

Limerick WWTP Upgrade and Regional Bioresource Centre

ElAR Appendix 16.1 - Water Framework Directive Assessment

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Formerly JB Barry Partners who became part of Egis in 2023

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1 INTRODUCTION

1.1 Background

The completion of a Water Framework Directive (WFD) Compliance Assessment (hereafter referred to as 'WFD Assessment') is a staged process. The proposed works on the Limerick WWTP Upgrade and Bioresource Centre Proposed Development (hereafter referred to as 'the Proposed Development') are assessed with respect to the requirements of the WFD. The assessment identifies if the Proposed Development, will, or will not, have a detrimental impact on the status of the nearby water bodies that are hydrologically linked to the Proposed Development. If the assessment concludes, after taking account of the measures included in the Proposed Development, that the Proposed Development may either result in;

- A deterioration of the status of the water bodies; or
- Prevent them from reaching their environmental objectives,

then, this represents a failure to achieve the WFD objectives and the Proposed Development should not proceed unless justification for the proposed works is demonstrated under Article 4.7 in the context of new modifications.

Whilst Environmental Assessment is an efficient mechanism to gather the relevant information for WFD compliance assessment, it still needs to be interpreted in relation to the WFD objectives and the potential impacts on biology, chemistry and hydromorphology. The WFD objectives and the biology, chemistry and hydromorphology need to be considered in relation to WFD status classes and reported under a specific WFD section in any Environmental Impact Assessment Report (EIAR) or report produced or in a separate WFD compliance report (Environment Agency, 2010).

Therefore, a WFD Assessment has been undertaken to assess the potential impacts of the Proposed Development in the context of the environmental objectives of any affected WFD surface water and groundwater bodies.

The WFD Assessment also offers the opportunity to inform the management of the Proposed Development to avoid, minimise, mitigate, or compensate for the risks to the environmental objectives of WFD surface water receptors where the risk assessment determines that the activities have the potential to:

- Cause a surface water body to deteriorate from one WFD status class to another or cause significant localised impacts that could contribute to this happening; and
- Prevent or undermine action to get surface water bodies to good status (e.g. compromise the programme of measures put in place to achieve the ultimate water body objective).

1.2 The Water Framework Directive

Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 Establishing a Framework for Community Action in the Field of Water Policy, as amended is known as the Water Framework Directive (hereafter referred to as the 'WFD').

The WFD established a framework for the protection of both surface and groundwaters. The WFD provides a vehicle for establishing a system to improve and / or maintain the quality of waterbodies across the European Union (EU). The WFD requires all waterbodies (river, lakes, groundwater, transitional, coastal) to attain 'Good Water Status' (qualitative and quantitative) by 2027.

There are a number of WFD objectives in respect of which the quality of water is protected. The key objectives at EU level are the general protection of aquatic ecology, specific protection of unique and valuable habitats, the protection of drinking water resources, and the protection of bathing water. The objective is to achieve this through a system of river basin management planning and extensive monitoring. 'Good Status' means both 'Good Ecological Status' (GES) and 'Good Chemical Status' (GCS).

The WFD Article 4 Environmental Objectives include the following:

- Member States shall implement the necessary measures to prevent deterioration of the status of all bodies of surface water;
- Member States shall protect, enhance and restore all bodies of surface water- subject to the application of subparagraph (iii) for artificial and heavily modified bodies of water- with the aim of achieving good surface water status within the prescribed time frame;
- Member States shall protect and enhance all artificial and heavily modified bodies of water, with the aim of achieving good ecological potential and good surface water chemical status within the prescribed time frame. Where this is not possible and subject to the criteria set out in the Directive, aim to achieve good status by 2021 or 2027;
- By implementing prescribed measures, progressively reduce pollution from priority substances and cease or phase out emissions, discharges and losses of priority hazardous substances; and
- Prevent Deterioration in status and prevent or limit input of pollutants to groundwater.

The WFD was initially transposed into Irish law by S.I. No. 722/2003 – European Communities (Water Policy) Regulations 2003, as amended (hereafter referred to as the Water Policy Regulations). The Water Policy Regulations outline the water protection and water management measures required to maintain high status of waters where it exists, prevent any deterioration in existing water status and achieve at least ‘Good’ status for all waters.

Subsequently, S.I. No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009, as amended (hereafter referred to as the Surface Waters Regulations), and S.I. No. 9/2010 - European Communities Environmental Objectives (Groundwater) Regulations 2010, as amended (hereafter referred to as the Groundwater Regulations), were introduced to regulate WFD characterisation, monitoring and status assessment programmes, through assigning responsibilities for the monitoring of different water categories, determining the quality elements and undertaking the characterisation and classification assessments.

1.3 Article 4.7 of the Water Framework Directive

Article 4.7 outlines exceptions where Member States will not be in breach of the WFD. These exceptions apply when failure to achieve good groundwater or ecological status is due to new modifications or alterations. This provision allows for necessary developments while maintaining the WFD's overall objectives. Article 4.7 states:

‘Member states will not be in breach of this Directive when:

- *failure to achieve good groundwater status, good ecological status or, where relevant, good ecological potential or to prevent deterioration in the status of a body of surface water or groundwater is the result of new modifications to the physical characteristics of a surface water body or alterations to the level of bodies of groundwater, or*
- *failure to prevent deterioration from high status to good status of a body of surface water is the result of new sustainable human development activities and all the following conditions are met:*

and all the following conditions are met:

(a) all practicable steps are taken to mitigate the adverse impact on the status of the body of water;

(b) the reasons for those modifications or alterations are specifically set out and explained in the river basin management plan required under Article 13 and the objectives are reviewed every six years;

(c) the reasons for those modifications or alterations are of overriding public interest and/or the benefits to the environment and to society of achieving the objectives set out in paragraph 1 are

outweighed by the benefits of the new modifications or alterations to human health, to the maintenance of human safety or to sustainable development; and

(d) the beneficial objectives served by those modifications or alterations of the water body cannot for reasons of technical feasibility or disproportionate cost be achieved by other means, which are a significantly better environmental option.'

1.4 The WFD Assessment

Activity potentially impacting WFD water bodies must be assessed to determine potential deterioration in the water body's ecological status or potential. It is therefore necessary to consider the possible changes associated with the Proposed Development.

The Water Policy Regulations require the assessment of permanent impacts of a scheme / project on waterbodies classified under the WFD including, rivers, lakes, estuaries, coastal waters and groundwater. Typically, the permanent impacts include all operational impacts but can also include impacts from construction depending on the length and / or nature of the works, etc. of the Proposed Development, as some potential construction impacts could be considered permanent in the absence of mitigation.

This WFD assessment report has been prepared for the Construction and Operational Phases of the Proposed Development.

The generic environmental objectives set out below (based on Article 4.1 of the WFD) are used for the assessment of the Proposed Development:

- No changes affecting high status sites;
- No changes that will cause failure to meet surface water Good Environmental Status (GES) or Good Ecological Potential (GEP) or result in a deterioration of surface water ecological status or potential;
- No changes which will permanently prevent or compromise the Environmental Objectives being met in other water bodies; and
- No changes that will cause failure to meet good groundwater status or result in a deterioration groundwater status.

2 OUTLINE OF THE PROPOSED DEVELOPMENT

2.1 Background

The Proposed Development will cater for future population growth and industrial development in the area, in line with population projections for Limerick as set out in the National Planning Framework (NPF) Implementation Roadmap and the Southern Region Regional Economic Spatial Strategy (RSES). It will provide 20% Headroom allowance, in line with Uisce Éireann guidelines for large urban settlements. It will also ensure the WWTP continues to comply with requirements of the EPA Wastewater Discharge License (WWDL), Urban Wastewater Treatment Regulations (UWWTR) and other relevant Uisce Éireann Guidelines.

The initial upgrade works will cater for the +10-year growth projections, increasing from 130,000 PE to 285,000 PE including a future industrial committed load of 27,500 PE. There will be provision made in the civil infrastructural development of the plant (tank sizing and pipework) for the +25-year growth projections of 325,000 PE. However, a planning review will be required before any uplift above 285,000 PE can be instated.

2.2 Wastewater Treatment Plant Capacity Upgrade

As outlined in Chapter 3 (The Proposed Development) of this EIAR, the upgrade works will support growth demands in the agglomeration by improving the treatment processes at Limerick WWTP. The WWTP capacity upgrade element of the project will cater for the 10-year growth projections, extending the existing WWTP from 130,000PE to 285,000 PE. Additional capacity will be provided by a new Aerobic Granular Sludge (AGS) process stream with a capacity of up to 157,000PE. The new process stream will operate in parallel with the

existing CAS system. The additional treatment capacity will facilitate domestic, commercial, and industrial future projected loadings, and it will ensure compliance with the requirements of UWWTD, WWDL and Uisce Éireann policies.

2.3 Stormwater Storage Capacity Upgrade

The proposed stormwater storage tank is a large piece of infrastructure that must cater for the long-term 25-year expansion. Total storage volume for the long term projected 325,000 PE is calculated to be c. 20,000m³ in accordance with UWWTD stormwater storage requirements. The existing stormwater holding tank at the WWTP can accommodate 7,500m³, therefore a minimum storage volume of 12,500m³ will now be provided.

The proposed location for the stormwater tank is a greenfield site adjacent to Corcanree PS. Space is limited at the main WWTP site, so locating it at Corcanree leaves sufficient room at the WWTP for the other elements of the upgrade works, and for any future upgrades that may be required. Locating the storm tank at Corcanree MLPS also negates the need for extensive pipeline upgrades; increased pumping of storm flows to the WWTP site from the MLPS would require complete upgrades to the Pass Forward Flow (PFF) twin rising mains (1km) and the WWTP outfall pipe to the Shannon Estuary (1.1km). Further to this, any upgrades to the final effluent pipeline would require a temporary shutdown of the entire WWTP which would cause significant environmental risks.

2.4 Regional Bioresource Centre (RBC)

The proposed Regional Bioresource Centre will be designed to treat indigenous sludge and imported sludges from Counties Limerick, Clare and Tipperary to the required Code of Good Practice standard for reuse of Biosolids in Agriculture, in alignment with the NWSMP. The current national strategy is to regionalise sludge treatment and achieve a Class A Biosolid through a combination of Anaerobic Digestion (AD) and heat treatment. Through Anaerobic Digestion, the plant can generate biogas, a source of renewable energy, which will be used to generate electrical power for use on site and to produce heat which is required for the AD process. There will be liquor treatment plant for centrate returns from the RBC to the main treatment process works, so there will be minimal risk to ammonia overloading in the main treatment process.

3 METHODOLOGY

3.1 Study Area

For the purposes of this WFD Assessment, water bodies that are within, intersect or which are hydrologically connected to the Proposed Development have been identified and considered as relevant water bodies for the different stages of the WFD compliance assessment (i.e. the WFD assessment study area, hereafter referred to as “WFD Study Area”).

This WFD assessment covers only those components of the Proposed Development that could affect water body features. These were primarily identified as sections of the Proposed Development which are within 2km of surface, groundwater, transitional and coastal water bodies. The 2km buffer is defined using the United Kingdom (UK) Environment Agency Water Framework Directive Assessment: Estuarine and Coastal Waters (updated 2023).

The assessment examines the impacts of the Proposed Development on the water bodies, including any new modifications and changes to existing conditions. Waterbodies considered as receptors pertain to those classified under the WFD, which includes riverine, transitional waterbodies, lake (water) bodies and coastal waterbodies, and also non-WFD classified waterbodies. The Water Policy Regulations also requires the assessment of permanent impacts of a scheme on groundwater waterbodies.

3.2 WFD Assessment Process

The WFD Assessment is undertaken in four stages:

- Stage 1 Screening – excludes any activities that do not need to go through the scoping or impact assessment stages.
- Stage 2 Scoping – to identify potential risks associated with a development proposal on the relevant water bodies and their water quality elements.
- Stage 3 Impact assessment – to undertake a detailed assessment of water bodies, their quality elements and activities carried forward from the scoping stage.
- Stage 4 Justification or Exemption - rigorous assessment of the appropriateness, or otherwise, of particular developments that, for various reasons, are being considered despite failure to comply with the objectives of the WFD, as laid down in Article 4(7).

The key steps in the development stage process are briefly outlined in Table 3-1.

TABLE 3-1 KEY STEPS IN THE WATER STATUS IMPACT ASSESSMENT PROCESS

WFD Assessment Steps	Development Management
Screening	Screening is required to determine whether a development proposal would screen in / out for more detailed consideration of WFD objectives.
Scoping	Once a development proposal is screened in it will rely on the professional expertise of the applicant's specialist consultants and, if/as required, the Environment Section of the planning authority and other bodies to engage in more specific pre-application consultation in relation to the requirements and to agree the scope of the assessment. The scope of the WFD Assessment must be proportionate to the type and scale of development and the sensitivity of the water body(s).
Assessment & Reporting	Applications for development proposals which have screened in for detailed consideration of WFD / River Basin Management Plan (RBMP) objectives, must clearly demonstrate that the proposal is compliant with the objectives of the WFD i.e. it will not cause or contribute to deterioration of status or jeopardise the water body achieving good status. Where the competent authority concludes that significant negative impacts on a water body cannot be fully avoided (i.e. with the potential to cause deterioration of its status or jeopardise its attaining good status), or uncertainty remains of the extent of impact, it is required to refuse consent, unless a derogation under Article 4(7) is sought and justified under the strict conditions of the WFD for new modifications. Where water quality is an issue (but not so as to cause the deterioration of the status of any body of water or jeopardise its attaining good status), the competent authority shall consider granting permission subject to conditions to deal with any residual risk and must be guided by the development management objectives set out in the development plan. Where potential for significant effects is identified, a mitigation and monitoring strategy shall be presented. This can align with EIAR requirements if screened in for EIA. Otherwise, a mitigation and monitoring strategy should be agreed with the planning authority and the developer to ensure no unforeseen effects from the construction or operation of the development.
Justification or WFD Exception	Where a development proposal is considered likely to cause deterioration of the status (or potential) of a surface or groundwater body or prevents the achievement of good groundwater status, good ecological status / potential for water bodies currently failing to achieve this status / potential, Article 4(7) of the WFD provides a derogation whereby a Member State will not be in breach of the Directive provided all the conditions set out in Article 4(7) are met.

3.2.1 Stage 1 – Screening

Where a development requires mandatory EIA, or it is screened in for EIA if it is not mandatory, water environment is a prescribed environmental factor to be addressed in the EIAR. The development would

therefore automatically screen in for WFD assessment and a WFD Compliance report should be prepared by a suitably qualified professional and submitted with the application.

In some situations, it will be clear that a proposed development could not cause deterioration or compromise the achievement of good status / potential and it should screen out for WFD Assessment. For example, where the nature, scale, timing, duration and location of a development is entirely unconnected to a water body or will not contribute to a further deterioration of the water body's current status. These instances will generally be small developments, for example signage or changes of use or extensions to existing buildings in serviced urban areas.

Other development proposals may require further consideration for screening. In these situations, the source-pathway-receptor (S-P-R) model will be useful in terms of considering the potential risk of a proposed development causing further deterioration of the water body's current status, for example, if the proposed development includes a source (e.g. risk of pollution), is there a pathway (i.e. hydrological connectivity [including flood risk] via water body or groundwater) and is there a receptor (i.e. water body at risk).

3.2.2 Stage 2 – Scoping

Scoping considers how a development proposal could affect the different WFD quality elements. Each aspect or activity associated with the development with the potential to impact the achievement of the WFD should be considered and then summarised in table form for each water body.

WFD scoping should involve:

- Undertaking an initial assessment to identify the risks from the development proposal to receptors (within the zone of influence) based on the relevant water bodies and their water quality elements; and
- Identification of those water bodies where a more detailed impact assessment is required.

This will require that the types of impact be identified, e.g. on what quality element; whether the effects are short, medium or long-term and, construction, operational or decommissioning related.

3.2.3 Stage 3 – Impact Assessment

The Stage 3 assessment process is focused on assessing the potential for the Proposed Development to impact on the objectives of the WFD and the RBMP. This can be an iterative process and the objective should be to find an appropriate solution wherever possible – this may include assessment and amending the design and/or including measures to mitigate the particular elements of the development that posed the risk.

The particular elements of the Proposed Development that have the potential to adversely affect the quality of a water body must be examined with respect to the specific objectives of the WFD and the RBMP. The information collected should facilitate:

- The identification and description of those aspects of the project that may affect a water body;
- A description of the characteristics of relevant water body, including their WFD objectives and an understanding of factors which either maintain or threaten those objectives;
- An assessment of the impact of the Proposed Development on the relevant objectives; and
- To conclude whether the Proposed Development will:
 - Cause or contribute to deterioration of status; or
 - Jeopardise the water body achieving *good status* (or *high status in the case of a waterbody with a high-status objective*).

3.2.4 Stage 4 – Justification or WFD Exception

Where a development proposal is considered likely to cause deterioration of the status (or potential) of a surface or groundwater body or prevents the achievement of good groundwater status, good ecological status / potential for water bodies currently failing to achieve this status / potential, Article 4(7) of the WFD provides a derogation whereby a Member State will not be in breach of the Directive provided all the conditions set out

in Article 4(7) are met. In the case of the Project the assessment stage has concluded that there is no risk of deterioration in the WFD status of any water bodies affected and that the Project will not compromise the achievement of the environmental objectives of these water bodies under the WFD. Therefore for this Project the assessment ends at Stage 3.

3.3 WFD Risk Status

The WFD Risk score is the risk for each waterbody of failing to meet their WFD objectives by 2027. The risk of not meeting WFD objectives has been determined by assessment of monitoring data, data on the pressures and data on the measures that have been implemented. Waterbodies that are 'At Risk' are prioritized for implementation of measures. This assessment was completed in 2020 by the EPA Catchments Unit in conjunction with other public bodies and was primarily based on monitoring data up the end of 2018. The three risk categories are:

- Waterbodies that are 'At Risk' of not meeting their WFD objectives. For these waterbodies an evidence-based process was undertaken to identify the significant pressures; once a pressure is designated as 'significant', measures and accompanying resources are needed to mitigate the impact(s) from this pressure. These 'At Risk' waterbodies require not only implementation of the existing measures described in the various regulations, e.g. the Good Agricultural Practices Regulations, but also in many instances more targeted supplementary measures.
- Waterbodies that are categorised as 'Review', either because additional information is needed to determine their status before resources and more targeted measures are initiated or the measures have been undertaken, e.g. a wastewater treatment plant upgrade, but the outcome hasn't yet been measured/monitored.
- Waterbodies that are 'Not at Risk' and therefore are meeting their Water Framework Directive objectives. These require maintenance of existing measures to protect the satisfactory status of the water bodies.

3.4 Background to Surface Water Body Status

Under the WFD, surface water body status is classified on the basis of chemical and ecological status or potential. Ecological status is assigned to surface water bodies that are natural and considered by the EPA not to have been significantly modified for anthropogenic purposes (i.e., culverting). Ecological potential is assigned to artificial and man-made water bodies (such as canals), or natural water bodies that have undergone significant modification. The term 'ecological potential' is used as it may be impossible to achieve good ecological status because of modification for a specific use, such as navigation or flood protection. The ecological potential represents the degree to which the quality of the water body approaches the maximum it could achieve. The worst-case classification is assigned as the overall surface water body status, in a 'one-out all-out' system (i.e., by taking the worst case of all the combined risk outcomes). This system is summarised below in Figure 3-1.

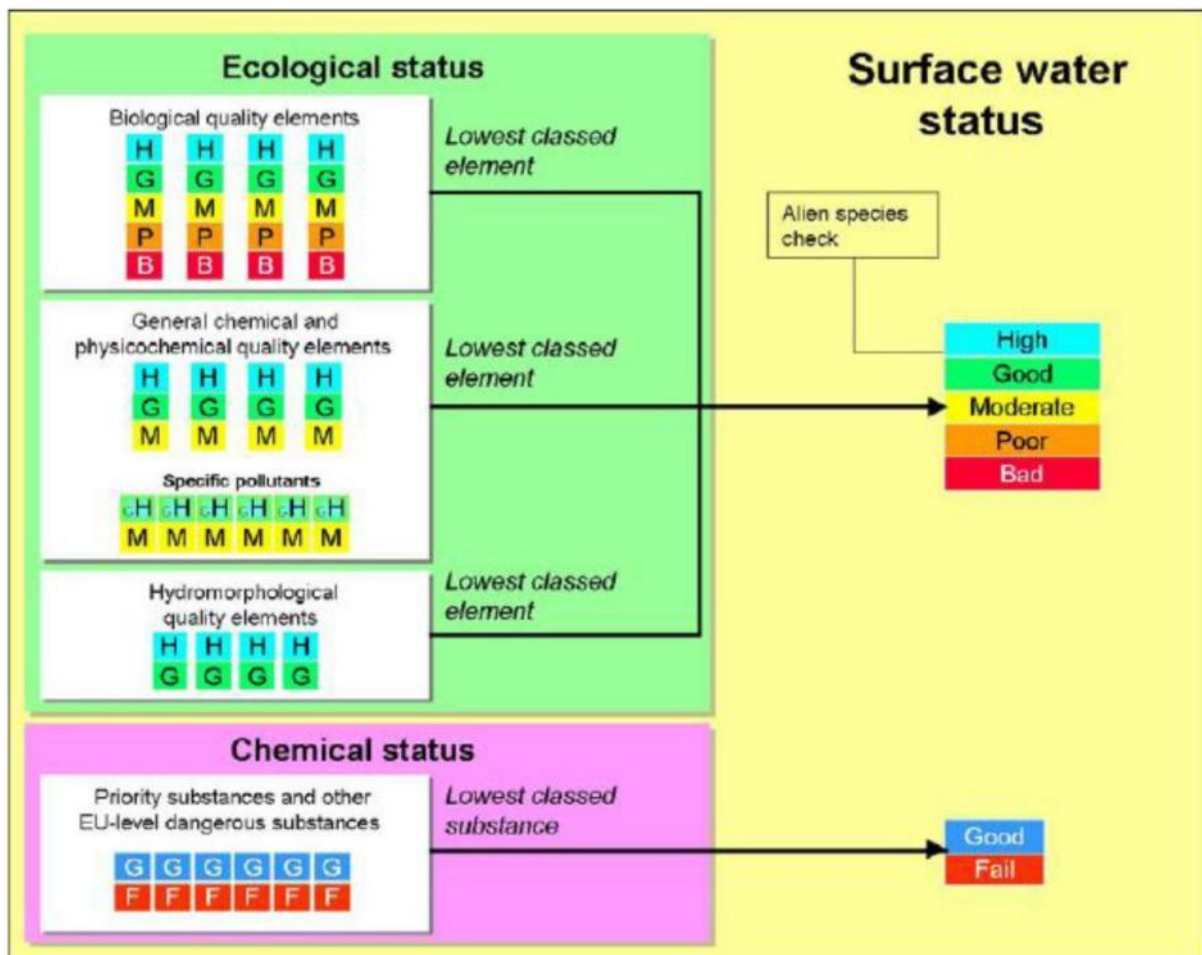


FIGURE 3-1 WFD CLASSIFICATION ELEMENTS FOR SURFACE WATER BODY STATUS (ENVIRONMENTAL AGENCY, 2015)

Chemical Status

Chemical status is defined by compliance with environmental standards for chemicals that are priority substances and/or priority hazardous substances, in accordance with the Environmental Quality Standards Directive (2008/105/EC). This is assigned on a scale of good or fail. Surface water bodies are only monitored for priority substances where there are known discharges of these pollutants; otherwise, surface water bodies are reported as being at good chemical status.

Ecological Status

Ecological status or potential is defined by the overall health or condition of the watercourse. This is assigned on a scale of High, Good, Moderate, Poor or Bad, and on the basis of four classification elements or 'tests', as follows:

- Biological:** This test is designed to assess the status indicated by a biological quality element such as the abundance of fish, invertebrates or algae and by the presence of invasive species. The biological quality elements can influence an overall water body status from Bad through to High.
- Physico-chemical:** This test is designed to assess compliance with environmental standards for supporting physicochemical conditions, such as dissolved oxygen, phosphorus and ammonia. The physicochemical elements can only influence an overall water body status from Moderate through to High.
- Specific pollutants:** This test is designed to assess compliance with environmental standards for concentrations of specific pollutants, such as zinc, cypermethrin or arsenic. As with the physico-chemical test, the specific pollutant assessment can only influence an overall water body status from Moderate through to High.

- **Hydromorphology:** For natural waterbodies, this test is undertaken when the biological and physicochemical tests indicate that a water body may be of High status. It specifically assesses elements such as water flow, sediment composition and movement, continuity, and structure of the habitat against reference or 'largely undisturbed' conditions. If the hydro morphological elements do not support High status, then the status of the water body is limited to Good overall status. For artificial or highly modified waterbodies, hydro morphological elements are assessed initially to determine which of the biological and physico-chemical elements should be used in the classification of ecological potential. In all cases, assessment of baseline hydro morphological conditions are an important factor in determining possible reasons for classifying biological and physicochemical elements of a water body as less than Good, and hence in determining what mitigation measures may be required to address these failing water bodies.

3.5 Background to Groundwater BodyStatus

Under the WFD, groundwater body status is classified on the basis of quantitative and chemical status. Status is assessed primarily using data collected from the EPA monitoring network; therefore, the scale of assessment means that groundwater status is mainly influenced by larger scale effects such as significant abstraction or widespread/ diffuse pollution. The worst-case classification is assigned as the overall groundwater body status, in a 'one-out all-out' system. This system is summarised in Figure 3-2 below.

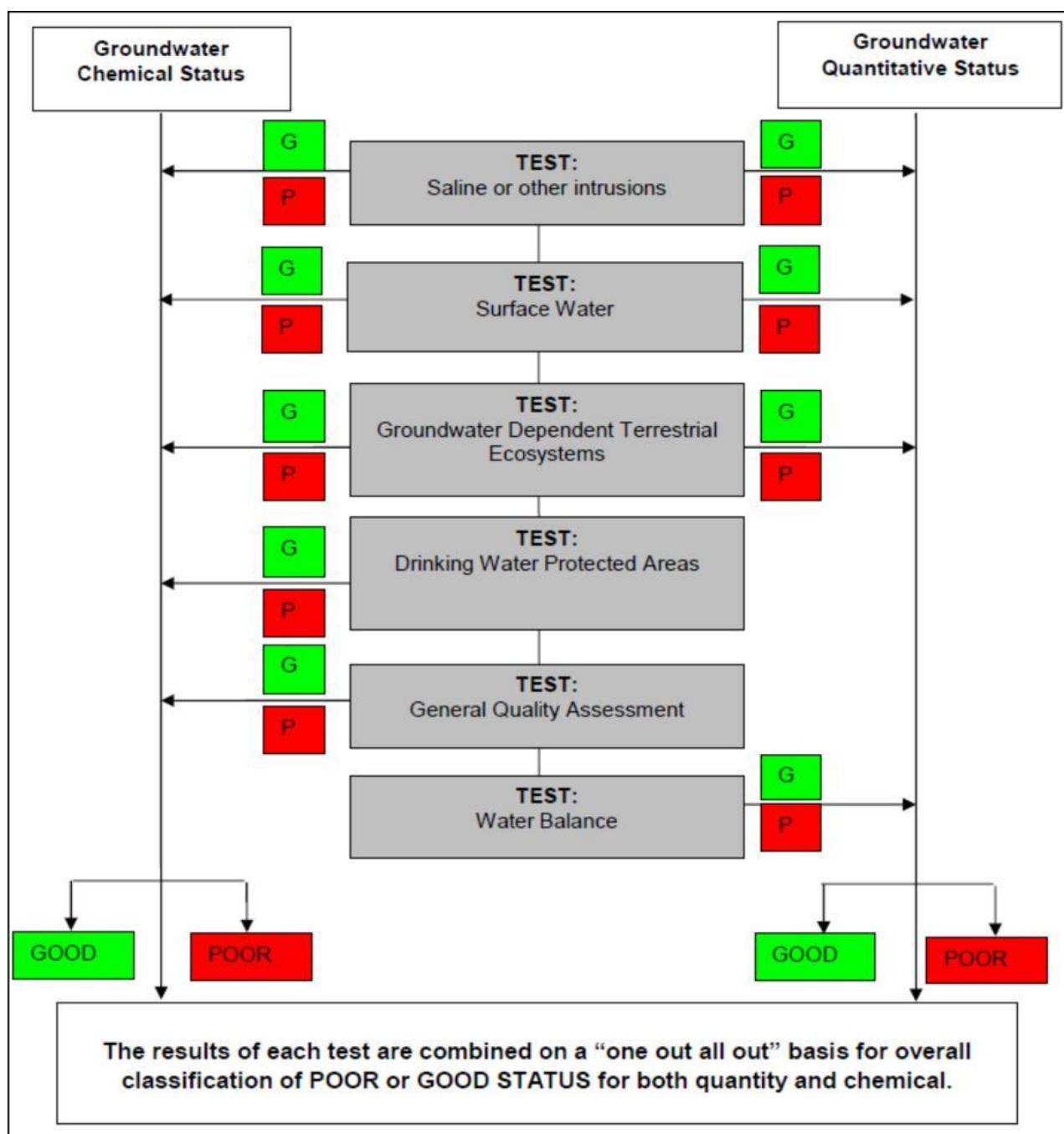


FIGURE 3-2 WFD CLASSIFICATION ELEMENTS FOR GROUNDWATER BODY STATUS (ENVIRONMENTAL AGENCY, 2015)

Quantitative Status

Quantitative status is defined by the quantity of groundwater available as baseflow to watercourses and water-dependent ecosystems, and as 'resource' available for use as drinking water and other consumptive purposes. This is assigned on a scale of Good or Poor, and on the basis of four classification elements or 'tests' as follows:

- Saline or other intrusions:** This test is designed to identify groundwater bodies where the intrusion of poor quality water, such as saline water or water of different chemical composition, as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.
- Surface water:** This test is designed to identify groundwater bodies where groundwater abstraction is leading to a significant diminution of the ecological status of associated surface water bodies.

- **Groundwater Dependent Terrestrial Ecosystems (GWDTes):** This test is designed to identify groundwater bodies where groundwater abstraction is leading to “significant damage” to associated GWDTes (with respect to water quantity).
- **Water balance:** This test is designed to identify groundwater bodies where groundwater abstraction exceeds the “available groundwater resource”, defined as the rate of overall recharge to the groundwater body itself, as well as the rate of flow required to meet the ecological needs of associated surface water bodies and GWDTes.

Chemical Status

Chemical status is defined by the concentrations of a range of key pollutants, by the quality of groundwater feeding into watercourses and water-dependent ecosystems and by the quality of groundwater available for drinking water purposes. This is assigned on a scale of Good or Poor, and on the basis of five classification elements or ‘tests’ as follows:

- **Saline or other intrusions:** This test is designed to identify groundwater bodies where the intrusion of poor-quality water, such as saline water or water of different chemical composition, as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.
- **Surface water:** This test is designed to identify groundwater bodies where groundwater abstraction is leading to a significant diminution of the chemical status of associated surface water bodies.
- **GWDTes:** This test is designed to identify groundwater bodies where groundwater abstraction is leading to “significant damage” to associated GWDTes (with respect to water quality).
- **Drinking Water Protected Areas (DrWPAs):** This test is designed to identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.
- **General quality assessment:** This test is designed to identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.

3.6 Relevant Guidelines, Policy and Legislation

3.6.1 River Basin Management Plan

River Basin Management Plans (RBMPs) provide the mechanism for implementing and ensuring an integrated approach to the protection, improvement, and sustainable management of the water environment and are published every six years. The River Basin Management Plan (RBMP) for 2022-2027, published by the Department of Housing, Local Government and Heritage, represents the third RBMP for Ireland. This plan continues the efforts to protect and improve water quality across the country, addressing the challenges posed by climate change and the need for more robust measures to counteract the recent decline in water quality.

The RBMP for 2022-2027 sets out at the outset that it is published in the context of a rapidly changing policy landscape at European and international levels and against a backdrop of ‘widespread, rapid and intensifying climate change’. In addition, Ireland is now experiencing a sustained decline in water quality following many years of improvements, and so stronger measures are now required to achieve sustainable water management in order to address and adapt to the impacts of climate change and achieve the desired outcomes for biodiversity.

For those waterbodies ‘At Risk’ of failing to meet the objectives of WFD, the RBMP 2022 - 2027 identified the most significant pressures impacting them as follows: agriculture (55%), hydromorphology (23%), urban wastewater (19%), forestry (14%), domestic wastewater (12%), urban runoff (10%), peat (7%), extractive industry (6%), and mines and quarries (5%).

Figure 3-3 presents the ecological status of water bodies in Ireland over the previous cycles of the RBMP and illustrates the reduction in water quality over the previous two cycles, particularly in relation to the reduced percentage of water bodies achieving high status and the increased percentage achieving bad status. However, the most recent cycle indicates an improvement in the number of water bodies achieving high status.

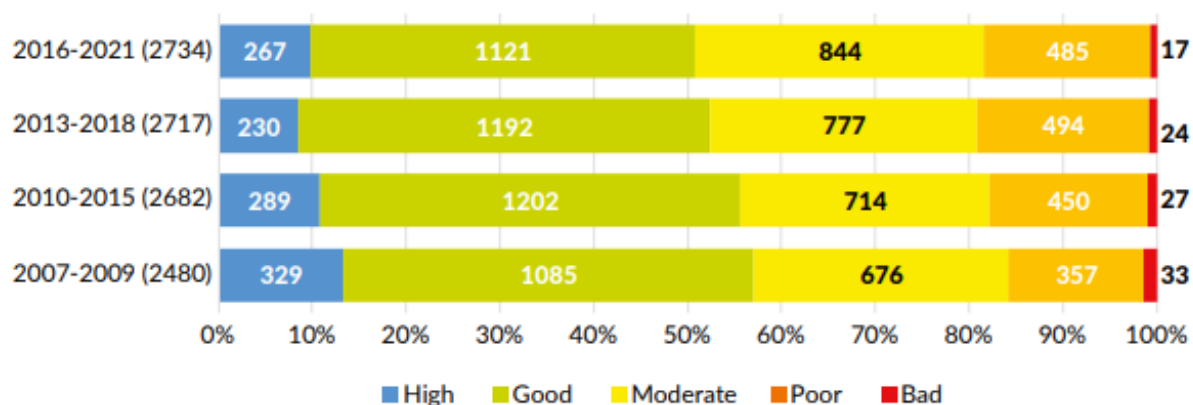


FIGURE 3-3: ECOLOGICAL STATUS OF WATERBODIES IN IRELAND (RBMP 2022-2027)

The characterisation and risk assessments carried out for the third cycle show that 34% of water bodies are At Risk of not meeting their environmental objective of good or high status. Of these, 46% are impacted by a single significant pressure. Agriculture remains the most common pressure, followed by pressures on hydromorphology, forestry and urban wastewater. There has been an increase in waterbodies impacted by agriculture since the 2nd cycle RBMP.

3.6.2 Relevant Guidelines

- EPA (2010) Methodology for Establishing Groundwater Threshold Values, the Assessment of Chemical and Quantitative Status for Groundwater Trends;
- Common Implementation Strategy (CIS) (2017) Guidance Document no. 36 'Exemptions to the environmental objectives according to Article 4(7) provides comprehensive guidance on the application of Article 4(7);
- UKTAG (2012) Groundwater Chemical Classification for the Water Framework Directive. Paper 11b(i), UK Technical Advisory Group on the Water Framework Directive;
- UKTAG (2012) Groundwater Quantitative Classification for the Water Framework Directive. Paper 11b(ii), UK Technical Advisory Group on the Water Framework Directive;
- Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (CIRIA 532, 2001);
- UK Environment Agency's 'Water Framework Directive assessment: Estuarine and Coastal waters' (Clearing the Waters for All) 2016 (updated 2023);
- European Communities 900030, Common Implementation Strategy for the Water Framework Directives (2000/60/EC) Guidance Document No. 2; and
- EPA (May 2015), An approach to characterisation as part of the Water Framework Directive V2 revised.

This WFD assessment was based on desktop review of the EPA and Local Authority Waters Programme water quality records, which were obtained from the portal www.catchments.ie. In addition, data from NIS has been considered to form this assessment. From the aforementioned source of information, the WFD Status classification and Risk score was obtained for the identified water bodies.

3.7 Data Collection and Collation

The EPA's Data Explorer (<https://gis.epa.ie/EPAMaps/>) was used to assess water bodies present within the Proposed Development's Study Area, and includes their WFD ID numbers, designation and classification details. The WFD compliance mapping for groundwater risk and status assessment was also reviewed along with any other supporting data.

3.8 Appraisal Method

In the absence of published WFD assessment guidance in Ireland, a staged assessment has been adopted to assess the potential for the Proposed Development to cause deterioration in WFD status or prevent the achievement of WFD environmental objectives.

The assessment is primarily based on the requirements of the WFD, the Water Policy Regulations, the Surface Water Regulations, EPA WFD status and risk information, Uisce Éireann requirements, and the project-specific hydrodynamic and water quality modelling prepared for the Proposed Development. UK guidance has been reviewed only to inform the structure of the assessment process, where relevant.

There follows a baseline assessment of the main water bodies within the Study Area/Zone of Influence (Zol), and a scoping assessment of the principal receptors potentially affected by the Proposed Development. This is followed by the impact assessment, which considers the potential impacts of an activity, identifies ways to avoid or minimise impacts, and indicates if an activity may cause deterioration or jeopardise the water body achieving GEP / GES.

There are several stages to this assessment:

- A scoping assessment of the main receptors including protected areas of nature conservation, bathing water etc. (Section 4);
- An assessment against quality elements including hydromorphology, biology, water quality, protected areas and invasive species (Section 5);
- Assessment of the Proposed Development against mitigation measures and a cumulative assessment against other Proposed Developments (Section 6); and
- Assessment against other EU Directives (Section 7).

4 BASELINE SCOPING

4.1 Water Body Scoping

The Proposed Development description has been used to inform the assessment of potential impacts of the construction and operation of the Proposed Development on the environmental objectives of the WFD water bodies within the study area. Table 4-1 lists the WFD water bodies within the study area and their status (2019-2024).

TABLE 4-1: WATER BODY STATUS (DATA EXPLORER EPA DATA EXPLORER AND WWW.CATCHMENTS.IE)

Water Body ID	Name of Water Body in RBMP	Current Status / Potential (2019-2024)	Environmental Objective	Significant Issues	Significant Pressures	WFD Risk
Groundwater						
IE_SH_G_141	Limerick City Southwest	Good	Good	Chemical Quality Diminution ForSW, Nutrients	Ag	At Risk
Surface Water						
IE_SH_25S012600	Shannon Lower_060	Moderate	Good			Review
Transitional						
IE_SH_060_0800	Upper Shannon Estuary	Poor	Good	Nutrients	Ag	At risk

IE_SH_060_0900	Limerick Dock	Poor	Good	Morphological	HYMO	At risk
IE_SH_060_0700	Maigue Estuary	Moderate	Good	Nutrients	Ag	At risk

Figure 4-1 shows the transitional water bodies near the Proposed Development.

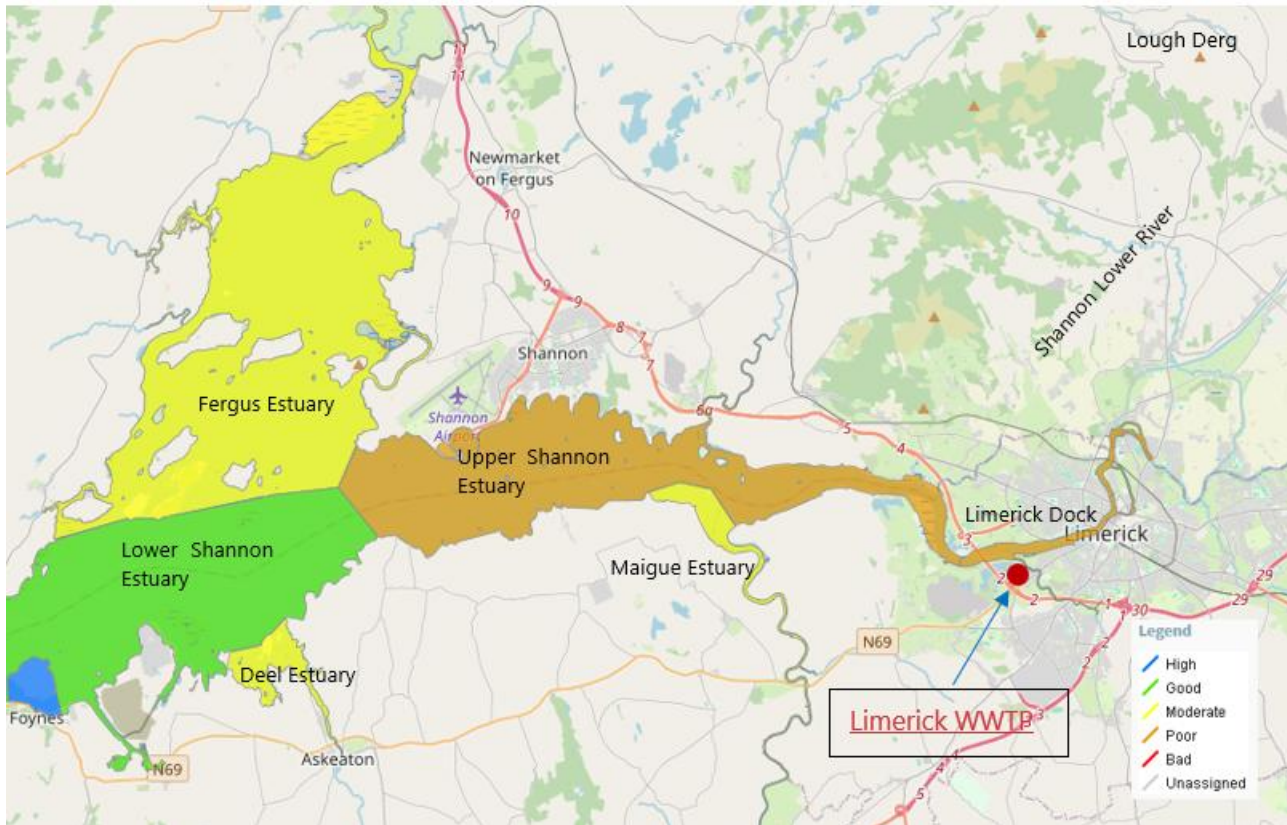


FIGURE 4-1: WFD WATERBODIES (EPA MAPS). STATUS OF WFD WATERBODIES IN THE STUDY AREA FOR THE ASSESSMENT PERIOD 2019-2024

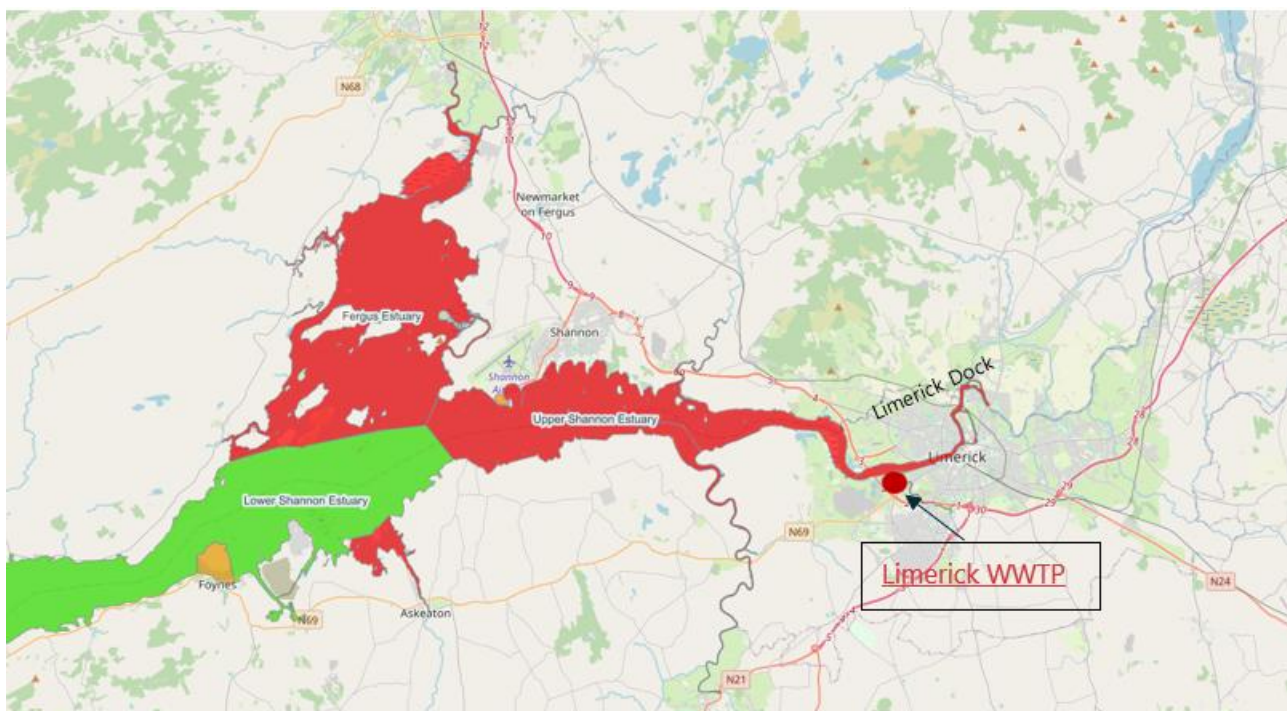


FIGURE 4-2: WFD WATERBODIES RISK STATUS 3RD CYCLE (EPA MAPS)

- Shellfish waters.

4.2.1.1 Nature Conservation Designations

These are areas previously designated for the protection of habitats or species where maintaining or improving the status of water is important for their protection. They comprise the aquatic part of Natura 2000 sites – Special Protection Areas (SPAs) designated under the Council Directive 2009/147/EC of 30 November 2009 on the conservation of wild birds (Birds Directive) and Special Areas of Conservation (SACs) designated under the Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Habitats Directive), as amended.

The EPA website (<https://gis.epa.ie/EPAMaps>) was used to identify the nature conservation designations in the proximity of the Proposed Development. The identified nature conservation designations are listed below:

- Special Areas of Conservation
 - Lower River Shannon SAC (will be crossed by the outfall pipeline route and will receive treated wastewater discharges);
 - Glenomra Wood SAC (located approximately 13km north of the Proposed Development);
 - Tory Hill SAC (located approximately 11.5km south of the Proposed Development);
 - Askeaton Fen Complex SAC (located approximately 12km west of the Proposed Development);
- Special Protection Areas
 - River Shannon and River Fergus Estuaries SPA (will be crossed by the outfall pipeline route); and
 - Slievefelim to Silvermines Mountains SPA (located approximately 18.2km east of the Proposed Development)
- Statutory Nature Reserves (Proposed National Heritage Areas)
 - Inner Shannon Estuary – South Shore; and
 - 'Fergus Estuary and Inner Shannon, North Shore'

The proposed works are located approximately 13km south from Glenomra Wood SAC, approximately 11.5km north from the Tory Hill SAC, approximately 12km east from the Askeaton Fen Complex SAC and approximately 18.2km west from the Slievefelim to Silvermines Mountains SPA. These areas are considered far from the Proposed Development, therefore are scoped out for further assessment.

The Nature Conservation Designations in the proximity of the Proposed Development are Lower River Shannon SAC shown in Figure 4-4, River Shannon and River Fergus Estuaries SPA shown in Figure 4-5 and the two pNHAS shown in Figure 4-6.

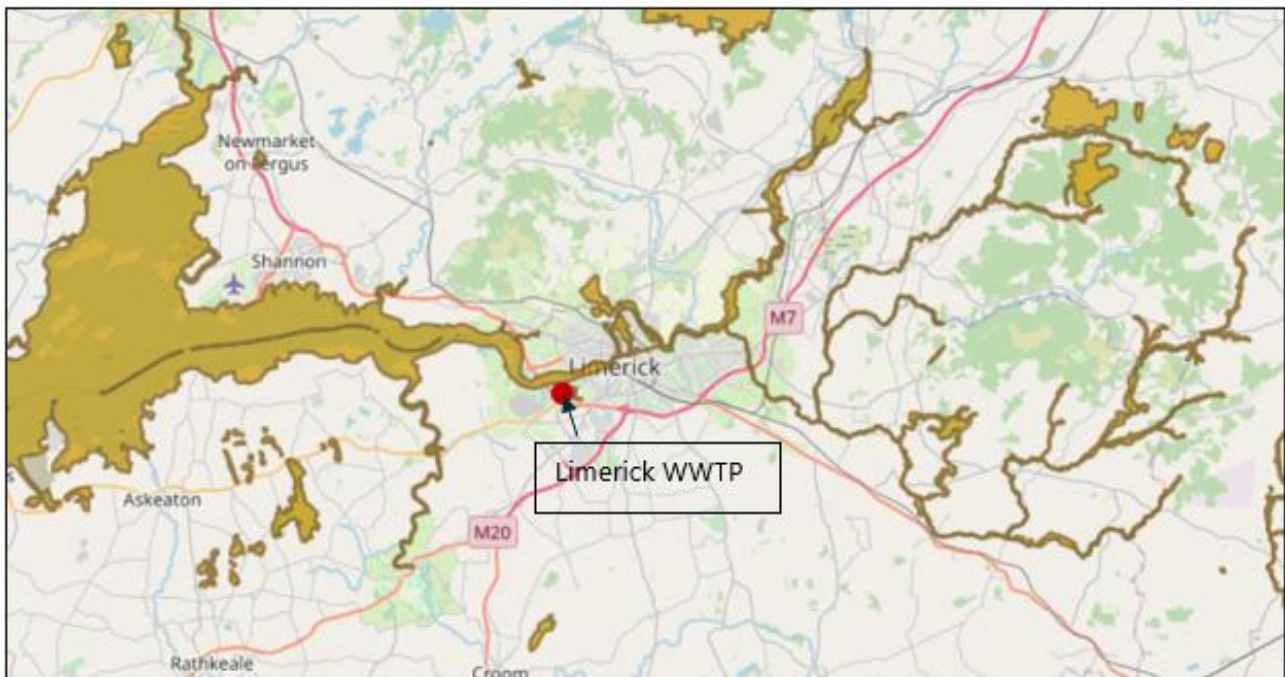


FIGURE 4-4: SPECIAL AREAS OF CONSERVATION (SAC AREAS)



FIGURE 4-5: SPECIAL PROTECTED AREAS (SPA AREAS)

National Heritage Areas, also called Statutory Nature Reserves, are areas considered important for the habitats present or areas which hold species whose habitats require protection. They are the basic designation for wildlife protection in the Irish state. From information of the NPWS (National Parks and Wildlife Service) there are no NHA in the Shannon Estuary.

In the project area, there are two proposed NHAs: Inner Shannon Estuary – South Shore, and 'Fergus Estuary and Inner Shannon, North Shore'.

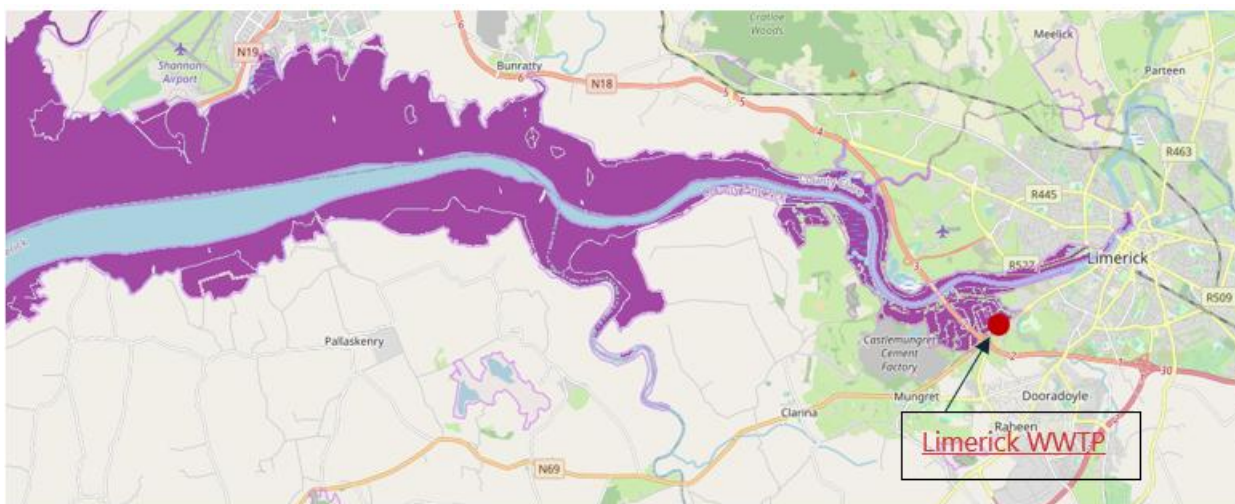


FIGURE 4-6: PROPOSED NATURE HERITAGE AREAS (PNHAS)

4.2.1.2 Bathing Waters

Bathing waters are those designated under the Directive 2006/7/EC of the European Parliament and of the Council of 15 February 2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC, as amended. The Bathing Water Quality Regulations S.I. No. 79 of 2008, as amended transpose the Directive 2006/7/EC into Irish law. The only designated bathing water area in the Shannon Estuary is at Kilrush (Cappagh Pier), approximately 60 km west of Bunlicky WWTP. Glin Pier and Kiltteery Pier are proposed designated bathing waters, located approximately 40 km west of the Bunlicky WWTP outfall. These three bathing waters are considered to be located at a sufficient distance away to not be affected by the effluent discharge of Bunlicky WWTP, therefore they are scoped out for further assessment.

4.2.1.3 Nutrient Sensitive Areas

Nutrient sensitive areas comprise Nitrate Vulnerable Zones and polluted waters designated under the Nitrates Directive (91/676/EEC) and areas designated as sensitive areas under the Urban Wastewater Treatment Directive (UWWTD)(91/271/EEC). The UWWTD aims to protect the environment from the adverse effects of the collection, treatment and discharge of urban wastewater. Sensitive areas under the UWWTD are water bodies affected by eutrophication associated with elevated nitrate concentrations and act as an indication that action is required to prevent further pollution caused by nutrients.

On 27 October 2022, following consultation with stakeholders and the general public, the European Commission published its proposal for a revised UWWTD (the Recast Directive). The Recast Directive proposes to bring in changes to increase the standard of wastewater treatment required across the EU, and support the transition forwards a circular economy and energy neutrality by 2040. The Recast Directive has, amongst other matters, the objective of nutrient recovery, and tighten phosphorus removal requirements for sewage works. The Recast Directive is published in December 2024.

There is one nutrient sensitive area in the wider area around the Bunlicky WWTP. This is the area of Lough Derg, upstream of the Shannon River. This area will not be affected by the discharge of the Bunlicky WWTP since this is further upstream. Other than Lough Derg there are no nutrient sensitive areas in the study area.

4.2.1.4 Shellfish Waters

Efforts to protect and improve shellfish waters are aimed at supporting the life and growth of bivalve and gastropod molluscs, including oysters, mussels, cockles, scallops, and clams. In Ireland, these efforts are implemented through the European Communities (Quality of Shellfish Waters) Regulations 2006, as amended (SI No 268 of 2006), which require the designation of waters needing protection to support shellfish life and growth. These regulations also mandate the establishment of pollution reduction programmes for the designated waters.

There are no designated shellfish waters in the proximity of the Proposed Development, therefore they are scoped out for further assessment.

5 WATERBODY ASSESSMENT AGAINST QUALITY ELEMENTS

This section details a site-specific assessment of the Proposed Development against ecological, physico-chemical hydromorphological and groundwater quality elements for the screened-in waterbodies.

5.1 Hydromorphology

Table 5-1 presents a summary of the hydromorphological considerations and associated risk issues of the Proposed Development for the waterbodies.

TABLE 5-1: HYDROMORPHOLOGY SCOPING SUMMARY

WFD Assessment Questions	Shannon River Lower	Limerick Dock	Upper Shannon Estuary	Maigue Estuary
Consider if your activity could impact on the hydromorphology (for example morphology or water flow) of a water body at high status?	No – Not at High Status	Hydromorphological condition is Moderate However, the proposed works does not consist in changing the outfall pipeline route.	No – Not at High Status Hydromorphological condition is Good	No – Not at High Status Hydromorphological condition is Moderate
Consider if your activity could significantly impact the hydromorphology of any water body?	Mitigation measures detailed within the CEMP will be in place during all construction activities adjacent to this water body. This will limit the potential for a reduction in hydromorphological diversity via silty runoff entering the water bodies and smothering hydromorphological features.	Mitigations are in place during construction to limit surface water runoff alongside pollution prevention controls. During operation, discharges from the outfall would be treated prior to discharge. The outfall pipeline route will not be changed, therefore no deterioration of this water body at-scale is anticipated.	No (Construction and Operation) The footprint of the works are not within or on the Upper Shannon Estuary. There is potential for indirect impacts through increased edimentation to the Shannon River which could be realised downstream on the Upper Shannon Estuary. However, mitigations are in place during construction to limit surface water runoff alongside pollution prevention controls. During operation, discharges from the outfall would be treated prior to discharge. No further assessment is required.	No (Construction and Operation) The footprint of the works are not within or on the Maigue Estuary. There is potential for indirect impacts through increased sedimentation to the Shannon River which could be realised downstream on the Maigue Estuary. However, mitigations are in place during construction to limit surface water runoff alongside pollution prevention controls. During operation, discharges from the outfall would be treated prior to discharge. No further assessment is required.

WFD Assessment Questions	Shannon River Lower	Limerick Dock	Upper Shannon Estuary	Maigue Estuary
Consider if your activity is in a water body that is heavily modified for the same use as your activity?	Heavily Modified Water Body (HMWB) status not designated.	Heavily Modified Water Body (HMWB) status not designated.		

There are no instream works proposed as part of the Proposed Development. Before works begin, a double silt fence with wooden posts and buried geotextile membrane will be installed along the western and northern drains of the WWTP site to intercept and filter surface water runoff, preventing entry into perimeter ditches. During construction, surface water runoff will be collected by the temporary drainage system installed by the contractor and then treated or desilted on-site before discharge into the Lower River Shannon.

5.2 Biology

Table 5-2 presents a summary of biology (habitat) considerations and associated risk issues for the works for the waterbodies.

TABLE 5-2: BIOLOGY SCOPING SUMMARY

WFD Assessment Questions	Shannon River Lower	Limerick Dock	Upper Shannon Estuary	Maigue Estuary
Is the footprint of the activity 0.5 Square Kilometres or larger.	No, the footprint of the Proposed Development within the redline boundaries (both Limerick WWTP site and Corcanree PS site) does not exceed 0.5 Square Kilometres			
Is the footprint of the activity 1% or more of the water body's area.	No, the footprint of the activity is not 1% of the water body's area.			
Is the footprint of the activity within 500m of any higher sensitivity habitat?	Yes - in the vicinity of Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA	Yes - in Lower River Shannon SAC designated under the EU Habitats Directive for its range of protected habitats, including mudflats, sandflats, estuaries, and saltmarshes, as well as for supporting populations of Annex II species (bottlenose dolphin, Freshwater Pearl Mussel, river lamprey, otter). Potential impacts during construction include disturbance from noise, vibration, or increased human activity near resting	The footprint of the activity is not within 500m or adjacent to any higher sensitivity habitat. The Proposed Development will not result in loss of habitat or protected species.	The footprint of the activity is not within 500m or adjacent to any higher sensitivity habitat. The Proposed Development will not result in loss of habitat or protected species.

		sites, particularly if in-river works or night-time activities are required.		
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5.2.1 Habitat

The study area comprises a section of the Shannon Estuary, a transitional waterbody of high ecological importance that supports a diversity of costal and estuarine habitats. The WWTP discharges into the upper estuarine zone near Limerick City, where salinity gradients, tidal influence, and freshwater input from the River Shannon combine to create dynamic conditions that support mudflats, sandflats and subtidal habitats. These habitats provide important ecological functions, including supporting benthic communities and acting as feeding and nursery grounds for fish and bird species.

The estuarine system is also part of the Lower River Shannon Special Area of Conservation (SAC)(site code: 002165), designated under the EU Habitats Directive for its range of protected habitats, including mudflats, sandflats, estuaries, and saltmarshes, as well as for supporting populations of Annex II species such as *Tursiops truncatus* (bottlenose dolphin), *Margaritifera margaritifera* (Freshwater Pearl Mussel), *Lampetra fluviatilis* (river lamprey), *Petromyzon marinus* (sea lamprey), *Lampetra planeri* (Brook Lamprey), *Lutra lutra* (otter) and *Salmo salar* (Atlantic salmon). These receptors are also identified as Key Ecological Receptors (KERs) within the wider biodiversity assessment.

In addition, the Lower River Shannon and Shannon Estuary Special Protection Area (SPA) support a range of wintering and migratory bird species, including Light-bellied Brent Goose (*Branta bernicla hrota*), Golden Plover (*Pluvialis apricaria*), Dunlin (*Calidris alpina*), Black-tailed Godwit (*Limosa limosa*), and Redshank (*Tringa totanus*), among others. The intertidal mudflats and sandflats, rich in invertebrates, provide essential feeding and roosting grounds. Portions of the SPA extend into the vicinity of the Proposed Development outfall, where habitat is influenced by freshwater input and reduced salinity but may still support opportunistic feeding by some bird species.

From a Water Framework Directive (WFD) perspective, habitats within the study area are closely linked to biological quality elements, particularly benthic invertebrates and fish, which are sensitive to changes in water quality and sediment conditions. Potential risks to WFD habitat receptors include loss of habitat, loss of protected species and prey species. The Proposed Development will maintain the existing outfall and all discharges will be treated to meet relevant emission standards prior to release to the waterbody. The additional 12,500m³ stormwater storage capacity will greatly reduce uncontrolled spills to the Shannon Estuary, thereby reducing the risk of short-term pollution events and associated impacts on estuarine habitats.

Given the expected scale and nature of works, the potential impact on marine mammals, including bottlenose dolphin and seal species is considered **negligible to minor in significance**, provided best practice noise mitigation and monitoring are enforced.

Similarly, construction impacts of the Proposed Development will be managed to ensure that habitats do not experience long term change. It is important to note that a Construction Environmental Management Plan (CEMP) will be implemented for construction management and sediment control measures respectively.

5.2.2 Fish

Activities occurring within an estuary or inshore environment could impact on normal fish behaviour such as movement, migration or spawning. Table 5-3 presents a summary of biology (fish) considerations and associated risk issues for the works.

TABLE 5-3: BIOLOGY (FISH) SCOPING SUMMARY

WFD Assessment Questions	Shannon River Lower	Limerick Dock	Upper Shannon Estuary	Maigue Estuary
Consider if your activity is in an estuary and could effect fish in the estuary, outside the estuary, but could delay or prevent fish from entering it or could effect fish migrating through the estuary.	No (Construction) – Not estuarine No (Operation) – Not estuarine	Yes - Construction noise and vibration, especially from piling or sheet driving if required, may disrupt migratory pathways or lead to temporary displacement of fish. Suspended sediment from construction works could also impact the gills of sensitive fish. With the implementation of the measures outline in CEMP the duration of impacts would be short-term and fully reversible. No (Operation) – There will be positive impact during operation for Fish species including Atlantic salmon and lamprey which may benefit from improved water quality and lower organic loading in the estuarine waters. Refer to Chapter 11 (Biodiversity) of this EIAR	No (Construction) – Moderate risk – pile-driving and noise may deter movement if unmitigated. No (Operation) – There is no impact in this water body during operation	Negligible – distance from main works and lack of direct connectivity limits influence.
Consider if your activity could impact on normal fish behaviour like movement, migration or spawning (for example creating a physical barrier, noise, chemical change or a change in depth or flow)?	Yes (Construction and Operation) – Construction noise may cause local avoidance behaviour. Suspended sediment from construction works could also impact the gills of sensitive fish.	Yes (Construction) – underwater noise during the proposed works and temporary lighting may disrupt behaviour. Potential for impacts from noise from proposed works, construction compound etc. No (Operation) – No impact on fish behaviour. This receptor is not sensitive to the Proposed Development. Refer to Chapter 11 (Biodiversity) of this EIAR	No (Construction) - The proposed works will not impact on fish behaviour. It will not increase the volume of the surface runoff. No (Operation) – No impact on fish behaviour.	The proposed works will not impact on fish behaviour, there is no connection/pathway with this water body. Minimal hydrological or acoustic influence expected. No (Operation) - No impact on fish behaviour. This receptor is not sensitive to the Proposed Development.
Consider if your activity could cause entrapment or impingement of fish?	No (Construction and Operation) – No new infrastructure within this waterbody	No (Construction and Operation) - No in-stream works or new infrastructure within this waterbody	No (Construction and Operation) in-stream works	No (Construction and Operation) in-stream works

The risks to the fish are due to noise from construction, potential release of suspended sediment concentrations and contaminated surface water runoff. The project area has limited spawning habitat, so direct impacts on eggs or juveniles are expected to be low, though temporary disruption to fish migration could occur if works overlap with peak passage periods. With timing restrictions to avoid salmonid migration (May–October), these impacts would be short-term, reversible, and negligible in significance.

Also, mitigation measures outline in the CEMP and NIS will be put in place, to reduce any risk of suspended solid release and to protect ground and surface water. Works in proximity to the waterbody shall avoid the peak salmonid migration season (typically October to May) and lamprey spawning (April to June), unless advised otherwise by Inland Fisheries Ireland (IFI).

The freshwater tidal zone functions mainly as a migratory corridor rather than a spawning habitat, and operational upgrades are expected to improve water quality, easing fish passage and reducing physiological stress. Any potential negative effects, such as thermal or flow changes from effluent, are minimal due to low discharge volumes and negligible temperature differences.

5.3 Water Quality

Consideration is also made regarding whether phytoplankton status and harmful algae could be affected by the works, as well as identifying the potential risks of using, releasing or disturbing chemicals. Table 5-4 presents a summary of water quality considerations and associated risk issues of the works for the downstream waterbodies.

TABLE 5-4: WATER QUALITY CONSIDERATIONS AND ASSOCIATED RISK ISSUES OF THE WORKS FOR THE WATERBODY

WFD Assessment Questions	Shannon River Lower	Limerick Dock	Upper Shannon Estuary	Maigue Estuary
Consider if your activity could affect clarity, temperature, salinity, oxygen levels, nutrients or microbial patterns continuously for longer than a spring neap tidal cycle (14 Days)	Potential for negative impact in water quality, pollution from runoff and erosion during site preparation, excavation, piles etc but mitigation is in place (as per CEMP) for spillage prevention. Short-term effects only Construction Compounds adjacent to the water body will be subject to mitigation measures to control surface water runoff, as outlined in the CEMP.	The outfall is located in the Lower River Shannon SAC and River Shannon and River Fergus Estuaries SPA, specifically in a freshwater tidal area called Limerick Docks. Construction Compounds adjacent to the water body will be subject to mitigation measures to control surface water runoff, as outlined in the CEMP	The footprint of the works are not within or on this water body.	The footprint of the works are not within or on this water body.
Consider if your activity is in a water body with a phytoplankton status of moderate poor or bad.	N/A	No – Phytoplankton status or potential is High	No – Phytoplankton status or potential is High The footprint of the works are not within or on this water body.	Not determined. The footprint of the works are not within or on this water body.

WFD Assessment Questions	Shannon River Lower	Limerick Dock	Upper Shannon Estuary	Maigue Estuary
Consider if your activity is in a water body with a history of harmful algae?	Not Determined	Not Determined	Not Determined	Not Determined
If your activity uses or releases chemicals (for example through sediment disturbance or building works) consider if the chemicals are on the environmental Quality Standard Directive (EQSD) List.	Yes (Construction) – During construction there is potential for an accidental release of chemicals which are on the EQSD list (hydrocarbons etc.). However, with the implementation of control and mitigation measures outlined in the CEMP there will be no significant impact. No (Operation) – The Proposed Development will not involve the direct release of EQSD-listed substances to the receiving water bodies during operation. Operational discharges will comprise treated effluent discharged in accordance with the WWDA licence requirements. See EIAR Chapter 16 (Water) for further information.	Yes (Construction) – During construction there is potential for an accidental release of chemicals which are on the EQSD list (hydrocarbons etc.). However, with the implementation of control and mitigation measures outlined in the CEMP there will be no significant impact. No (Operation) – No substances on the EQSD list will be released to the listed water bodies during operation. See EIAR Chapter 16 (Water) for further information.	No (Construction) – During construction, any discharges from construction compounds and works locations will be subject to controls as outlined in the CEMP. No direct impact to this waterbody No (Operation) – There will be no discharges to the this waterbody during operation.	Unlikely – no direct works in this waterbody
If your activity has a mixing zone (like a discharge pipe or outfall) consider if the chemicals released are on the Environmental Quality Standards (EQSD)	Yes (Construction) – Any discharges from construction compounds and works locations will be subject to controls as outlined in the CEMP. Yes (Operation) – Slight negative impact to BOD and DIN. The predicted changes in BOD, DIN and MRP concentrations will be small in magnitude and confined to the immediate mixing zone. The modelled mixing zones are limited in extent relative to the overall receiving estuarine environment, including the Limerick Dock (Shannon River) waterbody and will not result in deterioration of the overall WFD status of the receiving waterbody. There will be an improvement in OrthoP. During operation all effluent	Yes (Construction) – The Proposed Development includes 1 No. outfall to Limerick Dock. During construction there is potential for accidental release of hydrocarbons which are on the EQSD list, however, with the implementation of control and mitigation measures outlined in the CEMP there will be no significant impacts. No (Operation) – During operation the discharges from the outfall will be treated prior to discharge in this	No – During construction, no direct discharge will occur in this waterbody. Refer to EIAR Chapter 16 (Water) for further information. No (Operation) – There will be no discharges to the this waterbody during operation. No further assessment required.	Unlikely – no direct works in this waterbody

WFD Assessment Questions	Shannon River Lower	Limerick Dock	Upper Shannon Estuary	Maigue Estuary
	will be treated in accordance with the WWDA licence requirements prior to discharge, which include controls on ammonia. See EIAR Chapter 16 (Water) for further information.	waterbody. See EIAR Chapter 16 (Water) for further information.		
Consider if ancillary sources of discharge to contribute to water quality status (e.g UWWTP, Storm Water Overflow (SWO), Combined Sewer Overflow (CSO), etc.)	Construction - With the mitigation measures outline in CEMP and NIS, the Proposed Development will not have an impact on water quality status In the operational phase there will be a significant reduction in storm spills (in accordance with rUWWTD). WQ is not measured but it is likely to have a positive effect.	Yes. The study area is known to contain sources of known pressures including UWWTP, SWOs. However, with the proposed works at the WWTP and the additional stormwater storage capacity the quality of the treated effluent will improve.	No (Construction and Operation) – there will be no direct impact in this waterbody	Unlikely – no direct works in this waterbody

The potential operational phase effects on water quality have been assessed using the water quality modelling presented in EIAR Chapter 16 and Appendix 16.3. The modelling assessed BOD, DIN and MRP under existing and future upgrade scenarios, including the combined influence of Limerick WWTP, Castletroy WWTP and Shannon Town WWTP. The modelling outputs are presented as depth-averaged concentration plots, modelled indicative quality plots and mixing zone summary tables.

The classifications presented for BOD, DIN and MRP are modelled indicative quality classifications only. They relate to the specific supporting quality element assessed and its compliance with the relevant EQS or indicative threshold, where applicable, and do not represent the overall WFD status of the waterbody.

For BOD, the existing scenario (A01s) indicates a localised modelled indicative quality extent of approximately 110 m for 'Good' and 70 m for 'Moderate'. Under the future improved treatment scenario (C06s), the corresponding extents are approximately 170 m for 'Good' and 120 m for 'Moderate', equivalent to approximately 0.2% and 0.1% of the overall Shannon Estuary model domain, respectively. The modelled 'Moderate' indicative quality zone for DIN is minimal, reaching a maximum of approximately 80 m near the outfall.

For MRP, the modelling report identifies that existing ambient/background concentrations are already elevated across a large part of the estuary during summer conditions. Therefore, the modelled MRP indicative quality extents should not be interpreted as the spatial extent of impact from the proposed discharge alone. Under the improved treatment scenario, the modelled extent of 'Moderate' indicative quality for MRP reduces from approximately 16 km under the existing scenario to approximately 510 m around the outfall.

Overall, the modelled changes are localised in the context of the receiving waterbody and do not affect the wider waterbody classification. The Proposed Development will not result in deterioration of the overall WFD status of the waterbody and will not prevent the achievement of the WFD environmental objectives.

All of the impacts (which are not significant) on the watercourses and streams are indirect, i.e works are to be conducted on surface water networks which outfall to the streams and watercourses under consideration. A CEMP will also be implemented to mitigate potential impacts in relation to surface water contamination.

5.4 Protected Areas

Table 5-5 presents a summary of protected area considerations and associated risk issues of the works.

TABLE 5-5: PROTECTED AREAS

WFD Assessment Questions	Nature conservation designations	Bathing waters	Nutrient Sensitive Areas	Shellfish waters
Consider if your activity is within 2km of any WFD protected area?	Lower River Shannon SAC No (Construction and Operation) - Potential impacts relate to a degradation in water quality as a result of construction runoff and direct habitat loss within the protected area. As identified for water quality, mitigation measures within the CEMP will mitigate against runoff from the WWTP (which is outside but adjacent to the protected area footprint) entering the protected areas. No direct habitat loss will occur within the SAC or SPA as the outfall pipeline is existing and will not change. River Shannon and River Fergus Estuaries SPA No (Construction and Operation) - Potential impacts relate to a degradation in water quality as a result of construction runoff and direct habitat loss within the protected area. As identified for water quality, mitigation measures within the CEMP will mitigate against runoff from the WWTP (which is outside but adjacent to the protected area footprint) entering the protected areas. No direct habitat loss will occur within the SAC or SPA as the outfall pipeline is existing and will not change.	There are no bathing waters within 2km of the Proposed Development	There are no nutrient sensitive areas within 2km of the Proposed Development	There are no designated shellfish waters within 2km of the Proposed Development

It is not considered that the Proposed Development will pose a risk to protected areas as there are no new outfalls to be installed as part of the Proposed Development. With the mitigation measures outlined in the CEMP and NIS there will be no effects on the conservation objectives of the qualifying interests of the European Sites.

5.5 Invasive Species

Non-native (or alien) invasive species are scheduled to S.I. No. 477/2011 - European Communities (Birds and Natural Habitats) Regulations 2011 (as amended) and Regulation (EU) No 1143/2014 of the European Parliament and of the Council of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species (hereafter referred to as the Invasive Alien Species Regulations).

Consideration should be made regarding whether there is a risk the activity could introduce or spread of Invasive Species (IS). Risks of introducing or spreading invasive species include materials or equipment that have come from, had use in or travelled through other water bodies, as well as activities that help spread existing invasive species, either within the immediate water body or other water bodies. Table 5-6 presents a summary of invasive species considerations and associated risk issues of the works.

TABLE 5-6: INVASIVE SPECIES CONSIDERATIONS

WFD Assessment Questions	Shannon River Lower	Limerick Dock	Upper Shannon Estuary	Maigue Estuary
Introduction or spread of IS	No significant pathway for introduction of invasive species. Existing invasive species (e.g. zebra mussel <i>Dreissena polymorpha</i>) are already established within the wider Shannon catchment. Changes in effluent characteristics are not expected to create conditions that would significantly promote their spread.	Potential pathway during construction through movement of plant, materials or accidental transfer; however, this will be controlled through implementation of biosecurity and CEMP measures. No significant impact predicted.	No significant pathway for introduction or spread of invasive species. Any risk during construction will be managed through standard biosecurity measures.	No pathway for the introduction of non-native invasive species

During construction, there is a potential pathway for the introduction or spread of invasive species via plant, equipment or materials; however, this risk will be effectively managed through the implementation of biosecurity protocols within the Construction Environmental Management Plan (CEMP). Overall, no significant impact on invasive species distribution or WFD status is predicted.

The operational discharge of treated effluent is not expected to create new pathways for the introduction or spread of non-native invasive species. The magnitude and spatial extent of any potential impact are considered negligible and limited to the immediate vicinity of the outfall. While changes in water quality could theoretically influence conditions for opportunistic species, the likelihood of facilitating invasive species establishment or spread (e.g. *Dreissena polymorpha*, already present within the Shannon catchment) is considered low.

Monitoring of outfalls will continue to ensure that effluent characteristics do not promote the establishment or proliferation of such species. The WWTP upgrade is not expected to increase this risk. Therefore, the impact is assessed as long-term, reversible, of low probability, and not significant.

5.6 Groundwater

The Proposed Development will lie within the Limerick City Southwest (IE_SH_G_141) groundwater body. Activities such as deep excavations and piling activities into this groundwater body have the potential to intercept groundwater and affect quantitative dynamics of the groundwater through dewatering and interruption of groundwater flows and levels.

During operation, the permanent presence of piles has the potential to influence groundwater flow and therefore remains a risk. In addition to this piling, dewatering and general construction works may also create pathways for contaminants at the surface to reach the subsurface and affect the chemical status of the groundwater.

TABLE 5-7: GROUNDWATER CONSIDERATIONS

Groundwater ID	Quality Elements	Potential Impacts
Limerick City Southwest (IE_SH_G_141)	Groundwater Chemical	No (Construction) – Accidental spillage may potentially result in the indirect impact should contaminants migrate through the subsoils and underlying groundwater to surface waters. Accidental spillages and leaks are considered unlikely to occur and should they occur are likely to be rare. Any accidental spillage would have a negative short-medium term impact on water quality in the Lower River Shannon. In the event of an accidental spillage, emergency procedures will be put in place, as identified within the CEMP, to mitigate against potential contaminants entering the groundwater body. Reinforced concrete structures will be designed to be water retaining and the use of bunds around any chemicals and oil storage areas will reduce the risk of any leaks or accidental spillages. During construction, piling can create preferential pathways for groundwater movement and pathways for contaminants to migrate if not adequately sealed. Dewatering activities are anticipated during construction. The use of physical cut-off barriers, such as earth retention systems (e.g., sheet piles or secant piles), will assist in reducing groundwater inflows and thereby minimise the volume of groundwater requiring pumping. No (Operation) - There will be no operational discharges to groundwater as part of the Proposed Development, given the proposed containment, bunding, and drainage control measures.
	Groundwater Quantitative	No (Construction) - Dewatering will be required during construction, with cut-off barriers (e.g. sheet or secant piles) used to reduce groundwater inflows and minimise pumping. Abstracted water will be treated on site via settlement ponds or proprietary silt removal systems prior to discharge to the River Shannon or local sewer, subject to relevant discharge licence. With these mitigation measures in place, dewatering is expected to have only a small adverse impact, assessed as moderate/slight in significance. Excavated materials will be stockpiled in stable, drained areas, with contaminated soils removed to licensed facilities. Cement wash water will be contained and prevented from entering soils or watercourses. No (Operation) - There will be no operational discharges to groundwater as part of the Proposed Development, given the proposed containment, bunding, and drainage control measures.

5.7 Assessment Summary

The site-specific impacts of the Proposed Development on the ecological, physico-chemical hydromorphological and groundwater quality elements of the water bodies are shown in the assessment above and summarised in Table 5-8.

TABLE 5-8: ASSESSMENT SUMMARY

Receptor	Potential Risk to Receptor	Note the Risk Issue(s) for Impact Assessment
Hydromorphology	No	It is considered that the Proposed Development will not pose a risk to the surrounding environment with mitigation measures applied
Biology: habitats	No	Provided the mitigation measures referred to in the CEMP, and NIS are fully implemented, the risk of any impact is negligible.
Biology: fish	No	Provided the mitigation measures referred to in the CEMP, and NIS are fully implemented, the risk of any impact is negligible.
Water quality	No	Provided the mitigation measures referred to in the CEMP, and NIS are fully implemented, the risk of any impact is negligible.
Protected areas	No	It is considered that the Proposed Development will not pose a risk to the protected areas with the mitigation measures outlined in the CEMP and NIS
Invasive species	There is no predicted pathway for impacts that would place invasive species habitats in the zone of influence, precautionary mitigation is provided in the NIS	It is considered that the Proposed Development will not pose a risk to the surrounding environment.

6 ASSESSMENT OF THE PROPOSED DEVELOPMENT AGAINST WFD PROGRAMME OF MEASURES (POMS)

There is a list of measures, or environmental improvements, which have been identified by the RBMP (known as the Programme of Measures (PoMs) in the RBMP for Ireland), which need to be implemented in order to improve the ecology of water bodies by a specified date in order for Ireland to meet the target date set by the WFD. Part of the WFD assessment is to consider these PoMs and assess whether the Proposed Development can contribute to them or might obstruct any of them from being delivered.

The Programme of Measures are mostly the responsibility of Governmental Organisations and relate to the setting up of Organisations, Monitoring Bodies, and protocols, who will act as the mechanism to ensure the objectives of the WFD are achieved. Table 6-1 provides the only point from the Programme of Measures which is considered relevant to this scheme, and which is within the scheme's scope to act upon.

TABLE 6-1: MITIGATION MEASURES AND ASSESSMENT OF WHETHER THE PROPOSED DEVELOPMENT WILL HELP TO CONTRIBUTE TO THESE (MANAGEMENT PLAN)

Mitigation Measures	Will the Proposed Development help to achieve or contribute to the mitigation measure?
Minimize the impact of urban waste water discharges on receiving waters	As the surface water run-off flows, ultimately reach Lower River Shannon SAC, it is considered that the Proposed Development will reduce the existing risk to transitional waters. While the risk reduction is relatively small, it is an improvement on the existing condition in the absence of the Proposed Development. The additional 12,500m³ stormwater storage capacity will greatly reduce uncontrolled spills to the Shannon Estuary.

Quality of the treated effluent will improve with the reduced pressure on the existing system and new process stream in place

7 CUMULATIVE ASSESSMENT

The Proposed Development has been assessed for the potential for cumulative impacts with other proposed developments within 20km of the Proposed Development boundary (refer to Chapter 19 (Cumulative Impacts and Environmental Interactions) in Volume 2 of the EIAR.

This concludes that with appropriate mitigation measures applied at project level, adherence to regulatory requirements, and ongoing environmental monitoring, the potential for significant adverse cumulative effects is considered low. The scale and location of the proposed WWTP upgrade, in conjunction with the nature of the receiving environment and distance from other large-scale developments, further reduce the likelihood of synergistic or additive impacts. Ongoing coordination between agencies and project proponents remains critical to ensuring that any residual or unforeseen cumulative impacts are identified and managed in a timely and integrated manner.

8 ASSESSMENT OF THE PROPOSED DEVELOPMENT AGAINST WFD OBJECTIVES

Taking into consideration the anticipated impacts of the Proposed Development on the biological, physico-chemical and hydromorphological quality elements, following the implementation of design and mitigation measures, it is concluded that it will not compromise progress towards achieving GES or cause a deterioration of the overall GEP of any of the water bodies that are in scope (Table 8-1).

TABLE 8-1: COMPLIANCE OF THE PROPOSED DEVELOPMENT WITH THE ENVIRONMENTAL OBJECTIVES OF THE WFD

Environmental Objective	Proposed Development	Compliance with the WFD Directive
No changes affecting high status sites	No waterbodies identified as a high status.	Yes
No changes that will cause failure to meet surface water GES or GEP or result in a deterioration of surface water GED or GEP	After consideration as part of the detailed compliance assessment, the Proposed Development will not cause deterioration in the status of the water bodies during construction following the implementation of mitigation measures; during operation, no significant impacts are predicted.	Yes
No changes which will permanently prevent or compromise the Environmental Objectives being met in other water bodies	The Proposed Development will not cause a permanent exclusion or compromise achieving the WFD objectives in any other bodies of water within the River Basin District.	Yes
No changes that will cause failure to meet good groundwater status or result in a deterioration groundwater status.	The Proposed Development will not cause deterioration in the status of the groundwater bodies following the implementation of mitigation measures.	Yes

The WFD also requires consideration of how a new scheme might impact on other water bodies and other EU legislation. This is covered in Articles 4.8 and 4.9 of the WFD.

Article 4.8 states:

'a Member State shall ensure that the application does not permanently exclude or compromise the achievement of the objectives of this Directive in other bodies of water within the same river basin district and is consistent with the implementation of other Community environmental legislation'.

All water bodies within the study area have been assessed for direct impacts; indirect impacts have also been assessed. In addition, the Proposed Development alone or in combination has been assessed for the potential for cumulative impacts or in-combination effects. It has been concluded that the Proposed Development will not compromise the achievement of the objectives of the WFD for any water body. Therefore, the Proposed Development complies with Article 4.8.

Article 4.9 of the WFD requires that:

'Member States shall ensure that the application of the new provisions guarantees at least the same level of protection as the existing Community legislation'.

The Habitats Directive promotes the maintenance of biodiversity by requiring Member States to take measures to maintain or restore natural habitats and wild species listed on the Annexes to the Directive at a favourable conservation status, introducing robust protection for those habitats and species of European importance. There are European designated sites in the vicinity of the Proposed Development which have been assessed and are presented in the Natura Impact Assessment and Appropriate Assessment Screening Report .

Directive 91/676/EEC of 12 December 1991 concerning the protection of waters against pollution caused by nitrates from agricultural sources, as amended ("the Nitrates Directive") aims to protect water quality by preventing nitrates from agricultural sources polluting ground and surface waters and by promoting the use of good farming practices. The Proposed Development will not influence or moderate agricultural land use or land management.

Directive 2006/7/EC of the European Parliament and of the Council of 15 February 2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC, as amended (rBWD) was adopted in 2006, updating the microbiological and physico-chemical standards set by the original Bathing Water Directive (BWD) (76/160/EEC) and the process used to measure/monitor water quality at identified bathing waters. The rBWD focuses on fewer microbiological indicators, whilst setting higher standards, compared to those of the BWD. Bathing waters under the rBWD are classified as excellent, good, sufficient or poor according to the levels of certain types of bacteria (intestinal enterococci and *Escherichia coli*) in samples obtained during the bathing season (May to September).

The potential impacts of the Proposed Development will not impact any designated bathing waters. It is therefore compliant with the Bathing Water Directive.

9 CONCLUSION

Considering all requirements under the WFD, the Proposed Development is not anticipated to cause any deterioration in the status of affected water bodies, nor will it hinder them from achieving Good Ecological Status (GES) or Good Ecological Potential (GEP). While some cumulative or in-combination effects may arise in conjunction with other projects, the implementation of appropriate project-level mitigation measures, together with strict adherence to relevant regulatory requirements, means that the likelihood of significant adverse cumulative impacts is assessed as low. Furthermore, the Proposed Development is consistent with, and compliant with, all other applicable environmental legislation.

It can be concluded that the Proposed Development complies with all requirements of the WFD.

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