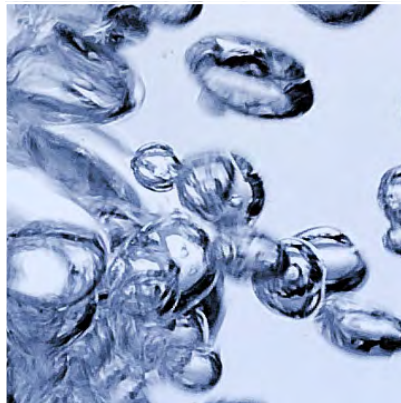
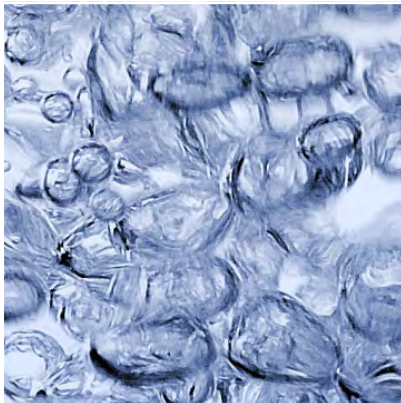
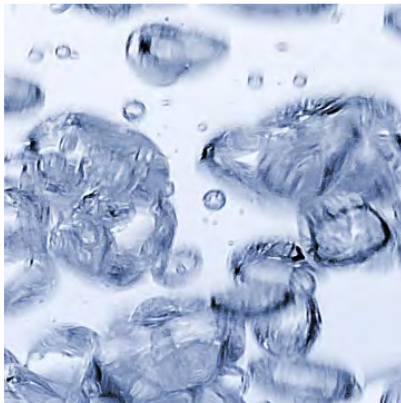




Uisce Éireann - Lead in Drinking Water Mitigation Plan

Screening for Appropriate Assessment

371 LCB Lismore (3100PUB1138) WSZ – LCB Lismore Deerpark Pump Station





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TABLE OF CONTENTS

1	INTRODUCTION	1
1.1	PURPOSE OF THIS REPORT	1
1.2	THE PLAN	1
1.3	PROJECT BACKGROUND	3
2	APPROPRIATE ASSESSMENT METHODOLOGY.....	4
2.1	LEGISLATIVE CONTEXT	4
2.2	GUIDANCE FOR THE APPROPRIATE ASSESSMENT PROCESS.....	5
2.3	STAGES OF THE APPROPRIATE ASSESSMENT PROCESS.....	6
2.4	INFORMATION SOURCES CONSULTED	7
2.5	EVALUATION OF THE RECEIVING ENVIRONMENT	7
3	DESCRIPTION OF THE PROJECT.....	11
3.1	OVERVIEW OF THE PROPOSAL.....	11
3.2	CONSTRUCTION OF CORRECTIVE WATER TREATMENT WORKS.....	12
3.3	CONSTRUCTION METHODOLOGY	15
3.4	OPERATION OF CORRECTIVE WATER TREATMENT WORKS	15
3.5	LDWMP APPROACH TO ASSESSMENT	16
4	PROJECT CONNECTIVITY TO EUROPEAN SITES.....	20
4.1	OVERVIEW OF THE PROJECT ZONE OF INFLUENCE.....	20
4.2	IDENTIFICATION OF RELEVANT EUROPEAN SITES.....	24
5	EVALUATION OF POTENTIAL IMPACTS	31
5.1	CONTEXT FOR IMPACT PREDICTION.....	31
5.2	IMPACT IDENTIFICATION	31
5.3	ASSESSMENT OF IMPACTS	32
6	EVALUATION OF LIKELY SIGNIFICANT EFFECTS	49
6.1	CONSTRUCTION PHASE	49
6.2	OPERATIONAL PHASE	49
6.3	ASSESSMENT OF IN-COMBINATION EFFECTS WITH OTHER PLANS OR PROJECTS	71
7	SCREENING CONCLUSION STATEMENT.....	79
8	REFERENCES.....	80

APPENDICES

- Appendix A** **European Sites - Conservation Objectives**
- Appendix B** **Nutrient Sensitive Qualifying Interests**
- Appendix C** **EAM Summary Report for LCB Lismore WSZ**

LIST OF FIGURES

Figure 3-1: Location of the corrective water treatment works	13
Figure 3-2: Plan and Elevation Drawings of a Typical Orthophosphate Dosing Unit.....	15
Figure 3-3: Conceptual Model of P Transfer	18
Figure 3-4 Stepwise Approach to the Environmental Assessment Methodology	19
Figure 4-1: European Sites within the Zol of the Proposed Project.....	23
Figure 4-2: European Sites within the Zol of the Proposed Works which are Hydrologically or Hydrogeologically Connected	30
Figure 6-1: Freshwater pearl mussel habitat within the main channel of the Munster Blackwater Catchment. The Allow catchment is marked in yellow (not yet updated since S.I. No. 355 of 2018)..	51
Figure 6-2: Blackwater River SAC Conservation Objectives for Freshwater pearl mussel ¹⁹	51

LIST OF TABLES

Table 4-1: European Sites within the Zol of the Proposed Project – Construction Phase.....	20
Table 4-2: European Sites within the Zol of the Proposed Project – Operational Phase	21
Table 4-3: European Sites Hydrologically or Hydrogeologically Connected to or Downstream of the WTP and WSZ.....	27
Table 5-1: Likely significant effects to European Sites arising as a result of the construction of the corrective water treatment works.....	33
Table 5-2: Surface and Groundwater Bodies within the WSZ with a Hydrological or Hydrogeological Connection to European Sites.....	37
Table 5-3: Increased loading / concentration due to Orthophosphate Dosing – Dosing rate = 0.8 mg/l	43
Table 5-4: Mass balance assessment based on 0.8 mg/l dosing using available background concentrations and mean flow information from Hydrotool and as assumed daily tidal exchange volume.	43
Table 5-5: Cumulative assessment of the increased loading and concentrations from Zone 3 Youghal Regional and other WSZs proposed for corrective water treatment in the upstream catchments.....	46
Table 6-1: In-Combination Impacts with Other Plans, Programmes and Policies	72

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 (2009).

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 LCB Lismore Water Treatment Plant (WTP), Waterford, Co. Waterford.

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 Government¹ 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, 2016²). 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 ($\mu\text{g}/\text{l}$) as per the European Union (Drinking Water) Regulations. From 2003 to 2013, the limit was $25\mu\text{g}/\text{l}$, which was a reduction on the previous limit (i.e. pre 2003) of $50\mu\text{g}/\text{l}$.

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

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

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

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

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

Orthophosphate is added in the form of Phosphoric acid, which is approved for use as a food additive (E338) in dairy, cereals, soft drinks, meat and cheese. The average adult person consumes between 1,000 and 1,500 milligrams (mg) of phosphorus every day as part of the normal diet. The quantity of orthophosphate that UE will be required to add to treated water is between $0.5\text{ mg}/\text{l}$ to $1.5\text{ mg}/\text{l}$. At LCB Lismore Deerpark Pump Station orthophosphate will be added at a rate of $0.8\text{ mg}/\text{l}$.

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

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

1.3 PROJECT BACKGROUND

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

The first step of the EAM is to identify the European Sites that have a hydrological or hydrogeological connectivity to the WSZs affected by the proposed orthophosphate dosing. The EAM recognises that for those European Sites with nutrient sensitive Qualifying Interests (habitats and species) and connectivity to the WSZ indicates that pathways for effects exist. The project effects on these European Sites, and an evaluation as to whether these are potentially significant, are the subject of the Screening for AA. The Screening report applies objective scientific information from the EAM as outlined in this document in the context of the Site Specific Conservation Objectives (SSCO) as published on the NPWS website.

The EAM process identified 28 European Sites with potential hydrological or hydrogeological connectivity to the WSZ:

- SAC sites: Blackwater River (Cork/Waterford) SAC, Ballymacoda (Clonpriest and Pillmore) SAC, Ardmore Head SAC, Great Island Channel SAC, Courtmacsherry Estuary SAC, Clonakilty Bay SAC, Kilkeran Lake and Castlefreke Dunes SAC, Castletownshend SAC, Myross Wood SAC, Lough Hyne Nature Reserve and Environs SAC, Roaringwater Bay and Islands SAC, Barley Cove to Ballyrisode Point SAC, Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC and Glendine Wood SAC; and
- SPA sites: Blackwater Callows SPA, Blackwater Estuary SPA, Ballymacoda Bay SPA, Ballycotton Bay SPA, Cork Harbour SPA, Sovereign Islands SPA, Old Head of Kinsale SPA, Courtmacsherry Bay SPA, Seven Heads SPA, Clonakilty Bay SPA, Galley Head to Duneen Point SPA, Sheep's Head to Toe Head SPA, Dungarvan Harbour SPA and Mullaghanish to Musheramore Mountains 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);
- Third Cycle Draft River Basin Management Plan 2022-2027 Consultation Report - www.housing.gov.ie;
- Ordnance Survey of Ireland – Mapping and Aerial photography www.osi.ie;
- National Summary for Article 12 Reporting 2013-2018 (Cummins et al., 2019); and
- Format for a Prioritised Action Framework (PAF) for Natura 2000 (2014) www.npws.ie/sites/default/files/general/PAF-IE-2014.pdf.

2.5 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 draft RBMP (2018-2021) (DHPLG, 2017³) 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 (2017) Public consultation on The River Basin Management Plan for Ireland (2018-2021). Available at: http://www.housing.gov.ie/sites/default/files/public-consultation/files/draft_river_basin_management_plan_1.pdf

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

LCB Lismore Deerpark Pump Station supplies all the distribution input to LCB Lismore WSZ (3100PUB1138) and 21% of the input to LCB Cappoquin WSZ (3100PUB1074), covering a total area of approximately 27km² in the west of Co. Waterford. LCB Cappoquin WSZ covers the town of Cappoquin and a large portion of Lismore (however the majority of the water supplied to LCB Cappoquin WSZ is from LCB Cappoquin WTP). LCB Lismore WSZ covers the remainder of Lismore and surrounding villages. The total distribution input to both LCB Lismore and LCB Cappoquin WSZs from Lismore Deerpark Pump Station is approximately 299.7 m³/day (162.57 m³/day to Lismore WSZ and 137.15 m³/day to LCB Cappoquin WSZ) 63.3% of which is accounted for (the remainder is assumed to be lost through leakage) serving a population of approximately 900. The non-domestic demand is 16% of the distribution input.

The area is served by Cappoquin (D0272) and Lismore (D0176) WWTPs which are licenced in accordance with the requirements of the Wastewater 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. It is estimated that there are 376 properties (92 in LCB Lismore WSZ & 284 in LCB Cappoquin WSZ) across the WSZs that are serviced by a DWWTS (see **Appendix C**).

LCB Lismore Deerpark Pump Station lies between Blackwater (Munster)_220 and Owbeg (Waterford)_010, which flow into the Upper Blackwater M Estuary and Lower Blackwater M Estuary / Youghal Harbour, respectively. The WSZ is located in the Colligan-Mahon, Blackwater (Munster) and Lee, Cork Harbour and Youghal Bay catchments. The EAM process identified 28 European Sites with hydrological or hydrogeological connectivity to the WSZ:

- SAC sites: Blackwater River (Cork/Waterford) SAC, Ballymacoda (Clonpriest and Pillmore) SAC, Ardmore Head SAC, Great Island Channel SAC, Courtmacsherry Estuary SAC, Clonakilty Bay SAC, Kilkeran Lake and Castlefreke Dunes SAC, Castletownshend SAC, Myross Wood SAC, Lough Hyne Nature Reserve and Environs SAC, Roaringwater Bay and Islands SAC, Barley Cove to Ballyrisode Point SAC, Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC and Glendine Wood SAC; and
- SPA sites: Blackwater Callows SPA, Blackwater Estuary SPA, Ballymacoda Bay SPA, Ballycotton Bay SPA, Cork Harbour SPA, Sovereign Islands SPA, Old Head of Kinsale SPA, Courtmacsherry Bay SPA, Seven Heads SPA, Clonakilty Bay SPA, Galley Head to Duneen Point SPA, Sheep's Head to Toe Head SPA, Dungarvan Harbour SPA and Mullaghanish to Musheramore Mountains SPA.

3.2 CONSTRUCTION OF CORRECTIVE WATER TREATMENT WORKS

The corrective water treatment works at LCB Lismore Deerpark Pump Station will involve the provision of orthophosphate dosing, pH control works and associated safety equipment.

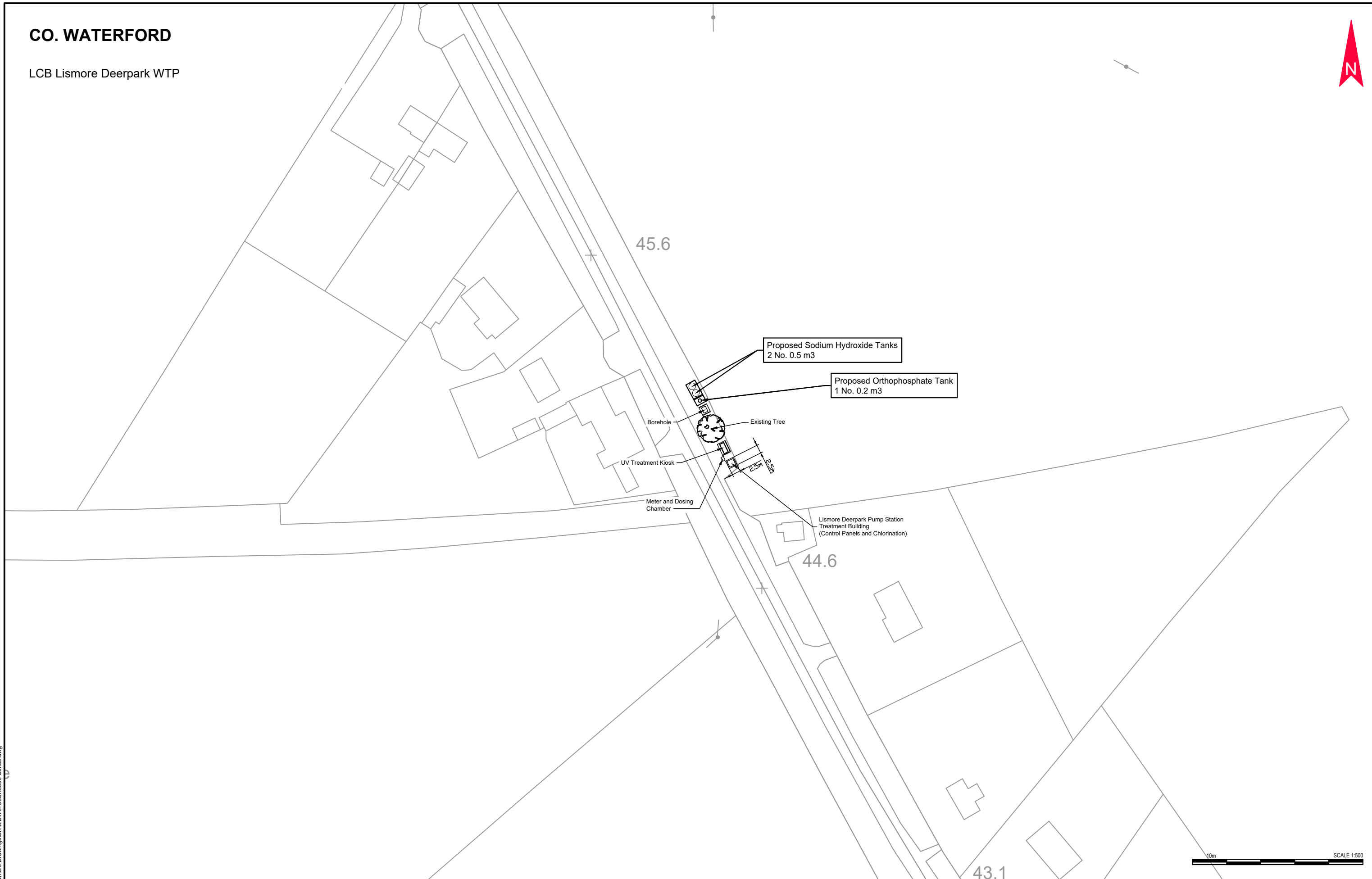
There is one possible location for the orthophosphate dosing system at LCB Lismore Deerpark Pump Station, which will be located adjacent to a public road (Deerpark Road) which is unfenced and therefore any new chemical treatment installations will be secured within locked kiosks. The proposed dosing point is after UV treatment with the creation of new dosing points within the distribution main. The surrounding landscape is dominated by improved agricultural grassland and tillage fields bounded by treelines, with some housing along Deerpark Road. The pump station itself is a small concrete structure situated on a grass verge adjacent to Deerpark Road. The location of the works is shown on **Figure 3-1**.

The implementation of orthophosphate dosing at the LCB Lismore Deerpark Pump Station will require the following elements:

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

CO. WATERFORD

LCB Lismore Deerpark WTP



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

Client




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No.	Date	By	App	Amendment / Issue
F01	Jan'19	BL		Issue for Information



West Pier
Business Campus
Dun Laoghaire
Co Dublin

T +353 1 4882900
F +353 1 2835676
W www.rpsgroup.com/ireland
E ireland@rpsgroup.com

Drawn	BL
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Approved	DC
Date	28/01/2019
Scale	1:500 @ A1
	1:1,000 @ A3
Job No.	MDW0766

Project **LEAD MITIGATION PLAN**

**LCB LISMORE DEERPARK
WATER TREATMENT PLANT - SITE LAYOUT**

File Ref. _____ Drg. No. SK0371 WTP Rev. F01

The bulk storage tank (1 no. tank, with a working volume of 100l) will sit upon an above ground reinforced concrete plinth, designed to support the combined weight of the storage tank, equipment and total volume of chemical to be stored (**Figure 3-2**).

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

A stable pH is critical to facilitate effective plumbosolvency control. With implementation of orthophosphate dosing it is necessary to ensure a stable pH of the final water. There is no existing pH correction system at the LCB Lismore. However, as the current average pH of the water is below the recommended levels for plumbosolvency control installation of a new system is recommended. As the size of the site is limited it is advised that a caustic dosing system is installed to allow elevation of the final water pH at LCB Lismore Deerpark PS.

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

A suitable kiosk will be installed on an above ground concrete plinth to house all electrical and control equipment required for the orthophosphate system. This will be located adjacent to the existing site infrastructure (i.e. site control building and UV disinfection unit). This control system will be incorporated into the existing supervisory control and data acquisition (SCADA) system on site. The proposed automation solution will be managed using a new programmable logic computer (PLC) / human machine interface (HMI) controller.

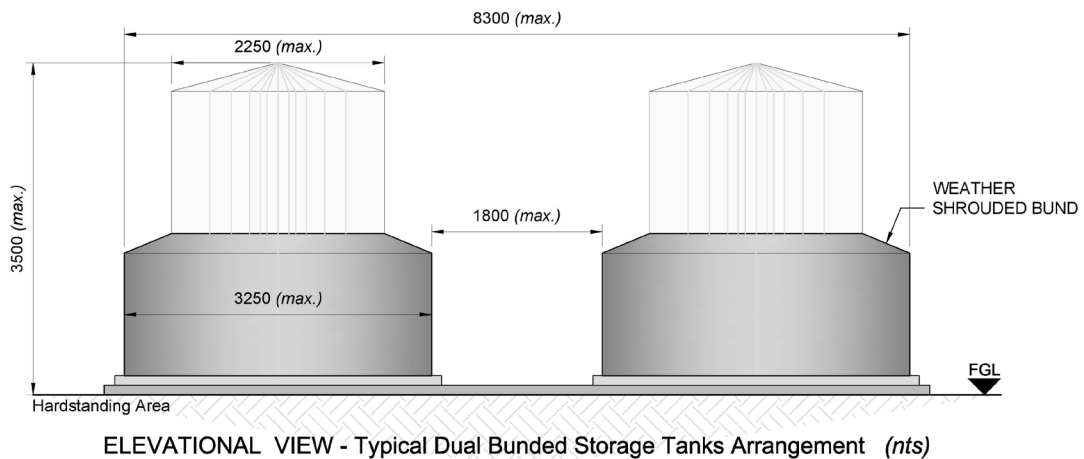
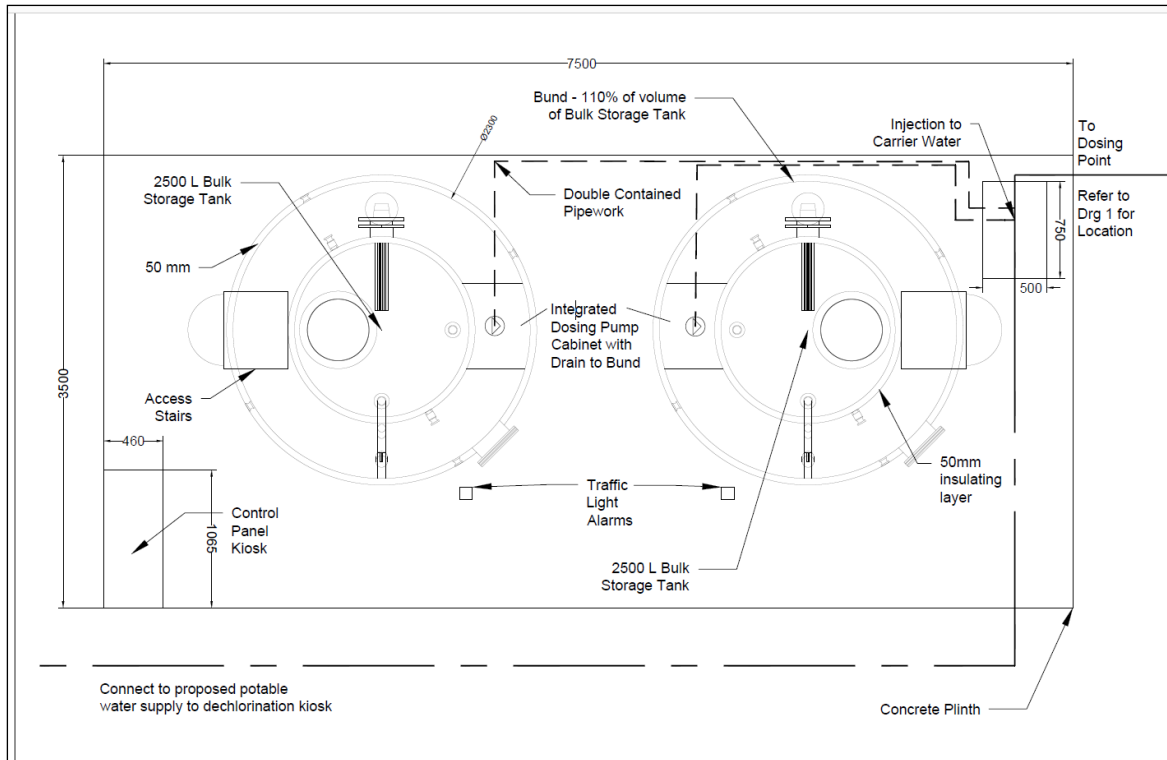


Figure 3-2: Plan and Elevation Drawings of a Typical Orthophosphate Dosing Unit

3.3 CONSTRUCTION METHODOLOGY

The proposed works will be carried out by suitably qualified contractors. The proposed dosing unit will be located adjacent to the existing LCB Lismore Deerpark Pump Station on an area of made ground.

3.4 OPERATION OF CORRECTIVE WATER TREATMENT WORKS

The operational stage for the corrective water treatment works will be a part of the day to day activities of the pump station 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 LCB Lismore Deerpark Pump Station, orthophosphate will be added to treated water at a rate of 0.8 mg/l. The onsite storage tanks have been designed to provide 60 days of storage so it is anticipated that deliveries will be approximately once every two months. All deliveries will be via existing access roads within the boundary of the WTP.

3.5 LDWMP APPROACH TO ASSESSMENT

3.5.1 Work Flow Process

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

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

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

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

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

3.5.2 Environmental Assessment Methodology

The EAM has been developed based on a conceptual model of P transfer (see **Figure 3-3**), based on the source-pathway-receptor model, from the water distribution and wastewater collection systems.

- The source of phosphorus is defined as the orthophosphate dosing at the water treatment plant which will be dependent on the water chemistry of the raw water quality, the integrity of the distribution network and the extent of lead piping.
- Pathways include discharges from the wastewater collection system (WWTP discharges and intermittent discharges – Storm Water Overflows (SWOs)), leakage from the distribution system and small point source discharges from DWWTs.
- Receptors refer to SACs and SPAs which may receive orthophosphate dosed water via the pathway examples outlined above. Receptors and their sensitivity, is of key consideration in the EAM. A water body may be more sensitive to additional phosphorus loadings where it has a low capacity for assimilating the load e.g. high status sites, such as the habitat of the freshwater pearl mussel or oligotrophic lakes. Where a SAC/SPA could receive orthophosphate dosing inputs at more than one WSZ, the cumulative effects are considered in the EAM.

A flow chart of the methodology applied in the EAM is provided in **Figure 3-4** and illustrates the importance of the European Sites in the process. In all instances where nutrient sensitive qualifying features within the Natura 2000 network are hydrologically linked with the WSZ, a Screening to inform AA will be required in the first instance.

For each WSZ where orthophosphate treatment is proposed, the conceptual model allows the quantification of loads in a mass balance approach to identify potentially significant pathways, as part of the risk assessment process. A summary report outlining the EAM results is available in **Appendix C**, which further outlines P dynamics and the consideration of P trends and capacity in receiving waters and the risk to WFD objectives from any increase in P load from orthophosphate dosing.

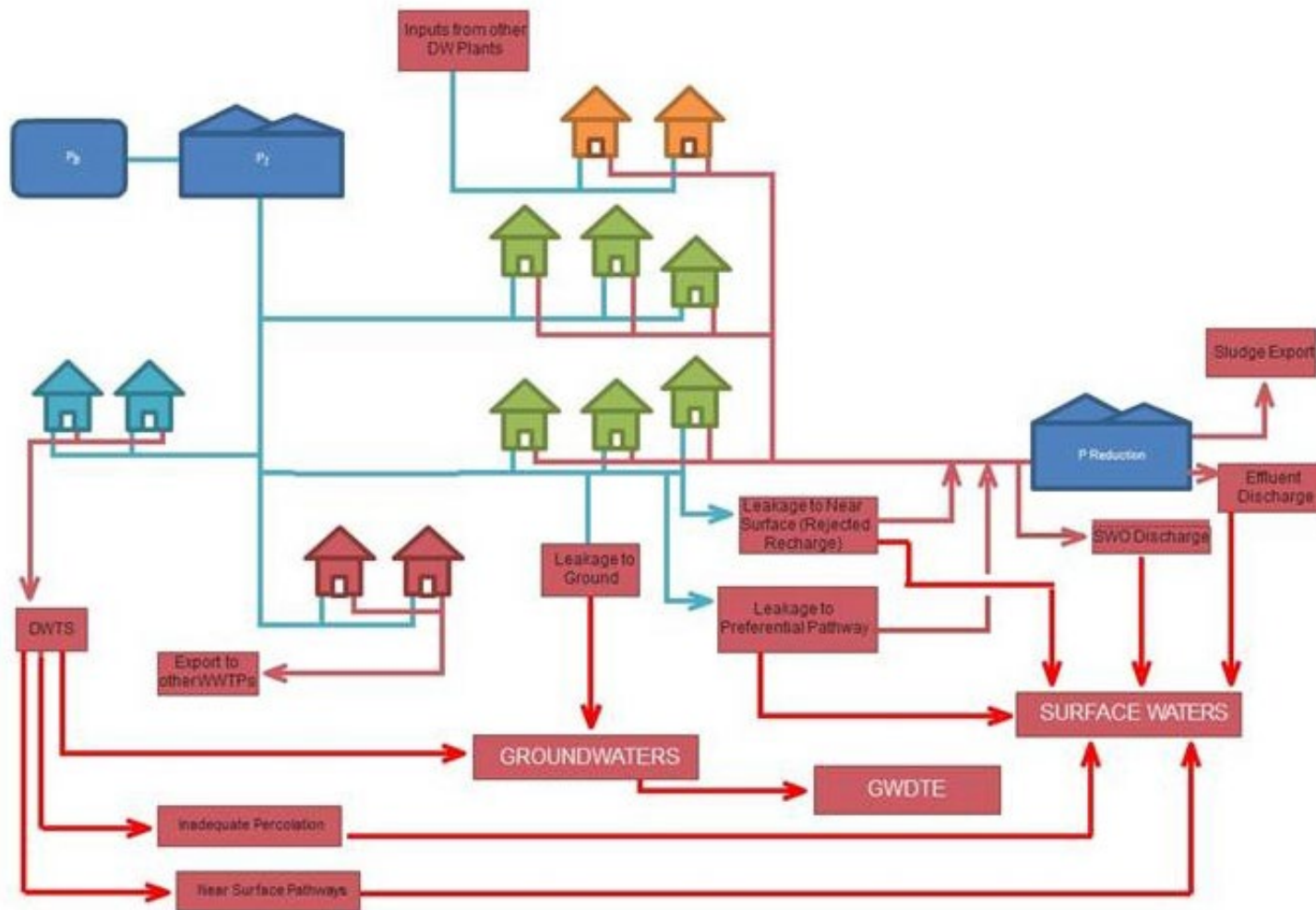


Figure 3-3: Conceptual Model of P Transfer

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

Step 1 - Stage 1 Appropriate Assessment Screening

- Identify downstream European Sites and qualifying features using water dependent database (Appendix B)
- Determine if qualifying features are nutrient sensitive from list of nutrient sensitive qualifying features
- Apply the EAM in the context of conservation objectives for European Sites

Application of EAM

Step 2 – Direct Discharges to Surface Water

WWTP

Calculate Increase in P Load to WWTP

- Determine proportion of WWTP influent to which dosing applies (D)
- Calculation of volume of dosed water based on WSZ daily production figures and leakage rates (Q_{WSZ})
- Determine dosage concentration (dosage conc.)
- Establish increase in annual P load ($\Delta \text{influent P load} = Q_{WSZ} \times (\text{dosage conc.}) \times D$ (Eqn 1))
- Determine new mass load to the WWTP $\text{NTMP} = \Delta \text{influent P load}$ (as per Eqn. 1) + \hat{E} Load (Eqn 2)

Where \hat{E} Load - Existing reported influent mass load or derived load based on OSPAR nutrient production rates

Compute Effluent P Loads and Concentrations Post Dosing

New WWTP effluent TP-load NLP

Tertiary Treatment - $\text{NLP} = (\hat{E} \text{ Load}) \times (\%TE)$ (Eqn. 3)

Secondary or less - $\text{NLP} = (\hat{E} \text{ Load}) \times (\%TE) + \Delta \text{influent P load}$ (Eqn 4)

Where

\hat{E} Load as per above

$\%TE$ - is the treatment plant percentage efficiency in removing TP (derived from AER data or OSPAR guidance)

TP Concentration (NCP as per Eqn. 5)

$\text{NCP} = (\text{NLP} / Q_{\text{WWTP}}) \times 1000$ (Eqn 5) Q_{WWTP} is the average annual hydraulic load to WWTP from AER or derived from PE and typical daily production figures

Storm Water Overflows

Estimate Nutrient Loads from Untreated Sewage Discharged via Storm Water Overflows

- The existing untreated sewage load via SWOs is estimated based on an assumed percentage loss of the WWTP load: $\text{Load}_{\text{untreated(Existing)}} = (\text{WWTP Influent Load (kg yr}^{-1}) / (1 + \%LOSS)) \times \%LOSS$ (Eqn 6)
- This can be modified to account for the increased P loading due to P-dosing at drinking water plants

$\text{Load}_{\text{untreated(Dosing)}} = (\text{WWTP NTMP (kg yr}^{-1}) / (1 + \%LOSS)) \times \%LOSS$ (Eqn 7)

- The pre and post-dosing SWO calculated loads are converted to concentrations using an assumed loss of 3% of the WWTP hydraulic load

$\text{SWO Q} = (\text{WWTP Influent Q (m}^3 \text{ yr}^{-1}) / (1 + \%LOSS)) \times \%LOSS$ (Eqn 8)

and

$\text{SWO TP Conc} = \text{Load}_{\text{untreated(X)}} / \text{SWO Q}$ Eqn 9

Step 4 – Distributed Sources

Mains Leakage

Calculate Load from Mains Leakage Additional Loading due to leakage

- Leakage Rate (m^3/day) calculated from WTP production figures, WSZ import/export data, latest metering data and demand estimates on a WSZ basis where data available.
- Load rate = dosage concentration * Leakage Rate
- **P load per m** = Load rate / Length of water main

Load to Pathways

- Constrained to location of water mains and assuming load infiltrates to GW unless in low subsoil or rejected recharge conditions or infiltration to sewers in urban environment.
- $\text{P (kg/m/yr)} = \text{P load per m} \times \text{trench coeff}$
- Flow in preferential pathway = Hydraulic load x % routed to NS Pathway Eqn. 10
- Subsurface flow = Hydraulic Load – Pref. Pathway flow if No Rech Cap, otherwise rejected recharge is redirected to Near Surface Pathway Eqn. 11
- Near surface flow = Hydraulic Load - Pref. Pathway flow – subsurface flow Eqn. 12
- $\text{P Load to GW} = \text{P (kg/m/yr)} \times \text{subsurface flow \%} \times (1 - \text{P atten to 1m}) \times (1 - \text{P atten} > 1\text{m})$ Eqn. 13
- Near surface flows combined with preferential flows:
 - $\text{P load to NS} = \text{P (kg/m/yr)} \times \text{near surface flow \%} \times (1 - \text{P atten in NS})$ Eqn. 14
 - $\text{P load to SW (kg/m/yr)} = \text{P Load to NS} + \text{P load to GW}$

DWTS

Calculate Load from Domestic Wastewater Treatment Systems

Additional Loading from DWTS

- Water consumption per person assumed to be 105 l/day. Each household assumed to have 2.7 people therefore annual hydraulic load calculated on this basis for each household and summed for water supply zones where DWTS are presumed present
- Additional P load is calculated based on dosing rate and hydraulic load derived for each household assumed to be on DWTS

Load reaching groundwater

$\text{P load to GW (kg/yr)} = \text{Load from DWTS (kg/yr)} \times \text{MRC} \times \text{Subsoil TF}$ Eqn. 14

$\text{P load to NS (kg/yr)} = \text{Load from DWTS (kg/yr)} \times \text{Biomat F} \times (1 - \text{MRC}) \times \text{NS TF}$ Eqn. 15

Additional load direct to surface water from septic tanks is estimated in areas of low subsoil permeability and close to water bodies.

$\text{P load to SW (kg/yr)} = \text{Load direct to SW} + \text{P load to GW} + \text{P load to NS}$

Step 3 - Assess Potential Impact on Receiving Water and ELV compliance

Apply Mass Balance equations incorporating primary discharge to establish likely increases in concentrations downstream of the agglomeration. Continue to Step 5.

Step 5 - Assessment of loads and concentrations from different sources to GW and SW Receptors

Determine combined direct discharges, DWTS and leakage loads and concentrations to SW and GW to determine significance. Continue to Step 6.

Step 6 – Assessment of Potential Impact of Surface and Sub surface Pathways on the receptors. Combine loads from direct discharges, DWTS and leakage and assess potential impact based on the existing status, trends and capacity of the water bodies to assimilate additional P loads. For European Sites the assessment will also be based on the Site Specific Conservation Objectives. EAM Conclusion will inform AA screening process.

Figure 3-4 Stepwise Approach to the Environmental Assessment Methodology

4 PROJECT CONNECTIVITY TO EUROPEAN SITES

4.1 OVERVIEW OF THE PROJECT ZONE OF INFLUENCE

4.1.1 Construction Phase

The construction phase of the proposed project will take place adjacent to the existing LCB Lismore Deerpark Pump Station. The pump station 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 LCB Lismore Deerpark Pump Station 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 is 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	Blackwater River (Cork / Waterford)	SAC 002170	No	Yes	No	Yes – (Lismore)	Yes
2	Blackwater Callows	SPA 004094	No	Yes	No	Yes – (Lismore)	Yes

4.1.2 Operational Phase

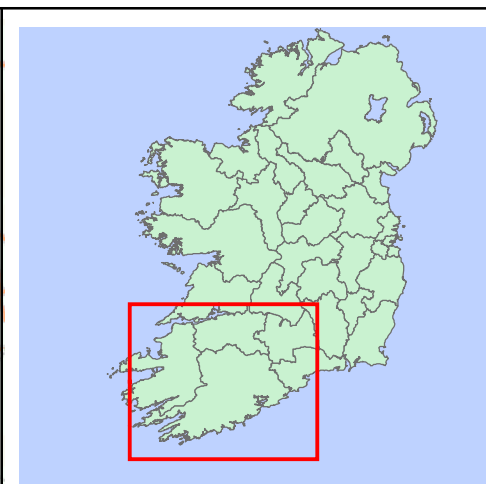
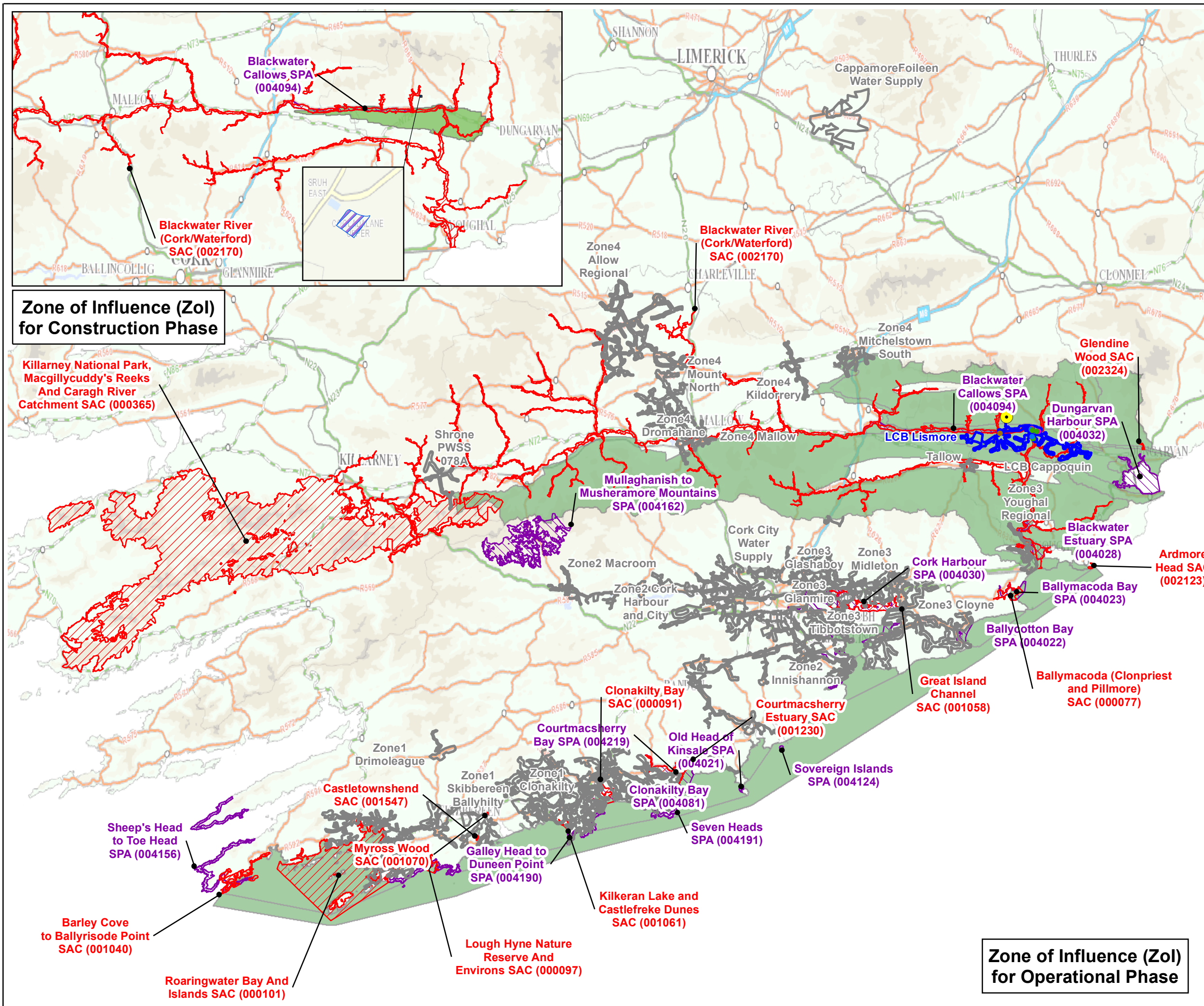
The ZoI for the operational phase of the proposed project was determined by establishing the potential for hydrological and hydrogeological connectivity between the LCB Lismore Deerpark Pump Station and associated WSZ and European Sites. The ZoI was therefore defined by the surface and groundwater bodies 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	Blackwater River (Cork / Waterford) SAC	SAC 002170	Yes	Yes	Yes – RWBs Blackwater (Munster), Owbeg (Waterford), Lyrenacallee East, Owennashad, Glennafallia, Moneygorm, Finisk	Yes - Glenville, Lismore, Cappoquin Kiltorcan	Yes
2	Ballymacoda (Clonpriest & Pillmore)	SAC 000077	Yes	Yes	Yes - CWB Youghal Bay	No	Yes
3	Ardmore Head	SAC 002123	Yes	Yes	Yes - CWB Youghal Bay	No	Yes
4	Great Island Channel	SAC 001058	Yes	Yes	Yes - CWB Western Celtic Sea, TWB North Channel Great Island	No	Yes
5	Courtmacsherry Estuary	SAC 001230	Yes	Yes	Yes - CWBs Western Celtic Sea, Courtmacsherry Bay	No	Yes
6	Clonakilty Bay	SAC 000091	Yes	Yes	Yes - CWBs Western Celtic Sea, Clonakilty Bay	No	Yes
7	Kilkeran Lake & Castlefreke Dunes	SAC 001061	Yes	Yes	Yes - CWBs Western Celtic Sea, Rosscarbery Bay	No	Yes
8	Castletownshend	SAC 001547	Yes	Yes	Yes - CWBs Western Celtic Sea, Rosscarbery Bay	No	Yes
9	Myross Wood	SAC 001070	Yes	Yes	Yes - CWB Western Celtic Sea, TWB Glandore Harbour	No	Yes
10	Lough Hyne Nature Reserve & Environs	SAC 000097	Yes	Yes	Yes - CWB Western Celtic Sea	No	Yes
11	Roaringwater Bay & Islands	SAC 000101	Yes	Yes	Yes - CWB Western Celtic Sea	No	Yes
12	Barley Cove to Ballyrisode Point	SAC 001040	Yes	Yes	Yes - CWBs Western Celtic Sea, Roaring Water Bay	No	Yes
13	Killarney National Park, Macgillycuddy's Reeks & Caragh River Catchment	SAC 000365	Yes	Yes	No	Yes - Glenville	Yes
14	Glendine Wood	SAC 002324	Yes	Yes	No	Yes - Dungarvan	Yes
15	Blackwater Callows	SPA 004094	Yes	Yes	Yes - RWB Blackwater (Munster)	Yes – Lismore, Cappoquin Kiltorcan	Yes
16	Blackwater Estuary	SPA 004028	Yes	Yes	Yes – RWB Blackwater (Munster), TWB Lower Blackwater M	Yes - Glenville	Yes

	Site Name	SAC / SPA Code	Water Dependent Species / Habitats	Nutrient Sensitive	Surface Water Connectivity	Groundwater Connectivity	Potential Source Pathway Receptor
					Estuary / Youghal Harbour		
17	Ballymacoda Bay	SPA 004023	Yes	Yes	Yes - CWB Youghal Bay	No	Yes
18	Ballycotton Bay	SPA 004022	Yes	Yes	Yes - CWBs Western Celtic Sea, Ballycotton Bay	No	Yes
19	Cork Harbour	SPA 004030	Yes	Yes	Yes - CWBs Western Celtic Sea, Cork Harbour	No	Yes
20	Sovereign Islands	SPA 004124	Yes	Yes	Yes - CWB Western Celtic Sea	No	Yes
21	Old Head of Kinsale	SPA 004021	Yes	Yes	Yes - CWBs Western Celtic Sea, Courtmacsherry Bay	No	Yes
22	Courtmacsherry Bay	SPA 004219	Yes	Yes	Yes - CWBs Western Celtic Sea, Courtmacsherry Bay	No	Yes
23	Seven Heads	SPA 004191	Yes	Yes	Yes - CWB Western Celtic Sea	No	Yes
24	Clonakilty Bay	SPA 004081	Yes	Yes	Yes - CWBs Western Celtic Sea, Clonakilty Bay	No	Yes
25	Galley Head to Duneen Point	SPA 004190	Yes	Yes	Yes - CWB Western Celtic Sea	No	Yes
26	Sheep's Head to Toe Head	SPA 004156	Yes	Yes	Yes - CWB Western Celtic Sea	No	Yes
27	Dungarvan Harbour	SPA 004032	Yes	Yes	Yes - CWB Dungarvan Harbour	Yes - Dungarvan	Yes
28	Mullaghanish to Musheramore Mountains	SPA 004162	Yes	Yes	No	Yes - Glenville	Yes



Legend

- LEMA Emission Type**
- Primary Discharge Point
 - Secondary Discharge Point
 - Storm Water Overflow
 - Waste Water Treatment Plant
 - LCB Lismore WTP
 - Water Supply Zone Boundary (WSZ)
 - Additional WSZ considered for dosing
 - ▨ Special Area of Conservation (SAC)
 - ▨ Special Protection Area (SPA)
 - Zone of Influence

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



Client



Project Lead Mitigation Plan
Corrective Water Treatment Works

Title

LCB Lismore
European Sites within the
Zoi of the Proposed Project



Scale: 1:600,000 @ A3

Date: 07/02/2019

File Ref:
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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 three sites for the operational phase, with justification provided below.

The construction phase of the proposed project will take place adjacent to the existing LCB Lismore Deerpark Pump Station. There is no potential for surface water connectivity to any European Site. The pump station is located within the Lismore groundwater body (IE_SW_G_050) and potential hydrogeological connectivity between the proposed development site and the Blackwater River (Cork / Waterford) SAC and Blackwater Callows SPA has been included for further assessment in Section 5.

For the operational phase, the WSZ for LCB Lismore Deerpark PS is located adjacent to the Blackwater Estuary / Youghal Harbour. Two transitional water bodies, the Upper Blackwater M Estuary (IE_SW_020_0500) and the Lower Blackwater M Estuary/ Youghal Harbour (IE_SW_020_0100), are directly intersected by the WSZ and extend downstream of the WSZ before entering Youghal Bay (IE_SW_020_0000) and the Western Celtic Sea coastal water body. Both transitional water bodies are designated as part of the Blackwater River (Cork/ Waterford) SAC. This SAC is also directly intersected by the WSZ. The WSZ also intersects the Blackwater Callows SPA and therefore both these sites are included for further assessment in Section 5 and 6.

The WSZ also intersects six groundwater bodies – Ballyknock (IE_SE_G_014), Glenville (IE_SW_G_037), Dungarvan (IE_SE_G_052), Lismore (IE_SW_G_050), Cappoquin Kiltorcan (IE_SW_G_025) and Knockmealdown (IE_SW_G_047). The Blackwater River (Cork/Waterford) SAC is intersected by four of these: Cappoquin Kiltorcan, Lismore, Glenville and Dungarvan and the Blackwater Callows SPA is intersected by Cappoquin Kiltorcan, Lismore. Both these sites are already included for hydrological connections. For European Sites which have only hydrogeological connections, i.e. Ardmore Head SAC, Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC, Mullaghanish to Musheramore Mountains SPA, Blackwater Estuary SPA, Glendine Wood SAC and Dungarvan Harbour SPA, an assessment was made of the direction of flow in the groundwater body forming the connection.

Groundwater flows through voids such as connected pore spaces in sand and gravel aquifers and through fissures, faults, joints and bedding planes in bedrock aquifers. Regional groundwater flows tend to follow the regional topography and generally discharge towards main surface water bodies including rivers, lakes and coastal water bodies. In 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 GSI⁴, and was consulted in making the assessment.

⁴ <https://www.gsi.ie/en-ie/programmes-and-projects/groundwater/activities/understanding-ireland-groundwater/Pages/Groundwater-bodies.aspx>

Glenville GWB (IE_SW_G_037) is poorly productive bedrock. Groundwater flow in this GWB occurs in faults and joints. Most groundwater flow probably occurs in an upper shallow weathered zone. The water table is generally within 10 m of the surface. Groundwater is generally unconfined. Local groundwater flow is towards the rivers and streams, and flow path will not usually exceed a few hundred metres in length⁵. A small area to the south of the WSZ intersects this groundwater body. Ardmore Head SAC, Blackwater River (Cork/Waterford) SAC, Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC, Mullaghanish to Musheramore Mountains SPA and Blackwater Estuary SPA also intersect the GWB. The Blackwater River (Cork/Waterford) SAC has already been included for further assessment in Section 6 for its hydrological connectivity to the WSZ. Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC and Mullaghanish to Musheramore Mountains SPA are located >70 km up gradient of the WSZ. As local groundwater flow is towards the rivers and streams, and flow path will not usually exceed a few hundred metres in length, the SAC and SPA are excluded from further assessment in Section 6. The Blackwater Estuary SPA and Ardmore Head SAC are located both located >10 km south of the WSZ, respectively, and therefore are also excluded from further assessment in Section 6.

Dungarvan (IE_SE_G_052) is a karstic GWB. The upper weathered and fractured zone of bedrock acts as a zone of high permeability; large fissures or karstic conduits are often present within the bedrock, through which a large proportion of groundwater flow takes place. The groundwater gradient is flatter in the more permeable limestone and flow direction in the vicinity of Ballynamuck is eastward toward the sea. A groundwater divide is present to the west of the public supply well in the Whitechurch area. Groundwater to the west of the divide flows towards the Munster Blackwater. Groundwater to the east flows toward Dungarvan Harbour. The eastern side of the WSZ intersects this GWB at its western end. The GWB provides hydrogeological connectivity to Glendine Wood SAC and Dungarvan Harbour SPA. Given the east/west divide in the GWB flows, there is no potential for the transfer of orthophosphate from the WSZ to Glendine Wood SAC and Dungarvan Harbour SPA and therefore both sites are excluded from further assessment in Section 6.

The Upper Blackwater M Estuary (IE_SE_020_0500) is directly connected to the WSZ, and the rivers that intersect the WSZ drain into both the Upper Blackwater M Estuary (IE_SE_020_0500) and the Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100) transitional water body. As the modelled increase in orthophosphate concentrations in both estuaries is not detectable (0.0000 mg/l), the Zol has been terminated at the Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100). The Blackwater Estuary SPA is located within the Lower Blackwater M Estuary and has been included for further assessment.

A large coastal water body i.e. the Western Celtic Sea lies downstream of the WSZ. As discussed above, the Zol has been terminated at the Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100) which then discharges to the Youghal Bay (IE_SW_020_0000) coastal water body, before entering the Western Celtic Sea (IE_SW_010_0000) coastal water body. All European Sites downstream of Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100) have been excluded from further assessment on this basis. These include: Ballymacoda Bay (Clonpriest and Pillmore) SAC, Ardmore Head SAC, Great Island Channel SAC, Courtmacsherry Estuary SAC, Clonakilty Bay SAC, Kilkeran Lake and Castlefreke Dunes SAC, Castletownshend SAC, Myross Wood SAC, Lough Hyne Nature Reserve and Environs SAC, Roaringwater Bay and Islands SAC, Barley Cove to Ballyrisode Point SAC, Ballymacoda Bay SPA, Ballycotton Bay SPA, Cork Harbour SPA, Sovereign Islands SPA, Old Head of Kinsale SPA, Courtmacsherry Bay SPA, Seven Heads SPA, Clonakilty Bay SPA, Galley Head to Duneen Point SPA and Sheep's Head to Toe Head SPA.

⁵ https://jetstream.gsi.ie/iwdds/delivery/GSI_Transfer/Groundwater/GWB/GlenvilleGWB.pdf

On this basis, two sites have been included for further assessment in order to evaluate the significance of potential effects arising during construction phase in Section 5 below i.e. Blackwater River (Cork / Waterford) SAC and Blackwater Callows SPA. Three sites have been included for further assessment for the operational phase in Sections 5 and 6 below, i.e. the Blackwater River (Cork / Waterford) SAC, Blackwater Callows SPA and Blackwater Estuary SPA.

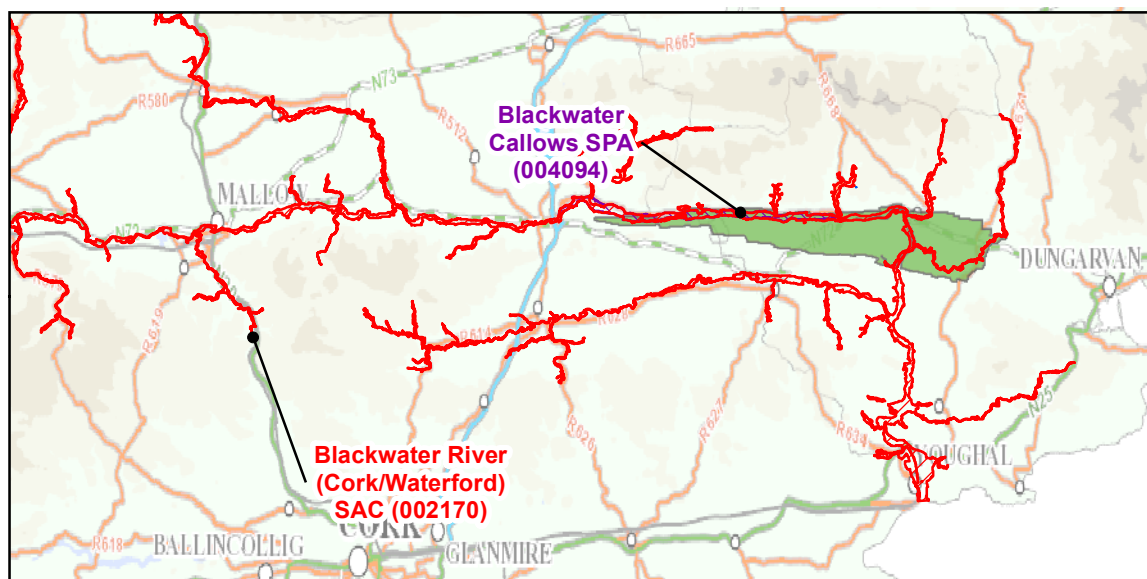
Table 4-3: European Sites Hydrologically or Hydrogeologically Connected to or Downstream of the WTP and WSZ

Site Name	SAC / SPA Code	Conservation Objectives Establishment Date	Feature Code	Qualifying Interests / Special Conservation Interests	Water Dependent Species / Habitats	Nutrient Sensitive	Potential Hydrological / Hydrogeological Connectivity	Potential Source Pathway Receptor
Construction and Operational Phases								
Blackwater River (Cork / Waterford) SAC	SAC 002170	31 July 2012 Version 1.0	1029	Freshwater pearl mussel (<i>Margaritifera margaritifera</i>)	Yes	Yes	Yes	Yes
			1092	White-clawed Crayfish (<i>Austropotamobius pallipes</i>)	Yes	Yes		
			1095	Sea lamprey (<i>Petromyzon marinus</i>)	Yes	Yes		
			1096	Brook lamprey (<i>Lampetra planeri</i>)	Yes	Yes		
			1099	River lamprey (<i>Lampetra fluviatilis</i>)	Yes	Yes		
			1103	Twaite shad (<i>Alosa fallax</i>)	Yes	Yes		
			1106	Atlantic salmon (<i>Salmo salar</i>) (only in fresh water)	Yes	Yes		
			1130	Estuaries	Yes	Yes		
			1140	Mudflats and sandflats not covered by seawater at low tide	Yes	Yes		
			1220	Perennial vegetation of stony banks	Yes	No		
			1310	Salicornia and other annuals colonising mud and sand <i>Spartina</i> swards (<i>Spartinion maritimae</i>)	Yes	Yes		
			1330	Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)	Yes	Yes		

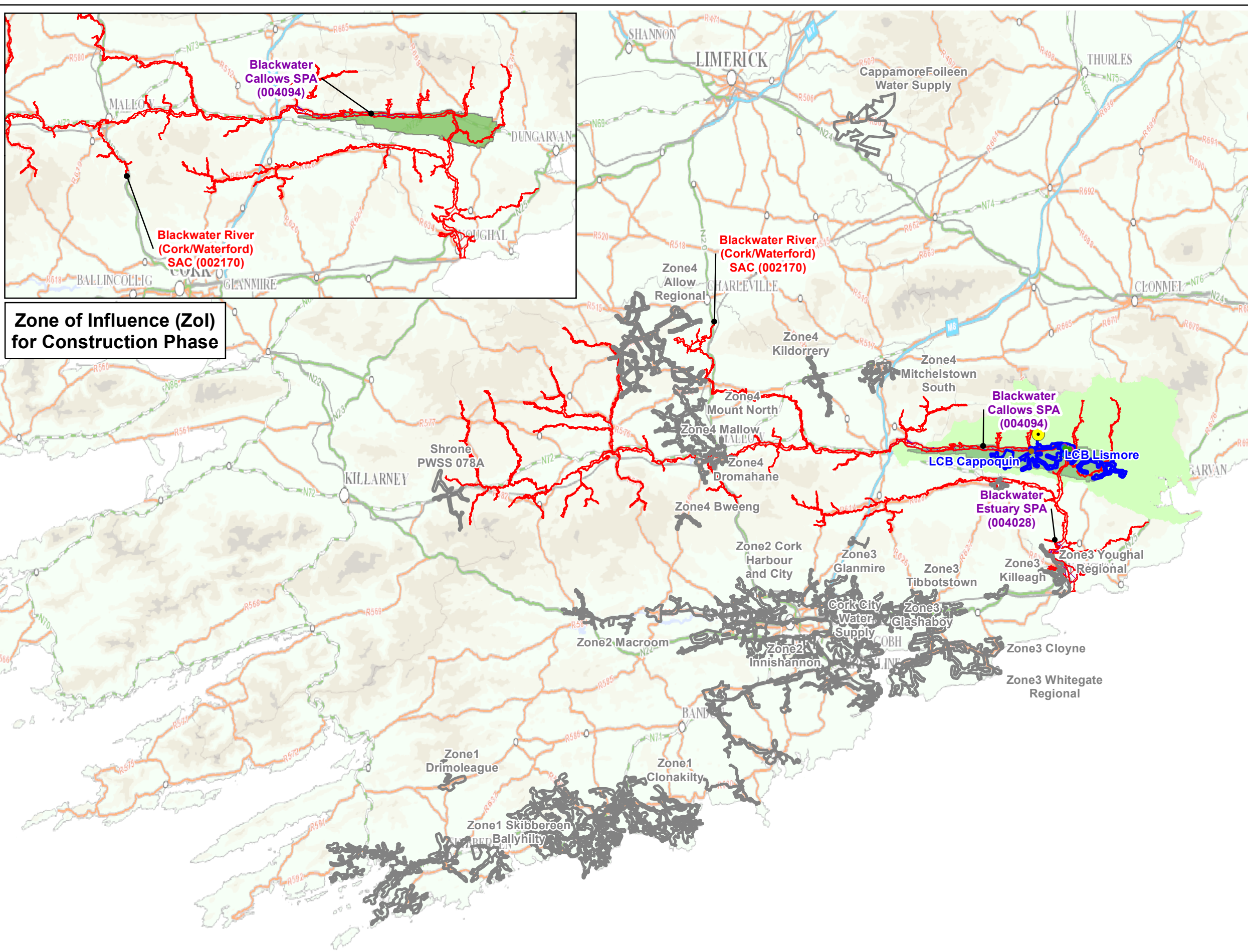
Site Name	SAC / SPA Code	Conservation Objectives Establishment Date	Feature Code	Qualifying Interests / Special Conservation Interests	Water Dependent Species / Habitats	Nutrient Sensitive	Potential Hydrological / Hydrogeological Connectivity	Potential Source Pathway Receptor
			1355	Otter (<i>Lutra lutra</i>)	Yes	Yes		
			1410	Mediterranean salt meadows (<i>Juncetalia maritimi</i>)	Yes	Yes		
			1421	Killarney fern (<i>Trichomanes speciosum</i>)	Yes	Yes		
			3260	Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation	Yes	Yes		
			91A0	Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles	No	Yes		
			91E0	* Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>)	Yes	Yes		
			91J0	* <i>Taxus baccata</i> woods of the British Isles	No	No		
Blackwater Callows SPA	SPA 004094	21 February 2018 Version 6.0	A038	Whooper Swan (<i>Cygnus cygnus</i>)	Yes	Yes	Yes	Yes
			A050	Wigeon (<i>Anas Penelope</i>)	Yes	Yes		
			A052	Teal (<i>Anas crecca</i>)	Yes	Yes		
			A156	Black-tailed Godwit (<i>Limosa limosa</i>)	Yes	Yes		
Operational Phase Only								
Blackwater Estuary SPA	SPA 004028	17 th Ma7 2012 Version 1.0	A050	Wigeon (<i>Anas Penelope</i>)	Yes	Yes	Yes	Yes
			A140	Golden Plover (<i>Pluvialis apricaria</i>)	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
			A142	Lapwing (<i>Vanellus vanellus</i>)	Yes	Yes		
			A149	Dunlin (<i>Calidris alpina</i>)	Yes	Yes		
			A156	Black-tailed Godwit (<i>Limosa limosa</i>)	Yes	Yes		
			A157	Bar-tailed Godwit (<i>Limosa lapponica</i>)	Yes	Yes		
			A160	Curlew (<i>Numenius arquata</i>)	Yes	Yes		
			A162	Redshank (<i>Tringa totanus</i>)	Yes	Yes		
			A999	Wetlands	Yes	Yes		

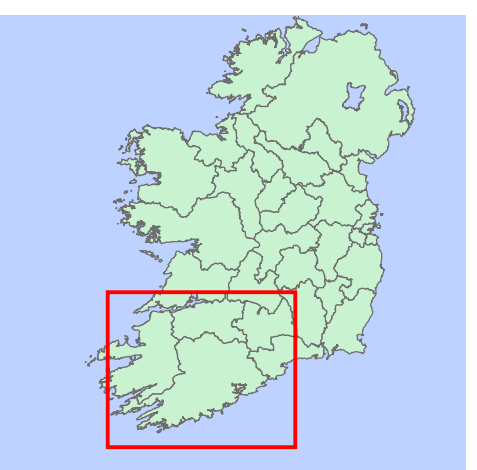
*Indicates a priority habitat under the habitats directive.



Zone of Influence (Zoi) for Construction Phase



Zone of Influence (Zoi) for Operational Phase



Legend

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

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

0 5 10 20 Kilometres

Client

Project **Lead Mitigation Plan**
Corrective Water Treatment Works

Title

LCB Lismore

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

RPS

Scale: 1:600,000 @ A3 Date: 07/02/2019

File Ref: MDW0766Arc0028bF01 Map Projection: Irish National Grid (TM65)

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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 LCB Lismore Deerpark Pump Station. These will be evaluated with regard to the potential for likely significant effects on European Sites. These are potential effects and in the absence of pathways (which is evaluated in **Section 5.3.1** below) the construction phase may not give rise to these effects.

- Sediment laden run-off from excavation areas (trenches for dosing pipelines, carrier water pipework and electrical cables) and the introduction of fine sediments to watercourses connected to the works area causing a deterioration in water quality;
- Dust and noise emissions from excavation (trenches for dosing pipelines, carrier water pipework and electrical cables and transportation of material and equipment close to watercourses causing a deterioration in water quality or disturbance to species (e.g. birds);
- Environmental incident or accident during the construction phase e.g. spillage of a contaminant such as diesel or phosphoric acid causing a deterioration in water quality;

- Groundwater level drawdown through the excavation of trenches for dosing pipelines, carrier water pipework and electrical cables.

5.2.2 Operational Phase

The source-pathway-receptor approach has identified a number of impact pathways associated with the operation of orthophosphate treatment works at LCB Lismore Deerpark Pump Station. 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 LCB Lismore Deerpark Pump Station.

5.3.1 Construction Phase

There is one possible location for the orthophosphate dosing system which will be located adjacent to the existing pump station. The assessment of potential significant effects associated with construction of the corrective water treatment works was conducted taking the whole LCB Lismore Deerpark Pump Station and proposed development area into account. The assessment of impacts associated with the construction of the corrective water treatment works at LCB Lismore Deerpark Pump Station is presented in **Table 5-1** and is based on a desktop study using the following information:

- Design descriptions and drawings for the proposed corrective water treatment works at LCB Lismore Deerpark Pump Station;
- 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	Evaluation of Potential Significant Effects
Blackwater River (Cork / Waterford) SAC (002170)	IE_SW_G_050 Lismore	GWB	<p>The construction works will be adjacent to the existing LCB Lismore Deerpark Pump Station; LCB Lismore Deerpark Pump Station is not located within or adjacent to any European Site.</p> <p>Surface Water LCB Lismore Pump Station lies approximately 1 km south of the Blackwater (Munster)_220 (IE_SW_18B022700) and approximately 1 km north-east of the Owbeg (Waterford)_020 (IE_SW_18O020800) rivers. The Blackwater (Munster)_220 (IE_SW_18B022700) river forms part of both the Blackwater River (Cork / Waterford)SAC and the Blackwater Callows SPA, however the SPA is located in a upstream direction of the pump station. The Owbeg (Waterford)_020 (IE_SW_18O020800) meets the Lower Blackwater M Estuary approximately 2 km downstream, which also forms part of the Blackwater River (Cork/Waterford) SAC (002170) and Blackwater Estuary SPA (004028).</p> <p>There is no potential for connectivity between the proposed works and any surface water body due to distance between the works and the closest rivers (approximately 1 km) and the nature of the landscape between the pump station site and the rivers, which includes a variety of agricultural grasslands, hedgerows, treelines and some regional and local roadways.</p>

Site Name (Code)	Contributing WB Code_Name	WB Type	Evaluation of Potential Significant Effects
Blackwater Callows SPA (004094)	IE_SW_G_050 Lismore	GWB	<p>These features comprise a boundary of separation, isolating any surface water pathway from the works area to the European Sites; the River Blackwater (Munster)_220 (IE_SW_18B022700); and the Owbeg River (Waterford)_020 (IE_SW_18O020800).</p> <p>Groundwater</p> <p>LCB Lismore Deerpark Pump Station overlies the Lismore (IE_SW_G_050) groundwater body. All European Sites overlying or supporting connectivity to this groundwater body have been assessed to determine potential source pathway receptors. This groundwater body comprises regionally important karstified aquifer dominated by diffuse flow, locally important aquifer which is moderately productive in local zones around the body margins and poor aquifer which is generally unproductive along the northern margin⁶. Groundwater discharges to springs within the GWB and to the rivers and streams crossing the GWB. A small amount of groundwater may cross as through-flow from the sandstones into this GWB. Point and diffuse recharge will occur. As a result, the Blackwater River (Cork/Waterford) SAC and Blackwater Callows SPA, are considered to have potential hydrogeological connectivity to the WTP. However they are located approximately 1.0 km and 1.5 km from the pump station respectively.</p> <p>As the excavation works will not be extensive (up to c. 75m for pipework and to an approximate depth of 700mm) and upon made ground, interference with water table will be unlikely to occur. Any interference would be localised, minor and temporary. Therefore, there is no potential for likely significant effects on the Blackwater River (Cork/Waterford) SAC and the Blackwater Callows SPA as a result of the construction of the corrective water treatment works at LCB Lismore Deerpark Pump Station.</p>

5.3.2 Operational Phase

In the case of the additional orthophosphate load due to dosing at LCB Lismore Deerpark Pump Station, 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;

⁶ https://jetstream.gsi.ie/iwdds/delivery/GSI_Transfer/Groundwater/GWB/LismoreGWB.pdf

- 75% of the upper threshold for the indicative quality;
- Cumulative orthophosphate load to surface from leakage, DWWTs and agglomerations;
- The modelled orthophosphate concentration following dosing at the WTP; and
- The orthophosphate potential baseline concentration (mg/l) following dosing at the WTP.

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

When assessing the increase in orthophosphate concentrations as a result of proposed dosing, an increase which is <5% of the Good / High indicative quality boundary, i.e. 0.00125mg/l, is excluded from further assessment and is assumed to result in no significant impact to a water body. If the baseline orthophosphate concentration in addition to the potential increase in orthophosphate concentration as a result of dosing is less than the 75% upper threshold of the indicative quality band for a water body, this also results in no significant impact. Where a water body does not have monitored orthophosphate concentrations, a conservative approach is used whereby the surrogate indicative quality is calculated based on the ecological status assigned to that water body by the EPA.

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

Where a transitional or coastal water body does not have monitored orthophosphate concentrations or salinity levels, a conservative approach is used whereby the surrogate indicative quality is calculated based on inputting water bodies or pressures acting on the ecological status assigned to that water body by the EPA but the more conservative freshwater orthophosphate limits for the different indicative quality bands are applied⁷.

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

⁷ 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.

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

The identification of statistically and environmentally significant trends for water bodies is a specific requirement of the WFD and the Groundwater Daughter Directive. Guidance on trends in groundwater assessments (UKTAG 2009, EPA 2010) indicates that trends are environmentally significant if they indicate that the Good Ecological Status will not be achieved within two future river basin cycles, i.e. within the next 6 years.

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

This assessment assumes a dosing rate of 0.8 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 the most up to date baseline data from the WFD monitoring programme. If tests fail and more investigation is required, more recent data can be used and the assessment rerun. For example, where 2019 - 2021 concentrations for a river water body are available, the 2019 – 2021 average can be used instead of the 2017 baseline provided in the WFD App.

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 ⁸	Ortho P Indicative Quality ⁹ and Trends ¹⁰	Baseline ¹¹ Ortho P Conc. ¹² (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. ¹³ (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l) ¹⁴	Evaluation
Blackwater River (Cork / Waterford) SAC (002170)	IE_SW_18B022700 Blackwater (Munster)_220	RWB Multiple Monitoring Points	Good Downwards Near	0.033	0.033	1.9	0.0000	0.033	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
			Moderate Upwards Far	0.037	0.051			0.037	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
			Moderate Upwards Far	0.044	0.051			0.044	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
			Moderate Upwards Far	0.050	0.051			0.050	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_18O080200 Owennashad_030	RWB	High Downwards Far	0.014	0.019	0.1	0.0000	0.014	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.

⁸ Monitoring period is annual unless specified.

⁹ Surrogate Indicative Quality in *italic*.

¹⁰ Distance to threshold.

¹¹ Baseline year is 2014 for surface water bodies and 2012 for groundwater bodies.

¹² Surrogate concentration is given in *italic* mg/l

¹³ 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.

¹⁴ 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 ⁸	Ortho P Indicative Quality ⁹ and Trends ¹⁰	Baseline ¹¹ Ortho P Conc. (mg/l) ¹²	75% of Indicative Quality Upper Threshold (mg/l)	Total Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Increase in Conc. ¹³ (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l) ¹⁴	Evaluation
	IE_SW_18L220930 Lyrenacallee East_010	RWB	Good	0.030	0.033	3.9	0.0007	0.031	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_18G100200 Glennafallia_020	RWB	Good Upwards Far	0.030	0.033	0.3	0.0000	0.030	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives
	IE_SW_18O020400 Owbeg (Waterford)_010	RWB	Moderate	0.046	0.051	2.5	0.0003	0.046	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives
	IE_SW_18O020800 Owbeg (Waterford)_020	RWB	Good Upwards Far	0.029	0.033	3.5	0.0003	0.029	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives
	IE_SW_18F020500 Finisk_030	RWB	Good Upwards Far	0.031	0.033	0.8	0.0000	0.031	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives
	IE_SW_18M260940 Moneygorm_010	RWB	Good	0.030	0.033	0.3	0.0001	0.030	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives
	IE_SW_020_0500 Upper Blackwater M Estuary	TWB Summer	High (S) Downwards Far	0.019	0.023	17.7	0.0000	0.019	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives
		TWB Winter	Good (W) Upwards Near	0.031	0.053			0.031	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives
	IE_SW_020_0100	TWB Summer	High (S) Downwards Far	0.021	0.023	22.2	0.0000	0.021	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives

Site Name (Code)	Contributing WB Code_Name	WB Type ⁸	Ortho P Indicative Quality ⁹ and Trends ¹⁰	Baseline ¹¹ Ortho P Conc. ¹² (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. ¹³ (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l) ¹⁴	Evaluation
	Lower Blackwater M Estuary / Youghal Harbour	TWB Winter	Good (W) Upwards Near	0.034	0.053			0.034	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives
	IE_SW_G_025 Cappelquin Kiltorcan	GWB Multiple Monitoring Points	Failing to achieve good Upwards Far	0.055	-	1.5	0.0001	0.055	Monitoring point is failing but the modelled conc. is negligible. No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
			Good Upwards Far	0.011	0.026			0.011	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives
	IE_SW_G_050 Lismore	GWB Multiple Monitoring Points	Good Upwards Far	0.006	0.026	6.1	0.0002	0.006	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives
			Good Upwards Far	0.005	0.026			0.005	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives
	IE_SW_G_037 Glenville	GWB Multiple Monitoring Points	Good None Far	0.006	0.026	0.0	0.0000	0.006	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives
			Good Upwards Far	0.009	0.026			0.009	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives
	IE_SE_G_052 Dungarvan	GWB	Good Upwards Far	0.009	0.026	0.0	0.0000	0.009	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives

Site Name (Code)	Contributing WB Code_Name	WB Type ⁸	Ortho P Indicative Quality ⁹ and Trends ¹⁰	Baseline ¹¹ Ortho P Conc. ¹² (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. ¹³ (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l) ¹⁴	Evaluation
Blackwater Estuary SPA (004028)	IE_SW_18B022700 Blackwater (Munster)_220	RWB Multiple Monitoring Points	Good Downwards Near	0.033	0.033	1.9	0.0000	0.033	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
			Moderate Upwards Far	0.037	0.051			0.037	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
			Moderate Upwards Far	0.044	0.051			0.044	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
			Moderate Upwards Far	0.050	0.051			0.050	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_18O080200 Owennashad_030	RWB	High Downwards Far	0.014	0.019	0.1	0.0000	0.014	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_18L220930 Lyrenacallee East_010	RWB	Good	0.030	0.033	3.9	0.0007	0.031	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SW_18G100200 Glennafallia_020	RWB	Good Upwards Far	0.030	0.033	0.3	0.0000	0.030	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives
IE_SW_18O020400 Owbeg (Waterford)_010	RWB	Moderate	0.046	0.051	2.5	0.0003	0.046	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives	
IE_SW_18O020800 Owbeg (Waterford)_020	RWB	Good Upwards Far	0.029	0.033	3.5	0.0003	0.029	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives	

Site Name (Code)	Contributing WB Code_Name	WB Type ⁸	Ortho P Indicative Quality ⁹ and Trends ¹⁰	Baseline ¹¹ Ortho P Conc. ¹² (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. ¹³ (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l) ¹⁴	Evaluation
	IE_SW_18F020500 Finisk_030	RWB	Good Upwards Far	0.031	0.033	0.8	0.0000	0.031	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives
	IE_SW_18M260940 Moneygorm_010	RWB	Good	0.030	0.033	0.3	0.0001	0.030	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives
	IE_SW_020_0500 Upper Blackwater M Estuary	TWB Summer	High (S) Downwards Far	0.019	0.023	17.7	0.0000	0.019	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives
		TWB Winter	Good (W) Upwards Near	0.031	0.053			0.031	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives
	IE_SW_020_0100 Lower Blackwater M Estuary / Youghal Harbour	TWB Summer	High (S) Downwards Far	0.021	0.023	22.2	0.0000	0.021	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives
		TWB Winter	Good (W) Upwards Near	0.034	0.053			0.034	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives

‡ Load from WWTP / SWO following treatment added

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 waste water discharge licence (WDDL) (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.

Cappoquin Agglomeration

Cappoquin WWTP (D0272-01) discharges into Upper Blackwater M Estuary (IE_SW_020_0500) which is located within the Blackwater River (Cork/ Waterford) SAC. The plant is currently operating with secondary treatment processes and is compliant with the ELV standards in terms of existing and post dosing modelled effluent orthophosphate concentrations. When mean flows are taken into account the modelled increase in orthophosphate concentration levels is undetectable 0.0% in the receiving water (**Table 5-4**). Therefore, there is no risk to the achievement of WFD objectives of the Upper Blackwater M Estuary (IE_SW_020_0500), and its hydrologically connected European Sites as a result of dosing at LCB Lismore Deerpark Pump Station.

Lismore Agglomeration

Lismore WWTP (D0176-01) discharges into the Blackwater (Munster)_220 (IE_SW_18B022700) which is hydrologically connected to the Blackwater River (Cork/ Waterford) SAC and Blackwater Callows

SPA. The plant’s effluent concentrations are compliant with ELVs. As Lismore WWTP receives tertiary treatment, i.e. chemical dosing for nutrient removal and is compliant with the ELVs set in the discharge licence, the EAM assumes that the additional orthophosphate loading to the plant can be dealt with and managed within the treatment process. When mean flows are taken into account the modelled increase in orthophosphate concentration is undetectable 0.0% in the receiving water (Table 5-4). Therefore, there is no risk to the achievement of WFD objectives of the Blackwater (Munster)_220 (IE_SW_18B022700) and its hydrologically connected European Sites as a result of dosing at LCB Lismore Deerpark Pump Station.

Table 5-3: Increased loading / concentration due to Orthophosphate Dosing – Dosing rate = 0.8 mg/l

Agglom. and Discharge Type	ELV from WWDL (mg/l)	Scenario	TP Load Kg/Yr	Ortho P Concentration mg/l TP – Ortho P Conversion factor varied for sensitivity analysis (40%, 50%, 68%)		
				0.5	0.4	0.68
Cappoquin Primary Discharge	5mg/l Ortho P Compliant with ELV for ortho P in 2022 AER	Existing	146.6	0.603	0.482	0.820
		Post Dosing	162.3	0.668	0.534	0.908
Cappoquin SWOs (2 no.)	n/a	Existing	13.3	1.884	1.507	2.562
		Post Dosing	13.8	1.949	1.559	2.650
Lismore Primary Discharge	3mg/l ortho P Compliant with ELV for ortho P in 2017 AER	Existing	300.6	0.633	0.506	0.860
		Post Dosing	300.6	0.633	0.506	0.860
Lismore SWOs (1 no.)	n/a	Existing	26.5	1.917	1.534	2.607
		Post Dosing	27.2	1.968	1.574	2.677

Table 5-4: Mass balance assessment based on 0.8 mg/l dosing using available background concentrations and mean flow information from Hydrotool and an assumed daily tidal exchange volume.

Agglom.	WB Name / Code for Primary Discharge	Background Conc. ¹⁵ (mg/l)	Modelled Conc. Existing (mg/l)	Modelled Conc. Post Dosing (mg/l)	% Inc
Lismore (D0176)	Blackwater (Munster)_220 IE_SW_18B022700	0.0270	0.0271	0.0271	0.0%
Cappoquin (D0272)	Upper Blackwater M Estuary IE_SW_020_0500	0.0350	0.0350	0.0351	0.0%

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 concentrations due to subsurface pathways are insignificant in all water bodies, i.e. < 0.00125 mg/l (5% of the High / Good indicative quality boundary for surface water bodies).

¹⁵ Annual mean from AER u/s monitoring point

The highest concentration modelled for receiving water bodies is 0.0007 mg/l to Lyrenacallee East_010 (IE_SW_18L220930) which is hydrologically connected to both the Blackwater River (Cork/Waterford) SAC and the Blackwater Estuary SPA downstream.

The modelled increases for the transitional water bodies are not detectable (0.0000 mg/l). There are no lake or coastal water bodies directly affected by the WSZ.

Therefore there will be no risk of deterioration in the orthophosphate indicative quality or of preventing the achievement of WFD objectives within waterbodies hydrologically / hydrogeologically connected to the proposed orthophosphate dosing.

5.3.4.2 Groundwater Assessment

The predicted loads and concentrations to groundwater bodies (GWBs) are undetectable in most cases (0.0000 mg/l), with the remaining modelled increases not exceeding 5% of the Good / Fail indicative quality boundary, as shown in **Table 3 of Appendix C**.

The groundwater body with the highest potential increase in orthophosphate concentration due to dosing is Lismore (IE_SW_G_050). In this case the potential increase is 0.0002 mg/l which is insignificant and does not exceed the 5% Good / Fail indicative quality boundary.

One groundwater body, Cappoquin Kiltorcan (IE_SW_G_025), has one monitoring point with orthophosphate indicative quality at "Failing to Achieve Good". However the modelled increase in concentration is negligible at 0.0001 mg/l.

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

5.3.5 Combined Assessment

Table 4A of Appendix C provides details of the combined orthophosphate inputs to river water bodies from direct discharges, DWWTSs and leakage loads. The increased loads due to orthophosphate dosing are not predicted to be significant i.e. are <0.0125 mg/l (5% of High / Good indicative quality boundary). The dosing therefore poses no risk of deterioration in the orthophosphate indicative quality of the river water bodies identified in **Table 5-2**, or of preventing their achievement of WFD objectives.

Table 4B of Appendix C gives the loads and concentrations to transitional water bodies. The modelled increases in concentration is not detectable in both water bodies (0.0000 mg/l). The increased load due to the WWTP in Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100) also has a negligible impact, as demonstrated in **Table 2 of Appendix C**; therefore, there will be no likely significant effect to the receiving water bodies as a result of dosing at LCB Lismore Deerpark Pump Station.

There are no lake or coastal water bodies directly affected by the WSZ.

5.3.6 Assessment of Cumulative Impacts from other WSZs

The cumulative impacts on Blackwater (Munster) (HA 18) catchment; Lee, Cork Harbour & Youghal (HA 19) Catchment and 20 Bandon-Ilen (HA 20) Catchment associated with the corrective water treatment at the following additional WTPs have been assessed in combination with LCB Lismore Deerpark Pump Station. The common water bodies evaluated within the WSZs supplied by these WTPs have been summarised in **Table 5-5** below.

- 4 Lee Road WTP - Cork City Water Supply
- 6 Inniscarra WTP – Zone 2 Cork City and Harbour
- 26 Glashaboy WTP – Zone 3 Glashaboy
- 30 Innishannon WTP – Zone 2 Innishannon
- 36 Clonakilty RWSS WTP (Jones Bridge WTP) - Zone 1 Clonakilty
- 54 Mallow WTP (Ballyellis WTP) – Zone 4 Mallow
- 59 Glendine WTP - Zone3 Youghal Regional
- 60 Ballyhilty WTP - Zone 1 Skibbreen Ballyhilty
- 72 Kilva Reservoir Site – Zone 3 Whitegate Regional
- 78 Midleton WTP – Zone 3 Midleton
- 83 Tibbetstown WTP - Tibbotstown
- 118 Macroom WTP – Zone 2 Macroom
- 157 Carriglusky Reservoir Site, Cloyne - Zone3 Cloyne
- 161 Freemount WTP – Zone 4 Allow Regional
- 165 Knockraha WTP -Zone3 Glanmire
- 180 Mitchelstown South WTP – Zone 4 Mitchelstown South
- 192 Michelstown Galtee WTP - Cappamore Foileen Water Supply
- 236 Mounthnorth Reservoir – Zone 4 Mount North
- 324 Kildorrery WTP – Zone 4 Kildorrery
- 333 Shrone WTP - Shrone PWSS 078A
- 359 Ballymacoda Road Borehole – Zone 3 Killeagh
- 363 Hammond Place Pump Station – Zone 4 Dromahane
- 370 LCB Cappoquin Pump Station - LCB Cappoquin
- 376 Tallow WTP - Tallow
- 386 Drimoleague WTP, Deelish – Zone 1 Drimoleague
- 400 Bweeng WTP – Zone 4 Bweeng

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

Table 5-5: Cumulative assessment of the increased loading and concentrations from Zone 3 Youghal Regional and other WSZs proposed for corrective water treatment in the upstream catchments

NAME / EU_CD	Period	Ortho P Indicative Quality and Trends (distance to threshold) [Surrogate indicative quality given in <i>italic</i>]	Baseline Year and Conc. mg/l [Surrogate Conc. given in <i>italic</i>]	75% of indicative quality upper threshold mg/l	Cumulative Ortho P load to SW from leakage, DWWTs & agglomerations kg/yr	Potential Increase in Ortho P Conc. due to Dosing (30%ile or gauged) mg/l	Potential Baseline for Ortho P Conc. following dosing mg/l
IE_SW_18B022700 Blackwater (Munster)_220	N/A	Good Downwards Near	0.033	0.033	338.3	0.0002	0.033
		Moderate Upwards Far	0.037	0.051			0.037
		Moderate Upwards Far	0.044	0.051			0.044
		Moderate Upwards Far	0.050	0.051			0.050
IE_SW_18F020500 Finisk_030	N/A	Good Upwards Far	0.031	0.033	5.3	0.0001	0.031
IE_SW_18F050600 Funshion_040	N/A	Moderate Downwards Far	0.040	0.051	19.5	0.0001	0.040
IE_SW_18F050700 Funshion_050	N/A	High Downwards Far	0.019	0.019	30.5	0.0001	0.019
IE_SW_18G100200 Glennafallia_020	N/A	Good Upwards Far	0.030	0.033	1.3	0.0000	0.030
IE_SW_18L220930 Lyrenacallee East_010	N/A	<i>Good</i>	<i>0.030</i>	<i>0.033</i>	4.5	0.0008	0.031
IE_SW_18M260940 Moneygorm_010	N/A	<i>Good</i>	<i>0.030</i>	<i>0.033</i>	6.7	<i>0.0012</i>	<i>0.031</i>
IE_SW_18O020400 Owbeg (Waterford)_010	N/A	<i>Moderate</i>	<i>0.046</i>	<i>0.051</i>	3.0	<i>0.0003</i>	<i>0.046</i>
IE_SW_18O020800 Owbeg (Waterford)_020	N/A	Good Upwards Far	0.029	0.033	6.8	0.0005	0.030

NAME / EU_CD	Period	Ortho P Indicative Quality and Trends (distance to threshold) [Surrogate indicative quality given in <i>italic</i>]	Baseline Year and Conc. mg/l [Surrogate Conc. given in <i>italic</i>]	75% of indicative quality upper threshold mg/l	Cumulative Ortho P load to SW from leakage, DWWTS & agglomerations kg/yr	Potential Increase in Ortho P Conc. due to Dosing (30%ile or gauged) mg/l	Potential Baseline for Ortho P Conc. following dosing mg/l
IE_SW_020_0500 Upper Blackwater M Estuary	TWB Summer	High (S) Downwards Far	0.019	0.023	380.9	0.0002	0.019
	TWB Winter	Good (W) Upwards Near	0.031	0.053			0.031
IE_SW_020_0100 Lower Blackwater M Estuary / Youghal Harbour	TWB Summer	High (S) Downwards Far	0.021	0.023	506.3	0.0001	0.021
	TWB Winter	Good (W) Upwards Near	0.034	0.053			0.034
IE_SW_020_0000 Youghal Bay	TWB Summer	High (S) Upwards Far	0.009	0.019	517.9	0.0000	0.009
	TWB Winter	High (W) Downwards Far	0.014	0.019			0.014
IE_SW_010_0000 Western Celtic Sea (HAs 18;19;20)	CWB	<i>High</i>	<i>0.013</i>	<i>0.019</i>	9601.2	0.0002	0.013

** 2014 Baseline is inconsistent with Upper and Lower Thresholds for the given Ortho P indicative quality as reported in the WFD App

5.3.7 Conclusions

The modelled increased orthophosphate dosing concentrations do not result in a noticeable effect with orthophosphate concentrations in both the receiving Blackwater M Estuary and Blackwater (Munster)_220 at 0%, 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) and therefore there is no risk of deterioration in the orthophosphate indicative quality of the river water bodies, or of preventing the achievement of their WFD objectives.

The highest concentration modelled for receiving water bodies is 0.0007 mg/l to Lyrenacallee East_010 (IE_SW_18L220930), which does not exceed 5% of the High / Good indicative quality boundary (0.00125 mg/l).

The predicted loads to groundwater bodies are undetectable (i.e. < 0.00175 mg/l = 5% of the Good / Fail boundary). One groundwater body has a monitoring point with orthophosphate Indicative Quality at “Failing to Achieve Good”, however the additional potential concentration to the water body is negligible, and the overlaying surface water bodies are not at risk of failing.

Increases in concentration for all remaining river and transitional water bodies are within the 5% Good / High indicative quality boundary threshold following dosing. Increases in all remaining groundwaters are within 5% of the Good / Fail indicative quality boundary. There are no coastal water bodies directly affected by the LCB Lismore Deerpark Pump Station.

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

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

6 EVALUATION OF LIKELY SIGNIFICANT EFFECTS

6.1 CONSTRUCTION PHASE

LCB Lismore Deerpark Pump Station is not located within or directly adjacent to the boundary of any European Site. The closest sites with connectivity to the proposal are Blackwater River (Cork/Waterford) SAC (002170) and Blackwater Estuary SPA (004028) located at approximate distances of 0.9 km and 1.5 km, respectively. Therefore, there is no potential for direct impacts to the European Sites as a result of the construction of the corrective water treatment works at LCB Lismore Deerpark Pump Station.

The LCB Lismore Deerpark Pump Station lies approximately 1 km south of the Blackwater (Munster)_220 (IE_SW_18B022700) and approximately 1 km north-east of the Owbeg (Waterford)_020 (IE_SW_18O020800) rivers. The Blackwater (Munster)_220 (IE_SW_18B022700) river forms part of both the Blackwater River (Cork / Waterford)SAC and the Blackwater Callows SPA, however the SPA is located a short distance upstream of the pump station. The Owbeg (Waterford)_020 (IE_SW_18O020800) meets the Lower Blackwater M Estuary approximately 2 km downstream, which also forms part of the Blackwater River (Cork/Waterford) SAC (002170) and Blackwater Estuary SPA (004028). From the minor scale of the proposed construction works, the existing habitats surrounding the works site will act to isolate any surface water flow paths from the works area to these rivers and as outlined in the impact assessment presented in **Section 5.3.1** above; there are no impact pathways identified which give rise to connectivity between the proposed construction works and any other European Sites.

In addition, LCB Lismore Deerpark Pump Station overlies the Lismore (IE_SW_G_050) groundwater body. This is a large groundwater body that intersects two European Sites, the Blackwater River (Cork/Waterford) SAC and the Blackwater Callows SPA. Interference with the underlying water table will be unlikely to occur owing to the nature of the construction works. The proposed construction works will be localised to the vicinity of the pump station development boundary; which comprises the grass verge adjacent to a regional road. The works site is bounded to the rear by scrub, a drainage ditch and agricultural grassland, therefore, any interference with groundwater interactions would be localised, minor and temporary. There is no potential for likely significant effects on the receiving ground or surface water bodies and by extension those European Sites as a result of the construction of the corrective water treatment works at LCB Lismore Deerpark Pump Station.

Therefore, it can be concluded on the basis of objective scientific information that the construction of the corrective water treatment works at LCB Lismore Deerpark Pump Station, individually or in combination with other plans or projects, will not have likely significant effects on European Sites.

6.2 OPERATIONAL PHASE

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

6.2.1 Blackwater River (Cork / Waterford)

SAC 002170

6.2.1.1 (1029) Freshwater Pearl Mussel

Conservation Objectives for the species in the Blackwater River SAC have been set; however an orthophosphate specific level is not defined (NPWS, 2012¹⁶). In addition, the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations S.I. No. 296 of 2009, set ecological quality objectives for the freshwater pearl mussel habitat, which are the equivalent of High status. The European Communities Environmental Objectives (Surface Water) Regulations S.I. No. 272 of 2009 (as amended) set a limit of ≤ 0.025 (mean) or ≤ 0.045 (95%ile) mg/l for Molybdate Reactive Phosphorus (MRP) (mg P/l) for High status waters; however, the level required is likely to be even more stringent than this standard. These objectives have framed the impact assessment for this species within this SAC for this proposed project.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Blackwater River SAC and will receive inputs from the proposed orthophosphate dosing at LCB Lismore Deerpark PS:

- The river water bodies that are hydrologically connected to the SAC include: Blackwater (Munster)_220 (IE_SW_18B022700), Owbeg (Waterford)_010 (IE_SW_18O020400), Owbeg (Waterford)_020 (IE_SW_18O020800), Owennashad_030 (IE_SW_18O080200), Lyrenacallee_East_010 (IE_SW_18L220930), Glennafallia_020 (IE_SW_18G100200), Moneygorm_010 (IE_SW_18M260940) and Finisk_030 (IE_SW_18F020500);
- The transitional water bodies connected to the SAC include: Upper Blackwater M Estuary (IE_SW_020_0500) and Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100); and
- The groundwater bodies connected to the SAC include: Glenville (IE_SW_G_037), Lismore (IE_SW_G_050), Cappoquin Kiltorcan (IE_SW_G_025), Dungarvan (IE_SE_G_052), Ballyknock (IE_SE_G_014) and Knockmealdown (IE_SW_G_047).

The freshwater pearl mussel in this SAC is known from the main Munster Blackwater River, two of its tributaries (Owentaraglin and Allow) and the Licky River which discharges into the Upper Blackwater Estuary. The Munster Blackwater population (including the Owentaraglin), the Allow population and the Licky population, are designated under the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations, S.I. No. 296 of 2009. The designated reach of the rivers along 168 km encompasses the length of channel from the most upstream records of the freshwater pearl mussel to the most downstream records of live mussels.

The distribution of the Freshwater pearl mussel in the Munster Blackwater catchment is presented in **Figure 6-1** below¹⁷. The mapped habitats are all upstream of the LCB Lismore WSZ, therefore there will be no interaction between the surface waters that have received dosing and the mapped locations. **Figure 6-2** shows the distribution and suitable habitat of Freshwater pearl mussel within the designated catchment from the Blackwater River (Cork/Waterford) SAC Conservation Objectives.

¹⁶ [NPWS 2012 Blackwater River \(Cork / Waterford\) SAC 002170 Conservation Objectives](#)

¹⁷ Munster Blackwater Freshwater Pearl Mussel Sub-basin Management Plan 2009 – 2015. Final. August 2010.

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 concentrations for river water bodies are in the range of 0.0000 mg/l to 0.0007 mg/l. For the Blackwater (Munster)_220 (IE_SW_18B022700), Owennashad_030 (IE_SW_18O080200), Glanafallia_020 (IE_SW_18G100200) and Finisk_030 (IE_SW_18F020500) the modelled increase is not detectable (0.0000 mg/l). The modelled increase in concentration for Moneygorm_010 (IE_SW_18M260940) is negligible (0.0001 mg/l). For both Owbeg (Waterford)_010 (IE_SW_18O020400) and Owbeg (Waterford)_020 (IE_SW_18O020800) the modelled increase is 0.0003 mg/l. Finally, the highest modelled increase for river water bodies is 0.0007 mg/l in Lyrenacallee_East_010 (IE_SW_18L220930). The modelled increases do not exceed 5% of the High / Good indicative quality boundary (0.00125 mg/l), and therefore there is no risk of deterioration of the current orthophosphate indicative quality of the river water bodies, or of preventing the achievement of WFD objectives.

For the transitional water bodies, Upper Blackwater M Estuary (IE_SW_020_0500) and Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100), the modelled increase in concentration due to dosing is not detectable (0.0000 mg/l) which is below the 5% High / Good indicative quality boundary of 0.00125 mg/l, and therefore there is no risk of deterioration of the current orthophosphate indicative quality of these transitional water bodies, or of preventing the achievement of WFD objectives.

For groundwater bodies Glenville (IE_SW_G_037), Dungarvan (IE_SE_G_052), Ballyknock (IE_SE_G_014) and Knockmealdown (IE_SW_G_047) the modelled increase in concentration is not detectable (0.0000 mg/l). For Cappoquin Kiltorcan (IE_SW_G_025) and Lismore (IE_SW_G_050), the modelled increases in orthophosphate concentrations are 0.0001 mg/l and 0.0002 mg/l, respectively. The modelled increases do not exceed 5% of the Good / Fail indicative quality boundary (0.00175 mg/l). There is one monitoring point within the Cappoquin Kiltorcan (IE_SW_G_025) which is currently failing to achieve good orthophosphate indicative quality. However, the modelled increase in orthophosphate concentration is negligible (0.0001mg/l). Therefore there is no risk of deterioration in the current orthophosphate indicative quality of these groundwater bodies, or of preventing the achievement of WFD objectives.

There are no coastal water bodies directly affected by this WSZ. There will be no potential for indirect impact to the species via these pathways e.g. via Atlantic salmon as a host to Freshwater pearl mussel larval glochidia. The assessment of potential for impacts to Atlantic salmon (freshwater only) is provided below under **Section** Error! Reference source not found..

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

6.2.1.2 (1092) White-clawed crayfish

A review of the targets and measures for the white-clawed crayfish found no nutrient specific targets for the species (NPWS, 2012¹⁶). However, white-clawed crayfish have a general water quality

requirement for moderate to good water quality (i.e. Q3-4 or higher; NPWS, 2013¹⁸), therefore any reduction in water quality as a result of orthophosphate loading would be contrary to the conservation objectives for this species.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Blackwater River SAC and will receive inputs from the proposed orthophosphate dosing at LCB Lismore Deerpark PS:

- The river water bodies that are hydrologically connected to the SAC include: Blackwater (Munster)_220 (IE_SW_18B022700), Owbeg (Waterford)_010 (IE_SW_18O020400), Owbeg (Waterford)_020 (IE_SW_18O020800), Owennashad_030 (IE_SW_18O080200), Lyrenacallee_East_010 (IE_SW_18L220930), Glennafallia_020 (IE_SW_18G100200), Moneygorm_010 (IE_SW_18M260940) and Finisk_030 (IE_SW_18F020500);
- The transitional water bodies connected to the SAC include: Upper Blackwater M Estuary (IE_SW_020_0500) and Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100); and
- The groundwater bodies connected to the SAC include: Glenville (IE_SW_G_037), Lismore (IE_SW_G_050), Cappoquin Kiltorcan (IE_SW_G_025), Dungarvan (IE_SE_G_052), Ballyknock (IE_SE_G_014) and Knockmealdown (IE_SW_G_047).

Within the Munster Blackwater River system, white-clawed crayfish are present only in the Awbeg River. There have been some records from other parts of the river system e.g. downstream of the confluence of the Awbeg and Munster Blackwater and upstream of Mallow (NPWS, 2012¹⁶). All known and potential locations of the species are a considerable distance upstream of the LCB Lismore WSZ, and there is no intersection between the river and groundwater bodies which intersect the WSZ and the Awbeg white-clawed crayfish population.

The modelled increases in orthophosphate concentrations for river water bodies are in the range of 0.0000 mg/l to 0.0007 mg/l. For the Blackwater (Munster)_220 (IE_SW_18B022700), Owennashad_030 (IE_SW_18O080200), Glennafallia_020 (IE_SW_18G100200) and Finisk_030 (IE_SW_18F020500) the modelled increase is not detectable (0.0000 mg/l). The modelled increase in concentration for Moneygorm_010 (IE_SW_18M260940) is negligible (0.0001 mg/l). For both Owbeg (Waterford)_010 (IE_SW_18O020400) and Owbeg (Waterford)_020 (IE_SW_18O020800) the modelled increase is 0.0003 mg/l. Finally the highest modelled increase for river water bodies is 0.0007 mg/l in Lyrenacallee_East_010 (IE_SW_18L220930). The modelled increases do not exceed 5% of the High / Good indicative quality boundary (0.00125 mg/l), and therefore there is no risk of deterioration of the current orthophosphate indicative quality of the river water bodies, or of preventing the achievement of WFD objectives.

For the transitional water bodies, Upper Blackwater M Estuary (IE_SW_020_0500) and Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100), the modelled increase in concentration due to dosing is not detectable (0.0000 mg/l) which is below the 5% High / Good indicative quality boundary of 0.00125 mg/l, and therefore there is no risk of deterioration of the current orthophosphate indicative quality of these transitional water bodies, or of preventing the

¹⁸ NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Species Assessments Volume 3. Version 1.0. Unpublished Report, National Parks & Wildlife

achievement of WFD objectives. White clawed crayfish are a freshwater species only and are not considered to occur within transitional water bodies.

For groundwater bodies Glenville (IE_SW_G_037), Dungarvan (IE_SE_G_052), Ballyknock (IE_SE_G_014) and Knockmealdown (IE_SW_G_047) the modelled increase in concentration is not detectable (0.0000 mg/l). For Cappoquin Kiltorcan (IE_SW_G_025) and Lismore (IE_SW_G_050), the modelled increases in orthophosphate concentrations are 0.0001 mg/l and 0.0002 mg/l, respectively. The modelled increases do not exceed 5% of the Good / Fail indicative quality boundary (0.00175 mg/l). There is one monitoring point within the Cappoquin Kiltorcan (IE_SW_G_025) which is currently failing to achieve good orthophosphate indicative quality. However, the modelled increase in orthophosphate concentration is negligible (0.0001mg/l). Therefore there is no risk of deterioration in the current orthophosphate indicative quality of these 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 LCB Lismore Deerpark PS, it has been demonstrated that the potential for likely significant effects on this habitat can be excluded. Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of this species.

6.2.1.3 (1095) Sea lamprey, (1096) Brook lamprey, (1099) River lamprey, (1103) Twaité shad 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.*, 2011¹⁹) 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 SSCOs (NPWS, 2012¹⁶) for these fish 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.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Blackwater River SAC and will receive inputs from the proposed orthophosphate dosing at LCB Lismore Deerpark PS:

- The river water bodies that are hydrologically connected to the SAC include: Blackwater (Munster)_220 (IE_SW_18B022700), Owbeg (Waterford)_010 (IE_SW_18O020400), Owbeg (Waterford)_020 (IE_SW_18O020800), Owennashad_030 (IE_SW_18O080200), Lyrenacallee_East_010 (IE_SW_18L220930), Glennafallia_020 (IE_SW_18G100200), Moneygorm_010 (IE_SW_18M260940) and Finisk_030 (IE_SW_18F020500);
- The transitional water bodies connected to the SAC include: Upper Blackwater M Estuary (IE_SW_020_0500) and Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100); and

¹⁹ 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 groundwater bodies connected to the SAC include: Glenville (IE_SW_G_037), Lismore (IE_SW_G_050), Cappoquin Kiltorcan (IE_SW_G_025), Dungarvan (IE_SE_G_052), Ballyknock (IE_SE_G_014) and Knockmealdown (IE_SW_G_047).

Sea lamprey, river lamprey and brook lamprey have a mapped distribution throughout the SAC, including some tributaries (as per Map 10, NPWS, 2012¹⁶). The distribution of Atlantic salmon is not provided in the SSCO report. The Munster Blackwater River and its tributaries are surveyed for fish as part of the WFD surveillance monitoring programme in rivers. The most recent fish survey of the Munster Blackwater was carried out in 2013 at Lismore Bridge (0km), Killavullen Br. (46km upstream of WSZ) and Nohaval Bridge (100km upstream of WSZ). At Lismore Bridge, salmon was the most abundant fish species recorded during the survey. No lamprey species were recorded. Salmon and lamprey were both previously recorded during a 2010 survey of the site. At Killavullen Bridge, lamprey species and salmon were among the fish species recorded. Salmon were also observed during a 2009 survey of the site. At the Nohaval Bridge, salmon was the most abundant fish species recorded during the 2013. Lamprey species were also recorded. Salmon were also observed during a 2010 and 2009 survey of the site. While lamprey species were observed during the 2010 survey only (Kelly *et al.*, 2014²⁰).

A WFD fish survey of the Finisk River (tributary of the Munster Blackwater) was carried out in 2014. The survey site was located downstream of Modelligo Bridge, approximately 4km downstream of the LCB Lismore WSZ. Salmon was the most abundant fish species recorded at this site. Lamprey species were not recorded during the 2014 survey; however, both lamprey and salmon were previously recorded at this location in 2010 (Kelly *et al.*, 2015²¹).

IFI also surveyed two sites on the River Funshion, one at Brackbaun Bridge and another at Kilbeheny Bridge, in 2014. The Funshion is a tributary of the Munster Blackwater and confluences with the Munster Blackwater approximately 20km upstream of the Cappoquin WSZ. Salmon was observed at both survey sites and it was one of the most abundant fish species recorded at the Kilbeheny Bridge. Lamprey species were not recorded at either survey site (Kelly *et al.*, 2015²¹). The River Funshion was also surveyed in 2013 upstream of Ballyfean Bridge, approximately 1km upstream of the Munster Blackwater river confluence. Salmon was the most common species recorded. Lamprey species were also recorded. Salmon and lamprey were previously observed during the 2010 survey of the site (Kelly *et al.*, 2014²⁰).

It is noted that large weirs on the Munster Blackwater may delay salmon upstream migration in certain water conditions but do not generally prevent access to spawning areas. For twaite shad, there is no distribution provided in the SSCO for the site and the species is also impacted by large weirs on the Munster Blackwater which prevents potential exploitation of adult spawning grounds (NPWS, 2012¹⁶). It is assumed for the purposes of this assessment, that all species have access to the water bodies which may potentially be impacted by the proposed dosing at LCB Lismore Deerpark PS, thereby providing a conservative assessment of impacts.

²⁰ Kelly, F.L., Matson, R., Connor, L., Feeney, R., Morrissey, E., Coyne, J. and Rocks, K. (2014) Water Framework Directive Fish Stock Survey of Rivers in the South Western River Basin District. Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24, Ireland. http://wfdfish.ie/wp-content/uploads/2011/11/SWRBD_rivers_report_2013.pdf

²¹ Kelly, F.L., Connor, L., Matson, R., Feeney, R., Morrissey, E., Coyne, J. and Rocks, K. (2015) Sampling Fish for the Water Framework Directive, Rivers 2014. Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24, Ireland. http://wfdfish.ie/wp-content/uploads/2011/11/Rivers_report_2014.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 flow data. Full details of the assessment results are provided in **Appendix C** and discussed above in **Section 5**.

The potential impacts of orthophosphate dosing at LCB Lismore Deerpark PS are assessed in the context of brook lamprey occurring in all river waterbodies; river lamprey occurring in all transitional and river waterbodies; sea lamprey and Atlantic salmon (designated in freshwater only) occurring in all river, transitional and coastal water bodies identified in **Table 5-2**.

The modelled increases in orthophosphate concentrations for river water bodies are in the range of 0.0000 mg/l to 0.0007 mg/l. For the Blackwater (Munster)_220 (IE_SW_18B022700), Owennashad_030 (IE_SW_18O080200), Glennafallia_020 (IE_SW_18G100200) and Finisk_030 (IE_SW_18F020500) the modelled increase is not detectable (0.0000 mg/l). The modelled increase in concentration for Moneygorm_010 (IE_SW_18M260940) is negligible (0.0001 mg/l). For both Owbeg (Waterford)_010 (IE_SW_18O020400) and Owbeg (Waterford)_020 (IE_SW_18O020800) the modelled increase is 0.0003 mg/l. Finally the highest modelled increase for river water bodies is 0.0007 mg/l in Lyrenacallee_East_010 (IE_SW_18L220930). The modelled increases do not exceed 5% of the High / Good indicative quality boundary (0.00125 mg/l), and therefore there is no risk of deterioration of the current orthophosphate indicative quality of the river water bodies, or of preventing the achievement of WFD objectives.

For the transitional water bodies, Upper Blackwater M Estuary (IE_SW_020_0500) and Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100), the modelled increase in concentration due to dosing is not detectable (0.0000 mg/l) which is below the 5% High / Good indicative quality boundary of 0.00125 mg/l, and therefore there is no risk of deterioration of the current orthophosphate indicative quality of these transitional water bodies, or of preventing the achievement of WFD objectives.

For groundwater bodies Glenville (IE_SW_G_037), Dungarvan (IE_SE_G_052), Ballyknock (IE_SE_G_014) and Knockmealdown (IE_SW_G_047) the modelled increase in concentration is not detectable (0.0000 mg/l). For Cappoquin Kiltorcan (IE_SW_G_025) and Lismore (IE_SW_G_050), the modelled increases in orthophosphate concentrations are 0.0001 mg/l and 0.0002 mg/l, respectively. The modelled increases do not exceed 5% of the Good / Fail indicative quality boundary (0.00175 mg/l). There is one monitoring point within the Cappoquin Kiltorcan (IE_SW_G_025) which is currently failing to achieve good orthophosphate indicative quality. However, the modelled increase in orthophosphate concentration is negligible (0.0001mg/l). Therefore there is no risk of deterioration in the current orthophosphate indicative quality of these 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 LCB Lismore Deerpark PS, 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 the species.

6.2.1.4 (1130) Estuaries

The attributes and targets that will maintain the favourable conservation condition of this habitat in the Blackwater River SAC do not make specific reference to water quality and nutrient conditions; however, there is a requirement to conserve community types in their natural conditions (NPWS,

2012¹⁶). The COs supporting document for Marine habitats (NPWS, 2012²²) does require that activities or operations that cause significant disturbance to communities but may not necessarily represent a continuous or ongoing source of disturbance over time and space may be assessed in a context - specific manner, giving due consideration to the proposed nature and scale of activities during the reporting cycle and the particular resilience of the receiving habitat in combination with other activities within the designated site.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Blackwater River SAC and will receive inputs from the proposed orthophosphate dosing at LCB Lismore Deerpark PS:

- The river water bodies that are hydrologically connected to the SAC include: Blackwater (Munster)_220 (IE_SW_18B022700), Owbeg (Waterford)_010 (IE_SW_18O020400), Owbeg (Waterford)_020 (IE_SW_18O020800), Owennashad_030 (IE_SW_18O080200), Lyrenacallee_East_010 (IE_SW_18L220930), Glennafallia_020 (IE_SW_18G100200), Moneygorm_010 (IE_SW_18M260940) and Finisk_030 (IE_SW_18F020500);
- The transitional water bodies connected to the SAC include: Upper Blackwater M Estuary (IE_SW_020_0500) and Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100); and
- The groundwater bodies connected to the SAC include: Glenville (IE_SW_G_037), Lismore (IE_SW_G_050), Cappoquin Kiltorcan (IE_SW_G_025), Dungarvan (IE_SE_G_052), Ballyknock (IE_SE_G_014) and Knockmealdown (IE_SW_G_047).

The habitat area for estuaries is estimated as 1,208ha using OSi data and the transitional water body area as defined under the Water Framework Directive (NPWS, 2012¹⁶). The designated estuary habitat incorporates both transitional water bodies connected to the LCB Lismore WSZ. The river water bodies identified above discharge into the SAC at different points along the Munster Blackwater estuary and therefore act as a pathway from the WSZ to the site.

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

The modelled increases in orthophosphate concentrations for river water bodies are in the range of 0.0000 mg/l to 0.0007 mg/l. For the Blackwater (Munster)_220 (IE_SW_18B022700), Owennashad_030 (IE_SW_18O080200), Glennafallia_020 (IE_SW_18G100200) and Finisk_030 (IE_SW_18F020500) the modelled increase is not detectable (0.0000 mg/l). The modelled increase in concentration for Moneygorm_010 (IE_SW_18M260940) is negligible (0.0001 mg/l). For both Owbeg (Waterford)_010 (IE_SW_18O020400) and Owbeg (Waterford)_020 (IE_SW_18O020800) the modelled increase is 0.0003 mg/l. Finally the highest modelled increase for river water bodies is 0.0007 mg/l in Lyrenacallee_East_010 (IE_SW_18L220930). The modelled increases do not exceed 5% of the High / Good indicative quality boundary (0.00125 mg/l), and therefore there is no risk of deterioration of the current orthophosphate indicative quality of the river water bodies, or of preventing the achievement of WFD objectives.

²² [NPWS 2012 Blackwater River \(Cork / Waterford\) SAC \(site code: 2170\) Conservation Objectives Supporting Document - Marine Habitats](#)

For the transitional water bodies, Upper Blackwater M Estuary (IE_SW_020_0500) and Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100), the modelled increase in concentration due to dosing is not detectable (0.0000 mg/l) which is below the 5% High / Good indicative quality boundary of 0.00125 mg/l, and therefore there is no risk of deterioration of the current orthophosphate indicative quality of these transitional water bodies, or of preventing the achievement of WFD objectives.

For groundwater bodies Glenville (IE_SW_G_037), Dungarvan (IE_SE_G_052), Ballyknock (IE_SE_G_014) and Knockmealdown (IE_SW_G_047) the modelled increase in concentration is not detectable (0.0000 mg/l). For Cappoquin Kiltorcan (IE_SW_G_025) and Lismore (IE_SW_G_050), the modelled increases in orthophosphate concentrations are 0.0001 mg/l and 0.0002 mg/l, respectively. The modelled increases do not exceed 5% of the Good / Fail indicative quality boundary (0.00175 mg/l). There is one monitoring point within the Cappoquin Kiltorcan (IE_SW_G_025) which is currently failing to achieve good orthophosphate indicative quality. However, the modelled increase in orthophosphate concentration is negligible (0.0001mg/l). Therefore there is no risk of deterioration in the current orthophosphate indicative quality of these 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 LCB Lismore Deerpark PS, it has been demonstrated that the potential for likely significant effects on this habitat can be excluded. Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of the habitat.

6.2.1.5 (1140) Mudflats and sandflats not covered by seawater at low tide

The attributes and targets that will maintain the favourable conservation condition of this habitat in the Blackwater River SAC do not make specific reference to water quality and nutrient conditions however there is a requirement to conserve community types in their natural conditions (NPWS, 2012¹⁶). The COs supporting document for Marine habitats (NPWS, 2012²²) does require that activities or operations that cause significant disturbance to communities but may not necessarily represent a continuous or ongoing source of disturbance over time and space may be assessed in a context-specific manner, giving due consideration to the proposed nature and scale of activities during the reporting cycle and the particular resilience of the receiving habitat in combination with other activities within the designated site.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Blackwater River SAC and will receive inputs from the proposed orthophosphate dosing at LCB Lismore Deerpark PS:

- The river water bodies that are hydrologically connected to the SAC include: Blackwater (Munster)_220 (IE_SW_18B022700), Owbeg (Waterford)_010 (IE_SW_18O020400), Owbeg (Waterford)_020 (IE_SW_18O020800), Owennashad_030 (IE_SW_18O080200), Lyrenacallee_East_010 (IE_SW_18L220930), Glennafallia_020 (IE_SW_18G100200), Moneygorm_010 (IE_SW_18M260940) and Finisk_030 (IE_SW_18F020500);
- The transitional water bodies connected to the SAC include: Upper Blackwater M Estuary (IE_SW_020_0500) and Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100); and

- The groundwater bodies connected to the SAC include: Glenville (IE_SW_G_037), Lismore (IE_SW_G_050), Cappoquin Kiltorcan (IE_SW_G_025), Dungarvan (IE_SE_G_052), Ballyknock (IE_SE_G_014) and Knockmealdown (IE_SW_G_047).

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

The habitat area for Mudflats and sandflats not covered by seawater at low tide in this SAC is estimated using OSi data as 284ha. The habitat distribution is confined to the Lower Blackwater M. Estuary / Youghal Harbour (IE_SW_020_0100) transitional water body. The river water bodies identified above discharge into the SAC at different points along the Upper Blackwater M. Estuary (IE_SW_020_0500) and Lower Blackwater M. Estuary / Youghal Harbour (IE_SW_020_0100) and therefore act as a pathway from the WSZ to the site.

The modelled increases in orthophosphate concentrations for river water bodies are in the range of 0.0000 mg/l to 0.0007 mg/l. For the Blackwater (Munster)_220 (IE_SW_18B022700), Owennashad_030 (IE_SW_18O080200), Glennafallia_020 (IE_SW_18G100200) and Finisk_030 (IE_SW_18F020500) the modelled increase is not detectable (0.0000 mg/l). The modelled increase in concentration for Moneygorm_010 (IE_SW_18M260940) is negligible (0.0001 mg/l). For both Owbeg (Waterford)_010 (IE_SW_18O020400) and Owbeg (Waterford)_020 (IE_SW_18O020800) the modelled increase is 0.0003 mg/l. Finally the highest modelled increase for river water bodies is 0.0007 mg/l in Lyrenacallee_East_010 (IE_SW_18L220930). The modelled increases do not exceed 5% of the High / Good indicative quality boundary (0.00125 mg/l), and therefore there is no risk of deterioration of the current orthophosphate indicative quality of the river water bodies, or of preventing the achievement of WFD objectives.

For the transitional water bodies, Upper Blackwater M. Estuary (IE_SW_020_0500) and Lower Blackwater M. Estuary / Youghal Harbour (IE_SW_020_0100), the modelled increase in concentration due to dosing is not detectable (0.0000 mg/l) which is below the 5% High / Good indicative quality boundary of 0.00125 mg/l, and therefore there is no risk of deterioration of the current orthophosphate indicative quality of these transitional water bodies, or of preventing the achievement of WFD objectives.

For groundwater bodies Glenville (IE_SW_G_037), Dungarvan (IE_SE_G_052), Ballyknock (IE_SE_G_014) and Knockmealdown (IE_SW_G_047) the modelled increase in concentration is not detectable (0.0000 mg/l). For Cappoquin Kiltorcan (IE_SW_G_025) and Lismore (IE_SW_G_050), the modelled increases in orthophosphate concentrations are 0.0001 mg/l and 0.0002 mg/l, respectively. The modelled increases do not exceed 5% of the Good / Fail indicative quality boundary (0.00175 mg/l). There is one monitoring point within the Cappoquin Kiltorcan (IE_SW_G_025) which is currently failing to achieve good orthophosphate indicative quality. However, the modelled increase in orthophosphate concentration is negligible (0.0001mg/l). Therefore there is no risk of deterioration in the current orthophosphate indicative quality of these 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 LCB Lismore Deerpark PS, it has been demonstrated that the potential for likely significant effects on this habitat can be excluded. Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of the habitat.

6.2.1.6 (1310) *Salicornia* and other annuals colonising mud and sand, (1330) Atlantic salt meadows and (1410) Mediterranean salt meadows

There are no nutrient specific targets in the SSCOs for these saltmarsh habitats (NPWS, 2012¹⁶); however there is a target relevant to all three habitats to maintain the natural tidal regime i.e. regular tidal inundation. The CO supporting document on coastal habitats (NPWS, 2012²³) for the Blackwater River SAC was reviewed, and discusses the flooding regime attribute and associated target in further detail. The regular ebb and flow of the tide brings salinity, but also nutrients, organic matter and sediment, which are central to the development, growth and survival of saltmarshes.

Salicornia habitat was not recorded by McCorry and Ryle (2009) during the Saltmarsh Monitoring Project at Kinsalebeg estuary, but is known to occur at Foxhole (above Youghal), Blackbog, and Tourig estuary (Curtis and Sheehy-Skeffington, 1998)¹⁶. However, the full extent is un-mapped and further surveyed areas maybe present within the site. It is estimated that the Kinsalebeg sub-site represents less than 10% of the total area of saltmarsh within this SAC (NPWS, 2012²³).

For Atlantic salt meadows, and based on the Saltmarsh Monitoring Project, one sub-site that supports the habitat was mapped (Kinsalebeg) (2.77ha) and additional areas of potential saltmarsh (28.13ha) were identified from an examination of aerial photographs. The habitat also occurs at Tourig Hall and Ballintray House (Curtis and Sheehy-Skeffington, 1998). As with *Salicornia* habitat, further unsurveyed areas maybe present within the site.

For Mediterranean salt meadows, one sub-site supporting the habitat was mapped as part of the Saltmarsh Monitoring Project (1.36ha) (Kinsalebeg) and additional areas of potential saltmarsh (8.67ha) were identified from an examination of aerial photographs. Further unsurveyed areas maybe present within the site.

On the basis of the information above, and using a precautionary approach, it was determined that the three habitat types have the potential to occur along any part of the coastline that is covered by the tide (following McCorry and Ryle, 2009²⁴).

The overall objective for *Salicornia* and other annuals colonising mud and sand, and Mediterranean salt meadows is to maintain favourable conservation status. For Atlantic salt meadows, it is to restore the favourable conservation status of the habitat.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Blackwater River SAC and will receive inputs from the proposed orthophosphate dosing at LCB Lismore Deerpark PS:

- The river water bodies that are hydrologically connected to the SAC include: Blackwater (Munster)_220 (IE_SW_18B022700), Owbeg (Waterford)_010 (IE_SW_18O020400), Owbeg (Waterford)_020 (IE_SW_18O020800), Owennashad_030 (IE_SW_18O080200), Lyrenacallee_East_010 (IE_SW_18L220930), Glennafallia_020 (IE_SW_18G100200), Moneygorm_010 (IE_SW_18M260940) and Finisk_030 (IE_SW_18F020500);

²³ [NPWS 2012 Blackwater River \(Cork / Waterford\) SAC \(site code: 2170\) Conservation Objectives Supporting Document - Coastal Habitats](#)

²⁴

https://www.npws.ie/sites/default/files/publications/pdf/McCorry_%26_Ryle_2009_Saltmarsh_survey_V1.pdf

- The transitional water bodies connected to the SAC include: Upper Blackwater M Estuary (IE_SW_020_0500) and Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100); and
- The groundwater bodies connected to the SAC include: Glenville (IE_SW_G_037), Lismore (IE_SW_G_050), Cappoquin Kiltorcan (IE_SW_G_025), Dungarvan (IE_SE_G_052), Ballyknock (IE_SE_G_014) and Knockmealdown (IE_SW_G_047).

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

The modelled increases in orthophosphate concentrations for river water bodies are in the range of 0.0000 mg/l to 0.0007 mg/l. For the Blackwater (Munster)_220 (IE_SW_18B022700), Owennashad_030 (IE_SW_18O080200), Glennafallia_020 (IE_SW_18G100200) and Finisk_030 (IE_SW_18F020500) the modelled increase is not detectable (0.0000 mg/l). The modelled increase in concentration for Moneygorm_010 (IE_SW_18M260940) is negligible (0.0001 mg/l). For both Owbeg (Waterford)_010 (IE_SW_18O020400) and Owbeg (Waterford)_020 (IE_SW_18O020800) the modelled increase is 0.0003 mg/l. Finally the highest modelled increase for river water bodies is 0.0007 mg/l in Lyrenacallee_East_010 (IE_SW_18L220930). The modelled increases do not exceed 5% of the High / Good indicative quality boundary (0.00125 mg/l), and therefore there is no risk of deterioration of the current orthophosphate indicative quality of the river water bodies, or of preventing the achievement of WFD objectives.

For the transitional water bodies, Upper Blackwater M Estuary (IE_SW_020_0500) and Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100), the modelled increase in concentration due to dosing is not detectable (0.0000 mg/l) which is below the 5% High / Good indicative quality boundary of 0.00125 mg/l, and therefore there is no risk of deterioration of the current orthophosphate indicative quality of these transitional water bodies, or of preventing the achievement of WFD objectives.

For groundwater bodies Glenville (IE_SW_G_037), Dungarvan (IE_SE_G_052), Ballyknock (IE_SE_G_014) and Knockmealdown (IE_SW_G_047) the modelled increase in concentration is not detectable (0.0000 mg/l). For Cappoquin Kiltorcan (IE_SW_G_025) and Lismore (IE_SW_G_050), the modelled increases in orthophosphate concentrations are 0.0001 mg/l and 0.0002 mg/l, respectively. The modelled increases do not exceed 5% of the Good / Fail indicative quality boundary (0.00175 mg/l). There is one monitoring point within the Cappoquin Kiltorcan (IE_SW_G_025) which is currently failing to achieve good orthophosphate indicative quality. However, the modelled increase in orthophosphate concentration is negligible (0.0001mg/l). Therefore there is no risk of deterioration in the current orthophosphate indicative quality of these 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 LCB Lismore Deerpark PS, 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.

6.2.1.7 (1355) Otter (*Lutra lutra*)

A review of the SSCOs (NPWS, 2012¹⁶) found no specific attributes or targets relating to water quality. The National Parks and Wildlife Service's 'Threat Response Plan for the Otter' (NPWS, 2009²⁵), which comprised a review of and response to the pressures and threats to otters in Ireland, categorized three principal risks to otters: i) habitat destruction and degradation; ii) water pollution; and, iii) accidental death and/or persecution.

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, 2012¹⁶). 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 Blackwater River SAC and will receive inputs from the proposed orthophosphate dosing at LCB Lismore Deerpark PS:

- The river water bodies that are hydrologically connected to the SAC include: Blackwater (Munster)_220 (IE_SW_18B022700), Owbeg (Waterford)_010 (IE_SW_18O020400), Owbeg (Waterford)_020 (IE_SW_18O020800), Owennashad_030 (IE_SW_18O080200), Lyrenacallee_East_010 (IE_SW_18L220930), Glennafallia_020 (IE_SW_18G100200), Moneygorm_010 (IE_SW_18M260940) and Finisk_030 (IE_SW_18F020500);
- The transitional water bodies connected to the SAC include: Upper Blackwater M Estuary (IE_SW_020_0500) and Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100); and
- The groundwater bodies connected to the SAC include: Glenville (IE_SW_G_037), Lismore (IE_SW_G_050), Cappoquin Kiltorcan (IE_SW_G_025), Dungarvan (IE_SE_G_052), Ballyknock (IE_SE_G_014) and Knockmealdown (IE_SW_G_047).

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

The modelled increases in orthophosphate concentrations for river water bodies are in the range of 0.0000 mg/l to 0.0007 mg/l. For the Blackwater (Munster)_220 (IE_SW_18B022700), Owennashad_030 (IE_SW_18O080200), Glennafallia_020 (IE_SW_18G100200) and Finisk_030 (IE_SW_18F020500) the modelled increase is not detectable (0.0000 mg/l). The modelled increase in concentration for Moneygorm_010 (IE_SW_18M260940) is negligible (0.0001 mg/l). For both Owbeg (Waterford)_010 (IE_SW_18O020400) and Owbeg (Waterford)_020 (IE_SW_18O020800) the modelled increase is 0.0003 mg/l. Finally the highest modelled increase for river water bodies is 0.0007 mg/l in Lyrenacallee_East_010 (IE_SW_18L220930). The modelled increases do not exceed 5% of the High / Good indicative quality boundary (0.00125 mg/l), and therefore there is no risk of deterioration

²⁵ NPWS (2009) Threat Response Plan: Otter (2009-2011). National Parks & Wildlife Service, Department of the Environment, Heritage & Local Government, Dublin.

of the current orthophosphate indicative quality of the river water bodies, or of preventing the achievement of WFD objectives.

For the transitional water bodies, Upper Blackwater M Estuary (IE_SW_020_0500) and Lower Blackwater M. Estuary / Youghal Harbour (IE_SW_020_0100), the modelled increase in concentration due to dosing is not detectable (0.0000 mg/l) which is below the 5% High / Good indicative quality boundary of 0.00125 mg/l, and therefore there is no risk of deterioration of the current orthophosphate indicative quality of these transitional water bodies, or of preventing the achievement of WFD objectives.

For groundwater bodies Glenville (IE_SW_G_037), Dungarvan (IE_SE_G_052), Ballyknock (IE_SE_G_014) and Knockmealdown (IE_SW_G_047) the modelled increase in concentration is not detectable (0.0000 mg/l). For Cappoquin Kiltorcan (IE_SW_G_025) and Lismore (IE_SW_G_050), the modelled increases in orthophosphate concentrations are 0.0001 mg/l and 0.0002 mg/l, respectively. The modelled increases do not exceed 5% of the Good / Fail indicative quality boundary (0.00175 mg/l). There is one monitoring point within the Cappoquin Kiltorcan (IE_SW_G_025) which is currently failing to achieve good orthophosphate indicative quality. However, the modelled increase in orthophosphate concentration is negligible (0.0001mg/l). Therefore there is no risk of deterioration in the current orthophosphate indicative quality of these 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 LCB Lismore Deerpark PS, 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.

6.2.1.8 (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 woodlands²⁶. A review of the SSCOs for Killarney fern (NPWS, 2012¹⁶) 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.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Blackwater River SAC and will receive inputs from the proposed orthophosphate dosing at LCB Lismore Deerpark PS:

- The river water bodies that are hydrologically connected to the SAC include: Blackwater (Munster)_220 (IE_SW_18B022700), Owbeg (Waterford)_010 (IE_SW_18O020400), Owbeg (Waterford)_020 (IE_SW_18O020800), Owennashad_030 (IE_SW_18O080200), Lyrenacallee_East_010 (IE_SW_18L220930), Glennafallia_020 (IE_SW_18G100200), Moneygorm_010 (IE_SW_18M260940) and Finisk_030 (IE_SW_18F020500);
- The transitional water bodies connected to the SAC include: Upper Blackwater M Estuary (IE_SW_020_0500) and Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100); and

²⁶ <https://www.npws.ie/sites/default/files/publications/pdf/Art17-Vol1-web.pdf>

- The groundwater bodies connected to the SAC include: Glenville (IE_SW_G_037), Lismore (IE_SW_G_050), Cappoquin Kiltorcan (IE_SW_G_025), Dungarvan (IE_SE_G_052), Ballyknock (IE_SE_G_014) and Knockmealdown (IE_SW_G_047).

There are currently two locations known within the SAC where this species occurs: one near Glendine, adjacent to Glendine Estuary, and the second site at Glengarra. The Glengarra site is located upstream of the WSZ and therefore it is not at risk of impacts from the dosing at LCB Lismore Deerpark PS. The Glendine site is located upstream of the Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100) in a separate sub-catchment to the WSZ. There is no hydrological pathway connecting the WSZ and the Glendine site and therefore, there is no potential for likely significant effects on the species as a result of dosing at LCB Lismore Deerpark PS.

6.2.1.9 (3260) Watercourses of plain to montane levels with *Ranunculus fluitantis* and *Callitriche-Batrachion* vegetation

The full distribution of this habitat and its sub-types in this site are currently unknown. The basis of the selection of the SAC for the habitat was the presence of plant species listed in the Interpretation Manual (European Commission, 2007), recorded during the Natural Heritage Area (NHA) survey of the river (internal NPWS files)¹⁶. The dominant floating-leaved species appears to be the common and widespread stream water-crowfoot (*Ranunculus penicillatus* subsp. *penicillatus*) (Green, 2008; O'Mahoney, 2009)¹⁶. No high conservation value sub-types are known to occur in the SAC and further survey is required to determine whether any such are present. Only one rare / threatened vascular plant species is known to occur in the SAC, the protected opposite-leaved pondweed (*Groenlandia densa*), which is abundant in the tidal stretches around Cappoquin (Green, 2008)¹⁶.

The SSCOs (NPWS, 2012¹⁶) for this site include a target that the concentration of nutrients in the water column should be sufficiently low to prevent changes in species composition or habitat condition. Water quality should reach a minimum of WFD 'good status', in terms of nutrient and oxygenation standards and ecological quality ratios (EQRs) for macroinvertebrates and phyto-benthos.

On the basis of the uncertainty associated with the distribution of this habitat within the Blackwater River SAC and as the WSZ directly intersects the transitional water bodies Upper Blackwater M Estuary (IE_SW_020_0500) and the Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100) at Cappoquin, it has been assumed that this habitat is hydrologically connected to all water bodies affected by the proposed dosing at LCB Cappoquin PS.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Blackwater River SAC and will receive inputs from the proposed orthophosphate dosing at LCB Lismore Deerpark PS:

- The river water bodies that are hydrologically connected to the SAC include: Blackwater (Munster)_220 (IE_SW_18B022700), Owbeg (Waterford)_010 (IE_SW_18O020400), Owbeg (Waterford)_020 (IE_SW_18O020800), Owennashad_030 (IE_SW_18O080200), Lyrenacallee_East_010 (IE_SW_18L220930), Glennafallia_020 (IE_SW_18G100200), Moneygorm_010 (IE_SW_18M260940) and Finisk_030 (IE_SW_18F020500);
- The transitional water bodies connected to the SAC include: Upper Blackwater M Estuary (IE_SW_020_0500) and Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100); and

- The groundwater bodies connected to the SAC include: Glenville (IE_SW_G_037), Lismore (IE_SW_G_050), Cappoquin Kiltorcan (IE_SW_G_025), Dungarvan (IE_SE_G_052), Ballyknock (IE_SE_G_014) and Knockmealdown (IE_SW_G_047).

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

The modelled increases in orthophosphate concentrations for river water bodies are in the range of 0.0000 mg/l to 0.0007 mg/l. For the Blackwater (Munster)_220 (IE_SW_18B022700), Owennashad_030 (IE_SW_18O080200), Glennafallia_020 (IE_SW_18G100200) and Finisk_030 (IE_SW_18F020500) the modelled increase is not detectable (0.0000 mg/l). The modelled increase in concentration for Moneygorm_010 (IE_SW_18M260940) is negligible (0.0001 mg/l). For both Owbeg (Waterford)_010 (IE_SW_18O020400) and Owbeg (Waterford)_020 (IE_SW_18O020800) the modelled increase is 0.0003 mg/l. Finally the highest modelled increase for river water bodies is 0.0007 mg/l in Lyrenacallee_East_010 (IE_SW_18L220930). The modelled increases do not exceed 5% of the High / Good indicative quality boundary (0.00125 mg/l), and therefore there is no risk of deterioration of the current orthophosphate indicative quality of the river water bodies, or of preventing the achievement of WFD objectives.

For the transitional water bodies, Upper Blackwater M Estuary (IE_SW_020_0500) and Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100), the modelled increase in concentration due to dosing is not detectable (0.0000 mg/l) which is below the 5% High / Good indicative quality boundary of 0.00125 mg/l, and therefore there is no risk of deterioration of the current orthophosphate indicative quality of these transitional water bodies, or of preventing the achievement of WFD objectives.

For groundwater bodies Glenville (IE_SW_G_037), Dungarvan (IE_SE_G_052), Ballyknock (IE_SE_G_014) and Knockmealdown (IE_SW_G_047) the modelled increase in concentration is not detectable (0.0000 mg/l). For Cappoquin Kiltorcan (IE_SW_G_025) and Lismore (IE_SW_G_050), the modelled increases in orthophosphate concentrations are 0.0001 mg/l and 0.0002 mg/l, respectively. The modelled increases do not exceed 5% of the Good / Fail indicative quality boundary (0.00175 mg/l). There is one monitoring point within the Cappoquin Kiltorcan (IE_SW_G_025) which is currently failing to achieve good orthophosphate indicative quality. However, the modelled increase in orthophosphate concentration is negligible (0.0001mg/l). Therefore there is no risk of deterioration in the current orthophosphate indicative quality of these 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 LCB Lismore Deerpark PS, it has been demonstrated that the potential for likely significant effects on this habitat can be excluded. Furthermore, dosing will not prevent the maintenance of the favourable conservation condition of the habitat.

6.2.1.10 (91E0) * Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, *Alnion incanae*, *Salicion albae*)

A review of the SSCOs for this habitat found no nutrient specific targets (NPWS, 2012¹⁶). The habitat is assessed based on woodland structure, and requires periodic flooding to maintain alluvial

woodlands along river floodplains. The main threats to this habitat are drainage and reclamation, together with non-native and invasive species encroachment.

There are six known sites within the SAC with a minimum area of 19.2ha; although there are likely to be further unsurveyed areas present (NPWS, 2012¹⁶). A target within the SSCOs (NPWS, 2012¹⁶) for this habitat is to maintain the appropriate hydrological regime necessary for maintenance of alluvial vegetation. The woodlands supporting document for this site lists fertiliser drift and water pollution as indirect threats to the habitat, which may increase trophic status of the wood leading to the stronger growth of nitrophilous species and loss of less vigorous species. However, as these are naturally eutrophic systems the impact is likely to be minimal²⁷. On the basis of the uncertainty related to the distribution of this habitat in this SAC, it is assumed on a precautionary basis, that the habitat may occur in some or all of the river water bodies hydrologically connected to the WSZ.

Table 5-2 identifies the surface water bodies which are hydrologically connected to Blackwater River SAC and will receive inputs from the proposed orthophosphate dosing at LCB Lismore Deerpark PS:

- The river water bodies that are hydrologically connected to the SAC include: Blackwater (Munster)_220 (IE_SW_18B022700), Owbeg (Waterford)_010 (IE_SW_18O020400), Owbeg (Waterford)_020 (IE_SW_18O020800), Owennashad_030 (IE_SW_18O080200), Lyrenacallee_East_010 (IE_SW_18L220930), Glennafallia_020 (IE_SW_18G100200), Moneygorm_010 (IE_SW_18M260940) and Finisk_030 (IE_SW_18F020500);
- The transitional water bodies connected to the SAC include: Upper Blackwater M Estuary (IE_SW_020_0500) and Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100); and
- The groundwater bodies connected to the SAC include: Glenville (IE_SW_G_037), Lismore (IE_SW_G_050), Cappoquin Kiltorcan (IE_SW_G_025), Dungarvan (IE_SE_G_052), Ballyknock (IE_SE_G_014) and Knockmealdown (IE_SW_G_047).

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

The modelled increases in orthophosphate concentrations for river water bodies are in the range of 0.0000 mg/l to 0.0007 mg/l. For the Blackwater (Munster)_220 (IE_SW_18B022700), Owennashad_030 (IE_SW_18O080200), Glennafallia_020 (IE_SW_18G100200) and Finisk_030 (IE_SW_18F020500) the modelled increase is not detectable (0.0000 mg/l). The modelled increase in concentration for Moneygorm_010 (IE_SW_18M260940) is negligible (0.0001 mg/l). For both Owbeg (Waterford)_010 (IE_SW_18O020400) and Owbeg (Waterford)_020 (IE_SW_18O020800) the modelled increase is 0.0003 mg/l. Finally the highest modelled increase for river water bodies is 0.0007 mg/l in Lyrenacallee_East_010 (IE_SW_18L220930). The modelled increases do not exceed 5% of the High / Good indicative quality boundary (0.00125 mg/l), and therefore there is no risk of deterioration of the current orthophosphate indicative quality of the river water bodies, or of preventing the achievement of WFD objectives.

For the transitional water bodies, Upper Blackwater M Estuary (IE_SW_020_0500) and Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100), the modelled increase in concentration

²⁷ [NPWS 2012 Blackwater River \(Cork / Waterford\) SAC \(site code:2170\) Conservation Objectives Supporting Document - Woodland Habitats](#)

due to dosing is not detectable (0.0000 mg/l) which is below the 5% High / Good indicative quality boundary of 0.00125 mg/l, and therefore there is no risk of deterioration of the current orthophosphate indicative quality of these transitional water bodies, or of preventing the achievement of WFD objectives.

For groundwater bodies Glenville (IE_SW_G_037), Dungarvan (IE_SE_G_052), Ballyknock (IE_SE_G_014) and Knockmealdown (IE_SW_G_047) the modelled increase in concentration is not detectable (0.0000 mg/l). For Cappoquin Kiltorcan (IE_SW_G_025) and Lismore (IE_SW_G_050), the modelled increases in orthophosphate concentrations are 0.0001 mg/l and 0.0002 mg/l, respectively. The modelled increases do not exceed 5% of the Good / Fail indicative quality boundary (0.00175 mg/l). There is one monitoring point within the Cappoquin Kiltorcan (IE_SW_G_025) which is currently failing to achieve good orthophosphate indicative quality. However, the modelled increase in orthophosphate concentration is negligible (0.0001mg/l). Therefore there is no risk of deterioration in the current orthophosphate indicative quality of these 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 LCB Lismore Deerpark PS, it has been demonstrated that the potential for likely significant effects on this habitat can be excluded. Furthermore, dosing will not prevent the restoration of the favourable conservation condition of the habitat.

6.2.2 BLACKWATER CALLOWS

SPA 004097

The Blackwater Callows SPA comprises the stretch of the Munster Blackwater River that runs in a west to east direction between Fermoy and Lismore in Counties Cork and Waterford, a distance of almost 25 km (NPWS, 2014²⁸). The site includes the river channel and strips of seasonally-flooded grassland within the flood plain. Sandstone ridges, which run parallel to the river, confine the area of flooding to a relatively narrow corridor. The site is an SPA under the E.U. Birds Directive, of special conservation interest for the following species: Whooper Swan, Wigeon, Teal and Black-tailed Godwit. Wetlands also form part of this SPA and therefore, the site and its associated waterbirds are of special conservation interest for Wetland and Waterbirds.

There are no SSCOs established for this SPA (NPWS, 2018²⁹). There are general objectives to *maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA* and to *maintain or restore the favourable conservation condition of the wetland habitat at Blackwater Callows SPA as a resource for the regularly-occurring migratory waterbirds that utilise it*.

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, 2018³⁰) 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

²⁸ [NPWS 2014 Blackwater Callows SPA 004094 Site Synopsis](#)

²⁹ [NPWS 2018 Blackwater Callows SPA 004094 Conservation Objectives](#)

³⁰ http://www.housing.gov.ie/sites/default/files/publications/files/rbmp_full_reportweb.pdf

environmental supporting conditions have not been defined within SSCOs by the NPWS. This is the case for SPA birds and wetlands.

Table 5-2 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to Blackwater Callows SPA and will receive inputs from the proposed orthophosphate dosing at LCB Cappoquin PS:

- The river water body hydrologically connected is the Blackwater (Munster)_220 (IE_SW_18B022700); and,
- The groundwater bodies hydrogeologically connected include: Lismore (IE_SW_G_050) and Cappoquin Kiltorcan (IE_SW_G_025).

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 Blackwater (Munster)_220 (IE_SW_18B022700) is 0.0000 mg/l which does not exceed 5% of the High / Good indicative quality boundary (0.00125 mg/l), and therefore there is no risk of deterioration of the current orthophosphate indicative quality of this river water body, or of preventing the achievement of WFD objectives.

For groundwater bodies Cappoquin Kiltorcan (IE_SW_G_025) and Lismore (IE_SW_G_050), the modelled increase in orthophosphate concentrations are 0.0001 mg/l and 0.0002 mg/l, respectively. The modelled increases do not exceed 5% of the Good / Fail indicative quality boundary (0.00175 mg/l). There is one monitoring point within the Cappoquin Kiltorcan (IE_SW_G_025) which is currently failing to achieve good orthophosphate indicative quality. However, the modelled increase in orthophosphate concentration is negligible (0.0001mg/l). Therefore there is no risk of deterioration in the current orthophosphate indicative quality of these groundwater bodies, or of preventing the achievement of WFD objectives.

In light of the EAM assessment which has determined that there is no risk of deterioration in the orthophosphate indicative quality of the water bodies that support the structure and function of the SPA, or of preventing their achievement of WFD objectives. The additional loading from the orthophosphate dosing is not likely to have significant effects on the favourable conservation status of its SCIs; either in terms of individual bird species or wetland habitats.

6.2.3 BLACKWATER ESTUARY

SPA 004028

The Blackwater Estuary SPA is a moderately-sized, sheltered south-facing estuary, which extends from Youghal New Bridge to the Ferry Point peninsula, close to where the river enters the sea (NPWS, 2014³¹). It comprises a section of the main channel of the River Blackwater to Ballynaclash Quay. At low tide, intertidal flats are exposed on both sides of the channel. On the eastern side the intertidal channel as far as Kinsalebeg and Moord Cross Roads is included, while on the west side the site includes part of the estuary of the Tourig River as far as Kilmagner.

³¹ [NPWS 2014 Blackwater Estuary SPA 004028 Site Synopsis](#)

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Wigeon, Golden Plover, Lapwing, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew and Redshank. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetlands and Waterbirds (NPWS, 2014³¹).

There are no SSCOs established for this SPA (NPWS, 2012³²). There are general objectives to *maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA* and to *maintain or restore the favourable conservation condition of the wetland habitat at Blackwater Estuary SPA as a resource for the regularly-occurring migratory waterbirds that utilise it*.

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, 2018³³) the risk assessment carried out by the EPA for these water dependent European Site protected areas has focussed on looking at the risks to the water standards/objectives established for the purpose of supporting Good Ecological Status (GES). GES, which is the default objective of the WFD, is considered adequate for supporting many water dependent European Site protected areas where site specific environmental supporting conditions have not been defined within SSCOs by the NPWS. This is the case for SPA birds and wetlands.

Table 5-2 identifies the surface water bodies which are hydrologically connected to Blackwater Estuary SPA and will receive inputs from the proposed orthophosphate dosing at LCB Cappoquin PS:

- The river water bodies that are hydrologically connected to the SAC include: Blackwater (Munster)_220 (IE_SW_18B022700), Owbeg (Waterford)_010 (IE_SW_18O020400), Owbeg (Waterford)_020 (IE_SW_18O020800), Owennashad_030 (IE_SW_18O080200), Lyrenacallee_East_010 (IE_SW_18L220930), Glennafallia_020 (IE_SW_18G100200), Moneygorm_010 (IE_SW_18M260940) and Finisk_030 (IE_SW_18F020500); and
- The transitional water bodies connected to the SAC include: Upper Blackwater M Estuary (IE_SW_020_0500) and Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100).

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 concentrations for river water bodies are in the range of 0.0000 mg/l to 0.0007 mg/l. For the Blackwater (Munster)_220 (IE_SW_18B022700), Owennashad_030 (IE_SW_18O080200), Glennafallia_020 (IE_SW_18G100200) and Finisk_030 (IE_SW_18F020500) the modelled increase is not detectable (0.0000 mg/l). The modelled increase in concentration for Moneygorm_010 (IE_SW_18M260940) is negligible (0.0001 mg/l). For both Owbeg (Waterford)_010 (IE_SW_18O020400) and Owbeg (Waterford)_020 (IE_SW_18O020800) the modelled increase is 0.0003 mg/l. Finally the highest modelled increase for river water bodies is 0.0007 mg/l in Lyrenacallee_East_010 (IE_SW_18L220930). The modelled increases do not exceed 5% of the High / Good indicative quality boundary (0.00125 mg/l), and therefore there is no risk of deterioration

³² [NPWS 2012 Blackwater Estuary SPA 004028 Conservation Objectives](#)

³³ http://www.housing.gov.ie/sites/default/files/publications/files/rbmp_full_reportweb.pdf

of the current orthophosphate indicative quality of the river water bodies, or of preventing the achievement of WFD objectives.

For the transitional water bodies, Upper Blackwater M Estuary (IE_SW_020_0500) and Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100), the modelled increase in concentration due to dosing is not detectable (0.0000 mg/l) which is below the 5% High / Good indicative quality boundary of 0.00125 mg/l, and therefore there is no risk of deterioration of the current orthophosphate indicative quality of these transitional water bodies, or of preventing the achievement of WFD objectives.

In light of the EAM assessment which has determined that there is no risk of deterioration in the orthophosphate indicative quality of the water bodies that support the structure and function of the SPA, or of preventing their achievement of WFD objectives. The additional loading from the orthophosphate dosing is not likely to have significant effects on the favourable conservation status of its SCIs; either in terms of individual bird species or wetland habitats.

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

In order to ensure all potential impacts upon European Sites within the project's ZoI were considered, including those direct and indirect impacts that are a result of cumulative or in-combination 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 Waterford 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
<p><u>Waterford City and County Development Plan 2022 – 2028</u> The policies, objectives and zonings of relevance in the Waterford County Development Plan include Water Services and Water Supply :</p> <p>UTL 02: Water Services</p> <p>To collaborate support and work, in conjunction with Irish Water [Uisce Éireann], to ensure the timely delivery and provision, extension and upgrading of existing and new high quality, climate resilient, water services infrastructure, in order to facilitate the sustainable growth and development of our City and County, in accordance with an ecosystem services and integrated catchment management approach, and the Development Plan Core and Settlement strategies.</p> <p>UTL 03: Water Supply & Drinking Water Regulations</p> <p>We will collaborate with Irish Water [Uisce Éireann] in contributing towards compliance with the European Union (Drinking Water) Regulations Drinking Water Regulations 2014 (as amended) and compliance of water supplies with the parameters identified in these Regulations.</p> <p>All new developments must be satisfactorily served by either a mains water supply, or by a private water supply. The preferred option will always be a public water supply and drainage solution. It will be the responsibility of the developer to demonstrate that any new supply is adequate to serve the proposed development and that for domestic use; it is safe to be consumed as drinking water. Groundwater abstractions must comply with EPA policies and guidelines.</p>	<ul style="list-style-type: none"> ▪ N/A 	<p>The Waterford City and County Development Plan emphasises the objectives of their water services which include the enhancement and improved quality of the service to its consumers. The plans also outline the importance of compliance with the River Basin Management Plan (2022-2027) and emphasises compliance with environmental objectives. The Plan also seeks to ensure the protection, integrity and conservation of European Sites and Annex I and II species listed in EU Directives. There is no potential for cumulative impacts with these plans.</p>
<p><u>River Basin Management Plan For Ireland 2022 – 2027</u> The Third Cycle Draft River Basin Management Plan 2022-2027 Consultation Report has been published. This report presents a summary of the issues raised in the submissions reviewed from the public consultation on the draft River Basin Management Plan for Ireland 2022-2027.</p>	<ul style="list-style-type: none"> ▪ N/A 	<p>The objectives of the RBMP are to</p> <ul style="list-style-type: none"> • Prevent deterioration; • Restore good status; • Reduce chemical pollution; and • Achieve water related protected areas objectives

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects
<p>The 3rd cycle of River Basin Management Plan (RBMP) for the period of 2022-2027 is currently being prepared by Department of Housing, Local Government and Heritage (DHLGH) in line with the EU Water Framework Directive (WFD) (2000/60/EC).</p> <p>The document (Chapter 3) sets out the condition of waters in Ireland and a summary of status for all monitored waters in the 2013 – 2018 period, including a description of the changes since 2007 – 2009 and 2010-2015. A large number of river waterbodies are still declining and unless this is addressed, sustained and progressive improvements in water quality will be difficult to achieve. Overall, 53% of surface waters are in good or high ecological status while the remaining 47% are in unsatisfactory ecological status. For groundwater bodies, 92% are in good chemical and quantitative status.</p> <p>Chapter 3 of the RBMP presents results of the catchment characterisation process, which identifies the significant pressures on each water body that is <i>At Risk</i> of not meeting the environmental objectives of the WFD. Importantly, the assessment includes a review of trends over time to see if conditions were likely to remain stable, improve or deteriorate by 2027. This work was presented in the RBMP for 4,842 water bodies nationally. 1,603 water bodies were classed <i>At Risk</i> or 33%. An assessment of significant environmental pressures found that agriculture was the most significant pressure in 1,000 water bodies that are <i>At Risk</i>. Urban waste water, hydromorphology and forestry were also significant pressures amongst others.</p>		<p>The implementation of the RBMP seeks compliance with the environmental objectives set under the plan, which will be documented for each water body. This includes compliance with the European Communities (Surface Waters) Regulations S.I. No. 272 of 2009 (as amended). The implementation of this plan will have a positive impact on biodiversity and the Project will not affect the achievement of the RBMP objectives given the detailed assessment of the effects of dosing on water body environmental objectives under the EAM.</p>
<p>Catchment based Flood Risk Assessment and Management (CFRAM) Programme, under the Floods Directive</p> <p>The Office of Public Works (OPW) is responsible for the implementation of the Floods Directive 2007/60/EC which is being carried out through a Catchment based Flood Risk Assessment and Management (CFRAM) Programme. As part of the directive Ireland is required to undertake a Preliminary Flood Risk Assessment, to identify areas of existing or potentially significant future flood risk and to prepare flood hazard and risk maps for these areas. Following this, flood risk management plans are developed for these areas setting objectives for managing the flood risk and setting out a prioritised set of measures to achieve the objectives. The CFRAM programme is currently being rolled out and Draft Flood Risk Management Plans have been prepared. These plans have been subject AA.</p>	<ul style="list-style-type: none"> ▪ Habitat loss or destruction; ▪ Habitat fragmentation or degradation; ▪ Alterations to water quality and/or water movement; ▪ Disturbance; ▪ In-combination impacts within the same scheme. 	<p>CFRAM Studies and their product Flood Risk Management Plans, will each undergo appropriate assessment. Any future flood plans will have to take into account the design and implementation of water management infrastructure as it has the potential to impact on hydromorphology and potentially on the ecological status and favourable conservation status of 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</p>

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.
<p>Foodwise 2025</p> <p>Foodwise 2025 strategy identifies significant growth opportunities across all subsectors of the Irish agri-food industry. Growth Projection includes increasing the value added in the agri-food, fisheries and wood products sector by 70% to in excess of €13 billion.</p>	<ul style="list-style-type: none"> ▪ Land use change or intensification; ▪ Water pollution; ▪ Nitrogen deposition; ▪ Disturbance to habitats / species. 	<p>Foodwise 2025 was subject to its own AA³⁴.</p> <p>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.</p>
<p>Rural Development Programme 2014 – 2020</p> <p>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</p>	<ul style="list-style-type: none"> ▪ Overgrazing; ▪ Land use change or intensification; ▪ Water pollution; ▪ Nitrogen deposition; ▪ Disturbance to habitats / species. 	<p>The RDP for 2014 – 2020 has been subject to SEA³⁵, and AA³⁶. 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,</p>

³⁴<http://www.agriculture.gov.ie/media/migration/foodindustrydevelopmenttrademarkets/agri-foodandtheeconomy/foodwise2025/environmentalanalysis/AgriFoodStrategy2025NISDRAFT300615.pdf>

³⁵<https://www.agriculture.gov.ie/media/migration/ruralenvironment/ruraldevelopment/ruraldevelopmentprogramme2014-2020/StrategEnvironmAssessSumState090615.pdf>

³⁶<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
<p>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.</p> <p>The achievement of the objectives outlined within GLAS, to improve water quality, mitigate against climate change and promote biodiversity will be of direct positive benefit in achieving the measures within the RBMP and the goals of the Natura Directives. The scheme has an expected participation for 2014-2020 of 50,000 farmers which have to engage in specific training and tasks in order to receive full payment. Farmers within the scheme must have a nutrient management plan which is a strategy for maximising the return from on and off-farm chemical and organic fertilizer resources. This has a direct positive contribution towards protecting 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.</p> <p>The TAMS scheme is open to all farmers and is focused on supporting productive investment for modernisation. This financial grant for farmers is focused on the pig and poultry sectors, dairy equipment and the storage of slurry and other farmyard manures. Within the TAMS scheme are two further schemes; the Animal Welfare, Safety and Nutrient Storage Scheme and the Low Emission Slurry Spreading Scheme. Both schemes are focused on productivity for farmers but have the ability to contribute towards a reduction in point and diffuse source pollution through improved nutrient management.</p>		<p>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.</p>
<p>National Nitrates Action Programme</p> <p>Ireland is obliged under the Nitrates Directive 91/676/EEC to prepare a National Nitrates Action Programme which is designed to prevent pollution of surface and ground waters from agricultural sources. This will directly contribute to the improvement of water quality and thus the objectives within the RBMP. Ireland’s third Nitrates Action Programme came into operation in 2014 and has a timescale up to 2017. The Agricultural Catchments Programme is an ongoing programme that monitors the efficiency of various measures within the nitrate regulations. It is spread across six catchments and encompasses approximately 300 farmers.</p>	<ul style="list-style-type: none"> ▪ Land use change or intensification; ▪ Water pollution; ▪ Nitrogen deposition; ▪ Disturbance to habitats / species. 	<p>This programme has been subject to a Screening for Appropriate Assessment and it concluded that the NAP will not have a significant effect on the Natura 2000 network and a Stage 2 AA was not required³⁷. 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</p>

³⁷ <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
<p>Forest Policy Review: Forests, Products and People – A Renewed Vision (2014) / Forestry Programme 2014 - 2020</p> <p>Ireland’s forestry sector is striving to increase forestry cover and one of the recommended policy actions in the Forest Policy Review: Forests, Products and People – A Renewed Vision (2014) is to increase the level of afforestation annually over time and support afforestation and mobilisation measures under the Forestry Programme 2014-2020. Two key objectives within the Forestry Programme 2014-2020 that will influence the RBMP are to increase Ireland’s forest cover to 18% and to establish 10,000 ha of new forests and woodlands per annum. As part of this programme there are a number of schemes that promote sustainable forest management and they include the Afforestation Scheme, the Woodland Improvement Scheme, the Forest Road Scheme and the Native Woodland Conservation Scheme. Under the Native Woodland Conservation Scheme funding is provided to restore existing native woodland which promotes Ireland’s native woodland resource and associated biodiversity. Native woodlands provide wider ecosystem functions and services which once restored can contribute to the protection and enhancement of water quality and aquatic habitats. New guidance and plans are also being developed to address forestry adjacent to 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.</p>	<ul style="list-style-type: none"> ▪ Habitat loss or destruction; ▪ Habitat fragmentation or degradation; ▪ Water quality changes; ▪ Disturbance to species. 	<p>strategy would have to operate within the constraints of the NAP.</p> <p>Ireland’s Forestry Programme 2014 – 2020 has undergone AA³⁸. 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.</p>
<p>Water Services Strategic Plan (WSSP, 2015)</p> <p>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</p>	<ul style="list-style-type: none"> ▪ Habitat loss and disturbance from new / upgraded infrastructure; ▪ Species disturbance; ▪ Changes to water quality or quantity; 	<p>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.</p>

³⁸<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
<p>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.</p>	<ul style="list-style-type: none"> ▪ Nutrient enrichment /eutrophication. 	
<p>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.</p>	<ul style="list-style-type: none"> ▪ Habitat loss and disturbance from new / upgraded infrastructure; ▪ Species disturbance; ▪ Changes to water quality or quantity; ▪ Nutrient enrichment /eutrophication. 	<p>The plan was subject to both AA and SEA and includes a number of mitigation measures which were identified in relation to transport of materials, land spreading of sludge and additional education and research requirements. This plan does not specifically address domestic wastewater loads, only those relating to Uisce Éireann facilities. In relation to the plan as it stands, no in-combination effects are expected with the implementation of proposed mitigation measures.</p>
<p>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.</p>	<ul style="list-style-type: none"> ▪ Increased abstractions leading to changes / pressure on existing hydrology / hydrogeological regimes. 	<p>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.</p>
<p>Planning Applications There are a large number of planning applications approved or pending in the LCB Lismore WSZ. The applications are predominantly for the construction of new dwellings or renovations to existing dwellings. There are also a number of applications for the construction of agricultural buildings such as cattle sheds with slatted tanks and the infilling of exhausted quarries.</p>	<ul style="list-style-type: none"> ▪ Habitat loss and disturbance from new / upgraded infrastructure; ▪ Species disturbance; ▪ Changes to water quality or quantity; 	<p>Adherence to the overarching policies and objectives of the Waterford City Development Plan 2013 – 2019 and Waterford County Development Plan 2011 – 2017 (amalgamated and extended as of 2014) will ensure that local planning applications and subsequent grant of planning will comply with the requirements of relevant</p>

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects
	<ul style="list-style-type: none"> ▪ Nutrient enrichment /eutrophication. 	environmental legislation including the WFD and Habitats Directive.
<p>Integrated Pollution Control (IPC) Licensing Cappoquin has a number of IPC licensed facilities for intensive agriculture activities, primarily poultry installations. 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.</p>	<ul style="list-style-type: none"> ▪ 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 LCB Lismore Deerpark Pump Station, within the LCB Lismore WSZ, in combination with other plans or projects, is likely to have a significant effect on any 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 construction phase of the corrective water treatment works at LCB Lismore Deerpark Pump Station the potential for direct, indirect and cumulative impacts affecting European Sites within the Zol (i.e. Blackwater River (Cork/Waterford) SAC and Blackwater Callows SPA) has been assessed. There will be no significant direct, indirect or cumulative impacts that will result in likely significant effects to the qualifying interests/special conservation interests of the European Sites within the Zol.

During the operational phase the potential for direct, indirect and cumulative impacts affecting the Blackwater River (Cork / Waterford) SAC, Blackwater Callows SPA and Blackwater Estuary SPA has been assessed. Due to the low orthophosphate inputs following dosing at LCB Lismore Deerpark Pump Station and no risk of deterioration in the orthophosphate indicative quality of the receiving water bodies or of preventing the achievement of WFD objectives, there will be no significant direct, indirect or cumulative impacts that will result in likely significant effects to the qualifying interests/special conservation interests of the European Sites within the Zol. 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 and associated construction works at the LCB Lismore Deerpark Pump Station; individually or in combination with other plans or projects, will not have a significant effect on any European Sites. Therefore, AA is not required.

8 REFERENCES

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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
Blackwater River (Cork / Waterford) SAC (002170)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002170.pdf
Blackwater Callows SPA (004094)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004094.pdf
Blackwater Estuary SPA (004028)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO004028.pdf

APPENDIX B

Nutrient Sensitive Qualifying Interests

Water dependant and nutrient sensitive SAC species

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

Water dependant and nutrient sensitive SAC habitats

Code	Qualifying Interest	Water dependant	GWDE	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 (<i>Spartinion maritimae</i>)	No		No
1330	Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)	Yes	Yes	Yes
1410	Mediterranean salt meadows (<i>Juncetalia maritimi</i>)	Yes	Yes	Yes
1420	Mediterranean and thermo-Atlantic halophilous scrubs (<i>Sarcocornetea fruticosi</i>)	Yes		Yes
2110	Embryonic shifting dunes	Yes		Yes
2120	Shifting dunes along the shoreline with <i>Ammophila arenaria</i> (white dunes)	Yes		Yes
2130	Fixed coastal dunes with herbaceous vegetation (grey dunes)	Yes		Yes
2140	Decalcified fixed dunes with <i>Empetrum nigrum</i>	Yes		Yes
2150	Atlantic decalcified fixed dunes (<i>Calluno-Ulicetea</i>)	Yes		Yes
2170	Dunes with <i>Salix repens</i> ssp. <i>argentea</i> (<i>Salicion arenariae</i>)	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 (<i>Littorelletalia uniflorae</i>)	Yes		Yes
3130	Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or <i>Isoeto-Nanojuncetea</i>	Yes		Yes
3140	Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> spp.	Yes		Yes
3150	Natural eutrophic lakes with <i>Magnopotamion</i> or <i>Hydrocharition</i> - 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 <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation	Yes		Yes
3270	Rivers with muddy banks with <i>Chenopodion rubri</i> p.p. and <i>Bidention</i> p.p. vegetation	Yes	Yes	Yes
4010	Northern Atlantic wet heaths with <i>Erica tetralix</i> (Flushes only)	Yes	Yes	Yes
4030	European dry heaths	No		Yes
4060	Alpine and Boreal heaths	No		No
5130	<i>Juniperus communis</i> formations on heaths or calcareous grasslands	No		No

Code	Qualifying Interest	Water dependant	GWDTE	Nutrient sensitive
6130	Calaminarian grasslands of the <i>Violetalia calaminariae</i>	No (flood risk)*		Yes
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) (* important orchid sites)	No (flood risk)*		Yes
6230	Species-rich <i>Nardus</i> 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 (<i>Molinion caeruleae</i>)	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 (<i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i>)	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 <i>Rhynchosporion</i>	Yes	Yes	Yes
7210	Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i>	Yes	Yes	Yes
7220	Petrifying springs with tufa formation (<i>Cratoneurion</i>)	Yes	Yes	Yes
7230	Alkaline fens	Yes	Yes	Yes
8110	Siliceous scree of the montane to snow levels (<i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladani</i>)	No		No
8120	Calcareous and calcshist screes of the montane to alpine levels (<i>Thlaspietea rotundifolii</i>)	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 <i>Ilex</i> and <i>Blechnum</i> in the British Isles	No		Yes
91D0	Bog woodland	Yes	Yes	Yes
91E0	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>)	Yes	Yes	Yes
91J0	<i>Taxus baccata</i> woods of the British Isles	No		No

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

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

APPENDIX C
EAM Summary Report

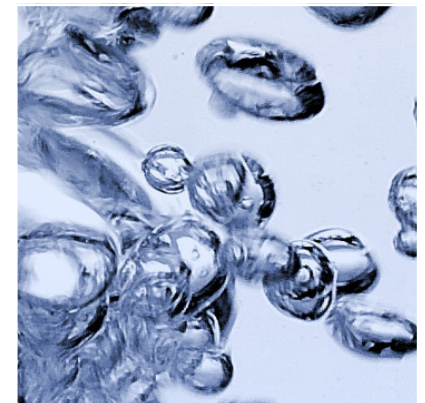
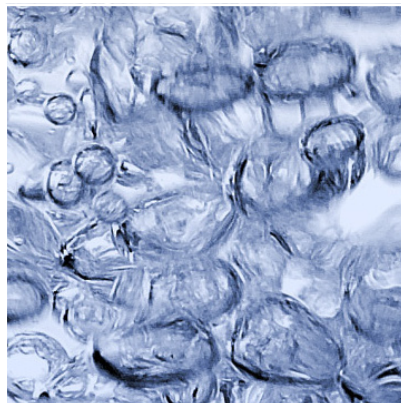
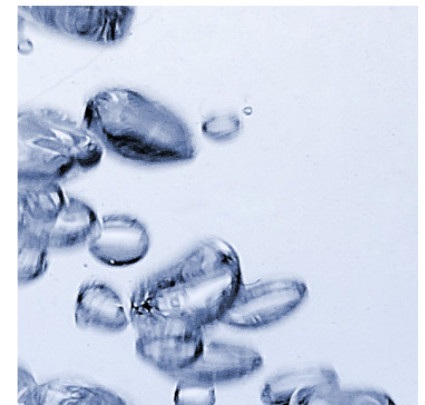
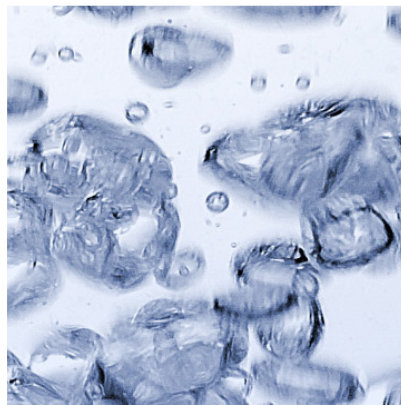
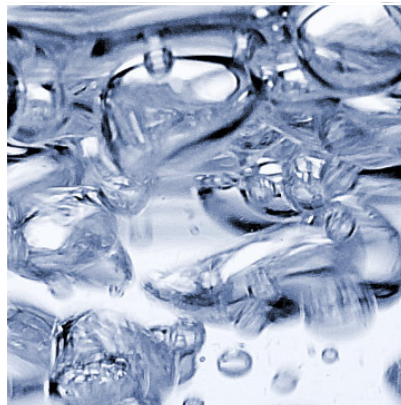
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Uisce Éireann - Lead in Drinking Water Mitigation Plan

Environmental Assessment Methodology (EAM) Summary Report

371 LCB Lismore Deerpark Pump Station – LCB Lismore WSZ (3100PUB1138)





National Lead in Water Mitigation Strategy

Environmental Assessment Methodology Report – 371 LCB Lismore Deerpark Pump Station (LCB Lismore WSZs)

Document Control Sheet

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Project Title:	National Lead in Water Mitigation Strategy
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Text Pages:	11	Appendices:	-
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371 LCB Lismore Deerpark Pump Station – LCB Lismore (3100PUB1138)

Supporting spreadsheet: 371_LCB Lismore Deerpark Pump Station_LCB Lismore _V09

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

LCB Lismore Deerpark Pump Station supplies all the distribution input to LCB Lismore WSZ (3100PUB1138) and 21% of the input to LCB Cappoquin WSZ (3100PUB1074), covering a total area of approximately 27km² in the west of Co. Waterford. LCB Cappoquin WSZ covers the town of Cappoquin and a large portion of Lismore (however the majority of the water supplied to LCB Cappoquin WSZ is from LCB Cappoquin WTP). LCB Lismore WSZ covers the remainder of Lismore and surrounding villages. The total distribution input to both LCB Lismore and LCB Cappoquin WSZs from Lismore Deerpark Pump Station is approximately 299.7 m³/day (162.57 m³/day to Lismore WSZ and 137.15 m³/day to LCB Cappoquin WSZ) 63.3% of which is accounted for (the remainder is assumed to be lost through leakage) serving a population of approximately 900. The non-domestic demand is 16% of the distribution input.

The area is served by Cappoquin (D0272) and Lismore (D0176) WWTPs which are licenced in accordance with the requirements of the Wastewater 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. It is estimated that there are 376 properties (92 in LCB Lismore WSZ & 284 in LCB Cappoquin WSZ) across the WSZs 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 Blackwater (Munster) (HA 18) catchment; Lee, Cork Harbour & Youghal (HA 19) Catchment and 20 Bandon-Ilen (HA 20) Catchment. An assessment of these cumulative loads has been undertaken and is detailed in the summary and mitigation section.

Water Treatment Plant	LCB Lismore Deerpark Pump Station	
Water Supply Zones	LCB Lismore WSZ (3100PUB1138)	LCB Cappoquin WSZ (3100PUB1074)
	See Figure 4.1 / 4.2 of the AA Screening for a map of the WSZ and Zol	
Step 1 Appropriate Assessment Screening	European Sites within Zone of Influence	
	SACs	
	- Ballymacoda (Clonpriest and Pillmore) SAC -Lough Hyne Nature Reserve And Environs SAC -Roaringwater Bay And Islands SAC -Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment SAC	-Barley Cove To Ballyrisode Point SAC -Ardmore Head SAC -Blackwater River (Cork/Waterford) SAC
	SPAs	
	-Ballymacoda Bay SPA	-Mullaghanish to Musheramore Mountains SPA

	<ul style="list-style-type: none"> -Blackwater Estuary SPA -Blackwater Callows SPA -Sovereign Islands SPA - Sheep's Head to Toe Head SPA 	<ul style="list-style-type: none"> -Galley Head to Duneen Point SPA -Seven Heads SPA 																																																										
	Appropriate Assessment Screening Required – see AA screening report for details																																																											
Step 2 – Direct Inputs to Surface Water	Table 1: Increased loading/concentration to agglomerations due to Orthophosphate Dosing – Dosing rate = 0.8 mg/l <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Agglomeration and discharge type</th> <th rowspan="2">ELV (Ortho- P unless otherwise stated) from WWDL (mg/l)</th> <th rowspan="2">Scenario</th> <th rowspan="2">TP Load kg/yr</th> <th colspan="3">Ortho P concentration mg/l <i>TP – Ortho P Conversion factor varied for sensitivity analysis (40%, 50%, 68%)</i></th> </tr> <tr> <th>0.5</th> <th>0.4</th> <th>0.68</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Lismore Primary Discharge</td> <td rowspan="2">3</td> <td>Existing</td> <td>300.6</td> <td>0.633</td> <td>0.506</td> <td>0.860</td> </tr> <tr> <td>Post Dosing</td> <td>300.6</td> <td>0.633</td> <td>0.506</td> <td>0.860</td> </tr> <tr> <td rowspan="2">Lismore SWOs (1 no.)</td> <td rowspan="2">n/a</td> <td>Existing</td> <td>26.5</td> <td>1.917</td> <td>1.534</td> <td>2.607</td> </tr> <tr> <td>Post Dosing</td> <td>27.2</td> <td>1.968</td> <td>1.574</td> <td>2.677</td> </tr> <tr> <td rowspan="2">Cappoquin Primary Discharge</td> <td rowspan="2">5</td> <td>Existing</td> <td>146.6</td> <td>0.603</td> <td>0.482</td> <td>0.820</td> </tr> <tr> <td>Post Dosing</td> <td>162.3</td> <td>0.668</td> <td>0.534</td> <td>0.908</td> </tr> <tr> <td rowspan="2">Cappoquin WOs (2 no.)</td> <td rowspan="2">n/a</td> <td>Existing</td> <td>13.3</td> <td>1.884</td> <td>1.507</td> <td>2.562</td> </tr> <tr> <td>Post Dosing</td> <td>13.8</td> <td>1.949</td> <td>1.559</td> <td>2.650</td> </tr> </tbody> </table> <p><i>Both WWTPs are modelled to be complaint with the ELV for orthophosphate for both the existing and post dosing scenarios. As Lismore WWTP receives tertiary treatment, i.e. chemical dosing for nutrient removal, and the plant is compliant with the ELVs, as reported in the 2022 AER, the EAM assumes that the additional P loading to the plant can be dealt with and managed within the treatment process therefore there is no impact on the existing effluent quality.</i></p>		Agglomeration and discharge type	ELV (Ortho- P unless otherwise stated) from WWDL (mg/l)	Scenario	TP Load kg/yr	Ortho P concentration mg/l <i>TP – Ortho P Conversion factor varied for sensitivity analysis (40%, 50%, 68%)</i>			0.5	0.4	0.68	Lismore Primary Discharge	3	Existing	300.6	0.633	0.506	0.860	Post Dosing	300.6	0.633	0.506	0.860	Lismore SWOs (1 no.)	n/a	Existing	26.5	1.917	1.534	2.607	Post Dosing	27.2	1.968	1.574	2.677	Cappoquin Primary Discharge	5	Existing	146.6	0.603	0.482	0.820	Post Dosing	162.3	0.668	0.534	0.908	Cappoquin WOs (2 no.)	n/a	Existing	13.3	1.884	1.507	2.562	Post Dosing	13.8	1.949	1.559	2.650
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	<p><u>Surface Assessment</u></p> <p><i>Lismore – Blackwater (Munster)_220 (IE_SW_18B022700)</i> - The effluent concentrations are compliant with ELVs. Tertiary treatment is assumed to remove any additional orthophosphate from the effluent due to dosing. There is no additional impact from SWOs during mean flows when SWOs are engaged (Table 2).</p> <p><i>Cappoquin - Upper Blackwater M Estuary (IE_SW_020_0500)</i> – The effluent concentrations are compliant with ELVs. Impact on water bodies downstream of the WWTP due to SWOs is negligible as during mean flows when SWOs are engaged.</p> <p>The dosing will therefore have an insignificant impact on the direct discharges to surface water from agglomerations within the WSZ.</p>
<p>Step 4 Distributed Inputs to surface water bodies from sub surface pathways</p>	<p><u>Subsurface Assessment</u></p> <p>The modelled increases in concentrations in the subsurface pathways are insignificant for all river water bodies (less than 0.00125 mg/l, which is 5% of the Good/High boundary for surface water bodies), with highest increase equal to 0.0007 mg/l, taking place in Lyrenacallee_East_010 (IE_SW_18L220930).</p> <p>There are also two transitional water bodies directly affected by this WSZ, namely, Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100) and Upper Blackwater M Estuary (IE_SW_020_0500). The modelled increases in concentrations from the subsurface pathways are undetectable for all transitional water bodies.</p>
<p>Step 5 and 6: Combined Inputs to Groundwater Bodies</p>	<p><u>Groundwater Bodies as receptors connected to WSZ</u></p> <p>Table 3 gives the loads and modelled concentrations for the assessment of groundwater bodies.</p> <p>The predicted loads to groundwater bodies are very low and the increases in concentration are not significant (less than 0.00175 mg/l, which is 5% of the Good/Fail boundary for groundwater bodies). The subsurface assessment takes into account the groundwater/surface water interaction and as the potential for impact on surface water is not significant. There is no risk of impact on groundwater receptors due to orthophosphate dosing.</p> <p>There is one monitoring point of two within the Cappoquin Kiltorcan (IE_SW_G_025) GWB which is currently “Failing to achieve good” orthophosphate indicative quality. However, the monitoring point is remote from the WSZ and due to the negligible modelled increase in orthophosphate concentrations (0.0001mg/l), there is deemed to be no further risk posed on this GWB as a result of dosing.</p>

Table 3: Increased loading and concentrations to groundwater bodies connected to the WSZs (note: where existing monitoring data is not available, a surrogate indicative quality is derived from 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	Ortho P Indicative Quality and Trends (distance to threshold) [Surrogate indicative quality given in <i>italic</i>]	Baseline Ortho P Conc. mg/l [Surrogate Conc. given in <i>italic</i>]	75% of indicative quality upper threshold mg/l	Ortho P load to GW kg/yr	Potential Increase in Ortho P Conc. due to Dosing mg/l	Potential Baseline for Ortho P Conc. following dosing mg/l	Notes
IE_SW_G_037 Glenville	Good None Far	0.006	0.026	0.0	0.0000	0.006	MP1
	Good Upwards Far	0.009	0.026			0.009	MP2
IE_SE_G_014 Ballyknock	<i>Good</i>	<i>0.018</i>	<i>0.026</i>	<i>0.0</i>	<i>0.0000</i>	<i>0.018</i>	
IE_SE_G_052 Dungarvan	Good Upwards Far	0.009	0.026	0.0	0.0000	0.009	
IE_SW_G_050 Lismore	Good Upwards Far	0.006	0.026	6.1	0.0002	0.006	MP1
	Good Upwards Far	0.005	0.026			0.005	MP2
IE_SW_G_025 Cappoquin Kiltorcan	Failing to achieve good Upwards Far	0.055	-	1.5	0.0001	0.055	MP1
	Good Upwards Far	0.011	0.026			0.011	MP2
IE_SW_G_047 Knockmealdown	Good Upwards Far	0.014	0.026	0.0	0.0000	0.014	

MP: Multiple Monitoring Points given for water body

**Step 5 and 6:
Combined
Inputs to
Surface Water
Bodies**

Combined Assessment

Table 4.A and Table 4.B give the loads and modelled concentrations for the combined assessment to rivers and receiving waterbodies respectively. The increased concentrations due to orthophosphate dosing are predicted to be insignificant, i.e. are below 5% of the Good / High boundary for Ortho P Indicative Quality (0.00125mg/l), with highest increase equal to 0.0007 mg/l, occurring in Lyrenacallee_East_010 (IE_SW_18L220930).

The rivers Blackwater (Munster)_220 (IE_SW_18B022700), BRICKEY_010 (IE_SE_17B010050), BRICKEY_020 (IE_SE_17B010090) and receiving waterbodies Upper Blackwater M Estuary (IE_SW_020_0500) and Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100) have individual baseline concentration above the 75% threshold to the high/good status boundary, however, the predicted increase in

concentration as a result of the dosing is negligible and will not increase the risk of achieving the WFD objectives for this water body.

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

EU_CD/Name	Ortho P Indicative Quality and Trends (distance to threshold) [Surrogate indicative quality indicated in italic]	Baseline Conc. mg/l [Surrogate Conc. given in italic]	75% of indicative quality upper threshold mg/l	Cumulative Ortho P load to SW from leakage & DWWTs kg/yr	Conc. Using flows (30%ile or gauged) mg/l	Potential Baseline for Ortho P Conc. following dosing mg/l	Notes
IE_SW_18B022700 BLACKWATER (MUNSTER)_220	Good Downwards Near	0.033	0.033	1.9	0.0000	0.033	‡ MP1
	Moderate Upwards Far	0.037	0.051			0.037	MP2
	Moderate Upwards Far	0.044	0.051			0.044	MP3
	Moderate Upwards Far	0.050	0.051			0.050	* MP4
IE_SW_18G060400 GLENAKEEFE_020	<i>High</i>	<i>0.013</i>	<i>0.019</i>	0.0	0.0000	<i>0.013</i>	
IE_SW_18L220930 LYRENACALLEE_EAST_010	<i>Good</i>	<i>0.030</i>	<i>0.033</i>	3.9	0.0007	<i>0.031</i>	
IE_SW_18O020400 OWBEG (WATERFORD)_010	<i>Moderate</i>	<i>0.046</i>	<i>0.051</i>	2.5	0.0003	<i>0.046</i>	
IE_SW_18O020800 OWBEG (WATERFORD)_020	Good Upwards Far	0.029	0.033	3.5	0.0003	0.029	
IE_SW_18O080200 OWENNASHAD_030	High Downwards Far	0.014	0.019	0.1	0.0000	0.014	
IE_SE_17B010050 BRICKEY_010	Good Upwards Near	0.024	0.033	0.3	0.0001	0.024	
IE_SE_17B010090 BRICKEY_020	High Upwards Near	0.022	0.019	0.4	0.0000	0.022	MP1
	Good Downwards Far	0.029	0.033			0.029	MP2
IE_SE_17C010300 COLLIGAN_040	High Upwards Far	0.014	0.019	0.6	0.0000	0.014	MP1
	High Upwards Far	0.015	0.019			0.015	MP2
	Good	0.030	0.033			0.030	MP3

	<table border="1"> <tr> <td>IE_SW_18F020500 FINISK_030</td> <td>Good Upwards Far</td> <td>0.031</td> <td>0.033</td> <td>0.8</td> <td>0.0000</td> <td>0.031</td> <td></td> </tr> <tr> <td>IE_SW_18G100200 GLENNAFALLIA_020</td> <td>Good Upwards Far</td> <td>0.030</td> <td>0.033</td> <td>0.3</td> <td>0.0000</td> <td>0.030</td> <td></td> </tr> <tr> <td>IE_SW_18M260940 MONEYGORM_010</td> <td>Good</td> <td>0.030</td> <td>0.033</td> <td>0.3</td> <td>0.0001</td> <td>0.030</td> <td></td> </tr> </table> <p>‡ Load from WWTP / SWO following treatment added. *Trends are Statistically Significant MP: Multiple Monitoring Points giver for water body</p> <p>Table 4.B: Increased loading and concentrations to Transitional and Coastal water bodies connected to the WSZs (note: where existing monitoring data is not available, a surrogate indicative quality is derived from ecological status of the WB or Ortho P indicative quality / Ecological status of upstream/downstream WBs, the mid-range of that indicative quality is used as Baseline Concentration)</p> <table border="1"> <thead> <tr> <th>EU_CD/Name</th> <th>Ortho P Indicative Quality and Trends (distance to threshold) [Surrogate indicative quality indicated in italic]</th> <th>Baseline Conc. mg/l [Surrogate Conc. given in italic]</th> <th>75% of indicative quality upper threshold mg/l</th> <th>Cumulative Ortho P load to SW from leakage & DWWTS kg/yr</th> <th>Conc. using flows (30%ile or gauged) mg/l</th> <th>Potential Baseline for Ortho P Conc. following dosing mg/l</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td rowspan="2">IE_SW_020_0500 Upper Blackwater M Estuary</td> <td>High (S) Downwards Far</td> <td>0.019</td> <td>0.023</td> <td rowspan="2">17.7</td> <td rowspan="2">0.0000</td> <td>0.019</td> <td rowspan="2">‡</td> </tr> <tr> <td>Good (W) Upwards Near</td> <td>0.031</td> <td>0.053</td> <td>0.031</td> </tr> <tr> <td rowspan="2">IE_SW_020_0100 Lower Blackwater M Estuary / Youghal Harbour</td> <td>High (S) Downwards Far</td> <td>0.021</td> <td>0.023</td> <td rowspan="2">22.2</td> <td rowspan="2">0.0000</td> <td>0.021</td> <td rowspan="2">‡</td> </tr> <tr> <td>Good (W) Upwards Near</td> <td>0.034</td> <td>0.053</td> <td>0.034</td> </tr> </tbody> </table> <p>‡ Load from WWTP / SWO following treatment added. S = Summer monitoring period, W = Winter monitoring period</p>	IE_SW_18F020500 FINISK_030	Good Upwards Far	0.031	0.033	0.8	0.0000	0.031		IE_SW_18G100200 GLENNAFALLIA_020	Good Upwards Far	0.030	0.033	0.3	0.0000	0.030		IE_SW_18M260940 MONEYGORM_010	Good	0.030	0.033	0.3	0.0001	0.030		EU_CD/Name	Ortho P Indicative Quality and Trends (distance to threshold) [Surrogate indicative quality indicated in italic]	Baseline Conc. mg/l [Surrogate Conc. given in italic]	75% of indicative quality upper threshold mg/l	Cumulative Ortho P load to SW from leakage & DWWTS kg/yr	Conc. using flows (30%ile or gauged) mg/l	Potential Baseline for Ortho P Conc. following dosing mg/l	Notes	IE_SW_020_0500 Upper Blackwater M Estuary	High (S) Downwards Far	0.019	0.023	17.7	0.0000	0.019	‡	Good (W) Upwards Near	0.031	0.053	0.031	IE_SW_020_0100 Lower Blackwater M Estuary / Youghal Harbour	High (S) Downwards Far	0.021	0.023	22.2	0.0000	0.021	‡	Good (W) Upwards Near	0.034	0.053	0.034
IE_SW_18F020500 FINISK_030	Good Upwards Far	0.031	0.033	0.8	0.0000	0.031																																																			
IE_SW_18G100200 GLENNAFALLIA_020	Good Upwards Far	0.030	0.033	0.3	0.0000	0.030																																																			
IE_SW_18M260940 MONEYGORM_010	Good	0.030	0.033	0.3	0.0001	0.030																																																			
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	Good (W) Upwards Near	0.034	0.053			0.034																																																			
Summary and Mitigation Proposed	<p>Considering LCB Lismore WSZ in isolation, orthophosphate dosing is predicted to have insignificant impact on all waterbodies. The modelled increases in load and concentrations to both groundwater and surface water receptors do not cause a risk to WFD objectives.</p> <p>The breakdown from source to pathway is depicted in Figure 1 and the fate of P loads from LCB Lismore Deerpark Pump Station is shown in Figure 2.</p> <p>The cumulative impacts on Blackwater (Munster) (HA 18) catchment; Lee, Cork Harbour & Youghal (HA 19) Catchment and 20 Bandon-Ilen (HA 20) Catchment associated with the corrective water treatment at the following additional WTPs have been assessed in combination with LCB Lismore Deerpark Pump Station.</p>																																																								

- 4 Lee Road WTP - Cork City Water Supply
- 6 Inniscarra WTP – Zone 2 Cork City and Harbour
- 26 Glashaboy WTP – Zone 3 Glashaboy
- 30 Innishannon WTP – Zone 2 Innishannon
- 36 Clonakilty RWSS WTP (Jones Bridge WTP) - Zone 1 Clonakilty
- 54 Mallow WTP (Ballyellis WTP) – Zone 4 Mallow
- 59 Glendine WTP - Zone3 Youghal Regional
- 60 Ballyhilty WTP - Zone 1 Skibbereen Ballyhilty
- 72 Kilva Reservoir Site – Zone 3 Whitegate Regional
- 78 Middleton WTP – Zone 3 Middleton
- 83 Tibbetstown WTP - Tibbotstown
- 118 Macroom WTP – Zone 2 Macroom
- 157 Carriglusky Reservoir Site, Cloyne - Zone3 Cloyne
- 161 Freemount WTP – Zone 4 Allow Regional
- 165 Knockraha WTP -Zone3 Glanmire
- 180 Mitchelstown South WTP – Zone 4 Mitchelstown South
- 192 Michelstown Galtee WTP - Cappamore Foileen Water Supply
- 236 Mountnorth Reservoir – Zone 4 Mount North
- 324 Kildorrery WTP – Zone 4 Kildorrery
- 333 Shrone WTP - Shrone PWSS 078A
- 359 Ballymacoda Road Borehole – Zone 3 Killeagh
- 363 Hammond Place Pump Station – Zone 4 Dromahane
- 370 LCB Cappelquin Pump Station - LCB Cappelquin
- 376 Tallow WTP - Tallow
- 386 Drimoleague WTP, Deelish - Zone1 Drimoleague
- 400 Bweeng WTP - Zone4 Bweeng

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 water bodies impacted by 371 LCB Lismore Deerpark Pump Station – LCB Lismore and other WSZs proposed for corrective water treatment in the Blackwater (Munster) catchment. (Note: where existing monitoring data is not available, a surrogate indicative quality is derived from ecological status of the WB or Ortho P indicative quality / ecological status of upstream and downstream WBS, the mid-range of that indicative quality is used as Baseline Concentration).

NAME / EU_CD	Ortho P Indicative Quality and Trends (distance to threshold) [surrogate indicative quality given in italic]	Baseline Conc. mg/l [surrogate Conc. given in italic]	75% of indicative quality upper threshold mg/l	Cumulative Ortho P load to SW from leakage, DWWTS & agglomerations kg/yr	Potential Increase in Ortho P Conc. due to Dosing (30%ile or gauged) mg/l	Potential Baseline for Ortho P Conc. following dosing mg/l	Notes
IE_SW_18B022700 BLACKWATER (MUNSTER)_220	Good Downwards Near	0.033	0.033	338.3	0.0002	0.033	‡ MP1
	Moderate Upwards Far	0.037	0.051			0.037	MP2
	Moderate Upwards Far	0.044	0.051			0.044	MP3
	Moderate Upwards Far	0.050	0.051			0.050	* MP4
IE_SW_18F020500 FINISK_030	Good Upwards Far	0.031	0.033	5.3	0.0001	0.031	
IE_SW_18F050600 FUNSHION_040	Moderate Downwards Far	0.040	0.051	19.5	0.0001	0.040	‡ * MP1
IE_SW_18F050700 FUNSHION_050	High Downwards Far	0.019	0.019	30.5	0.0001	0.019	‡
IE_SW_18G100200 GLENNAFALLIA_020	Good Upwards Far	0.030	0.033	1.3	0.0000	0.030	
IE_SW_18L220930 LYRENACALLEE_EAST_010	<i>Good</i>	<i>0.030</i>	<i>0.033</i>	4.5	0.0008	0.031	
IE_SW_18M260940 MONEYGORM_010	<i>Good</i>	<i>0.030</i>	<i>0.033</i>	6.7	0.0012	0.031	
IE_SW_18O020400 OWBEG (WATERFORD)_010	<i>Moderate</i>	<i>0.046</i>	<i>0.051</i>	3.0	0.0003	0.046	
IE_SW_18O020800 OWBEG (WATERFORD)_020	Good Upwards Far	0.029	0.033	6.8	0.0005	0.030	
IE_SW_020_0500 Upper Blackwater M Estuary	High (S) Downwards Far	0.019	0.023	380.9	0.0002	0.019	‡
	Good (W) Upwards Near	0.031	0.053			0.031	

	IE_SW_020_0100 Lower Blackwater M Estuary / Youghal Harbour	High (S) Downwards Far	0.021	0.023	506.3	0.0001	0.021	‡
		Good (W) Upwards Near	0.034	0.053			0.034	
	IE_SW_020_0000 Youghal Bay	High (S) Upwards Far	0.009	0.019	517.9	0.0000	0.009	‡
		High (W) Downwards Far	0.014	0.019			0.014	
	IE_SW_010_0000 Western Celtic Sea (Has 18;19;20)	<i>High</i>	<i>0.013</i>	<i>0.019</i>	<i>9601.2</i>	<i>0.0002</i>	<i>0.013</i>	‡
	<p>* Trend is Statistically Significant. ‡ Load from WWTP / SWO following treatment added. MP: Multiple Monitoring Points given for water body. S = Summer monitoring period, W = Winter monitoring period</p> <p>The cumulative assessment has demonstrated that there will not be significant impact on the receiving waters and the dosing will not cause deterioration in status or prevent the achievement of the WFD objectives.</p> <p>MITIGATION OPTION – None</p> <p>RAG STATUS – GREEN</p>							

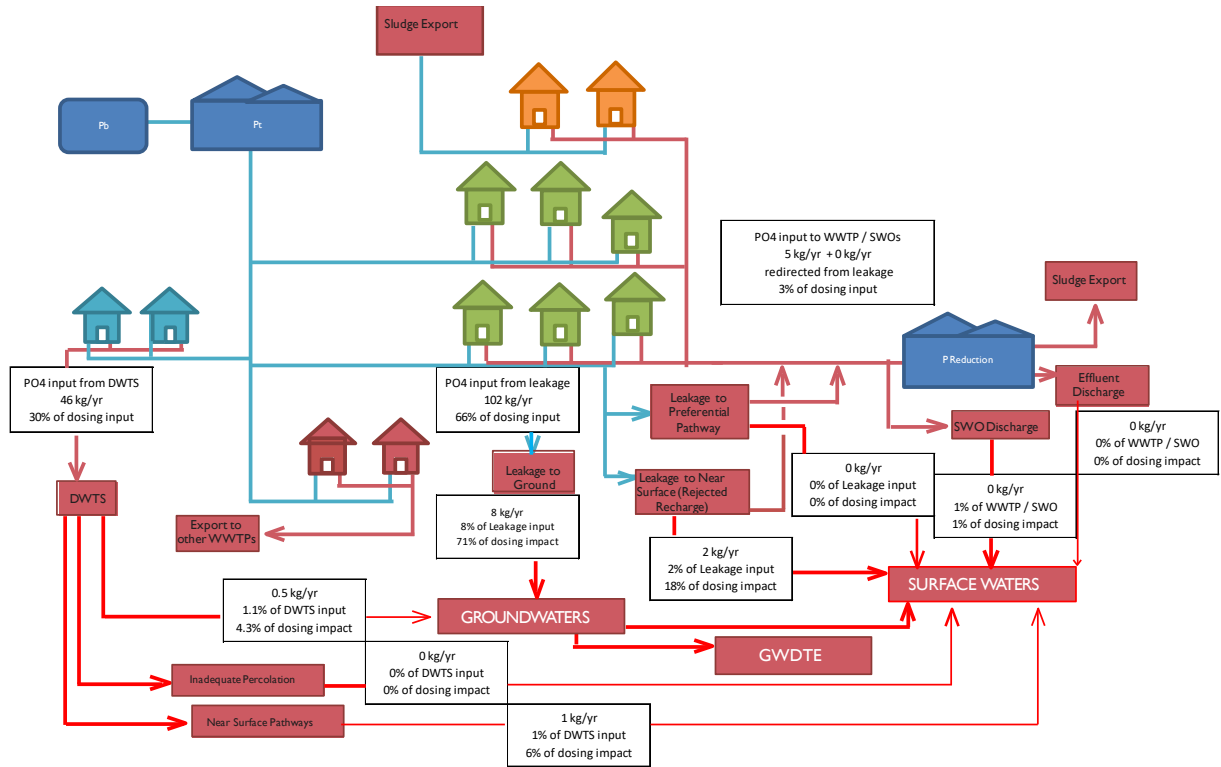


Figure 1 – Source Pathway Receptor model for LCB Lismore Deerpark Pump Station illustrating key sources and pathways to the associated WSZs.

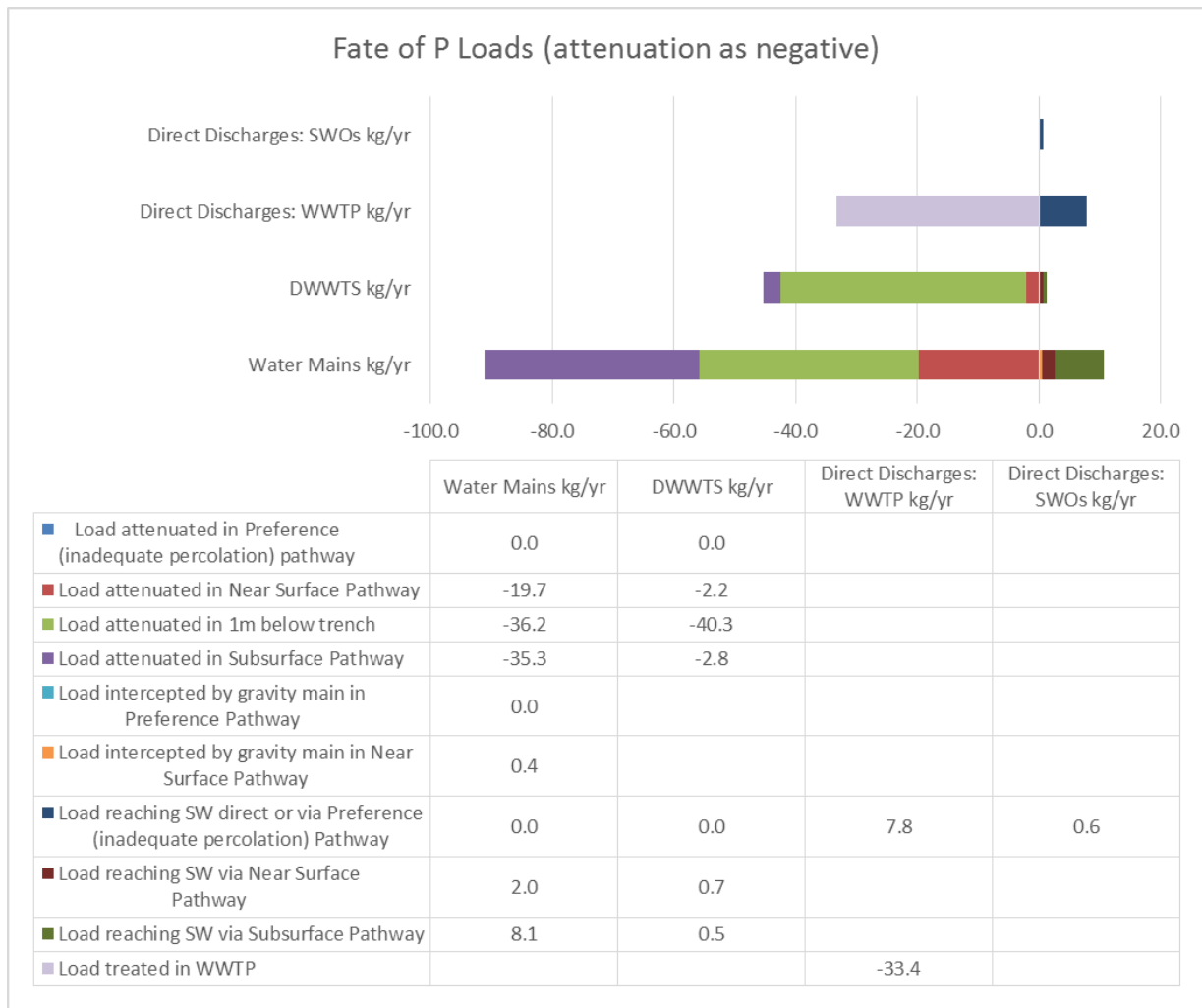


Figure 2 – Fate of orthophosphate loads modelled for LCB Lismore WSZ impacting on Lower Blackwater M Estuary / Youghal Harbour (IE_SW_020_0100) due to dosing by source type, indicating levels of attenuation in pathways and relative impact on the surface water receptor.