Irish Water - Lead in Drinking Water Mitigation Plan

Screening for Appropriate Assessment

177 Lingaun WTP - Carrick-on-Suir (Lingaun River) WSZ (2900PUB0108)

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GLOSSARY OF TERMS & ABBREVIATIONS

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

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

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

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

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

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

Natura 2000: European network of protected sites, which represent areas of the highest value for natural habitats and species of plants and animals, which are rare, endangered or vulnerable in the European Community. The Natura 2000 network of sites will include two types of area. Areas may be designated as Special Areas of Conservation (SAC) where they support rare, endangered or vulnerable natural habitats and species of plants or animals (other than birds). Where areas support significant numbers of wild birds and their habitats, they may become Special Protection Areas (SPA). SACs are designated under the Habitats Directive and SPAs are classified under the Birds Directive. In some situations, there may be overlap in extent of SAC and SPA.

Screening: The determination of whether implementation of a plan or project would be likely to have significant environmental effects on the Natura 2000 network.

Special Area for Conservation (SAC): An SAC designation is an internationally important site, protected for its habitats and species. It is designated, as required, under the EC Habitats Directive (1992).

Special Protection Area (SPA): An SPA is a site of international importance for breeding, feeding and roosting habitat for bird species. It is designated under the EC Birds Directive (1979).

Statutory Instrument: Any order, regulation, rule, scheme or byelaw made in exercise of a power conferred by statute.

1 INTRODUCTION

RPS was commissioned by Irish Water (IW) to undertake Screening for Appropriate Assessment (AA) for the proposed orthophosphate dosing (herein referred to as the proposed project) of drinking water supplied by Lingaun Water Treatment Plant (WTP), Carrick-on-Suir, Co. Tipperary.

This report comprises information to support the Screening for AA in line with the requirements of Article 6(3) of the EU Habitats Directive (Directive 92/43/EEC) on the Conservation of Natural Habitats and of Wild Fauna and Flora (hereafter referred to as the Habitats Directive). The report assesses the potential for likely significant effects resulting from the additional phosphorus (P) load to environmental receptors, resulting from orthophosphate dosing being undertaken to mitigate against consumer exposure to lead in drinking water. It is therefore necessary to consider the sources, pathways and receptors in relation to added phosphorus.

1.1 PURPOSE OF THIS REPORT

The overall purpose of the Screening for AA, as a first step in determining the requirement for AA, is to determine whether the project is likely to have a significant effect on any European Site within the zone of influence (ZoI) of the Water Supply Zone (WSZ), either individually or in combination with other plans or projects, in view of the site's conservation objectives. This Screening report complies with the requirements of Article 6 of the Habitats Directive transposed in Ireland principally through the Planning and Development Act 2000 (as amended) and the European Communities (Birds and Natural Habitats) Regulations, S.I. No. 477 of 2011 (as amended). In the context of the proposed project, the governing legislation is the EC Birds and Habitats Regulations 2011 (as amended).

1.2 THE PLAN

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

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

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

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

Health studies have identified risks to human health from ingestion of lead. In December 2013, the acceptable limit for lead in drinking water was reduced to 10 micrograms per litre (µg/l) as per the European Union (Drinking Water) Regulations. From 2003 to 2013, the limit was 25µg/l, which was a reduction on the previous limit (i.e. pre 2003) of 50µg/l.

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

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

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

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

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

Orthophosphate is added in the form of Phosphoric acid, which is approved for use as a food additive (E338) in dairy, cereals, soft drinks, meat and cheese. The average adult person consumes between 1,000 and 1,500 milligrams (mg) of phosphorus every day as part of the normal diet. The quantity of orthophosphate that IW will be required to add to treated water is between 0.5 mg/l to 1.5 mg/l. At Lingaun WTP orthophosphate will be added at a rate of 1.0 mg/l.

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

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

1.3 PROJECT BACKGROUND

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

The first step of 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 22 European Sites with potential hydrological or hydrogeological connectivity to the WSZ:

- SAC sites: Lower River Suir SAC, River Barrow and River Nore SAC, Hook Head SAC, Bannow Bay SAC, Ballyteigue Burrow SAC, Saltee Islands SAC, Tacumshin Lake SAC, Lady's Island Lake SAC, Carnsore Point SAC, Tramore Dunes and Back Strand SAC, Helvick Head SAC and Ardmore Head SAC; and

- SPA sites: Bannow Bay SPA, Keeragh Islands SPA, Ballyteigue Burrow SPA, Saltee Islands SPA, Tacumshin Lake SPA, Lady's Island Lake SPA, Tramore Back Strand SPA, Mid-Waterford Coast SPA, Dungarvan Harbour SPA and Helvick Head to Ballyquin SPA.

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

2 APPROPRIATE ASSESSMENT METHODOLOGY

2.1 LEGISLATIVE CONTEXT

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

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

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

Article 6(4) states:

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

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

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

2.2 GUIDANCE FOR THE APPROPRIATE ASSESSMENT PROCESS

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

European and National Legislation:

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

Guidance / Case Law:

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

Departmental/NPWS Circulars:

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

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

2.3 STAGES OF THE APPROPRIATE ASSESSMENT PROCESS

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

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

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

Stage 1: Screening for a likely significant effect

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

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

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

Stage 3: Assessment of Alternative Solutions

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

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

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

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

2.4 INFORMATION SOURCES CONSULTED

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

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

2.5 EVALUATION OF THE RECEIVING ENVIRONMENT

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

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

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

2.5.1 Identification of European Sites

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

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

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

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

Therefore, the ZoI for this project includes all of the hydrologically connected surface water sub catchments and groundwater bodies (**Figure 4-2**).

2.5.2 Conservation Objectives

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

Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, 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 2013 a, b &c) and on information contained in Ireland's most recent Article 12 submission to the EU on *the Status and trends of Birds species* (NPWS 2013d). Water dependent 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

Linguan WTP supplies the town of Carrick-on-Suir in the south-east portion of Co. Tipperary near the borders of Co. Waterford and Co. Kilkenny. The distribution input for Carrick-on-Suir (Linguan River) is 1,587 m^3/day (50% of which is accounted for) serving a population in excess of 4,975. The non-domestic demand is 10.6% of the distribution input. The area is served by Carrick-on-Suir (D0148) WWTP which is licensed in accordance with the requirements of the Waste Water Discharge (Authorisation) Regulations 2007 as amended and the potential impact of the orthophosphate dosing on the emission limit values and the receiving water body downstream of the point of discharge are assessed. There are no WWTPs with a population equivalent of less than 500. It is estimated that there are five properties across the WSZ that are serviced by a DWWTS (see **Appendix C**).

Lingaun WTP lies adjacent to the Upper Suir Estuary in the Suir catchment (HA16). The EAM process identified 22 European Sites with potential hydrological or hydrogeological connectivity to the WSZ:

- SAC sites: Lower River Suir SAC, River Barrow and River Nore SAC, Hook Head SAC, Bannow Bay SAC, Ballyteigue Burrow SAC, Saltee Islands SAC, Tacumshin Lake SAC, Lady's Island Lake SAC, Carnsore Point SAC, Tramore Dunes and Back Strand SAC, Helvick Head SAC and Ardmore Head SAC; and

- SPA sites: Bannow Bay SPA, Keeragh Islands SPA, Ballyteigue Burrow SPA, Saltee Islands SPA, Tacumshin Lake SPA, Lady's Island Lake SPA, Tramore Back Strand SPA, Mid-Waterford Coast SPA, Dungarvan Harbour SPA and Helvick Head to Ballyquin SPA.

3.2 CONSTRUCTION OF CORRECTIVE WATER TREATMENT WORKS

The corrective water treatment works at Lingaun WTP will involve the provision of orthophosphate dosing, pH control works and associated safety equipment.

The orthophosphate dosing system will be located within the confines of the existing Lingaun WTP boundary. Dosing infrastructure will be located with the existing WTP building; no new pipework is required outside of the building. The surrounding landscape is dominated by amenity and agricultural grassland. The location of the works is shown on **Figure 3-1**.

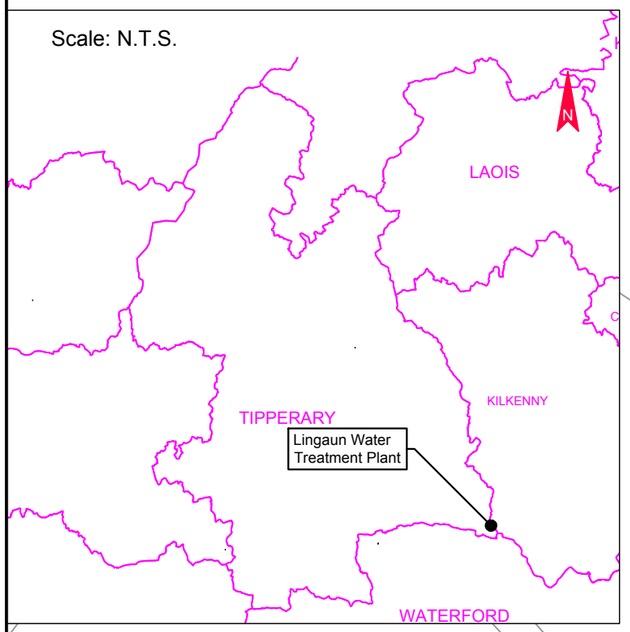
The implementation of orthophosphate dosing at the Lingaun WTP will require the following elements:

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

CO. TIPPERARY

Lingaun Water Treatment Plant

Scale: N.T.S.



Client

UISCE ÉIREANN : IRISH WATER

No.	Date	Dn. / Chk.	Amendment / Issue	App
F01	Nov'18	JR / BL	ISSUED FOR INFORAMTION	DC

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Project

LEAD MITIGATION PLAN

LINGAUN WATER
TREATMENT PLANT - SITE LAYOUT

Job No.	File Ref.	Drg. No.	Rev.
MDW0766		SK0177 WTP	F01

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The bulk storage tanks (1 no. tank, with a working volume of 500 l) will sit upon an above ground reinforced concrete plinth, designed to support the combined weight of the storage tanks, equipment and total volume of chemical to be stored (**Figure 3-3**).

Each storage tank will be self-bunded to accommodate greater than 110% of the tank working volume. The tanks shall conform to Irish Water 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.

There is an existing pH correction system at the Linguan WTP. Currently sodium hypochlorite solution is dosed prior to the water entering the clearwater tank and monitored from within the clearwater tank with a target free chlorine residual of approximately 0.7mg/l the water then flows directly to the 2,500 cubic meters capacity Carrick-on-Suir reservoir prior to distribution to the network. A stable pH is critical to facilitate effective plumbosolvency control. It is proposed that an existing soda ash dosing system is recommissioned in order to provide a stable final water pH at the Lingaun WTP.

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 Lingaun WTP. The ducts will be installed at approximately 700mm below ground level and following installation the trench will be backfilled and the surface reinstated to match the existing surface. Where pipework and cables are routed through existing structures, they shall be surface mounted within trunking.

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

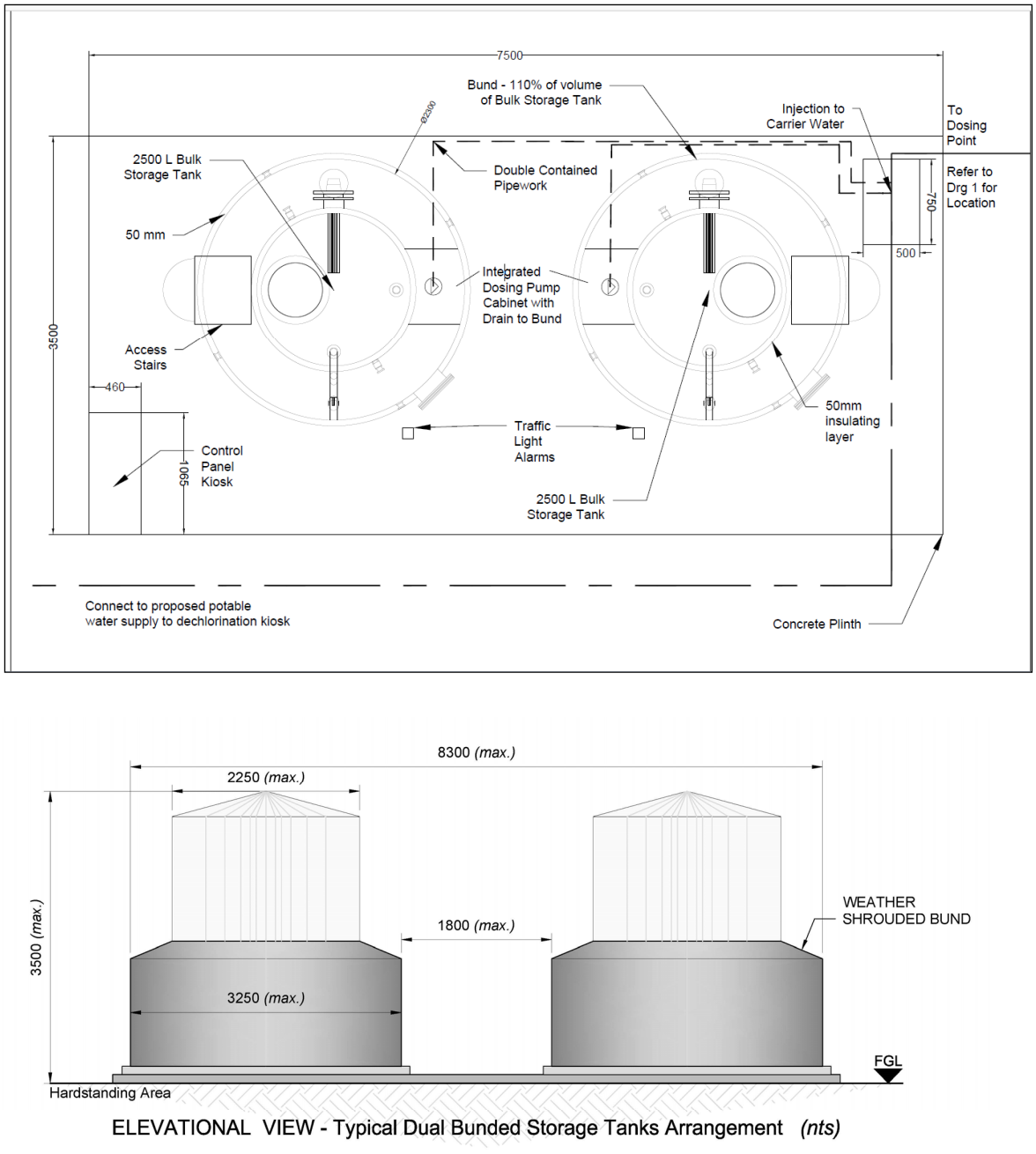


Figure 3-2: Plan and Elevation Drawings of a typical Orthophosphate Dosing Unit

3.3 CONSTRUCTION METHODOLOGY

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

3.4 OPERATION OF CORRECTIVE WATER TREATMENT WORKS

The operational stage for the corrective water treatment works will be a part of the day to day activities of the WTP and will be operated in accordance with the SOPs. Dosing will occur prior to distribution to the network and overflows from the reservoir will not contain orthophosphate.

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 Lingaun WTP, orthophosphate will be added to treated water at a rate of 1.0 mg/l. The onsite storage tanks have been designed to provide 60 days of storage so it is anticipated that deliveries will be approximately once every two months. All deliveries will be via existing access roads within the boundary of the WTP.

3.5 LDWMP APPROACH TO ASSESSMENT

3.5.1 Work Flow Process

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

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

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

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

The EAM will be the basis of the decision support matrix to inform any programmes developed as part of the LDWMP. Further detail on the model is presented in **Section 3.5.2** below.

3.5.2 Environmental Assessment Methodology

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

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

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

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

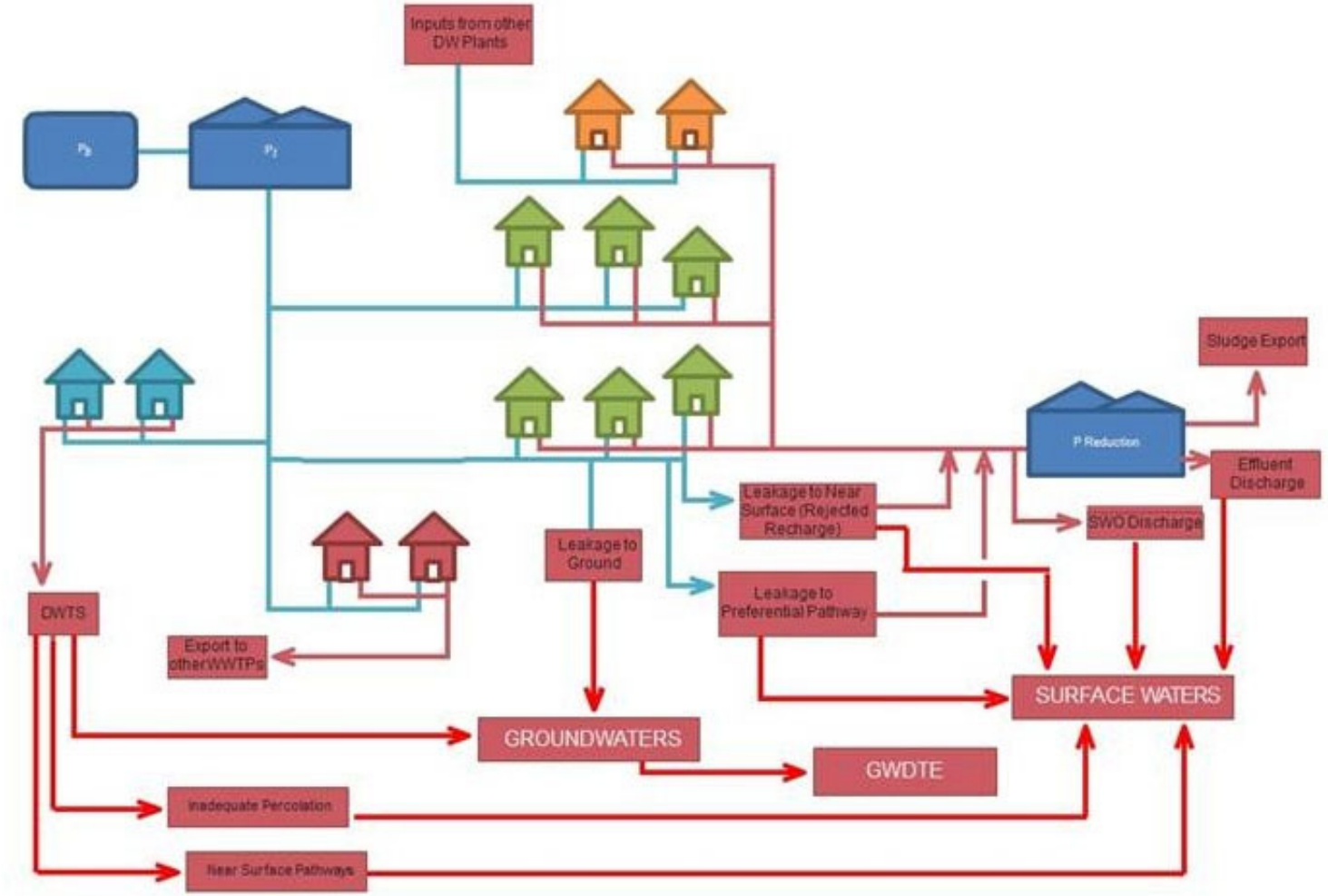


Figure 3-3: Conceptual Model of P Transfer

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

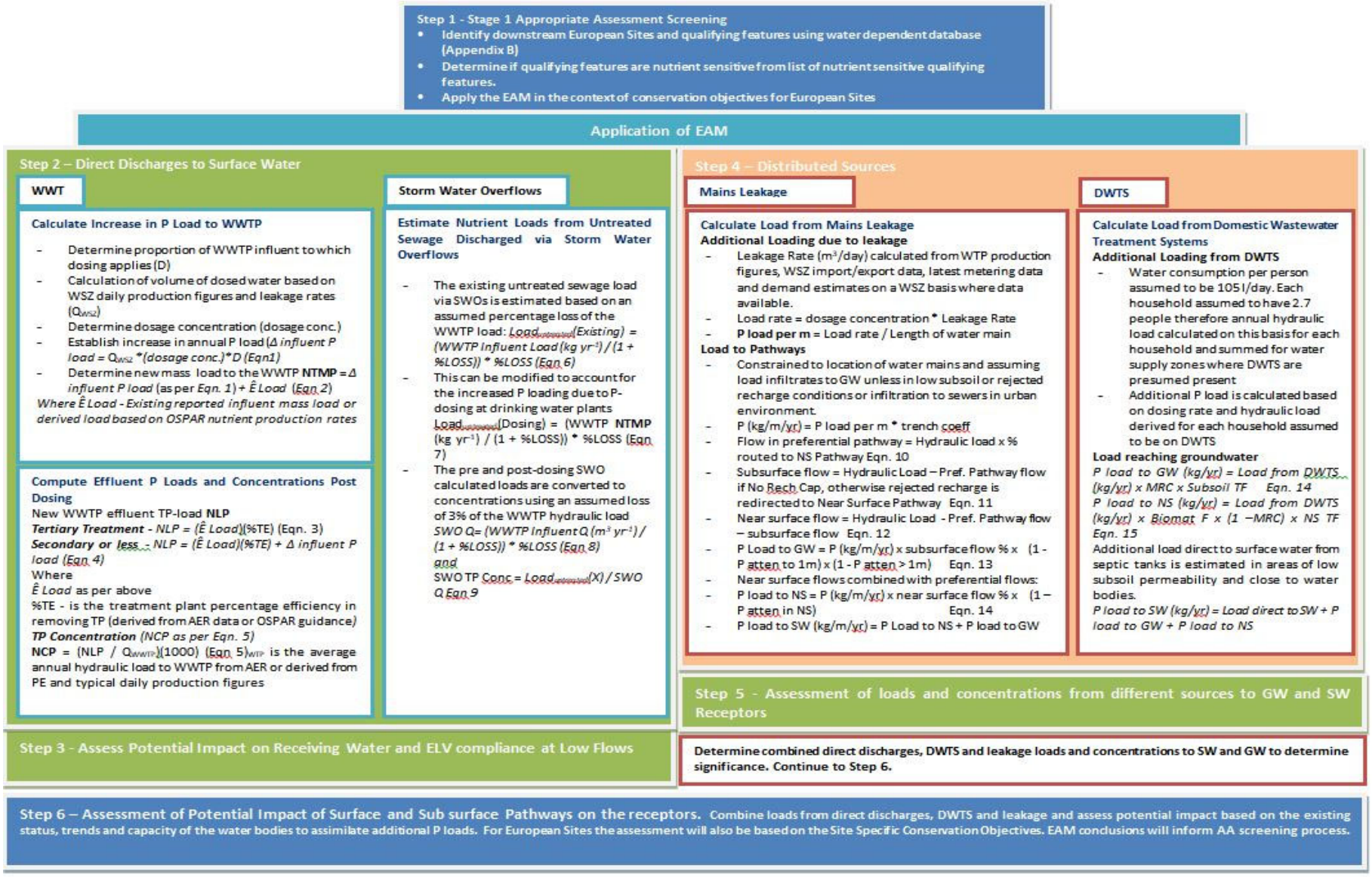


Figure 3-4: Stepwise Approach to the Environmental Assessment Methodology

4 PROJECT CONNECTIVITY TO EUROPEAN SITES

4.1 OVERVIEW OF THE PROJECT ZONE OF INFLUENCE

4.1.1 Construction Phase

The construction phase of the proposed project will take place within the confines of the existing Lingaun WTP. Dosing infrastructure will be located with the existing WTP building; no new pipework is required outside of the building. The WTP is not located within any European Site. The south west corner of the WTP is directly adjacent to the Lower River Suir SAC. Given the small-scale nature of construction works, the ZoI was considered to include the footprint of the existing Lingaun WTP followed by a review of hydrological and hydrogeological connectivity between the proposed development site and European Sites. The European Sites within ZoI for the construction phase of the project are listed in **Table 4-2** and displayed in **Figure 4-1**.

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

	Site Name	SAC / SPA Code	Direct Impact	Water Dependent Species / Habitats	Surface Water Connectivity	Groundwater Connectivity[4]	Potential Source Pathway Receptor
1	Lower River Suir SAC	002137	No	Yes	No	No	No

4.1.2 Operational Phase

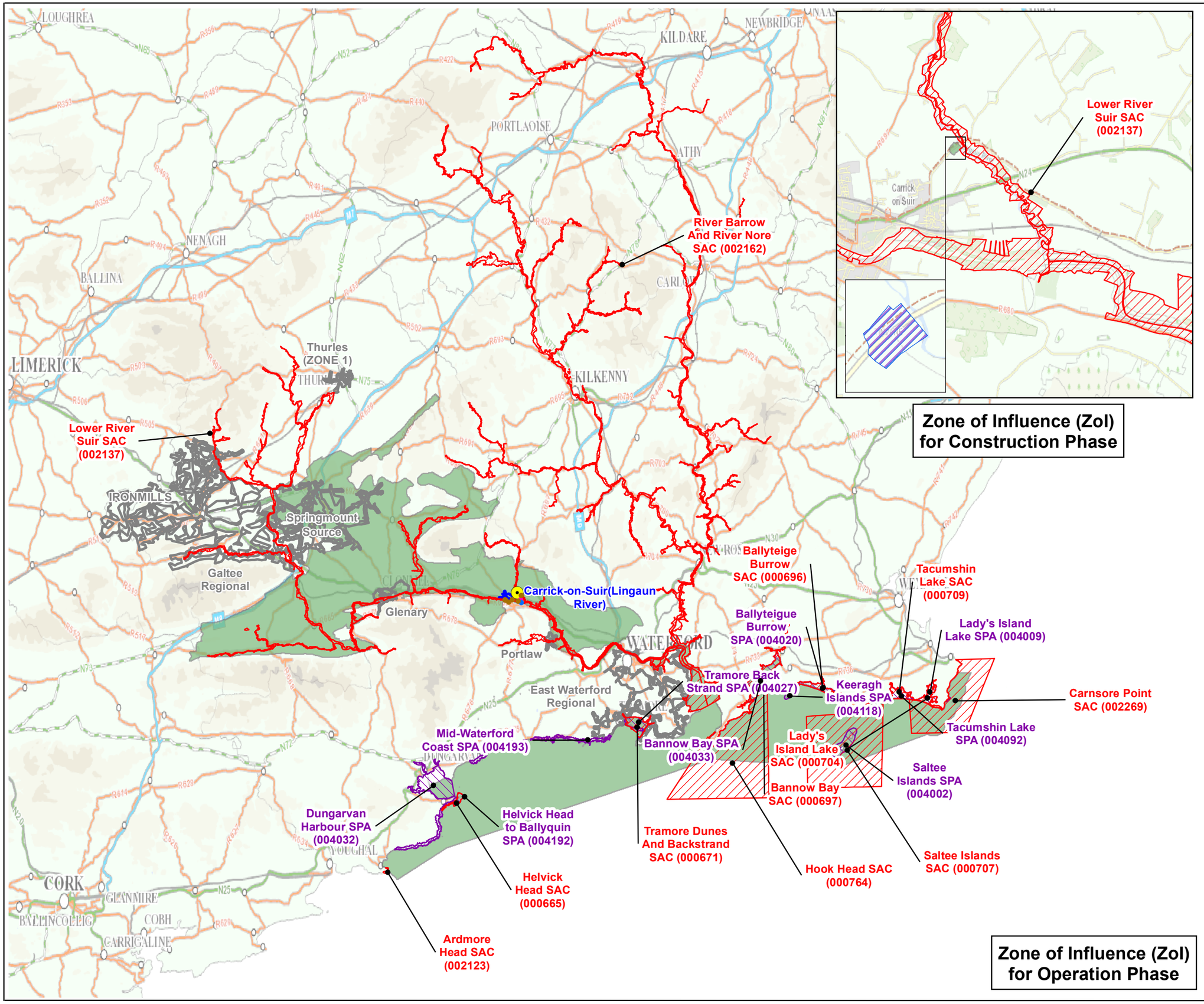
The ZoI for the operational phase of the proposed project was determined by establishing the potential for hydrological and hydrogeological connectivity between the Lingaun WTP and associated WSZ and European Sites. The ZoI was therefore defined by the surface and groundwater bodies that are hydrologically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

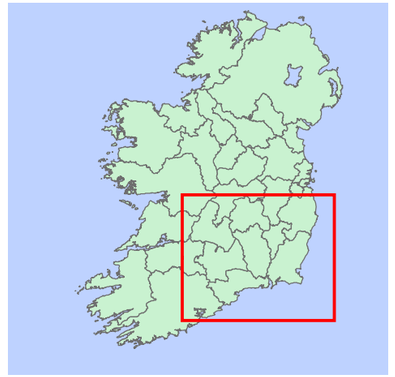
In the EAM, all water bodies linked to the WSZ have been identified. Downstream water bodies to the estuary and coastal water bodies have also been identified. Groundwater bodies touching or intersecting the WSZs are also included in the ZoI. Hydrogeological linkages in karst areas have also been taken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

[4] Lingaun WTP overlies the Clonmel (IE_SE_G_040) groundwater body. The groundwater body is contained within the low-lying broad valley of the River Suir and is a '*Regionally Important Karstified Aquifer*'. Most of the groundwater moves relatively rapidly along short flow paths and discharges into the streams which cross the aquifers. Flow in the karstified system tends to be conduit flow along the fault zones. All European Sites overlying or supporting connectivity to this groundwater body have been assessed to determine potential source impact pathways. Given the proposed construction phase works, including pH correction system reinstatement, are to be located within the WTP building and no new pipework is required outside of the existing WTP building. Therefore it is not anticipated for negative impacts to occur to the Lower River Suir SAC. As a result, the Lower River Suir SAC is not included for further assessment regarding the construction phase.

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

	Site Name	SAC / SPA Code	Water Dependent Species / Habitats	Nutrient Sensitive Species/ Habitats	Surface Water Connectivity	Groundwater Connectivity	Potential Source Pathway Receptor
1	Lower River Suir SAC	002137	Yes	Yes	Yes – RWB (Lingaun, Glenbrook)	Yes (Clonmel)	Yes
2	River Barrow and River Nore SAC	002162	Yes	Yes	Yes – TWBs Upper Suir Estuary, Lower Suir Estuary	No	Yes
3	Hook Head SAC	000764	Yes	Yes	Yes – CWB Eastern Celtic Sea	No	Yes
4	Bannow Bay SAC	000697	Yes	Yes	Yes – CWB Eastern Celtic Sea	No	Yes
5	Ballyteigue Burrow SAC	000696	Yes	Yes	Yes – CWB Eastern Celtic Sea	No	Yes
6	Saltee Islands SAC	000707	Yes	Yes	Yes – CWB Eastern Celtic Sea	No	Yes
7	Tacumshin Lake SAC	000709	Yes	Yes	Yes – CWB Eastern Celtic Sea	No	Yes
8	Lady's Island Lake SAC	000704	Yes	Yes	Yes – CWB Eastern Celtic Sea	No	Yes
9	Carnsore Point SAC	002269	Yes	Yes	Yes – CWB Eastern Celtic Sea	No	Yes
10	Tramore Dunes & Back Strand SAC	000671	Yes	Yes	Yes – CWB Eastern Celtic Sea	No	Yes
11	Helvick Head SAC	000665	Yes	Yes	Yes – CWB Eastern Celtic Sea	No	Yes
12	Ardmore Head SAC	002123	Yes	Yes	Yes – CWB Eastern Celtic Sea	No	Yes
13	Bannow Bay SPA	004033	Yes	Yes	Yes – CWB Eastern Celtic Sea	No	Yes
14	Keeragh Islands SPA	004118	Yes	Yes	Yes – CWB Eastern Celtic Sea	No	Yes
15	Ballyteigue Burrow SPA	004020	Yes	Yes	Yes – CWB Eastern Celtic Sea	No	Yes
16	Saltee Islands SPA	004002	Yes	Yes	Yes – CWB Eastern Celtic Sea	No	Yes
17	Tacumshin Lake SPA	004092	Yes	Yes	Yes – CWB Eastern Celtic Sea	No	Yes
18	Lady's Island Lake SPA	004009	Yes	Yes	Yes – CWB Eastern Celtic Sea	No	Yes
19	Tramore Back Strand SPA	004027	Yes	Yes	Yes – CWBs Eastern Celtic Sea, Tramore Bay	No	Yes
20	Mid-Waterford Coast SPA	004193	Yes	Yes	Yes – CWB Eastern Celtic Sea	No	Yes
21	Dungarvan Harbour SPA	004032	Yes	Yes	Yes – CWBs Eastern Celtic Sea, Dungarvan Harbour	No	Yes
22	Helvick Head to Ballyquin SPA	004192	Yes	Yes	Yes – CWB Eastern Celtic Sea	No	Yes





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LEMA Emission Type

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

Data Source:
Irish Water
NPWS (April 2018)
EPA

N

0 5 10 20 Kilometres

Client: UISCE ÉIREANN : IRISH WATER

Project: Lead Mitigation Plan
Corrective Water Treatment Works

Figure 4.1

Carrick-on-Suir (Lingaun River)

European Sites within the ZoI of the Proposed Project

RPS

Scale: 1:600,000 @ A3	Date: 31/07/2018
File Ref: MDW0766Arc0044aA02	Map Projection: Irish National Grid (TM65)

4.2 IDENTIFICATION OF RELEVANT EUROPEAN SITES

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

The construction phase of the proposed project will take place within the confines of the existing Lingaun WTP. Dosing infrastructure will be located within the existing WTP building; no new pipework is required outside of the building. There is no potential for surface water connectivity to the nearby Lower River Suir SAC due to the proposed works being limited to within the confines of the existing buildings within the WTP. The WTP overlies the Clonmel (IE_SE_G_040) GWB though, given the isolated nature of the construction phase works, there is no potential connectivity between the proposed works and the Lower River Suir SAC that would result in negative impacts to the European site network.

The WSZ for the operational phase in Carrick-on-Suir Region is quite small and located adjacent to the Upper Suir Estuary. The WSZ intersects the Lower River Suir SAC and therefore the site has been screened into the assessment. The WSZ also intersects one groundwater body – Clonmel (IE_SE_G_040) (**Table 3, Appendix C**), which also intersects the Lower River Suir SAC and is therefore included in the Section 5 and Section 6 assessment.

Groundwater flows through voids such as connected pore spaces in sand and gravel aquifers and through fissures, faults, joints and bedding planes in bedrock aquifers. Regional groundwater flows tend to follow the regional topography and generally discharge towards main surface water bodies including rivers, lakes and coastal water bodies. In areas of karstified limestones, high permeability zones give rise to rapid groundwater velocities with more complex flow directions, which may vary seasonally and are difficult to predict with certainty. In this case, the assumption is that groundwater flow direction is from areas of higher elevations to lower elevations, unless groundwater specific information indicates otherwise. Groundwater body specific information relating to flow and discharge is available from the GSI[5], was consulted in making the assessment.

The Clonmel groundwater body is contained within the low-lying broad valley of the River Suir and is a '*Regionally Important Karstified Aquifer*'. Most of the groundwater moves relatively rapidly along short flow paths and discharges into the streams which cross the aquifers. Flow in the karstified system tends to be conduit flow along the fault zones. There are also a large number of outcrops over all areas of the groundwater body. There are considerable variations in the hydrogeological conditions in this aquifer unit, owing to the wide range in elevation of the outcrop areas and its karstic nature. Conditions in the main limestone aquifers are predominantly unconfined, as the water table is generally less than 10 m from the surface. Some water tracing has been carried out which indicates the groundwater is following surface water pathways, but this is not complete for the groundwater body. Owing to the karstic nature of this groundwater body and potential for groundwater to travel long distances, the European Site hydrogeologically connected to the Clonmel groundwater body is included for assessment at this stage, i.e. the Lower River Suir SAC.

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

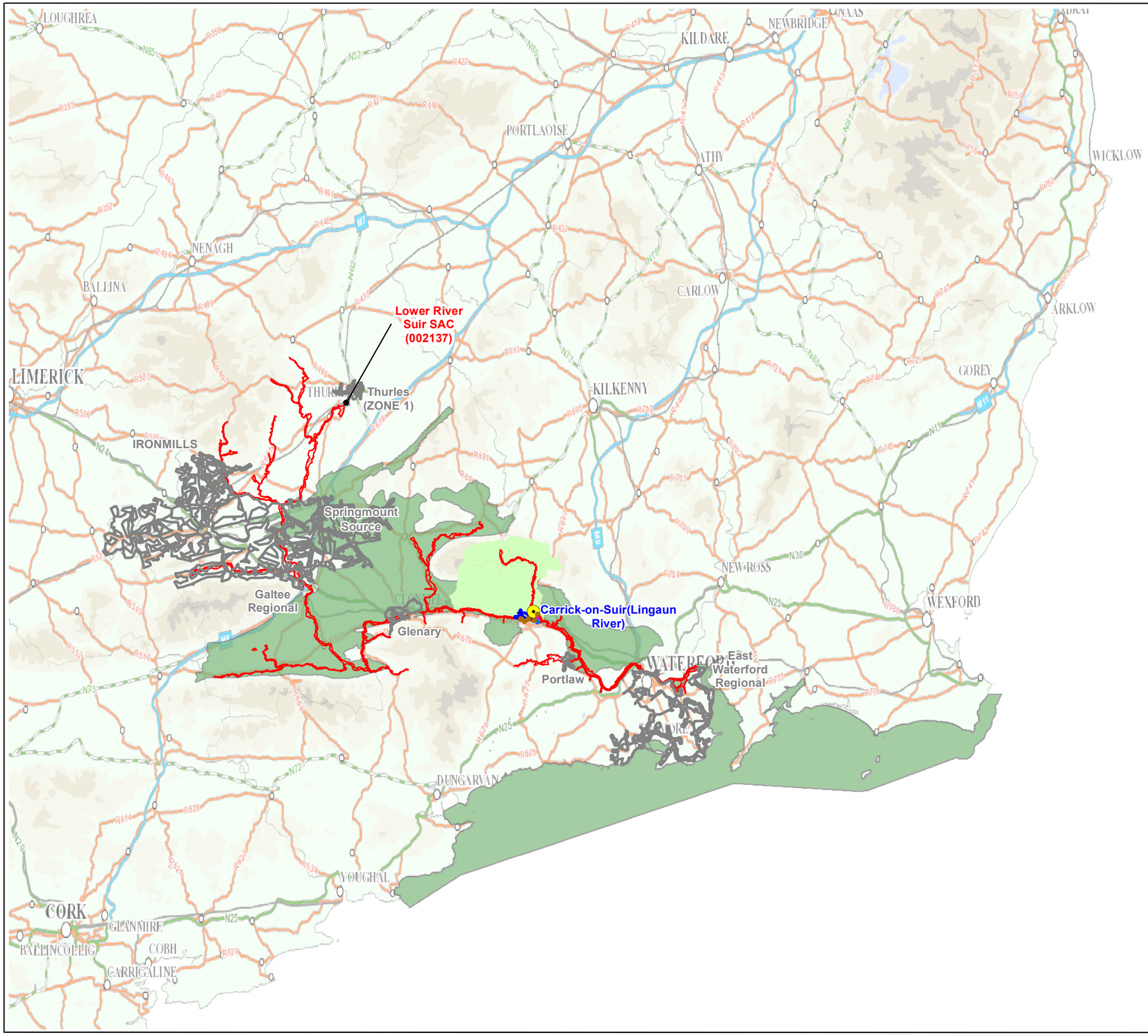
A large coastal water body i.e. the Eastern Celtic Sea lies downstream of the WSZ. However, the WSZ discharges directly into a transitional water body – Upper Suir Estuary, followed by the Middle Suir Estuary, and then Waterford Harbour coastal water body, before entering the Eastern Celtic Sea coastal water body. The EAM results show that the potential increase in orthophosphate in the Upper Suir Estuary (IE_SE_100_0600) as a result of dosing at Lingaun WTP is not detectable (0.0000 mg/l) (see **Table 5-1** below). Therefore, the ZoI for the project has been determined to terminate at the Upper Suir Estuary transitional water body, and the following sites are excluded from further assessment: River Barrow and River Nore SAC, Hook Head SAC, Bannow Bay SAC, Ballyteigue Burrow SAC, Saltee Islands SAC, Tacumshin Lake SAC, Lady's Island Lake SAC, Carnsore Point SAC, Tramore Dunes and Back Strand SAC, Helvick Head SAC, Ardmore Head SAC, Bannow Bay SPA, Keeragh Islands SPA, Ballyteigue Burrow SPA, Saltee Islands SPA, Tacumshin Lake SPA, Lady's Island Lake SPA, Tramore Back Strand SPA, Mid-Waterford Coast SPA, Dungarvan Harbour SPA and Helvick Head to Ballyquin SPA.

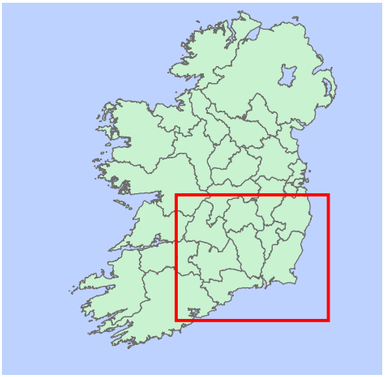
On this basis, one site has been included for further assessment in order to evaluate the significance of potential effects during the operational phase in Sections 5 and 6 below i.e. Lower River Suir SAC.

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
Operational Phase Only								
Lower River Suir SAC	SAC 002137	28th Mar 2017 (Version 1)	1029	Freshwater Pearl Mussel (*Margaritifera margaritifera*)	Yes	Yes	Yes	Yes
			1092	White-clawed Crayfish (*Austropotamobius pallipes*)	Yes	Yes		
			1095	Sea Lamprey (*Petromyzon marinus*)	Yes	Yes		
			1096	Brook Lamprey (*Lampetra planeri*)	Yes	Yes		
			1099	River Lamprey (*Lampetra fluviatilis*)	Yes	Yes		
			1103	Twaite Shad (*Alosa fallax fallax*)	Yes	Yes		
			1106	Salmon (*Salmo salar*)	Yes	Yes		
			1330	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	Yes	Yes		
			1355	Otter (*Lutra lutra*)	Yes	Yes		
			1410	Mediterranean salt meadows (*Juncetalia maritimi*)	Yes	Yes		
			3260	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation	Yes	Yes		
			6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	Yes	Yes		

Site Name	SAC / SPA Code	Conservation Objectives Establishment Date	Feature Code	Qualifying Interests / Special Conservation Interests	Water Dependent Species / Habitats	Nutrient Sensitive	Potential Hydrological / Hydrogeological Connectivity	Potential Source Pathway Receptor
			91A0	Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	No	Yes		
			91E0	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)*	Yes	Yes		
			91J0	*Taxus baccata* woods of the British Isles*	No	No	No	No





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LEMA Emission Type

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

Data Source:
Irish Water
NPWS (April 2018)
EPA

N

0 5 10 20 Kilometres

Client: UISCE ÉIREANN : IRISH WATER

Project: Lead Mitigation Plan
Corrective Water Treatment Works

Figure 4.2

Carrick-on-Suir (Lingaun River)

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

RPS

Scale: 1:600,000 @ A3	Date: 31/07/2018
File Ref: MDW0766Arc0044bA02	Map Projection: Irish National Grid (TM65)

5 EVALUATION OF POTENTIAL IMPACTS

5.1 CONTEXT FOR IMPACT PREDICTION

The methodology for the assessment of impacts is derived from the *Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites* (EC, 2002). When describing changes/activities and impacts on ecosystem structure and function, the types of impacts that are commonly presented include:

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

5.2 IMPACT IDENTIFICATION

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

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

- Altered structure and functions relating to the physical components of a habitat ("structure") and the ecological processes that drive it ("functions"). For aquatic habitats these include attributes such as vegetation and water quality;
- Altered species composition due to changes in abiotic conditions such as water quality;
- Reduced breeding success (e.g. due to disturbance, habitat alteration, pollution) possibly resulting in reduced population viability; and
- Impacts to surface water and groundwater and the species they support (changes to key indicators).

5.2.1 Construction Phase

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

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

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

However, given the proposed works are to be carried out within the confines of the existing WTP buildings on-site, these potential impacts are to be considered inert in this case and not likely to result in impacts to the Lower River Suir SAC or surrounding environment.

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 Lingaun WTP. These will be evaluated with regard to the potential for likely significant effects on European Sites in relation to:

- Excessive phosphate within an aquatic ecosystem may lead to eutrophication with a corresponding reduction in oxygen levels, reduction in species diversity and subsequent impacts on animal life;
- Groundwater dependent habitats include both surface water habitats (e.g. hard oligo-mesotrophic lakes) and Groundwater Dependent Terrestrial Ecosystems (GWDTEs, e.g. alkaline fens). Any change in the water quality of these systems may have subsequent impacts for these habitats and species;
- The discharge of additional phosphorus loads to the environment (through surface and sub surface pathways) may have potentially negative effects on nutrient sensitive species such as the freshwater pearl mussel, Atlantic salmon and the white-clawed crayfish.
- Phosphorus in wastewater collection systems is the result of drinking water and derived from a number of other sources, including phosphorus imported from areas outside the agglomeration through import of sludges or leachates for treatment at the plant. The disposal and use of phosphorus removed in wastewater sludge is regulated (i.e. through nutrient management plans) and should not pose further threat of environmental impact;
- Leakage of phosphates from the drinking water supply network to the environment from use of orthophosphate;
- Direct discharges of increased phosphorus to water bodies from the wastewater treatment plant licensed discharges; and
- Potential discharges to water bodies of untreated effluent potentially high in orthophosphate from Storm Water Overflows (SWOs).

5.3 ASSESSMENT OF IMPACTS

Article 6 of the Habitats Directive states that:

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

The focus of this Screening to inform AA is the evaluation of the potential for likely significant effects associated with the additional orthophosphate load due to orthophosphate dosing and the construction of treatment works at Lingaun WTP.

5.3.1 Construction Phase

The orthophosphate dosing system will be located within the confines of the existing WTP boundary. Dosing infrastructure will be located within the existing WTP building; no new pipework is required outside of the building. The assessment of potential significant effects associated with construction of the corrective water treatment works was conducted taking the whole Linguan WTP into account. The assessment of impacts associated with the construction of the corrective water treatment works at Linguan WTP is based on a desktop study using the following information:

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

The ZoI assessment for the construction phase of the corrective water treatment works at Linguan WTP is presented in **Section 4.1.1** above. The Linguan WTP is not located any European Site. The south west corner of the WTP is directly adjacent to the Lower River Suir SAC. There are no water bodies supporting hydrological or hydrogeological connectivity to European Sites.

The nearest water body is the Linguan (IE_SE_16L010600) approximately 85m east of the WTP works area. The proposed construction works are small scale in nature and within the confines of Lingaun WTP and dosing infrastructure will be located with the existing WTP building and connect to existing pipework outside of the building. The grounds surrounding the existing WTP infrastructure are comprised of well-maintained grassland habitat providing a buffer between the WTP facility and the Lower River Suir SAC.

Therefore there is no risk of likely significant effects to the European Site network as a result of the construction phase.

5.3.2 Operational Phase

In the case of the additional orthophosphate load due to dosing at Linguan WTP, the EAM conceptual model developed for orthophosphate transfer identified the surface and groundwater bodies that have the potential to be affected by the orthophosphate dosing and which could provide a hydrological or hydrogeological pathway to the European Sites. These water bodies are listed in **Table 5-1.** The table identifies the following:

- European Sites included for assessment;
- Water bodies hydrologically or hydrogeologically connected to the European Sites;

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

The EAM has been undertaken assuming the capacity of a water body is a measure of its ability to absorb extra pressures before its indicative quality changes. In order to do this the indicative quality as presented in the EPA's WFD APP is used as the baseline concentration for the different monitoring points within a water body. For example, a river water body with Good orthophosphate indicative quality will have mean orthophosphate value in the range 0.025 to 0.035 mg/l. River water bodies with mean orthophosphate concentrations of 0.0275 mg/l have 75% capacity left, i.e. high capacity, while river water bodies with a mean of 0.0325 mg/l have lower capacity (25%) as the baseline concentrations are closer to the Good/Moderate indicative quality boundary.

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

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

Where a water body is unassigned and therefore does not have monitored orthophosphate concentrations or salinity levels, a conservative approach is used whereby the surrogate indicative quality is calculated based on inputting water bodies or pressures acting on the water body but the more conservative freshwater orthophosphate limits for the different indicative quality bands are applied[6].

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

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

The identification of statistically and environmentally significant trends for water bodies is a specific requirement of the WFD and the Groundwater Daughter Directive. Guidance on trends in groundwater assessments (UKTAG 2009, EPA 2010) indicates that trends are environmentally significant if they indicate that the Good Ecological Status will not be achieved within two future river basin cycles, i.e. within the next 12 years. For surface water bodies, the environmental significance is evaluated until 2021 in the WFD App.

This test applies only when the trend for orthophosphate concentration for the water body is considered statistically significant in the WFD App. For surface water bodies, the predicted concentration for 2021 is given and the additional concentration due to orthophosphate dosing is added and assessed as appropriate. If the new calculated predicted concentration prevents the achievement of good indicative quality then this test fails.

This assessment assumes a dosing rate of 1.0 mg/l, this test could be reassessed in the future.

An additional test for groundwater bodies states that downward trends should not be reversed as a result of pollution. This test applies to groundwater bodies with statistically significant trends according to the WFD App and the Sens Slope provided is used to assess direction and strength of trend. If the trend is negative and the predicted increase in orthophosphate concentration is lower than the absolute value of the Sens Slope, then the test passes.

The initial assessment is automated using existing WFD App data. If tests fail and more investigation is required, more recent data can be used and the assessment rerun. For example, if 2015 - 2017 concentrations for a river water body are available, the 2015 – 2017 average can be used instead of the 2014 baseline provided in the WFD App.

Table 5-1: 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[7]	Ortho P Indicative Quality[8] and Trends[9]	Baseline[10] Ortho P Conc.[11] (mg/l)	75% of Indicative Quality Upper Threshold (mg/l)	Cumulative Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Conc.[12] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[13]	Evaluation
Lower River Suir SAC (002137)	IE_SE_16S022850 Suir_220	RWB	High Downwards Far	0.017	0.019	0.0	0.0000	0.017*	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
			High Downwards Far	0.017	0.019			0.017*	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SE_16G040200 Glenbrook_010	RWB	Good Downwards Far	0.028	0.033	9.6	0.0007	0.029	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
			Good Downwards Far	0.031	0.033			0.032	No risk of deterioration in the Ortho P indicative quality or of preventing

[7] Monitoring period is annual unless specified.
[8] Surrogate Indicative Quality in italic.
[9] Distance to threshold.
[10] Baseline year is 2014 for surface water bodies and 2012 for groundwater bodies.
[11] Surrogate concentration is given in italic mg/l
[12] 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.
[13] Green cells signify that there is no risk of deterioration in indicative quality of the waterbody following dosing at the WTP.

Site Name (Code)	Contributing WB Code_Name	WB Type[7]	Ortho P Indicative Quality[8] and Trends[9]	Baseline[10] Ortho P Conc.[11] (mg/l)	75% of Indicative Quality Upper Threshold (mg/l)	Cumulative Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Conc.[12] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[13]	Evaluation
									the achievement of WFD objectives.
	IE_SE_16L010600 Lingaun_050	RWB	High None Far	0.014	0.019	12.8	0.0002	0.014	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
			High Downwards Far	0.018	0.019			0.018	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SE_100_0600 Upper Suir Estuary	TWB Summer	High Downwards Far	0.003	0.019	26.6	0.0000	0.003‡	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
		TWB Winter	High Downwards Far	0.017	0.019			0.017‡	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
	IE_SE_G_040 Clonmel	GWB	Good Upwards Far	0.012	0.026	19.2	0.0001	0.012	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[7]	Ortho P Indicative Quality[8] and Trends[9]	Baseline[10] Ortho P Conc.[11] (mg/l)	75% of Indicative Quality Upper Threshold (mg/l)	Cumulative Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Modelled Conc.[12] (mg/l)	Post-dosing Ortho P Potential Baseline Conc. (mg/l)[13]	Evaluation
			Good Upwards Far	0.008	0.026			0.008	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
			Good Upwards Far	0.008	0.026			0.008	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.
			Good Upwards Far	0.008	0.026			0.008	No risk of deterioration in the Ortho P indicative quality or of preventing the achievement of WFD objectives.

* Trends are statistically significant.
‡ Load from WWTP / SWO following treatment added.

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 5-2**). 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 of impact of orthophosphate dosing downstream of each agglomeration is provided below.

Table 5-2 provides the data used for the WWTP continuous discharge, and the SWO intermittent discharge, to compare with the emission limit values (ELVs) from the waste water discharge licence (WWDL) (if it has been set) that are applicable to the agglomeration discharge to transitional waters or freshwaters. The resultant concentration in the waters downstream of the discharge point from the agglomerations is provided in **Table 5-3**, assuming mean flows.

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

Table 5-2: Increased loading/concentration due to Orthophosphate Dosing – Dosing rate = 1.0 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*
Carrick-on-Suir Primary Discharge	1.5 Ortho P	**Existing**	388.4	0.23	0.18	0.31
		Post Dosing	388.4	0.23	0.18	0.31
Carrick-on-Suir SWOs (6 no.)	n/a	**Existing**	87.0	1.78	1.42	2.42
		Post Dosing	95.6	1.95	1.56	2.65

Table 5-3: Mass balance assessment based on 1.0 mg/l dosing using available background concentrations and mean flow information from Hydrotool and as assumed daily tidal exchange volume

Agglom.	RWB Name / Code for Primary Discharge	Background Conc.[14] (mg/l)	Modelled Conc. Existing (mg/l)	Modelled Conc. Post Dosing (mg/l)	% Inc
Carrick-on-Suir (D0148)	IE_SE_100_0600 Upper Suir Estuary	0.023	0.023	0.023	0.0

Carrick-on-Suir Agglomeration

The Carrick-on-Suir agglomeration discharges into the Upper Suir Estuary (IE_SE_100_0600) which is within the Lower River Suir SAC. The modelled concentrations for both existing and post dosing scenarios are compliant with total phosphorus ELVs set in the WWDL. Tertiary treatment is operational at this plant, and the plant is compliant with its current ELVs, therefore the EAM can assume the plant can remove any additional orthophosphate from the effluent due to dosing. When fluvial and daily tidal exchange volumes are taken into account the increase in the receiving water is not detectable (0.0%) (**Table 5-3**)**.** Therefore there is no risk of failing to achieve WFD objectives of the Upper Suir Estuary (IE_SE_100_0600), and its hydrologically connected European Sites as a result of dosing at Lingaun WTP.

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).

The highest increase was noted for Glenbrook_010 (IE_SE_16G040200) at 0.0007 mg/l. Therefore, there is no risk of deterioration in the status of river water bodies connected to the WSZ, as a result of dosing at Lingaun WTP.

The concentration modelled for the receiving water body, the Upper Suir Estuary (IE_SE_100_0600), is not detectable (0.0000 mg/l). This estuary intersects the Lower River Suir SAC. Therefore, there is no risk of deterioration in the orthophosphate indicative quality of transitional water bodies as a result of dosing at Lingaun WTP, or of preventing the achievement of WFD objectives.

5.3.4.2 Groundwater assessment

The predicted load and concentration to the groundwater body (GWB) is negligible at 0.0001 mg/l, which does not exceed 5% of the Good / Fail indicative quality boundary (0.00175 mg/l) as shown in **Table 3 of Appendix C**.

The Carrick-on-Suir WSZ intersects one GWB, Clonmel (IE_SE_G_040). The potential increase in orthophosphate concentration in this GWB is 0.0001 mg/l which does not exceed the 5% Good / Fail indicative quality boundary.

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

Therefore, there is no risk of deterioration in orthophosphate indicative quality from proposed dosing at Lingaun WTP, or of preventing the achievement of WFD objectives.

5.3.5 Combined Assessment

Table 4.A of Appendix C provides details of the combined orthophosphate inputs to river water bodies from direct discharges, DWWTSs and leakage loads. The increased loads due to orthophosphate dosing are not predicted to be significant i.e. are <0.00125 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 5-1**, or of preventing their achievement of WFD objectives.

Table 4.B of Appendix C gives the loads and concentrations to transitional water bodies. The modelled post-dosing increase in concentration is not detectable (0.0000 mg/l); therefore there is no risk of deterioration in the orthophosphate indicative quality of the water bodies as a result of dosing at Lingaun WTP, or of preventing the achievement of WFD objectives.

There are no lake water bodies affected by this WTP.

5.3.6 Assessment of Cumulative Impacts from other WSZs

The cumulative impacts on Suir Catchment (HA 16) associated with phosphate dosing from following additional WTPs in addition to loads impacting on the Ballyteigue-Bannow (HA 13), Barrow (HA 14), Nore (HA 15) and Colligan-Mahon (HA 17) catchments are summarised in **Table 5-4** below:

- 010 Adamstown WTP - East Waterford Regional (3800PUB1110)
- 021 Rossadrehid WTP - Galtee Regional (2900PUB0130)
- 041 Glenary WTP – Glenary (2000PUB1009)
- 047 Goatenbridge WTP - Ardfinnan Regional (2900PUB0102)
- 098 Mooncoin WTP - Mooncoin Regional WS 1012 (1500PUB1012)
- 115 Springmount Pump Station - Springmount Source (2900PUB_TEMP_002)
- 138 Thurles WTP – Thurles (ZONE 1) (2800PUB1012)
- 190 Ironmills Pump Station – Ironmills (2900PUB0146)
- 399 Portlaw WTP – Portlaw (3100PUB1081)

The baseline concentration for the Middle Suir Estuary (IE_SE_100_0550) exceeds 75% of the orthophosphate indicative quality upper threshold, however the modelled increase in concentration (0.0004 mg/l) does not exceed 5% of the Good / High indicative quality boundary and therefore there is no risk of deterioration in the indicative quality of the estuary or of preventing the achievement of WFD objectives.

The impact to the remaining receiving waters is also not significant as outlined in **Table 5, Appendix C** and **Table 5-4** 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 5-4: Cumulative assessment of the increased loading and concentrations to receiving water bodies from Carrick-on-Suir and other WSZs proposed for corrective water treatment in the upstream catchments

EU Code_Name	Period	Ortho P Indicative Quality[15] and Trends[16] (distance to threshold) Surrogate Indicative Quality indicated in *italic*	Baseline Year 2014 and Conc.[17] (mg/l) given in *italic*	75% of Ortho P Indicative Quality Upper Threshold (mg/l)	Cumulative Ortho P load to SW from Leakage, DWWTS & Agglom. (kg/yr)	Conc. using Flows (30%ile tidal or gauged) mg/l	PO_4 Potential Baseline Conc. Following Dosing (mg/l)
IE_SE_16S022850 Suir_220	n/a	High Downwards Far	0.017	0.019	414.4	0.0002	0.017‡*
		High Downwards Far	0.017	0.019			0.017‡*
IE_SE_16L010600 Lingaun_050	n/a	High None Far	0.014	0.019	16.4	0.0003	0.014
		High Downwards Far	0.018	0.019			0.018
IE_SE_100_0600 Upper Suir Estuary	Summer	High None Far	0.006	0.019	535.94	0.0002	0.006‡
	Winter	High None Near	0.023	0.019			0.023‡
IE_SE_100_0550 Middle Suir Estuary	Summer	High Upwards Near	0.029	0.023	2618.7	0.0010	0.030‡
	Winter	Good Downwards Far	0.037	0.053			0.038‡
IE_SE_100_0500 Lower Suir Estuary (Little Island - Cheekpoint)	Summer	High Upwards Far	0.026	0.023	2647.8	0.0010	0.032‡
	Winter	Good Downwards Near	0.053	0.053			0.033‡
IE_SE_100_0100 Barrow Suir Nore Estuary	Summer	High Upwards Far	0.019	0.020	3752.2	0.0004	0.02‡
	Winter	Good None Far	0.045	0.042			0.046‡
IE_SE_100_0000 Waterford Harbour	Summer	High Downwards Far	0.005	0.019	3851.9	0.0003	0.006‡
	Winter	High Downwards Far	0.02	0.019			0.020‡
IE_SE_050_0000 Eastern Celtic Sea (HAs 13; 17)	n/a	*Good*	0.033	0.036	4716.3	0.0000	0.033

[15] Surrogate indicative quality in *italic*
[16] Distance to threshold
[17] Surrogate concentration indicated in *italic*

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

5.3.7 Conclusions

The increased orthophosphate effluent concentrations are not resulting in a noticeable impact with an increase in the orthophosphate concentrations in the receiving Upper Suir Estuary at 0.0%, 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 main receiving water body, Upper Suir Estuary (IE_SE_100_0600), has a post-dosing concentration of 0.0000 mg/l which is below the 0.0125 mg/l High / Good indicative quality boundary.

The predicted load to the groundwater body is negligible (i.e. < 0.00175 mg/l = 5% of the Good / Fail boundary). Therefore there is no risk of deterioration in the indicative quality of the water body as a result of the proposed project.

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

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

6 EVALUATION OF LIKELY SIGNIFICANT EFFECTS

6.1 CONSTRUCTION PHASE

The Linguan WTP is not located within the boundary of any European site. It is within 85m of the Lower River Suir SAC. However, given the proposed works for Linguan WTP are to be confined to the existing building infrastructure of the WTP facility, no new trenches for pipework are required outside of the building. The proposed construction works will be localised and contained to the existing buildings of the WTP immediate development area which supports amenity grassland / buildings and artificial surfaces. Works such as excavations will be contained to the defined working area and necessary works with cast in place concrete will be undertaken within sealed shuttered units. Such works practices will retain all potential construction related pollutants at source regarding potential impacts to both surface water and groundwater body vectors to proximal European Sites.

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

6.2 OPERATIONAL PHASE

The key pressure associated with the proposed orthophosphate dosing is the potential for increased orthophosphate levels in the receiving waters 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 Lower River Suir SAC 002137

6.2.1.1 (1029) Freshwater Pearl Mussel (*Margaritifera margaritifera*)

Conservation objectives for the species in the Lower River Suir SAC have been set; however an orthophosphate specific level is not defined. 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 lower than this standard. These objectives have framed the impact assessment for this species within this SAC for this proposed project.

The freshwater pearl mussel in this SAC is located in the Clodiagh River (Portlaw), which discharges into the Middle Suir Estuary. The Clodiagh population is designated under the European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations, S.I. No. 296 of 2009. Carrick-on-Suir WTP abstracts from the Lingaun River, which is a tributary of the Upper Suir Estuary. Therefore, there is no interaction between the Lingaun River (Suir_SC_140) and the Clodiagh River (Clodiagh [Portlaw]_SC_010), and they lie is two separate sub-catchments.

Table 5-1 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Lower River Suir SAC and will receive inputs from the proposed orthophosphate dosing at Lingaun WTP:

- The river water bodies that are hydrologically connected include Suir_220 (IE_SE_16S022850), Glenbrook_010 (IE_SE_16G040200) and Lingaun_050 (IE_SE_16L010600);
- The transitional water body connected to the site is the Upper Suir Estuary (IE_SE_100_0600); and
- The groundwater body hydrogeologically connected to the site is Clonmel (IE_SE_G_040).

Given that the freshwater pearl mussel is a wholly freshwater species, there is no risk to the species from proposed dosing which will directly affect transitional and coastal water bodies and any potential effect to the indicative quality of these water bodies as a result of dosing.

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 are provided in **Appendix C**.

The assessment has modelled very low increases in orthophosphate for water bodies intersected by the WSZ. The assessment of the distance to threshold is based on the existing indicative quality of each water body, rather than the WFD environmental objective assigned to a given water body.

With respect to the freshwater pearl mussel habitat, there is no risk posed by orthophosphate dosing at Lingaun WTP, as discussed above. However, the Upper Suir Estuary which is hydrologically connected to the Middle Suir Estuary is connected to this WSZ. There is potential for indirect effects to other species associated with the freshwater pearl mussels life cycle via transitional water body pathways e.g. via Atlantic salmon as a host to freshwater pearl mussel larval glochidia. An assessment of potential for impacts to Atlantic salmon (freshwater only) is provided below under **Section 6.2.1.3**.

6.2.1.2 (1092) White-clawed Crayfish (*Austropotamobius pallipes*)

A review of the targets and measures for the white-clawed crayfish found no nutrient specific targets for the species (NPWS, 2017[18]). However, white-clawed crayfish have a general water quality requirement for moderate to good water quality (i.e. Q3-4 or higher; NPWS, 2013[19]), therefore any reduction in water quality as a result of orthophosphate dosing would be contrary to the conservation objectives for this species.

Table 5-1 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Lower River Suir SAC and will receive inputs from the proposed orthophosphate dosing at Lingaun WTP:

[18] NPWS (2017) Lower River Suir 002137 Conservation Objectives
[19] NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Species Assessments Volume 3. Version 1.0. Unpublished Report, National Parks & Wildlife

- The river water bodies that are hydrologically connected include Suir_220 (IE_SE_16S022850), Glenbrook_010 (IE_SE_16G040200) and Lingaun_050 (IE_SE_16L010600);
- The transitional water body connected to the site is the Upper Suir Estuary (IE_SE_100_0600); and
- The groundwater body hydrogeologically connected to the site is Clonmel (IE_SE_G_040).

White-clawed crayfish occurs extensively in the River Suir and in many of its tributaries. On the river Suir main channel, the species has been recorded in almost the entire length of non-tidal river from the most upstream point at Cabragh, near Thurles, to downstream of Kilsheelan. It is also present on the following tributaries: Anner and Clashawley, Clodiagh and Owenbeg, Multeen, Tar, Nier, and Clodiagh Lower. With the exception of historic crayfish records in the Clodiagh River, which discharges to the Middle Suir Estuary downstream of the WSZ (and therefore does not interact with any surface water flow from the WSZ), all current known locations for White-clawed crayfish within the Lower River Suir SAC are located upstream of the water bodies identified in **Table 5-1.** There are no records of crayfish within the Lingaun, however provided there is suitable habitat available crayfish may be present within the Lingaun.

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 are provided in **Appendix C**.

The modelled orthophosphate concentration in the river water bodies Suir_220 (IE_SE_16S022850), Glenbrook_010 (IE_SE_16G040200) and Lingaun_050 (IE_SE_16L010600) following dosing at Lingaun WTP are not detectable (0.0000 mg/l), or negligible 0.0007 mg/l and 0.0002 mg/l respectively. These concentrations are within 5% of the Good / High indicative quality boundary (0.00125 mg/l) threshold.

The transitional water body Upper Suir Estuary (IE_SE_100_0600) has a modelled post-dosing increase in concentration of 0.0000 mg/l, which is not detectable.

The modelled orthophosphate increase in concentration in the groundwater body Clonmel (IE_SE_G_040) is negligible (0.0001 mg/l), and therefore does not exceed 5% of the Good / Fail indicative quality upper threshold.

Therefore there is no risk of deterioration in the orthophosphate indicative quality of any surface or groundwater body, or of preventing the achievement of WFD objectives.

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

6.2.1.3 (1095) Sea lamprey (*Petromyzon marinus*), (1096) Brook lamprey (*Lampetra planeri*), (1099), River lamprey (*Lampetra fluviatilis*), (1103), Twaite shad (*Alosa fallax*) and (1106), Atlantic salmon (*Salmo salar*) (only in fresh water)

Water quality is a particular threat to all fish fauna listed as Qualifying Interests. The latest Red List of Irish amphibians, reptiles and freshwater fish (King *et al.*, 2011[20]) highlights the deterioration in water quality and ongoing point and diffuse sources of pollution as a key threat to these species and includes the potential effects from municipal discharges. The SSCO (NPWS, 2017[18]) 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 SSCO for salmon also requires a Q-value of at least 4, which equates to good ecological status.

Table 5-1 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Lower River Suir SAC and will receive inputs from the proposed orthophosphate dosing at Lingaun WTP:

- The river water bodies that are hydrologically connected include Suir_220 (IE_SE_16S022850), Glenbrook_010 (IE_SE_16G040200) and Lingaun_050 (IE_SE_16L010600);
- The transitional water body connected to the site is the Upper Suir Estuary (IE_SE_100_0600); and
- The groundwater body hydrogeologically connected to the site is Clonmel (IE_SE_G_040).

Details on the distribution of Sea lamprey; Brook lamprey; River lamprey; Twaite shad; and Atlantic salmon (only in fresh water) are not provided for the site within the published Conservation Objectives for the site. It is therefore considered that there is potential for the Brook lamprey; River lamprey; and Atlantic salmon to occur in all river water bodies identified in **Table 5-1**, and for Sea lamprey to occur in all river; transitional and coastal water bodies identified in **Table 5-1**. Twaite Shad are considered to utilise the lower reaches of the Suir as far as the tidal limit at Carrick on Suir. Kelly et al. (2013)[21] conducted a Twaite Shad survey within this section of the Suir and juvenile Twaite Shad were recorded downstream of Carrick on Suir close to the Barrow confluence.

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 are provided in **Appendix C**.

The modelled orthophosphate concentration in the river water bodies Suir_220 (IE_SE_16S022850), Glenbrook_010 (IE_SE_16G040200) and Lingaun_050 (IE_SE_16L010600) following dosing at Lingaun WTP are not detectable (0.0000 mg/l), or negligible 0.0007 mg/l and 0.0002 mg/l respectively. These

[20] 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.

[21] Kelly, F.L., Matson, R., Coyne, J., Feeney, R., Morrissey, E. and Rocks, K. (2013) Water Framework Directive Fish Stock Survey of Transitional Waters in the South Eastern River Basin District – Barrow, Nore and Suir Estuary. Inland Fisheries Ireland, Swords Business Campus, Swords, Co. Dublin, Ireland

concentrations are within 5% of the Good / High indicative quality boundary (0.00125 mg/l) threshold.

The transitional water body Upper Suir Estuary (IE_SE_100_0600) has a modelled post-dosing increase in concentration of 0.0000 mg/l, which is not detectable.

The modelled orthophosphate increase in concentration in the groundwater body Clonmel (IE_SE_G_040) is negligible (0.0001 mg/l), and therefore does not exceed 5% of the Good / Fail indicative quality upper threshold.

Therefore there is no risk of deterioration in the orthophosphate indicative quality of any surface or groundwater body, or of preventing the achievement of WFD objectives.

In light of the EAM assessment results, which evaluate the additional orthophosphate loading from dosing at Lingaun WTP, it has been demonstrated that there will be no significant increase in orthophosphate loading, no change to the orthophosphate indicative quality, or of preventing their achievement of WFD objectives. Therefore there will be no change to supporting aquatic habitats for the species and the potential for likely significant effects on these Annex II species can be excluded. Furthermore, dosing will not prevent the restoration of the favourable conservation condition of these species.

6.2.1.4 (1330) Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) and (1410) Mediterranean salt meadows (*Juncetalia maritimi*)

A review of the SSCOs (NPWS, 2017[18]) for the site found no nutrient specific targets for these habitats; however, one attribute common to both habitats under physical structure is flooding regime. The target is to maintain the natural tidal regime. The CO supporting document on coastal habitats (NPWS, 2017[22]) for the Lower River Suir SAC was reviewed, and discusses the flooding regime attribute and associated target in further detail. The regular ebb and flow of the tide brings salinity, but also nutrients, organic matter and sediment, which are central to the development, growth and survival of saltmarshes.

Table 5-1 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Lower River Suir SAC and will receive inputs from the proposed orthophosphate dosing at Lingaun WTP:

- The river water bodies that are hydrologically connected include Suir_220 (IE_SE_16S022850), Glenbrook_010 (IE_SE_16G040200) and Lingaun_050 (IE_SE_16L010600);
- The transitional water body connected to the site is the Upper Suir Estuary (IE_SE_100_0600); and
- The groundwater body hydrogeologically connected to the site is Clonmel (IE_SE_G_040).

The habitat Atlantic salt meadow is located at Belmont House at the north-west end of the Kings Channel; in low-lying land to the north of the Little Island slipway (Ballynakill House); and distributed

[22] NPWS (2017) Lower River Suir 002137 Conservation Objectives supporting document - coastal habitats

along the southern side of the Kings Channel. The habitat is located within the transitional water body Lower Suir Estuary (Little Island - Cheekpoint) (IE_SE_100_0500) which is downstream of the Upper Suir Estuary (IE_SE_100_0600) transitional water body and the Suir_220 (IE_SE_16S022850), Glenbrook_010 (IE_SE_16G040200) and Lingaun_050 (IE_SE_16L010600) river water bodies.

Mediterranean salt meadows habitat was not recorded in Lower River Suir SAC during the Saltmarsh Monitoring Project (SMP) (McCorry and Ryle, 2009[23]). Thus, the total area of the qualifying habitat in the SAC is unknown. An NPWS survey in the 1990s noted stands of sea rush (*Juncus maritimus*), indicative of Mediterranean salt meadows, on the saltmarsh at Grantstown but the habitat was not recorded in the Little Island sub-site during the SMP in 2007 (McCorry and Ryle, 2009). Unsurveyed areas may be present within the SAC. On this basis, a conservative assessment has been undertaken and has assumed that this habitat may be present downstream of the WSZ.

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 are provided in **Appendix C**.

The modelled orthophosphate concentration in the river water bodies Suir_220 (IE_SE_16S022850), Glenbrook_010 (IE_SE_16G040200) and Lingaun_050 (IE_SE_16L010600) following dosing at Lingaun WTP are not detectable (0.0000 mg/l), or negligible 0.0007 mg/l and 0.0002 mg/l respectively. These concentrations are within 5% of the Good / High indicative quality boundary (0.00125 mg/l) threshold.

The transitional water body Upper Suir Estuary (IE_SE_100_0600) has a modelled post-dosing increase in concentration of 0.0000 mg/l, which is not detectable.

The modelled orthophosphate increase in concentration in the groundwater body Clonmel (IE_SE_G_040) is negligible (0.0001 mg/l), and therefore does not exceed 5% of the Good / Fail indicative quality upper threshold.

Therefore there is no risk of deterioration in the orthophosphate indicative quality of any surface or groundwater body, or of preventing the achievement of WFD objectives.

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

6.2.1.5 (1355) Otter (*Lutra lutra*)

A review of the SSCOs (NPWS, 2017[18]) found no specific attributes or targets relating to water quality. In addition, the National Parks and Wildlife Service's Threat Response Plan for the Otter (NPWS 2009[24]), categorized three principal risks to otters: i) habitat destruction and degradation; ii) water pollution; and, iii) accidental death and/or persecution. Water pollution may influence otters either indirectly or directly. Indirect effects include damage to food supply or habitat, thus lowering the carrying capacity of an affected area. Direct effects impact the animal itself, resulting in either

[23] McCorry, M. and Ryle, T. (2009) Saltmarsh monitoring project 2007-2008. Unpublished report to NPWS.
[24] NPWS 2009 Threat Response Plan: Otter *Lutra lutra* 2009-2011

rapid death (acute toxicity) or in lowered fitness (sub-lethal toxicity), reducing the animal's ability to reproduce successfully or to survive in inclement conditions. The diet of the species varies locally and seasonally; however, it is dominated by fish, in particular salmonids, eels and sticklebacks in freshwater and also crayfish locally. In coastal waters their diet can consist of wrasse and rockling. Poorly treated effluents can wipe out fish populations for long distances downstream of the discharge, making otherwise ideal habitat unsuitable for otter.

Table 5-1 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Lower River Suir SAC and will receive inputs from the proposed orthophosphate dosing at Lingaun WTP:

- The river water bodies that are hydrologically connected include Suir_220 (IE_SE_16S022850), Glenbrook_010 (IE_SE_16G040200) and Lingaun_050 (IE_SE_16L010600);
- The transitional water body connected to the site is the Upper Suir Estuary (IE_SE_100_0600); and
- The groundwater body hydrogeologically connected to the site is Clonmel (IE_SE_G_040).

The distribution of otter terrestrial habitat in the SAC is calculated as 116.17ha above high water mark (HWM) and 726.61ha along river banks. The area of marine habitat is calculated as 712.27ha and the length of freshwater (river) calculated is 382.31km. It is assumed therefore that otter have the potential to interact with all surface water bodies identified **Table 5-1**.

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 are provided in **Appendix C**.

The modelled orthophosphate concentration in the river water bodies Suir_220 (IE_SE_16S022850), Glenbrook_010 (IE_SE_16G040200) and Lingaun_050 (IE_SE_16L010600) following dosing at Lingaun WTP are not detectable (0.0000 mg/l), or negligible 0.0007 mg/l and 0.0002 mg/l respectively. These concentrations are within 5% of the Good / High indicative quality boundary (0.00125 mg/l) threshold.

The transitional water body Upper Suir Estuary (IE_SE_100_0600) has a modelled post-dosing increase in concentration of 0.0000 mg/l, which is not detectable.

The modelled orthophosphate increase in concentration in the groundwater body Clonmel (IE_SE_G_040) is negligible (0.0001 mg/l), and therefore does not exceed 5% of the Good / Fail indicative quality upper threshold.

Therefore there is no risk of deterioration in the orthophosphate indicative quality of any surface or groundwater body, or of preventing the achievement of WFD objectives.

Given the construction phase of the proposed works are confined to the existing built infrastructure of the WTP, there is no potential for construction phase impacts to the favourable conservation condition of otter species as a result of the proposed works.

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

6.2.1.6 (6430) Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels

A review of the SSCOs (NPWS, 2017[18]) for this site do not contain nutrient specific water quality targets for this habitat, however an important attribute for the habitat is hydrological regime, namely flooding depth/height of the water table. The habitat relies on winter inundation, which results in deposition of naturally nutrient-rich sediment.

Table 5-1 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Lower River Suir SAC and will receive inputs from the proposed orthophosphate dosing at Lingaun WTP:

- The river water bodies that are hydrologically connected include Suir_220 (IE_SE_16S022850), Glenbrook_010 (IE_SE_16G040200) and Lingaun_050 (IE_SE_16L010600);
- The transitional water body connected to the site is the Upper Suir Estuary (IE_SE_100_0600); and
- The groundwater body hydrogeologically connected to the site is Clonmel (IE_SE_G_040).

The location of this habitat has not been mapped in detail for the Lower River Suir SAC and therefore the total area of the qualifying habitat in the SAC is unknown. It is assumed that the habitat has the potential to be hydrologically connected to all surface water bodies identified **Table 5-1**.

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 are provided in **Appendix C**.

The modelled orthophosphate concentration in the river water bodies Suir_220 (IE_SE_16S022850), Glenbrook_010 (IE_SE_16G040200) and Lingaun_050 (IE_SE_16L010600) following dosing at Lingaun WTP are not detectable (0.0000 mg/l), or negligible 0.0007 mg/l and 0.0002 mg/l respectively. These concentrations are within 5% of the Good / High indicative quality boundary (0.00125 mg/l) threshold.

The transitional water body Upper Suir Estuary (IE_SE_100_0600) has a modelled post-dosing increase in concentration of 0.0000 mg/l, which is not detectable.

The modelled orthophosphate increase in concentration in the groundwater body Clonmel (IE_SE_G_040) is negligible (0.0001 mg/l), and therefore does not exceed 5% of the Good / Fail indicative quality upper threshold.

Therefore there is no risk of deterioration in the orthophosphate indicative quality of any surface or groundwater body, or of preventing the achievement of WFD objectives.

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

6.2.1.7 (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. 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.

Table 5-1 identifies the surface and groundwater bodies which are hydrologically or hydrogeologically connected to the Lower River Suir SAC and will receive inputs from the proposed orthophosphate dosing at Lingaun WTP:

- The river water bodies that are hydrologically connected include Suir_220 (IE_SE_16S022850), Glenbrook_010 (IE_SE_16G040200) and Lingaun_050 (IE_SE_16L010600);
- The transitional water body connected to the site is the Upper Suir Estuary (IE_SE_100_0600); and
- The groundwater body hydrogeologically connected to the site is Clonmel (IE_SE_G_040).

Alluvial forest was surveyed in Lower River Suir SAC by Perrin *et al*. (2008[25]) as part of the National Survey of Native Woodlands (NSNW) at Fiddown (NSNW site code: 0022), Mountbolton (NSNW site code: 1823) and Ballycanvan Big (NSNW site code: 1839). The area of alluvial woodlands in the surveyed sites within the SAC is estimated to be 32.9ha. It is important to note that further unsurveyed areas of alluvial forest are present within the SAC, for example at islands below Carrick-on-Suir, at Shanbally (Coillte LIFE project site), Tibberaghny Marshes, along the lower stretches of the more westerly of the Suir tributaries and along both banks of the Suir as far east as the Dawn River. Alluvial woodlands occur in the IE_SE_100_0550 Middle Suir Estuary. The habitats are located approximately 7 km downstream of the Carrick-on-Suir (Lingaun River) WSZ and the river water bodies that are hydrologically connected to the WSZ: Suir_220 (IE_SE_16S022850), Glenbrook_010 (IE_SE_16G040200) and Lingaun_050 (IE_SE_16L010600). Given that there are potentially further unsurveyed areas, a precautionary approach has been taken for this assessment and it has been assumed that the habitat may be present in the water bodies intersected by the Portlaw WSZ.

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 are provided in **Appendix C**.

[25] Perrin, P.M.; Martin, J.; Barron, S.; O'Neill, F.H.; McNutt, K.E.; Delaney, A. National survey of native woodlands 2003-2008. Unpublished report to NPWS

The modelled orthophosphate concentration in the river water bodies Suir_220 (IE_SE_16S022850), Glenbrook_010 (IE_SE_16G040200) and Lingaun_050 (IE_SE_16L010600) following dosing at Lingaun WTP are not detectable (0.0000 mg/l), or negligible 0.0007 mg/l and 0.0002 mg/l respectively. These concentrations are within 5% of the Good / High indicative quality boundary (0.00125 mg/l) threshold.

The transitional water body Upper Suir Estuary (IE_SE_100_0600) has a modelled post-dosing increase in concentration of 0.0000 mg/l, which is not detectable.

The modelled orthophosphate increase in concentration in the groundwater body Clonmel (IE_SE_G_040) is negligible (0.0001 mg/l), and therefore does not exceed 5% of the Good / Fail indicative quality upper threshold.

Therefore there is no risk of deterioration in the orthophosphate indicative quality of any surface or groundwater body, or of preventing the achievement of WFD objectives.

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

6.3 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 Tipperary 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 Team's 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
Draft Tipperary County Development Plan 2022 – 2028. The policies, objectives and zonings of relevance in both Development Plans include under Infrastructure and Water Services: **Planning Policy 11.1 -** In assessing proposals for new development to balance the need for new development with the protection and enhancement of the natural environment and human health. No plans, programmes, etc. or projects giving rise to significant cumulative, direct, indirect or secondary impacts on European sites arising from their size or scale, land take, proximity, resource requirements, emissions (disposal to land, water or air), transportation requirements, duration of construction, operation, decommissioning or from any other effects shall be permitted on the basis of this Plan (either individually or in combination with other plans, programmes, etc. or projects). **Planning Policy 11.2 -** Ensure the protection, integrity and conservation of European Sites and Annex I and II species listed in EU Directives. Where it is determined that a development may individually, or cumulatively, impact on the integrity of European sites, the Council will require planning applications to be accompanied by a NIS in accordance with the Habitats Directive and transposing Regulations, 'Appropriate Assessment of Plans and Projects, Guidelines for Planning Authorities', (DEHLG 2009) or any amendment thereof and relevant EPA and European Commission guidance documents. **Planning Policy 11.7** - a) Ensure the protection of water quality in accordance with the EU WFD, and support the objectives and facilitate the implementation of the associated Programme of Measures of the River Basin Management Plan 2018-2021 and any successor. This includes contributing towards the protection of blue-dot catchments and drinking water resources. Also, have cognisance of the EU's Common Implementation Strategy Guidance Document No. 20 and 36 which provide guidance on exemptions to the environmental objectives of the WFD. b) Support an integrated and collaborative approach to catchment management in accordance with the River Basin Management Plan 2018-2021 and any successor. c) Require an undisturbed edge or buffer zone to be maintained, where appropriate, between new developments and riparian zones of water bodies to maintain the natural function of existing ecosystems associated with water courses and their riparian zones,	▪ N/A	The Tipperary 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 (2018-2021), 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.

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects
and to enable sustainable public access. **Planning Policy 11.8** - Provide for the sustainable development of fisheries, in compliance with the Habitats and Birds Directives, and other ecological protection objectives. New infrastructure should be positioned at already modified locations where feasible; and sedimentation and siltation issues should be considered, with floating infrastructure used where feasible. Fishery related developments may necessitate the preparation of a Visitor/Habitat Management Plan that includes requirements in relation to: sustainable fishing practices that would not affect the ecological site integrity; and invasive species. **Planning Objective 15-A** - Work in partnership with Irish Water in the performance of its functions and in the implementation of the Water Services Strategic Plan, Investment Plan and National Water Resources Plan (and any amendment thereof), to ensure that water infrastructure complies with appropriate regulations and to ensure and support the sustainable development of the county.		
River Basin Management Plan For Ireland 2022 – 2027 The Third Cycle Draft River Basin Management Plan 2022-2027 Consultation Report has been published. This report presents a summary of the issues raised in the submissions reviewed from the public consultation on the draft River Basin Management Plan for Ireland 2022-2027. The 3rd cycle of River Basin Management Plan (RBMP) for the period of 2022-2027 is currently being prepared by Department of Housing, Local Government and Heritage (DHLGH) in line with the EU Water Framework Directive (WFD) (2000/60/EC). The document (Chapter 3) sets out the condition of Irish waters and a summary of status for all monitored waters in the 2013 – 2018 period, including a description of the changes since 2007 – 2009 and 2010-2015. A large number of river waterbodies are still declining and unless this is addressed, sustained and progressive improvements in water quality will be difficult to achieve. Overall, 53% of surface waters are in good or high ecological status while the remaining 47% are in unsatisfactory ecological status. For groundwater bodies, 92% are in good chemical and quantitative status. Chapter 3 of the RBMP presents results of the catchment characterisation process, which identifies the significant pressures on each water body that is *At Risk* of not meeting the environmental objectives of the WFD. Importantly, the assessment	▪ N/A	The objectives of the RBMP are to • Prevent deterioration; • Restore good status; • Reduce chemical pollution; and • Achieve water related protected areas objectives The implementation of the RBMP seeks compliance with the environmental objectives set under the plan, which will be documented for each water body. This includes compliance with the European Communities (Surface Waters) Regulations S.I. No. 272 of 2009 (as amended). The implementation of this plan will have a positive impact on biodiversity and the Project will not affect the achievement of the RBMP objectives given the detailed assessment of the effects of dosing on water body environmental objectives under the EAM.

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects
includes a review of trends over time to see if conditions were likely to remain stable, improve or deteriorate by 2027. This work was presented in the RBMP for 4,842 water bodies nationally. 1,603 water bodies were classed *At Risk* or 33%. An assessment of significant environmental pressures found that agriculture was the most significant pressure in 1,000 water bodies that are *At Risk*. Urban waste water, hydromorphology and forestry were also significant pressures amongst others.		
Catchment based Flood Risk Assessment and Management (CFRAM) Programme, under the Floods Directive The Office of Public Works (OPW) is responsible for the implementation of the Floods Directive 2007/60/EC which is being carried out through a Catchment based Flood Risk Assessment and Management (CFRAM) Programme. As part of the directive Ireland is required to undertake a Preliminary Flood Risk Assessment, to identify areas of existing or potentially significant future flood risk and to prepare flood hazard and risk maps for these areas. Following this, flood risk management plans are developed for these areas setting objectives for managing the flood risk and setting out a prioritised set of measures to achieve the objectives. The CFRAM programme is currently being rolled out and Draft Flood Risk Management Plans have been prepared. These plans have been subject AA.	▪ Habitat loss or destruction; ▪ Habitat fragmentation or degradation; ▪ Alterations to water quality and/or water movement; ▪ Disturbance; ▪ In-combination impacts within the same scheme.	CFRAM Studies and their product Flood Risk Management Plans will each undergo AA. Any future flood plans will have to take into account the design and implementation of water management infrastructure as it has the potential to impact on hydromorphology and potentially on the ecological status and favourable conservation status of water bodies. The establishment of how flooding may be contributing to deterioration in water quality in areas where other relevant pressures are absent is a significant consideration in terms of achieving the objectives of the WFD. The AA of the plans will need to consider the potential for impacts from hard engineering solutions and how they might affect hydrological connectivity and hydromorphological supporting conditions for protected habitats and species. There is no potential for cumulative impacts with the CFRAMS programme as no infrastructure is proposed as part of this project.
Foodwise 2025 Foodwise 2025 strategy identifies significant growth opportunities across all subsectors of the Irish agri-food industry. Growth Projection includes increasing the value added in the agri-food, fisheries and wood products sector by 70% to in excess of €13 billion.	▪ Land use change or intensification; ▪ Water pollution; ▪ Nitrogen deposition; ▪ Disturbance to habitats / species.	Foodwise 2025 was subject to its own AA[26]. 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-

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

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects
		combination impacts are predicted. Mitigation measures included cross compliance with 13 Statutory Management Requirements, EIA Agricultural Regulations 2011, GLAS, and AA Screening of licencing and permitting in the forestry and seafood sectors.
Rural Development Policy 2014 – 2020 The agricultural sector is actively enhancing competitiveness whilst trying to achieve more sustainable management of natural resources. The common set of objectives, principles and rules through which the European Union co-ordinates support for European agriculture is outlined in the Rural Development Programme (RDP) 2014-2020 under the Common Agricultural Policy. The focus of the programme is to assist with the sustainable development of rural communities and while improvements are sought in relation to water management. Within the RDP are two targeted agri-environment schemes; Green Low Carbon Agri-Environment Scheme (GLAS) and Targeted Agriculture Modernisation Scheme (TAMS). They provide the role of a supportive measure to improve water quality and thus provide direct benefits in achieving the measures within the RBMP. The achievement of the objectives outlined within GLAS, to improve water quality, mitigate against climate change and promote biodiversity will be of direct positive benefit in achieving the measures within the RBMP and the goals of the Natura Directives. The scheme has an expected participation for 2014-2020 of 50,000 farmers which have to engage in specific training and tasks in order to receive full payment. Farmers within the scheme must have a nutrient management plan which is a strategy for maximising the return from on and off-farm chemical and organic fertilizer resources. This has a direct positive contribution towards protecting water bodies from pollution through limiting the amount of fertiliser that is placed on the land. The scheme prioritises farms in vulnerable catchments with 'high status' water bodies and also focuses on educating farmers on best practices to try and improve efficiency along with environmental outcomes. The TAMS scheme is open to all farmers and is focused on supporting productive	▪ Overgrazing; ▪ Land use change or ▪ intensification; ▪ Water pollution; ▪ Nitrogen deposition; ▪ Disturbance to habitats / species.	The RDP for 2014 – 2020 has been subject to SEA[27], and AA[28]. The AA assessed the potential for impacts from the RDP measures e.g. for the GLAS scheme to result in inappropriate management prescriptions; minimum stocking rates under the Areas of Natural Constraints measure leading to overgrazing in sensitive habitats with dependent species, and TAMS supporting intensification. Mitigation included project specific AA for individual building, tourism or agricultural reclamation projects, consultations with key stakeholders during detailed measure development, and site-based monitoring of the effects of RDP measures. With such measures in place, it was concluded that there would be no significant in-combination impacts on Natura 2000 sites.

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28 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
investment for modernisation. This financial grant for farmers is focused on the pig and poultry sectors, dairy equipment and the storage of slurry and other farmyard manures. Within the TAMS scheme are two further schemes; the Animal Welfare, Safety and Nutrient Storage Scheme and the Low Emission Slurry Spreading Scheme. Both schemes are focused on productivity for farmers but have the ability to contribute towards a reduction in point and diffuse source pollution through improved nutrient management.		
National Nitrates Action Programme Article 28 of the Good Agricultural Practice Regulations, in line with the Nitrates Directive (91/676/EEC), requires the Minister for Housing, Local Government and Heritage, in consultation with the Minister for Agriculture, Food and the Marine, to review the Nitrates Action Programme every four years. Ireland has published the Fifth Nitrates Action Programme on the 11th March 2022. The Programme sets out new measures that have been introduced since the Fourth Programme. This iteration of the NAP is developed in the context of significantly greater environmental ambition in the Programme for Government and at EU level. The key issues considered in the fifth iteration of the NAP include: ▪ Better Policy Alignment; ▪ Compliance and Enforcement; ▪ Climate Action Measures. ▪ Biodiversity Measures; and ▪ Nitrates Derogation.	▪ Land use change or intensification; ▪ Water pollution; ▪ Nitrogen deposition; ▪ Disturbance to habitats / species.	In accordance with the Directive 2001/42/EC on the assessment of effects of certain plans and programmes, as transposed into Irish law, a Strategic Environmental Assessment (SEA) is being undertaken and an Environmental Report has been prepared. Appropriate Assessment under EU Directive 92/43/EEC, as transposed into Irish law, is also being undertaken and a Natura Impact Statement (NIS) has been prepared It concluded that the NAP was an environmental programme which imposes environmental constraints on all agricultural systems in the state. Consultation and submission on the 5th NAP have been considered in the SEA Statement and the Natura Impact Statement of the adopted fifth Nitrates Action Programme. These documents provide information on the decision-making process and documents how environmental considerations, the views of consultees/stakeholders and the recommendations of the SEA Environmental Report and the assessment carried out under Article 6 of the Habitats Directive have influenced the final adopted Plan. Adherence to the recommendations in these documents and incorporation into the Plan will ensure that there is no potential for cumulative impacts with

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects
		the proposed project.
Forest Policy Review: Forests, Products and People – A Renewed Vision (2014) / Forestry Programme 2014 - 2020 Ireland's forestry sector is striving to increase forestry cover and one of the recommended policy actions in the Forest Policy Review: Forests, Products and People – A Renewed Vision (2014) is to increase the level of afforestation annually over time and support afforestation and mobilisation measures under the Forestry Programme 2014-2020. Two key objectives within the Forestry Programme 2014-2020 that will influence the RBMP are to increase Ireland's forest cover to 18% and to establish 10,000 ha of new forests and woodlands per annum. As part of this programme there are a number of schemes that promote sustainable forest management and they include the Afforestation Scheme, the Woodland Improvement Scheme, the Forest Road Scheme and the Native Woodland Conservation Scheme. Under the Native Woodland Conservation Scheme funding is provided to restore existing native woodland which promotes Ireland's native woodland resource and associated biodiversity. Native woodlands provide wider ecosystem functions and services which once restored can contribute to the protection and enhancement of water quality and aquatic habitats. New guidance and plans are also being developed to address forestry adjacent to water bodies, Freshwater Pearl Mussel Plans for 8 priority catchments and a Hen Harrier Threat Response Plan (NPWS). The mitigation measures within these plans will be particularly important in terms of protecting sensitive habitats and species from such forestry increases.	▪ Habitat loss or destruction; ▪ Habitat fragmentation or degradation; ▪ Water quality changes; ▪ Disturbance to species.	Ireland's Forestry Programme 2014 – 2020 has undergone AA[29]. A key recommendation is that all proposed forestry projects should be subject to an assessment of their impacts and the proximity of Natura 2000 habitats and species should be taken into account when proposals are generated. In-combination effects will therefore be assessed at the project specific scale. Adherence to this recommendation will ensure that there is no potential for cumulative impacts with the proposed project.
Water Services Strategic Plan (WSSP, 2015) Irish Water has prepared a Water Services Strategic Plan (WSSP, 2015), under Section 33 of the Water Service No. 2 Act of 2013 to address the delivery of strategic objectives which will contribute towards improved water quality and WFD requirements. The WSSP forms the highest tier of asset management plans (Tier 1) which Irish Water prepare and it sets the overarching framework for subsequent detailed implementation plans (Tier 2) and water services projects (Tier 3). The WSSP sets out the challenges we face as a country in relation to the provision of water services and identifies strategic national priorities. It includes Irish Water's short, medium and long term objectives and	▪ Habitat loss and disturbance from new / upgraded infrastructure; ▪ Species disturbance; ▪ Changes to water quality or quantity;	The overarching strategy was subject to AA and highlighted the need for additional plan/project environmental assessments to be carried out at the tier 2 and tier 3 level. Therefore, no likely significant in-combination effects are envisaged.

[29] 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
identifies strategies to achieve these objectives. As such, the plan provides the context for subsequent detailed implementation plans (Tier 2) which will document the approach to be used for key water service areas such as water resource management, wastewater compliance and sludge management. The WSSP also sets out the strategic objectives against which the Irish Water Capital Investment Programme is developed. The current version of the CAP outlines the proposals for capital expenditure in terms of upgrades and new builds within the Irish Water owned asset and this is a significant piece of the puzzle in terms of the expected improvements from the RBMP.	▪ Nutrient enrichment /eutrophication.	
National Wastewater Sludge Management Plan (2016) The National Wastewater Sludge Management Plan was prepared in 2015, outlining the measures needed to improve the management of wastewater sludge.	▪ Habitat loss and disturbance from new / upgraded infrastructure; ▪ Species disturbance; ▪ Changes to water quality or quantity; ▪ Nutrient enrichment /eutrophication.	The plan was subject to both AA and SEA and includes a number of mitigation measures which were identified in relation to transport of materials, land spreading of sludge and additional education and research requirements. This plan does not specifically address domestic wastewater loads, only those relating to Irish Water facilities. In relation to the plan as it stands, no in-combination effects are expected with the implementation of proposed mitigation measures.
National Water Resources Plan – Framework Plan This Framework will deliver a sustainable water supply on a catchment and water resource zone basis, meeting growth and demand requirements through drought and critical periods. The resources plan takes account of WFD objectives and the programme of measures proposed in the relevant catchments and water resource zones. Specific measures in the plan with relevance to Irish Water include those for urban wastewater and urban runoff and also as part of other measures in relation to the lead in drinking water.	▪ Increased abstractions leading to changes / pressure on existing hydrology / hydrogeological regimes.	The plan will seek to develop sustainable water supplies but must consider particularly critical drought periods when assimilation capacity for diffuse runoff may be reduced. The SEA Environmental Report for the Framework Plan has made mitigation recommendations for the implementation of the Framework Plan which are included in the Environmental Action Plan (EAP), and the EAP will provide a basis for tracking recommendations from the SEA and NIS during the Framework Plan implementation and Regional Plan development. A Monitoring Plan has also been developed which covers the integration of environmental and sustainability considerations throughout implementation of the

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects
		Framework Plan and the options development methodology and provides a framework for future long-term monitoring. Therefore, no likely significant in-combination effects are envisaged.
National Nitrates Action Programme Ireland is obliged under the Nitrates Directive 91/676/EEC to prepare a National Nitrates Action Programme which is designed to prevent pollution of surface and ground waters from agricultural sources. This will directly contribute to the improvement of water quality and thus the objectives within the RBMP. Ireland's third Nitrates Action Programme came into operation in 2014 and has a timescale up to 2017. The Agricultural Catchments Programme is an ongoing programme that monitors the efficiency of various measures within the nitrate regulations. It is spread across six catchments and encompasses approximately 300 farmers.	▪ Land use change or intensification; ▪ Water pollution; ▪ Nitrogen deposition; ▪ Disturbance to habitats / species.	This programme has been subject to a Screening for Appropriate Assessment and it concluded that the NAP will not have a significant effect on the Natura 2000 network and a Stage 2 AA was not required[30]. It concluded that the NAP was an environmental programme which imposes environmental constraints on all agricultural systems in the state. It therefore benefits Natura 2000 sites and their species. In terms of in-combination effects, it stated that the Food Wise 2025 strategy would have to operate within the constraints of the NAP.
Forest Policy Review: Forests, Products and People – A Renewed Vision (2014) / Forestry Programme 2014 - 2020 Ireland's forestry sector is striving to increase forestry cover and one of the recommended policy actions in the Forest Policy Review: Forests, Products and People – A Renewed Vision (2014) is to increase the level of afforestation annually over time and support afforestation and mobilisation measures under the Forestry Programme 2014-2020. Two key objectives within the Forestry Programme 2014-2020 that will influence the RBMP are to increase Ireland's forest cover to 18% and to establish 10,000 ha of new forests and woodlands per annum. As part of this programme there are a number of schemes that promote sustainable forest management and they include the Afforestation Scheme, the Woodland Improvement Scheme, the Forest Road Scheme and the Native Woodland Conservation Scheme. Under the Native Woodland Conservation Scheme funding is provided to restore existing native woodland which promotes Ireland's native woodland resource and associated biodiversity. Native woodlands provide wider ecosystem functions and services which	▪ Habitat loss or destruction; ▪ Habitat fragmentation or degradation; ▪ Water quality changes; ▪ Disturbance to species.	Ireland's Forestry Programme 2014 – 2020 has undergone AA[31]. 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.

[30] http://www.housing.gov.ie/sites/default/files/migrated-files/en/Publications/Environment/Water/FileDownLoad,35218,en.PDF
[31] 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
once restored can contribute to the protection and enhancement of water quality and aquatic habitats. New guidance and plans are also being developed to address forestry adjacent to water bodies, Freshwater Pearl Mussel Plans for 8 priority catchments and a Hen Harrier Threat Response Plan (NPWS). The mitigation measures within these plans will be particularly important in terms of protecting sensitive habitats and species from such forestry increases.		
Water Services Strategic Plan (WSSP, 2015) Irish Water has prepared a Water Services Strategic Plan (WSSP, 2015), under Section 33 of the Water Service No. 2 Act of 2013 to address the delivery of strategic objectives which will contribute towards improved water quality and WFD requirements. The WSSP forms the highest tier of asset management plans (Tier 1) which Irish Water prepare and it sets the overarching framework for subsequent detailed implementation plans (Tier 2) and water services projects (Tier 3). The WSSP sets out the challenges we face as a country in relation to the provision of water services and identifies strategic national priorities. It includes Irish Water's short, medium and long term objectives and identifies strategies to achieve these objectives. As such, the plan provides the context for subsequent detailed implementation plans (Tier 2) which will document the approach to be used for key water service areas such as water resource management, wastewater compliance and sludge management. The WSSP also sets out the strategic objectives against which the Irish Water Capital Investment Programme is developed. The current version of the CAP outlines the proposals for capital expenditure in terms of upgrades and new builds within the Irish Water owned asset and this is a significant piece of the puzzle in terms of the expected improvements from the RBMP.	▪ Habitat loss and disturbance from new / upgraded infrastructure; ▪ Species disturbance; ▪ Changes to water quality or quantity; ▪ Nutrient enrichment /eutrophication.	The overarching strategy was subject to 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.
National Wastewater Sludge Management Plan (2016) The National Wastewater Sludge Management Plan was prepared in 2015, outlining the measures needed to improve the management of wastewater sludge.	▪ Habitat loss and disturbance from new / upgraded infrastructure; ▪ Species disturbance; ▪ Changes to water quality or quantity; ▪ Nutrient enrichment /eutrophication.	The plan was subject to both AA and SEA and includes a number of mitigation measures which were identified in relation to transport of materials, land spreading of sludge and additional education and research requirements. This plan does not specifically address domestic wastewater loads, only those relating to Irish Water facilities. In relation to the plan as it stands, no in-combination effects are expected with the implementation of proposed mitigation measures.

Plan / Programme/Policy	Key Types of Impacts	Potential for In-combination Effects
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 Irish Water include those for urban wastewater and urban runoff and also as part of other measures in relation to the lead in drinking water.	▪ Increased abstractions leading to changes / pressure on existing hydrology / hydrogeological regimes.	The plan will seek to develop sustainable water supplies but must consider particularly critical drought periods when assimilation capacity for diffuse runoff may be reduced. The potential for in-combination impacts are unclear as the plan is not sufficiently developed at this stage.
Planning Applications There are a large number of planning applications approved, pending or recently approved within the Thurles WSZ, particularly within the town is Thurles itself. The applications are predominantly for the construction of new infrastructure or renovations to existing infrastructure. These include for housing, commercial facilities etc.	▪ Habitat loss and disturbance from new / upgraded infrastructure; ▪ Species disturbance; ▪ Changes to water quality or quantity; ▪ Nutrient enrichment /eutrophication.	Adherence to the overarching policies and objectives of the County Development Plan will ensure that local planning applications and subsequent grant of planning will comply with the requirements of relevant environmental legislation including the WFD and Habitats Directive. Effluent from proposed and new infrastructure connected to the drainage systems will be treated prior to discharge, negating the potential for cumulative impacts in the receiving environment.
Integrated Pollution Control (IPC) Licensing Thurles has no active Industrial Emission licence (IEL) and no IPC licensed facilitates. Under the Industrial Emissions Directive 2010/75/EU and Environmental Protection Agency Act, 1992 (as amended) industrial activities (e.g. pharmaceutical) are licensed by the EPA to prevent or reduce emissions to air, water and land, reduce water and use energy/resources efficiently. An IPC licence is a single integrated licence which covers all emissions from the facility and its environmental management. All related operations that the licence holder carries in connection with the activity are controlled by this licence.	▪ Changes to water quality or quantity; ▪ Nutrient enrichment /eutrophication.	The EPA is responsible for monitoring emissions and dealing with any infringements on IPC licences. All emissions must be within set limits which must not be contravened. Limits are set for phosphorus where relevant. Compliance with the limits set for phosphorus will ensure that there will be no significant in-combination impacts on Natura 2000 sites.

7 SCREENING CONCLUSION STATEMENT

This Screening to inform the AA process has considered whether the proposed construction works and operational orthophosphate dosing at the Lingaun WTP, within the Carrick-on-Suir (Lingaun River) WSZ, in combination with other plans or projects, is likely to have a significant effect on European Sites.

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

During the construction phase of the corrective water treatment works at Linguan WTP, the potential for direct, indirect and cumulative impacts affecting European Sites within the ZoI (i.e. Lower River Suir SAC) has been assessed. There will be no significant direct, indirect or cumulative impacts that will result in likely significant effects to the Qualifying Interests / Special Conservation Interests of the European Sites within the ZoI.

During the operational phase, the potential for direct, indirect and cumulative impacts affecting European Sites within the ZoI, i.e. Lower River Suir SAC, have been assessed Due to the low orthophosphate inputs following dosing at Lingaun WTP and no risk of deterioration in the orthophosphate indicative quality of the receiving water bodies or of preventing the achievement of WFD objectives, there will be no significant direct, indirect or cumulative impacts that will result in likely significant effects to the qualifying interests/special conservation interests of the European Sites within the ZoI. This is concluded with regard to the range, population densities and overall conservation status of the habitats and species for which these sites are designated (i.e. Conservation Objectives).

The screening has been carried out on the basis of the information presented in the Project Description. It has been concluded that the project it is not connected or necessary to the management of any European Site. It can be concluded on the basis of objective scientific information and in view of best scientific knowledge, the proposed orthophosphate dosing and associated construction works at the Lingaun WTP; individually or in combination with other plans or projects, will not have a significant effect on any European Sites. Therefore, AA is not required.

8 REFERENCES

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APPENDIX A

European Sites

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

Site Name (Code)	Conservation Objectives Source
Lower River Suir SAC (002137)	https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002137.pdf

APPENDIX B

Nutrient Sensitive Qualifying Interests

Water dependant and nutrient sensitive SAC species

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

Water dependant and nutrient sensitive SAC habitats

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

Code	Qualifying Interest	Water dependant	GWDTE	Nutrient sensitive
3270	Rivers with muddy banks with *Chenopodion rubri* p.p. and Bidention p.p. vegetation	Yes	Yes	Yes
4010	Northern Atlantic wet heaths with Erica tetralix (Flushes only)	Yes	Yes	Yes
4030	European dry heaths	No		Yes
4060	Alpine and Boreal heaths	No		No
5130	Juniperus communis formations on heaths or calcareous grasslands	No		No
6130	Calaminarian grasslands of the *Violetalia calaminariae*	No (flood risk)*		Yes
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites)	No (flood risk)*		Yes
6230	Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe)	No		No
6410	Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)	Yes	Yes	Yes
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	Yes	Yes	Yes
6510	Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*)	No (flood risk)*		Yes
7110	Active raised bogs	Yes	Yes	Yes
7120	Degraded raised bogs still capable of natural regeneration	Yes	Yes	Yes
7130	Blanket bogs (* if active bog)	Yes	Yes	Yes
7140	Transition mires and quaking bogs	Yes	Yes	Yes
7150	Depressions on peat substrates of the Rhynchosporion	Yes	Yes	Yes
7210	Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*	Yes	Yes	Yes
7220	Petrifying springs with tufa formation (*Cratoneurion*)	Yes	Yes	Yes
7230	Alkaline fens	Yes	Yes	Yes
8110	Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*)	No		No
8120	Calcareous and calcshist screes of the montane to alpine levels (*Thlaspietea rotundifolii*)	No		No
8210	Calcareous rocky slopes with chasmophytic vegetation	No		No
8220	Siliceous rocky slopes with chasmophytic vegetation	No		No
8240	Limestone pavements	No		Yes
8310	Caves not open to the public	Yes	Yes	Yes
8330	Submerged or partially submerged sea caves	Yes		Yes
91A0	Old sessile oak woods with Ilex and Blechnum in the British Isles	No		Yes

Code	Qualifying Interest	Water dependant	GWDTE	Nutrient sensitive
91D0	Bog woodland	Yes	Yes	Yes
91E0	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*)	Yes	Yes	Yes
91J0	Taxus baccata woods of the British Isles	No		No

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

Water dependant and nutrient sensitive SPA birds

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

Code	Species of special conservation interest	Water dependant	Nutrient sensitive
A140	Golden Plover (*Pluvialis apricaria*)	Yes	Yes
A141	Grey Plover (*Pluvialis squatarola*)	Yes	Yes
A142	Lapwing (*Vanellus vanellus*)	Yes	Yes
A143	Knot (*Calidris canutus*)	Yes	Yes
A144	Sanderling (*Calidris alba*)	Yes	Yes
A148	Purple Sandpiper (*Calidris maritima*)	Yes	Yes
A149	Dunlin (*Calidris alpina*) (non-breeding)	Yes	Yes
A156	Black-tailed Godwit (*Limosa limosa*)	Yes	Yes
A157	Bar-tailed Godwit (*Limosa lapponica*)	Yes	Yes
A160	Curlew (*Numenius arquata*)	Yes	Yes
A162	Redshank (*Tringa totanus*)	Yes	Yes
A164	Greenshank (*Tringa nebularia*)	Yes	Yes
A169	Turnstone (*Arenaria interpres*)	Yes	Yes
A179	Black-headed Gull (*Larus ridibundus*)	Yes	Yes
A182	Common Gull (*Larus canus*)	Yes	Yes
A183	Lesser Black-backed Gull (*Larus fuscus*)	Yes	Yes
A184	Herring Gull (*Larus argentatus*)	Yes	Yes
A188	Kittiwake (*Rissa tridactyla*)	Yes	Yes
A191	Sandwich Tern (*Sterna sandvicensis*)	Yes	Yes
A192	Roseate Tern (*Sterna dougallii*)	Yes	Yes
A193	Common Tern (*Sterna hirundo*)	Yes	Yes
A194	Arctic Tern (*Sterna paradisaea*)	Yes	Yes
A195	Little Tern (*Sterna albifrons*)	Yes	Yes
A199	Guillemot (*Uria aalge*)	Yes	Yes
A200	Razorbill (*Alca torda*)	Yes	Yes
A204	Puffin (*Fratercula arctica*)	Yes	Yes
A229	Kingfisher (*Alcedo atthis*)	Yes	Yes
A346	Chough (*Pyrrhocorax pyrrhocorax*)	Yes	Yes
A395	Greenland White-fronted Goose (*Anser albifrons flavirostris*)	Yes	Yes
A466	Dunlin (*Calidris alpina schinzii*) (breeding)	Yes	Yes

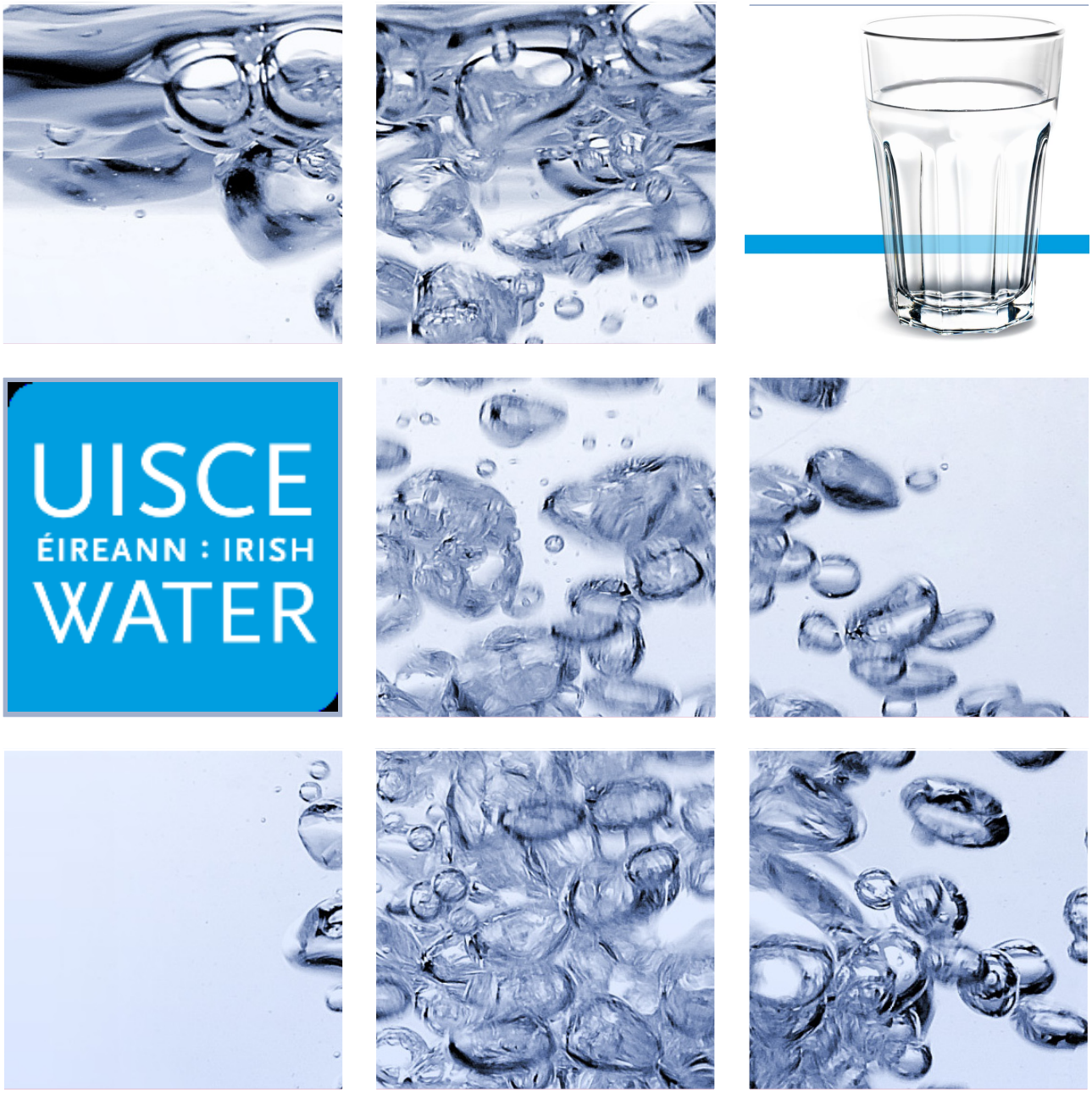
APPENDIX C

EAM Summary Report

Irish Water - Lead in Drinking Water Mitigation Plan

Environmental Assessment Methodology (EAM) Summary Report

177 Linguan WTP – Carrick-on-Suir (Linguan River) (2900PUB0108)



National Lead in Water Mitigation Strategy

Environmental Assessment Methodology Report: 177 Linguan WTP – Carrick-on-Suir (Linguan River) (2900PUB0108)

Document Control Sheet

Client:	Irish Water
Project Title:	National Lead in Water Mitigation Strategy
Document Title:	Environmental Assessment Methodology Report: 177 Linguan WTP – Carrick-on-Suir (Linguan River) (2900PUB0108)
Document No:	MDW0766RP_5.1_EAM_177_Linguan_F03

Text Pages:	8	Appendices:	-

Rev.	Status	Date	Author(s)		Reviewed By		Approved By	
F01	Final	22nd Aug 2018	YE		IP MM		DC	
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F03	Final	3rd Apr 2023	YE		IP MM		MM	

177 Linguan WTP – Carrick-on-Suir (Linguan River) (2900PUB0108)

Supporting spreadsheet: 177_Linguan WTP_Carrick-on-Suir (Linguan River)_V05

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

Linguan WTP supplies the town of Carrick-on-Suir in the south-east portion of Co. Tipperary near the borders of Co. Waterford and Co. Kilkenny. The distribution input for Carrick-on-Suir (Linguan River) is 1587 m^3/day (50% of which is accounted for, with the remainder assumed to be lost through leakage) serving a population of approximately 5,000. The non-domestic demand is 10.6% of the distribution input.

The area is served by Carrick-on-Suir (D0148) WWTP which is licenced in accordance with the requirements of the Waste Water Discharge (Authorisation) Regulations 2007 as amended and the impact of the orthophosphate dosing on the emission limit values and the receiving water body downstream of the point of discharge are assessed. There are no WWTPs with a population equivalent of less than 500. It is estimated that there are 5 properties across the WSZ that are serviced by a DWWTS.

This assessment has been undertaken for the WSZ in isolation. However, if corrective water treatment is proposed for WTPs in the same catchment area, the cumulative impact from the combined loads to downstream water bodies are assessed (see Summary, Mitigation, and Table 5).

<table>
<tr><td>Water Treatment Plant</td><td colspan="2">Linguan</td></tr>
<tr><td>Water Supply Zone</td><td colspan="2">Carrick-on-Suir (Linguan River) (2900PUB0108)</td></tr>
<tr><td rowspan="3">Step 1 Appropriate Assessment Screening</td><td colspan="2">European Sites within Zone of Influence</td></tr>
<tr><td colspan="2">SACs</td></tr>
<tr><td>Helvick Head SAC
Ballyteige Burrow SAC
Bannow Bay SAC
Lady's Island Lake SAC
Saltee Islands SAC
Tacumshin Lake SAC
Hook Head SAC</td><td>Ardmore Head SAC
Carnsore Point SAC
Hook Head SAC
Ardmore Head SAC
Lower River Suir SAC
River Barrow and River Nore SAC
Carnsore Point SAC</td></tr>
<tr><td rowspan="3"></td><td colspan="2">SPAs</td></tr>
<tr><td>Ballyteigue Burrow SPA
Bannow Bay SPA
Helvick Head to Ballyquin SPA
Keeragh Islands SPA</td><td>Lady's Island Lake SPA
Mid-Waterford Coast SPA
Saltee Islands SPA</td></tr>
<tr><td colspan="2">Nutrient Sensitive Qualifying Interests present – Yes
Appropriate Assessment Screening Required – Yes</td></tr>
</table>

Step 2 – Direct Inputs to Surface Water

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

Agglomeration and discharge type	ELV (Ortho P unless otherwise stated) from WWDL (mg/l)	Scenario	TP Load kg/yr	Ortho P concentration mg/l *TP – Ortho P Conversion factor varied for sensitivity analysis (40%, 50%, 68%)*		
				0.5	*0.4*	*0.68*
Carrick-on-Suir Primary Discharge	1.5	Existing	388.4	0.23	0.18	0.31
		Post Dosing	388.4	0.23	0.18	0.31
Carrick-on-Suir SWOs (6 no.)	n/a	Existing	87.0	1.78	1.42	2.42
		Post Dosing	95.6	1.95	1.56	2.65

Note: The modelled effluent concentrations are compliant with ELVs. The 2021 AER confirms that the plant is operating well in the context of orthophosphate removal with the monitoring of the effluent compliant with the ELVs.

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

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

Table 2: Mass balance assessment based on 1 mg/l dosing using available background concentrations and mean flow information

Agglom. (WWDL code)	RWB Name / Code for Primary Discharge	Background Conc. (mg/l) (annual mean from AER u/s monitoring point)	Modelled Conc. existing (mg/l)	Modelled Conc. Post Dosing (mg/l)	% Inc.
Carrick-on-Suir (D0148)	Upper Suir Estuary IE_SE_100_0600	0.0237	0.0231	0.0231	0.0%

Surface Assessment

Upper Suir Estuary *(IE_SE_100_0600)* – The effluent concentrations from Carrick-on-Suir are compliant with ELVs. Tertiary treatment is assumed to remove any additional orthophosphate from the effluent due to dosing and impact due to SWOs is negligible as shown by the mass balance assessment in Tables 2.

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

Step 4 Distributed Inputs to surface water bodies from sub surface pathways

Subsurface Assessment

The modelled increments 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, in GLENBROOK_010 (IE_SE_16G040200).

The predicted concentration on the receiving waterbody, Upper Suir Estuary (IE_SE_100_0600), is undetectable (0.0000 mg/l).

Step 5 and 6: Combined Inputs to Groundwater Bodies

Groundwater Bodies as receptors connected to WSZ

Table 3 gives the loads and modelled concentrations for the assessment of groundwater bodies.

The predicted loads to the Clonmel (IE_SE_G_040) groundwater body are negligible (0.0001 mg/l). The subsurface assessment takes into account the groundwater/surface water interaction and as the potential for impact on surface water is not significant, and none of the overlying surface waterbodies are at Bad ecological status, there is no risk of impact on groundwater receptors due to orthophosphate dosing.

Table 3: Increased loading and concentrations to groundwater bodies connected to the WSZs *(note: where existing monitoring data is not available, a surrogate Indicative Quality is derived from chemical status of the WB, and the mid-range of that Indicative Quality is used as Baseline Concentration)*

EU_CD/Name	Ortho P Indicative Quality and Trends (distance to threshold) *[Surrogate Indicative Quality indicated in italic]*	Baseline Year 2012 Ortho P Conc. mg/l *[Surrogate Conc. given in italic]*	75% of Ortho P Indicative Quality upper threshold mg/l	Total 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_SE_G_040 Clonmel	Good Upwards Far	0.012	0.026	19.2	0.0001	0.012	
	Good Upwards Far	0.008	0.026			0.008	
	Good Upwards Far	0.008	0.026			0.008	
	Good Upwards Far	0.008	0.026			0.008	

MP: multiple Monitoring Points given for waterbody

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 loads due to orthophosphate dosing are predicted to be insignificant, i.e. are below 5% of the Good / High boundary for Ortho P Indicative Quality (0.00125mg/l), in the Glenbrook_010 and Linguan_050, and undetectable (0.0000 mg/l) in Suir_220 and the Upper Suir Estuary.

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 / Ecological status of neighbouring WBS, the mid-range of that Indicative Quality is used as Baseline Concentration)***

EU_CD/Name	Ortho P Indicative Quality and Trends (distance to threshold) *[Surrogate Indicative Quality indicated in italic]*	Baseline Year 2014 and Conc. mg/l *[Surrogate Conc. given in italic]*	75% of Ortho P Indicative Quality upper threshold mg/l	Cumulative Ortho P load to SW from leakage & DWWTS kg/yr	Conc. using flows (30%ile or gauged) mg/l	Potential Baseline for Ortho P Conc. following dosing mg/l	Notes
IE_SE_16S022850 SUIR_220	High Downwards Far	0.017	0.019	0.0	0.0000	0.017	* MP1
	High Downwards Far	0.017	0.019			0.017	* MP2
IE_SE_16G040200 GLENBROOK_010	Good Downwards Far	0.028	0.033	9.6	0.0007	0.029	MP1
	Good Downwards Far	0.031	0.033			0.032	MP2
IE_SE_16L010600 LINGAUN_050	High None Far	0.014	0.019	12.8	0.0002	0.014	MP1
	High Downwards Far	0.018	0.019			0.018	MP2

* Trends are Statistically significant.

MP: multiple Monitoring Points given for waterbody

There are no lake water bodies directly affected by this WTP.

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 / Ecological status of neighbouring WBS, the mid-range of that Indicative Quality is used as Baseline Concentration)***

EU_CD/Name	Ortho P Indicative Quality and Trends (distance to threshold) *[Surrogate Indicative Quality indicated in italic]*	Baseline Year 2014 and Conc. mg/l *[Surrogate Conc. given in italic]*	75% of Ortho P Indicative Quality upper threshold mg/l	Total Ortho P Load in receiving waters kg/ yr	Conc. using flows (30%ile, gauged or tidal) mg/l	Potential Baseline for Ortho P Conc. following dosing mg/l	Notes
IE_SE_100_0600 Upper Suir Estuary	High (S) Downwards Far	0.003	0.019	26.6	0.0000	0.003	‡
	High (W) Downwards Far	0.017	0.019			0.017	

‡ Load from WWTP / SWO following treatment added.

S = Summer monitoring period, W = Winter monitoring period

Summary and Mitigation Proposed

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

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

The cumulative impacts on Suir Catchment (HA 16) associated with phosphate dosing from following additional WTPs plus loads impacting on the Ballyteigue-Bannow (HA 13), Barrow (HA 14), Nore (HA 15) and Colligan-Mahon (HA 17) catchments are summarised in Table 5 below:

- 010 Adamstown WTP - East Waterford Regional (3800PUB1110)
- 021 Rossadrehid WTP - Galtee Regional (2900PUB0130)
- 041 Glenary WTP – Glenary (2000PUB1009)
- 047 Goatenbridge WTP - Ardfinnan Regional (2900PUB0102)
- 098 Mooncoin WTP - Mooncoin Regional WS 1012 (1500PUB1012)
- 115 Springmount Pump Station - Springmount Source (2900PUB_TEMP_002)
- 138 Thurles WTP – Thurles (ZONE 1) (2800PUB1012)
- 190 Ironmills Pump Station – Ironmills (2900PUB0146)
- 399 Portlaw WTP – Portlaw (3100PUB1081)

Table 5: Cumulative assessment of the increased loading and concentrations to water bodies impacted by 177 Linguan WTP – Carrick-on-Suir (Linguan River) (2900PUB0108) and other WSZs proposed for corrective water treatment in the upstream catchments.

EU_CD/Name	Ortho P indicative quality and Trends (distance to threshold) *Surrogate Indicative Quality given in italic*	Baseline Year 2014 and Conc. *Surrogate Conc. given in italic* mg/l	75% of Ortho P Indicative Quality upper threshold mg/l	Cumulative Ortho P load to SW from leakage, DWWTS & agglomerations kg/yr	Conc. using 30%ile, gauged or tidal flows mg/l	PO4 Potential Baseline Conc. following dosing mg/l	Notes
IE_SE_16S022850 SUIR_220	High Downwards Far	0.017	*0.019*	414.4	0.0002	0.017	*
	High Downwards Far	0.017	*0.019*			0.017	*
IE_SE_16L010600 LINGAUN_050	High None Far	0.014	*0.019*	16.4	0.0003	0.014	
	High Downwards Far	0.018	*0.019*			0.018	
IE_SE_100_0600 Upper Suir Estuary	High (S) None Far	0.006	0.019	535.9	0.0002	0.006	‡
	High (W) None Near	0.023	0.019			0.023	
IE_SE_100_0550 Middle Suir Estuary	High (S) Upwards Near	0.029	0.023	2618.7	0.0010	0.030	‡
	Good (W) Downwards Far	0.037	0.053			0.038	
IE_SE_100_0500 Lower Suir Estuary (Little Island - Cheekpoint)	High (S) Upwards Far	0.026	0.023	2647.8	0.0010	0.032	‡
	Good (W) Downwards Near	0.053	0.053			0.033	
IE_SE_100_0100 Barrow Suir Nore Estuary	High (S) Upwards Far	0.019	0.020	3752.2	0.0004	0.020	‡
	Good (W) None Far	0.045	0.042			0.046	
IE_SE_100_0000 Waterford Harbour	High (S) Downwards Far	0.005	0.019	3851.9	0.0003	0.006	‡
	High (W) Downwards Far	0.020	0.019			0.020	
IE_SE_050_0000 Eastern Celtic Sea (HAs 13;17)	*Good*	*0.033*	*0.036*	*4716.3*	*0.0000*	*0.033*	‡

‡ Load from WWTP / SWO following treatment added.

	S = Summer monitoring period, W = Winter monitoring period * Trends are Statistically significant. MP: multiple Monitoring Points given for waterbody The cumulative assessment has demonstrated that there will not be significant impact on the receiving waters and the dosing will not cause deterioration in orthophosphate indicative quality or prevent the achievement of the WFD objectives.
	MITIGATION OPTION – None required **RAG STATUS – GREEN**

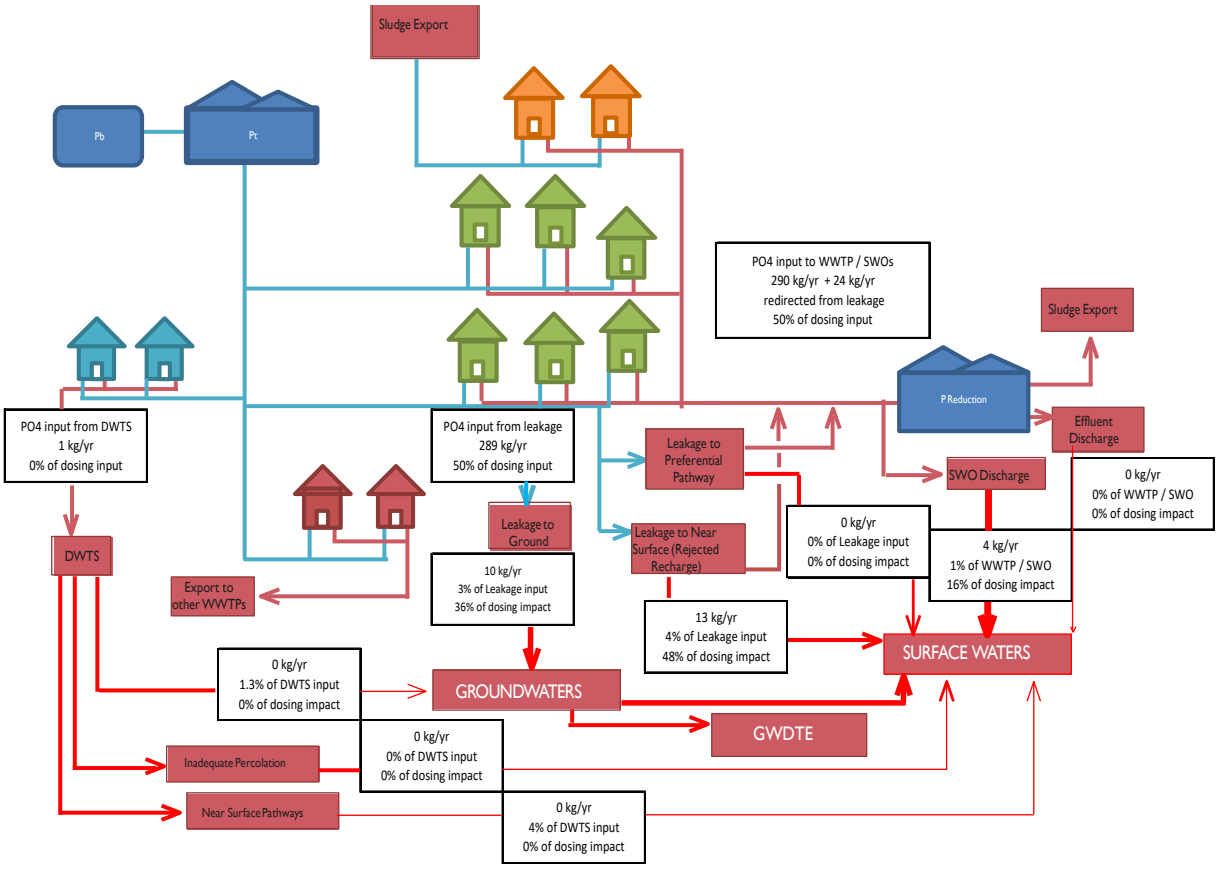
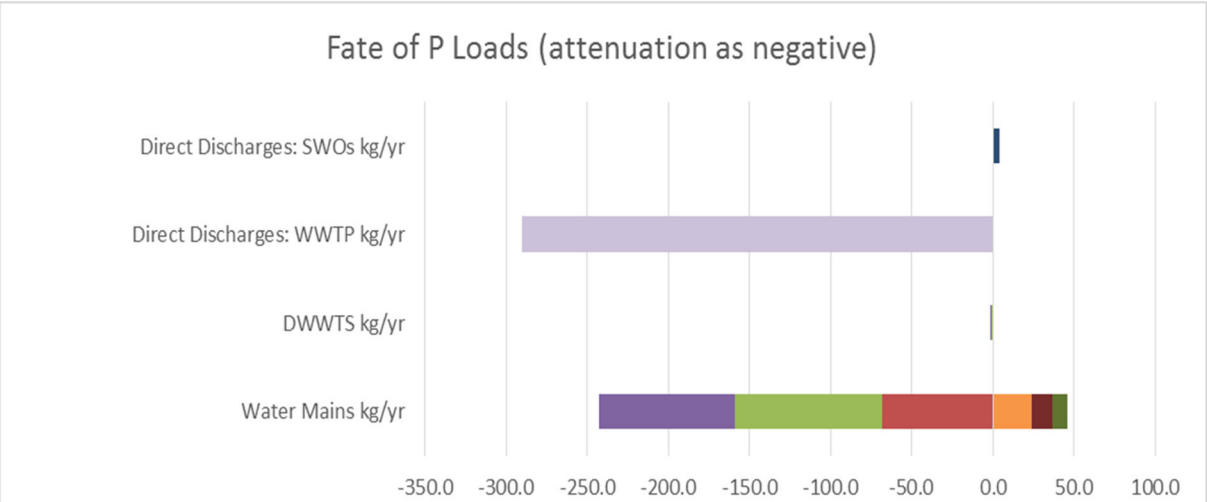


Figure 1 – Source Pathway Receptor model for Carrick-on-Suir (Linguan River) (2900PUB0108) WSZ illustrating key sources and pathways to the associated WSZs.



	Water Mains kg/yr	DWWTS kg/yr	Direct Discharges: WWTP kg/yr	Direct Discharges: SWOs kg/yr
Load attenuated in Preference (inadequate percolation) pathway	0.0	0.0		
Load attenuated in Near Surface Pathway	-68.1	-0.1		
Load attenuated in 1m below trench	-90.8	-0.5		
Load attenuated in Subsurface Pathway	-83.7	0.0		
Load intercepted by gravity main in Preference Pathway	0.0			
Load intercepted by gravity main in Near Surface Pathway	23.8			
Load reaching SW direct or via Preference (inadequate percolation) Pathway	0.0	0.0	0.0	4.3
Load reaching SW via Near Surface Pathway	12.8	0.0		
Load reaching SW via Subsurface Pathway	9.6	0.0		
Load treated in WWTP			-290.5	

Figure 2 – Fate of orthophosphate loads modelled for Linguan WTP impacting on the Upper Suir Estuary (IE_SE_100_0600) due to dosing by source type, indicating levels of attenuation in pathways and relative impact on the surface water receptor.