0002	0.030	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_050_0100 Lee K Estuary	TWB Summer	Good Upwards Far	0.036	0.036	165.5	0.0004	0.036‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
		TWB Winter	Good Upwards Near	0.050	0.045			0.050‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_050_0000 Inner Tralee Bay	CWB Summer	High Downwards Far	0.014	0.019	184.0	0.0000	0.014‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
		CWB Winter	High Upwards	0.021	0.019			0.021‡	Existing baseline conc. exceeds 75% of indicative

Site Name (Code)	Contributing WB Code_Name	WB Type[14]	Ortho P Indicative Quality[15] and Trends[16]	Baseline[17] Ortho P Conc.[18] (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.[19] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[20]	Evaluation
			Near						quality upper threshold. However as modelled post-dosing increase is < 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_040_0000 Outer Tralee Bay	CWB Summer	High Upwards Far	0.011	0.019	219.1	0.0000	0.011‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
		CWB Winter	High Downwards Far	0.018	0.019			0.018	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_010_0000 Southwestern Atlantic Seaboard (HA 23)	CWB	High	0.013	0.019	318.9	0.0000	0.013‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_G_226 Tralee	GWB	Good	0.018	0.026	27.7	0.0016	0.019	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_G_223 Spa	GWB	Good	0.018	0.026	2.1	0.0002	0.018	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_G_044 Brandon Head	GWB	Good Upwards Far	0.015	0.026	3.3	0.0000	0.015	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_G_008 Ardfert	GWB	Good Upwards Far	0.007	0.026	13.2	0.0008	0.008**	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.

Site Name (Code)	Contributing WB Code_Name	WB Type[14]	Ortho P Indicative Quality[15] and Trends[16]	Baseline[17] Ortho P Conc.[18] (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.[19] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[20]	Evaluation
			Good Upwards Far	0.010	0.026			0.011**	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
Slieve Mish Mountains SAC	IE_SH_23L010100 Lee (Tralee)_030	RWB	Good Upwards Near	0.033	0.033	62.0	0.0007	0.034*	Existing baseline conc. is just over the 75% of indicative quality upper threshold. However as modelled post-dosing increase is < 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23L010200 Lee (Tralee)_040	RWB	Good	0.030	*0.033*	111.7	0.0010	0.031	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives
	IE_SW_22M010800 Maine_050	RWB	High - Near	0.020	0.019	276.3	0.0008	0.021 ‡**	Existing baseline conc. is just over the 75% of indicative quality upper threshold. However as modelled post-dosing increase is < 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_G_226 Tralee	GWB	Good	0.018	0.026	27.7	0.0016	0.019	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_G_044 Brandon Head	GWB	Good Upwards Far	0.015	0.026	3.3	0.0000	0.015	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.

Site Name (Code)	Contributing WB Code_Name	WB Type[14]	Ortho P Indicative Quality[15] and Trends[16]	Baseline[17] Ortho P Conc.[18] (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.[19] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[20]	Evaluation
	IE_SW_G_033 Dingle	GWB	Good	0.018	0.026	6.2	0.0001	0.018	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
Akeragh, Banna & Barrow Harbour SAC	IE_SH_23A190800 Ardfert Oughter_010	RWB	*High*	*0.013*	0.019	0.9	0.0008	0.013	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23B910900 Ballynoe_010	RWB	*Poor*	*0.077*	0.087	13.1	0.0006	0.077‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23T020400 Tyshe_010	RWB	Poor - Far	0.058	0.087	4.5	0.0010	0.059**	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23T020500 Tyshe_020	RWB Multiple Monitoring Points	*Poor*	*0.093*	0.087	12.7	0.0012	0.094‡**	Existing baseline conc. is over the 75% of indicative quality upper threshold. However as modelled post-dosing increase is < 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
			Bad	*0.108*	-			0.109‡**	The modelled increase in conc. is just below 5% of the High/Good indicative quality boundary. As the increase in concentration due to orthophosphate dosing is below significant levels, dosing will not result in any further impact on the structure and functioning of

Site Name (Code)	Contributing WB Code_Name	WB Type[14]	Ortho P Indicative Quality[15] and Trends[16]	Baseline[17] Ortho P Conc.[18] (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.[19] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[20]	Evaluation
									aquatic ecosystems in this water body
	IE_SH_050_0000 Inner Tralee Bay	CWB Summer	High Downwards Far	0.014	0.019	184.0	0.0000	0.014‡	Existing baseline conc. exceeds 75% of indicative quality upper threshold. However as modelled post-dosing increase is < 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
		CWB Winter	High Upwards Near	0.021	0.019			0.021‡	Existing baseline conc. exceeds 75% of indicative quality upper threshold. However as modelled post-dosing increase is < 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_040_0000 Outer Tralee Bay	CWB Summer	High Upwards Far	0.011	0.019	219.1	0.0000	0.011‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
		CWB Winter	High Downwards Far	0.018	0.019			0.018	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_G_118 Kerry Head	GWB	*Good*	*0.018*	0.026	0.1	0.0000	0.018	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_G_008 Ardfert	GWB Multiple	Good Upwards Far	0.007	0.026	13.2	0.0008	0.008**	No risk of deterioration in the orthoP indicative quality or of preventing

Site Name (Code)	Contributing WB Code_Name	WB Type[14]	Ortho P Indicative Quality[15] and Trends[16]	Baseline[17] Ortho P Conc.[18] (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.[19] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[20]	Evaluation
		Monitoring Points							the achievement of WFD objectives.
			Good Upwards Far	0.010	0.026			0.011**	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
Magharee Islands SAC	IE_SH_23P160880 Pinure_010	RWB	*Good*	*0.030*	0.033	11.2	0.0007	0.031	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23A190800 Ardfert Oughter_010	RWB	*High*	*0.013*	0.019	0.9	0.0008	0.013	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23T020400 Tyshe_010	RWB	Poor - Far	0.058	0.087	4.5	0.0010	0.059**	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23T020500 Tyshe_020	RWB Multiple Monitoring Points	*Poor*	*0.093*	0.087	12.7	0.0012	0.094‡**	Existing baseline conc. is over the 75% of indicative quality upper threshold. However as modelled post-dosing increase is < 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
			Bad	*0.108*	-			0.109‡**	The modelled increase in conc. is just below 5% of the High/Good indicative quality boundary. As the increase in concentration due to orthophosphate dosing is below significant levels, dosing will not result in any further impact on the structure

Site Name (Code)	Contributing WB Code_Name	WB Type[14]	Ortho P Indicative Quality[15] and Trends[16]	Baseline[17] Ortho P Conc.[18] (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.[19] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[20]	Evaluation
									and functioning of aquatic ecosystems in this water body
	IE_SH_23B040150 Big River (Tralee)_010	RWB	*Poor Downwards Far*	*0.069*	0.087	28.8	0.0023	0.072**	The modelled increase in conc. exceeds 5% of the High / Good indicative quality boundary. However, this does not cause the post-dosing baseline to exceed 75% of the indicative quality upper threshold, therefore there is no risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23L010030 Lee (Tralee)_010	RWB	Moderate Upwards Far	0.040	0.051	11.8	0.0006	0.041†** *†	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives
	IE_SH_23L010050 Lee (Tralee)_020	RWB	Moderate	0.040	0.051	22.8	0.0006	0.041**	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23L010100 Lee (Tralee)_030	RWB	Good Upwards Near	0.033	0.033	62.0	0.0007	0.034*	Existing baseline conc. is just the 75% of indicative quality upper threshold. However as modelled post-dosing increase is < 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23L010200 Lee (Tralee)_040	RWB	Good	0.030	0.033	111.7	0.0010	0.031	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives

Site Name (Code)	Contributing WB Code_Name	WB Type[14]	Ortho P Indicative Quality[15] and Trends[16]	Baseline[17] Ortho P Conc.[18] (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.[19] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[20]	Evaluation
	IE_SH_23A060890 Annagh 23_010	RWB	*Good*	*0.030*	0.033	7.2	0.0003	0.030^	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives
	IE_SH_050_0100 Lee K Estuary	TWB Summer	Good Upwards Far	0.036	0.036	165.5	0.0004	0.036‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
		TWB Winter	Good Upwards Near	0.050	0.045	165.5	0.0004	0.036‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_050_0000 Inner Tralee Bay	CWB Summer	High Downwards Far	0.014	0.019	184.0	0.0000	0.014‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
		CWB Winter	High Upwards Near	0.021	0.019			0.021‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_040_0000 Outer Tralee Bay	CWB Summer	High Upwards Far	0.011	0.019	219.1	0.0000	0.011‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
		CWB Winter	High Downwards Far	0.018	0.019			0.018	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
Castlemaine Harbour SAC	IE_SW_22L020500 Little Maine_010	RWB	*High*	*0.013*	0.019	2.0	0.0002	0.013	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_22L021000 Little Maine_020	RWB	High Downwards Far	0.014	0.019	12.7	0.0004	0.014**	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.

Site Name (Code)	Contributing WB Code_Name	WB Type[14]	Ortho P Indicative Quality[15] and Trends[16]	Baseline[17] Ortho P Conc.[18] (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.[19] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[20]	Evaluation
	IE_SW_22M 010500 Maine_030	RWB	High - Near	0.024	0.019	88.4	0.0005	0.025**	Existing baseline conc. is over the 75% of indicative quality upper threshold. However as modelled post-dosing increase is < 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_22M 010700 Maine_040	RWB	Good - Far	0.026	0.033	184.9	0.0005	0.027‡ **	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_22M 010800 Maine_050	RWB	High - Near	0.020	0.019	276.3	0.0008	0.021 ‡**	Existing baseline conc. is over the 75% of indicative quality upper threshold. However as modelled post-dosing increase is < 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_22K 040500 Kealbrogee n STREAM (Laune)_010	RWB	*Good*	*0.030*	0.033	3.5	0.0002	0.030	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives
	IE_SW_22L0 10400 Laune_040	RWB	*High*	*0.013*	0.019	52.1	0.0001	0.013	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_22G 080300 Groin_010	RWB	*High*	*0.013*	0.019	0.9	0.0001	0.013	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.

Site Name (Code)	Contributing WB Code_Name	WB Type[14]	Ortho P Indicative Quality[15] and Trends[16]	Baseline[17] Ortho P Conc.[18] (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.[19] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[20]	Evaluation
	IE_SW_22S130900 Shanakeal_010	RWB	High	0.013	0.019	16.4	0.0004	0.013	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_22D030400 Dogue_010	RWB	*High*	*0.013*	0.019	3.1	0.0002	0.013	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_22F090400 Fahaduff_010	RWB	*Moderate*	*0.046*	0.051	6.0	0.0004	0.047	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_22G060300 Gweestin_010	RWB	*High*	*0.013*	0.019	8.2	0.0007	0.013	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_22G060600 Gweestin_020	RWB	*Good*	*0.030*	0.033	19.0	0.0008	0.031	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_22G060900 Gweestin_030	RWB	*High*	*0.013*	0.019	44.6	0.0008	0.013	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_230_0200 Castlemaine Harbour	TWB Summer	High Downwards Far	0.010	0.020	321.9	0.0000	0.010‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
		TWB Winter	High Downwards Far	0.020	0.021			0.020‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_G_033 Dingle	GWB	Good	0.018	0.026	6.2	0.0001	0.018	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.

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Killarney National Park, Macgillycuddy's Reeks And Caragh River Catchment SAC	IE_SW_G_073 Scartaglin	GWB	Good	0.018	0.026	37.2	0.0005	0.018	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_010_0000 Southwestern Atlantic Seaboard (HA 23)	CWB	High	0.013	0.019	318.9	0.0000	0.013‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA	IE_SH_23B030300 Brick_010	RWB	*Moderate*	*0.046*	0.051	24.9	0.0008	0.046‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23B030500 Brick_030	RWB	Moderate	0.046	0.051	75.1	0.0011	0.047‡	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23L010030 Lee (Tralee)_010	RWB	Moderate Upwards Far	0.040	0.051	11.8	0.0006	0.041†† **	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives
	IE_SW_22M010500 Maine_030	RWB	High - Near	0.024	0.019	88.4	0.0005	0.025**	Existing baseline conc. is over the 75% of indicative quality upper threshold. However as modelled post-dosing increase is < 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23M440980 Mountcoal_010	RWB	High	0.013	0.019	0.0	0.0000	0.013	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_G_001 Abbeyfeale	GWB	Good	0.018	0.026	4.6	0.0000	0.018	No risk of deterioration in the orthoP indicative quality or of preventing

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									the achievement of WFD objectives.
	IE_SH_G_223 Spa	GWB	Good	0.018	0.026	2.1	0.0002	0.018	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_G_073 Scartaglin	GWB	Good	0.018	0.026	37.2	0.0005	0.018	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
Tralee Bay Complex SPA	IE_SH_23P160880 Pinure_010	RWB	Good	0.030	0.033	11.2	0.0007	0.031	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23A190800 Ardfert Oughter_010	RWB	High	0.013	0.019	0.9	0.0008	0.013	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23T020400 Tyshe_010	RWB	Poor - Far	0.058	0.087	4.5	0.0010	0.059**	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23T020500 Tyshe_020	RWB Multiple Monitoring Points	*Poor*	*0.093*	0.087	12.7	0.0012	0.098‡**	Existing baseline conc. is over the 75% of indicative quality upper threshold. However as modelled post-dosing increase is < 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
			Bad	*0.108*	-			0.109‡**	The modelled increase in conc. is just below 5% of the High/Good indicative quality boundary. As the increase in concentration due to orthophosphate dosing

Site Name (Code)	Contributing WB Code_Name	WB Type[14]	Ortho P Indicative Quality[15] and Trends[16]	Baseline[17] Ortho P Conc.[18] (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.[19] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[20]	Evaluation
									is below significant levels, dosing will not result in any further impact on the structure and functioning of aquatic ecosystems in this water body
	IE_SH_23B040150 Big River (Tralee)_010	RWB	*Poor Downwards Far*	*0.069*	0.087	28.8	0.0023	0.072**	The modelled increase in conc. exceeds 5% of the High / Good indicative quality boundary. However, this does not cause the post-dosing baseline to exceed 75% of the indicative quality upper threshold, therefore there is no risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23L010030 Lee (Tralee)_010	RWB	Moderate Upwards Far	0.040	0.051	11.8	0.0006	0.041†† **	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives
	IE_SH_23L010050 Lee (Tralee)_020	RWB	Moderate	0.040	0.051	22.8	0.0006	0.041**	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23L010100 Lee (Tralee)_030	RWB	Good Upwards Near	0.033	0.033	62.0	0.0007	0.034*	Existing baseline conc. is just the 75% of indicative quality upper threshold. However as modelled post-dosing increase is < 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.

Site Name (Code)	Contributing WB Code_Name	WB Type[14]	Ortho P Indicative Quality[15] and Trends[16]	Baseline[17] Ortho P Conc.[18] (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.[19] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[20]	Evaluation
	IE_SH_23L010200 Lee (Tralee)_040	RWB	Good	0.030	0.033	111.7	0.0010	0.031	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives
	IE_SH_23A060890 Annagh 23_010	RWB	*Good*	*0.030*	0.033	7.2	0.0003	0.030^	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives
	IE_SH_23C190920 Carrigaha_010	RWB	*Good*	*0.030*	0.033	2.2	0.0002	0.030	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_050_0100 Lee K Estuary	TWB Summer	Good Upwards Far	0.036	0.036	165.5	0.0004	0.036‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives
		TWB Winter		0.050	0.045	165.5	0.0004	0.036‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_050_0000 Inner Tralee Bay	CWB Summer	High Downwards Far	0.014	0.019	184.0	0.0000	0.014‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
		CWB Winter	High Upwards Near	0.021	0.019			0.021‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_040_0000 Outer Tralee Bay	CWB Summer	High Upwards Far	0.011	0.019	219.1	0.0000	0.011‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
		CWB Winter	High Downwards Far	0.018	0.019			0.018	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_G_226	GWB	Good	0.018	0.026	27.7	0.0016	0.019	No risk of deterioration in the orthoP indicative

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	Tralee								quality or of preventing the achievement of WFD objectives.
	IE_SH_G_044 Brandon Head	GWB	Good Upwards Far	0.015	0.026	3.3	0.0000	0.015	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_G_223 Spa	GWB	Good	0.018	0.026	2.1	0.0002	0.018	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_G_008 Ardfert	GWB Multiple Monitoring Points	Good Upwards Far	0.007	0.026	13.2	0.0008	0.0080**	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
			Good Upwards Far	0.010	0.026			0.011**	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_G_118 Kerry Head	GWB	Good	0.018	0.026	0.1	0.0000	0.018	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
Magharee Islands SPA	IE_SH_23P160880 Pinure_010	RWB	Good	0.030	0.033	11.2	0.0007	0.031	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23A190800 Ardfert Oughter_010	RWB	High	0.013	0.019	0.9	0.0008	0.013	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23T020400 Tyshe_010	RWB	Poor - Far	0.058	0.087	4.5	0.0010	0.059**	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23T020500 Tyshe_020	RWB Multiple Monitoring Points	*Poor*	*0.093*	0.087	12.7	0.0012	0.094‡**	Existing baseline conc. is over the 75% of indicative quality upper threshold. However as modelled

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									post-dosing increase is < 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
			Bad	*0.108*	0.087			0.109‡**	The modelled increase in conc. is just below 5% of the High/Good indicative quality boundary. As the increase in concentration due to orthophosphate dosing is below significant levels, dosing will not result in any further impact on the structure and functioning of aquatic ecosystems in this water body
	IE_SH_23B040150 Big River (Tralee)_010	RWB	*Poor Downwards Far*	*0.069*	0.087	28.8	0.0023	0.072**	The modelled increase in conc. exceeds 5% of the High / Good indicative quality boundary. However, this does not cause the post-dosing baseline to exceed 75% of the indicative quality upper threshold, therefore there is no risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23L010030 Lee (Tralee)_010	RWB	Moderate Upwards Far	0.040	0.051	11.8	0.0006	0.041†† **	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives
	IE_SH_23L010050 Lee	RWB	Moderate	0.040	0.051	22.8	0.0006	0.041**	No risk of deterioration in the orthoP indicative quality or of preventing

Site Name (Code)	Contributing WB Code_Name	WB Type[14]	Ortho P Indicative Quality[15] and Trends[16]	Baseline[17] Ortho P Conc.[18] (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.[19] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[20]	Evaluation
	(Tralee)_020								the achievement of WFD objectives.
	IE_SH_23L010100 Lee (Tralee)_030	RWB	Good Upwards Near	0.033	0.033	62.0	0.0007	0.034*	Existing baseline conc. is just the 75% of indicative quality upper threshold. However as modelled post-dosing increase is < 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_23L010200 Lee (Tralee)_040	RWB	Good	0.030	0.033	111.7	0.0010	0.031	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives
	IE_SH_23A060890 Annagh 23_010	RWB	*Good*	*0.030*	0.033	7.2	0.0003	0.030^	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives
	IE_SH_050_0100 Lee K Estuary	TWB Summer	Good Upwards Far	0.036	0.036	165.5	0.0004	0.036‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives
		TWB Winter	Good Upwards Near	0.050	0.045	165.5	0.0004	0.036‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives
	IE_SH_050_0000 Inner Tralee Bay	CWB Summer	High Downwards Far	0.014	0.019	184.0	0.0000	0.014‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
		CWB Winter	High Upwards Near	0.021	0.019			0.021‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SH_040_0000	CWB Summer	High Upwards	0.011	0.019	219.1	0.0000	0.011‡	No risk of deterioration in the orthoP indicative

Site Name (Code)	Contributing WB Code_Name	WB Type[14]	Ortho P Indicative Quality[15] and Trends[16]	Baseline[17] Ortho P Conc.[18] (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.[19] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[20]	Evaluation
	Outer Tralee Bay		Far						quality or of preventing the achievement of WFD objectives.
		CWB Winter	High Downwards Far	0.018	0.019			0.018	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives
Castlemaine Harbour SPA	IE_SW_22L020500 Little Maine_010	RWB	*High*	*0.013*	0.019	2.0	0.0002	0.013	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_22L021000 Little Maine_020	RWB	High Downwards Far	0.014	0.019	12.7	0.0004	0.014**	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_22M010500 Maine_030	RWB	High - Near	0.024	0.033	88.4	0.0005	0.025**	Existing baseline conc. is over the 75% of indicative quality upper threshold. However as modelled post-dosing increase is < 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives
	IE_SW_22M010700 Maine_040	RWB	Good - Far	0.026	0.033	184.9	0.0005	0.027‡**	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_22M010800 Maine_050	RWB	High - Near	0.020	0.019	276.3	0.0008	0.021‡**	Existing baseline conc. is over the 75% of indicative quality upper threshold. However as modelled post-dosing increase is < 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the orthoP indicative quality or of preventing the

Site Name (Code)	Contributing WB Code_Name	WB Type[14]	Ortho P Indicative Quality[15] and Trends[16]	Baseline[17] Ortho P Conc.[18] (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.[19] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[20]	Evaluation
									achievement of WFD objectives
	IE_SW_22K 040500 Kealbrogee n STREAM (Laune)_010	RWB	*Good*	*0.030*	0.033	3.5	0.0002	0.030	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives
	IE_SW_22L0 10400 Laune_040	RWB	*High*	*0.013*	0.019	52.1	0.0001	0.013	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_22G 080300 Groin_010	RWB	*High*	*0.013*	0.019	0.9	0.0001	0.013	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_22S1 30900 Shanakeal_ 010	RWB	High	0.013	0.019	16.4	0.0004	0.013	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_22D 030400 Dogue_010	RWB	*High*	*0.013*	0.019	3.1	0.0002	0.013	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_22F0 90400 Fahaduff_0 10	RWB	*Moderate*	*0.046*	0.051	6.0	0.0004	0.047	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_22G 060300 Gweestin_0 10	RWB	*High*	*0.013*	0.019	8.2	0.0007	0.013	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_22G 060600 Gweestin_0 20	RWB	*Good*	*0.030*	0.033	19.0	0.0008	0.031	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_22G 060900 Gweestin_0 30	RWB	*High*	*0.013*	0.019	44.6	0.0008	0.013	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.

Site Name (Code)	Contributing WB Code_Name	WB Type[14]	Ortho P Indicative Quality[15] and Trends[16]	Baseline[17] Ortho P Conc.[18] (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.[19] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[20]	Evaluation
	IE_SW_230_0200 Castlemaine Harbour	TWB Summer	High Downwards Far	0.010	0.020	321.9	0.0000	0.010‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
		TWB Winter	High Downwards Far	0.020	0.021			0.020‡	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_G_033 Dingle	GWB	Good	0.018	0.026	6.2	0.0001	0.018	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.
Killarney National Park SPA	IE_SW_G_073 Scartaglin	GWB	Good	0.018	0.026	37.2	0.0005	0.018	No risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.

‡ Load from WWTP / SWO following treatment included
† 2014 baseline used (no data post 2015)
* Trends are statistically significant
^ Effective Rainfall used to calculate concentration
†† Surrogate derived from 2011 and 2016 monitoring data
** 2019 Mean reported, following upgrade to Ardfert WWTP in 2018

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 5-3**). 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 5-3 provides the data used for the WWTP continuous discharge, and the SWO intermittent discharge, to compare with the emission limit values (ELVs) from the wastewater 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 5-4** 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 5-3: Increased loading / concentration due to Orthophosphate Dosing – Dosing rate = 0.95 mg/l

Agglom. and Discharge Type	ELV from WWDL (mg/l) (Ortho P unless otherwise stated)	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*
Tralee Primary Discharge	**2 (Total P)**	**Existing**	4873	0.6	0.4	0.7
		Post Dosing	4873	0.6	0.4	0.7
Tralee SWOs (12 no.)	**n/a**	**Existing**	279.4	1.1	0.9	1.5
		Post Dosing	350.2	1.3	1.1	1.8
Abbeydorney Primary Discharge	**0.5**	**Existing**	231	1.8	1.4	2.4
		Post Dosing	273	2.1	1.7	2.7
Abbeydorney SWOs (2 no.)	**n/a**	**Existing**	10.1	2.7	2.1	3.6
		Post Dosing	11.3	3.0	2.4	4.1
Lixnaw Primary Discharge	**n/a**	**Existing**	430.9	5.3	4.3	7.3
		Post Dosing	432.7	5.4	4.3	7.3
Lixnaw SWOs (2 no.)	**n/a**	**Existing**	18.8	8.0	6.4	10.9
		Post Dosing	18.9	8.0	6.4	10.9
Castleisland Primary Discharge	**2**	**Existing**	234	0.21	0.17	0.28
		Post Dosing	234	0.21	0.17	0.28
Castleisland SWOs (5 no.)	**n/a**	**Existing**	68.1	2.1	1.7	2.0
		Post Dosing	77.9	2.4	1.9	3.3
	8	**Existing**	320	1.2	1.0	1.6

Agglom. and Discharge Type	ELV from WWDL (mg/l) (Ortho P unless otherwise stated)	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*
Ardfert Primary Discharge		**Post Dosing**	324	1.2	1.0	1.6
Ardfert SWOs (1 no.)	**n/a**	**Existing**	19.9	2.6	2.1	3.5
		Post Dosing	20.1	2.6	2.1	3.3
Fenit Primary Discharge	**n/a**	**Existing**	308	1.0	0.8	1.3
		Post Dosing	309	1.0	.08	1.3
Fenit SWOs (3 no.)	**n/a**	**Existing**	14.4	1.5	1.2	2.1
		Post Dosing	14.5	1.5	1.2	2.1
Firies Primary Discharge	**1**	**Existing**	58.2	0.22	0.18	0.30
		Post Dosing	58.2	0.22	0.18	0.30
Firies SWOs (1 no.)	**n/a**	**Existing**	16.95	2.23	1.79	3.04
		Post Dosing	18.74	2.47	1.97	3.36
Milltown Primary Discharge	**5**	**Existing**	581.3	1.31	1.05	1.78
		Post Dosing	717.0	1.62	1.29	2.20
Milltown SWOs (12 no.)	**n/a**	**Existing**	36.25	2.80	2.24	3.81
		Post Dosing	40.21	3.11	2.49	4.23

Table 5-4: Mass balance assessment based on 0.95 mg/l dosing using available background concentrations and mean flow information from Hydrotool and as assumed daily tidal exchange volume.

Agglom.	RWB Name / Code for Primary Discharge	Background Conc.[21] (mg/l)	Modelled conc. Existing (mg/l)	Modelled conc. Post Dosing (mg/l)	% Inc
Tralee	Lee K Estuary IE_SH_050_0100	0.030	0.0351	0.0352	0.2%
Abbeydorney	Brick_020 IE_SH_23B030400	0.050	0.0632	0.0656	3.9%
Lixnaw	Brick_040 IE_SH_23B030700	0.043	0.0480	0.0480	0.0%
Castleisland	MAINE_020 IE_SW_22M010400	0.035	0.0370	0.0371	0.2%
Ardfert	TYSHE 23_020 IE_SH_23T020500	0.045	0.0815	0.0820	0.6%
Fenit	Outer Tralee Bay IE_SH_040_0000	0.01875	0.0188	0.0188	0.0%
Firies	Maine_040 IE_SW_22M010700	0.027	0.0271	0.0271	0.0%
Milltown	Castlemaine Harbour IE_SW_230_0200	0.023	0.0230	0.0231	0.0%

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

Tralee Agglomeration

Tralee agglomeration (D0040-01) employs tertiary treatment which was installed in 2018 i.e. nutrient removal is assumed to remove any additional orthophosphate load to the WWTP during the treatment process. This assumes that there is adequate capacity in the chemical dosing system to effectively manage the removal of the additional phosphorus without affecting the performance of the treatment process at the WWTP or the quality of the effluent discharged under the current operating regime. The modelled concentrations for both existing and post dosing scenarios are compliant with total phosphorus ELVs set in WWDL. The 2020 AER lists 4 specific ELV exceedances. The 2019 AER reported no ELV exceedances. The plant is generally performing well with average TP levels (0.66 mg/l) well below the ELV. There were a few isolated incidents that resulted in the exceedances, however, these will not impact on the ability of the plant to remove the small additional loading of Phosphorus due to corrective water treatment. Lee K Estuary is the point of primary discharge and is hydrologically connected to Tralee Bay and Magharees Peninsula, West to Cloghane SAC and Tralee Bay Complex SPA.

When fluvial and daily tidal exchange volumes are taken into account the increase in the receiving water is negligible (0.2%) (**Table 5-4**). Therefore, there is no risk of failing to achieve WFD objectives for Lee K Estuary (IE_SH_050_0100) and its hydrologically connected European Sites as a result of dosing at Scart Reservoir.

Abbeydorney Agglomeration

At Abbeydorney agglomeration, according to the AER 2017, only preliminary and primary treatment exist. The 2020 AER notes that orthophosphate concentration at primary discharge point is not complaint with ELVs and a WWTP upgrade is required. It is noted in the AER that the current discharge is having an impact on the receiving water, Brick_020 (IE_SH_23B030400), which is hydrologically connected to Lower River Shannon SAC and hydrogeologically connected to Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA. As the WWTP only receives primary treatment, the EAM model does not assume treatment reduction and the entire additional load from orthophosphate dosing is assumed to be discharged to the receiving water.

When mean flow is taken into account the increase in the receiving water is from 0.0632 to 0,0656 mg/l (3.9 %) (**Table 5-4**), downstream of the discharge. The dosing at Abbeydorney will not impact on the ecological status of this water body which is currently at poor status as the increase is downstream of the agglomeration is not significant in the context of the water body and will not result in any further deterioration in the biological elements ensuring that the overall ecological status remains unchanged. This is discussed further in Section 6. Therefore, there is no risk of failing to achieve WFD objectives for Brick_020 (IE_SH_23B030400) and its hydrologically connected European Sites as a result of dosing at Scart Reservoir.

Lixnaw Agglomeration

There are seven properties within this agglomeration that are also within the WSZ (provided with preliminary and primary treatment), so the additional load from the orthophosphate dosing is considered to be discharged into Brick_040 (IE_SH_23B030700) . The 2017 AER does note that the existing plant is severely overloaded and there is a downstream impact but not in terms of orthophosphate. There is no orthophosphate ELV for this agglomeration. The Lixnaw agglomeration receives primary treatment only and therefore the entire additional load from orthophosphate dosing is assumed to be discharged to the receiving water. A 2019 EPA site visit report notes that a new Integrated Constructed Wetland (ICW) was under construction and this was completed in December

2020 and requires 12month commissioning period for maturation and plant establishment. As stated above the EAM has assumed all additional load from orthophosphate dosing is discharged to the receiving waterbody in reality, the load is likely to be reduced when the ICW is fully functional.

When mean flow is taken into account the increase in the receiving water is 0.0% (**Table 5-4**). Therefore, there is no risk of failing to achieve WFD objectives for Brick_040 (IE_SH_23B030700) and its hydrologically connected European Sites as a result of dosing at Scart Reservoir.

Castleisland Agglomeration

For Castleisland agglomeration (D0180-01) the 2017 AER states that tertiary treatment is employed at this agglomeration. Nutrient removal is assumed to remove any additional orthophosphate load to the WWTP during the treatment process. This assumes that there is adequate capacity in the chemical dosing system to effectively manage the removal of the additional phosphorus without affecting the performance of the treatment process at the WWTP or the quality of the effluent discharged under the current operating regime. The modelled concentrations for both existing and post dosing scenarios are compliant with total phosphorus ELVs set in WWDL. Maine_020 is the point of primary discharge and is hydrologically connected to a number of SACs and SPAs.

When mean flow is taken into account the increase in the receiving water is negligible (0.2%) (**Table 5-4**). Therefore, there is no risk of failing to achieve WFD objectives for Maine_020 (IE_SW_22M010400) and its hydrologically connected European Sites as a result of dosing at Scart Reservoir.

Ardfert Agglomeration

At Ardfert agglomeration, the WWTP was upgraded to secondary treatment in 2018. The 2017 AER noted that orthophosphate concentration at primary discharge point is not complaint with ELVs but following the upgrade an improvement in the receiving water body, Tyshe 23_020 was noted and the WWTP was compliant with orthophosphate ELV in 2019 and 2020 AERs. As the WWTP only receives secondary treatment, the EAM model does not assume treatment reduction and the entire additional load from orthophosphate dosing is assumed to be discharged to the receiving water.

When mean flow is taken into account the increase in the receiving water will increase by 0.6% downstream of the discharge (**Table 5-4**). Therefore, there is no risk of failing to achieve WFD objectives for Tyshe 23_020_020 (IE_SH_23T020500) and its hydrologically connected European Sites as a result of dosing at Scart Reservoir.

Fenit Agglomeration

At Fenit agglomeration, according to the AER 2019, only preliminary and primary treatment exist.. There are no TP or orthophosphate ELVs for this agglomeration. The 2019 AER notes that the plant is exceeding BOD limits but does not have an observable impact on the water quality and WFD status of the receiving water body Outer Tralee Bay (IE_SH_040_0000) which is hydrologically connected to a number of SACs and SPAs. As the WWTP only receives primary treatment, the EAM model does not assume treatment reduction and the entire additional load from orthophosphate dosing is assumed to be discharged to the receiving water.

When fluvial and daily tidal exchange volumes are taken into account the increase in the receiving water is negligible (0.0%) (**Table 5-4**), downstream of the discharge. Therefore, there is no risk of failing to achieve WFD objectives for Outer Tralee Bay (IE_SH_040_0000) and its hydrologically connected European Sites as a result of dosing at Scart Reservoir.

Firies Agglomeration

At Firies agglomeration, tertiary treatment is employed. Nutrient removal is assumed to remove any additional orthophosphate load to the WWTP during the treatment process. This assumes that there is adequate capacity in the chemical dosing system to effectively manage the removal of the additional phosphorus without affecting the performance of the treatment process at the WWTP or the quality of the effluent discharged under the current operating regime. The modelled concentrations for both existing and post dosing scenarios are compliant with total phosphorus ELVs set in WWDL. Maine_040 is the point of primary discharge and is hydrologically connected to a number of SACs and SPAs.

When mean flow is taken into account the increase in the receiving water is negligible (0.0%) (**Table 5-4**). Therefore, there is no risk of failing to achieve WFD objectives for Maine_040 (IE_SW_22M010700) and its hydrologically connected European Sites as a result of dosing at Scart Reservoir.

Milltown Agglomeration

At Milltown agglomeration, according to the AER 2019, only secondary treatment exist. There are no TP or orthophosphate ELVs for this agglomeration. The 2019 AER notes there were two non-compliances of the orthophosphate ELV, the reason for non-compliance given is 'Shock load to the WWTP'. As the WWTP only receives secondary treatment, the EAM model does not assume treatment reduction and the entire additional load from orthophosphate dosing is assumed to be discharged to the receiving water.

When fluvial and daily tidal exchange volumes are taken into account the increase in the receiving water is negligible (0.0%) (**Table 5-4**), downstream of the discharge due to the large flows within Castlemaine Harbour. Therefore, there is no risk of failing to achieve WFD objectives for Castlemaine Harbour (IE_SW_230_0200) and its hydrologically connected European Sites as a result of dosing at Scart Reservoir.

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 river water bodies from subsurface pathways (**Appendix C**). The modelled increases in concentration due to subsurface pathways are insignificant in most water bodies, i.e. ≤ 0.00125 mg/l (5% of the High / Good indicative quality boundary for surface water bodies), except in, Big River (Tralee)_010 (IE_SH_23B040150), which has modelled increases that exceed 5% of the High / Good indicative quality boundary. However, this increase do not cause the post-dosing baseline concentration to exceed 75% of the orthophosphate indicative quality upper threshold.

The modelled additional concentration modelled for the Big River (Tralee)_010 [IE_SH_23B040150) is 0.0023 mg/l to which is hydrologically connected to Tralee Bay and Magharees Peninsula, West to

Cloghane SAC, Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA and Tralee Bay Complex SPA.

Additional orthophosphate as a result of dosing on surface waters due to subsurface and near surface pathways is predicted to be insignificant for all transitional and coastal water bodies directly affected by the WSZs.There will therefore be no risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives within waterbodies hydrologically/hydrogeologically connected surface water bodies due to proposed orthophosphate dosing.

5.3.4.2 Groundwater Assessment

The predicted loads and concentrations to groundwater bodies (GWBs) are insignificant in all cases (i.e. ≤0.00175 mg/l = 5% of the Good / Fail indicative quality boundary) as shown in **Table 3 of Appendix C**, Therefore, there is no risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives within the hydrogeologically connected groundwater bodies due to orthophosphate dosing.

5.3.5 Combined Assessment

Table 4 A of Appendix C provides details of the combined orthophosphate inputs to river water bodies from direct discharges, DWWTSs and leakage loads. The increased loads due to orthophosphate dosing are predicted to be insignificant (i.e. ≤0.00125 mg/l; 5% of High / Good indicative quality boundary) with exception of Big River (Tralee)_010 (IE_SH_23B040150). The Tyshe 23_020 (IE_SH_23T020500) and Brick_020 (IE_SH_23B030400), are just below the boundary at 0.0012mg/l However, for all these water bodies, the modelled increase in concentration will not cause the post-dosing baseline concentration to exceed 75% of the orthoP indicative quality upper threshold.

The river Brick_020 (IE_SH_23B030400) has a modelled concentration just under the significance level (0.0012 mg/l). It has two monitoring points, one at Poor Ortho P indicative quality and the downstream one at Bad indicative quality. The river is impacted by Abbeydorney and Kiliflynn WWTPs and the downstream monitoring point represents a short length of river at the Abbeydorney WWTP. Both the upstream (Brick_010, IE_SH_23B030300) and downstream receiving (Brick_030, IE_SH_23B030500) stretches of river are at Moderate indicative quality, with no deterioration in orthoP indicative quality modelled. The potential for likely significant effects upon European Sites hydrologically connected to this water body is discussed below in Section 6.

The river Tyshe 23_020 (IE_SH_23T020500) also has a modelled concentration just under the significance level (0.0012 mg/l). It has two monitoring points. It was impacted by the Ardfert WWTP until an upgrade in 2018. The orthophosphate levels in the river have since improved to Poor indicative quality, but one monitoring point is now at Poor Ortho P indicative quality and the downstream one at Bad indicative quality. The upstream (Tyshe 23_010, IE_SH_23T020400) and downstream receiving water body (Ballynoe 23_010, IE_SH_23B910900) are at Poor indicative quality, with no deterioration in orthoP indicative quality modelled. The Operational monitoring point downstream of the Ardfert agglomeration (RS23T020500: Bridge near Banna House) and has a Q Value of 3, indicative of Poor status. The potential for likely significant effects upon European Sites hydrologically connected to this water body is discussed below in Section 6.

The river water bodies Maine_010 (IE_SW_22M010300), Maine_040 (IE_SW_22M010700), and Lee (Tralee)_030 (IE_SH_23L010100), all have monitoring points with a baseline concentration higher than

75% of Orthophosphate indicative quality upper threshold, but since the increase in concentration in those rivers is insignificant (<5% of the Good / High indicative quality boundary i.e. 0.00125mg/l, dosing will not cause a deterioration in the orthophosphate indicative quality or prevent the achievement of the WFD objectives of the water bodies.

Table 4B of Appendix C gives the loads and concentrations to transitional / coastal WBs receiving flows from river water bodies connected to the WSZ.

The combined impact from surface water and subsurface pathways due to orthophosphate dosing is insignificant (≤0.00125 mg/l, which is 5% of the Good / High boundary for orthophosphate indicative quality) for most receiving transitional and coastal water bodies, except Lee K Estuary [IE_SH_050_0100], Cashen (IE_SH_060_0100), Inner Tralee Bay (IE_SH_050_0000) and Mouth of the Shannon (HAs 23;27) (IE_SH_060_0000). These water bodies have a baseline concentration higher than 75% of orthophosphate indicative quality upper threshold. However, the predicted increases in concentration will not cause the post-dosing baseline concentration to exceed 75% of the orthophosphate indicative quality upper threshold. Therefore, there is no risk of deterioration in the indicative quality of these transitional or coastal water bodies or of preventing the achievement of WFD objectives

5.3.6 Assessment of Cumulative Impacts from other WSZs

The cumulative loads on the Laune-Maine-Dingle Bay (HA 22), Tralee Bay-Feale (HA 23), and Shannon Catchments (HAs 24, 25, 26, and 27), associated with the corrective water treatment at the following additional WTPs have been assessed in combination with the proposed dosing at Scart Reservoir:

HA 22 - Laune-Maine-Dingle Bay catchment

- 199 Coulagh WTP – Cahersiveen PWSS

HA 23 - Tralee Bay-Feale catchment

- 032 Dromin WTP – Dromin Listowel Moyvane 601E

HAs 24, 25, 26, 27 - Shannon Catchment

- 005 Clareville WTP – Limerick City Water Supply
- 012 Tuam WTP – Tuam RWSS
- 013 Portloman WTP – Ardonagh Reservoir
- 017 Drumcliffe WTP - Ennis PWS
- 019 New Doolough WTP - W.Clare RWS (New WTP)
- 020 Castle Lake WTP - Shannon/Sixmilebridge RWSS
- 021 Rossadrehid WTP – Galtee Regional
- 027 Athlone WTP – Athlone WSS
- 034 Lough Forbes WTP – Longford Central
- 040 Coolbawn WTP – Nenagh RWSS
- 049 Ballany WTP – Ballany High Level Reservoir
- 058 Ballinasloe Town WTP - Ballinasloe Public Supply
- 068 Rockingham WTP - Boyle Regional WSS

- 081 Ballinagard Springs WTP - Roscommon Central Water Supply Scheme
- 128 Longford Springs WTP Future Supply - Castlerea WSS
- 140 Lisbrock WTP - SRRWSS Lisbrock
- 161 Freemount WTP – Zone 4 Allow Regional
- 178 Clavin's Bridge WTP – Kells/Oldcastle WS
- 184 Foileen WTP – Cappamore Foileen Water Supply
- 185 Ballinlough/ Loughglynn (Ballybane Springs) - Ballinlough/Loughglynn
- 190 Ironmills Pump Station – Ironmills
- 203 Ardan Boreholes - Tullamore North PWS
- 216 Kylebeg WTP – Borrisokane
- 237 Killadysert WTP - Killadysert PWS
- 238 Williamstown WTP - Williamstown PS3
- 246 Ballingarry Spring WTP - Ballingarry Water Supply
- 260 Kilcolman PS - Rathkeale Water Supply
- 267 Cloughjordan Pump Station – Cloughjordan
- 321 Ahascragh WTP - Ahascragh P.S.
- 355 Croo Bypass Pump Station – Croom Water Supply
- 381 Hospital Pump Station 2 - Hospital Water Supply

The common water bodies evaluated within the WSZs supplied by these WTPs have been summarised in

Table 5-5 below. The increase in concentration for Tyshe 23_020 (IE_SH_23T020500), and Ballynoe 23_010 (IE_SH_23B910900) are just below 5% of the High / Good indicative quality boundary at 0.0012mg/l, however the modelled increases do not cause the post-dosing baseline concentration to exceed 75% of the indicative quality upper threshold and there is no risk of orthophosphate indicative quality deterioration or risk to WFD objectives.

The river Tyshe 23_020 (IE_SH_23T020500) also has a modelled concentration just under the significance level (0.0012 mg/l). It has two monitoring points, one at Poor Ortho P indicative quality and the downstream one at Bad indicative quality. The upstream (Tyshe 23_010, IE_SH_23T020400) and downstream receiving water body (Ballynoe 23_010, IE_SH_23B910900) are at Poor indicative quality, with no deterioration in orthoP indicative quality modelled. As stated above the modelled increases do not cause the post-dosing baseline concentration to exceed 75% of the indicative quality upper threshold and there is no risk of orthophosphate indicative quality deterioration or risk to WFD objectives. The potential for likely significant effects upon European Sites this water body is connected to is discussed below in Section 6.

The winter baseline concentration for the following transitional and coastal water bodies; Cashen (IE_SH_060_0100), Inner Tralee Bay (IE_SH_050_0000) and Mouth of the Shannon (HAs 23;27) (IE_SH_060_0000) are above 75% of the upper orthophosphate indicative quality threshold. The modelled additional concentration is insignificant for these water bodies listed and will not cause a deterioration in the orthophosphate indicative quality of the water bodies or prevent their achievement of WFD objectives.

The impact to the remaining receiving waters is also insignificant as outlined in **Table 5, Appendix C** and

Table 5-5 below as predicted increase in orthophosphate concentration as a result of dosing are all ≤5% of the Good / High indicative quality boundary (i.e. <0.00125 mg/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 5-5: Cumulative assessment of the increased loading and concentrations from Central Kerry - Scart Reservoir WSZ and other WSZs proposed for corrective water treatment in the upstream catchments

EU_CD / NAME	WB type/ Period	Ortho P Indicative Quality and Trends (Distance to Threshold. *Surrogate Indicative Quality in italic*	Baseline 2017 Conc. Surrogate Conc. given in *italic* mg/l	75% of Ortho P Indicative Quality Upper threshold mg/l	Cumulative Ortho P load to SW from leakage, DWWTS and agglomerations kg/yr	Potential increase in Ortho P Conc. due to Dosing mg/l	Potential Ortho P Baseline Conc. following dosing mg/l
IE_SH_23B030700 BRICK_040	RWB	Poor Upwards Far	0.064	0.087	89.4	0.0007	0.065‡**
	RWB	Poor Upwards Far	0.063	0.087			0.064‡**
IE_SH_23M440980 Mountcoal 23_010	RWB	High	0.013	0.019	1.8	0.0001	0.013
IE_SH_23P160880 Pinure 23_010	RWB	Good	0.030	0.033	11.2	0.0007	0.031
IE_SH_23T020400 TYSHE 23_010	RWB	Poor - Far	0.058	0.087	4.5	0.0010	0.059
IE_SH_23T020500 TYSHE 23_020	RWB	Poor	*0.093*	0.087	12.7	0.0012	0.094‡**
	RWB	Bad	*0.108*	0.087			0.109‡ **
IE_SH_23K120820 KNOPPOGE_SOUTH _010	RWB	Good	0.030	0.033	125.4	0.0011	0.031
IE_SH_23B910900 BALLYNOE 23_010	RWB	Poor	0.077	0.087	25.8	0.0012	0.078‡
IE_SW_230_0200 Castlemaine Harbour	CWB Summer	High Downwards Far	0.010	0.020	346.3	0.0000	0.010‡
	CWB Winter	High Downwards Far	0.020	0.021			0.020‡
IE_SH_060_0100 Cashen	TWB Summer	High Upwards Far	0.011	0.022	511.4	0.0002	0.011‡
	TWB Winter	High Downwards Near	0.022	0.019			0.022‡
IE_SH_050_0000 Inner Tralee Bay	CWB Summer	High Downwards Far	0.014	0.019	195.2	0.0000	0.014‡
	CWB Winter	High Upwards Near	0.021	0.019			0.021‡
IE_SH_040_0000 Outer Tralee Bay	TWB Summer	High Upwards Far	0.011	0.019	244.4	0.0000	0.011‡

EU_CD / NAME	WB type/ Period	Ortho P Indicative Quality and Trends (Distance to Threshold. *Surrogate Indicative Quality in italic*	Baseline 2017 Conc. Surrogate Conc. given in *italic* mg/l	75% of Ortho P Indicative Quality Upper threshold mg/l	Cumulative Ortho P load to SW from leakage, DWWTS and agglomerations kg/yr	Potential increase in Ortho P Conc. due to Dosing mg/l	Potential Ortho P Baseline Conc. following dosing mg/l
	TWB Winter	High Downwards Far	0.018	0.019			0.018‡
IE_SH_060_0200 Upper Feale Estuary	TWB Summer	High Upwards Far	0.013	0.019	191.0	0.0002	0.013‡
	TWB Winter	High Downwards Far	0.018	0.019			0.018‡
IE_SH_060_0000 Mouth of the Shannon (HAs 23;27)	CWB Summer	High Upwards Far	0.010	0.019	5894.6	0.0000	0.010‡
	CWB Winter	Good Upwards Near	0.040	0.037			0.040‡
IE_SH_010_0000 Southwestern Atlantic Seaboard (HA 23)	CWB	High	0.013	0.019	5857.2	0.0000	0.013‡
IE_SW_150_0000 South Western Atlantic Seaboard (HAs 21;22)	CWB	High	0.013	0.019	478.7	0.0000	0.013‡

‡ Load from WWTP / SWO following treatment included
** 2018, 2019, 2020 Mean reported

5.3.7 Conclusions

The modelled increased orthophosphate dosing concentrations do not result in a noticeable effect with orthophosphate concentrations in the receiving Lee K Estuary (IE_SH_050_0100), Brick_020 (IE_SH_23B030400), Brick_040 (IE_SH_23B030700), Maine_020 (IE_SW_22M010400), Tyshe 23_020 (IE_SH_23T020500) , Outer Tralee Bay (IE_SH_040_0000), Maine_040 (IE_SW_22M010700) and Castlemaine Harbour (IE_SW_230_0200) at 0.2%, 3.9%, 0.0%, 0.2%, 0.6% , 0.0%, 0.0% and 0.0% respectively, as shown by the mass balance assessment in **Table 2 Appendix C**.

The modelled concentrations due to subsurface pathways are insignificant in all river water bodies, i.e. ≤ 0.00125 mg/l (5% of the High / Good indicative quality boundary for surface water bodies) with the exception of Big River (Tralee)010 [IE_SH_23B040150] at 0.0023mg/l,. The modelled increases in concentration does not cause the post-dosing baselines following dosing to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the orthophosphate indicative quality of the river water body, or of preventing the achievement of their WFD objectives.

For Brick_020 and Tyshe 23_010 the modelled increases in concentration are just below 5% of the High / Good indicative quality boundary (0.00125 mg/l) and 75% of the upper indicative quality

threshold and therefore, there is no risk of deterioration in the orthophosphate indicative quality of the river water body, or of preventing the achievement of their WFD objectives.

All concentrations modelled for receiving transitional water bodies did not exceed 5% of the High / Good indicative quality boundary (0.00125 mg/l) and will not cause the post-dosing baseline concentration to exceed 75% of the orthoP indicative quality upper threshold. Therefore, there is no risk of orthophosphate indicative quality deterioration as a result dosing, or of preventing the achievement of WFD objectives.

The predicted loads and concentrations to groundwater bodies (GWBs) are insignificant (i.e. ≤0.00175 mg/l = 5% of the Good / Fail indicative quality boundary) as shown in Table 8 of Appendix C. Therefore, there is no risk of deterioration in the orthoP indicative quality or of preventing the achievement of WFD objectives.

Increases in concentration for all remaining river and transitional water bodies are within the 5% High / Good indicative quality boundary threshold following dosing. Increases in all remaining groundwaters are within 5% if of the Good / Fail indicative quality boundary.

The cumulative assessment of dosing at Scart Reservoir 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 OPERATIONAL PHASE

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

6.1.1 Lower River Shannon SAC 002165

6.1.1.1 (1029) Freshwater pearl mussel (*Margaritifera margaritifera*)

The population of the freshwater pearl mussel in this SAC lies within the Cloon River, Co. Clare only (NPWS 2012[22]). The Cloon population is confined to the main channel and is distributed from Croany Bridge to approx. 1.5 km upstream of Clonderalaw Bridge. The Environmental Quality Ratios for the water quality parameters monitored within freshwater pearl mussel catchments correspond to high ecological status. Orthophosphate specific targets are not defined in the SSCOs. Nevertheless, the freshwater pearl mussel requires High Status conditions. The Surface Water Regulations (2009) set a limit of ≤0.025 (mean) or ≤0.045 (95%ile) for Molybdate Reactive Phosphorus (MRP) (mg P/l) for High Status waters. The habitat in the Cloon failed both standards during 2009 sampling undertaken to inform the preparation of the sub-basin management plan for this site.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Lower River Shannon SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the SAC include: Brick_010 (IE_SH_23B030300), Brick_020 (IE_SH_23B030400), Brick_030 (IE_SH_23B030500), Brick_040 (IE_SH_23B030700), Mountcoal_010 (IE_SH_23M440980) and Knoppoge South_010 (IE_SH_23K120820);
- The transitional water bodies hydrologically connected to the SAC include: Upper Feale Estuary (IE_SH_060_0200) and Cashen (IE_SH_060_0100);
- The coastal water body hydrologically connected to the SAC is: Mouth of the Shannon (Has 23;27) (IE_SH_060_0000); and
- The groundwater bodies hydrogeologically connected to the SAC are: Ballybunnion (IE_SH_G_027), Kerry Head (IE_SH_G_118) and Abbeyfeale (IE_SH_G_001).

The Cloon River is located in the Shannon Estuary North catchment. The river discharges to Clonderalaw Bay in the Lower Shannon Estuary which is located approximately 40 km upstream of where the WSZs discharge into the Mouth of the Shannon CWB. As such it is considered that there is

[22] NPWS 2012 Lower River Shannon SAC 002165 Conservation Objectives

no hydrological pathway between the WSZs and Cloon River. The Cloon River and WSZ are also located in separate GWBs and therefore there is no hydrogeological connection between the sites.

In terms of the potential for effect on Atlantic salmon, which are host to the larval stage of the Freshwater pearl mussel called glochidia, please see **Section 6.1.1.2** below.

In the absence of pathways for impacts, it has been demonstrated that the potential for likely significant effects on this Annex II species can be excluded. Furthermore, dosing will not prevent the restoration of the favourable conservation condition of the species.

6.1.1.2 (1095) Sea lamprey (*Petromyzon marinus)*, (1096) Brook lamprey (*Lampetra planeri*), (1099) River lamprey (*Lampetra fluviatilis*) and (1106) Atlantic salmon (*Salmo salar*) (only in freshwater)

Artificial barriers can block or cause difficulties to the upstream migration of Atlantic salmon and lamprey species; thereby limiting the species to lower stretches and restricting access to spawning areas. Specific barriers serve to constrain the up-river migration of lamprey species in this SAC. Within the extent of the SAC as a whole, the designated site boundary in the River Fergus is delineated by a barrier to lamprey migration. Significant barriers for lamprey migration are also present in the Mulkear and Feale rivers. For salmon, the large hydro-electric station at Ardnacrusha and the Parteen regulating weir present considerable obstructions to upstream passage of salmon and lamprey species on the Shannon main channel. While both features have fish passes installed, upstream migration of salmon is still problematical (NPWS 2012[23]). No obstacles causing significant fish passage issues for salmon are present on the Feale and Mulkear rivers.

Water quality is a particular threat to all fish fauna listed as qualifying interests. The latest Red List of Irish amphibians, reptiles and freshwater fish (King *et al*., 2011[24]) highlights the deterioration in water quality and ongoing point and diffuse sources of pollution as a key threat to these species and includes the potential effects from municipal discharges. The SSCO (NPWS, 2012[23]) states that lampreys and salmon spawn in clean gravels. Deterioration in water quality has the potential for a detrimental effect on spawning habitats, particularly where nutrient conditions result in excessive algal growth and macrophyte abundance, leading to smothering, shading effects, alteration of macroinvertebrate communities and silt deposition. The SSCO for salmon also requires a Q-value of at least 4, which equates to good ecological status.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Lower River Shannon SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the SAC include: Brick_010 (IE_SH_23B030300), Brick_020 (IE_SH_23B030400), Brick_030 (IE_SH_23B030500), Brick_040 (IE_SH_23B030700), Mountcoal_010 (IE_SH_23M440980) and Knoppoge South_010 (IE_SH_23K120820);

[23] NPWS 2012 Lower River Shannon SAC 002165 Conservation Objectives

[24] King, J.L., Marnell, F., Kingston, N., Rosell, R., Boylan, P., Caffrey, J.M., FitzPatrick, Ú., Gargan, P.G., Kelly, F.L., O'Grady, M.F., Poole, R., Roche, W.K. & Cassidy, D. (2011) Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

- The transitional water bodies hydrologically connected to the SAC include: Upper Feale Estuary (IE_SH_060_0200) and Cashen (IE_SH_060_0100);
- The coastal water body hydrologically connected to the SAC is: Mouth of the Shannon (Has 23;27) (IE_SH_060_0000); and
- The groundwater bodies hydrogeologically connected to the SAC are: Ballybunnion (IE_SH_G_027), Kerry Head (IE_SH_G_118) and Abbeyfeale (IE_SH_G_001).

The potential impacts of orthophosphate dosing at Scart Reservoir are assessed in the context of brook lamprey, river lamprey, sea lamprey and Atlantic salmon occurring in the Lower Shannon SAC which is located downstream of the surface water bodies identified in **Table 5-2**. There is the potential for river lamprey also occurring in transitional waterbodies and sea lamprey and Atlantic salmon (designated in freshwater only) occurring in transitional and coastal water bodies.

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

The modelled increase in orthophosphate concentration in the river water bodies are as follows: Brick_010 (IE_SH_23B030300) (0.0011 mg/l), Brick_020 (IE_SH_23B030400) (0.0012 mg/l), Brick_030 (IE_SH_23B030500) (0.0011 mg/l), Brick_040 (IE_SH_23B030700) (0.0007 mg/l), Mountcoal_010 (IE_SH_23M440980) (undetectable, 0.0000 mg/l) and Knoppoge South (IE_SH_23K120820) (0.0008 mg/l). The increases in concentration do not exceed 5% of the High / Good indicative quality boundary for all waterbodies. Therefore, there is no risk of deterioration in the indicative quality for most water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

For Brick_20 (IE_SH_23B030300) the modelled increases in concentration is just under 5% of the High / Good indicative quality boundary, at 0.0012 mg/l). There are two monitoring points on this water body. The first is within 75% of the upper indicative quality threshold. Therefore, there is no risk in the deterioration of the current Poor orthoP indicative quality or achievement of WFD objective.

The second monitoring point is downstream and has a current baseline orthoP indicative quality of Bad. This monitoring point represents a short length of river at the Abbeydorney WWTP. The Brick_020 water body is at Poor biological status, so by definition the supporting conditions are considered as being consistent with the achievement of the class for the biological elements, so supporting orthophosphate conditions are considered to be consistent with Poor ecological status. As the modelled increase in concentration is below significant levels it is reasoned that the dosing will not result in any further impact on the structure and functioning of aquatic ecosystems in this water body and will not result in any further deterioration in the contributing elements to ecological status.

This river waterbody discharges into the Brick_030 (IE_SH_23B030500) and the Cashen (IE_SH_060_0100) transitional water body before reaching the Mouth of the River Shannon (IE_SH_060_0000) coastal water body. The pathway becomes undetectable as it reaches Cashen TWB (0.0000 mg/l), and undetectable at the Mouth of the Shannon (IE_SH_060_0000). This second monitoring point in the Brick_20 (IE_SH_23B030400) is located approximately 2km upstream of the SAC and is directly connected to the Brick_30 for which QI Sea lamprey (*Petromyzon marinus*), Brook lamprey (*Lampetra planeri*), River lamprey (*Lampetra fluviatilis*) and Atlantic salmon (*Salmo salar*) are designated.

A desktop review found no Inland Fisheries Ireland surveys conducted within the Brick River. The river forms part of the Tralee Bay Feale catchment. A 2005 lamprey survey within the Feale catchment conducted a walkover survey of the Brick River and concluded "*no suitable lamprey habitat / electrical fishing sites were found due to poor access. The river was not investigated*" (O'Connor, 2006). An IFI survey carried out in 2014 within the Feale catchment found the lowest densities of salmon during the survey (IFI, 2016). In terms of water quality, the upper reaches of the Brick have been assigned Good WFD status 2013-2018), this encompasses Brick_010 water body. The mid reaches where Brick_20 is located was found to have Poor WFD Status (Q3 assigned) and the lower reaches (Brick_030) has an '*unassigned*' WFD Status.

As Brick_20 is currently at Bad orthophosphate indicative quality, there is a risk of allowing this to continue to deteriorate and prevent improvement. The section of river is short (480m). From aerial imagery the river here appears modified with straightening and deepening. Given the current Bad WFD status of the Brick_20 it is clear there are pressures acting upon the stream and is not achieving the Q4 target for salmon or good status for lamprey. This monitoring point is located downstream of Abberdorney WWTP. This WWTP had breaches in orthoP ELVs in 2018 however as this plant has primary treatment only the EAM has assumed there will be no orthoP removal and all the load will pass through the plant.

The section of river currently at Bad orthoP indicative quality is short (480m) and located 2km upstream of the SAC. The current water quality conditions are considered not supportive for salmon or lamprey. Adult fish may be present within the Brick river system in low densities, but current water quality would indicate spawning potential is limited within this 480m section of river. Therefore, it is not considered to be a supporting habitat for QI fish species.

The upstream monitoring point in the Brick_020 and waterbodies upstream and downstream of the Brick_020 will not result in a deterioration of orthoP indicative quality as a result of the proposed dosing. Given only a short section of river is currently at Bad status, it is considered that the proposed dosing will not result in likely significant effects upon the fish QIs of the Lower River Shannon SAC which is located 2km downstream. The section of the Brick river where WFD objectives are at risk is not considered to be a significant supporting habitat for QI fish populations given current habitat and water quality conditions as to cause likely significant effects.

The modelled increase in orthophosphate concentration in the transitional water bodies which are hydrologically connected to the site are as follows: Upper Feale Estuary (IE_SH_060_0200) (undetectable i.e. 0.0000 mg/l) and Cashen (IE_SH_060_0100) (0.0000 mg/l). As the modelled increases in concentration do not exceed 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the indicative quality of the water bodies or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the single modelled coastal water body, which is hydrologically connected to the site, Mouth of the Shannon (HAs 23;27) (IE_SH_060_0000) was undetectable (0.0000 mg/l). As such there is no risk of deterioration in the indicative quality of the water body or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the groundwater bodies connected to the site are as follows: Ballybunnion (IE_SH_G_027) (0.0006 mg/l), Kerry Head (IE_SH_G_118) (undetectable, 0.0000 mg/l) and Abbeyfeale (IE_SH_G_001) (undetectable 0.0000 mg/l). As the modelled increases in concentration do not exceed 5% of the Good / Fail indicative quality boundary,

there is no risk of deterioration in the indicative quality of the groundwater bodies or of preventing the achievement of WFD objectives.

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

6.1.1.3 (1110) Sandbanks which are slightly covered by sea water all the time, (1130) Estuaries and (1140) Mudflats and sandflats not covered by seawater at low tide, (1160) Large shallow inlets and bays and (1170) Reefs

The habitat area of sandbanks in this SAC is estimated at 1,353 ha and is located within the coastal water body Mouth of the Shannon (HAs 23;27) (IE_SH_060_0000), in the area from Kerry Head to Beal Head. The site-specific conservation objectives[25] for estuaries, mudflats and sandflats not covered by seawater at low tide and large shallow inlets and bays relate to the achievement of attributes and targets in respect of both the habitat area and the community distribution within these habitats. A further attribute or target set out for sandbanks which are slightly covered by seawater all the time and reefs relates to the habitat distribution within the SAC, subject to natural processes.

The extent of the habitat estuaries in this SAC is estimated as 24,273 ha and uses Water Framework transitional water body delineation to define the extent. The habitat extends from Limerick Dock on the eastern side of the site, almost to Kilrush on the western side of the site. The habitat also encompasses the Annex I habitat of Mudflats and sandflats not covered by seawater at low tide which has an area of 8,808 ha.

The habitat area for large shallow inlets and bays was estimated as 35,282 ha in this SAC. The site supports an excellent example of the QI, which is contained within the coastal water body Mouth of the Shannon (HAs 23;27) (IE_SH_060_0000). Littoral sediment communities in the mouth of the Shannon Estuary occur in areas that are exposed to wave action and also in areas extremely sheltered from wave action. Characteristically, exposed sediment communities are composed of coarse sand and have a sparse fauna. Species richness increases as conditions become more sheltered. All shores in the site have a zone of sand hoppers at the top, and below this each of the shores has different characteristic species giving a range of different shore types. This habitat also encompasses the Annex I habitats mudflats and sandflats not covered by water at low tide, sandbanks which are slightly covered by sea water all the time and reefs[26].

This habitat area for reefs within the Lower River Shannon SAC is estimated as 21,421 ha and is found within the Shannon Estuary and Mouth of the Shannon water bodies. There are no nutrient specific targets in the SSCO for this habitat. The attributes and targets that will maintain the favourable conservation condition of this habitat do not make specific reference to water quality or nutrient conditions.

[25] NPWS 2012 Lower River Shannon SAC 002165 Site Specific Conservation Objectives
[26] NPWS 2012 Lower River Shannon SAC 002165 Conservation Objectives Supporting Document - Marine Habitats

The COs supporting document for marine habitats (NPWS, 2012[27]) does require that activities or operations that cause significant disturbance to communities but may not necessarily represent a continuous or ongoing source of disturbance over time and space may be assessed in a context-specific manner, giving due consideration to the proposed nature and scale of activities during the reporting cycle and the particular resilience of the receiving habitat in combination with other activities within the designated site. This CO is applicable to all of the QIs listed here.

Annex I habitat structure and function, and the extent and quality of all habitats varies considerably in space and time and marine habitats are particularly prone to such variation. Anthropogenic disturbance may be considered significant when it causes a change in biotic and/or abiotic variables in excess of what could reasonably be envisaged under natural processes. A target for this habitat 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.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Lower River Shannon SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the SAC include: Brick_010 (IE_SH_23B030300), Brick_020 (IE_SH_23B030400), Brick_030 (IE_SH_23B030500), Brick_040 (IE_SH_23B030700), Mountcoal_010 (IE_SH_23M440980) and Knoppoge South_010 (IE_SH_23K120820);
- The transitional water bodies hydrologically connected to the SAC include: Upper Feale Estuary (IE_SH_060_0200) and Cashen (IE_SH_060_0100);
- The coastal water body hydrologically connected to the SAC is: Mouth of the Shannon (Has 23;27) (IE_SH_060_0000); and
- The groundwater bodies hydrogeologically connected to the SAC are: Ballybunnion (IE_SH_G_027), Kerry Head (IE_SH_G_118) and Abbeyfeale (IE_SH_G_001).

The habitat Sandbanks is located approximately 14 km downstream of the WSZs, where the Cashen TWB discharges into Mouth of the Shannon CWB. The habitats Estuaries and Mudflats and sandflats not covered by seawater are located approximately 23 km upstream of where flows from the WSZs discharge into Mouth of the Shannon CWB. As such it is considered that there is limited potential for hydrological connectivity with these qualifying interests and the WSZs. However, on a precautionary basis inputs to the various water bodies have been considered below. The habitat large shallow inlets and bays and reefs are located downstream of the WSZs, within Mouth of the Shannon CWB, into which all river and transitional water bodies connected to the WSZs discharge (as listed at **Table 5-3**).

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

[27] NPWS 2012 Lower River Shannon SAC 002165 Conservation Objectives Supporting Document - Marine Habitats

The modelled increase in orthophosphate concentration in the river water bodies are as follows: Brick_010 (IE_SH_23B030300) (0.0011 mg/l), Brick_020 (IE_SH_23B030400) (0.0012 mg/l), Brick_030 (IE_SH_23B030500) (0.0011 mg/l), Brick_040 (IE_SH_23B030700) (0.0007 mg/l), Mountcoal_010 (IE_SH_23M440980) (undetectable, 0.0000 mg/l) and Knoppoge South (IE_SH_23K120820) (0.0008 mg/l). The increases in concentration do not exceed 5% of the High / Good indicative quality boundary for all waterbodies. Therefore, there is no risk of deterioration in the indicative quality for most water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

For Brick_20 (IE_SH_23B030300) the modelled increases in concentration is just under 5% of the High / Good indicative quality boundary, at 0.0012 mg/l). There are two monitoring points on this water body. The first is within 75% of the upper indicative quality threshold. Therefore, there is no risk in the deterioration of the current Poor orthoP indicative quality or achievement of WFD objective.

The second monitoring point is downstream and has a current baseline orthoP indicative quality of Bad. This monitoring point represents a short length of river at the Abbeydorney WWTP. The Brick_020 water body is at Poor biological status, so by definition the supporting conditions are considered as being consistent with the achievement of the class for the biological elements, so supporting orthophosphate conditions are considered to be consistent with Poor ecological status. As the modelled increase in concentration is below significant levels it is reasoned that the dosing will not result in any further impact on the structure and functioning of aquatic ecosystems in this water body and will not result in any further deterioration in the contributing elements to ecological status.

However, the habitat Sandbanks is located within the Mouth of the Shannon coastal water body approximately >18km downstream of the Brick_020 (IE_SH_23B030400). The river waterbody discharges into the Brick_030 (IE_SH_23B030500) and the Cashen (IE_SH_060_0100) transitional water body where the ZoI of influence is terminated prior to discharge into the Mouth of the River Shannon (IE_SH_060_0000). Owing to the fact that this marine habitat is not present within the Brick_020 (IE_SH_23B030400) river water body, the distance of separation, and orthophosphate concentrations are modelled to be undetectable within the Cashen transitional waterbody it has been determined that there will be no potential for likely significant effects on this habitat.

The modelled increase in orthophosphate concentration in the transitional water bodies which are hydrologically connected to the site are as follows: Upper Feale Estuary (IE_SH_060_0200) (undetectable i.e. 0.0000 mg/l) and Cashen (IE_SH_060_0100) (undetectable 0.0000 mg/l). As the modelled increases in concentration do not exceed 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the indicative quality of the water bodies or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the single modelled coastal water body, which is hydrologically connected to the site, Mouth of the Shannon (HAs 23;27) (IE_SH_060_0000) was undetectable (0.0000 mg/l). As such there is no risk of deterioration in the indicative quality of the water body or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the groundwater bodies connected to the site are as follows: Ballybunnion (IE_SH_G_027) (0.0006 mg/l), Kerry Head (IE_SH_G_118) (undetectable, 0.0000 mg/l) and Abbeyfeale (IE_SH_G_001) (undetectable 0.0000 mg/l). As the modelled increases in concentration do not exceed 5% of the Good / Fail indicative quality boundary,

there is no risk of deterioration in the indicative quality of the groundwater bodies or of preventing the achievement of WFD objectives.

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

6.1.1.4 (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 such factors such as freshwater inputs and barrier permeability.

There are four coastal lagoons – Quayfield and Poulaweala Loughs, Shannon Airport Lagoon, Scattery Lagoon and Cloonconeen Pool, located within this site (NPWS 2012[28]).

Shannon Airport Lagoon lies to the east of the Fergus Estuary, and north of the Upper Shannon Estuary. The site is also situated only a few hundred metres southwest of Shannon Airport. The lagoon constitutes a small (2 ha) artificial lagoon with a sluiced inlet, formed behind a coastal embankment (artificial). When visited briefly in 1996, salinity measured 13 psu and water depth was approximately 1m, but when sampled in 2002, a large part of the lagoon was dry and salinity measured 0 psu[28].

Scattery Island Lagoon is situated on Scattery Island in the River Shannon, 2.5 km southwest of Kilrush, Co. Clare. The lagoon is a small (10 ha), shallow, "estuarine" natural sedimentary lagoon with a cobble/shingle barrier. A relatively large natural inlet allows most tides to enter through the barrier and salinity is generally high, ranging from 29-32 psu at the time of sampling (18-21/9/03).

Cloonconeen Pool lies on the Shannon Estuary, just west of Kilcredaun Point, 2 km southwest of Carrigaholt. It is a small (7 ha) natural sedimentary lagoon with a cobble barrier in an area of partially cut peat bog which has become flooded by seawater. Salinity was high at the time of sampling (9-10/8/96[28]) and ranged from 32-34 psu in the main pool but is probably less for much of the time. There is a drowned forest of pine, some 4,000 years old on the beach. Further offshore is another barrier of rock, which possibly represents the position of a former complete barrier, enclosing a larger lagoon. The lagoon and cobble barrier, together with the drowned forest, is of great geomorphological interest.

Structure and functions relate to the physical components of a habitat ("structure") and the ecological processes that drive it ("functions"). For lagoons these include attributes such as salinity, hydrology and various water quality attributes. Lagoons can vary considerably in salinity both within and between sites depending on the volume and timing of inflowing and outflowing fresh and seawater. Salinity is probably the most important variable in the classification of lagoon types (Roden and Oliver, 2010[28]). All the lagoons identified within the Lower River Shannon SAC can be classified as shallow, thus even small changes in water depth can cause significant losses in habitat area.

[28] NPWS 2012 Lower River Shannon SAC 002165 Conservation Objectives Supporting Document - Lagoons

In the COs supporting document for coastal lagoons for the site (NPWS 2012[29]), the target for the attribute water quality- Molybdate Reactive Phosphorus (MRP) is: annual median MRP within natural ranges and less than 0.1 mg/L. The target is based on Roden and Oliver (2010[30]). 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 the Lower River Shannon SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the SAC include: Brick_010 (IE_SH_23B030300), Brick_020 (IE_SH_23B030400), Brick_030 (IE_SH_23B030500), Brick_040 (IE_SH_23B030700), Mountcoal_010 (IE_SH_23M440980) and Knoppoge South_010 (IE_SH_23K120820);
- The transitional water bodies hydrologically connected to the SAC include: Upper Feale Estuary (IE_SH_060_0200) and Cashen (IE_SH_060_0100);
- The coastal water body hydrologically connected to the SAC is: Mouth of the Shannon (Has 23;27) (IE_SH_060_0000); and
- The groundwater bodies hydrogeologically connected to the SAC are: Ballybunnion (IE_SH_G_027), Kerry Head (IE_SH_G_118) and Abbeyfeale (IE_SH_G_001).

Each of the coastal lagoon habitats are located upstream of the water bodies that connect the WSZs to the SAC, however several are considered likely to be hydrologically linked to flows discharging into Mouth of the Shannon CWB through tidal flows.

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

The modelled increase in orthophosphate concentration in the river water bodies are as follows: Brick_010 (IE_SH_23B030300) (0.0011 mg/l), Brick_020 (IE_SH_23B030400) (0.0012 mg/l), Brick_030 (IE_SH_23B030500) (0.0011 mg/l), Brick_040 (IE_SH_23B030700) (0.0007 mg/l), Mountcoal_010 (IE_SH_23M440980) (undetectable, 0.0000 mg/l) and Knoppoge South (IE_SH_23K120820) (0.0008 mg/l). The increases in concentration do not exceed 5% of the High / Good indicative quality boundary for all waterbodies. Therefore, there is no risk of deterioration in the indicative quality for most water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

For Brick_20 (IE_SH_23B030300) the modelled increases in concentration is just under 5% of the High / Good indicative quality boundary, at 0.0012 mg/l). There are two monitoring points on this water body. The first is within 75% of the upper indicative quality threshold. Therefore, there is no risk in the deterioration of the current Poor orthoP indicative quality or achievement of WFD objective.

The second monitoring point is downstream and has a current baseline orthoP indicative quality of Bad. This monitoring point represents a short length of river at the Abbeydorney WWTP. The

[29] NPWS 2012 Lower River Shannon SAC 002165 Conservation Objectives Supporting Document- Lagoons
[30] Roden, C.M. and Oliver, G. 2010. Monitoring and assessment of Irish Lagoons for the purpose of the EU Water Framework Directive.

Brick_020 water body is at Poor biological status, so by definition the supporting conditions are considered as being consistent with the achievement of the class for the biological elements, so supporting orthophosphate conditions are considered to be consistent with Poor ecological status. As the modelled increase in concentration is below significant levels it is reasoned that the dosing will not result in any further impact on the structure and functioning of aquatic ecosystems in this water body and will not result in any further deterioration in the contributing elements to ecological status.

However, the habitat Coastal Lagoons is located within the Mouth of the Shannon coastal water body approximately >18km downstream of Brick_020 (IE_SH_23B030400). This river waterbody discharges into the Brick_030 (IE_SH_23B030500) and the Cashen (IE_SH_060_0100) transitional water body where the ZoI of influence is terminated prior to discharge into the Mouth of the River Shannon (IE_SH_060_0000). Owing to the fact that this coastal habitat is not present within the Brick_020 river water body, the distance of separation, and orthophosphate concentrations are modelled to be undetectable within the Cashen transitional waterbody it has been determined that there will be no potential for likely significant effects on this habitat.

The modelled increase in orthophosphate concentration in the transitional water bodies which are hydrologically connected to the site are as follows: Upper Feale Estuary (IE_SH_060_0200) (undetectable i.e. 0.0000 mg/l) and Cashen (IE_SH_060_0100) (0.0000 mg/l). As the modelled increases in concentration do not exceed 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the indicative quality of the water bodies or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the single modelled coastal water body, which is hydrologically connected to the site, Mouth of the Shannon (HAs 23;27) (IE_SH_060_0000) was undetectable (0.0000 mg/l). As such there is no risk of deterioration in the indicative quality of the water body or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the groundwater bodies connected to the site are as follows: Ballybunnion (IE_SH_G_027) (0.0006 mg/l), Kerry Head (IE_SH_G_118) (undetectable, 0.0000 mg/l) and Abbeyfeale (IE_SH_G_001) (undetectable 0.0000 mg/l). As the modelled increases in concentration do not exceed 5% of the Good / Fail indicative quality boundary, there is no risk of deterioration in the indicative quality of the groundwater bodies or of preventing the achievement of WFD objectives.

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

6.1.1.5 (1310) Salicornia and other annuals colonising mud and sand, (1330) Atlantic salt meadows and (1410) Mediterranean salt meadows

There are three saltmarsh habitats within this site, and the Saltmarsh Monitoring Project (SMP)[31] has documented an estimated area of 0.223 ha for Salicornia habitat. Further unrecorded areas may be present within the site. For Atlantic salt meadows, the SMP mapped 119.36 ha and additional areas of potential saltmarsh (376.07 ha) were identified from an examination of aerial photographs, giving a total estimated area of 495.43 ha. Further unrecorded areas maybe present within the site.

For Mediterranean salt meadows, eight sub-sites that support the habitat were mapped (22.379 ha) as part of the SMP and additional areas of potential saltmarsh (25.646 ha) were identified from an examination of aerial photographs, giving a total estimated area of 48.025 ha. Saltmarsh habitat also occurs at 11 other sub-sites within the SAC. Furthermore, un-surveyed areas maybe present within the site.

While there are no nutrient specific targets set for these habitats, 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: 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 the Lower River Shannon SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the SAC include: Brick_010 (IE_SH_23B030300), Brick_020 (IE_SH_23B030400), Brick_030 (IE_SH_23B030500), Brick_040 (IE_SH_23B030700), Mountcoal_010 (IE_SH_23M440980) and Knoppoge South_010 (IE_SH_23K120820);
- The transitional water bodies hydrologically connected to the SAC include: Upper Feale Estuary (IE_SH_060_0200) and Cashen (IE_SH_060_0100);
- The coastal water body hydrologically connected to the SAC is: Mouth of the Shannon (Has 23;27) (IE_SH_060_0000); and
- The groundwater bodies hydrogeologically connected to the SAC are: Ballybunnion (IE_SH_G_027), Kerry Head (IE_SH_G_118) and Abbeyfeale (IE_SH_G_001).

The saltmarsh habitats are located downstream of the WSZs and all water bodies identified as being connected to the SAC are included within **Table 5-3**.

[31] Saltmarsh Monitoring Project 2006, Mark Mc Corry 2007. A Report for Research Branch, National Parks and Wildlife Service.
https://www.npws.ie/sites/default/files/publications/pdf/McCorry_2007_Saltmarsh_survey.pdf

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

The modelled increase in orthophosphate concentration in the river water bodies are as follows: Brick_010 (IE_SH_23B030300) (0.0011 mg/l), Brick_020 (IE_SH_23B030400) (0.0012 mg/l), Brick_030 (IE_SH_23B030500) (0.0011 mg/l), Brick_040 (IE_SH_23B030700) (0.0007 mg/l), Mountcoal_010 (IE_SH_23M440980) (undetectable, 0.0000 mg/l) and Knoppoge South (IE_SH_23K120820) (0.0008 mg/l). The increases in concentration do not exceed 5% of the High / Good indicative quality boundary for all waterbodies. Therefore, there is no risk of deterioration in the indicative quality for most water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

For Brick_20 (IE_SH_23B030300) the modelled increases in concentration is just under 5% of the High / Good indicative quality boundary, at 0.0012 mg/l). There are two monitoring points on this water body. The first is within 75% of the upper indicative quality threshold. Therefore, there is no risk in the deterioration of the current Poor orthoP indicative quality or achievement of WFD objective.

The second monitoring point is downstream and has a current baseline orthoP indicative quality of Bad. This monitoring point represents a short length of river at the Abbeydorney WWTP. The Brick_020 water body is at Poor biological status, so by definition the supporting conditions are considered as being consistent with the achievement of the class for the biological elements, so supporting orthophosphate conditions are considered to be consistent with Poor ecological status. As the modelled increase in concentration is below significant levels it is reasoned that the dosing will not result in any further impact on the structure and functioning of aquatic ecosystems in this water body and will not result in any further deterioration in the contributing elements to ecological status.

However, the habitats of Salicornia and other annuals colonising mud and sand Spartina swards (*Spartinion maritimae*), Atlantic and Mediterranean salt meadows are located within the Deel Estuary (IE_SH_060_0600) and Lower Shannon Estuary (IE_SH_060_0300) transitional water bodies which are located approximately 40 km upstream of where the WSZs discharge into the Mouth of the Shannon CWB. However, potential habitats are mapped within the Cashen (IE_SH_060_0100) transitional waterbody. The river waterbody discharges into the Brick_030 (IE_SH_23B030500) and the Cashen (IE_SH_060_0100) transitional water body where the Zol of influence is terminated prior to discharge into the Mouth of the River Shannon (IE_SH_060_0000). Owing to the fact that this transitional/coastal habitat is not present within the Brick_020 (IE_SH_23B030400) river water body, the distance of separation, and orthophosphate concentrations are modelled to be undetectable within the Cashen transitional waterbody it has been determined that there will be no potential for likely significant effects on this habitat.

The modelled increase in orthophosphate concentration in the transitional water bodies which are hydrologically connected to the site are as follows: Upper Feale Estuary (IE_SH_060_0200) (undetectable i.e. 0.0000 mg/l) and Cashen (IE_SH_060_0100) (0.0000 mg/l). As the modelled increases in concentration do not exceed 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the indicative quality of the water bodies or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the single modelled coastal water body, which is hydrologically connected to the site, Mouth of the Shannon (HAs 23;27) (IE_SH_060_0000)

was undetectable (0.0000 mg/l). As such there is no risk of deterioration in the indicative quality of the water body or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the groundwater bodies connected to the site are as follows: Ballybunnion (IE_SH_G_027) (0.0006 mg/l), Kerry Head (IE_SH_G_118) (undetectable, 0.0000 mg/l) and Abbeyfeale (IE_SH_G_001) (undetectable 0.0000 mg/l). As the modelled increases in concentration do not exceed 5% of the Good / Fail indicative quality boundary, there is no risk of deterioration in the indicative quality of the groundwater bodies or of preventing the achievement of WFD objectives.

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

6.1.1.6 (1349) Bottlenose dolphin (*Tursiops truncates*)

The bottlenose dolphin habitat extends throughout the Lower River Shannon SAC and the dolphins are known to range widely throughout the site (NPWS 2012[32]). Critical habitat areas[33] are between Tarbert Island and Scattery Island, and in the Mouth of the Shannon (HAs 23;27) (IE_SH_060_0000), as far as Kerry Head and Loop Head. The population is described as resident within the site with dolphin groups present in the estuary throughout the year, repeated occurrence of known individuals within the between years, and a fine scale genetic distinction evident between members of the Shannon population and populations or communities occurring outside the estuary (NPWS 2012[34]). A target has been established for this species which states that human activities should occur at levels that do not significantly affect the bottlenose dolphin population at the site. While the target predominantly relates to preventing impacts from man-made energy e.g. aerial or underwater noise, light or thermal energy, it also includes for proposed activities or operations that may result in the deterioration of key resources (e.g. water quality, feeding etc.), upon which the bottlenose dolphin depends. It is not fully known what the ecological requirements of the species are; therefore, assessment needs to be on a case by case basis where appropriate.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Lower River Shannon SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the SAC include: Brick_010 (IE_SH_23B030300), Brick_020 (IE_SH_23B030400), Brick_030 (IE_SH_23B030500), Brick_040 (IE_SH_23B030700), Mountcoal_010 (IE_SH_23M440980) and Knoppoge South_010 (IE_SH_23K120820);
- The transitional water bodies hydrologically connected to the SAC include: Upper Feale Estuary (IE_SH_060_0200) and Cashen (IE_SH_060_0100);

[32] NPWS 2012 Lower River Shannon SAC 002165 Conservation Objectives

[33] Critical areas are described within NPWS (2012) as representing high value habitats used preferentially by the species within its overall range at the site and they broadly coincide with areas of steep benthic (i.e. seafloor) slope, greater depth and stronger currents. See https://www.npws.ie/sites/default/files/publications/pdf/002165_Lower%20River%20Shannon%20SAC%20Marine%20Supporting%20Doc_V1.pdf, Figure 7.

[34] NPWS 2012 Lower River Shannon SAC 002165 Conservation Objectives

- The coastal water body hydrologically connected to the SAC is: Mouth of the Shannon (Has 23;27) (IE_SH_060_0000); and
- The groundwater bodies hydrogeologically connected to the SAC are: Ballybunnion (IE_SH_G_027), Kerry Head (IE_SH_G_118) and Abbeyfeale (IE_SH_G_001).

Bottlenose dolphins are known to range widely throughout the Lower Shannon SAC. The COs have mapped habitat for the bottlenose dolphin as extending from the coastal waterbodies up to the transitional waterbodies within the SAC. Critical habitat is mapped within the Mouth of the River Shannon and the downstream end of the Lower Shannon Estuary.

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

The modelled increase in orthophosphate concentration in the river water bodies are as follows: Brick_010 (IE_SH_23B030300) (0.0011 mg/l), Brick_020 (IE_SH_23B030400) (0.0012 mg/l), Brick_030 (IE_SH_23B030500) (0.0011 mg/l), Brick_040 (IE_SH_23B030700) (0.0007 mg/l), Mountcoal_010 (IE_SH_23M440980) (undetectable, 0.0000 mg/l) and Knoppoge South (IE_SH_23K120820) (0.0008 mg/l). The increases in concentration do not exceed 5% of the High / Good indicative quality boundary for all waterbodies. Therefore, there is no risk of deterioration in the indicative quality for most water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

For Brick_20 (IE_SH_23B030300) the modelled increases in concentration is just under 5% of the High / Good indicative quality boundary, at 0.0012 mg/l). There are two monitoring points on this water body. The first is within 75% of the upper indicative quality threshold. Therefore, there is no risk in the deterioration of the current Poor orthoP indicative quality or achievement of WFD objective.

The second monitoring point is downstream and has a current baseline orthoP indicative quality of Bad. This monitoring point represents a short length of river at the Abbeydorney WWTP. The Brick_020 water body is at Poor biological status, so by definition the supporting conditions are considered as being consistent with the achievement of the class for the biological elements, so supporting orthophosphate conditions are considered to be consistent with Poor ecological status. As the modelled increase in concentration is below significant levels it is reasoned that the dosing will not result in any further impact on the structure and functioning of aquatic ecosystems in this water body and will not result in any further deterioration in the contributing elements to ecological status.

However, the habitat for Bottlenose Dolphin is located within the Mouth of the River Shannon (IE_SH_060_0000) approximately >18km downstream of the Brick_020 (IE_SH_23B030400). The river waterbody discharges into the Brick_030 (IE_SH_23B030500) and the Cashen (IE_SH_060_0100) transitional water body where the ZoI of influence is terminated prior to discharge into the Mouth of the River Shannon (IE_SH_060_0000). Owing to the fact that this marine QI species is not present within the Brick_020 (IE_SH_23B030400) River, the distance of separation, and orthophosphate concentrations are modelled to be undetectable within the Cashen transitional waterbody and Mouth of the Shannon it has been determined that there will be no potential for likely significant effects on this habitat.

The modelled increase in orthophosphate concentration in the transitional water bodies which are hydrologically connected to the site are as follows: Upper Feale Estuary (IE_SH_060_0200)

(undetectable i.e. 0.0000 mg/l) and Cashen (IE_SH_060_0100) (undetectable 0.0000 mg/l). As the modelled increases in concentration do not exceed 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the indicative quality of the water bodies or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the single modelled coastal water body, which is hydrologically connected to the site, Mouth of the Shannon (HAs 23;27) (IE_SH_060_0000) was undetectable (0.0000 mg/l). As such there is no risk of deterioration in the indicative quality of the water body or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the groundwater bodies connected to the site are as follows: Ballybunnion (IE_SH_G_027) (0.0006 mg/l), Kerry Head (IE_SH_G_118) (undetectable, 0.0000 mg/l) and Abbeyfeale (IE_SH_G_001) (undetectable 0.0000 mg/l). As the modelled increases in concentration do not exceed 5% of the Good / Fail indicative quality boundary, there is no risk of deterioration in the indicative quality of the groundwater bodies or of preventing the achievement of WFD objectives.

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

6.1.1.7 (1355) Otter (*Lutra lutra*)

A review of the SSCOs (NPWS 2012[35]) found no specific attributes or targets relating to water quality for the species however the NPWS Threat Response Plan for the Otter (NPWS, 2009[36]) review of and response to the pressures and threats to otters in Ireland, categorized three principal risks to otters: i) habitat destruction and degradation; ii) water pollution; and, iii) accidental death and/or persecution.

The extent of terrestrial, marine and freshwater (river) habitat within the site includes all areas within a 10m terrestrial buffer along the shoreline (above the high water mark and along river banks) identified as critical for otters; areas within 80m of the shoreline (high water mark) and river length calculated on the basis that otters will utilise freshwater habitats from estuary to headwaters (NPWS, 2012[23]). The diet of the species varies locally and seasonally; however, it is dominated by fish, in particular salmonids, eels and sticklebacks in freshwater.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Lower River Shannon SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the SAC include: Brick_010 (IE_SH_23B030300), Brick_020 (IE_SH_23B030400), Brick_030 (IE_SH_23B030500), Brick_040 (IE_SH_23B030700), Mountcoal_010 (IE_SH_23M440980) and Knoppoge South_010 (IE_SH_23K120820);

[35] NPWS 2012 Lower River Shannon SAC 002165 Conservation Objectives

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

- The transitional water bodies hydrologically connected to the SAC include: Upper Feale Estuary (IE_SH_060_0200) and Cashen (IE_SH_060_0100);
- The coastal water body hydrologically connected to the SAC is: Mouth of the Shannon (Has 23;27) (IE_SH_060_0000); and
- The groundwater bodies hydrogeologically connected to the SAC are: Ballybunnion (IE_SH_G_027), Kerry Head (IE_SH_G_118) and Abbeyfeale (IE_SH_G_001).

As the habitat of the otter extends all throughout the Lower River Shannon SAC, there is potential for all water bodies identified in **Table 5-2**, as connected to the SAC, to affect the species.

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

The modelled increase in orthophosphate concentration in the river water bodies are as follows: Brick_010 (IE_SH_23B030300) (0.0011 mg/l), Brick_020 (IE_SH_23B030400) (0.0012 mg/l), Brick_030 (IE_SH_23B030500) (0.0011 mg/l), Brick_040 (IE_SH_23B030700) (0.0007 mg/l), Mountcoal_010 (IE_SH_23M440980) (undetectable, 0.0000 mg/l) and Knoppoge South (IE_SH_23K120820) (0.0008 mg/l). The increases in concentration do not exceed 5% of the High / Good indicative quality boundary for all waterbodies. Therefore, there is no risk of deterioration in the indicative quality for most water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

For Brick_20 (IE_SH_23B030300) the modelled increases in concentration is just under 5% of the High / Good indicative quality boundary, at 0.0012 mg/l). There are two monitoring points on this water body. The first is within 75% of the upper indicative quality threshold. Therefore, there is no risk in the deterioration of the current Poor orthoP indicative quality or achievement of WFD objective.

The second monitoring point is downstream and has a current baseline orthoP indicative quality of Bad. This monitoring point represents a short length of river at the Abbeydorney WWTP. The Brick_020 water body is at Poor biological status, so by definition the supporting conditions are considered as being consistent with the achievement of the class for the biological elements, so supporting orthophosphate conditions are considered to be consistent with Poor ecological status. As the modelled increase in concentration is below significant levels it is reasoned that the dosing will not result in any further impact on the structure and functioning of aquatic ecosystems in this water body and will not result in any further deterioration in the contributing elements to ecological status.

In Ireland, the territory of female otters in mesotrophic rivers (i.e. those with an intermediate level of productivity) is approximately 7.5 ± 1.5km in length and inversely related to river width (Ó Néill et al. 2009). In coastal environments for male and female otters, an average range of 6.5km along the shoreline in Roaring water Bay coastal environment was observed (de Jongh *et al*. 2010). O'Neil also noted that male territory can be variable and influenced by other otters with one male expanding its territory from 10.2km to 19.3km following the death of another. Otters utilising coastal habitats will require access to freshwater for bathing and supplementary foraging. Using a precautionary basis, supporting habitat for QI Otter designated within the Lower River Shannon SAC, is considered to extend for up to 18km from the Mouth of the Shannon into the Cashen transitional water body. Brick_20 lies upstream and 8km south west of this TWB with mapping also indicating that commuting largely occurs within Cashen transitional water body. Therefore, the Brick_020 is unlikely a supporting habitat for otter located within the coastal environment of the Lower River Shannon SAC.

The Brick_20 river waterbody discharges into the Brick_030 (IE_SH_23B030500) and the Cashen (IE_SH_060_0100) transitional water body where the ZoI of influence is terminated prior to discharge into the Mouth of the River Shannon (IE_SH_060_0000). A short section (480m) of the Brick_20 is considered to be at Risk of Achieving WFD objectives however it is not considered supporting habitat for otter. Potential impacts to salmon a potential otter food source has been excluded in Section 6.1.1.5 above for the Brick_020 (IE_SH_23B030400). Supplementary food resources are available outside of this short section of river water body.

The modelled increase in orthophosphate concentration in the transitional water bodies which are hydrologically connected to the site are as follows: Upper Feale Estuary (IE_SH_060_0200) (undetectable i.e. 0.0000 mg/l) and Cashen (IE_SH_060_0100) (0.0000 mg/l). As the modelled increases in concentration do not exceed 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the indicative quality of the water bodies or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the single modelled coastal water body, which is hydrologically connected to the site, Mouth of the Shannon (HAs 23;27) (IE_SH_060_0000) was undetectable (0.0000 mg/l). As such there is no risk of deterioration in the indicative quality of the water body or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the groundwater bodies connected to the site are as follows: Ballybunnion (IE_SH_G_027) (0.0006 mg/l), Kerry Head (IE_SH_G_118) (undetectable, 0.0000 mg/l) and Abbeyfeale (IE_SH_G_001) (undetectable 0.0000 mg/l). As the modelled increases in concentration do not exceed 5% of the Good / Fail indicative quality boundary, there is no risk of deterioration in the indicative quality of the groundwater bodies or of preventing the achievement of WFD objectives.

In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Scart Reservoir, it has been demonstrated that the potential for likely significant effects on this species can be excluded. Furthermore, dosing will not interfere with the terrestrial, marine or freshwater habitat of the species. In the absence of any likely significant effect on water quality or fish species, the main food source for the otter in this SAC, there is no potential for likely significant effects on the conservation status of otter as a result of this project. Furthermore, dosing will not prevent the restoration of the favourable conservation condition of the species.

6.1.1.8 (3260) Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation

There are three sub-types of high conservation value known to occur in this site i.e. *Groenlandia densa*, *Schoenoplectus triqueter* and bryophyte-rich streams and rivers. The full distribution of this habitat and its sub-types in this site are currently unknown (NPWS 2012[37]). There are stretches of six main rivers in the Lower River Shannon SAC: the Shannon, the Cloon, the Fergus, the Mulkear, the Maigue and the Feale. The high conservation value areas influenced by the tide are found, most notably, in the Shannon, the Fergus and the Maigue. The catchments of these three rivers are dominated by

[37] NPWS 2012 Lower River Shannon SAC 002165 Conservation Objectives Supporting Document - Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho Batrachion* vegetation (habitat code 3260)

limestone geology. All of these watercourses lie upstream of the WSZs which discharge into the marine region of the SAC, via the Cashen and Upper Feale Estuary.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Lower River Shannon SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the SAC include: Brick_010 (IE_SH_23B030300), Brick_020 (IE_SH_23B030400), Brick_030 (IE_SH_23B030500), Brick_040 (IE_SH_23B030700), Mountcoal_010 (IE_SH_23M440980) and Knoppoge South_010 (IE_SH_23K120820);
- The transitional water bodies hydrologically connected to the SAC include: Upper Feale Estuary (IE_SH_060_0200) and Cashen (IE_SH_060_0100);
- The coastal water body hydrologically connected to the SAC is: Mouth of the Shannon (Has 23;27) (IE_SH_060_0000); and
- The groundwater bodies hydrogeologically connected to the SAC are: Ballybunnion (IE_SH_G_027), Kerry Head (IE_SH_G_118) and Abbeyfeale (IE_SH_G_001).

While the known extent of the three sub-types has been broadly mapped within the SAC (NPWS 2012[37]), the exact area of each has not been quantified. The area of the *Schoenoplectus triqueter* sub-type is likely to be smaller than the mapped range, however, as both the *Groenlandia densa* and the bryophyte-rich sub-types are presumed to be more widespread than mapped, it is not possible to comment on their areas at this time. For this reason, and on a precautionary basis, the assessment included all surface waters with hydrological connectivity to this site as identified in **Table 5-2**.

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

The modelled increase in orthophosphate concentration in the river water bodies are as follows: Brick_010 (IE_SH_23B030300) (0.0011 mg/l), Brick_020 (IE_SH_23B030400) (0.0012 mg/l), Brick_030 (IE_SH_23B030500) (0.0011 mg/l), Brick_040 (IE_SH_23B030700) (0.0007 mg/l), Mountcoal_010 (IE_SH_23M440980) (undetectable, 0.0000 mg/l) and Knoppoge South (IE_SH_23K120820) (0.0008 mg/l). The increases in concentration do not exceed 5% of the High / Good indicative quality boundary for all waterbodies. Therefore, there is no risk of deterioration in the indicative quality for most water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

For Brick_20 (IE_SH_23B030300) the modelled increases in concentration is just under 5% of the High / Good indicative quality boundary, at 0.0012 mg/l). There are two monitoring points on this water body. The first is within 75% of the upper indicative quality threshold. Therefore, there is no risk in the deterioration of the current Poor orthoP indicative quality or achievement of WFD objective.

The second monitoring point is downstream and has a current baseline orthoP indicative quality of Bad. This monitoring point represents a short length of river at the Abbeydorney WWTP. The Brick_020 water body is at Poor biological status, so by definition the supporting conditions are considered as being consistent with the achievement of the class for the biological elements, so supporting orthophosphate conditions are considered to be consistent with Poor ecological status. As the modelled increase in concentration is below significant levels it is reasoned that the dosing will

not result in any further impact on the structure and functioning of aquatic ecosystems in this water body and will not result in any further deterioration in the contributing elements to ecological status.

However, this area of interest for this habitat is located in the Shannon Estuary North catchment, which is located approximately 40 km upstream of where the WSZs discharge into the Mouth of the Shannon CWB. As such it is considered that there is no hydrological pathway between the WSZs and the Brick_20 and is not considered a supporting habitat for the QI habitat. The river waterbody discharges into the Brick_030 (IE_SH_23B030500) and the Cashen (IE_SH_060_0100) transitional water body where the ZoI of influence is terminated prior to discharge into the Mouth of the River Shannon (IE_SH_060_0000). Owing to the fact that this habitat is not present within the Brick_020 (IE_SH_23B030400), the distance of separation, and orthophosphate concentrations are modelled to be undetectable within the Cashen transitional waterbody and Mouth of the Shannon it has been determined that there will be no potential for likely significant effects on this habitat.

The modelled increase in orthophosphate concentration in the transitional water bodies which are hydrologically connected to the site are as follows: Upper Feale Estuary (IE_SH_060_0200) (undetectable i.e. 0.0000 mg/l) and Cashen (IE_SH_060_0100) (0.0000 mg/l). As the modelled increases in concentration do not exceed 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the indicative quality of the water bodies or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the single modelled coastal water body, which is hydrologically connected to the site, Mouth of the Shannon (HAs 23;27) (IE_SH_060_0000) was undetectable (0.0000 mg/l). As such there is no risk of deterioration in the indicative quality of the water body or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the groundwater bodies connected to the site are as follows: Ballybunnion (IE_SH_G_027) (0.0006 mg/l), Kerry Head (IE_SH_G_118) (undetectable, 0.0000 mg/l) and Abbeyfeale (IE_SH_G_001) (undetectable 0.0000 mg/l). As the modelled increases in concentration do not exceed 5% of the Good / Fail indicative quality boundary, there is no risk of deterioration in the indicative quality of the groundwater bodies or of preventing the achievement of WFD objectives.

In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Scart Reservoir, 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.

6.1.1.9 (6410) *Molinia* meadows

Molinia meadows on calcareous, peaty or clayey-silt-laden soils is a semi-natural grassland listed on Annex I of the Habitats Directive. Areas of *Molinia-Succisa* grassland are often seasonally flooded and can be managed as rough grazing or through a traditional regime of mowing during the drier summer months. They occur primarily in the midlands and the north-west, and less often in the south and east. The main negative impacts recorded for Annex I grassland habitats are species composition change (succession) and problematic native species (e.g. bracken). *Molinia* meadows are a groundwater

dependent terrestrial ecosystem (GWDTE) and have low to moderate sensitivity to changes in groundwater quantity and quality[38].

The Irish Semi-Natural Grasslands Survey (ISGS) 2007 – 2012 included within it, surveys undertaken in Co. Clare, Co. Limerick and Co. Tipperary[39]. Ten sites in Co. Clare, three sites in Co. Limerick and one site in Co. Tipperary were recorded[40]. The habitat has been recorded on the eastern bank of the Shannon, just north of Castleconnell, Co. Limerick and on the West bank of Lough Derg near Garrerghter (Figure 20, 21, O'Neill *et. al*., 2013[39]). Two other locations in Co. Limerick are located adjacent to Shannon North and South of Montpelier; there is a history of flooding in the vicinity of the grassland sites[41].

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Lower River Shannon SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the SAC include: Brick_010 (IE_SH_23B030300), Brick_020 (IE_SH_23B030400), Brick_030 (IE_SH_23B030500), Brick_040 (IE_SH_23B030700), Mountcoal_010 (IE_SH_23M440980) and Knoppoge South_010 (IE_SH_23K120820);
- The transitional water bodies hydrologically connected to the SAC include: Upper Feale Estuary (IE_SH_060_0200) and Cashen (IE_SH_060_0100);
- The coastal water body hydrologically connected to the SAC is: Mouth of the Shannon (Has 23;27) (IE_SH_060_0000); and
- The groundwater bodies hydrogeologically connected to the SAC are: Ballybunnion (IE_SH_G_027), Kerry Head (IE_SH_G_118) and Abbeyfeale (IE_SH_G_001).

The location of the Molinia meadows in the SAC is downstream of the water bodies that connect the WSZ to the SAC. The full extent of the habitat is currently unknown (NPWS, 2012[23]). Therefore, it is considered that all surface water bodies comprising the SAC and associated with the WSZ have the potential to contain this habitat type.

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

The modelled increase in orthophosphate concentration in the river water bodies are as follows: Brick_010 (IE_SH_23B030300) (0.0011 mg/l), Brick_020 (IE_SH_23B030400) (0.0012 mg/l), Brick_030 (IE_SH_23B030500) (0.0011 mg/l), Brick_040 (IE_SH_23B030700) (0.0007 mg/l), Mountcoal_010 (IE_SH_23M440980) (undetectable, 0.0000 mg/l) and Knoppoge South (IE_SH_23K120820) (0.0008 mg/l). The increases in concentration do not exceed 5% of the High / Good indicative quality boundary for all waterbodies. Therefore, there is no risk of deterioration in the indicative quality for most water

[38] Working Group on Groundwater (2005) WFD Pressures and Impacts Assessment Methodology, Guidance Document no. GW11

[39] O'Neill, F.H., Martin, J.R., Devaney, F.M. & Perrin, P.M. (2013) The Irish semi-natural grasslands survey 2007-2012. Irish Wildlife Manuals, No. 78. NPWS, Department of Arts, Heritage and the Gaeltacht, Ireland.

[40] Devaney, F.M., Martin, J.R., O'Neill, F.H. & Delaney, A. (2013) Irish Semi-natural Grasslands Survey, Annual Report No. 4

[41] http://www.floodmaps.ie/View/Default.aspx

bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

For Brick_20 (IE_SH_23B030300) the modelled increases in concentration is just under 5% of the High / Good indicative quality boundary, at 0.0012 mg/l). There are two monitoring points on this water body. The first is within 75% of the upper indicative quality threshold. Therefore, there is no risk in the deterioration of the current Poor orthoP indicative quality or achievement of WFD objective.

The second monitoring point is downstream and has a current baseline orthoP indicative quality of Bad. This monitoring point represents a short length of river at the Abbeydorney WWTP. The Brick_020 water body is at Poor biological status, so by definition the supporting conditions are considered as being consistent with the achievement of the class for the biological elements, so supporting orthophosphate conditions are considered to be consistent with Poor ecological status. As the modelled increase in concentration is below significant levels it is reasoned that the dosing will not result in any further impact on the structure and functioning of aquatic ecosystems in this water body and will not result in any further deterioration in the contributing elements to ecological status.

The closest known location for this habitat is along the banks of the Shannon, north of Castleconnell. This location does not receive any inputs from the WSZ. The Brick_20 is located 40km upstream of the SAC and is not considered to represent supporting habitat with suburban housing, agricultural pasture and scrub bordering the dominant habitats boarding the 480m section of water body at risk. The river waterbody discharges into the Brick_030 (IE_SH_23B030500) and the Cashen (IE_SH_060_0100) transitional water body where the Zol of influence is terminated prior to discharge into the Mouth of the River Shannon (IE_SH_060_0000). Owing to the fact that this habitat is not present within the Brick_020 (IE_SH_23B030400), the distance of separation, and orthophosphate concentrations are modelled to be undetectable within the Cashen transitional waterbody and Mouth of the Shannon it has been determined that there will be no potential for likely significant effects on this habitat.

The modelled increase in orthophosphate concentration in the transitional water bodies which are hydrologically connected to the site are as follows: Upper Feale Estuary (IE_SH_060_0200) (undetectable i.e. 0.0000 mg/l) and Cashen (IE_SH_060_0100) (0.0000 mg/l). As the modelled increases in concentration do not exceed 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the indicative quality of the water bodies or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the single modelled coastal water body, which is hydrologically connected to the site, Mouth of the Shannon (HAs 23;27) (IE_SH_060_0000) was undetectable (0.0000 mg/l). As such there is no risk of deterioration in the indicative quality of the water body or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the groundwater bodies connected to the site are as follows: Ballybunnion (IE_SH_G_027) (0.0006 mg/l), Kerry Head (IE_SH_G_118) (undetectable, 0.0000 mg/l) and Abbeyfeale (IE_SH_G_001) (undetectable 0.0000 mg/l). As the modelled increases in concentration do not exceed 5% of the Good / Fail indicative quality boundary, there is no risk of deterioration in the indicative quality of the groundwater bodies or of preventing the achievement of WFD objectives.

In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Scart Reservoir, it has been demonstrated that the potential for likely significant effects on

the habitats can be excluded. Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of the habitats.

6.1.1.10 (91E0) Alluvial forests

The Lower River Shannon SAC lies mostly within an intensively managed agricultural region and it contains only a small amount of woodland. This occurs principally along the banks of the River Shannon upstream of Limerick and in the uplands, mostly in the upper reaches of deeply incised tributaries on the Limerick/Tipperary border and in a few smaller areas along the River Feale and its tributaries in North Kerry/West Limerick (NPWS 2012[42]). In most cases the individual woodlands are small.

Within the SAC, five sites surveyed as part of the National Survey of Native Woodlands (NSNW, Perrin et al., 2008) contain discrete areas of alluvial woodlands (Clare Glen, Doonass Demesne, Newgarden North, Knockanavar and Gortnaskehy). These are small stands, restricted to narrow bands where the ground is subject to flooding or flushing. The total area of these is only c.8.5 ha but another site, Gortnageragh River Valley (NSNW code 1284) covering 56.4 ha, is a complex of old oak woodland, alluvial woodland and ash/hazel woodland. While the total extent within the SAC is likely to be somewhat greater there is an absence of suitable terrain for the occurrence of extensive alluvial woodland. Continuity of woodland cover is provided by oak woodlands, ash woodlands and conifer plantations.

The Clare Glens lie close to Murroe village, Co. Limerick, and the Annagh River (Tributary of the Mulkear River). Doonass Demesne and Newgarden North are located downstream of Castleconnell, Co. Limerick, on the River Shannon. Knockanavar is located on the Cahernahallia River (tributary of the Dead River), located between Doon, Co. Limerick and Cappagh White in south Co. Tipperary. Gortnaskehy is located on the Allaghaun River (tributary of the Feale River), near Toornafulla, Co. Limerick.

A review of the SSCOs for this habitat found no nutrient specific targets. The SCCOs target indicates that an appropriate hydrological regime is necessary for maintenance of alluvial vegetation, with periodic flooding essential to maintaining the alluvial woodlands along the river floodplains. The main pressures on this habitat are invasive alien species; grazing; forest management; agriculture; urban development; and, sewage and slurry discharges.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Lower River Shannon SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the SAC include: Brick_010 (IE_SH_23B030300), Brick_020 (IE_SH_23B030400), Brick_030 (IE_SH_23B030500), Brick_040 (IE_SH_23B030700), Mountcoal_010 (IE_SH_23M440980) and Knoppoge South_010 (IE_SH_23K120820);
- The transitional water bodies hydrologically connected to the SAC include: Upper Feale Estuary (IE_SH_060_0200) and Cashen (IE_SH_060_0100);

[42]NPWS 2012 Lower River Shannon SAC 002165 Conservation Objectives Supporting Document - Woodland Habitats

- The coastal water body hydrologically connected to the SAC is: Mouth of the Shannon (Has 23;27) (IE_SH_060_0000); and
- The groundwater bodies hydrogeologically connected to the SAC are: Ballybunnion (IE_SH_G_027), Kerry Head (IE_SH_G_118) and Abbeyfeale (IE_SH_G_001).

The habitat alluvial forest within the SAC is, for the most part, located upstream of the water bodies that connect the WSZs to the SAC (NPWS, 2012[23]). However, a single area (Gortnaskehy) is located within the Abbeyfeale GWB. This is a poorly productive groundwater body with short flow paths (30-300m) and as such it is not considered that there is any potential for ground water connectivity with the WSZs.

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

The modelled increase in orthophosphate concentration in the river water bodies are as follows: Brick_010 (IE_SH_23B030300) (0.0011 mg/l), Brick_020 (IE_SH_23B030400) (0.0012 mg/l), Brick_030 (IE_SH_23B030500) (0.0011 mg/l), Brick_040 (IE_SH_23B030700) (0.0007 mg/l), Mountcoal_010 (IE_SH_23M440980) (undetectable, 0.0000 mg/l) and Knoppoge South (IE_SH_23K120820) (0.0008 mg/l). The increases in concentration do not exceed 5% of the High / Good indicative quality boundary for all waterbodies. Therefore, there is no risk of deterioration in the indicative quality for most water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

For Brick_20 (IE_SH_23B030300) the modelled increases in concentration is just under 5% of the High / Good indicative quality boundary, at 0.0012 mg/l). There are two monitoring points on this water body. The first is within 75% of the upper indicative quality threshold. Therefore, there is no risk in the deterioration of the current Poor orthoP indicative quality or achievement of WFD objective.

The second monitoring point is downstream and has a current baseline orthoP indicative quality of Bad. This monitoring point represents a short length of river at the Abbeydorney WWTP. The Brick_020 water body is at Poor biological status, so by definition the supporting conditions are considered as being consistent with the achievement of the class for the biological elements, so supporting orthophosphate conditions are considered to be consistent with Poor ecological status. As the modelled increase in concentration is below significant levels it is reasoned that the dosing will not result in any further impact on the structure and functioning of aquatic ecosystems in this water body and will not result in any further deterioration in the contributing elements to ecological status.

The Brick_20 is not considered to be supporting habitat for this QI. The river waterbody discharges into the Brick_030 (IE_SH_23B030500) and the Cashen (IE_SH_060_0100) transitional water body where the ZoI of influence is terminated prior to discharge into the Mouth of the River Shannon (IE_SH_060_0000). Owing to the fact that this habitat is not present within the Brick_020 (IE_SH_23B030400), the distance of separation, and orthophosphate concentrations are modelled to be undetectable within the Cashen transitional waterbody and Mouth of the Shannon it has been determined that there will be no potential for likely significant effects on this habitat.

The modelled increase in orthophosphate concentration in the transitional water bodies which are hydrologically connected to the site are as follows: Upper Feale Estuary (IE_SH_060_0200) (undetectable i.e. 0.0000 mg/l) and Cashen (IE_SH_060_0100) (0.0000 mg/l). As the modelled

increases in concentration do not exceed 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the indicative quality of the water bodies or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the single modelled coastal water body, which is hydrologically connected to the site, Mouth of the Shannon (HAs 23;27) (IE_SH_060_0000) was undetectable (0.0000 mg/l). As such there is no risk of deterioration in the indicative quality of the water body or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the groundwater bodies connected to the site are as follows: Ballybunnion (IE_SH_G_027) (0.0006 mg/l), Kerry Head (IE_SH_G_118) (undetectable, 0.0000 mg/l) and Abbeyfeale (IE_SH_G_001) (undetectable 0.0000 mg/l). As the modelled increases in concentration do not exceed 5% of the Good / Fail indicative quality boundary, there is no risk of deterioration in the indicative quality of the groundwater bodies or of preventing the achievement of WFD objectives.

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

6.1.2 Ballyseedy Wood SAC 002112

6.1.2.1 (91E0) Alluvial forests

The Ballyseedy Wood SAC lies within the floodplain to the south of the River Lee, approximately 2km south-east of Tralee Co. Kerry (NPWS 2013[44]). The site comprises an area of 23.79 ha of alluvial woodland including three semi-natural woodland types. These include areas of high canopy alder and ash dominated woodland, ash and hazel woodland in the well-drained areas, and alder and rusty willow woods within areas which are drier still.

Areas of alder and ash dominated woodland support a high canopy with some very large alder specimens supported, planted approximately 100 years ago. A number of non-native species including sycamore, horse chestnut, poplar and beech are also present with an understorey comprised of hawthorn, spindle, holly and guelder rose also supported. Ash and hazel dominated woodland also support a high canopy, with hazel present in the understorey. Sycamore, beech and hornbeam are also present. Alder and rusty willow woodland is primarily dominated by alder with rusty willow present as scattered trees.

The site supports a range of ground flora, including the rare moss *Pylaisia polyantha*, in addition to notable wildlife such as long-eared owl and otter.

While no SSCOs are currently published for the site by NPWS (NPWS 2018[43]), a review of the generic conservation objectives for this habitat found no nutrient specific targets. The conservation objectives simply relate to the maintenance of the habitat to ensure its ongoing favourable conservation status.

[43] https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002112.pdf

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

- The river water bodies hydrologically connected to the SAC include: Lee (Tralee)_010 (IE_SH_23L010030), Lee (Tralee)_020 (IE_SH_23L010050) and Lee (Tralee)_030 (IE_SH_23L010100); and
- The groundwater body hydrogeologically connected to the site is: Tralee (IE_SH_G_226).

The habitat alluvial forest within the SAC is located downstream of the water bodies that connect the WSZs to the SAC (NPWS 2013[44]) and within the Tralee groundwater body.

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

The modelled increases in orthophosphate concentration in the river water bodies are as follows: Lee (Tralee)_010 (IE_SH_23L010030) (0.0006 mg/l), Lee (Tralee)_020 (IE_SH_23L010050) (0.0006 mg/l) and Lee (Tralee)_030 (IE_SH_23L010100) (0.0007 mg/l). The increases in concentration do not exceed 5% of the High / Good indicative quality boundary and does not cause the post-dosing baseline concentration for this or any of the other water bodies to exceed 75% of the indicative quality upper threshold for orthophosphate. Therefore, there is no risk of deterioration in the indicative quality of the water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The modelled additional increase in orthophosphate concentration in the groundwater body connected to the site is Tralee (IE_SH_G_226) (0.0016 mg/l). This increase does not exceed 5% of the High / Good indicative quality boundary and does not cause the post-dosing baseline concentration to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the indicative quality of the groundwater body, or of preventing the achievement of WFD objectives.

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

6.1.3 Tralee Bay and Magharees Peninsula, West to Cloghane SAC 002070

6.1.3.1 (1130) Estuaries, (1140) Mudflats and sandflats not covered by seawater at low tide, (1160) Large shallow inlets and bays and (1170) Reefs

The extent of estuarine habitats within the SAC is estimated at 306ha and is located entirely within, and encompassing the majority of, the Lee K Estuary transitional water body. Extent of the Annex I habitat of Mudflats and sandflats not covered by seawater at low tide within the SAC is estimated at an area of approximately 1685ha which is located along the coastal margins of the Inner Tralee Bay,

[44] https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY002112.pdf

Outer Tralee Bay, Brandon Bay and South-western Atlantic Seaboard (HA:23) coastal water bodies, in addition to a large proportion of the Lee K Estuary.

There are no nutrient specific targets in the SSCO (NPWS, 2012[45]) for these habitats. The attributes and targets that will maintain the favourable conservation condition of these habitats do not make specific reference to water quality or nutrient conditions however it is considered that water quality is linked to a number of the targets for this habitat, such as the maintenance and extent of certain habitat types supported. A target for this habitat 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.

The habitat area (1140) was estimated as 10,131 ha, encompassing the majority of marine areas across the SAC, within the Inner Tralee Bay, Outer Tralee Bay, Brandon Bay and Southwestern Atlantic Seaboard (HA23) coastal water bodies. The majority of Tralee Bay is shallow and supports sublittoral sediments. More sheltered areas of the Bay support more important habitats such as seagrass beds and maerl beds.

This habitat also encompasses the Annex I habitats mudflats and sandflats not covered by water at low tide and reefs[46]. As for estuaries and mudflats above, a target for this habitat (under conservation of the community type) 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.

The area of reef habitat within the Tralee Bay SAC is estimated as 2,856 ha and is found scattered in areas throughout the Inner Tralee Bay, Outer Tralee Bay, Brandon Bay and South-western Atlantic Seaboard (HA:23) coastal water bodies. There are no nutrient specific targets in the SSCO (NPWS, 2012[38]) for this habitat. The attributes and targets that will maintain the favourable conservation condition of this habitat do not make specific reference to water quality or nutrient conditions however it is considered that water quality is linked to a number of the targets for this habitat, such as the maintenance and extent of certain habitat types supported. The COs supporting document for Marine habitats (NPWS, 2012[47]) does require that activities or operations that cause significant disturbance to communities but may not necessarily represent a continuous or ongoing source of disturbance over time and space may be assessed in a context-specific manner, giving due consideration to the proposed nature and scale of activities during the reporting cycle and the particular resilience of the receiving habitat in combination with other activities within the designated site.

[45] https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002070.pdf
[46] https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002070.pdf
[47] https://www.npws.ie/sites/default/files/publications/pdf/002070%20Tralee%20Bay%20and%20Magharees%20Peninsula%20West%20to%20Cloghane%20SAC%20Marine%20Supporting%20Doc%20V1.pdf

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Tralee Bay and Magharees Peninsula, West to Cloghane SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the SAC include: Pinure_010 (IE_SH_23P160880), Lee (Tralee)_010 (IE_SH_23L010030), Lee (Tralee)_020 (IE_SH_23L010050), Lee (Tralee)_030 (IE_SH_23L010100), Lee (Tralee)_040 (IE_SH_23L010200), Big River (Tralee)_010 (IE_SH_23B040150), Annagh 23_010 (IE_SH_23A060890), Knockglass_Beg_010 (IE_SH_23K130870), Finglas (Tralee Bay)_010 (IE_SH_23F030400), Carrigaha_010 (IE_SH_23C190920) and Derryquay River_010 (IE_SH_23D420880), Ballynoe_010 (IE_SH_23B910900), Ardfert_Oughter_010 (IE_SH_23A190800), Tyshe_010 (IE_SH_23T020400) and Tyshe_020 (IE_SH_23T020500);
- The transitional water body hydrologically connected to the SAC is: Lee K Estuary (IE_SH_050_0100);
- The coastal water bodies hydrologically connected to the SAC are: Inner Tralee Bay (IE_SH_050_0000), Outer Tralee Bay (IE_SH_040_0000) and Southwestern Atlantic Seaboard (HA:27) (IE_SH_010_0000); and
- The groundwater bodies hydrogeologically connected to the SAC are: Tralee (IE_SH_G_226), Spa (IE_SH_G_223), Brandon Head (IE_SH_G_044), Dingle (IE_SW_G_033) and Ardfert (IE_SH_G_008) and

This habitat is located downstream of the WSZs, within the CWBs, into which all river and transitional water bodies connected to the WSZs discharge (as listed at **Table 5-3**).

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

The modelled increase in orthophosphate concentration in the river water bodies are as follows: Pinure_010 (IE_SH_23P160880) (0.0007 mg/l), Lee (Tralee)_010 (IE_SH_23L010030) (0.0006 mg/l), Lee (Tralee)_020 (IE_SH_23L010050) (0.0006 mg/l), Lee (Tralee)_030 (IE_SH_23L010100) (0.0007 mg/l), Lee (Tralee)_040 (IE_SH_23L010200) (0.0010mg/l), Ballynoe_010 (IE_SH_23B910900) (0.0006mg/l), Annagh 23_010 (IE_SH_23A060890) (0.0003 mg/l), Knockglass_Beg_010 (IE_SH_23K130870) (0.0002 mg/l), Finglas (Tralee Bay)_010 (IE_SH_23F030400) (0.0002 mg/l), Carrigaha_010 (IE_SH_23C190920) (0.0002 mg/l), Derryquay River_010 (IE_SH_23D420880) (0.0002 mg/l), Ardfert_Oughter_010 (IE_SH_23A190800) (0.0008 mg/l), Tyshe_010 (IE_SH_23T020400) (0.0010 mg/l) and Tyshe_020 (IE_SH_23T020500) (0.0012 mg/l). These modelled increases do not exceed 5% of the High / Good indicative quality boundary (<0.00125 mg/l) Therefore, there is no risk of deterioration in the current indicative quality of these water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The modelled post-dosing additional increase in concentration for Big River (Tralee)_010 (IE_SH_23B040150) is 0.0023 mg/l. This modelled additional increase exceeds 5% of the High / Good indicative quality boundary; however, does not cause the post-dosing baseline concentrations to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the current indicative quality ((Poor) due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The Tyshe_020 (IE_SH_23T020500) is just below the 5% boundary at 0.0012mg/l. The Tyshe_020 (IE_SH_23T020500) was impacted by the Ardfert WWTP until an upgrade in 2018. The orthophosphate levels in the river have since improved to Poor indicative quality, but recent monitoring suggests a degradation back to Bad indicative quality in one of the monitoring points. The Operational monitoring point downstream of the Ardfert agglomeration (RS23T020500: Bridge near Banna House) and has a Q Value of 3, indicative of Poor status. As the increase in concentration due to orthophosphate dosing is below significant levels, dosing will not result in any further impact on the structure and functioning of aquatic ecosystems in this water bodies and will not result in any further deterioration in the contributing elements to ecological status.

In addition, the Annex I habitats for 1130, 1140 1160 and 1170 are not located within the Big River (Tralee)_010 or Tyshe_020 river waterbodies but are located within the downstream transitional and coastal waterbodies which are evaluated below.

The modelled increase in orthophosphate concentration in the transitional water body, which is hydrologically connected to the site, Lee K Estuary (IE_SH_050_0100), is 0.0004 mg/l. The habitat Estuaries (1130) and Mudflats (1140) are located within this transitional water body. For these habitats there are no nutrient specific targets within the SSCOs. This modelled increase does not exceed 5% of the High / Good indicative quality boundary and the modelled increase does not cause the post-dosing baseline concentration to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the current Good indicative quality of the water body or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the coastal water bodies which are hydrologically connected to the site are as follows: Inner Tralee Bay (IE_SH_050_0000) (0.0000 mg/l), Outer Tralee Bay (IE_SH_040_0000) (0.0000 mg/l) and Southwestern Atlantic Seaboard (HA:27) (IE_SH_010_0000) (undetectable i.e. 0.0000 mg/l). As these modelled increases do not exceed 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the indicative quality of the water bodies or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the groundwater bodies connected to the site are as follows: Tralee (IE_SH_G_226) (0.0016 mg/l), Spa (IE_SH_G_223) (0.0002 mg/l), Brandon Head (IE_SH_G_044) (0.0000 mg/l) and Ardfert (IE_SH_G_008) (0.0008 mg/l). The modelled increase for all groundwater bodies do not exceed 5% of the Good / Fail indicative quality boundary or cause the post-dosing baseline concentration to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the Good ortho P indicative status of the groundwater bodies.

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

6.1.3.2 (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 such factors such as freshwater inputs and barrier permeability.

There are two coastal lagoon sites – Lough Gill and Blennerville Lakes, located within this site (NPWS 2013[48]). However, given the small size of the lagoons supported at the Blennerville Lakes site and their low conservation value, it is not considered that this lagoon site forms a part of the designation[48]. As such the single coastal lagoon site supported and considered to represent Annex I habitat is Lough Gill. The area of this lagoon is approximately 29 ha and it supports a range of lagoon specific flora in addition to a number of notable faunal species including Natterjack toad.

Structure and functions relate to the physical components of a habitat ("structure") and the ecological processes that drive it ("functions"). For lagoons these include attributes such as salinity, hydrology and various water quality attributes. Lagoons can vary considerably in salinity both within and between sites depending on the volume and timing of inflowing and outflowing fresh and seawater. Salinity is probably the most important variable in the classification of lagoon types (Roden and Oliver, 2010[28]). The single lagoon identified within the Tralee Bay SAC can be classified as shallow, thus even small changes in water depth can cause significant losses in habitat area.

In the COs supporting document for coastal lagoons for the site[48], the targets for the attribute water quality include- Molybdate Reactive Phosphorus (MRP) is: annual median MRP within natural ranges and less than 0.1 mg/L. The target is based on Roden and Oliver (2010[49]). This limit is required to ensure that excessive shading from phytoplankton does not reduce submergent colonisation of the littoral zone; Dissolved inorganic nitrogen which will not be affected by the proposed dosing; and chlorophyll A within the water column, which again will not be affected by the proposed dosing.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Tralee Bay and Magharees Peninsula, West to Cloghane SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the SAC include: Pinure_010 (IE_SH_23P160880), Lee (Tralee)_010 (IE_SH_23L010030), Lee (Tralee)_020 (IE_SH_23L010050), Lee (Tralee)_030 (IE_SH_23L010100), Lee (Tralee)_040 (IE_SH_23L010200), Big River (Tralee)_010 (IE_SH_23B040150), Annagh 23_010 (IE_SH_23A060890), Knockglass_Beg_010 (IE_SH_23K130870), Finglas (Tralee Bay)_010 (IE_SH_23F030400), Carrigaha_010 (IE_SH_23C190920) and Derryquay River_010 (IE_SH_23D420880), Ballynoe_010 (IE_SH_23B910900), Ardfert_Oughter_010 (IE_SH_23A190800), Tyshe_010 (IE_SH_23T020400) and Tyshe_020 (IE_SH_23T020500);
- The transitional water body hydrologically connected to the SAC is: Lee K Estuary (IE_SH_050_0100);
- The coastal water bodies hydrologically connected to the SAC are: Inner Tralee Bay (IE_SH_050_0000), Outer Tralee Bay (IE_SH_040_0000) and Southwestern Atlantic Seaboard (HA:27) (IE_SH_010_0000); and

[48] NPWS 2013 Tralee Bay and Magharees Peninsula, West to Cloghane SAC (site code 2070) Conservation Objectives Supporting Document - Lagoons

[49] Roden, C.M. and Oliver, G. 2010. Monitoring and assessment of Irish Lagoons for the purpose of the EU Water Framework Directive.

- The groundwater bodies hydrogeologically connected to the SAC are: Tralee (IE_SH_G_226), Spa (IE_SH_G_223), Brandon Head (IE_SH_G_044), Dingle (IE_SW_G_033) and Ardfert (IE_SH_G_008) and

This habitat is located downstream of the WSZs, within the CWBs, into which all river and transitional water bodies connected to the WSZs discharge (as listed at **Table 5-3**).

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

The modelled increase in orthophosphate concentration in the river water bodies are as follows: Pinure_010 (IE_SH_23P160880) (0.0007 mg/l), Lee (Tralee)_010 (IE_SH_23L010030) (0.0006 mg/l), Lee (Tralee)_020 (IE_SH_23L010050) (0.0006 mg/l), Lee (Tralee)_030 (IE_SH_23L010100) (0.0007 mg/l), Lee (Tralee)_040 (IE_SH_23L010200) (0.0010mg/l), Ballynoe_010 (IE_SH_23B910900) (0.0006mg/l), Annagh 23_010 (IE_SH_23A060890) (0.0003 mg/l), Knockglass_Beg_010 (IE_SH_23K130870) (0.0002 mg/l), Finglas (Tralee Bay)_010 (IE_SH_23F030400) (0.0002 mg/l), Carrigaha_010 (IE_SH_23C190920) (0.0002 mg/l), Derryquay River_010 (IE_SH_23D420880) (0.0002 mg/l), Ardfert_Oughter_010 (IE_SH_23A190800) (0.0008 mg/l), Tyshe_010 (IE_SH_23T020400) (0.0010 mg/l) and Tyshe_020 (IE_SH_23T020500) (0.0012 mg/l). These modelled increases do not exceed 5% of the High / Good indicative quality boundary (<0.00125 mg/l) Therefore, there is no risk of deterioration in the current indicative quality of these water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The modelled post-dosing additional increase in concentration for Big River (Tralee)_010 (IE_SH_23B040150) is 0.0023 mg/l. This modelled additional increase exceeds 5% of the High / Good indicative quality boundary; however, does not cause the post-dosing baseline concentrations to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the current indicative quality ((Poor) due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The Tyshe_020 (IE_SH_23T020500) is just below the 5% boundary at 0.0012mg/l. The Tyshe_020 (IE_SH_23T020500) was impacted by the Ardfert WWTP until an upgrade in 2018. The orthophosphate levels in the river have since improved to Poor indicative quality, but recent monitoring suggests a degradation back to Bad indicative quality in one of the monitoring points. The Operational monitoring point downstream of the Ardfert agglomeration (RS23T020500: Bridge near Banna House) and has a Q Value of 3, indicative of Poor status. As the increase in concentration due to orthophosphate dosing is below significant levels, dosing will not result in any further impact on the structure and functioning of aquatic ecosystems in this water bodies and will not result in any further deterioration in the contributing elements to ecological status.

The Annex I habitat is not located within the Big River (Tralee)_010 or Tyshe_020 waterbodies but are located within the downstream coastal waterbodies which are evaluated below.

The modelled increase in orthophosphate concentration in the transitional water body, which is hydrologically connected to the site, Lee K Estuary (IE_SH_050_0100), is 0.0004 mg/l. This modelled increase does not exceed 5% of the High / Good indicative quality boundary and the modelled increase does not cause the post-dosing baseline concentration to exceed 75% of the indicative quality upper

threshold. Therefore, there is no risk of deterioration in the current Good indicative quality of the water body or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

Lough Gill is located between Outer Tralee Bay and Brandon Bay coastal waterbodies. The river water bodies discharging directly to the lagoon are not located within the WSZ and therefore the only hydrological pathway from the WSZ to this habitat is via the Lee K estuary. The Lee K estuary discharges to Inner Tralee Bay, then Outer Tralee Bay and the Southwestern Atlantic Seaboard. The modelled increase in orthophosphate concentration in the coastal water bodies are as follows: Inner Tralee Bay (IE_SH_050_0000) (0.0000 mg/l), Outer Tralee Bay (IE_SH_040_0000) (0.0000 mg/l) and Southwestern Atlantic Seaboard (HA:27) (IE_SH_010_0000) (undetectable i.e. 0.0000 mg/l). Brandon Bay receives water from the Southwestern Atlantic Seaboard and as the modelled additional concentration is undetectable the ZoI was terminated at this coastal water body. As these modelled increases do not exceed 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the indicative quality of the water bodies or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the groundwater bodies connected to the site are as follows: Tralee (IE_SH_G_226) (0.0016 mg/l), Spa (IE_SH_G_223) (0.0002 mg/l), Brandon Head (IE_SH_G_044) (0.0000 mg/l) and Ardfert (IE_SH_G_008) (0.0008 mg/l). The modelled increase for all groundwater bodies do not exceed 5% of the Good / Fail indicative quality boundary or cause the post-dosing baseline concentration to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the Good ortho P indicative status of the groundwater bodies.

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

6.1.3.3 (1210) Annual vegetation of drift lines, (2120) Shifting dunes along the shoreline with *Ammophila arenaria,* (2130) Fixed coastal dunes with herbaceous vegetation (grey dunes)*, (2170) Dunes with *Salix* repens and (2190) Humid dune slacks

There are five dune habitats which are included as qualifying interest features for the SAC (NPWS 2014[45]). Annual vegetation of drift lines is present across an approximate area of 6ha within the SAC, located within a narrow zone along the high tide mark of beaches; Shifting dunes along the shoreline with *Ammophila arenaria* are present in areas where sand accumulation is rapid and marram grass becomes established. Approximately 14.6 ha of this habitat is supported within the SAC. Fixed coastal dunes with herbaceous vegetation (grey dunes) comprise an area of approximately 263.3 ha within the SAC, located in the shelter of mobile dune systems. Approximately 41.3 ha of dunes with *Salix repens* are located within the SAC, located in association with dune slacks where the water table lies relatively close to the surface. Humid dune slacks are characterised by wet depressions between dune ridges in which the water table is maintained close to or above the surface. Approximately 22.2 ha of this habitat is supported within the SAC.

Conservation objectives outlined for these habitats, within the COs supporting document for coastal habitats (NPWS 2013[50]), relate specifically to the need to restore the favourable conservation status of the habitats, defined by three attributes namely, area, range and structure and functions.

While it is considered that the proposed dosing has limited potential to result in an effect upon the area or range of the supported sand dune habitats, any potential effect is considered likely to arise as a result of effects associated with structure and function of the habitats, which are influenced by hydrological regimes and associated nutrient cycles. However, no specific reference is made to nutrient enrichment or orthophosphate and as such it is not considered that such effects are likely to be a priority for the maintained and restored favourable conservation status of these habitats.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Tralee Bay and Magharees Peninsula, West to Cloghane SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the SAC include: Pinure_010 (IE_SH_23P160880), Lee (Tralee)_010 (IE_SH_23L010030), Lee (Tralee)_020 (IE_SH_23L010050), Lee (Tralee)_030 (IE_SH_23L010100), Lee (Tralee)_040 (IE_SH_23L010200), Big River (Tralee)_010 (IE_SH_23B040150), Annagh 23_010 (IE_SH_23A060890), Knockglass_Beg_010 (IE_SH_23K130870), Finglas (Tralee Bay)_010 (IE_SH_23F030400), Carrigaha_010 (IE_SH_23C190920) and Derryquay River_010 (IE_SH_23D420880), Ballynoe_010 (IE_SH_23B910900), Ardfert_Oughter_010 (IE_SH_23A190800), Tyshe_010 (IE_SH_23T020400) and Tyshe_020 (IE_SH_23T020500);
- The transitional water body hydrologically connected to the SAC is: Lee K Estuary (IE_SH_050_0100);
- The coastal water bodies hydrologically connected to the SAC are: Inner Tralee Bay (IE_SH_050_0000), Outer Tralee Bay (IE_SH_040_0000) and Southwestern Atlantic Seaboard (HA:27) (IE_SH_010_0000); and
- The groundwater bodies hydrogeologically connected to the SAC are: Tralee (IE_SH_G_226), Spa (IE_SH_G_223), Brandon Head (IE_SH_G_044), Dingle (IE_SW_G_033) and Ardfert (IE_SH_G_008) and

This habitat is located downstream of the WSZs, within the CWBs, into which all river and transitional water bodies connected to the WSZs discharge (as listed at **Table 5-3**).

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

The modelled increase in orthophosphate concentration in the river water bodies are as follows: Pinure_010 (IE_SH_23P160880) (0.0007 mg/l), Lee (Tralee)_010 (IE_SH_23L010030) (0.0006 mg/l), Lee (Tralee)_020 (IE_SH_23L010050) (0.0006 mg/l), Lee (Tralee)_030 (IE_SH_23L010100) (0.0007 mg/l), Lee (Tralee)_040 (IE_SH_23L010200) (0.0010mg/l), Ballynoe_010 (IE_SH_23B910900) (0.0006mg/l), Annagh 23_010 (IE_SH_23A060890) (0.0003 mg/l), Knockglass_Beg_010 (IE_SH_23K130870) (0.0002 mg/l), Finglas (Tralee Bay)_010 (IE_SH_23F030400) (0.0002 mg/l), Carrigaha_010 (IE_SH_23C190920) (0.0002 mg/l), Derryquay River_010 (IE_SH_23D420880) (0.0002 mg/l), Ardfert_Oughter_010 (IE_SH_23A190800) (0.0008 mg/l), Tyshe_010 (IE_SH_23T020400)

[50] NPWS 2013 Tralee Bay and Magharees Peninsula, West to Cloghane SAC (site code 2070) Conservation Objectives Supporting Document - Coastal Habitats

(0.0010 mg/l) and Tyshe_020 (IE_SH_23T020500) (0.0012 mg/l). These modelled increases do not exceed 5% of the High / Good indicative quality boundary (<0.00125 mg/l) Therefore, there is no risk of deterioration in the current indicative quality of these water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The modelled post-dosing additional increase in concentration for Big River (Tralee)_010 (IE_SH_23B040150) is 0.0023 mg/l. This modelled additional increase exceeds 5% of the High / Good indicative quality boundary; however, does not cause the post-dosing baseline concentrations to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the current indicative quality ((Poor) due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The Tyshe_020 (IE_SH_23T020500) is just below the 5% boundary at 0.0012mg/l. The Tyshe_020 (IE_SH_23T020500) was impacted by the Ardfert WWTP until an upgrade in 2018. The orthophosphate levels in the river have since improved to Poor indicative quality, but recent monitoring suggests a degradation back to Bad indicative quality in one of the monitoring points. The Operational monitoring point downstream of the Ardfert agglomeration (RS23T020500: Bridge near Banna House) and has a Q Value of 3, indicative of Poor status. As the increase in concentration due to orthophosphate dosing is below significant levels, dosing will not result in any further impact on the structure and functioning of aquatic ecosystems in this water bodies and will not result in any further deterioration in the contributing elements to ecological status.

The Annex I habitats 2120, 2130, 2170 and 2190 are not located within the Big River (Tralee)_010 or Tyshe_020 waterbodies but are located within along the shorelines of the Inner Tralee Bay, Outer Tralee Bay and Brandon Bay coastal waterbodies. These coastal water bodies are evaluated below.

The modelled increase in orthophosphate concentration in the transitional water body, which is hydrologically connected to the site, Lee K Estuary (IE_SH_050_0100), is 0.0004 mg/l. This modelled increase does not exceed 5% of the High / Good indicative quality boundary and the modelled increase does not cause the post-dosing baseline concentration to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the current Good indicative quality of the water body or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The only hydrological pathway from the WSZ to these Annex I habitats is via the Lee K estuary. The Lee K estuary discharges to Inner Tralee Bay, then Outer Tralee Bay and finally the Southwestern Atlantic Seaboard. The modelled increase in orthophosphate concentration in the coastal water bodies which are hydrologically connected to the site are as follows: Inner Tralee Bay (IE_SH_050_0000) (0.0000 mg/l), Outer Tralee Bay (IE_SH_040_0000) (0.0000 mg/l) and Southwestern Atlantic Seaboard (HA:27) (IE_SH_010_0000) (undetectable i.e. 0.0000 mg/l). As these modelled increases do not exceed 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the indicative quality of the water bodies or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir. Brandon Bay receives water from the Southwestern Atlantic Seaboard and as the modelled additional concentration is undetectable the ZoI was terminated at this coastal water body. As these modelled increases do not exceed 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the indicative quality of the coastal water bodies or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the groundwater bodies connected to the site are as follows: Tralee (IE_SH_G_226) (0.0016 mg/l), Spa (IE_SH_G_223) (0.0002 mg/l), Brandon Head (IE_SH_G_044) (0.0000 mg/l) and Ardfert (IE_SH_G_008) (0.0008 mg/l). The modelled increase for all groundwater bodies do not exceed 5% of the Good / Fail indicative quality boundary or cause the post-dosing baseline concentration to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the Good ortho P indicative status of the groundwater bodies.

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

6.1.3.4 (1310) Salicornia and other annuals colonising mud and sand, (1330) Atlantic salt meadows and (1410) Mediterranean salt meadows

There are three saltmarsh habitats within this site which comprise qualifying interest features for the SAC (NPWS 2014[45]). All three of these habitats comprise areas of estuary-type salt marsh which is underlain by a mud substrate. The largest areas of salt marsh habitats within the SAC lie to the east of Derrymore Island within the Lee K Estuary TWB and the Inner Tralee Bay CWB, with four other sub-sites identified throughout the site. Atlantic salt meadows are estimated to cover an area of approximately 97.7 ha and Mediterranean salt meadow an area of approximately 36.3 ha. Further unrecorded areas of these habitats may be present within the site. *Salicornia* and other annuals colonising mud and sand cover is not estimated within the SSCOs or saltmarsh monitoring project

While there are no nutrient specific targets set for these habitats, 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: 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 the Tralee Bay and Magharees Peninsula, West to Cloghane SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the SAC include: Pinure_010 (IE_SH_23P160880), Lee (Tralee)_010 (IE_SH_23L010030), Lee (Tralee)_020 (IE_SH_23L010050), Lee (Tralee)_030 (IE_SH_23L010100), Lee (Tralee)_040 (IE_SH_23L010200), Big River (Tralee)_010 (IE_SH_23B040150), Annagh 23_010 (IE_SH_23A060890), Knockglass_Beg_010 (IE_SH_23K130870), Finglas (Tralee Bay)_010 (IE_SH_23F030400), Carrigaha_010 (IE_SH_23C190920) and Derryquay River_010 (IE_SH_23D420880), Ballynoe_010 (IE_SH_23B910900), Ardfert_Oughter_010 (IE_SH_23A190800), Tyshe_010 (IE_SH_23T020400) and Tyshe_020 (IE_SH_23T020500);
- The transitional water body hydrologically connected to the SAC is: Lee K Estuary (IE_SH_050_0100);
- The coastal water bodies hydrologically connected to the SAC are: Inner Tralee Bay (IE_SH_050_0000), Outer Tralee Bay (IE_SH_040_0000) and Southwestern Atlantic Seaboard (HA:27) (IE_SH_010_0000); and

- The groundwater bodies hydrogeologically connected to the SAC are: Tralee (IE_SH_G_226), Spa (IE_SH_G_223), Brandon Head (IE_SH_G_044), Dingle (IE_SW_G_033) and Ardfert (IE_SH_G_008) and

This habitat is located downstream of the WSZs, within the CWBs, into which all river and transitional water bodies connected to the WSZs discharge (as listed at **Table 5-3**).

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

The modelled increase in orthophosphate concentration in the river water bodies are as follows: Pinure_010 (IE_SH_23P160880) (0.0007 mg/l), Lee (Tralee)_010 (IE_SH_23L010030) (0.0006 mg/l), Lee (Tralee)_020 (IE_SH_23L010050) (0.0006 mg/l), Lee (Tralee)_030 (IE_SH_23L010100) (0.0007 mg/l), Lee (Tralee)_040 (IE_SH_23L010200) (0.0010mg/l), Ballynoe_010 (IE_SH_23B910900) (0.0006mg/l), Annagh 23_010 (IE_SH_23A060890) (0.0003 mg/l), Knockglass_Beg_010 (IE_SH_23K130870) (0.0002 mg/l), Finglas (Tralee Bay)_010 (IE_SH_23F030400) (0.0002 mg/l), Carrigaha_010 (IE_SH_23C190920) (0.0002 mg/l), Derryquay River_010 (IE_SH_23D420880) (0.0002 mg/l), Ardfert_Oughter_010 (IE_SH_23A190800) (0.0008 mg/l), Tyshe_010 (IE_SH_23T020400) (0.0010 mg/l) and Tyshe_020 (IE_SH_23T020500) (0.0012 mg/l). These modelled increases do not exceed 5% of the High / Good indicative quality boundary (<0.00125 mg/l) Therefore, there is no risk of deterioration in the current indicative quality of these water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The modelled post-dosing additional increase in concentration for Big River (Tralee)_010 (IE_SH_23B040150) is 0.0023 mg/l. This modelled additional increase exceeds 5% of the High / Good indicative quality boundary; however, does not cause the post-dosing baseline concentrations to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the current indicative quality ((Poor) due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The Tyshe_020 (IE_SH_23T020500) is just below the 5% boundary at 0.0012mg/l. The Tyshe_020 (IE_SH_23T020500) was impacted by the Ardfert WWTP until an upgrade in 2018. The orthophosphate levels in the river have since improved to Poor indicative quality, but recent monitoring suggests a degradation back to Bad indicative quality in one of the monitoring points. The Operational monitoring point downstream of the Ardfert agglomeration (RS23T020500: Bridge near Banna House) and has a Q Value of 3, indicative of Poor status. As the increase in concentration due to orthophosphate dosing is below significant levels, dosing will not result in any further impact on the structure and functioning of aquatic ecosystems in this water bodies and will not result in any further deterioration in the contributing elements to ecological status.

All these Annex I habitats would be located downstream of the Big River (Tralee)_010 which does not receive tidal influences. The Annex I habitats for 1310 *Salicornia* is not mapped within the SSCOs due to difficulties mapping from aerial photography. For the purpose of this AA screening it is assumed to potential occur where there is tidal inundation. Potential 1330 Atlantic Salt Meadow is mapped in the transitional and coastal water bodes and lower section of the Lee (Tralee)_040. As stated above there are no nutrient specific targets within the SSCOs. This modelled increase does not exceed 5% of the High / Good indicative quality boundary and does not cause the post-dosing baseline concentration to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in

the current High surrogate indicative quality of the water body or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the transitional water body, which is hydrologically connected to the site, Lee K Estuary (IE_SH_050_0100), is 0.0004 mg/l. Potential 1330 Atlantic Salt Meadow is mapped within this estuary. For this habitat there are no nutrient specific targets within the SSCOs. This modelled increase does not exceed 5% of the High / Good indicative quality boundary and the modelled increase does not cause the post-dosing baseline concentration to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the current Good indicative quality of the water body or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the coastal water bodies which are hydrologically connected to the site are as follows: Inner Tralee Bay (IE_SH_050_0000) (0.0000 mg/l), Outer Tralee Bay (IE_SH_040_0000) (0.0000 mg/l) and Southwestern Atlantic Seaboard (HA:27) (IE_SH_010_0000) (undetectable i.e. 0.0000 mg/l). As these modelled increases do not exceed 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the indicative quality of the water bodies or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the groundwater bodies connected to the site are as follows: Tralee (IE_SH_G_226) (0.0016 mg/l), Spa (IE_SH_G_223) (0.0002 mg/l), Brandon Head (IE_SH_G_044) (0.0000 mg/l) and Ardfert (IE_SH_G_008) (0.0008 mg/l). The modelled increase for all groundwater bodies do not exceed 5% of the Good / Fail indicative quality boundary or cause the post-dosing baseline concentration to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the Good ortho P indicative status of the groundwater bodies.

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

6.1.3.5 (6410) Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinia caeruleae*)

The SAC is described, within the site synopsis (NPWS 2013[51]), as supporting a small area of *Molinia* meadow, which themselves support *Molinia caeruleae,* Devil's-bit Scabious *Sucissa pratensis,* Sharp-flowered Rush *Juncus acutiflorus* and Common Valerian *Valeriana officinalis* amongst others. An area of this habitat is estimated to be supported within the SAC, located at Cappaclough between Camp and Castlegregory in the southern extent of the SAC, however other areas may occur.

No nutrient or hydrologically specific targets are set for these habitats and it is not considered that the proposed dosing would be likely to lead to a significant effect on this habitat.

[51] NPWS 2013 Tralee Bay and Magharees Peninsula, West to Cloghane 002070 Site Synopsis

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Tralee Bay and Magharees Peninsula, West to Cloghane SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the SAC include: Pinure_010 (IE_SH_23P160880), Lee (Tralee)_010 (IE_SH_23L010030), Lee (Tralee)_020 (IE_SH_23L010050), Lee (Tralee)_030 (IE_SH_23L010100), Lee (Tralee)_040 (IE_SH_23L010200), Big River (Tralee)_010 (IE_SH_23B040150), Annagh 23_010 (IE_SH_23A060890), Knockglass_Beg_010 (IE_SH_23K130870), Finglas (Tralee Bay)_010 (IE_SH_23F030400), Carrigaha_010 (IE_SH_23C190920) and Derryquay River_010 (IE_SH_23D420880), Ballynoe_010 (IE_SH_23B910900), Ardfert_Oughter_010 (IE_SH_23A190800), Tyshe_010 (IE_SH_23T020400) and Tyshe_020 (IE_SH_23T020500);
- The transitional water body hydrologically connected to the SAC is: Lee K Estuary (IE_SH_050_0100);
- The coastal water bodies hydrologically connected to the SAC are: Inner Tralee Bay (IE_SH_050_0000), Outer Tralee Bay (IE_SH_040_0000) and Southwestern Atlantic Seaboard (HA:27) (IE_SH_010_0000); and
- The groundwater bodies hydrogeologically connected to the SAC are: Tralee (IE_SH_G_226), Spa (IE_SH_G_223), Brandon Head (IE_SH_G_044), Dingle (IE_SW_G_033) and Ardfert (IE_SH_G_008) and

This habitat is located downstream of the WSZs, within the CWBs, into which all river and transitional water bodies connected to the WSZs discharge (as listed at **Table 5-3**).

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

The modelled increase in orthophosphate concentration in the river water bodies are as follows: Pinure_010 (IE_SH_23P160880) (0.0007 mg/l), Lee (Tralee)_010 (IE_SH_23L010030) (0.0006 mg/l), Lee (Tralee)_020 (IE_SH_23L010050) (0.0006 mg/l), Lee (Tralee)_030 (IE_SH_23L010100) (0.0007 mg/l), Lee (Tralee)_040 (IE_SH_23L010200) (0.0010mg/l), Ballynoe_010 (IE_SH_23B910900) (0.0006mg/l), Annagh 23_010 (IE_SH_23A060890) (0.0003 mg/l), Knockglass_Beg_010 (IE_SH_23K130870) (0.0002 mg/l), Finglas (Tralee Bay)_010 (IE_SH_23F030400) (0.0002 mg/l), Carrigaha_010 (IE_SH_23C190920) (0.0002 mg/l), Derryquay River_010 (IE_SH_23D420880) (0.0002 mg/l), Ardfert_Oughter_010 (IE_SH_23A190800) (0.0008 mg/l), Tyshe_010 (IE_SH_23T020400) (0.0010 mg/l) and Tyshe_020 (IE_SH_23T020500) (0.0012 mg/l). These modelled increases do not exceed 5% of the High / Good indicative quality boundary (<0.00125 mg/l) Therefore, there is no risk of deterioration in the current indicative quality of these water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The modelled post-dosing additional increase in concentration for Big River (Tralee)_010 (IE_SH_23B040150) is 0.0023 mg/l. This modelled additional increase exceeds 5% of the High / Good indicative quality boundary; however, does not cause the post-dosing baseline concentrations to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the current indicative quality ((Poor) due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The Tyshe_020 (IE_SH_23T020500) is just below the 5% boundary at 0.0012mg/l. The Tyshe_020 (IE_SH_23T020500) was impacted by the Ardfert WWTP until an upgrade in 2018. The orthophosphate levels in the river have since improved to Poor indicative quality, but recent monitoring suggests a degradation back to Bad indicative quality in one of the monitoring points. The Operational monitoring point downstream of the Ardfert agglomeration (RS23T020500: Bridge near Banna House) and has a Q Value of 3, indicative of Poor status. As the increase in concentration due to orthophosphate dosing is below significant levels, dosing will not result in any further impact on the structure and functioning of aquatic ecosystems in this water bodies and will not result in any further deterioration in the contributing elements to ecological status.

The Habitat *Molinia* meadows is located downstream of Big River (Tralee) river waterbodies. The Tyshe_020, is outside of this SAC and only connected via the large coastal water body of Tralee Bay.

The modelled increase in orthophosphate concentration in the transitional water body, which is hydrologically connected to the site, Lee K Estuary (IE_SH_050_0100), is 0.0004 mg/l. This modelled increase does not exceed 5% of the High / Good indicative quality boundary and the modelled increase does not cause the post-dosing baseline concentration to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the current Good indicative quality of the water body or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the coastal water bodies which are hydrologically connected to the site are as follows: Inner Tralee Bay (IE_SH_050_0000) (0.0000 mg/l), Outer Tralee Bay (IE_SH_040_0000) (0.0000 mg/l) and Southwestern Atlantic Seaboard (HA:27) (IE_SH_010_0000) (undetectable i.e. 0.0000 mg/l). As these modelled increases do not exceed 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the indicative quality of the water bodies or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the groundwater bodies connected to the site are as follows: Tralee (IE_SH_G_226) (0.0016 mg/l), Spa (IE_SH_G_223) (0.0002 mg/l), Brandon Head (IE_SH_G_044) (0.0000 mg/l) and Ardfert (IE_SH_G_008) (0.0008 mg/l). The modelled increase for all groundwater bodies do not exceed 5% of the Good / Fail indicative quality boundary or cause the post-dosing baseline concentration to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the Good ortho P indicative status of the groundwater bodies.

In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Scart Reservoir, 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.

6.1.3.6 (91E0) Alluvial forests

As the Tralee Bay and Magharees Peninsula, West to Cloghane SAC is principally designated on account of the supported coastal and marine habitats, in addition to the overall lack of woodland supported on the peninsula; woodland habitats included in the designation are limited to areas of woodland peripheral to the SAC, in low lying fertile soils. Approximately 18.9 ha of this habitat is supported within the SAC.

Areas of alluvial forest supported within the SAC are comprised of wet willow-birch and wet willow-alder woodlands. These habitats are present in scattered individual stands less than 3 ha in size and are characterised by dense, low-growing stands of alder, willow and birch, less than 12 m high. Occasional ash, holly and hawthorn are also supported, with wet ground floral composition including meadowsweet *Filipendula ulmaria* and yellow flag *Iris pseudacorus.*

A review of the SSCOs for this habitat found no nutrient specific targets (NPWS 2014[45]). The SCCOs target indicates that an appropriate hydrological regime is necessary for maintenance of alluvial vegetation, with periodic flooding essential to maintaining the alluvial woodlands along the river floodplains. The main pressures on this habitat are invasive alien species; grazing; forest management; agriculture; urban development; and, sewage and slurry discharges[52].

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Tralee Bay and Magharees Peninsula, West to Cloghane SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the SAC include: Pinure_010 (IE_SH_23P160880), Lee (Tralee)_010 (IE_SH_23L010030), Lee (Tralee)_020 (IE_SH_23L010050), Lee (Tralee)_030 (IE_SH_23L010100), Lee (Tralee)_040 (IE_SH_23L010200), Big River (Tralee)_010 (IE_SH_23B040150), Annagh 23_010 (IE_SH_23A060890), Knockglass_Beg_010 (IE_SH_23K130870), Finglas (Tralee Bay)_010 (IE_SH_23F030400), Carrigaha_010 (IE_SH_23C190920) and Derryquay River_010 (IE_SH_23D420880), Ballynoe_010 (IE_SH_23B910900), Ardfert_Oughter_010 (IE_SH_23A190800), Tyshe_010 (IE_SH_23T020400) and Tyshe_020 (IE_SH_23T020500);
- The transitional water body hydrologically connected to the SAC is: Lee K Estuary (IE_SH_050_0100);
- The coastal water bodies hydrologically connected to the SAC are: Inner Tralee Bay (IE_SH_050_0000), Outer Tralee Bay (IE_SH_040_0000) and Southwestern Atlantic Seaboard (HA:27) (IE_SH_010_0000); and
- The groundwater bodies hydrogeologically connected to the SAC are: Tralee (IE_SH_G_226), Spa (IE_SH_G_223), Brandon Head (IE_SH_G_044), Dingle (IE_SW_G_033) and Ardfert (IE_SH_G_008) and

This habitat is not hydrologically connected to the WSZs, as it lies within an unconnected river catchment; however, the habitat is hydrogeologically connected to the site via the associated groundwater body (as listed at **Table 5-3**).

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

The modelled increase in orthophosphate concentration in the river water bodies are as follows: Pinure_010 (IE_SH_23P160880) (0.0007 mg/l), Lee (Tralee)_010 (IE_SH_23L010030) (0.0006 mg/l), Lee (Tralee)_020 (IE_SH_23L010050) (0.0006 mg/l), Lee (Tralee)_030 (IE_SH_23L010100) (0.0007 mg/l), Lee (Tralee)_040 (IE_SH_23L010200) (0.0010mg/l), Ballynoe_010 (IE_SH_23B910900) (0.0006mg/l), Annagh 23_010 (IE_SH_23A060890) (0.0003 mg/l), Knockglass_Beg_010 (IE_SH_23K130870) (0.0002 mg/l), Finglas (Tralee Bay)_010 (IE_SH_23F030400) (0.0002 mg/l),

[52] NPWS 2013 Tralee Bay and Magharees Peninsula, West to Cloghane SAC (site code 2070) Conservation Objectives Supporting Document - Woodland Habitats

Carrigaha_010 (IE_SH_23C190920) (0.0002 mg/l), Derryquay River_010 (IE_SH_23D420880) (0.0002 mg/l), Ardfert_Oughter_010 (IE_SH_23A190800) (0.0008 mg/l), Tyshe_010 (IE_SH_23T020400) (0.0010 mg/l) and Tyshe_020 (IE_SH_23T020500) (0.0012 mg/l). These modelled increases do not exceed 5% of the High / Good indicative quality boundary (<0.00125 mg/l) Therefore, there is no risk of deterioration in the current indicative quality of these water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The modelled post-dosing additional increase in concentration for Big River (Tralee)_010 (IE_SH_23B040150) is 0.0023 mg/l. This modelled additional increase exceeds 5% of the High / Good indicative quality boundary; however, does not cause the post-dosing baseline concentrations to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the current indicative quality ((Poor) due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The Tyshe_020 (IE_SH_23T020500) is just below the 5% boundary at 0.0012mg/l. The Tyshe_020 (IE_SH_23T020500) was impacted by the Ardfert WWTP until an upgrade in 2018. The orthophosphate levels in the river have since improved to Poor indicative quality, but recent monitoring suggests a degradation back to Bad indicative quality in one of the monitoring points. The Operational monitoring point downstream of the Ardfert agglomeration (RS23T020500: Bridge near Banna House) and has a Q Value of 3, indicative of Poor status. As the increase in concentration due to orthophosphate dosing is below significant levels, dosing will not result in any further impact on the structure and functioning of aquatic ecosystems in this water bodies and will not result in any further deterioration in the contributing elements to ecological status.

In addition, as stated above, the habitat is not mapped within the Big River (Tralee)_010 and therefore will not receive orthophosphate dosed water from these water bodies. Aerial imagery would indicate this habitat is unlikely in the waterbodies. The Big River Tralee_010 flows through the urbanised Tralee Town and lower sections of the Lee (Tralee)_040 appears to be tidal influenced and surrounded by mudflat. The Tyshe is outside of this SAC and are connected via the large coastal water body of Tralee Bay.

The modelled increase in orthophosphate concentration in the transitional water body, which is hydrologically connected to the site, Lee K Estuary (IE_SH_050_0100), is 0.0004 mg/l. This modelled increase does not exceed 5% of the High / Good indicative quality boundary and the modelled increase does not cause the post-dosing baseline concentration to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the current Good indicative quality of the water body or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the coastal water bodies which are hydrologically connected to the site are as follows: Inner Tralee Bay (IE_SH_050_0000) (0.0000 mg/l), Outer Tralee Bay (IE_SH_040_0000) (0.0000 mg/l) and Southwestern Atlantic Seaboard (HA:27) (IE_SH_010_0000) (undetectable i.e. 0.0000 mg/l). As these modelled increases do not exceed 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the indicative quality of the water bodies or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the groundwater bodies connected to the site are as follows: Tralee (IE_SH_G_226) (0.0016 mg/l), Spa (IE_SH_G_223) (0.0002 mg/l), Brandon Head (IE_SH_G_044) (0.0000 mg/l) and Ardfert (IE_SH_G_008) (0.0008 mg/l). The modelled increase

for all groundwater bodies do not exceed 5% of the Good / Fail indicative quality boundary or cause the post-dosing baseline concentration to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the Good ortho P indicative status of the groundwater bodies.

Mapped Alluvial woodland habitat overlies Tralee Bay and Brandon Head groundwater bodies. For the Alluvial woodland hydrogeologically connected via Brandon Head the woodland is approx. 23km from the WSZ, the main discharges are to the gaining rivers and streams, and groundwater will discharge to the coast. Flow paths are relatively short, typically 30 – 300m, and flow directions are expected to approximately follow the local surface water catchments, which in this case would be stream discharging to the Lee K estuary and impacts to the TWB and CWBs have been discussed above.

For the remaining Alluvial woodland that is hydrogeologically connected via both the Tralee GWB and Brandon GWB, the woodland is approx. 10km from the WSZ. Tralee Bay is a karstic GWB, no further information is available via GSI website however flow paths are not assumed to be short owning to the karstic nature. The Slieve Mish Mountains separate this habitat from the WSZ and therefore it is considered highly unlikely to receive any orthoP dosed water via groundwater flow to impact upon this habitat. Groundwater discharge is more likely to be toward the coast and to the TWB and CWBs which have been discussed above.

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

6.1.3.7 (1355) Otter (*Lutra lutra*)

A review of the SSCOs (NPWS, 2014[45]) found no specific attributes or targets relating to water quality for the species however the NPWS Threat Response Plan for the Otter (NPWS, 2009[53]) review of and response to the pressures and threats to otters in Ireland, categorized three principal risks to otters: i) habitat destruction and degradation; ii) water pollution; and, iii) accidental death and/or persecution.

The extent of terrestrial, marine and freshwater (river) habitat within the site includes all areas within a 10m terrestrial buffer along the shoreline (above the high water mark and along river banks) identified as critical for otters; areas within 80m of the shoreline (high water mark) and river length calculated on the basis that otters will utilise freshwater habitats from estuary to headwaters. The diet of the species varies locally and seasonally; however, it is dominated by fish, in particular salmonids, eels and sticklebacks in freshwater.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Tralee Bay and Magharees Peninsula, West to Cloghane SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the SAC include: Pinure_010 (IE_SH_23P160880), Lee (Tralee)_010 (IE_SH_23L010030), Lee (Tralee)_020

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

(IE_SH_23L010050), Lee (Tralee)_030 (IE_SH_23L010100), Lee (Tralee)_040 (IE_SH_23L010200), Big River (Tralee)_010 (IE_SH_23B040150), Annagh 23_010 (IE_SH_23A060890), Knockglass_Beg_010 (IE_SH_23K130870), Finglas (Tralee Bay)_010 (IE_SH_23F030400), Carrigaha_010 (IE_SH_23C190920) and Derryquay River_010 (IE_SH_23D420880), Ballynoe_010 (IE_SH_23B910900), Ardfert_Oughter_010 (IE_SH_23A190800), Tyshe_010 (IE_SH_23T020400) and Tyshe_020 (IE_SH_23T020500);

- The transitional water body hydrologically connected to the SAC is: Lee K Estuary (IE_SH_050_0100);
- The coastal water bodies hydrologically connected to the SAC are: Inner Tralee Bay (IE_SH_050_0000), Outer Tralee Bay (IE_SH_040_0000) and Southwestern Atlantic Seaboard (HA:27) (IE_SH_010_0000); and
- The groundwater bodies hydrogeologically connected to the SAC are: Tralee (IE_SH_G_226), Spa (IE_SH_G_223), Brandon Head (IE_SH_G_044), Dingle (IE_SW_G_033) and Ardfert (IE_SH_G_008) and

The habitats on which this species rely are located downstream of the WSZs, associated with CWBs, TWBs and RWBs into which all river and transitional water bodies connected to the WSZs discharge (as listed at **Table 5-3**).

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

The modelled increase in orthophosphate concentration in the river water bodies are as follows: Pinure_010 (IE_SH_23P160880) (0.0007 mg/l), Lee (Tralee)_010 (IE_SH_23L010030) (0.0006 mg/l), Lee (Tralee)_020 (IE_SH_23L010050) (0.0006 mg/l), Lee (Tralee)_030 (IE_SH_23L010100) (0.0007 mg/l), Lee (Tralee)_040 (IE_SH_23L010200) (0.0010mg/l), Ballynoe_010 (IE_SH_23B910900) (0.0006mg/l), Annagh 23_010 (IE_SH_23A060890) (0.0003 mg/l), Knockglass_Beg_010 (IE_SH_23K130870) (0.0002 mg/l), Finglas (Tralee Bay)_010 (IE_SH_23F030400) (0.0002 mg/l), Carrigaha_010 (IE_SH_23C190920) (0.0002 mg/l), Derryquay River_010 (IE_SH_23D420880) (0.0002 mg/l), Ardfert_Oughter_010 (IE_SH_23A190800) (0.0008 mg/l), Tyshe_010 (IE_SH_23T020400) (0.0010 mg/l) and Tyshe_020 (IE_SH_23T020500) (0.0012 mg/l). These modelled increases do not exceed 5% of the High / Good indicative quality boundary (<0.00125 mg/l) Therefore, there is no risk of deterioration in the current indicative quality of these water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The modelled post-dosing additional increase in concentration for Big River (Tralee)_010 (IE_SH_23B040150) is 0.0023 mg/l. This modelled additional increase exceeds 5% of the High / Good indicative quality boundary; however, does not cause the post-dosing baseline concentrations to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the current indicative quality ((Poor) due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The Tyshe_020 (IE_SH_23T020500) is just below the 5% boundary at 0.0012mg/l. The Tyshe_020 (IE_SH_23T020500) was impacted by the Ardfert WWTP until an upgrade in 2018. The orthophosphate levels in the river have since improved to Poor indicative quality, but recent monitoring suggests a degradation back to Bad indicative quality in one of the monitoring points. The Operational monitoring point downstream of the Ardfert agglomeration (RS23T020500: Bridge near Banna House) and has a Q Value of 3, indicative of Poor status. As the increase in concentration due to orthophosphate dosing is below significant levels, dosing will not result in any further impact on the structure and functioning

of aquatic ecosystems in this water bodies and will not result in any further deterioration in the contributing elements to ecological status.

The main otter habitat mapped within the SSCOs is along the transitional and coastal waterbodies of the SAC which are discussed below. The Tyshe is outside of this SAC and are connected via the large coastal water body of Tralee Bay.

The modelled increase in orthophosphate concentration in the transitional water body, which is hydrologically connected to the site, Lee K Estuary (IE_SH_050_0100), is 0.0004 mg/l. This modelled increase does not exceed 5% of the High / Good indicative quality boundary and the modelled increase does not cause the post-dosing baseline concentration to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the current Good indicative quality of the water body or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the coastal water bodies which are hydrologically connected to the site are as follows: Inner Tralee Bay (IE_SH_050_0000) (0.0000 mg/l), Outer Tralee Bay (IE_SH_040_0000) (0.0000 mg/l) and Southwestern Atlantic Seaboard (HA:27) (IE_SH_010_0000) (undetectable i.e. 0.0000 mg/l). As these modelled increases do not exceed 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the indicative quality of the water bodies or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the groundwater bodies connected to the site are as follows: Tralee (IE_SH_G_226) (0.0016 mg/l), Spa (IE_SH_G_223) (0.0002 mg/l), Brandon Head (IE_SH_G_044) (0.0000 mg/l) and Ardfert (IE_SH_G_008) (0.0008 mg/l). The modelled increase for all groundwater bodies do not exceed 5% of the Good / Fail indicative quality boundary or cause the post-dosing baseline concentration to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the Good ortho P indicative status of the groundwater bodies.

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

6.1.3.8 (1395) Petalwort (*Petalophyllum ralfsii*)

Tralee Bay and Magharee's Peninsula, West to Cloghane SAC supports only three known populations of petalwort, those being located at south-west of Lough Naparka, Magherabeg and Kilshannig, supporting a combined population estimated at around 10,000 individuals. A review of the SSCOs (NPWS, 2014[45]) found no specific attributes or targets relating to water quality for the species.

The habitats which support this species within its known distribution in the SAC are limited to the complex of dune habitats on the peninsula north of Castlegregory and as such they are not directly hydrologically connected to the WSZs, however there is potential groundwater connectivity via the groundwater bodies listed at **Table 5-2**. The river waterbodies within the WSZ discharge to the Lee K estuary and Inner Tralee Bay. Petalwort is mapped as occurring within the dune habitat between Outer Tralee Bay and Brandon Bay.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Tralee Bay and Magharees Peninsula, West to Cloghane SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the SAC include: Pinure_010 (IE_SH_23P160880), Lee (Tralee)_010 (IE_SH_23L010030), Lee (Tralee)_020 (IE_SH_23L010050), Lee (Tralee)_030 (IE_SH_23L010100), Lee (Tralee)_040 (IE_SH_23L010200), Big River (Tralee)_010 (IE_SH_23B040150), Annagh (Kerry)_010 (IE_SH_23A060890), Knockglass_Beg_010 (IE_SH_23K130870), Finglas (Tralee Bay)_010 (IE_SH_23F030400), Carrigaha_010 (IE_SH_23C190920) and Derryquay River_010 (IE_SH_23D420880), Ballynoe_010 (IE_SH_23B910900), Ardfert_Oughter_010 (IE_SH_23A190800), Tyshe_010 (IE_SH_23T020400) and Tyshe_020 (IE_SH_23T020500);
- The transitional water body hydrologically connected to the SAC is: Lee K Estuary (IE_SH_050_0100);
- The coastal water bodies hydrologically connected to the SAC are: Inner Tralee Bay (IE_SH_050_0000), Outer Tralee Bay (IE_SH_040_0000) and Southwestern Atlantic Seaboard (HA:27) (IE_SH_010_0000); and
- The groundwater bodies hydrogeologically connected to the SAC are: Tralee (IE_SH_G_226), Spa (IE_SH_G_223), Brandon Head (IE_SH_G_044), Dingle (IE_SW_G_033) and Ardfert (IE_SH_G_008) and

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

The modelled increase in orthophosphate concentration in the river water bodies are as follows: Pinure_010 (IE_SH_23P160880) (0.0007 mg/l), Lee (Tralee)_010 (IE_SH_23L010030) (0.0006 mg/l), Lee (Tralee)_020 (IE_SH_23L010050) (0.0006 mg/l), Lee (Tralee)_030 (IE_SH_23L010100) (0.0007 mg/l), Lee (Tralee)_040 (IE_SH_23L010200) (0.0010mg/l), Ballynoe_010 (IE_SH_23B910900) (0.0006mg/l), Annagh 23_010 (IE_SH_23A060890) (0.0003 mg/l), Knockglass_Beg_010 (IE_SH_23K130870) (0.0002 mg/l), Finglas (Tralee Bay)_010 (IE_SH_23F030400) (0.0002 mg/l), Carrigaha_010 (IE_SH_23C190920) (0.0002 mg/l), Derryquay River_010 (IE_SH_23D420880) (0.0002 mg/l), Ardfert_Oughter_010 (IE_SH_23A190800) (0.0008 mg/l), Tyshe_010 (IE_SH_23T020400) (0.0010 mg/l) and Tyshe_020 (IE_SH_23T020500) (0.0012 mg/l). These modelled increases do not exceed 5% of the High / Good indicative quality boundary (<0.00125 mg/l) Therefore, there is no risk of deterioration in the current indicative quality of these water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The modelled post-dosing additional increase in concentration for Big River (Tralee)_010 (IE_SH_23B040150) is 0.0023 mg/l. This modelled additional increase exceeds 5% of the High / Good indicative quality boundary; however, does not cause the post-dosing baseline concentrations to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the current indicative quality ((Poor) due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The Tyshe_020 (IE_SH_23T020500) is just below the 5% boundary at 0.0012mg/l. The Tyshe_020 (IE_SH_23T020500) was impacted by the Ardfert WWTP until an upgrade in 2018. The orthophosphate levels in the river have since improved to Poor indicative quality, but recent monitoring suggests a degradation back to Bad indicative quality in one of the monitoring points. The Operational monitoring point downstream of the Ardfert agglomeration (RS23T020500: Bridge near Banna House) and has a

Q Value of 3, indicative of Poor status. As the increase in concentration due to orthophosphate dosing is below significant levels, dosing will not result in any further impact on the structure and functioning of aquatic ecosystems in this water bodies and will not result in any further deterioration in the contributing elements to ecological status.

As noted above, this habitat will not receive direct discharges from any river water bodies in **Table 5-2**. These river waterbodies discharge to the Lee K estuary and Inner Tralee Bay. Petalwort is mapped as occurring within the dune habitat between Outer Tralee Bay and Brandon Bay and therefore will not receive input directly via these river water bodies. The transitional and coastal water bodies are discussed below. The Tyshe is outside of this SAC and are connected via the large coastal water body of Tralee Bay.

The modelled increase in orthophosphate concentration in the transitional water body, which is hydrologically connected to the site, Lee K Estuary (IE_SH_050_0100), is 0.0004 mg/l. This modelled increase does not exceed 5% of the High / Good indicative quality boundary and the modelled increase does not cause the post-dosing baseline concentration to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the current Good indicative quality of the water body or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir. This TWB is not directly connected to Petalwort habitat, which is located within the dune habitat between Outer Tralee Bay and Brandon Bay.

The modelled increase in orthophosphate concentration in the coastal water bodies which are hydrologically connected to the site are as follows: Inner Tralee Bay (IE_SH_050_0000) (0.0000 mg/l), Outer Tralee Bay (IE_SH_040_0000) (0.0000 mg/l) and Southwestern Atlantic Seaboard (HA:27) (IE_SH_010_0000) (undetectable i.e. 0.0000 mg/l). As these modelled increases do not exceed 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the indicative quality of the water bodies or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir. Given the low additional orthoP concentrations within the Outer Tralee bay and that Petalwort is located within the dunes between Outer Tralee Bay and Brandon Bay and therefore there is very tentative coastal hydrological connected, impact to Petalwort habitat have been excluded Brandon Bay receives water from Southwestern Atlantic Seaboard which was modelled as undetectable and therefore the ZoI was terminated before reaching Brandon Bay.

The modelled increase in orthophosphate concentration in the groundwater bodies connected to the site are as follows: Tralee (IE_SH_G_226) (0.0016 mg/l), Spa (IE_SH_G_223) (0.0002 mg/l), Brandon Head (IE_SH_G_044) (0.0000 mg/l) and Ardfert (IE_SH_G_008) (0.0008 mg/l). The modelled increase for all groundwater bodies do not exceed 5% of the Good / Fail indicative quality boundary or cause the post-dosing baseline concentration to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the Good ortho P indicative status of the groundwater bodies.

Brandon Head GWB is the only GWB which intersects the WSZ which contains mapped Petalwort approximately 18km from the WSZ. For this poorly productive GWB, the main discharges are to the gaining rivers and streams, and groundwater will discharge to the coast. Flow paths are relatively short, typically 30 – 300m, and flow directions are expected to approximately follow the local surface water catchments. In this case would be the stream discharging to the Lee K estuary and Inner Tralee Bay. Therefore, potential impacts to Petalwort via groundwater flow have been excluded. Impacts to the TWB and CWBs have been discussed above.

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

6.1.4 Slieve Mish Mountains SAC 002185

6.1.4.1 (4010) Northern Atlantic wet heaths with *Erica tetralix*

The Slieve Mish Mountains SAC lies within the Slieve Mish mountain range forming the eastern edge of the Dingle peninsula and encompassing an area of approximately 9800 ha (NPWS 2016[54]). The primary habitat supported within the SAC is heath, including drier areas dominated by heather located in the upper slopes, and wetter areas in the lower slopes, which exist in a mosaic with dry heath and acid grasslands. The area of wet heaths with *Erica tetralix* supported within the SAC is estimated at 1958ha; the area of dry heaths is estimated at 3329ha and alpine and boreal heaths at 685 ha, all of which are located throughout the SAC subject to altitudinal and microclimate factors. There are no SSCOs set for this SAC. AA search of other SACs revealed that there is a soil nutrient target to maintain soil nutrient status within natural range.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Slieve Mish Mountains SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the SAC include: Lee (Tralee)_030 (IE_SH_23L010100), Lee (Tralee)_040 (IE_SH_23L010200) and Maine_050 (IE_SH_22M010800); and
- The groundwater bodies hydrogeologically connected to the SAC include: Brandon Head (IE_SH_G_044), Tralee (IE_SH_G_226) and Dingle (IE_SW_G_033).

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

The modelled increases in orthophosphate concentration in the river water bodies are as follows: Lee (Tralee)_030 (IE_SH_23L010100) (0.0011 mg/l), Lee (Tralee)_040 (IE_SH_23L010200) (0.0016 mg/l), and Maine_050 (IE_SW_22M010800) (0.0007 mg/l). Both Lee (Tralee)_030 (IE_SH_23L010100) and Maine_050 (IE_SW_22M010800) have modelled increases in concentration that do not exceed 5% of the High / Good indicative quality boundary (0.00125 mg/l). Therefore, there is no risk of deterioration in the indicative quality of these water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

For Lee (Tralee)_040 (IE_SH_23L010200), the modelled increase exceeds 5% of the High / Good indicative quality boundary, however this does not cause the modelled post-dosing baseline concentration to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the indicative quality of the water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives. Only a small section near the upper reaches

[54] NPWS 2016 Slieve Mish Mountains SAC 002185 Site Synopsis

approx. <0.5km^2 will receive orthoP inputs and over the SAC representing a fraction of 1% of the total area of the SAC. Wet Heath habitat covers 47.4% of the SAC. Given that the Lee (Tralee)_040 only intersects a small section of the SAC, wet heath is mainly terrestrial habitat that may receive additional nutrients from flooding and finally that dosing will not cause a risk of deterioration in the indicative quality of WFD objectives of the Lee (Tralee)_040 it is considered that dosing will not result in likely significant effect to this habitat.

The modelled increase in orthophosphate concentration in the groundwater bodies hydrogeologically connected to the site are as follows: Brandon Head (IE_SH_G_044) (0.0000 mg/l), Tralee (IE_SH_G_226) (0.0016 mg/l) and Dingle (IE_SW_G_033) (0.0001 mg/l). The modelled increases for all groundwater bodies do not exceed 5% of the Good / Fail indicative quality boundary (<0.00175 mg/l) or do not cause the post-dosing baseline to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the indicative quality of the groundwater bodies or of preventing the achievement of WFD objectives.

A very small section (0.009km^2) of Tralee GWB intersects the SAC approximately 4.5km from the WSZ. This is a karstic groundwater body and therefore it is assumed flow can travel over large distances. No further detail is available regarding this groundwater body, however given that only a small section of the SAC actually intersects the GWB, the habitat is not a GWDTE and that there is no risk in deterioration in indicative quality of the groundwater body or of preventing the achievement of WFD objectives. Impacts to this habitat via this groundwater body have been excluded.

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

6.1.5 Akeragh, Banna and Barrow Harbour SAC 000332

6.1.5.1 (1210) Annual vegetation of drift lines, (2110) Embryonic shifting dunes, (2120) Shifting dunes along the shoreline with *Ammophila arenaria,* (2130) Fixed coastal dunes with herbaceous vegetation (grey dunes) *and (2190) Humid dune slacks

Akeragh, Banna and Barrow Harbour SAC is a large coastal site covering a 10 km stretch of coastline in Co. Kerry (NPWS 2013[55]). There are five dune habitats which are included as qualifying interest features for the SAC which are supported within a strand approximately 9 km from Ballyheige in the north and Barrow harbour in the south. Annual vegetation of drift lines is present across an approximate area of 0.013 ha within the SAC, located within a narrow zone along the high tide mark of beaches; Embryonic shifting dunes are present across an area of approximately 0.024 ha within the site, which is extremely limited in extent, Shifting dunes along the shoreline with *Ammophila arenaria* are present in areas where sand accumulation is rapid and marram grass becomes established. Approximately 0.62 ha of this habitat is supported within the SAC. Fixed coastal dunes with herbaceous vegetation (grey dunes) comprise an area of approximately 42.4 ha within the SAC, located in the shelter of mobile dune systems. Approximately 0.4 ha of Humid dune slacks are present within the SAC and are characterised by wet depressions between dune ridges in which the water table is maintained close to or above the surface.

Conservation objectives outlined for these habitats, within the COs supporting document for coastal habitats (NPWS 2017[56]), relate specifically to the need to restore the favourable conservation status of the habitats, defined by three attributes namely, area, range and structure and functions, however no objectives specifically address nutrient input.

While it is considered that the proposed dosing has limited potential to result in an effect upon the area or range of the supported sand dune habitats, any potential effect is considered likely to arise as a result of effects associated with structure and function of the habitats, which are influenced by hydrological regimes and associated nutrient cycles. However, no specific reference is made to nutrient enrichment or orthophosphate and as such it is not considered that such effects are likely to be a priority for the maintained and restored favourable conservation status of these habitats.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Akeragh, Banna and Barrow Harbour SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the SAC include: Ballynoe_010 (IE_SH_23B910900), Ardfert_Oughter_010 (IE_SH_23A190800), Tyshe_010 (IE_SH_23T020400) and Tyshe_020 (IE_SH_23T020500);
- The coastal water bodies hydrologically connected to the SAC are: Inner Tralee Bay (IE_SH_050_0000), Outer Tralee Bay (IE_SH_040_0000) and Southwestern Atlantic Seaboard (HA23) (IE_SH_010_0000); and
- The groundwater bodies hydrogeologically connected to the SAC are: Ardfert (IE_SH_G_008) and Kerry Head (IE_SH_G_118).

[55] NPWS 2013 Akeragh, Banna and Barrow Harbour SAC 000332 Site Synopsis
[56] NPWS 2017 Akeragh, Banna and Barrow Harbour SAC (site code 000332) Conservation Objectives Supporting Document - Coastal Habitats

These habitats are located downstream of the WSZs, associated with CWBs into which all river and transitional water bodies connected to the WSZs discharge (as listed at **Table 5-3**). However, the habitats are not located within the marine waters but are regularly inundated by coastal floodwater. These habitats share groundwater connectivity with the WSZs.

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

The modelled increase in orthophosphate concentration in the river water bodies are as follows: Ballynoe_010 (IE_SH_23B910900) (0.0006 mg/l), Ardfert_Oughter_010 (IE_SH_23A190800) (0.0008 mg/l), Tyshe_010 (IE_SH_23T020400) (0.0010 mg/l) and Tyshe_020 (IE_SH_23T020500) (0.0012 mg/l). These modelled increases do not exceed 5% of the High / Good indicative quality boundary (<0.00125 mg/l).

The Tyshe_020 (IE_SH_23T020500) is just below the 5% boundary at 0.0012mg/l. The Tyshe_020 (IE_SH_23T020500) was impacted by the Ardfert WWTP until an upgrade in 2018. The orthophosphate levels in the river have since improved to Poor indicative quality, but recent monitoring suggests a degradation back to Bad indicative quality in one of the monitoring points. The Operational monitoring point downstream of the Ardfert agglomeration (RS23T020500: Bridge near Banna House) and has a Q Value of 3, indicative of Poor status. As the increase in concentration due to orthophosphate dosing is below significant levels, dosing will not result in any further impact on the structure and functioning of aquatic ecosystems in this water bodies and will not result in any further deterioration in the contributing elements to ecological status. In addition, these Annex I habitats are associated with coastal water bodies which are discussed below.

The modelled increase in orthophosphate concentration in the coastal water bodies which are hydrologically connected to the site are as follows: Inner Tralee Bay (IE_SH_050_0000) (0.0000 mg/l), Outer Tralee Bay (IE_SH_040_0000) (0.0000 mg/l) and Southwestern Atlantic Seaboard (HA23) (IE_SH_010_0000) (0.0000 mg/l). As the modelled increases do not exceed 5% of the High / Good indicative quality boundary (0.00125 mg/l), there is no risk of deterioration in the indicative quality of the water bodies or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the groundwater bodies connected to the site are as follows: Ardfert (IE_SH_G_008) (0.0008 mg/l) and Kerry Head (IE_SH_G_118) (0.0000 mg/l). Therefore, there is no risk of deterioration in the indicative quality of the groundwater bodies, or of preventing the achievement of WFD objectives.

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

6.1.5.2 (1310) Salicornia and other annuals colonising mud and sand, (1330) Atlantic salt meadows and (1410) Mediterranean salt meadows

There are three saltmarsh habitats within this site which comprise qualifying interest features for the SAC (NPWS 2017[57]). These habitats are supported at three sub-sites namely, Ballyheige, Carrahane/Banna and Barrow Harbour. Of these sub-sites the first two comprise sandflat type saltmarshes with the third comprising estuary-type salt marsh which is underlain by a mud substrate. A total estimated area of 54.9 ha of saltmarsh habitat is supported within the SAC. The extent of Salicornia and other annuals colonising mud and sand habitat supported within the SAC is unknown, Atlantic salt meadows are estimated to cover an area of approximately 22.3 ha and Mediterranean salt meadow an area of approximately 32.7 ha. Further unrecorded areas of these habitats may be present within the site (NPWS 2017[56]).

While there are no nutrient specific targets set for these habitats (NPWS 2017[57]), 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: 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 the Akeragh, Banna and Barrow Harbour SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the SAC include: Ardfert_Oughter_010 (IE_SH_23A190800), Tyshe_010 (IE_SH_23T020400) and Tyshe_020 (IE_SH_23T020500);
- The coastal water body hydrologically connected to the SAC is: Outer Tralee Bay (IE_SH_040_0000); and
- The groundwater body hydrogeologically connected to the SAC is: Ardfert (IE_SH_G_008).

These habitats are located downstream of the WSZs, associated with CWBs into which all river and transitional water bodies connected to the WSZs discharge (as listed at **Table 5-3**). However, the habitats are not located within the marine waters but are regularly inundated by coastal floodwater. These habitats share groundwater connectivity with the WSZs.

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

The modelled increase in orthophosphate concentration in the river water bodies are as follows: Ballynoe_010 (IE_SH_23B910900) (0.0006 mg/l), Ardfert_Oughter_010 (IE_SH_23A190800) (0.0008 mg/l), Tyshe_010 (IE_SH_23T020400) (0.0010 mg/l) and Tyshe_020 (IE_SH_23T020500) (0.0012 mg/l). These modelled increases do not exceed 5% of the High / Good indicative quality boundary (<0.00125 mg/l).

The Tyshe_020 (IE_SH_23T020500) is just below the 5% boundary at 0.0012mg/l. The Tyshe_020 (IE_SH_23T020500) was impacted by the Ardfert WWTP until an upgrade in 2018. The orthophosphate

[57] NPWS 2017 Akeragh, Banna and Barrow Harbour SAC 000332 Conservation Objectives

levels in the river have since improved to Poor indicative quality, but recent monitoring suggests a degradation back to Bad indicative quality in one of the monitoring points. The Operational monitoring point downstream of the Ardfert agglomeration (RS23T020500: Bridge near Banna House) and has a Q Value of 3, indicative of Poor status. As the increase in concentration due to orthophosphate dosing is below significant levels, dosing will not result in any further impact on the structure and functioning of aquatic ecosystems in this water bodies and will not result in any further deterioration in the contributing elements to ecological status. In addition, these Annex I habitats are associated with coastal water bodies which are discussed below.

The modelled increase in orthophosphate concentration in the coastal water bodies which are hydrologically connected to the site are as follows: Inner Tralee Bay (IE_SH_050_0000) (0.0000 mg/l), Outer Tralee Bay (IE_SH_040_0000) (0.0000 mg/l) and Southwestern Atlantic Seaboard (HA23) (IE_SH_010_0000) (0.0000 mg/l). As the modelled increases do not exceed 5% of the High / Good indicative quality boundary (0.00125 mg/l), there is no risk of deterioration in the indicative quality of the water bodies or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the groundwater bodies connected to the site are as follows: Ardfert (IE_SH_G_008) (0.0008 mg/l) and Kerry Head (IE_SH_G_118) (0.0000 mg/l). Therefore, there is no risk of deterioration in the indicative quality of the groundwater bodies, or of preventing the achievement of WFD objectives.

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

6.1.6 Magharee Islands SAC 002261

6.1.6.1 (1170) Reefs

The area of reef habitat within the Magharee Islands SAC is estimated at 2237 ha, comprising areas surrounding and between the islands themselves, located within the Outer Tralee Bay and South-western Atlantic Seaboard (HA:23) coastal water bodies. There are no nutrient specific targets in the SSCO (NPWS, 2013[58]) for this habitat. The attributes and targets that will maintain the favourable conservation condition of this habitat do not make specific reference to water quality or nutrient conditions however it is considered that water quality is linked to a number of the targets for this habitat, such as the maintenance and extent of certain habitat types supported. The COs supporting document for Marine habitats (NPWS, 2012[59]) does require that activities or operations that cause significant disturbance to communities but may not necessarily represent a continuous or ongoing source of disturbance over time and space may be assessed in a context-specific manner, giving due consideration to the proposed nature and scale of activities during the reporting cycle and the particular resilience of the receiving habitat in combination with other activities within the designated site.

[58] NPWS 2013 Magharee Islands SAC 002261 Conservation Objectives
[59] NPWS 2013 Magharee Islands SAC (site code: 2261) Conservation Objectives Supporting Document - Marine Habitats

Table 5-2 identifies the surface and groundwater bodies which are hydrologically connected to the Magharees Islands SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the SAC include: Pinure_010 (IE_SH_23P160880), Lee (Tralee)_010 (IE_SH_23L010030), Lee (Tralee)_020 (IE_SH_23L010050), Lee (Tralee)_030 (IE_SH_23L010100), Lee (Tralee)_040 (IE_SH_23L010200), Big River (Tralee)_010 (IE_SH_23B040150), Annagh (Kerry)_010 (IE_SH_23A060890), Knockglass_Beg_010 (IE_SH_23K130870), Finglas (Tralee Bay)_010 (IE_SH_23F030400), Carrigaha_010 (IE_SH_23C190920) and Derryquay River_010 (IE_SH_23D420880), Ballynoe_010 (IE_SH_23B910900), Ardfert_Oughter_010 (IE_SH_23A190800), Tyshe_010 (IE_SH_23T020400) and Tyshe_020 (IE_SH_23T020500);
- The transitional water body hydrologically connected to the SAC is: Lee K Estuary (IE_SH_050_0100);
- The coastal water bodies hydrologically connected to the SAC are: Inner Tralee Bay (IE_SH_050_0000), Outer Tralee Bay (IE_SH_040_0000) and Southwestern Atlantic Seaboard (HA:27) (IE_SH_010_0000); and
- The groundwater bodies hydrogeologically connected to the SAC are: Tralee (IE_SH_G_226), Spa (IE_SH_G_223), Brandon Head (IE_SH_G_044), Dingle (IE_SW_G_033) and Ardfert (IE_SH_G_008) and

This habitat is located downstream of the WSZs, associated with CWBs into which all river and transitional water bodies connected to the WSZs discharge (as listed at **Table 5-3**).

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

The modelled increase in orthophosphate concentration in the river water bodies are as follows: Pinure_010 (IE_SH_23P160880) (0.0007 mg/l), Lee (Tralee)_010 (IE_SH_23L010030) (0.0006 mg/l), Lee (Tralee)_020 (IE_SH_23L010050) (0.0006 mg/l), Lee (Tralee)_030 (IE_SH_23L010100) (0.0007 mg/l), Lee (Tralee)_040 (IE_SH_23L010200) (0.0010mg/l), Ballynoe_010 (IE_SH_23B910900) (0.0006mg/l), Annagh 23_010 (IE_SH_23A060890) (0.0003 mg/l), Knockglass_Beg_010 (IE_SH_23K130870) (0.0002 mg/l), Finglas (Tralee Bay)_010 (IE_SH_23F030400) (0.0002 mg/l), Carrigaha_010 (IE_SH_23C190920) (0.0002 mg/l), Derryquay River_010 (IE_SH_23D420880) (0.0002 mg/l), Ardfert_Oughter_010 (IE_SH_23A190800) (0.0008 mg/l), Tyshe_010 (IE_SH_23T020400) (0.0010 mg/l) and Tyshe_020 (IE_SH_23T020500) (0.0012 mg/l). These modelled increases do not exceed 5% of the High / Good indicative quality boundary (<0.00125 mg/l) Therefore, there is no risk of deterioration in the current indicative quality of these water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The modelled post-dosing additional increase in concentration for Big River (Tralee)_010 (IE_SH_23B040150) is 0.0023 mg/l. This modelled additional increase exceeds 5% of the High / Good indicative quality boundary; however, does not cause the post-dosing baseline concentrations to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the current indicative quality ((Poor) due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The Tyshe_020 (IE_SH_23T020500) is just below the 5% boundary at 0.0012mg/l. The Tyshe_020 (IE_SH_23T020500) was impacted by the Ardfert WWTP until an upgrade in 2018. The orthophosphate levels in the river have since improved to Poor indicative quality, but recent monitoring suggests a degradation back to Bad indicative quality in one of the monitoring points. The Operational monitoring point downstream of the Ardfert agglomeration (RS23T020500: Bridge near Banna House) and has a Q Value of 3, indicative of Poor status. As the increase in concentration due to orthophosphate dosing is below significant levels, dosing will not result in any further impact on the structure and functioning of aquatic ecosystems in this water bodies and will not result in any further deterioration in the contributing elements to ecological status.

The modelled increase for all groundwater bodies do not exceed 5% of the Good / Fail indicative quality boundary or cause the post-dosing baseline concentration to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the Good ortho P indicative status of the groundwater bodies.

Magharee Islands SAC is located within Inner Tralee Bay and South Wester Atlantic Seaboard. All of the river water bodies discussed above are not directly connected to the SAC but discharge to coastal and transitional waterbodies. The modelled additional concentrations to these are discussed below.

The modelled increase in orthophosphate concentration in the transitional water body, Lee K Estuary (IE_SH_050_0100) (0.0004 mg/l). The modelled increases do not exceed 5% of the High / Good indicative quality boundary. Therefore, there is no risk of deterioration in the indicative quality of the water bodies or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increases in orthophosphate concentration in the coastal water bodies which are hydrologically connected to the site are as follows: Inner Tralee Bay (IE_SH_050_0000) (0.0000 mg/l), Outer Tralee Bay (IE_SH_040_0000) (0.0000 mg/l) and Southwestern Atlantic Seaboard (HA23) (IE_SH_010_0000) (undetectable, i.e. 0.0000 mg/l). The modelled increases do not exceed 5% of the High / Good indicative quality boundary. Therefore, there is no risk of deterioration in the indicative quality of the water bodies or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir. Given the insignificant orthoP concentrations modelled for Outer Tralee Bay and undetectable (0.0000mg/l) concentrations within the South Western Atlantic Seaboards it is considered dosing will not impact upon the water quality requirements for Reef habitat.

In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Scart Reservoir, 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.

6.1.7 Castlemaine Harbour SAC 000343

6.1.7.1 (1130) Estuaries and (1140) Mudflats and sandflats not covered by seawater at low tide

The extent of Estuaries habitat supported within this SAC is estimated as 5,696 ha and uses Water Framework Transitional water body delineation to define extent (NPWS 2011[60]). The habitat comprises the majority of the SAC and encompasses the entirety of the Castlemaine Harbour

[60] NPWS 2011 Castlemaine Harbour SAC 000343 Conservation Objectives

transitional water body. The transitional water body and the area of estuaries habitat also encompasses the Annex I habitat of Mudflats and sandflats not covered by seawater at low tide of which an estimated area of 4,287 ha is supported. A target for this habitat 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.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically and hydrogeologically connected to the Castlemaine Harbour SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the site include: Little Maine_010 (IE_SW_22L020500), Little Maine_020 (IE_SW_22L021000), Maine_030 (IE_SW_22M010500), Maine_040 (IE_SW_22M010700) and Maine_050 (IE_SW_22M010800); Kealbrogeen stream (Laune)_010 (IE_SW_22K040500), Laune_040 (IE_SW_22L010400); Groin_010 (IE_SW_22G080300), Shanakeal_010 (IE_SW_22S130900), Dogue_010 (IE_SW_22D030400), Fahaduff_010 (IE_SW_22F090400), Gweestin_010 (IE_SW_22G060300), Gweestin_020 (IE_SW_22G060600) and Gweestin_030 (IE_SW_22G060900);
- The transitional water body hydrologically connected to the SAC is: Castlemaine Harbour (IE_SW_230_0200);
- The groundwater bodies connected to the site are: Castlemaine (IE_SW_G_026), Dingle (IE_SW_G_033).

This habitat is located downstream of the WSZs, associated with CWBs into which all river and transitional water bodies connected to the WSZs discharge (as listed at **Table 5-3**).

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

The modelled increases in orthophosphate concentration in the river water bodies are as follows: Little Maine_010 (IE_SW_22L020500) (0.0002 mg/l), Little Maine_020 (IE_SW_22L021000) (0.0004 mg/l), Maine_030 (IE_SW_22M010500) (0.0005 mg/l), Maine_040 (IE_SW_22M010700) (0.0005 mg/l), Maine_050 (IE_SW_22M010800) (0.0008 mg/l), Kealbrogeen stream (Laune)_010 (IE_SW_22K040500), (0.0002mg/l) Laune_040 (IE_SW_22L010400) (0.0001mg/l), Groin_010 (IE_SW_22G080300) (0.0001 mg/l), Shanakeal_010 (IE_SW_22S130900) (0.0004 mg/l), Dogue_010 (IE_SW_22D030400) (0.0002 mg/l), Fahaduff_010 (IE_SW_22F090400) (0.0004 mg/l), Gweestin_010 (IE_SW_22G060300) (0.0007 mg/l), Gweestin_020 (IE_SW_22G060600) (0.0008 mg/l) and Gweestin_030 (IE_SW_22G060900) (0.0008 mg/l). As the modelled increases do not exceed 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the indicative quality of the water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The modelled increase in orthophosphate concentration in the transitional water body, which is hydrologically connected to the site, Castlemaine Harbour (IE_SW_230_0200), is undetectable (0.0000

mg/l). Therefore, there is no risk of deterioration in the indicative quality or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the groundwater bodies connected to the site, Castlemaine (IE_SW_G_026) and Dingle (IE_SW_G_033), is 0.0012mg/l and 0.0002 mg/l respectively. Therefore, there is no risk of deterioration in the indicative quality of the groundwater body, or of preventing the achievement of WFD objectives.

In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Scart Reservoir, 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 these habitats.

6.1.7.2 (1210) Annual vegetation of drift lines, (2110) Embryonic shifting dunes, (2120) Shifting dunes along the shoreline with *Ammophila arenaria,* (2130) Fixed coastal dunes with herbaceous vegetation (grey dunes) *, (2170) Dunes with *Salix repens ssp. argentea* (Salicion arenariae) and (2190) Humid dune slacks

There are six dune habitats which are included as qualifying interest features for the SAC which are supported within a number of sub-sites namely Rossbehy and Inch (NPWS 2011[60]). Annual vegetation of drift lines is present across an approximate area of 1.9 ha within the SAC, located within a narrow zone along the high tide mark of beaches; Embryonic shifting dunes are present across an area of approximately 15.2 ha within the site, Shifting dunes along the shoreline with *Ammophila arenaria* are present in areas where sand accumulation is rapid and marram grass becomes established. Approximately 36.2 ha of this habitat is supported within the SAC. Fixed coastal dunes with herbaceous vegetation (grey dunes) comprise the majority of sand dune habitats, an area of approximately 451.3 ha within the SAC, located in the shelter of mobile dune systems. Approximately 0.34 ha of dunes with *Salix repens* are supported within the SAC while Humid dune slacks, characterised by wet depressions between dune ridges in which the water table is maintained close to or above the surface, occupy an area of 34.2 ha.

Conservation objectives outlined for these habitats, within the COs supporting document for coastal habitats (NPWS 2011[61]), relate specifically to the need to restore the favourable conservation status of the habitats, defined by three attributes namely, area, range and structure and functions, however no objectives specifically address nutrient input.

While it is considered that the proposed dosing has limited potential to result in an effect upon the area or range of the supported sand dune habitats, any potential effect is considered likely to arise as a result of effects associated with structure and function of the habitats, which are influenced by hydrological regimes and associated nutrient cycles. However, no specific reference is made to nutrient enrichment or orthophosphate and as such it is not considered that such effects are likely to be a priority for the maintained and restored favourable conservation status of these habitats.

[61] NPWS 2011 Castlemaine Harbour SAC (site code 343) Conservation Objectives Supporting Document - Coastal Habitats

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Castlemaine Harbour SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the site include: Little Maine_010 (IE_SW_22L020500), Little Maine_020 (IE_SW_22L021000), Maine_030 (IE_SW_22M010500), Maine_040 (IE_SW_22M010700) and Maine_050 (IE_SW_22M010800), Kealbrogeen stream (Laune)_010 (IE_SW_22K040500), Laune_040 (IE_SW_22L010400), Groin_010 (IE_SW_22G080300), Shanakeal_010 (IE_SW_22S130900), Dogue_010 (IE_SW_22D030400), Fahaduff_010 (IE_SW_22F090400), Gweestin_010 (IE_SW_22G060300), Gweestin_020 (IE_SW_22G060600) and Gweestin_030 (IE_SW_22G060900);
- The transitional water body hydrologically connected to the SAC is: Castlemaine Harbour (IE_SW_230_0200);
- The groundwater bodies connected to the site are: Castlemaine (IE_SW_G_026), Dingle (IE_SW_G_033).

This habitat is located downstream of the WSZs, associated with CWBs into which all river and transitional water bodies connected to the WSZs discharge (as listed at **Table 5-3**).

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

The modelled increases in orthophosphate concentration in the river water bodies are as follows: Little Maine_010 (IE_SW_22L020500) (0.0002 mg/l), Little Maine_020 (IE_SW_22L021000) (0.0004 mg/l), Maine_030 (IE_SW_22M010500) (0.0005 mg/l), Maine_040 (IE_SW_22M010700) (0.0005 mg/l), Maine_050 (IE_SW_22M010800) (0.0008 mg/l), Kealbrogeen stream (Laune)_010 (IE_SW_22K040500), (0.0002mg/l) Laune_040 (IE_SW_22L010400) (0.0001mg/l), Groin_010 (IE_SW_22G080300) (0.0001 mg/l), Shanakeal_010 (IE_SW_22S130900) (0.0004 mg/l), Dogue_010 (IE_SW_22D030400) (0.0002 mg/l), Fahaduff_010 (IE_SW_22F090400) (0.0004 mg/l), Gweestin_010 (IE_SW_22G060300) (0.0007 mg/l), Gweestin_020 (IE_SW_22G060600) (0.0008 mg/l) and Gweestin_030 (IE_SW_22G060900) (0.0008 mg/l). As the modelled increases do not exceed 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the indicative quality of the water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The modelled increase in orthophosphate concentration in the transitional water body, which is hydrologically connected to the site, Castlemaine Harbour (IE_SW_230_0200), is undetectable (0.0000 mg/l). Therefore, there is no risk of deterioration in the indicative quality or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the groundwater bodies connected to the site, Castlemaine (IE_SW_G_026) and Dingle (IE_SW_G_033), is 0.0012mg/l and 0.0002 mg/l respectively. Therefore, there is no risk of deterioration in the indicative quality of the groundwater body, or of preventing the achievement of WFD objectives.

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

6.1.7.3 (1310) Salicornia and other annuals colonising mud and sand, (1330) Atlantic salt meadows and (1410) Mediterranean salt meadows

There are three saltmarsh habitats within this site which comprise qualifying interest features for the SAC (NPWS 2011[60]). These habitats are supported at four sub-sites namely, Inch, Rossbehy, Cromane and Whitegate-Fybagh supporting a total area of saltmarsh habitat of approximately 157.9 ha. The extent of Salicornia and other annuals colonising mud and sand habitat supported within the SAC is estimated at 1.24 ha, Atlantic salt meadows are estimated to cover an area of approximately 34 ha and Mediterranean salt meadow an area of approximately 122.6 ha. Further unrecorded areas of these habitats may be present within the site.

While there are no nutrient specific targets set for these habitats, 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: 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 the Castlemaine Harbour SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the site include: Little Maine_010 (IE_SW_22L020500), Little Maine_020 (IE_SW_22L021000), Maine_030 (IE_SW_22M010500), Maine_040 (IE_SW_22M010700) and Maine_050 (IE_SW_22M010800); Kealbrogeen stream (Laune)_010 (IE_SW_22K040500), Laune_040 (IE_SW_22L010400), Groin_010 (IE_SW_22G080300), Shanakeal_010 (IE_SW_22S130900), Dogue_010 (IE_SW_22D030400), Fahaduff_010 (IE_SW_22F090400), Gweestin_010 (IE_SW_22G060300), Gweestin_020 (IE_SW_22G060600) and Gweestin_030 (IE_SW_22G060900);
- The transitional water body hydrologically connected to the SAC is: Castlemaine Harbour (IE_SW_230_0200);
- The groundwater bodies connected to the site are: Castlemaine (IE_SW_G_026), Dingle (IE_SW_G_033).

This habitat is located downstream of the WSZs, associated with CWBs into which all river and transitional water bodies connected to the WSZs discharge (as listed at **Table 5-3**).

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

The modelled increases in orthophosphate concentration in the river water bodies are as follows: Little Maine_010 (IE_SW_22L020500) (0.0002 mg/l), Little Maine_020 (IE_SW_22L021000) (0.0004 mg/l), Maine_030 (IE_SW_22M010500) (0.0005 mg/l), Maine_040 (IE_SW_22M010700) (0.0005 mg/l), Maine_050 (IE_SW_22M010800) (0.0008 mg/l), Kealbrogeen stream (Laune)_010 (IE_SW_22K040500), (0.0002mg/l), Laune_040 (IE_SW_22L010400) (0.0001mg/l), Groin_010 (IE_SW_22G080300) (0.0001 mg/l), Shanakeal_010 (IE_SW_22S130900) (0.0004 mg/l), Dogue_010 (IE_SW_22D030400) (0.0002 mg/l), Fahaduff_010 (IE_SW_22F090400) (0.0004 mg/l), Gweestin_010 (IE_SW_22G060300) (0.0007 mg/l), Gweestin_020 (IE_SW_22G060600) (0.0008 mg/l) and Gweestin_030 (IE_SW_22G060900) (0.0008 mg/l). As the modelled increases do not exceed 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the indicative quality of the water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The modelled increase in orthophosphate concentration in the transitional water body, which is hydrologically connected to the site, Castlemaine Harbour (IE_SW_230_0200), is undetectable (0.0000 mg/l). Therefore, there is no risk of deterioration in the indicative quality or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the groundwater bodies connected to the site, Castlemaine (IE_SW_G_026) and Dingle (IE_SW_G_033), is 0.0012mg/l and 0.0002 mg/l respectively. Therefore, there is no risk of deterioration in the indicative quality of the groundwater body, or of preventing the achievement of WFD objectives.

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

6.1.7.4 (91E0) Alluvial forests

As the Castlemaine Harbour SAC encompasses the River Laune and its tributaries, it includes for areas of woodland which lie in proximity to this watercourse, which are largely numerous scattered small woodlands comprising a total minimum area of 17.5 ha (NPWS 2011[60]). Areas of alluvial forest supported within the SAC are largely comprised of wet alder woodlands with frequent grey willow *Salix cinerea*. Ash and birch also occur, with the majority of the woodlands supporting a poor shrub layer dominated by Bramble. These habitats are present in scattered individual stands less than 3ha in size with a number of larger sites including Whitefield and Farrantooreen.

A review of the SSCOs for this habitat found no nutrient specific targets (NPWS 2011[60]). The SCCOs target indicates that an appropriate hydrological regime is necessary for maintenance of alluvial vegetation, with periodic flooding essential to maintaining the alluvial woodlands along the river floodplains. The main pressures on this habitat are invasive alien species; grazing; forest management; agriculture; urban development; and, sewage and slurry discharges.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Castlemaine Harbour SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the site include: Little Maine_010 (IE_SW_22L020500), Little Maine_020 (IE_SW_22L021000), Maine_030 (IE_SW_22M010500), Maine_040 (IE_SW_22M010700) and Maine_050 (IE_SW_22M010800), Kealbrogeen stream (Laune)_010 (IE_SW_22K040500), Laune_040 (IE_SW_22L010400), Groin_010 (IE_SW_22G080300), Shanakeal_010 (IE_SW_22S130900), Dogue_010 (IE_SW_22D030400), Fahaduff_010 (IE_SW_22F090400), Gweestin_010 (IE_SW_22G060300), Gweestin_020 (IE_SW_22G060600) and Gweestin_030 (IE_SW_22G060900);
- The transitional water body hydrologically connected to the SAC is: Castlemaine Harbour (IE_SW_230_0200);
- The groundwater bodies connected to the site are: Castlemaine (IE_SW_G_026), Dingle (IE_SW_G_033).

This habitat is located downstream of the WSZs, associated with RWBs into which river water bodies connected to the WSZs discharge (as listed at **Table 5-3**).

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

The modelled increases in orthophosphate concentration in the river water bodies are as follows: Little Maine_010 (IE_SW_22L020500) (0.0002 mg/l), Little Maine_020 (IE_SW_22L021000) (0.0004 mg/l), Maine_030 (IE_SW_22M010500) (0.0005 mg/l), Maine_040 (IE_SW_22M010700) (0.0005 mg/l), Maine_050 (IE_SW_22M010800) (0.0008 mg/l), Kealbrogeen stream (Laune)_010 (IE_SW_22K040500), (0.0002mg/l), Laune_040 (IE_SW_22L010400) (0.0001mg/l), Groin_010 (IE_SW_22G080300) (0.0001 mg/l), Shanakeal_010 (IE_SW_22S130900) (0.0004 mg/l), Dogue_010 (IE_SW_22D030400) (0.0002 mg/l), Fahaduff_010 (IE_SW_22F090400) (0.0004 mg/l), Gweestin_010 (IE_SW_22G060300) (0.0007 mg/l), Gweestin_020 (IE_SW_22G060600) (0.0008 mg/l) and Gweestin_030 (IE_SW_22G060900) (0.0008 mg/l). As the modelled increases do not exceed 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the indicative quality of the water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The modelled increase in orthophosphate concentration in the transitional water body, which is hydrologically connected to the site, Castlemaine Harbour (IE_SW_230_0200), is undetectable (0.0000 mg/l). Therefore, there is no risk of deterioration in the indicative quality or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the groundwater bodies connected to the site, Castlemaine (IE_SW_G_026) and Dingle (IE_SW_G_033), is 0.0012mg/l and 0.0002 mg/l respectively. Therefore, there is no risk of deterioration in the indicative quality of the groundwater body, or of preventing the achievement of WFD objectives.

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

6.1.7.5 (1095) Sea lamprey (*Petromyzon marinus)*, (1099) River lamprey (*Lampetra fluviatilis*) and (1106) Atlantic salmon (*Salmo salar*) (only in freshwater)

Artificial barriers can block or cause difficulties to the upstream migration of Atlantic salmon and lamprey species; thereby limiting the species to lower stretches and restricting access to spawning areas. Specific barriers serve to constrain the up-river migration of lamprey species in this SAC (NPWS 2011[60]).

Water quality is a particular threat to all fish fauna listed as qualifying interests. The latest Red List of Irish amphibians, reptiles and freshwater fish (King *et al*., 2011[62]) highlights the deterioration in water quality and ongoing point and diffuse sources of pollution as a key threat to these species and includes the potential effects from municipal discharges. The SSCO (NPWS, 2011[60]) states that lampreys and salmon spawn in clean gravels. Deterioration in water quality has the potential for a detrimental effect on spawning habitats, particularly where nutrient conditions result in excessive algal growth and macrophyte abundance, leading to smothering, shading effects, alteration of macroinvertebrate communities and silt deposition. The SSCO for salmon also requires a Q-value of at least 4, which equates to good ecological status.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Castlemaine Harbour SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the site include: Little Maine_010 (IE_SW_22L020500), Little Maine_020 (IE_SW_22L021000), Maine_030 (IE_SW_22M010500), Maine_040 (IE_SW_22M010700) and Maine_050 (IE_SW_22M010800), Kealbrogeen stream (Laune)_010 (IE_SW_22K040500), Laune_040 (IE_SW_22L010400), Groin_010 (IE_SW_22G080300), Shanakeal_010 (IE_SW_22S130900), Dogue_010 (IE_SW_22D030400), Fahaduff_010 (IE_SW_22F090400), Gweestin_010 (IE_SW_22G060300), Gweestin_020 (IE_SW_22G060600) and Gweestin_030 (IE_SW_22G060900);
- The transitional water body hydrologically connected to the SAC is: Castlemaine Harbour (IE_SW_230_0200);
- The groundwater bodies connected to the site are: Castlemaine (IE_SW_G_026), Dingle (IE_SW_G_033).

The potential impacts of orthophosphate dosing at Scart Reservoir are assessed in the context of brook lamprey; river lamprey; sea lamprey and Atlantic salmon occurring in the Castlemaine Harbour SAC which is located downstream of the river water bodies identified in **Table 5-2**. There is the potential for river lamprey also occurring in transitional water bodies and sea lamprey and Atlantic salmon (designated in freshwater only) occurring in transitional and coastal water bodies.

[62] King, J.L., Marnell, F., Kingston, N., Rosell, R., Boylan, P., Caffrey, J.M., FitzPatrick, Ú., Gargan, P.G., Kelly, F.L., O'Grady, M.F., Poole, R., Roche, W.K. & Cassidy, D. (2011) Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

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

The modelled increases in orthophosphate concentration in the river water bodies are as follows: Little Maine_010 (IE_SW_22L020500) (0.0002 mg/l), Little Maine_020 (IE_SW_22L021000) (0.0004 mg/l), Maine_030 (IE_SW_22M010500) (0.0005 mg/l), Maine_040 (IE_SW_22M010700) (0.0005 mg/l), Maine_050 (IE_SW_22M010800) (0.0008 mg/l), Kealbrogeen stream (Laune)_010 (IE_SW_22K040500), (0.0002mg/l), Laune_040 (IE_SW_22L010400) (0.0001mg/l), Groin_010 (IE_SW_22G080300) (0.0001 mg/l), Shanakeal_010 (IE_SW_22S130900) (0.0004 mg/l), Dogue_010 (IE_SW_22D030400) (0.0002 mg/l), Fahaduff_010 (IE_SW_22F090400) (0.0004 mg/l), Gweestin_010 (IE_SW_22G060300) (0.0007 mg/l), Gweestin_020 (IE_SW_22G060600) (0.0008 mg/l) and Gweestin_030 (IE_SW_22G060900) (0.0008 mg/l). As the modelled increases do not exceed 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the indicative quality of the water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The modelled increase in orthophosphate concentration in the transitional water body, which is hydrologically connected to the site, Castlemaine Harbour (IE_SW_230_0200), is 0.0000 mg/l. Therefore, there is no risk of deterioration in the indicative quality or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the groundwater bodies connected to the site, Castlemaine (IE_SW_G_026) and Dingle (IE_SW_G_033), is 0.0012mg/l and 0.0002 mg/l respectively. Therefore, there is no risk of deterioration in the indicative quality of the groundwater body, or of preventing the achievement of WFD objectives.

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

6.1.7.6 (1355) Otter (*Lutra lutra*)

A review of the SSCOs (NPWS, 2011[60]) found no specific attributes or targets relating to water quality for the species however the NPWS Threat Response Plan for the Otter (NPWS, 2009[63]) review of and response to the pressures and threats to otters in Ireland, categorized three principal risks to otters: i) habitat destruction and degradation; ii) water pollution; and, iii) accidental death and/or persecution.

The extent of terrestrial, marine and freshwater (river) habitat within the site includes all areas within a 10m terrestrial buffer along the shoreline (above the high-water mark and along river banks) identified as critical for otters; areas within 80m of the shoreline (high water mark) and river length calculated on the basis that otters will utilise freshwater habitats from estuary to headwaters. The

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

diet of the species varies locally and seasonally; however, it is dominated by fish, in particular salmonids, eels and sticklebacks in freshwater.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Castlemaine Harbour SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the site include: Little Maine_010 (IE_SW_22L020500), Little Maine_020 (IE_SW_22L021000), Maine_030 (IE_SW_22M010500), Maine_040 (IE_SW_22M010700) and Maine_050 (IE_SW_22M010800), Kealbrogeen stream (Laune)_010 (IE_SW_22K040500), Laune_040 (IE_SW_22L010400), Groin_010 (IE_SW_22G080300), Shanakeal_010 (IE_SW_22S130900), Dogue_010 (IE_SW_22D030400), Fahaduff_010 (IE_SW_22F090400), Gweestin_010 (IE_SW_22G060300), Gweestin_020 (IE_SW_22G060600) and Gweestin_030 (IE_SW_22G060900);
- The transitional water body hydrologically connected to the SAC is: Castlemaine Harbour (IE_SW_230_0200);

- The groundwater bodies connected to the site are: Castlemaine (IE_SW_G_026), Dingle (IE_SW_G_033).

The habitats on which this species rely are located downstream of the WSZs, associated with CWBs, TWBs and RWBs into which all river and transitional water bodies connected to the WSZs discharge (as listed at **Table 5-3**).

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

The modelled increases in orthophosphate concentration in the river water bodies are as follows: Little Maine_010 (IE_SW_22L020500) (0.0002 mg/l), Little Maine_020 (IE_SW_22L021000) (0.0004 mg/l), Maine_030 (IE_SW_22M010500) (0.0005 mg/l), Maine_040 (IE_SW_22M010700) (0.0005 mg/l), Maine_050 (IE_SW_22M010800) (0.0008 mg/l), Kealbrogeen stream (Laune)_010 (IE_SW_22K040500), (0.0002mg/l), Laune_040 (IE_SW_22L010400) (0.0001mg/l), Groin_010 (IE_SW_22G080300) (0.0001 mg/l), Shanakeal_010 (IE_SW_22S130900) (0.0004 mg/l), Dogue_010 (IE_SW_22D030400) (0.0002 mg/l), Fahaduff_010 (IE_SW_22F090400) (0.0004 mg/l), _010 (IE_SW_22G060300) (0.0007 mg/l), Gweestin_020 (IE_SW_22G060600) (0.0008 mg/l) and Gweestin_030 (IE_SW_22G060900) (0.0008 mg/l). As the modelled increases do not exceed 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the indicative quality of the water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The modelled increase in orthophosphate concentration in the transitional water body, which is hydrologically connected to the site, Castlemaine Harbour (IE_SW_230_0200), is undetectable (0.0000 mg/l). Therefore, there is no risk of deterioration in the indicative quality or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

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The modelled increase in orthophosphate concentration in the groundwater bodies connected to the site, Castlemaine (IE_SW_G_026) and Dingle (IE_SW_G_033), is 0.0012mg/l and 0.0002 mg/l respectively. Therefore, there is no risk of deterioration in the indicative quality of the groundwater body, or of preventing the achievement of WFD objectives.

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

6.1.7.7 (1395) Petalwort (*Petalophyllum ralfsii*)

Castlemaine Harbour SAC supports only four known populations of petalwort, those being located at Inch and Rossbehy, with a combined total population estimated at above 72,000 individuals. A review of the SSCOs (NPWS, 2011[60]) found no specific attributes or targets relating to water quality for the species.

The habitats which support this species within its known distribution in the SAC are limited to dune slacks at Inch and as such they are not hydrologically connected to the WSZs, however there is potential groundwater connectivity via the groundwater bodies listed at **Table 5-3**.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Castlemaine Harbour SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the site include: Little Maine_010 (IE_SW_22L020500), Little Maine_020 (IE_SW_22L021000), Maine_030 (IE_SW_22M010500), Maine_040 (IE_SW_22M010700) and Maine_050 (IE_SW_22M010800), Kealbrogeen stream (Laune)_010 (IE_SW_22K040500), Laune_040 (IE_SW_22L010400),Groin_010 (IE_SW_22G080300), Shanakeal_010 (IE_SW_22S130900), Dogue_010 (IE_SW_22D030400), Fahaduff_010 (IE_SW_22F090400), Gweestin_010 (IE_SW_22G060300), Gweestin_020 (IE_SW_22G060600) and Gweestin_030 (IE_SW_22G060900);
- The transitional water body hydrologically connected to the SAC is: Castlemaine Harbour (IE_SW_230_0200);

- The groundwater bodies connected to the site are: Castlemaine (IE_SW_G_026), Dingle (IE_SW_G_033).

The habitats on which this species rely are located downstream of the WSZs, associated with CWBs, TWBs and RWBs into which all river and transitional water bodies connected to the WSZs discharge (as listed at **Table 5-3**).

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

The modelled increases in orthophosphate concentration in the river water bodies are as follows: Little Maine_010 (IE_SW_22L020500) (0.0002 mg/l), Little Maine_020 (IE_SW_22L021000) (0.0004 mg/l), Maine_030 (IE_SW_22M010500) (0.0005 mg/l), Maine_040 (IE_SW_22M010700) (0.0005 mg/l), Maine_050 (IE_SW_22M010800) (0.0008 mg/l), Kealbrogeen stream (Laune)_010 (IE_SW_22K040500), (0.0002mg/l), Laune_040 (IE_SW_22L010400) (0.0001mg/l), Groin_010 (IE_SW_22G080300) (0.0001 mg/l), Shanakeal_010 (IE_SW_22S130900) (0.0004 mg/l), Dogue_010 (IE_SW_22D030400) (0.0002 mg/l), Fahaduff_010 (IE_SW_22F090400) (0.0004 mg/l), Gweestin_010 (IE_SW_22G060300) (0.0007 mg/l), Gweestin_020 (IE_SW_22G060600) (0.0008 mg/l) and Gweestin_030 (IE_SW_22G060900) (0.0008 mg/l). As the modelled increases do not exceed 5% of the High / Good indicative quality boundary, there is no risk of deterioration in the indicative quality of the water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The modelled increase in orthophosphate concentration in the transitional water body, which is hydrologically connected to the site, Castlemaine Harbour (IE_SW_230_0200), is undetectable (0.0000 mg/l). Therefore, there is no risk of deterioration in the indicative quality or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the groundwater bodies connected to the site, Castlemaine (IE_SW_G_026) and Dingle (IE_SW_G_033), is 0.0012mg/l and 0.0002 mg/l respectively. Therefore, there is no risk of deterioration in the indicative quality of the groundwater body, or of preventing the achievement of WFD objectives.

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

6.1.8 Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC

6.1.8.1 (1029) Freshwater Pearl Mussel

The known population of the freshwater pearl mussel extends through the Cummeragh, Cappal and Isknagahiny Lough Rivers of the Currane catchment. The known distribution of the freshwater pearl mussel is from the base of a section of falls in the Owenreagh River at Looscaunagh to the Bridge on the Gearhameen River at Lord Brandon's Cottage (Ross, 2007). The extent of the mussel habitat in the Caragh system is well-documented and most of the available habitat in the Caragh system is occupied by adult mussels. The Environmental Quality Ratios for the water quality parameters monitored within freshwater pearl mussel catchments correspond to high ecological status. Orthophosphate specific targets are not defined in the SSCOs. Nevertheless, the freshwater pearl mussel requires High Status conditions. The Surface Water Regulations (2009) set a limit of ≤0.025 (mean) or ≤0.045 (95%ile) for Molybdate Reactive Phosphorus (MRP) (mg P/l) for High Status waters. The habitat in the Cloon failed both standards during 2009 sampling undertaken to inform the preparation of the sub-basin management plan for this site.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The coastal water body hydrologically connected to the SAC is: Southwestern Atlantic Seaboard (HA 23) (IE_SH_010_0000);
- The groundwater body hydrogeologically connected to the SAC is the Scartaglin (IE_SW_G_073);
- No river, transitional or lake water bodies are hydrologically connected to the SAC.

The designated FWPM catchments are Curran, Caragh and Gearhameen. The Kerry Blackwater River is classed as having suitable habitat. These catchments/rivers are not connected to the WSZ and will not receive ortho-P dosed water. The known suitable habitat area is likely an underestimate particularly in the Cummeragh River. Suitable habitat appears to be widespread in the Cummeragh River from Lough Derriana to Lough Currane, but the river hasn't been comprehensively surveyed (Ross, 2008, 2009, 2017; NPWS, 2010). Pearl mussels are known to occur within the Flesk (Kerry)_060 which is directly downstream of the Woodford (Flesk) 23 and populations potentially also occur in this river also. These rivers are also not hydrologically connected to the WSZ. Therefore, LSE via hydrological pathways upon the designated FWMP populations of the SAC are excluded.

The modelled increase in orthophosphate concentration in the coastal water body, which is hydrologically connected to the site, is undetectable (0.0000 mg/l). Therefore, there is no risk of deterioration in the indicative quality or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the Scartaglin (IE_SW_G_073) groundwater body connected to the site, (0.0005 mg/l). This modelled increase does not exceed 5% of the High / Good indicative quality boundary. Therefore, there is no risk of deterioration in the indicative quality of the groundwater body, or of preventing the achievement of WFD objectives.

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

In terms of the potential for effect on Atlantic salmon, which are host to the larval stage of the Freshwater pearl mussel called glochidia, likely significant effects have been excluded. Please see **Section 6.1.8.2** below.

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

6.1.8.2 (1095) Sea lamprey, (1096) Brook lamprey, (1099) River lamprey, and (1106) Atlantic salmon (freshwater only)

Water quality is a particular threat to all fish fauna listed as qualifying interests. The latest Red List of Irish amphibians, reptiles and freshwater fish (King *et al*., 2011[64]) highlights the deterioration in water

[64] King, J.L., Marnell, F., Kingston, N., Rosell, R., Boylan, P., Caffrey, J.M., FitzPatrick, Ú., Gargan, P.G., Kelly, F.L., O'Grady, M.F., Poole, R., Roche, W.K. & Cassidy, D. (2011) Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

quality and ongoing point and diffuse sources of pollution as a key threat to these species and includes the potential effects from municipal discharges. The SSCOs (NPWS, 2012[Error! Bookmark not defined.]) for these f ish species requires that the spawning habitat should not be reduced. Deterioration in water quality has the potential for a detrimental effect on spawning habitats, particularly where nutrient conditions result in excessive algal growth and macrophyte abundance, leading to smothering, shading effects, alteration of macroinvertebrate communities and silt deposition. The SSCOs for salmon also requires a Q-value of at least 4, which equates to Good ecological status (at least good ecological status is required for Salmon).

It is noted that Artificial barriers can block or cause difficulties to the upstream migration of Atlantic salmon and lamprey species; thereby limiting the species to lower stretches and restricting access to spawning areas. However, there are no noted artificial barriers in this SAC on the Cummeragh/Finglas, Caragh, Ferta and Flesk/Laune systems although there are a number of natural waterfall barriers. Adult spawning is known to occur at the top of the catchment. The potential impacts of orthophosphate dosing at are assessed in the context of brook lamprey occurring in all river water bodies; river lamprey occurring in all transitional and river water bodies; sea lamprey and Atlantic salmon (designated in freshwater only) occurring in all river, transitional and coastal water bodies. Twaite shad as occurring in all freshwater (most upstream freshwater areas of tidal regions), transitional and coastal water bodies identified in **Table 5-2.**

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The coastal water body hydrologically connected to the SAC is: Southwestern Atlantic Seaboard (HA 23) (IE_SH_010_0000);
- The groundwater body hydrogeologically connected to the SAC is the Scartaglin (IE_SW_G_073);
- No river, transitional or lake water bodies are hydrologically connected to the SAC.

The modelled increase in orthophosphate concentration in the coastal water body, which is hydrologically connected to the site, Southwestern Atlantic Seaboard (HA 23) (IE_SH_010_0000), is undetectable (0.0000 mg/l). Therefore, there is no risk of deterioration in the indicative quality or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the Scartaglin (IE_SW_G_073) groundwater body connected to the site, (0.0005 mg/l). This modelled increase does not exceed 5% of the High / Good indicative quality boundary. Therefore, there is no risk of deterioration in the indicative quality of the groundwater body, or of preventing the achievement of WFD objectives.

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

6.1.8.3 (1355) Otter (*Lutra lutra*)

A review of the SSCOs (NPWS 2012[65]) found no specific attributes or targets relating to water quality for the species however the NPWS Threat Response Plan for the Otter (NPWS, 2009[66]) review of and response to the pressures and threats to otters in Ireland, categorized three principal risks to otters: i) habitat destruction and degradation; ii) water pollution; and, iii) accidental death and/or persecution.

The extent of terrestrial, marine and freshwater (river) habitat within the site includes all areas within a 10m terrestrial buffer along the shoreline (above the high water mark and along river banks) identified as critical for otters; areas within 80m of the shoreline (high water mark) and river length calculated on the basis that otters will utilise freshwater habitats from estuary to headwaters (NPWS, 2012[23]). The diet of the species varies locally and seasonally; however, it is dominated by fish, in particular salmonids, eels and sticklebacks in freshwater.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The coastal water body hydrologically connected to the SAC is: Southwestern Atlantic Seaboard (HA 23) (IE_SH_010_0000);
- The groundwater body hydrogeologically connected to the SAC is the Scartaglin (IE_SW_G_073);
- No river, transitional or lake water bodies are hydrologically connected to the SAC.

The modelled increase in orthophosphate concentration in the coastal water body, which is hydrologically connected to the site, Southwestern Atlantic Seaboard (HA 23) (IE_SH_010_0000), is undetectable (0.0000 mg/l). Therefore, there is no risk of deterioration in the indicative quality or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the Scartaglin (IE_SW_G_073) groundwater body connected to the site, (0.0005 mg/l). This modelled increase does not exceed 5% of the High / Good indicative quality boundary. Therefore, there is no risk of deterioration in the indicative quality of the groundwater body, or of preventing the achievement of WFD objectives.

In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Scart Reservoir, it has been demonstrated that the potential for likely significant effects on this species can be excluded. Furthermore, dosing will not interfere with the terrestrial, marine or freshwater habitat of the species. In the absence of any likely significant effect on water quality or fish species, the main food source for the otter in this SAC, there is no potential for likely significant effects on the conservation status of otter as a result of this project.

[65] NPWS 2017 Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC 000365 Conservation Objectives

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

6.1.8.4 (1421) Killarney fern

Killarney fern is a type of filmy fern. It grows in deeply shaded, humid situations such as dripping caves, crevices and overhands on cliffs and rocky slopes, in stream gullies, by waterfalls and in woodlands, and occasionally occurs under fallen trees and on the floor of damp woodlands[67]. A review of the SSCOs for Killarney fern (NPWS, 2017[65]) found no specific attributes or targets relating to nutrients or water quality; however it is threatened by a variety of activities and impacts, including indirectly by water pollution.

Twenty confirmed populations of the species have been recorded in the SAC since 1960, of which 52 colonies of the species have been identified in the 20 confirmed populations recorded in the SAC. Exact locations are not mapped in the SSCO report and it is not possible to comment on their areas at this time.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The coastal water body hydrologically connected to the SAC is: Southwestern Atlantic Seaboard (HA 23) (IE_SH_010_0000);
- The groundwater body hydrogeologically connected to the SAC is the Scartaglin (IE_SW_G_073);
- No river, transitional or lake water bodies are hydrologically connected to the SAC.

The modelled increase in orthophosphate concentration in the coastal water body, which is hydrologically connected to the site, Southwestern Atlantic Seaboard (HA 23) (IE_SH_010_0000), is undetectable (0.0000 mg/l). Therefore, there is no risk of deterioration in the indicative quality or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the Scartaglin (IE_SW_G_073) groundwater body connected to the site, (0.0005 mg/l). This modelled increase does not exceed 5% of the High / Good indicative quality boundary. Therefore, there is no risk of deterioration in the indicative quality of the groundwater body, or of preventing the achievement of WFD objectives.

The modelled increase in orthophosphate concentration in the groundwater body connected to the site, Cahersiveen (IE_SW_G_033), is undetectable (0.0000 mg/l), Laune Muckross (IE_SW_G_048) (0.0001 mg/l) and Scartaglin (IE_SW_G_073) (0.0005 mg/l). All the modelled increases not exceed 5% of the High / Good indicative quality boundary. Therefore, there is no risk of deterioration in the indicative quality of the groundwater body, or of preventing the achievement of WFD objectives.

In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Scart Reservoir, it has been demonstrated that the potential for likely significant effects on this species can be excluded. In the absence of any likely significant effect on water quality there is no potential for likely significant effects on the conservation status of Killarney Fern as a result of this project.

[67] https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000365.pdf

6.1.8.5 (5046) Killarney Shad

Water quality is a particular threat to all fish fauna listed as qualifying interests. The latest Red List of Irish amphibians, reptiles and freshwater fish (King *et al*., 2011[68]) highlights the deterioration in water quality and ongoing point and diffuse sources of pollution as a key threat to these species and includes the potential effects from municipal discharges. Killarney shad (*Alosa fallax killarnensis*), unique to Lough Leane which intersects the water supply zone and is directly connected via surface water flow paths, is listed as Vulnerable (D2) in the Irish red list (King et al., 2011), based on the species' restricted distribution and area of occupancy. The SSCOs[69] for this fish species requires that spawning habitat should not be reduced and should be maintained as stable particularly where nutrient conditions result in excessive algal growth and macrophyte abundance, leading to smothering, shading effects, alteration of macroinvertebrate communities and silt deposition. The SSCO for Killarney Shad requires a Q-value of at least 4, which equates to good ecological status.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The coastal water body hydrologically connected to the SAC is: Southwestern Atlantic Seaboard (HA 23) (IE_SH_010_0000);
- The groundwater body hydrogeologically connected to the SAC is the Scartaglin (IE_SW_G_073);
- No river, transitional or lake water bodies are hydrologically connected to the SAC.

The modelled increase in orthophosphate concentration in the coastal water body, which is hydrologically connected to the site, Southwestern Atlantic Seaboard (HA 23) (IE_SH_010_0000), is undetectable (0.0000 mg/l). Therefore, there is no risk of deterioration in the indicative quality or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the Scartaglin (IE_SW_G_073) groundwater body connected to the site, (0.0005 mg/l). This modelled increase does not exceed 5% of the High / Good indicative quality boundary. Therefore, there is no risk of deterioration in the indicative quality of the groundwater body, or of preventing the achievement of WFD objectives.

- In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Scart Reservoir, 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 this species or its habitat.

[68] King, J.L., Marnell, F., Kingston, N., Rosell, R., Boylan, P., Caffrey, J.M., FitzPatrick, Ú., Gargan, P.G., Kelly, F.L., O'Grady, M.F., Poole, R., Roche, W.K. & Cassidy, D. (2011) Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

[69] NPWS 2017 Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC 000365 Conservation Objectives

6.1.8.6 (1833) *Najas flexilis* (Slender Naiad)

Slender Naiad is a fragile, relatively short (rarely >30cm) and permanently submerged species of the lower euphotic depths and is often overlooked. It is typically found on flat to gently sloping areas of the lake bed with soft substrata of mud, silt or fine sand. Records of the species within Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC exist for seven lakes, although many recordings have been rejected. The full extent of Najas flexilis in the lakes of this SAC has not been mapped; however, data indicate that it is widespread in Acoose, Caragh, Leane, and The Long Range lakes. *Najas flexilis* is typically associated with high water quality.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The coastal water body hydrologically connected to the SAC is: Southwestern Atlantic Seaboard (HA 23) (IE_SH_010_0000);
- The groundwater body hydrogeologically connected to the SAC is the Scartaglin (IE_SW_G_073);
- No river, transitional or lake water bodies are hydrologically connected to the SAC.

The modelled increase in orthophosphate concentration in the coastal water body, which is hydrologically connected to the site, Southwestern Atlantic Seaboard (HA 23) (IE_SH_010_0000), is undetectable (0.0000 mg/l). Therefore, there is no risk of deterioration in the indicative quality or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the Scartaglin (IE_SW_G_073) groundwater body connected to the site, (0.0005 mg/l). This modelled increase does not exceed 5% of the High / Good indicative quality boundary. Therefore, there is no risk of deterioration in the indicative quality of the groundwater body, or of preventing the achievement of WFD objectives.

In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Scart Reservoir, 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 this species or its habitat.

6.1.8.7 (91E0) * Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)

Alluvial woods within the SAC are generally found on the low-lying limestone areas within the floodplain of Lough Leane and also in association with streams or calcareous springs such as at Cloghereen Pool Wood, the woodland behind Muckross Abbey, Carrigafreaghane Wood and Bellview Wood (Barron and Perrin, 2011). This habitat was surveyed by Perrin et al. (2008) as part of the National Survey of Native Woodlands (NSNW) at Game Wood (NSNW site code 1288) and mapped as 32.24ha. Game Wood was also included in a national monitoring survey (O'Neill and Barron, 2013). In the production of a habitat map for Killarney National Park, Barron and Perrin (2011) mapped a further 138.6ha of the habitat within the National Park to give a total minimum area of 170.84ha of alluvial woods within the SAC.

Areas of alluvial forest supported within the SAC are comprised of, Ash-ivy woodland, locally with alder (Alnus glutinosa) and pedunculate oak, with wood avens and wet willow-alder-ash. These habitats are present in relatively small stands, although on the lower reaches more extensive stands occur. A review of the SSCOs for this habitat found no nutrient specific targets (NPWS 2014[70]). The SCCOs target indicates that an appropriate hydrological regime is necessary for maintenance of alluvial vegetation, with periodic flooding essential to maintaining the alluvial woodlands along the river floodplains. The main pressures on this habitat are invasive alien species; grazing; forest management; agriculture; urban development; and, sewage and slurry discharges[71].

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The coastal water body hydrologically connected to the SAC is: Southwestern Atlantic Seaboard (HA 23) (IE_SH_010_0000);
- The groundwater body hydrogeologically connected to the SAC is the Scartaglin (IE_SW_G_073);
- No river, transitional or lake water bodies are hydrologically connected to the SAC.

The modelled increase in orthophosphate concentration in the coastal water body, which is hydrologically connected to the site, Southwestern Atlantic Seaboard (HA 23) (IE_SH_010_0000), is undetectable (0.0000 mg/l). Therefore, there is no risk of deterioration in the indicative quality or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the Scartaglin (IE_SW_G_073) groundwater body connected to the site, (0.0005 mg/l). This modelled increase does not exceed 5% of the High / Good indicative quality boundary. Therefore, there is no risk of deterioration in the indicative quality of the groundwater body, or of preventing the achievement of WFD objectives.

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

6.1.8.8 (6410) Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinia caeruleae*)

According to the SSCOs for this site the full extent of Molinia meadows within the SAC is unknown. *Molinia meadows* habitat was recorded as part of the Irish Semi-natural Grassland Survey (ISGS) within the sub-site Bunrower (Devaney et al., 2013; O'Neill et al., 2013) with an area of 8.03ha. In the production of a habitat map for Killarney National Park, Barron and Perrin (2011) mapped a further 0.98ha of the habitat at Ross Island to give a total minimum area of 9.02ha of Molinia meadows in the SAC located <1km from the WSZ, however there are still further un-surveyed areas.

[70] NPWS 2017 Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC 000365 Conservation Objectives
[71] NPWS 2012 River Blackwater (Cork/Waterford) SAC (site code 2170) Conservation Objectives Supporting Document - Woodland Habitats

No nutrient or hydrologically specific targets are set for these habitats and it is not considered that the proposed dosing would be likely to lead to a significant effect on this habitat.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The coastal water body hydrologically connected to the SAC is: Southwestern Atlantic Seaboard (HA 23) (IE_SH_010_0000);
- The groundwater body hydrogeologically connected to the SAC is the Scartaglin (IE_SW_G_073);
- No river, transitional or lake water bodies are hydrologically connected to the SAC.

The modelled increase in orthophosphate concentration in the coastal water body, which is hydrologically connected to the site, Southwestern Atlantic Seaboard (HA 23) (IE_SH_010_0000), is undetectable (0.0000 mg/l). Therefore, there is no risk of deterioration in the indicative quality or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the Scartaglin (IE_SW_G_073) groundwater body connected to the site, (0.0005 mg/l). This modelled increase does not exceed 5% of the High / Good indicative quality boundary. Therefore, there is no risk of deterioration in the indicative quality of the groundwater body, or of preventing the achievement of WFD objectives. In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Scart Reservoir, 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.

6.1.8.9 (3260) Watercourses of plain to montane levels with Ranunculion fluitantis and Callitricho-Batrachion vegetation

The full distribution of this habitat and its sub-types in this site are currently unknown. The basis of selection for this SAC used a broad interpretation of the habitat's including the distribution Records for rare/threatened lotic plant and invertebrate species in the SAC that indicate high conservation value. The rivers in the SAC are very variable in terms of hydrology and morphology, but all are naturally very nutrient-poor. High conservation value sub-types are associated with natural hydrology. The SAC overlaps with four freshwater pearl mussel SAC catchments: Caragh, Kerry Blackwater, Currane and Gearhameen (the first three are priority catchments). The freshwater pearl mussel (1029) conservation objective for this SAC and that for SAC 002173 take precedence because the mussel requires environmental conditions close to natural background levels.

The rivers within the SAC typically require Water Framework Directive (WFD) high status, in terms of nutrient and oxygenation standards, and EQRs (Ecological Quality Ratios) for macroinvertebrates and phytobenthos. Rivers dominated by bryophytes and macroalgae, in particular, typically require WFD high status. High status targets apply to freshwater pearl mussel (*Margaritifera margaritifera*) habitat in the Caragh, Kerry Blackwater, Currane and Gearhameen. The sub-types of this habitat are poorly understood and their typical species have not yet been fully defined however there are no rivers hydrologically connected from the WSZ to this SAC

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The coastal water body hydrologically connected to the SAC is: Southwestern Atlantic Seaboard (HA 23) (IE_SH_010_0000);
- The groundwater body hydrogeologically connected to the SAC is the Scartaglin (IE_SW_G_073);
- No river, transitional or lake water bodies are hydrologically connected to the SAC.

The modelled increase in orthophosphate concentration in the coastal water body, which is hydrologically connected to the site, Southwestern Atlantic Seaboard (HA 23) (IE_SH_010_0000), is undetectable (0.0000 mg/l). Therefore, there is no risk of deterioration in the indicative quality or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the Scartaglin (IE_SW_G_073) groundwater body connected to the site, (0.0005 mg/l). This modelled increase does not exceed 5% of the High / Good indicative quality boundary. Therefore, there is no risk of deterioration in the indicative quality of the groundwater body, or of preventing the achievement of WFD objectives. In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Scart Reservoir, 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.

6.1.8.10 (3110) Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae), (3130) Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea

These lake habitats are considered likely to occur in most lakes in the SAC, notably in upland corrie lakes and lowland lakes such as Currane, Muckross, Guitane and Derriana. It may also co-occur with lake habitat in lakes/ponds in blanket bog. In line with Article 17 reporting (NPWS, 2013), all lakes larger than 1ha were mapped as potential habitats. It is likely, however, that the habitat also occurs in many of the smaller lakes and ponds in the SAC. Specific targets have yet to be established for lake habitat but is usually associated with very clear water. The OECD fixed boundary system set transparency targets for oligotrophic lakes of ≥6m annual mean Secchi disk depth, and ≥3m annual minimum Secchi disk depth. As a nutrient-poor habitat, oligotrophic and WFD 'high' status targets apply. Where a lake has nutrient concentrations that are lower than these targets, there should be no decline within class, i.e. no upward trend in nutrient concentrations. As for nutrients, the targets are WFD ‘High Status’.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The coastal water body hydrologically connected to the SAC is: Southwestern Atlantic Seaboard (HA 23) (IE_SH_010_0000);
- The groundwater body hydrogeologically connected to the SAC is the Scartaglin (IE_SW_G_073);
- No river, transitional or lake water bodies are hydrologically connected to the SAC.

The modelled increase in orthophosphate concentration in the coastal water body, which is hydrologically connected to the site, Southwestern Atlantic Seaboard (HA 23) (IE_SH_010_0000), is undetectable (0.0000 mg/l). Therefore, there is no risk of deterioration in the indicative quality or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the Scartaglin (IE_SW_G_073) groundwater body connected to the site, (0.0005 mg/l). This modelled increase does not exceed 5% of the High / Good indicative quality boundary. Therefore, there is no risk of deterioration in the indicative quality of the groundwater body, or of preventing the achievement of WFD objectives.

In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Scart Reservoir, 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.

6.1.9 Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA 004161

Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA, is a large site located at the border between Cork, Kerry and Limerick, comprising a number of peaks and mountainous areas which support a variety of upland habitats (NPWS 2015[72]). Almost half of the SPA is forested, with commercial conifer forestry plantations, with substantial areas of rotational clear fell supported. Approximately 28% of the site is comprised of blanket bog and wet and dry heath with the remainder of the site comprising rough grassland which is used for hill farming which varies in its composition. The site is an SPA under the E.U. Birds Directive, of special conservation interest for hen harrier (*Circus cyaneus*). This SPA is described (NPWS 2015[72]) as supporting the highest concentration of hen harrier in Ireland, with 45 pairs recorded to be breeding within the site in 2005.

The single SCI is considered to be water-dependent and nutrient sensitive. There are no SSCOs for this SPA (NPWS, 2018[73]) however, there is an overall objective to maintain or restore the favourable conservation condition of the bird species listed as SCIs for this SPA.

In relation to protected water-dependent habitats and species under the Birds and Habitats Directive, the river basin management planning process contributes towards achieving water conditions that support Favourable Conservation Status. In preparing the RBMP (2018-2021) (DHPLG, 2018[74]) 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.

[72] NPWS 2015 Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA 004161 Site Synopsis
[73] NPWS 2018 Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA 004161 Conservation Objectives
[74] DHPLG (2018) The River Basin Management Plan for Ireland (2018-2021). Available at: https://www.housing.gov.ie/sites/default/files/publications/files/rbmp_report_english_web_version_final_0.pdf

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies include: Brick_010 (IE_SH_23B030300), Brick_030 (IE_SH_23B030500), Big River (Tralee)_010 (IE_SH_23B040150), Mountcoal_010 (IE_SH_23M440980), Lee (Tralee)_010 (IE_SH_23L010030) and Maine_030 (IE_SW_22M010500); and
- The groundwater bodies hydrogeologically connected to the site are: Abbeyfeale (IE_SH_G_001), Spa (IE_SH_G_223) and Scartaglin (IE_SW_G_073).

The boundary of the SPA slightly overlaps with the boundary of the WSZ. However, the SPA lies upstream (and upgradient) of many of the streams that connect it to the WSZ. Where the SAC intersects Big River (Tralee)_010 and Lee (Tralee)_010 it is located upstream of the WSZ but the EAM modelling results have been discussed owing to the close proximity the WSZ is to the SAC and flooding potential (<100m).

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

The modelled increase in orthophosphate concentration in the river water bodies are as follows: Brick_010 (IE_SH_23B030300) (0.0008 mg/l), Brick_030 (IE_SH_23B030500) (0.0011 mg/l), Big River (Tralee)_010 (IE_SH_23B040150) (0.0023 mg/l), Mountcoal_010 (IE_SH_23M440980) (0.0000 mg/l), Lee (Tralee)_010 (IE_SH_23L010030) (0.0006 mg/l) and Maine_030 (IE_SW_22M010500) (0.0005 mg/l). With the exception of the Big River (Tralee)_010 the remaining water bodies are within 5% of the High / Good indicative quality boundary (i.e. <0.00125mg/l) Therefore, there is no risk of deterioration in the indicative quality of these water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

Big River (Tralee)_010 (IE_SH_23B040150) has a modelled additional increase in concentration that exceeds 5% of the High / Good indicative quality boundary (>0.00125 mg/l). However, this does not cause the post-dosing baseline to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the indicative quality of the water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

In addition, the Big River (Tralee)_010 river is located upstream of the WSZ and where it comes into close proximity to the SPA there is potential for floodwater to transport nutrients, however some of this habitat is not considered optimal for Hen Harrier (lawn, rural housing, improved grassland) and would not impact upon prey species for Hen Harriers (small birds and mammals)

For the Brick river_030 the upper reaches intersect the periphery of the SPA and are located within the WSZ. Habitats surrounding this river could be potentially utilised by Hen Harrier and there is potential for floodwater to transport nutrients. However as noted above there is no risk of deterioration of orthoP indicative quality or risk to the achievement of WFD objectives for this water body. Following the EAM model it is considered unlikely for a flood event to transport significant enough nutrients overland as to impact upon critical feeding resources for Hen Harrier.

The modelled increases in orthophosphate concentration in the groundwater bodies are as follows: Abbeyfeale (IE_SH_G_001) (0.0000 mg/l), Spa (IE_SH_G_223) (0.0002 mg/l) and Scartaglin (IE_SW_G_073) (0.0005 mg/l). As these concentrations do not exceed 5% of the Good / Fail indicative quality boundary (i.e. < 0.00175 mg/l), there is no risk of deterioration in the indicative quality of the groundwater bodies, or of preventing the achievement of WFD objectives.

In light of the EAM assessment, which evaluates the additional orthophosphate loading from dosing at Scart Reservoir, it has been demonstrated that the potential for likely significant effects on this site can be excluded. Furthermore, dosing will not prevent the maintenance or restoration of favourable conservation status of its SCI, either in terms of individual bird species or its associated habitats.

6.1.10 Tralee Bay Complex SPA 004058

The Tralee Bay Complex SPA is located along the coast of north Co. Kerry between Ballyheige in the north, Tralee town in the east and Stradbally in the west, the site includes the inner part of Tralee Bay in addition to a large number of inlets, islands and intertidal habitats within is vicinity (NPWS 2015[75]). Inner Tralee Bay is afforded shelter by Derrymore Island and as such supports a range of intertidal habitats which are not overly affected by wave action including mudflats, sandflats and saltmarsh. The site is an SPA under the E.U. Birds Directive, of special conservation interest for the following species: whooper swan, light-bellied brent goose, shelduck, wigeon, teal, mallard, pintail, scaup, oystercatcher, ringed plover, golden plover, grey plover, lapwing, sanderling, dunlin, black-tailed godwit, bar-tailed godwit, curlew, redshank, turnstone, black-headed gull and common gull. The 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.

All 23 SCI's are considered water-dependent and nutrient sensitive. SSCOs are published for this SPA (NPWS, 2014[76]) however, these generally relate to the maintenance or restoration the favourable conservation condition of the bird species listed as SCIs for this SPA, as defined by their abundance and distribution within or use of the SPA. Where wetland habitats are concerned the SSCO simply relates to the need for maintained area of the habitats themselves. As such no nutrient specific conservation objectives are listed.

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[77]) 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.

[75] NPWS 2015 Tralee Bay Complex SPA 004188 Site Synopsis
[76] NPWS 2014 Tralee Bay Complex SPA 004188 Conservation Objectives
[77] DHPLG (2018) The River Basin Management Plan for Ireland (2018-2021). Available at: https://www.housing.gov.ie/sites/default/files/publications/files/rbmp_report_english_web_version_final_0.pdf

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Tralee Bay Complex SPA and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the SPA include: Pinure_010 (IE_SH_23P160880), Ardfert_Oughter_010 (IE_SH_23A190800), Ballynoe_010 (IE_SH_23B910900), Tyshe_010 (IE_SH_23T020400), Tyshe_020 (IE_SH_23T020500), Lee (Tralee)_010 (IE_SH_23L010030), Lee (Tralee)_020 (IE_SH_23L010050), Lee (Tralee)_030 (IE_SH_23L010100), Lee (Tralee)_040 (IE_SH_23L010200), Big River (Tralee)_010 (IE_SH_23B040150), Annagh (Kerry)_010 (IE_SH_23A060890) and Carrigaha_010 (IE_SH_23C190920);
- The transitional water body hydrologically connected to the SPA is: Lee K Estuary (IE_SH_050_0100);
- The coastal water bodies hydrologically connected to the SPA are: Inner Tralee Bay (IE_SH_050_0000) and Outer Tralee Bay (IE_SH_040_0000);
- The groundwater bodies hydrogeologically connected to the site are: Tralee (IE_SH_G_226), Spa (IE_SH_G_223), Brandon Head (IE_SH_G_044), Dingle (IE_SW_G_033), Ardfert (IE_SH_G_008) and Kerry Head (IE_SH_G_118).

The habitats on which these species rely are located downstream of the WSZs, associated with CWBs, TWBs and RWBs into which all river and transitional water bodies connected to the WSZs discharge (as listed at **Table 5-3**).

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

The modelled increase in orthophosphate concentration in the river water bodies are as follows: Pinure_010 (IE_SH_23P160880) (0.0007 mg/l), Ardfert_Oughter_010 (IE_SH_23A190800) (0.0008 mg/l), Ballynoe_010 (IE_SH_23B910900) (0.0006mg/l), Tyshe_010 (IE_SH_23T020400) (0.0010 mg/l), Tyshe_020 (IE_SH_23T020500) (0.0012 mg/l), Lee (Tralee)_010 (IE_SH_23L010030) (0.0006 mg/l), Lee (Tralee)_020 (IE_SH_23L010050) (0.0006 mg/l), Lee (Tralee)_030 (IE_SH_23L010100) (0.0007 mg/l), Lee (Tralee)_040 (IE_SH_23L010200) (0.0010mg/l), Big River (Tralee)_010 (IE_SH_23B040150) (0.0023mg/l), Annagh 23_010 (IE_SH_23A060890) (0.0003 mg/l) and Carrigaha_010 (IE_SH_23C190920) (0.0002 mg/l).

With the exception Big River (Tralee)_010 the remaining water bodies have a modelled additional concentration within exceed 5% of the High / Good indicative quality boundary (i.e. <0.00125mg/l). Therefore, there is no risk of deterioration in the indicative quality of the water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The modelled post-dosing additional increase in concentration for Big River (Tralee)_010 (IE_SH_23B040150) is 0.0023 mg/l. This modelled additional increase exceeds 5% of the High / Good indicative quality boundary; however, does not cause the post-dosing baseline concentrations to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the current indicative quality ((Poor) due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The Tyshe_020 (IE_SH_23T020500) is just below the 5% boundary at 0.0012mg/l. The Tyshe_020 (IE_SH_23T020500) was impacted by the Ardfert WWTP until an upgrade in 2018. The orthophosphate levels in the river have since improved to Poor indicative quality, but recent monitoring suggests a degradation back to Bad indicative quality in one of the monitoring points. The Operational monitoring point downstream of the Ardfert agglomeration (RS23T020500: Bridge near Banna House) and has a Q Value of 3, indicative of Poor status. As the increase in concentration due to orthophosphate dosing is below significant levels, dosing will not result in any further impact on the structure and functioning of aquatic ecosystems in this water bodies and will not result in any further deterioration in the contributing elements to ecological status.

The Big River (Tralee)_010 is located upstream of the SPA, it flows through the urbanised centre of Tralee Town it then discharges to the Lee (Tralee)_040. Only the lower section of the Lee (Tralee)_040 is located within the SPA. From aerial imagery it the lower section of the Lee (Tralee)_040 is tidal influenced with areas of exposed mudflat. This habitat would offer feeding opportunities to the bird species designated within the SPA. There are no nutrient specific targets for the mudflats and estuaries designated within the Tralee Bay and Magharees Peninsula, West to Cloghane SAC which overlaps this SPA. Potential impacts to these habitats have been discussed and excluded above. As the EAM has modelled that there is no risk of deterioration in the current High surrogate indicative quality of the Lee (Tralee)_040 or of preventing the achievement of WFD, it has been determined that indirect impact to the bird species via changes to their habitat can be excluded.

The modelled increase in orthophosphate concentration in the transitional water body, which is hydrologically connected to the site, Lee K Estuary (IE_SH_050_0100), is 0.0004 mg/l. This increase does not exceed 5% of the High / Good indicative quality boundary. Therefore, there is no risk of deterioration in the indicative quality or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increases in orthophosphate concentrations in the coastal water bodies which are hydrologically connected to the site are as follows: Inner Tralee Bay (IE_SH_050_0000) (0.0000 mg/l) and Outer Tralee Bay (IE_SH_040_0000) (0.0000 mg/l). The modelled increases do not exceed 5% of the High / Good indicative quality boundary (<0.00125 mg/l). Therefore, there is no risk of deterioration in the indicative quality or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase for all groundwater bodies do not exceed 5% of the Good / Fail indicative quality boundary or cause the post-dosing baseline concentration to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the Good ortho P indicative status of the groundwater bodies.

In light of the EAM assessment, which evaluates the additional orthophosphate loading from dosing at Scart Reservoir, it has been demonstrated that the potential for likely significant effects on this site can be excluded. Furthermore, dosing will not prevent the maintenance or restoration of favourable conservation status of its SCIs, either in terms of individual bird species or the wetland habitats.

6.1.11 Magharee Islands SPA 004125

The Magharee Islands lie 2 km north of the Magharee's peninsula, on the north side of the Dingle peninsula Co. Kerry (NPWS 2014[78]). The SPA includes the main Magharee Islands ("Seven Hogs"), the islands of Mucklaghmore and Illaunnabarnagh to the east, Illaunnanoon and Doonagaun Island to the south and several smaller rocky islets. Illaunimmill and Illauntannig are the largest of the islands included in the site. The majority of the islands are exposed to the Atlantic on the western coasts and are comprised of carboniferous limestone with the larger islands supporting a covering of glacial boulder clay. The site is an SPA under the E.U. Birds Directive, of special conservation interest for the following species: barnacle goose, storm petrel, shag, common gull, common tern, arctic tern and little tern.

All seven SCI's are considered water-dependent and nutrient sensitive. No SSCOs are published for this SPA (NPWS, 2018[79]) however generic conservation objectives relate to the maintenance or restoration the favourable conservation condition of the bird species listed as SCIs for this SPA, as defined by their abundance and distribution within the SPA.

In relation to protected water-dependent habitats and species under the Birds and Habitats Directive, the river basin management planning process contributes towards achieving water conditions that support Favourable Conservation Status. In preparing the RBMP (2018-2021) (DHPLG, 2018[80]) 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.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Magharee Islands SPA and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies hydrologically connected to the SAC include: Pinure_010 (IE_SH_23P160880), Lee (Tralee)_010 (IE_SH_23L010030), Lee (Tralee)_020 (IE_SH_23L010050), Lee (Tralee)_030 (IE_SH_23L010100), Lee (Tralee)_040 (IE_SH_23L010200), Big River (Tralee)_010 (IE_SH_23B040150), Annagh _010 (IE_SH_23A060890), Knockglass_Beg_010 (IE_SH_23K130870), Finglas (Tralee Bay)_010 (IE_SH_23F030400), Carrigaha_010 (IE_SH_23C190920) and Derryquay River_010 (IE_SH_23D420880), Ballynoe_010 (IE_SH_23B910900), Ardfert_Oughter_010 (IE_SH_23A190800), Tyshe_010 (IE_SH_23T020400) and Tyshe_020 (IE_SH_23T020500);
- The transitional water body hydrologically connected to the SAC is: Lee K Estuary (IE_SH_050_0100);
- The coastal water bodies hydrologically connected to the SAC are: Inner Tralee Bay (IE_SH_050_0000), Outer Tralee Bay (IE_SH_040_0000) and Southwestern Atlantic Seaboard (HA:27) (IE_SH_010_0000); and

[78] NPWS 2014 Magharee Islands SPA 004125 Site Synopsis
[79] NPWS 2018 Magharee Islands SPA 004125 Conservation Objectives
[80] 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

- The groundwater bodies hydrogeologically connected to the SAC are: Tralee (IE_SH_G_226), Spa (IE_SH_G_223), Brandon Head (IE_SH_G_044), Dingle (IE_SW_G_033) and Ardfert (IE_SH_G_008) and

This habitat is located downstream of the WSZs, associated with CWBs into which all river, lake and transitional water bodies connected to the WSZs discharge (as listed at **Table 5-3**).

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

The modelled increase in orthophosphate concentration in the river water bodies are as follows: Pinure_010 (IE_SH_23P160880) (0.0007 mg/l), Lee (Tralee)_010 (IE_SH_23L010030) (0.0006 mg/l), Lee (Tralee)_020 (IE_SH_23L010050) (0.0006 mg/l), Lee (Tralee)_030 (IE_SH_23L010100) (0.0007 mg/l), Lee (Tralee)_040 (IE_SH_23L010200) (0.0010mg/l), Ballynoe_010 (IE_SH_23B910900) (0.0006mg/l), Annagh 23_010 (IE_SH_23A060890) (0.0003 mg/l), Knockglass_Beg_010 (IE_SH_23K130870) (0.0002 mg/l), Finglas (Tralee Bay)_010 (IE_SH_23F030400) (0.0002 mg/l), Carrigaha_010 (IE_SH_23C190920) (0.0002 mg/l), Derryquay River_010 (IE_SH_23D420880) (0.0002 mg/l), Ardfert_Oughter_010 (IE_SH_23A190800) (0.0008 mg/l), Tyshe_010 (IE_SH_23T020400) (0.0010 mg/l) and Tyshe_020 (IE_SH_23T020500) (0.0012 mg/l). These modelled increases do not exceed 5% of the High / Good indicative quality boundary (<0.00125 mg/l) Therefore, there is no risk of deterioration in the current indicative quality of these water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The modelled post-dosing additional increase in concentration for Big River (Tralee)_010 (IE_SH_23B040150) is 0.0023 mg/l. This modelled additional increase exceeds 5% of the High / Good indicative quality boundary; however, does not cause the post-dosing baseline concentrations to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the current indicative quality ((Poor) due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The Tyshe_020 (IE_SH_23T020500) is just below the 5% boundary at 0.0012mg/l. The Tyshe_020 (IE_SH_23T020500) was impacted by the Ardfert WWTP until an upgrade in 2018. The orthophosphate levels in the river have since improved to Poor indicative quality, but recent monitoring suggests a degradation back to Bad indicative quality in one of the monitoring points. The Operational monitoring point downstream of the Ardfert agglomeration (RS23T020500: Bridge near Banna House) and has a Q Value of 3, indicative of Poor status. As the increase in concentration due to orthophosphate dosing is below significant levels, dosing will not result in any further impact on the structure and functioning of aquatic ecosystems in this water bodies and will not result in any further deterioration in the contributing elements to ecological status.

Magharee Islands SPA is located within Inner Tralee Bay and South Wester Atlantic Seaboard. All of the river water bodies discussed above are not directly connected to the SPA but discharge to coastal and transitional waterbodies. The modelled additional concentrations to these are discussed below.

The modelled increase in orthophosphate concentration in the transitional water body, Lee K Estuary (IE_SH_050_0100), is 0.0004 mg/l. This increase does not exceed 5% of the High / Good indicative quality boundary. Therefore, there is no risk of deterioration in the indicative quality or of preventing

the achievement of WFD objectives due to dosing at Scart Reservoir. Lee K estuary is not directly connected to the SPA but discharges to Inner and then Outer Tralee Bay.

The modelled increase for all groundwater bodies do not exceed 5% of the Good / Fail indicative quality boundary or cause the post-dosing baseline concentration to exceed 75% of the indicative quality upper threshold. Therefore, there is no risk of deterioration in the Good ortho P indicative status of the groundwater bodies.

The modelled increases in orthophosphate concentration in the coastal water bodies which are hydrologically connected to the site are as follows: Inner Tralee Bay (IE_SH_050_0000) (0.0000 mg/l), Outer Tralee Bay (IE_SH_040_0000) (0.0000 mg/l) and Southwestern Atlantic Seaboard (HA23) (IE_SH_010_0000) (undetectable, i.e. 0.0000 mg/l). The modelled increases do not exceed 5% of the High / Good indicative quality boundary. Therefore, there is no risk of deterioration in the indicative quality of the water bodies or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir. Given the insignificant orthoP concentrations modelled for Outer Tralee Bay and undetectable (0.0000mg/l) concentrations within the South Western Atlantic Seaboards it is considered dosing will not impact upon the bird species and habitats within the SPA.

In light of the EAM assessment, which evaluates the additional orthophosphate loading from dosing at Scart Reservoir, it has been demonstrated that the potential for likely significant effects on this site can be excluded. Furthermore, dosing will not prevent the maintenance or restoration of favourable conservation status of its SCIs, either in terms of individual bird species or the wetland habitats on which they rely.

6.1.12 Killarney National Park SPA 004038

Killarney National Park is a large inland SPA bordering Killarney town to the southeast and is approximately 9km northwest of the Outer Kenmare coastal water body. It comprises a large part of the Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC, stretching from Lough Leane at its most northern point to Lough Glas at its most southern point. It consists of several lakes including; Muckross, Long Range, Upper KY, Devils Punchbowl and Looscaunagh, many of which are high quality oligotrophic systems. The average width of the SPA extends up to c. 9km at its outer limits. Killarney National Park is perhaps best known for its Oak woodlands. They form the most extensive area of native woodland remaining in Ireland and include Derrycunihy Wood, described as perhaps the most natural Sessile Oak wood in the country. The higher areas of the site are dominated by blanket bog and wet heath. At the time this site was designated as a Special Protection Area (SPA) it was being utilised by Greenland White-fronted Goose. This, along with the nearby Eirk Bog, is the most southerly site in Ireland utilised by this species and it is also one of the few flocks that continues to utilise peatland habitats. The site continues to be used by Greenland White-fronted Goose in small numbers (<20 birds). While Killarney National Park has not been subject to a complete upland breeding bird survey the habitat within the site it is also estimated to support up to 5 pairs of Merlin. Lough Leane, and to a lesser extent the other lakes, support a variety of wintering waterfowl species.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Killarney National Park and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The groundwater body hydrogeologically connected to the site is: Scartaglin (IE_SW_G_073).

Both SCI's are considered water-dependent and nutrient sensitive. No SSCOs are published for this SPA (NPWS, 2018[81]) however generic conservation objectives relate to the maintenance or restoration the favourable conservation condition of the bird species listed as SCIs for this SPA, as defined by their abundance and distribution within the SPA.

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

The modelled increase in orthophosphate concentration in the Scartaglin (IE_SW_G_073) groundwater body connected to the site, (0.0005 mg/l). This modelled increase does not exceed 5% of the High / Good indicative quality boundary. Therefore, there is no risk of deterioration in the indicative quality of the groundwater body, or of preventing the achievement of WFD objectives.

In light of the EAM assessment, which evaluates the additional orthophosphate loading from dosing at Scart Reservoir, it has been demonstrated that the potential for likely significant effects on this site can be excluded. Furthermore, dosing will not prevent the maintenance or restoration of favourable conservation status of its SCIs, either in terms of individual bird species or the wetland habitats on which they rely.

6.1.13 Castlemaine Harbour SPA 004029

Castlemaine Harbour is a large coastal SPA, comprising the majority of the innermost part of Dingle Bay. It extends from the lower tidal reaches of the River Maine and River Laune to west of the Inch and Rosbehy peninsulas (c. 16 km from east to west) (NPWS 2014[82]). The average width of the estuary is 4-5 km though it is c. 11 km wide at the outer limit. The site comprises the estuaries of the River Maine and the River Laune, both substantial rivers, and has extensive areas of intertidal sand and mud flats. The site is an SPA under the E.U. Birds Directive, of special conservation interest for the following species: Red-throated diver, cormorant, light-bellied brent goose, wigeon, mallard, pintail, scaup, common scoter, oystercatcher, ringed plover, sanderling, bar-tailed godwit, redshank, greenshank, turnstone, chough and wetland and waterbirds.

All 17 SCI's are considered water-dependent and nutrient sensitive. SSCOs are published for this SPA (NPWS, 2011[83]), shared with the overlapping Castlemaine Harbour SAC (discussed above), however these relate to the maintenance or restoration the favourable conservation condition of the bird species listed as SCIs for this SPA, as defined by their abundance and distribution within the SPA, with habitats themselves covered in respect of the SAC. Where wetland habitats are concerned the SSCO simply relates to the need for maintained area of the habitats themselves. As such no nutrient specific conservation objectives are listed.

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[84]) the risk

[81] NPWS 2018 Magharee Islands SPA 004125 Conservation Objectives
[82] NPWS 2014 Castlemaine Harbour SPA 004029 Site Synopsis
[83] NPWS 2011 Castlemaine Harbour SPA 004029 Conservation Objectives
[84] 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

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.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Castlemaine Harbour SPA and will receive inputs from the proposed orthophosphate dosing at Scart Reservoir:

- The river water bodies that are hydrologically connected to the site include: Little Maine_010 (IE_SW_22L020500), Little Maine_020 (IE_SW_22L021000), Maine_030 (IE_SW_22M010500), Maine_040 (IE_SW_22M010700), Maine_050 (IE_SW_22M010800) , Kealbrogeen stream (Laune)_010 (IE_SW_22K040500), Laune_040 (IE_SW_22L010400), Groin_010 (IE_SW_22G080300), Shanakeal_010 (IE_SW_22S130900), Dogue_010 (IE_SW_22D030400), Fahaduff_010 (IE_SW_22F090400), Gweestin_010 (IE_SW_22G060300), Gweestin_020 (IE_SW_22G060600) and Gweestin_030 (IE_SW_22G060900);
- The transitional water body hydrologically connected to the SPA is: Castlemaine Harbour (IE_SW_230_0200);
- The groundwater bodies connected to the site are: Castlemaine (IE_SW_G_026), Dingle (IE_SW_G_033).

The habitats on which these species rely are located downstream of the WSZs, associated with CWBs, TWBs and RWBs into which all river and transitional water bodies connected to the WSZs discharge (as listed at **Table 5-3**).

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

The modelled increases in orthophosphate concentration in the river water bodies are as follows: Little Maine_010 (IE_SW_22L020500) (0.0002 mg/l), Little Maine_020 (IE_SW_22L021000) (0.0004 mg/l), Maine_030 (IE_SW_22M010500) (0.0005 mg/l), Maine_040 (IE_SW_22M010700) (0.0005 mg/l), Maine_050 (IE_SW_22M010800) (0.0008 mg/l), Kealbrogeen stream (Laune)_010 (IE_SW_22K040500) (0.0002mg/l), Laune_040 (IE_SW_22L010400) (0.0001mg/l), Groin_010 (IE_SW_22G080300) (0.0001 mg/l), Shanakeal_010 (IE_SW_22S130900) (0.0004 mg/l), Dogue_010 (IE_SW_22D030400) (0.0002 mg/l), Fahaduff_010 (IE_SW_22F090400) (0.0004 mg/l), Gweestin_010 (IE_SW_22G060300) (0.0007 mg/l), Gweestin_020 (IE_SW_22G060600) (0.0008 mg/l) and Gweestin_030 (IE_SW_22G060900) (0.0008 mg/l). The modelled increases in concentration do not exceed 5% of the High / Good indicative quality boundary. Therefore, there is no risk of deterioration in the indicative quality of the water bodies due to dosing at Scart Reservoir (**Appendix C**), or of preventing the achievement of WFD objectives.

The modelled increase in orthophosphate concentration in the transitional water body, which is hydrologically connected to the site, Castlemaine Harbour (IE_SW_230_0200), is 0.0000 mg/l. Therefore, there is no risk of deterioration in the indicative quality of the water body or of preventing the achievement of WFD objectives due to dosing at Scart Reservoir.

The modelled increase in orthophosphate concentration in the groundwater bodies connected to the site, Castlemaine (IE_SW_G_026) and Dingle (IE_SW_G_033), is 0.0012mg/l and 0.0002 mg/l respectively. Therefore, there is no risk of deterioration in the indicative quality of the groundwater body, or of preventing the achievement of WFD objectives.

In light of the EAM assessment, which evaluates the additional orthophosphate loading from dosing at Scart Reservoir, it has been demonstrated that the potential for likely significant effects on this site can be excluded. Furthermore, dosing will not prevent the maintenance or restoration of favourable conservation status of its SCIs, either in terms of individual bird species or the wetland habitats on which they rely.

6.2 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 effects, the following steps were completed:

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

A search of Kerry County Council's planning enquiry system was conducted for developments that may have in-combination effects on European Sites with the ZoI. Plans and projects relevant to the area were searched in order to identify any elements of the plans and projects that may act cumulatively or in-combination with the proposed development.

Based on this search and the Project Teams knowledge of the study area a list of those projects and plans which may potentially contribute to cumulative or in-combination effects with the proposed project was generated as listed in **Table 6-1** below.

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

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects
Kerry County Development Plan 2015-2021[85] The plan outlines under Chapter 7: Water Services , the following objectives: a) WS-1: Support the sustainable provision of an adequate level of water services infrastructure throughout the County to meet domestic, commercial, industrial and other needs, having regard to the Core Strategy and Settlement Strategy of this Plan, Irish Water's [Uisce Éireann's]Proposed Capital Investment Plan 2014-2016 and Table 7.2 in Section 7.1 b) WS-2: Prioritise the sustainable provision of infrastructure having regard to the potential for pollution from wastewater discharges, sensitivity of receiving waters and the settlement strategy of this Plan. c) WS-3: Support the sustainable provision of a safe and secure water supply in the County. d) WS-4: Work in partnership with Irish Water [Uisce Éireann] for the provision and operation of public water services infrastructure. e) WS-5: Work in partnership with communities and individuals for the provision and operation of private/group water services infrastructure. f) WS-8: Require that the following be complied with in regard to the lakes being used as drinking water sources and/or vulnerable to elevated nutrient levels: a. Prohibit all new discharges of wastewater effluent to groundwater (via percolation areas, polishing filters etc.) from on-site wastewater treatment systems within 200m of the lakeshore. b. Assess any proposed development that has the potential to discharge to a watercourse which drains into any of the lakes in terms of its potential impact on the lake. c. Assess all forestry proposals within each lake catchment in terms of potential impact on water quality of the lake. d. Prohibit any development which would have an adverse impact on the water quality in these lakes. WS-9: All areas within 1km of a public drinking water source will be regarded as nutrient sensitive areas and the effluent from any onsite waste water treatment system proposed within these areas must comply with the EPA Code of Practice.	▪ N/A	The County Development Plan emphasis the objectives for water services in the county which include the enhancement and improved quality of the service to its consumers. The plan also outlines the importance of compliance with the South Western River Basin Management Plan (now replaced by the RBMP 2018-2021), and the Shannon International River Basin Management Plan, emphasising compliance with environmental objectives. There is no potential for cumulative impacts with these plans.

[85] http://cdp.kerrycoco.ie/wordpress/wp-content/uploads/2015/12/chptr_7.pdf

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects
River Basin Management Plan For Ireland 2018 – 2021 Public Consultation on the River Basin Management Plan (RBMP) for Ireland (2018 – 2021), began in February 2017. The document (Chapter 4) sets out the condition of waters in Ireland and a summary of status for all monitored waters in the 2013 – 2015 period, including a description of the changes since 2007 – 2009. Nationally, both monitored river water bodies and lakes at high or good ecological status, appear to have declined by 3% since 2007 – 2009; nevertheless, this figure does not reflect a significant number of improvements and dis-improvements across these waters since 2009. Provisional figures from the EPA suggest that approximately 900 river water bodies and lakes have either improved or dis-improved. In addition, the previously observed long term trend of decline in the number of high status river sites has continued. Chapter 5 of the RBMP presents results of the catchment characterisation process, which identifies the significant pressures on each 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 2021. This work was presented in the RBMP for 81% of water bodies nationally, which had been characterised at the time. 1,517 water bodies were classed *At Risk* out of a total of 4,775, or 32%. An assessment of significant environmental pressures found that agriculture was the most significant pressure in 729 river and lake water bodies that are *At Risk*. Urban wastewater, hydromorphology and forestry were also significant pressures amongst others.	▪ N/A	The objectives of the RBMP are to • Prevent deterioration; • Restore good status; • Reduce chemical pollution; and • Achieve water related protected areas objectives The implementation of the RBMP seeks compliance with the environmental objectives set under the plan, which will be documented for each water body. This includes compliance with the European Communities (Surface Waters) Regulations S.I. No. 272 of 2009 (as amended). The implementation of this Draft RBMP will have a positive impact on biodiversity and the Project will not affect the achievement of the RBMP objectives.
Catchment based Flood Risk Assessment and Management (CFRAM) Programme, under the Floods Directive The Office of Public Works (OPW) is responsible for the implementation of the Floods Directive 2007/60/EC which is being carried out through a Catchment based Flood Risk Assessment and Management (CFRAM) Programme. As part of the directive Ireland is required to undertake a Preliminary Flood Risk Assessment, to identify areas of existing or potentially significant future flood risk and to prepare flood hazard and risk maps for these areas. Following this, flood risk management plans are developed for these areas setting objectives for managing the flood risk and setting out a prioritised set of measures to achieve the objectives. The CFRAM programme is currently being rolled out and Draft Flood Risk Management Plans have been prepared. These plans have been subject AA.	▪ Habitat loss or destruction; ▪ Habitat fragmentation or degradation; ▪ Alterations to water quality and/or water movement; ▪ Disturbance; ▪ 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

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects
		how they might affect hydrological connectivity and hydromorphological supporting conditions for protected habitats and species. There is no potential for cumulative impacts with the CFRAMS programme as no infrastructure is proposed as part of this project.
Foodwise 2025 Foodwise 2025 strategy identifies significant growth opportunities across all subsectors of the Irish agri-food industry. Growth Projection includes increasing the value added in the agri-food, fisheries and wood products sector by 70% to in excess of €13 billion.	▪ Land use change or intensification; ▪ Water pollution; ▪ Nitrogen deposition; ▪ Disturbance to habitats / species.	Foodwise 2025 was subject to its own AA[86]. 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	▪ Overgrazing; ▪ Land use change or ▪ intensification; ▪ Water pollution; ▪ Nitrogen deposition; ▪ Disturbance to habitats / species.	The RDP for 2014 – 2020 has been subject to SEA[87], and AA[88]. 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,

[86] http://www.agriculture.gov.ie/media/migration/foodindustrydevelopmenttrademarkets/agri-foodandtheeconomy/foodwise2025/environmentalanalysis/AgriFoodStrategy2025NISDRAFT300615.pdf
[87] https://www.agriculture.gov.ie/media/migration/ruralenvironment/ruraldevelopment/ruraldevelopmentprogramme2014-2020/StrategEnvironmAssessSumState090615.pdf
[88] 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
Targeted Agriculture Modernisation Scheme (TAMS). They provide the role of a supportive measure to improve water quality and thus provide direct benefits in achieving the measures within the RBMP. The achievement of the objectives outlined within GLAS, to improve water quality, mitigate against climate change and promote biodiversity will be of direct positive benefit in achieving the measures within the RBMP and the goals of the Natura Directives. The scheme has an expected participation for 2014-2020 of 50,000 farmers which have to engage in specific training and tasks in order to receive full payment. Farmers within the scheme must have a nutrient management plan which is a strategy for maximising the return from on and off-farm chemical and organic fertilizer resources. This has a direct positive contribution towards protecting water bodies from pollution through limiting the amount of fertiliser that is placed on the land. The scheme prioritises farms in vulnerable catchments with 'high status' water bodies and also focuses on educating farmers on best practices to try and improve efficiency along with environmental outcomes. The TAMS scheme is open to all farmers and is focused on supporting productive investment for modernisation. This financial grant for farmers is focused on the pig and poultry sectors, dairy equipment and the storage of slurry and other farmyard manures. Within the TAMS scheme are two further schemes; the Animal Welfare, Safety and Nutrient Storage Scheme and the Low Emission Slurry Spreading Scheme. Both schemes are focused on productivity for farmers but have the ability to contribute towards a reduction in point and diffuse source pollution through improved nutrient management.		consultations with key stakeholders during detailed measure development, and site-based monitoring of the effects of RDP measures. With such measures in place, it was concluded that there would be no significant in-combination impacts on Natura 2000 sites.
National Nitrates Action Programme Ireland is obliged under the Nitrates Directive 91/676/EEC to prepare a National Nitrates Action Programme which is designed to prevent pollution of surface and ground waters from agricultural sources. This will directly contribute to the improvement of water quality and thus the objectives within the RBMP. Ireland's third Nitrates Action Programme came into operation in 2014 and has a timescale up to 2017. The Agricultural Catchments Programme is an ongoing programme that monitors the efficiency of various measures within the nitrate regulations. It is spread across six catchments and encompasses approximately 300 farmers.	▪ Land use change or intensification; ▪ Water pollution; ▪ Nitrogen deposition; ▪ Disturbance to habitats / species.	This programme has been subject to a Screening for Appropriate Assessment and it concluded that the NAP will not have a significant effect on the Natura 2000 network and a Stage 2 AA was not required[89]. It concluded that the NAP was an environmental programme which imposes environmental constraints on all agricultural systems in the state. It therefore benefits Natura 2000 sites and their species. In terms of in-combination effects, it stated that the Food Wise 2025

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

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects
		strategy would have to operate within the constraints of the NAP.
Forest Policy Review: Forests, Products and People – A Renewed Vision (2014) / Forestry Programme 2014 - 2020 Ireland's forestry sector is striving to increase forestry cover and one of the recommended policy actions in the Forest Policy Review: Forests, Products and People – A Renewed Vision (2014) is to increase the level of afforestation annually over time and support afforestation and mobilisation measures under the Forestry Programme 2014-2020. Two key objectives within the Forestry Programme 2014-2020 that will influence the RBMP are to increase Ireland's forest cover to 18% and to establish 10,000 ha of new forests and woodlands per annum. As part of this programme there are a number of schemes that promote sustainable forest management and they include the Afforestation Scheme, the Woodland Improvement Scheme, the Forest Road Scheme and the Native Woodland Conservation Scheme. Under the Native Woodland Conservation Scheme funding is provided to restore existing native woodland which promotes Ireland's native woodland resource and associated biodiversity. Native woodlands provide wider ecosystem functions and services which once restored can contribute to the protection and enhancement of water quality and aquatic habitats. New guidance and plans are also being developed to address forestry adjacent to 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[90]. 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 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	▪ 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.

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

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects
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 (in prep.) 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 will need to take 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 potential for in-combination impacts are unclear as the plan is not sufficiently developed at this stage.
Planning Applications There are a large number of planning applications approved, pending or recently approved within the Central Kerry - Scart Reservoir WSZs, particularly within the town is Tralee and surrounding villages. The applications are predominantly for the construction of new infrastructure or renovations to existing infrastructure. These include for housing, modifications to existing housing and commercial structures and commercial developments.	▪ Habitat loss and disturbance from new / upgraded infrastructure; ▪ Species disturbance; ▪ Changes to water quality or quantity;	Adherence to the overarching policies and objectives of the Kerry County Development Plan 2015-2021 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.

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects
	▪ Nutrient enrichment /eutrophication.	
Integrated Pollution Control (IPC) Licensing No Industrial Emission licences (IEL) and IPC licensed facilities are currently present within the Lissardboola WSZs. Under the Industrial Emissions Directive 2010/75/EU and Environmental Protection Agency Act, 1992 (as amended) industrial activities (e.g. pharmaceutical) are licensed by the EPA to prevent or reduce emissions to air, water and land, reduce water and use energy/resources efficiently. An IPC licence is a single integrated licence which covers all emissions from the facility and its environmental management. All related operations that the licence holder carries in connection with the activity are controlled by this licence.	▪ 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 Scart Reservoir, within the Central Regional Lough Guitane (H) 400F (1300PUB1016) 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 for the European Sites potentially affected by the proposed project, in order to provide a scientific basis for the evaluations.

During the operational phase the potential for direct, indirect and cumulative impacts affecting the Lower River Shannon SAC, Ballyseedy Wood SAC, Tralee Bay and Magharees Peninsula, West to Cloghane SAC, Slieve Mish Mountains SAC, Akeragh, Banna and Barrow Harbour SAC, Magharee Islands SAC, Castlemaine Harbour SAC, Killarney National Park, Macgillycuddy's Reeks And Caragh River Catchment SAC , Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA, Tralee Bay Complex SPA, Magharee Islands SPA, Castlemaine Harbour SPA and Killarney National Park SPA has been assessed.

Due to the low orthophosphate inputs following dosing at Scart Reservoir and no risk of deterioration in the orthophosphate indicative quality of receiving water bodies and therefore no risk to the achievement of WFD objectives there will be no significant direct, indirect or cumulative impacts that will result in likely significant effects to the qualifying interests/special conservation interests of the European Sites within the ZoI. This is concluded with regard to the range, population densities and overall conservation status of the habitats and species for which these sites are designated (i.e. Conservation Objectives).

The screening has been carried out on the basis of the information presented in the Project Description. It has been concluded that the project is 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 at the Scart Reservoir; individually or in combination with other plans or projects, will not have a significant effect on the 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
Lower River Shannon SAC (002165)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002165.pdf
Ballyseedy Wood SAC (002112)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002112.pdf
Tralee Bay and Magharees Peninsula, West to Cloghane SAC (002070)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002070.pdf
Slieve Mish Mountains SAC (002185)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002185.pdf
Akeragh, Banna and Barrow Harbour SAC (000332)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000332.pdf
Magharee Islands SAC (002261)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002261.pdf
Castlemaine Harbour SAC (000343)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000343.pdf
Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC (000365)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000365.pdf
Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004161.pdf
Tralee Bay Complex SPA (004058)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004058.pdf
Magharee Islands SPA (0041225)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004225.pdf
Castlemaine Harbour SPA (004029)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004029.pdf
Killarney National Park SPA (004038)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004038.pdf

APPENDIX B

Nutrient Sensitive Qualifying Interests

Water dependant and nutrient sensitive SAC species

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

Water dependant and nutrient sensitive SAC habitats

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

Code	Qualifying Interest	Water dependant	GWDTE	Nutrient sensitive
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
8310	Caves not open to the public	Yes	Yes	Yes
8330	Submerged or partially submerged sea caves	Yes		Yes
91A0	Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	No		Yes
91D0	Bog woodland	Yes	Yes	Yes
91E0	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)	Yes	Yes	Yes
91J0	Taxus baccata woods of the British Isles	No		No

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

Water dependant and nutrient sensitive SPA birds

Code	Species of special conservation interest	Water dependant	Nutrient sensitive
A001	Red-throated Diver (*Gavia stellata*)	Yes	Yes
A003	Great Northern Diver (*Gavia immer*)	Yes	Yes
A004	Little Grebe (*Tachybaptus ruficollis*)	Yes	Yes
A005	Great Crested Grebe (*Podiceps cristatus*)	Yes	Yes
A009	Fulmar (*Fulmarus glacialis*)	Yes	Yes
A013	Manx Shearwater (*Puffinus puffinus*)	Yes	Yes
A014	Storm Petrel (*Hydrobates pelagicus*)	Yes	Yes
A015	Leach's Storm-petrel (*Oceanodroma leucorhoa*)	Yes	Yes
A016	Gannet (*Morus bassanus*)	Yes	Yes
A017	Cormorant (*Phalacrocorax carbo*)	Yes	Yes
A018	Shag (*Phalacrocorax aristotelis*)	Yes	Yes
A048	Grey Heron (*Ardea cinerea*)	Yes	Yes
A047	Bewick's Swan (*Cygnus columbianus bewickii*)	Yes	Yes
A048	Whooper Swan (*Cygnus cygnus*)	Yes	Yes
A043	Greylag Goose (*Anser anser*)	Yes	Yes
A045	Barnacle Goose (*Branta leucopsis*)	Yes	Yes
A046	Light-bellied Brent Goose (*Branta bernicla hrota*)	Yes	Yes
A048	Shelduck (*Tadorna tadorna*)	Yes	Yes
A050	Wigeon (*Anas penelope*)	Yes	Yes
A051	Gadwall (*Anas strepera*)	Yes	Yes
A052	Teal (*Anas crecca*)	Yes	Yes
A053	Mallard (*Anas platyrhynchos*)	Yes	Yes
A054	Pintail (*Anas acuta*)	Yes	Yes
A056	Shoveler (*Anas clypeata*)	Yes	Yes
A059	Pochard (*Aythya ferina*)	Yes	Yes
A061	Tufted Duck (*Aythya fuligula*)	Yes	Yes
A062	Scaup (*Aythya marila*)	Yes	Yes
A063	Eider (*Somateria mollissima*)	Yes	Yes
A065	Common Scoter (*Melanitta n*igra)	Yes	Yes
A067	Goldeneye (*Bucephala clangula*)	Yes	Yes
A069	Red-breasted Merganser (*Mergus serrator*)	Yes	Yes
A082	Hen Harrier (*Circus cyaneus*)	Yes	Yes
A098	Merlin (*Falco columbarius*)	Yes	Yes
A103	Peregrine (*Falco peregrinus*)	Yes	Yes
A122	Corncrake (*Crex crex*)	Yes	Yes
A125	Coot (*Fulica atra*)	Yes	Yes
A130	Oystercatcher (*Haematopus ostralegus*)	Yes	Yes
A137	Ringed Plover (*Charadrius hiaticula*)	Yes	Yes
A140	Golden Plover (*Pluvialis apricaria*)	Yes	Yes
A141	Grey Plover (*Pluvialis squatarola*)	Yes	Yes

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

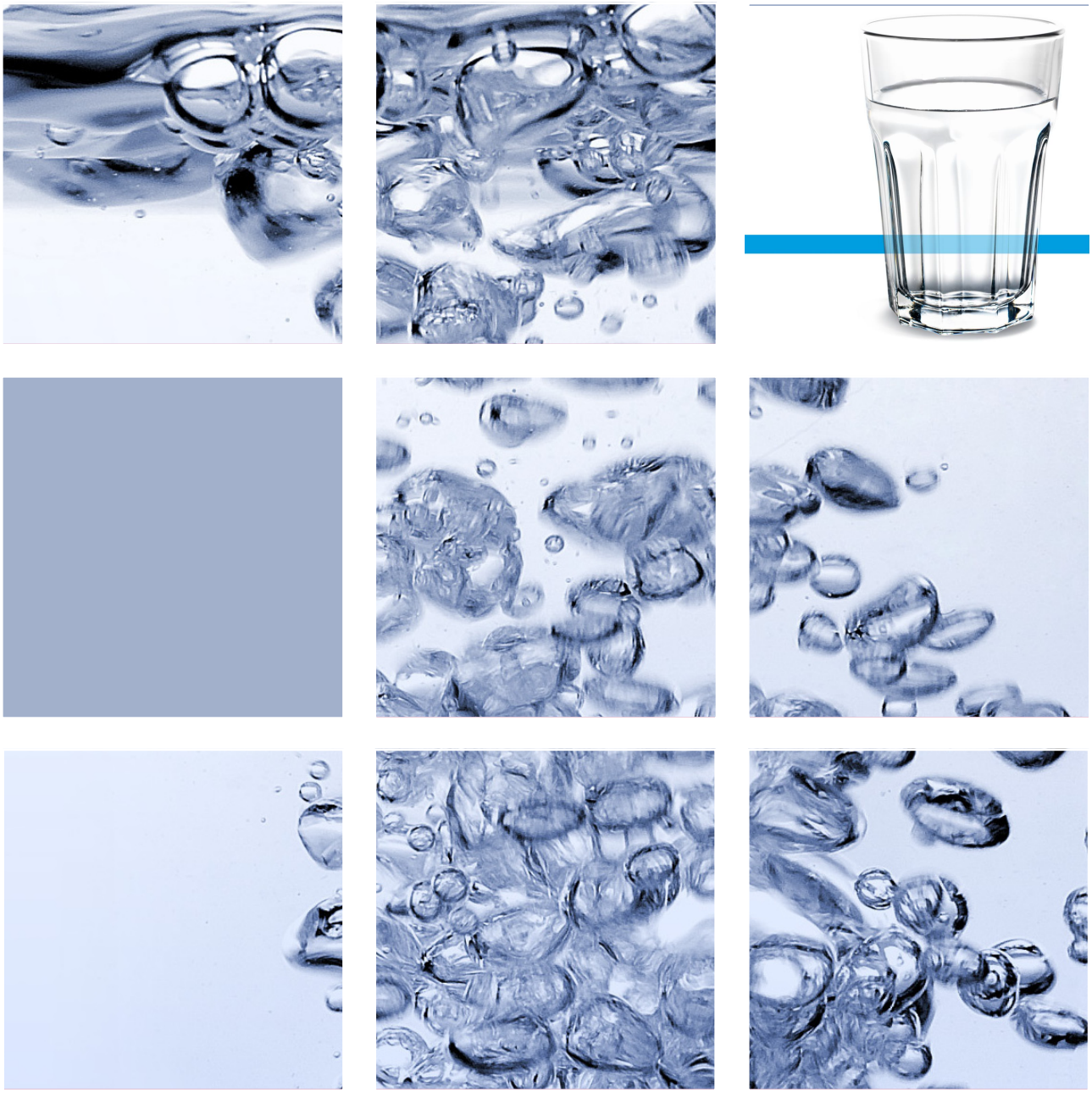
APPENDIX C

EAM Summary Report

Uisce Éireann - Lead in Drinking Water Mitigation Plan

Environmental Assessment Methodology (EAM) Summary Report 008

Central Kerry Regional Water Supply Scheme – Scart Reservoir WSZ



National Lead in Water Mitigation Strategy

Environmental Assessment Methodology Report: 008 Central Kerry Regional Water Supply Scheme – Scart Reservoir WSZ

Document Control Sheet

Client:	Uisce Éireann
Project Title:	National Lead in Water Mitigation Strategy
Document Title:	Environmental Assessment Methodology Report: 008 Central Kerry Regional Water Supply Scheme – Scart Reservoir WSZ
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Text Pages:	18	Appendices:	-

Rev.	Status	Date	Author(s)		Reviewed By		Approved By	
F06	Final	12th Jul 2021	IP		MM		AC	
F07	Final	19th Oct 2021	IP		MM		AC	
F08	Final	26th Nov 2021	IP		MM		AC	

008 Central Kerry Regional Water Supply Scheme – Scart Reservoir WSZ

Supporting spreadsheet: 008 Central Kerry Regional Water Supply Scheme – Scart Reservoir WSZ_rev34.xlsx

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

It is proposed to introduce orthophosphate dosing at Central Kerry Regional Water Supply Scheme - Scart Reservoir, that boosts the supply from Lough Guitane Headworks in Killarney. Scart Reservoir supplies the following water supply zones (WSZs): Fenit PWSS 037D, Ardfert South PWSS 004F, Camp PWS 020D, Inch PWS 044D. In addition, 15 Group Water Schemes have been identified in the region that the Scart Reservoir supplies; the extended area supplied by Scart Reservoir is depicted in Figure 1. The distribution input from Scart Reservoir to the WSZs is estimated to be 24,990m^3/day (63% of which is accounted for, with the remainder assumed to be lost through leakage), serving a population of approximately 45,000. Non-domestic demand is 24% of the distribution input. Estimated statistics are taken from figures supplied for the Lough Guitane Headworks, distributed pro-rata by the length of watermain assumed to be supplied by Scart Reservoir.

A dosing rate of 0.95 mg/l is used in this assessment.

The WSZ boundaries cover a large rural area and towns that are served by agglomerations Tralee (D0040), Abbeydorney (D0417), Castleisland (D0180), Lixnaw (D0462), Ardfert (D0282), Fenit (D0284), Firies (D0460) and Milltown (D0331) WWTPs which are licenced in accordance with the requirements of the Waste Water Discharge (Authorisation) Regulations 2007 as amended. The impact of the orthophosphate dosing on the emission limit values and the receiving water body downstream of the point of discharge are assessed. There are also a smaller WWTP with a population equivalent of less than 500, namely Kilfenora (A0022), Kilflynn (A0027), Farranfore (A0073) and Castlemaine (A0013). 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 10,389 properties across the WSZ that are serviced by a DWWTS.

This assessment has been undertaken for the WSZ in isolation. However, if corrective water treatment is proposed for WTPs in the same catchment area, the cumulative impact from the combined loads to downstream water bodies are assessed. The WTPs listed in the summary and mitigation section are currently being considered for corrective water treatment in the HA 22 - Laune-Maine-Dingle Bay catchment, Tralee Bay-Feale catchment (HAs 23) and the Shannon catchments (HAs 24, 25, 26, 27) and Blackwater (Munster) catchment (HA 18).

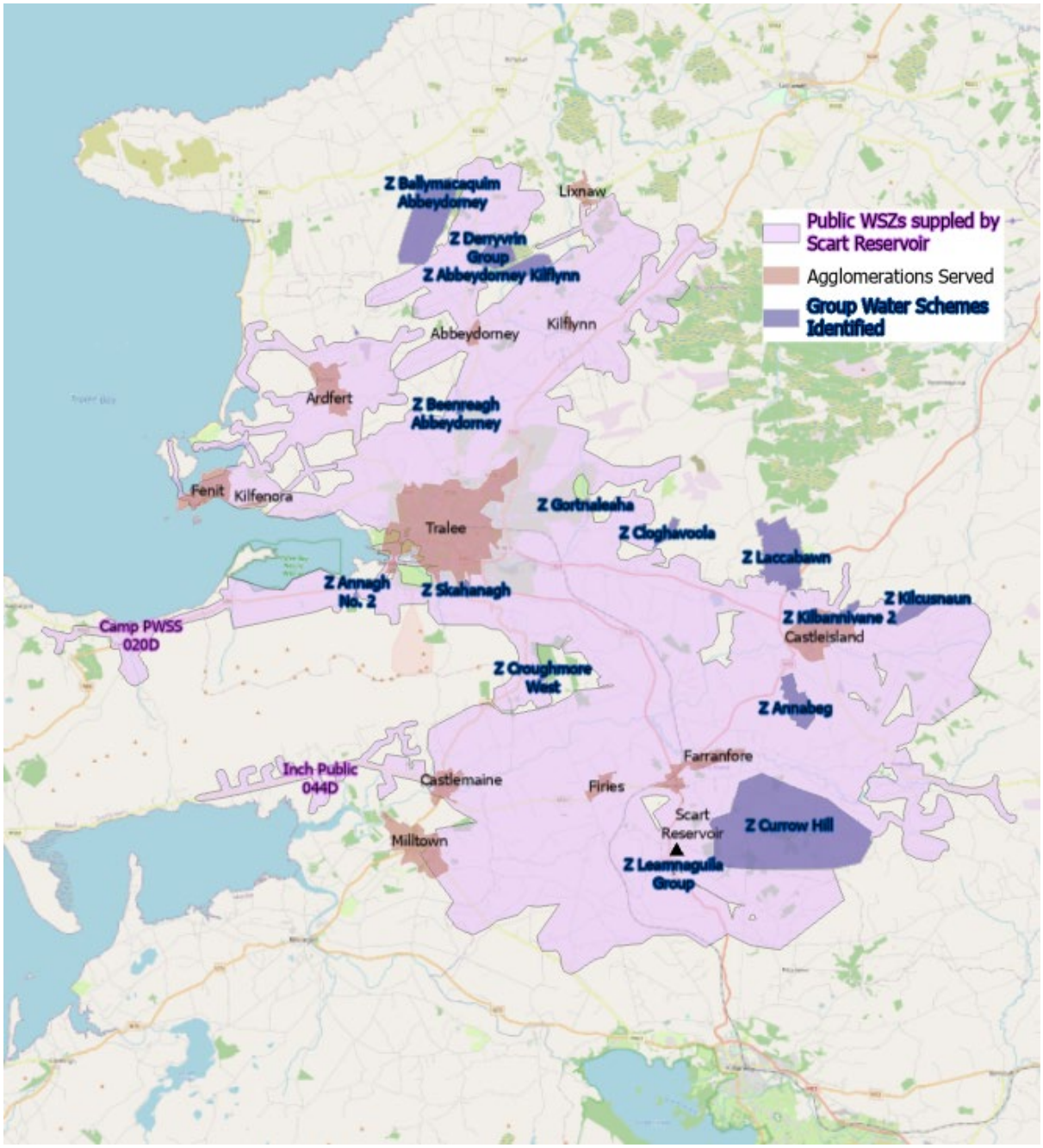


Figure 1 – Water Supply Area, Group Water Schemes and Agglomerations Served by Scart Reservoir

<table>
<tr><td>Water Supply Zone</td><td colspan="2">Fenit PWSS 037D (1300PUB1007)
Ardfert South PWSS 004F (1300PUB1002)
Central Regional: Extended Supply Area from Scart 406F* (1300PUB1107)
Camp PWS 020D (1300PUB1024)
Inch PWS 044D (1300PUB1040)
Group Water Schemes as shown in Figure 1

See Figure 4.1 / 4.2 of the AA Screening for a map of the WSZ and ZoI</td></tr>
<tr><td rowspan="4">Step 1 - Appropriate Assessment Screening</td><td colspan="2">Downstream European Sites (List of SAC/SPAs)</td></tr>
<tr><td colspan="2">SACs</td></tr>
<tr><td>Lower River Shannon SAC
Ballyseedy Wood SAC
Tralee Bay And Magharees Peninsula, West To Cloghane SAC
Slieve Mish Mountains SAC
Akeragh, Banna and Barrow Harbour SAC
Magharee Islands SAC
Kerry Head Shoal SAC
Mount Brandon SAC
Blasket Islands SAC
Killarney National Park, Macgillycuddy's Reeks And Caragh River Catchment SAC</td><td>Valencia Harbour/Portmagee Channel SAC
Ballinskelligs Bay And Inny Estuary SAC
Kenmare River SAC
Glengarriff Harbour And Woodland SAC
Sheep's Head SAC
Farranamanagh Lough SAC
Reen Point Shingle SAC
Dunbeacon Shingle SAC
Three Castle Head To Mizen Head SAC
Barley Cove To Ballyrisode Point SAC
Moanveanlagh Bog SAC
Castlemaine Harbour SAC</td></tr>
<tr><td colspan="2">SPAs</td></tr>
<tr><td>Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA
Tralee Bay Complex SPA
Magharee Islands SPA
Kerry Head SPA
River Shannon and River Fergus Estuaries SPA
Loop Head SPA
Dingle Peninsula SPA
Blasket Islands SPA</td><td>Castlemaine Harbour SPA
Iveragh Peninsula SPA
Puffin Island SPA
Skelligs SPA
Deenish Island and Scariff Island SPA
Beara Peninsula SPA
The Bull and The Cow Rocks SPA
Sheep's Head to Toe Head SPA
Killarney National Park SPA</td></tr>
<tr><td colspan="2">Appropriate Assessment Screening Required – Yes see AA screening report for details</td></tr>
<tr><td>Step 2 –Direct Inputs to Surface Water</td><td colspan="2">Table 1: Increased loading/concentration to agglomerations due to Orthophosphate Dosing – Dosing rate = 0.95 mg/l
<table>
<tr><th rowspan="2">Agglomeration and discharge type</th><th rowspan="2">ELV from WWDL (mg/l) (PO_4 unless otherwise stated)</th><th rowspan="2">Scenario</th><th rowspan="2">TP Load kg/yr</th><th colspan="3">Orthophosphate concentration mg/l
TP – PO_4 Conversion factor varied for sensitivity analysis (40%, 50%, and 68%)</th></tr>
<tr><th>0.5</th><th>0.4</th><th>0.68</th></tr>
<tr><td rowspan="2">Tralee Primary Discharge</td><td rowspan="2">2 (Total P)</td><td>Existing</td><td>4873</td><td>0.6</td><td>0.4</td><td>0.7</td></tr>
<tr><td>Post Dosing</td><td>4873</td><td>0.6</td><td>0.4</td><td>0.7</td></tr>
<tr><td rowspan="2">Tralee SWOs (12 no.)</td><td rowspan="2">n/a</td><td>Existing</td><td>279.4</td><td>1.1</td><td>0.9</td><td>1.5</td></tr>
<tr><td>Post Dosing</td><td>350.2</td><td>1.3</td><td>1.1</td><td>1.8</td></tr>
<tr><td></td><td>0.5</td><td>Existing</td><td>231</td><td>1.8</td><td>1.4</td><td>2.4</td></tr>
</table></td></tr>
</table>

Abbeydorney Primary Discharge		**Post Dosing**	273	2.1	1.7	2.7
Abbeydorney SWOs (2 no.)	**n/a**	**Existing**	10.1	2.7	2.1	3.6
		Post Dosing	11.3	3.0	2.4	4.1
Lixnaw Primary Discharge	**n/a**	**Existing**	430.9	5.3	4.3	7.3
		Post Dosing	432.7	5.4	4.3	7.3
Lixnaw SWOs (2 no.)	**n/a**	**Existing**	18.8	8.0	6.4	10.9
		Post Dosing	18.9	8.0	6.4	10.9
Castleisland Primary Discharge	**2**	**Existing**	234	0.21	0.17	0.28
		Post Dosing	234	0.21	0.17	0.28
Castleisland SWOs (5 no.)	**n/a**	**Existing**	68.1	2.1	1.7	2.0
		Post Dosing	77.9	2.4	1.9	3.3
Ardfert Primary Discharge	**8**	**Existing**	320	1.2	1.0	1.6
		Post Dosing	324	1.2	1.0	1.6
Ardfert SWOs (2 no.)	**n/a**	**Existing**	19.9	2.6	2.1	3.5
		Post Dosing	20.1	2.6	2.1	3.3
Fenit Primary Discharge	**n/a**	**Existing**	308	1.0	0.8	1.3
		Post Dosing	309	1.0	.08	1.3
Fenit SWOs (3 no.)	**n/a**	**Existing**	14.4	1.5	1.2	2.1
		Post Dosing	14.5	1.5	1.2	2.1
Firies Primary Discharge	**1**	**Existing**	58.2	0.22	0.18	0.30
		Post Dosing	58.2	0.22	0.18	0.30
Firies SWOs (1 no.)	**n/a**	**Existing**	16.95	2.23	1.79	3.04
		Post Dosing	18.74	2.47	1.97	3.36
Milltown Primary Discharge	**5**	**Existing**	581.3	1.31	1.05	1.78
		Post Dosing	717.0	1.62	1.29	2.20
Milltown SWOs (12 no.)	**n/a**	**Existing**	36.25	2.80	2.24	3.81
		Post Dosing	40.21	3.11	2.49	4.23

Note: Tralee, Castleisland and Firies and WWTPs have tertiary treatment (i.e. nutrient removal), so all the additional Orthophosphate is assumed to be removed during the treatment process.

All other WWTPs listed above have primary or secondary treatment only available; it is assumed that the additional load from orthophosphate dosing is not removed in the treatment process but rather is added to the existing effluent loads.

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

Table 2: Mass balance assessment based on 0.95 mg/l dosing using available background concentrations and mean flow information

Agglom.	RWB Name / Code	Background Conc. (mg/l) (annual mean from AER u/s monitoring point)	Modelled Conc. existing (mg/l)	Modelled Conc. Post Dosing (mg/l)	% Inc.
Tralee	Lee K Estuary IE_SH_050_0100	0.030	0.0351	0.0352	0.2%
Abbeydorney	Brick_020 IE_SH_23B030400	0.050	0.0632	0.0656	3.9%
Lixnaw	Brick_040 IE_SH_23B030700	0.043	0.0480	0.0480	0.0%
Castleisland	MAINE_020 IE_SW_22M010400	0.035	0.0370	0.0371	0.2%
Ardfert	TYSHE 23_020 IE_SH_23T020500	0.045	0.0815	0.0820	0.6%
Fenit	Outer Tralee Bay IE_SH_040_0000	0.01875	0.0188	0.0188	0.0%
Firies	Maine_040 IE_SW_22M010700	0.027	0.0271	0.0271	0.0%
Milltown	Castlemaine Harbour IE_SW_230_0200	0.023	0.0230	0.0231	0.0%

Surface Assessment

Tralee (Lee K Estuary, IE_SH_050_0100) – Tralee WWTP uses tertiary treatment that was installed during 2018, so it is assumed that all Orthophosphate will be removed. Table 1 indicates that the WWTP is modelled to be compliant with its ELV as a result of Orthophosphate dosing. The 2020 AER lists 4 specific ELV exceedances. The 2019 AER reported no ELV exceedances. Therefore the plant is generally performing well The 2020 AER lists 4 specific ELV exceedances. The 2019 AER reported no ELV exceedances. The plant is generally performing well with average TP levels (0.66 mg/l) well below the ELV. There were a few isolated incidents that resulted in the exceedances, however, these will not impact on the ability of the plant to remove the small additional loading of Phosphorus due to corrective water treatment. The increase due to Orthophosphate dosing in the Lee K Estuary (0.2%) will be insignificant (Table 2).

Abbeydorney (Brick_020, IE_SH_23B030400) – The WWTP has preliminary and primary treatment only and is currently failing its orthophosphate ELVs on the WWDL (Table 1). The 2020 AER notes that a WWTP upgrade is required. The current discharge is having an impact on the receiving waters and orthophosphate dosing will increase the modelled concentrations by 3.9 % downstream of the discharge. The dosing at Abbeydorney will not impact on the ecological status of this water body which is currently at poor status as the increase is downstream of the agglomeration is not

	significant in the context of the water body and will not result in any further deterioration in the biological elements ensuring that the overall ecological status remains unchanged. This is discussed further in Step 5 and 6. **Lixnaw** (Brick_040 IE_SH_23B030700) – The WWTP has preliminary and primary treatment only. There are no orthophosphate ELVs for this agglomeration (Table 1) and the model indicates that there will be no increase in loading (Table 2). **Castleisland (**MAINE_020, IE_SW_22M010400) – The WWTP uses tertiary treatment, so it assumed that all the orthophosphate will be removed. The WWTP is compliant with its ELVs and it is also modelled to be compliant (Table 1). The increase due to orthophosphate dosing in the MAINE_020 (0.2%) is considered insignificant (Table 2). **Ardfert** (TYSHE 23_020, IE_SH_23T020500) – The 2020 AER reports that this WWTP has secondary treatment only and it is compliant with its orthophosphate ELV; the modelling confirms this as shown in Table 1. Orthophosphate dosing will increase the modelled concentrations by 0.6% downstream of the discharge (Table 2), which is considered insignificant. **Fenit** (Outer Tralee Bay, IE_SH_040_0000) - The WWTP has preliminary and primary treatment only. There are no orthophosphate ELVs for this agglomeration (Table 1) and there is no increase in modelled concentrations due to orthophosphate dosing (Table 2) **Firies (**MAINE_040, IE_SW_22M010700) – The WWTP uses tertiary treatment, so it assumed that all the orthophosphate will be removed. The WWTP is compliant with its ELV for orthophosphate and it is also modelled to be compliant (Table 1). There is no increase in modelled concentrations due to orthophosphate dosing (Table 2) **Milltown** (Castlemaine Harbour, IE_SW_230_0200) – The 2019 AER reports that this WWTP has secondary treatment only. There were two non-compliances of the orthophosphate ELV reported, the reason for non-compliance given is 'Shock load to the WWTP'. It is modelled to be compliant with its ELV, as shown in Table 1 and due to the large flows in Castlemaine Harbour, there is no increase in modelled concentrations due to orthophosphate dosing (Table 2).
Step 4 - Step 4 Distributed Inputs to surface water bodies from sub surface pathways	**<u>Subsurface Assessment</u>** Impact from orthophosphate dosing on surface waters due to subsurface and near surface pathways is predicted to be insignificant (below 0.00125 mg/l, which is 5% of the Good / High boundary for orthophosphate indicative quality in river waterbodies) except in Big River (Tralee)_010 (IE_SH_23B040150) where the maximum increase in concentration is 0.0023 mg/l. The predicted increase in concentration does not cause the potential baseline following dosing to rise above 75% of the indicative quality upper threshold. Impact from orthophosphate dosing on surface waters due to subsurface and near surface pathways is predicted to be insignificant for all Transitional and Coastal waterbodies directly affected by the WSZs.

Step 5 and 6: Combined Impact to Groundwater Bodies

Groundwater Bodies as receptors connected to WSZ

The predicted increase in loads and concentrations for GWBs connected to the modelled WSZs are insignificant in all cases (below 0.00175 mg/l, which is 5% of the Good / Fail boundary for orthophosphate indicative quality in groundwater bodies) (Table 3).

Table 3: Increased loadings and concentrations in Groundwater bodies ***(note: where existing monitoring data is not available, a surrogate indicative quality is derived from the initial characterisation or chemical status of the WB, and the mid-range of that indicative quality is used as Baseline Concentration))***

EU_CD / NAME	PO_4 Indicative Quality and Trends (Distance to Threshold). *Surrogate Indicative Quality in italic*	Baseline 2015 Conc. Surrogate Conc. given in *italic* mg/l	75% of PO_4 Indicative Quality Upper threshold mg/l	Total PO_4 GW Dosing Load kg/yr	Potential increase in PO_4 Conc. due to Dosing mg/l	Potential PO_4 Baseline Conc. following dosing mg/l	Notes
IE_SW_G_073 Scartaglin	Good	0.018	0.026	37.2	0.0005	0.018	
IE_SH_G_001 Abbeyfeale	Good	0.018	0.026	4.6	0.0000	0.018	
IE_SH_G_008 Ardfert	Good Upwards Far	0.007	0.026	13.2	0.0008	0.008	MP 1 **
	Good Upwards Far	0.010	0.026			0.011	MP 2 **
IE_SH_G_027 Ballybunnion	Good Downwards Far	0.008	0.026	19.6	0.0006	0.009	**
IE_SH_G_044 Brandon Head	Good Upwards Far	0.015	0.026	3.3	0.0000	0.015	
IE_SH_G_118 Kerry Head	Good	0.018	0.026	0.1	0.0000	0.018	
IE_SH_G_223 Spa	Good	0.018	0.026	2.1	0.0002	0.018	
IE_SH_G_226 Tralee	Good	0.018	0.026	27.7	0.0016	0.019	
IE_SW_G_026 Castlemaine	Good Upwards Far	0.007	0.026	25.7	0.0012	0.008	**
IE_SW_G_033 Dingle	Good	0.018	0.026	6.2	0.0001	0.018	

MP: multiple Monitoring Points given for waterbody

Step 5 and 6: Combined Inputs to Surface Water Bodies	**Combined Assessment** The combined impact from surface water and subsurface pathways due to orthophosphate dosing is insignificant (below 0.00125 mg/l, which is 5% of the Good / High boundary for orthophosphate indicative quality) for most river waterbodies (Table 4.A) and receiving waterbodies (Table 4.B), with exception of Big River (Tralee)_010 (IE_SH_23B040150). However, for these waterbodies, the predicted increase in concentration will not cause the baseline concentration to rise above 75% of the orthophosphate indicative quality upper threshold. The river Brick_020 (IE_SH_23B030400) has two monitoring points shown in Table 4.A, one at Poor orthophosphate indicative quality with the furthermost downstream monitoring point at Bad indicative quality. The river is impacted by Abbeydorney and Kiliflynn WWTPs and the downstream monitoring point represents a short length of river at the Abbeydorney WWTP; the distance between the upstream and downstream monitoring points is 480m. The next Operational monitoring point downstream of the river is at the outlet of the Brick_020 river catchment (RS23B030400: W of Garrynagore) and has a Q Value of 3, indicative of Poor status. The modelled increase in concentration due to orthophosphate dosing is just below the significance level (0.0012 mg/l). As the increase in concentration due to orthophosphate dosing is below significant levels, dosing will not result in any further impact on the structure and functioning of aquatic ecosystems in this water bodies and will not result in any further deterioration in the contributing elements to ecological status. The river TYSHE 23_020 (IE_SH_23T020500) was impacted by the Ardfert WWTP until an upgrade in 2018. The orthophosphate levels in the river have since improved to Poor indicative quality, but recent monitoring suggests a degradation back to Bad indicative quality in one of the monitoring points as shown in Table 4.A. The Operational monitoring point downstream of the Ardfert agglomeration (RS23T020500: Bridge near Banna House) and has a Q Value of 3, indicative of Poor status. The modelled increase in concentration due to orthophosphate dosing is below significant levels (0.0012 mg/l) and dosing will not result in any further impact on the structure and functioning of aquatic ecosystems in this water body and will not result in any further deterioration in the contributing elements to ecological status. The rivers MAINE_010 (IE_SW_22M010300), MAINE_030 (IE_SW_22M010500), MAINE_050 (IE_SW_22M010800) and LEE (TRALEE)_030 (IE_SH_23L010100) have monitoring points with a baseline concentration higher than 75% of orthophosphate indicative quality upper threshold, but since the increase in concentration in those rivers is insignificant, dosing won't impose any further risk of orthophosphate indicative quality deterioration. One of the rivers LEE (TRALEE)_030 exhibits a statistically significant upward trend. However, the modelled increase in concentration is below 5% of the Good / High Indicative Quality threshold, so it is considered to be insignificant and not impact on the ability of this river waterbody to achieve the WFD Objectives.

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 the ecological status of the WB or the Orthophosphate / Ecological status of neighbouring WBS, the mid-range of that Indicative Quality is used as Baseline Concentration)***

EU_CD / NAME	PO_4 Indicative Quality and Trends (Distance to Threshold *Surrogate Indicative Quality in italic*	Baseline 2017 Conc. *Surrogate Conc. given in italic mg/l*	75% of PO_4 Indicative Quality Upper threshold mg/l	Total PO_4 Load in receiving waters kg/ yr	Potential increase in PO_4 Conc. due to Dosing mg/l	Potential PO_4 Baseline Conc. following dosing mg/l	Notes
IE_SW_22G080300 GROIN_010	*High*	*0.013*	0.019	0.9	0.0001	0.013	
IE_SW_22B030100 BROWN FLESK_010	High Downwards Far	0.014	0.019	3.0	0.0001	0.014	**
IE_SW_22B030250 BROWN FLESK_020	High Downwards Far	0.013	0.019	22.9	0.0002	0.013	†
IE_SW_22B030500 BROWN FLESK_030	High Downwards Far	0.014	0.019	31.3	0.0003	0.014	MP1 **
	High Downwards Far	0.015	0.019			0.015	MP2 **
	High Upwards Far	0.018	0.019			0.018	MP3 **
IE_SW_22D030400 DOGUE_010	*High*	*0.013*	0.019	3.1	0.0002	0.013	
IE_SW_22F090400 FAHADUFF_010	*Moderate*	*0.046*	0.051	6.0	0.0004	0.046	
IE_SW_22G060300 GWEESTIN_010	*High*	*0.013*	0.019	8.2	0.0007	0.013	
IE_SW_22G060600 GWEESTIN_020	*Good*	*0.030*	0.033	19.0	0.0008	0.031	
IE_SW_22G060900 GWEESTIN_030	*High*	*0.013*	0.019	44.6	0.0008	0.013	
IE_SW_22L020500 LITTLE MAINE_010	*High*	*0.013*	0.019	2.0	0.0002	0.013	
IE_SW_22L021000 LITTLE MAINE_020	High Downwards Far	0.014	0.019	12.7	0.0004	0.014	**
IE_SW_22M010300 MAINE_010	High Downwards Near	0.020	0.019	37.7	0.0008	0.021	MP1
	Good - Far	0.028	0.033			0.029	MP2 **

		Good - Far	0.030	0.033			0.031	MP3 **
	IE_SW_22M010400 MAINE_020	Good - Far	0.028	0.033	69.4	0.0007	0.029	MP1 ‡ **
		Moderate - Far	0.038	0.051			0.039	MP2 ‡ **
	IE_SW_22M010500 MAINE_030	High - Near	0.024	0.019	88.4	0.0005	0.025	**
	IE_SW_22M010700 MAINE_040	Good - Far	0.026	0.033	184.9	0.0005	0.027	‡ **
	IE_SW_22M010800 MAINE_050	High - Near	0.020	0.019	276.3	0.0008	0.021	‡ **
	IE_SH_23A060890 ANNAGH 23_010	*Good*	*0.030*	0.033	7.2	0.0003	0.030	^
	IE_SH_23A190800 ARDFERT_OUGHTER_ 010	*High*	*0.013*	0.019	9.0	0.0008	0.013	
	IE_SH_23B030300 BRICK_010	*Moderate*	*0.046*	0.051	24.9	0.0008	0.046	‡
	IE_SH_23B030400 BRICK_020 2013 – 2018 Ecological Status is Poor	Bad	0.168	-	62.8	0.0012	0.169	MP1 ‡ **
		Poor	0.068	0.087			0.069	MP2 ‡ **
	IE_SH_23B030500 BRICK_030	Moderate	0.046	0.051	75.1	0.0011	0.047	‡
	IE_SH_23B030700 BRICK_040	Poor Upwards Far	0.064	0.087	89.4	0.0007	0.065	MP1 ‡ **
		Poor Upwards Far	0.063	0.087			0.064	MP2 ‡ **
	IE_SH_23B040150 Big River (Tralee)_010	*Poor*	*0.069*	0.087	28.8	0.0023	0.072	**
	IE_SH_23L010030 LEE (TRALEE)_010	Moderate Upwards Far	0.040	0.051	11.8	0.0006	0.041	†† **
	IE_SH_23L010050 LEE (TRALEE)_020	Moderate	0.040	0.051	22.8	0.0006	0.041	**
	IE_SH_23L010100 LEE (TRALEE)_030	Good Upwards Near	0.033	0.033	62.0	0.0007	0.034	*
	IE_SH_23L010200 LEE (TRALEE)_040	Good	0.030	0.033	111.7	0.0010	0.031	
	IE_SH_23M440980 Mountcoal 23_010	High	0.013	0.019	0.0	0.0000	0.013	

IE_SH_23P160880 Pinure 23_010	Good	0.030	0.033	11.2	0.0007	0.031	
IE_SH_23T020400 TYSHE 23_010	Poor - Far	0.058	0.087	4.5	0.0010	0.059	**
IE_SH_23T020500 TYSHE 23_020	Poor	0.093	0.087	12.7	0.0012	0.094	MP1 ‡ **
	Bad	0.108	0.087			0.109	MP2 ‡ **
IE_SH_23K120820 KNOPPOGE_SOUTH_ 010	*Good*	*0.030*	0.033	89.4	0.0008	0.031	
IE_SH_23B910900 BALLYNOE 23_010	*Poor*	*0.077*	0.087	13.1	0.0006	0.077	‡
IE_SH_23C190920 CARRIGAHA_010	*Good*	*0.030*	0.033	2.2	0.0002	0.030	
IE_SH_23D420880 Derryquay River_010	*Good*	*0.030*	0.033	2.3	0.0002	0.030	
IE_SH_23F030400 FINGLAS (TRALEE BAY)_010	*Good*	*0.030*	0.033	4.8	0.0002	0.030	
IE_SH_23K130870 KNOCKGLASS_BEG_0 10	*Good*	*0.030*	0.033	2.0	0.0002	0.030	
IE_SW_22G061200 GWEESTIN_040	Good - Far	0.026	0.019	47.8	0.0008	0.027	**
IE_SW_22L010400 LAUNE_040	*High*	*0.013*	*0.019*	*52.1*	*0.0001*	*0.013*	
IE_SW_22K040500 KEALBROGEEN STREAM (LAUNE)_010	*Good*	*0.030*	0.033	3.5	0.0002	0.030	
IE_SW_22S010020 SHANOWEN (MAINE)_010	*Good*	*0.030*	0.033	5.5	0.0005	0.031	

‡ Load from WWTP / SWO following treatment included
MP: multiple Monitoring Points given for waterbody
† 2014 baseline used (no data post 2015)
* Trends are statistically significant
^ Effective Rainfall used to calculate concentration
†† Surrogate derived from 2011 and 2016 monitoring data
** 2018, 2019, 2020 Mean reported

Step 5 and 6 - Combined Inputs to Surface Water Bodies – Receiving Water Bodies and Lakes

Table 4.B: Increased loading and concentrations to transitional and coastal water bodies receiving flows from 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 Orthophosphate / Ecological status of neighbouring WBS, the mid-range of that Indicative Quality is used as Baseline Concentration)***

EU_CD / NAME	PO_4 Indicative Quality and Trends (Distance to Threshold. *Surrogate Indicative Quality in italic*	Baseline 2017 Conc. Surrogate Conc. given in *italic* mg/l	75% of PO_4 Indicative Quality Upper threshold mg/l	Total PO_4 Load in receiving waters kg/ yr	Potential increase in PO_4 Conc. due to Dosing mg/l	Potential PO_4 Baseline Conc. following dosing mg/l	Notes
IE_SH_050_0100 Lee K Estuary	Good (S) Upwards Far	0.036	0.036	165.5	0.0004	0.036	‡
	Good (W) Upwards Near	0.050	0.045			0.050	
IE_SW_230_0200 Castlemaine Harbour	High (S) Downwards Far	0.010	0.020	321.9	0.0000	0.010	‡
	High (W) Downwards Far	0.020	0.021			0.020	
IE_SH_060_0100 Cashen	High (S) Upwards Far	0.011	0.022	99.8	0.0000	0.011	‡
	High (W) Downwards Near	0.022	0.019			0.022	
IE_SH_050_0000 Inner Tralee Bay	High (S) Downwards Far	0.014	0.019	184.0	0.0000	0.014	‡
	High (W) Upwards Near	0.021	0.019			0.021	
IE_SH_040_0000 Outer Tralee Bay	High (S) Upwards Far	0.011	0.019	219.1	0.0000	0.011	‡
	High (W) Downwards Far	0.018	0.019			0.018	
IE_SH_060_0200 Upper Feale Estuary	High (S) Upwards Far	0.013	0.019	0.0	0.0000	0.013	
	High (W) Downwards Far	0.018	0.019			0.018	

	IE_SH_060_0000 Mouth of the Shannon (HAs 23;27)	High (S) Upwards Far	0.010	0.019	99.8	0.0000	0.010	‡
		Good (W) Upwards Near	0.040	0.037			0.040	
	IE_SH_010_0000 Southwestern Atlantic Seaboard (HA 23)	High	0.013	0.019	318.8	0.0000	0.013	‡

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

In the receiving water bodies, the loads due to orthophosphate dosing will not cause a significant increase in concentrations (Table 4.B) including in the following water bodies, Lee K Estuary (IE_SH_050_0100), Cashen (IE_SH_060_0100), Inner Tralee Bay (IE_SH_050_0000) and Mouth of the Shannon (HAs 23;27) (IE_SH_060_0000) that have monitoring points with a baseline concentration higher than 75% of orthophosphate indicative quality upper threshold.

There are no lakes impacted by dosing for the Scart Reservoir.

Therefore dosing will not increase the risk of a deterioration in orthophosphate indicative quality or compromise the achievement of the WFD objectives for all waterbodies considered in this assessment.

Summary and Mitigation Proposed

Considering Central Kerry - Scart Reservoir WSZ in isolation, orthophosphate dosing is predicted to have insignificant impact on the majority of waterbodies. The modelled increases in load and concentrations to both groundwater and surface water receptors do not cause a risk to the achievement of the WFD objectives.

The breakdown of loads from source to pathway is depicted in Figure 2 and the fate of P loads from Central Kerry - Scart Reservoir WSZ and related WSZs is depicted in Figure 3.

The increase in modelled concentration for Big River (Tralee)_010 (IE_SH_23B040150) are above significance thresholds, however the orthophosphate baseline concentration are below 75% of the relevant orthophosphate indicative quality upper thresholds, and there is no increase in the risk of deterioration in orthophosphate indicative quality.

A short length of river Brick_020 (IE_SH_23B030400), at the Abbeydorney WWTP, is at Bad indicative quality. The Brick_020 water body is at Poor biological status, so by definition the supporting conditions are considered as being consistent with the achievement of the class for the biological elements, so supporting orthophosphate conditions are considered to be consistent with Poor ecological status. The river body has a modelled increase in concentration just below the significance level (0.0012 mg/l) As the modelled increase in concentration is below significant levels it is reasoned that the dosing will not result in any further impact on the structure and functioning of aquatic ecosystems in this water body and will not result in any further deterioration in the contributing elements to ecological status.

	The cumulative impacts on the Laune-Maine-Dingle Bay (HA 22), Tralee Bay-Feale (HA 23), and Shannon Catchments (HAs 24, 25, 26, and 27), associated with the corrective water treatment at the following additional WTPs have been assessed in combination with the proposed dosing at Central Kerry - Scart Reservoir WSZ: **HA 22 - Laune-Maine-Dingle Bay catchment** • 199 Coulagh WTP – Cahersiveen PWSS **HA 23 - Tralee Bay-Feale catchment** • 032 Dromin WTP – Dromin Listowel Moyvane 601E **HAs 24, 25, 26, 27 - Shannon Catchment** • 005 Clareville WTP – Limerick City Water Supply • 012 Tuam WTP – Tuam RWSS • 013 Portloman WTP – Ardonagh Reservoir • 017 Drumcliffe WTP - Ennis PWS • 019 New Doolough WTP - W.Clare RWS (New WTP) • 020 Castle Lake WTP - Shannon/Sixmilebridge RWSS • 021 Rossadrehid WTP – Galtee Regional • 027 Athlone WTP – Athlone WSS • 034 Lough Forbes WTP – Longford Central • 040 Coolbawn WTP – Nenagh RWSS • 049 Ballany WTP – Ballany High Level Reservoir • 058 Ballinasloe Town WTP - Ballinasloe Public Supply • 068 Rockingham WTP - Boyle Regional WSS • 081 Ballinagard Springs WTP - Roscommon Central Water Supply Scheme • 128 Longford Springs WTP Future Supply - Castlerea WSS • 140 Lisbrock WTP - SRRWSS Lisbrock • 161 Freemount WTP – Zone 4 Allow Regional • 178 Clavin's Bridge WTP – Kells/Oldcastle WS • 184 Foileen WTP - CappamoreFoileen Water Supply • 185 Ballinlough/ Loughglynn (Ballybane Springs) - Ballinlough/Loughglynn • 190 Ironmills Pump Station – Ironmills • 203 Ardan Boreholes - Tullamore North PWS • 216 Kylebeg WTP – Borrisokane • 237 Killadysert WTP - Killadysert PWS • 238 Williamstown WTP - Williamstown PS3 • 246 Ballingarry Spring WTP - Ballingarry Water Supply • 260 Kilcolman PS - Rathkeale Water Supply • 267 Cloughjordan Pump Station – Cloughjordan • 321 Ahascragh WTP - Ahascragh P.S. • 355 Croom Bypass Pump Station – Croom Water Supply • 381 Hospital Pump Station 2 - Hospital Water Supply The cumulative loads to water bodies that are impacted by the WSZs supplied by these WTPs have been summarised in Table 5 below.

Table 5: Cumulative assessment of the increased loading and concentrations to receiving water bodies common to the WSZs within the Shannon catchment where orthophosphate dosing is proposed ***(note: where existing monitoring data is not available, a surrogate indicative quality is derived from ecological status of the WB or Orthophosphate indicative quality / Ecological status of the upstream/downstream WBS, the mid-range of that indicative quality is used as Baseline Concentration)***

EU_CD / NAME	PO_4 Indicative Quality and Trends (Distance to Threshold. *Surrogate Indicative Quality in italic*	Baseline 2017 Conc. Surrogate Conc. given in	75% of PO_4 Indicative Quality Upper threshold	Cumulative PO_4 load to SW from leakage, DWWTS and agglomerations kg/yr	Potential increase in PO_4 Conc. due to Dosing mg/l	Potential PO_4 Baseline Conc. following dosing	Notes
IE_SH_23B030700 BRICK_040	Poor Upwards Far	0.064	0.087	107.4	0.0008	0.065	MP1 ‡ **
	Poor Upwards Far	0.063	0.087			0.064	MP2 ‡ **
IE_SH_23M440980 Mountcoal 23_010	High	0.013	0.019	1.8	0.0001	0.013	
IE_SH_23P160880 Pinure 23_010	Good	0.030	0.033	11.2	0.0007	0.031	
IE_SH_23T020400 TYSHE 23_010	Poor Upwards Far	0.058	0.087	4.5	0.0010	0.059	**
IE_SH_23T020500 TYSHE 23_020	*Poor*	*0.093*	0.087	12.7	0.0012	0.094	MP1 ‡ **
	Bad	*0.108*	0.087			0.109	MP2 ‡ **
IE_SH_23K120820 KNOPPOGE_SOUTH_010	Good	0.030	0.033	125.4	0.0011	0.031	
IE_SH_23B910900 BALLYNOE 23_010	Poor	0.077	0.087	25.8	0.0012	0.078	‡
IE_SW_230_0200 Castlemaine Harbour	High (S) Downwards Far	0.010	0.020	346.3	0.0000	0.010	‡
	High (W) Downwards Far	0.020	0.021			0.020	
IE_SH_060_0100 Cashen	High (S) Upwards Far	0.011	0.022	511.4	0.0002	0.011	‡
	High (W) Downwards Near	0.022	0.019			0.022	
IE_SH_050_0000 Inner Tralee Bay	High (S) Downwards Far	0.014	0.019	195.2	0.0000	0.014	‡

	High (W) Upwards Near	0.021	0.019			0.021	
IE_SH_040_0000 Outer Tralee Bay	High (S) Upwards Far	0.011	0.019	244.4	0.0000	0.011	‡
	High (W) Downwards Far	0.018	0.019			0.018	
IE_SH_060_0200 Upper Feale Estuary	High (S) Upwards Far	0.013	0.019	191.0	0.0002	0.013	‡
	High (W) Downwards Far	0.018	0.019			0.018	
IE_SH_060_0000 Mouth of the Shannon (HAs 23;27)	High (S) Upwards Far	0.010	0.019	5894.6	0.0000	0.010	‡
	Good (W) Upwards Near	0.040	0.037			0.040	
IE_SH_010_0000 Southwestern Atlantic Seaboard (HA 23)	High	0.013	0.019	5857.2	0.0000	0.013	‡
IE_SW_150_0000 South Western Atlantic Seaboard (HAs 21;22)	High	0.013	0.019	478.7	0.0000	0.013	‡

‡ Load from WWTP / SWO following treatment included
MP: multiple Monitoring Points given for waterbody
** 2018, 2019, 2020 Mean reported

The cumulative assessment has demonstrated that there will not be a significant impact on the receiving waters, so the dosing will not increase the risk of a deterioration in orthophosphate indicative quality or prevent the achievement of the WFD objectives for these water bodies.

RECOMMENDATIONS

This EAM is based on an assumed optimum orthophosphate dosing rate of 0.95 mg/l.

RAG STATUS – GREEN

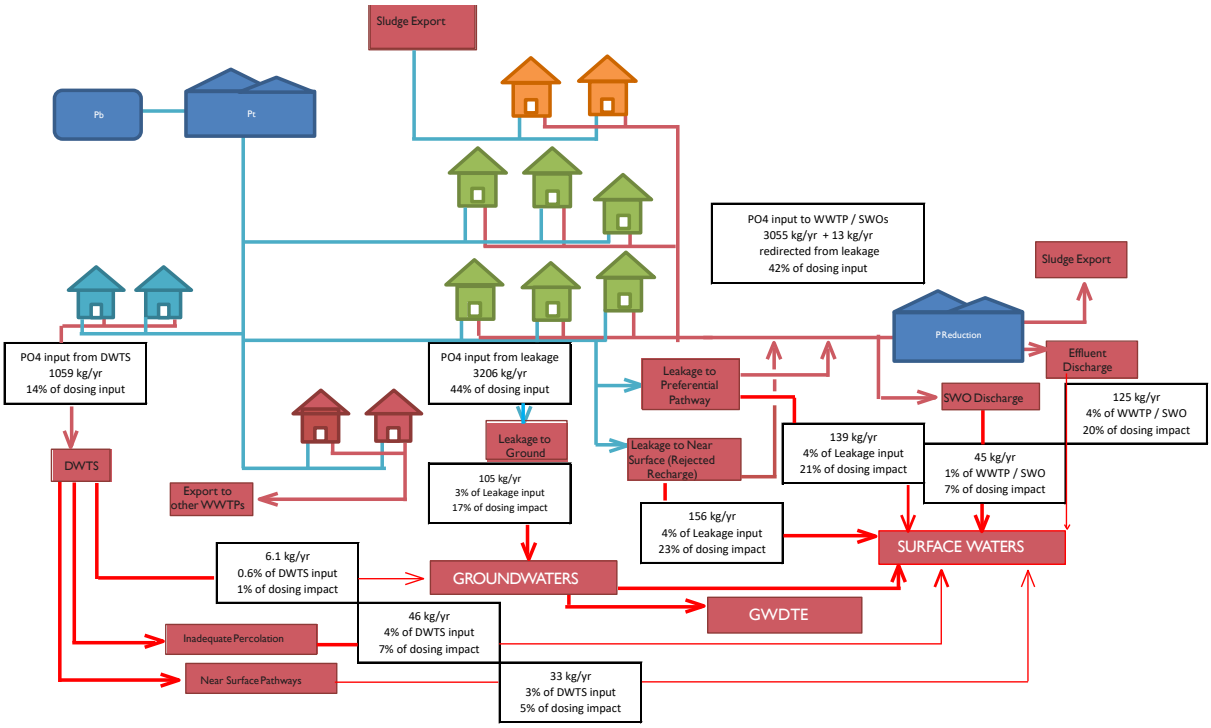
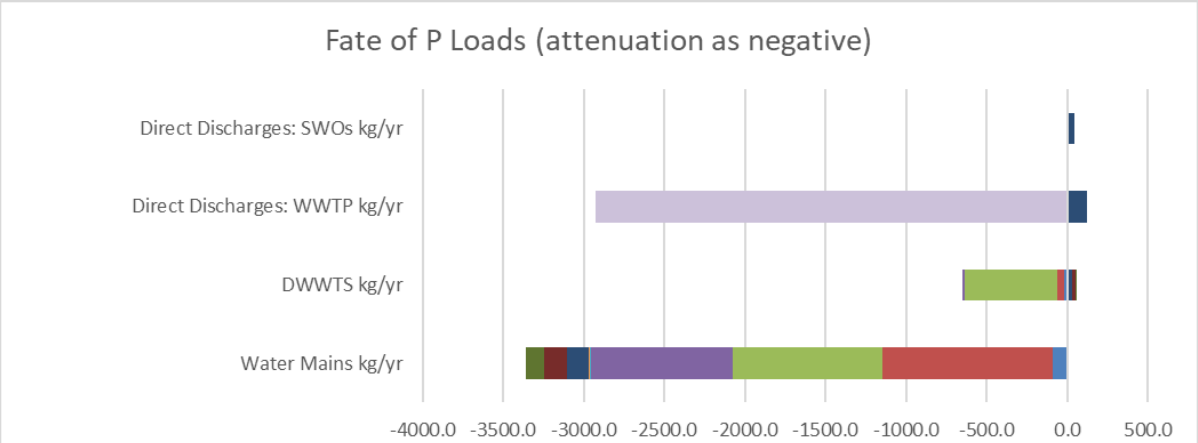


Figure 2 – Source Pathway Receptor model for Central Kerry - Scart Reservoir WSZ illustrating key sources and pathways to the associated WSZs



	Water Mains kg/yr	DWWTS kg/yr	Direct Discharges: WWTP kg/yr	Direct Discharges: SWOs kg/yr
Load attenuated in Preference (inadequate percolation) pathway	-86.4	-15.5		
Load attenuated in Near Surface Pathway	-1063.7	-48.3		
Load attenuated in 1m below trench	-928.5	-568.6		
Load attenuated in Subsurface Pathway	-874.3	-16.7		
Load intercepted by gravity main in Preference Pathway	-7.6			
Load intercepted by gravity main in Near Surface Pathway	-13.0			
Load reaching SW direct or via Preference (inadequate percolation) Pathway	-131.7	30.8	125.2	44.8
Load reaching SW via Near Surface Pathway	-143.0	22.1		
Load reaching SW via Subsurface Pathway	-110.9	4.0		
Load treated in WWTP			-2929.4	

Figure 3 – Fate of orthophosphate loads modelled for Central Kerry - Scart Reservoir WSZ and related WSZs (combined impact) on Lee K Estuary and Tralee Bay (Inner and Outer) due to dosing by source type, indicating levels of attenuation in pathways and relative impact on the surface water receptor.