

Uisce Éireann

Report

AA Screening & Natura Impact Statement Report as part of the
Midleton Waste Water Discharge Licence Review
July 2023



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Introduction

This report provides information to enable the EPA, as the competent authority, to conduct an Appropriate Assessment (AA) Screening Determination and Stage 2 AA in respect of the Midleton and Carrigtwohill agglomeration operational discharges, for the purposes of the European Union (Waste Water Discharge) Regulations 2007 to 2020. It considers whether the operational discharges from the amalgamated Midleton and Carrigtwohill agglomerations, alone or in combination with other plans and projects, could adversely affect the integrity of European Site(s) in view of best scientific knowledge and the conservation objectives of the site(s). European Sites are those identified as sites of European Community importance designated as Special Areas of Conservation (SACs) under Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (the "Habitats Directive") or as Special Protection Areas (SPAs) under the Conservation of Wild Birds Directive (79/409/ECC) as codified by Directive 2009/147/EC (the "Birds Directive").

This report takes account of the guidance for AA published by the Environmental Protection Agency's (EPA) '*Note on Appropriate Assessments for the purposes of the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I. No. 684 of 2007)*' (EPA, 2009), the OPR guidance on Appropriate Assessment Screening for Development Management, OPR Practice Note PN01 (OPR, 2021) and the Department of the Environment, Heritage and Local Government's guidelines '*Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities*' (DoEHLG, 2009), together with subsequent case law.

This assessment was completed by Kate Harrington MSc MCIEEM, an Ecologist who has 20 years' experience in undertaking ecological surveys and assessments in Ireland and abroad. Ms Harrington's experience includes the preparation of AA Screening, NIS, Ecological Impact Assessments, biodiversity studies and water quality studies for a range of infrastructure projects. She has extensive experience of reviewing and undertaking ecological assessments for Uisce Éireann (UÉ) projects and activities as well as developing guidance documents and advising consultant engineers and ecologists regarding best practice. She currently works as a freelance ecologist and is pursuing a PhD in woodland ecology.

Legislative Context

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 SACs designated under the Habitats Directive and SPAs designated under the Birds Directive.

Articles 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to affect European sites (Annex 1.1). Article 6(3) establishes the requirement for Appropriate Assessment (AA):

Any plan or project not directly connected with or necessary to the management of the [Natura 2000] 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 [Natura 2000] 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.

Article 7 of the Habitats Directive provides that the provisions of Article 6(3) and 6(4) (among other provisions) are to apply to SPAs designated under the Birds Directive.

Article 6(3) provides for a two-stage process. The first stage involves a screening for AA and the second stage arises where, having screened the application for the development, the competent authority determines that AA is required, in which case it must then carry out that AA. A competent authority does not have jurisdiction to grant development consent unless the AA provisions are correctly applied.

The Habitats and Birds Directives are transposed in Ireland under the European Communities (Birds and Natural Habitats) Regulations 2011, as amended (2011 Regulations). In relation to the assessments to be carried out under the Habitats Directive, the provisions of Regulation 42 of the 2011 Regulations require “a screening for AA of a... project for which an application for consent is received”. Following that screening, if the relevant public authority determines that an AA is required, then a Natura Impact Statement [NIS] must be submitted and “a public authority shall give consent for a... project, only after having determined that the... project shall not adversely affect the integrity of a European site”.

Methodology

Guidance Followed

Both EU and national guidance exists in relation to Member States fulfilling their requirements under the EU Habitats Directive, with particular reference to Article 6(3) and 6(4) of that Directive. The methodology followed in relation to this NIS has had regard to the following guidance:

- Office of the Planning Regulator (OPR). Appropriate Assessment Screening for Development Management. OPR Practice Note PN01. (OPR, 2021)
- Note on Appropriate Assessments for the purposes of the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I. No. 684 of 2007). Environmental Protection Agency, (EPA, 2009).
- Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities. Department of Environment, Heritage and Local Government, (DoEHLG, 2010).
- Circular L8/08 – Water Services Investment and Rural Water Programmes – Protection of Natural Heritage and National Monuments. Department of Environment, Heritage and Local Government, (DoEHLG, 2008).
- Communication from the Commission on the Precautionary Principle. Office for Official Publications of the European Communities, Luxembourg, (EC, 2000).
- Managing Natura 2000 Sites: the provisions of Article 6 of the ‘Habitats’ Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg, (EC, 2018).
- Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC. Office for Official Publications of the European Communities, Brussels (EC, 2001).
- Assessment of plans and projects in relation to Natura 2000 sites - Methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC. European Commission, Brussels (EC, 2021).
- 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. Office for Official Publications of the European Communities, Luxembourg, (EC, 2007).
- Nature and biodiversity cases: Ruling of the European Court of Justice. Office for Official Publications of the European Communities, Luxembourg (EC, 2006).

- Interpretation Manual of European Union Habitats. Version EUR 28. European Commission (EC, 2013).
- Marine Natura Impact Statements in Irish Special Areas of Conservation: A working document, National Parks and Wildlife Service, Dublin (NPWS, 2012).
- EPA Guidance for Uisce Éireann on Requests for Alterations to a Wastewater Discharge Licence or Certificate of Authorisation” (Revised March 2019).

Stages Involved in the Appropriate Assessment Process

Stage 1: Screening / Test of Significance

This process identifies whether the agglomeration operational discharges are directly connected to or necessary for the management of a European Site(s); and identifies whether the Midleton & Carrigtwohill operational discharges are likely to have significant impacts upon a European Site(s) either alone or in combination with other projects or plans.

In essence, upon conducting a Stage 1 Screening, the competent authority is required to determine whether or not it can be excluded, on the basis of objective scientific information, that the project, individually or in combination with other plans or projects, will have a significant effect on a European site.

The output from this stage is a determination for each European Site(s) of not significant, significant, potentially significant, or uncertain effects. The latter three determinations will cause that site to be brought forward to Stage 2.

Stage 2: Appropriate Assessment

This stage considers the impact of the operational discharges on the integrity of a European Site(s), either alone or in combination with other projects or plans, with respect to (1) the site's conservation objectives; and (2) the site's structure and function and its overall integrity. The potential impacts the Midleton & Carrigtwohill operational discharges are examined with respect to the attributes and targets which define the favourable conservation condition of each qualifying interest in the European sites, and the extent, if any, to which meeting those targets could be affected. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts may be carried out at Stage 2.

To assist the competent authority to carry out the Stage 2 AA, the developer must prepare a Natura Impact Statement (NIS). This document must include sufficient information for the EPA to carry out the Appropriate Assessment. If the assessment is negative, *i.e.*, adverse effects on the integrity of a European site cannot be excluded, then the process must consider alternatives (Stage 3) or proceed to Stage 4.

Stage 3: Assessment of Alternatives

This process examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the European Site. This assessment may be carried out concurrently with Stage 2 in order to find the most appropriate solution. If no alternatives exist or

all alternatives would result in negative impacts to the integrity of the European sites, then the process either moves to Stage 4 or the project is abandoned.

Stage 4: Assessment Where Adverse Impacts Remain

An assessment of compensatory measures where, in the light of an assessment of Imperative Reasons of Overriding Public Interest (IROPI), it is deemed that the project or plan should proceed.

Consultation

UÉ issued a request to the EPA on the 27th September 2022, for a Scoping Opinion on the scope and level of detail to be included in an EIAR for the Midleton WWDL (D0056-01) review. In accordance with the requirements of Regulation 17C & 17D of the European Union (Waste Water Discharge) Regulations 2007 to 2020 (WWD Regulations), the EPA consulted with the relevant prescribed bodies under Regulation 21(1) of the above referenced WWD Regulations. Three scoping responses were received from the Health Service Executive (HSE), Inland Fisheries Ireland (IFI) and the Sea Fisheries Protection Authority (SFPA). The other prescribed bodies did not provide a response within the timeframe set out.

The IFI response was the only pertinent response received in terms of Biodiversity:

“The Owennacurra River and greater Cork Harbour are significant angling, spawning and nursery waters. Therefore any quality deterioration in these waters would naturally be a cause for concern. In this context IFI fails to see how a ‘notionally clean river approach’ could be applied when assessing the environmental impact of the Midleton and Carrigtwohill Agglomeration WwTPs.

IFI would ask the EPA to ensure that current actual background data is applied when calculation of the assimilative capacity relative to legislative requirements is carried out as part of the licence review in this case”.

The assessment contained herein has taken full regard of the IFI submission.

Desk Study

The sources of available desktop information used to inform the assessment included:

- The National Parks and Wildlife Service (NPWS) natural heritage database (www.npws.ie) was consulted for designated sites of nature conservation interest in the study area;
- The National Biodiversity Data Centre (NBDC) species database (<http://www.biodiversityireland.ie/>) and BSBI database <https://database.bsbi.org/> were consulted to obtain species records in the study area.
- The Environmental Protection Agency mapping system (<https://gis.epa.ie/EPAMaps/>), and www.catchments.ie website for data related to water quality;
- The Inland Fisheries Ireland (IFI) website and www.wfdfish.ie website for fisheries data;

- Ordnance Survey Ireland mapping and aerial photography from <http://map.geohive.ie/>;
- Geological Survey Ireland (GSI) data and maps <https://www.gsi.ie/en-ie/data-and-maps/Pages/default.aspx> ;
- Information on the conservation status of birds in Ireland from Birds of Conservation Concern in Ireland <https://birdwatchireland.ie/birds-of-conservation-concern-in-ireland/>;
- Atkins (2022) Midleton North Wastewater Pumping Station and Network. Natura Impact Statement. Dated 23/03/2022. Available on Cork Co.Co. Planning System Ref 225032
- Intertek (2023) Water Quality Modelling Report

Field Study

A walkover survey was carried out by the author on January 30th, 2023. The relevant operational discharge locations were visited with the aim of identifying the aquatic habitats in the receiving waters, and determining what qualifying interests occur, or have the potential to occur, within the zone of influence of the discharges. Habitats were classified with reference to The Heritage Council's 'A Guide to Habitats in Ireland' (Fossitt, 2000)¹ and the Annex I interpretation manual². Searches for protected species followed NRA (2009)³ guidance. Salmonid habitat was assessed for adult, juvenile and nursery habitat potential following DANI guidelines⁴, while lamprey habitat potential was assessed following Harvey & Cowx (2003)⁵.

Biological water quality assessment involved kick sampling for macroinvertebrates and subsequent application of the EPA Q-rating scheme (Toner *et al*, 2005⁶). The Q rating scheme involves assigning a water quality rating considering the relative abundance⁷ of pollution tolerant and pollution sensitive species (Groups A to E), along with other biotic and physio-chemical indicators. The river in the vicinity of the discharge and downstream was also visually assessed for any indicators of pollution.

¹ <https://www.npws.ie/sites/default/files/publications/pdf/A%20Guide%20to%20Habitats%20in%20Ireland%20-%20Fossitt.pdf>

² Interpretation Manual of European Union Habitats – EUR28

https://ec.europa.eu/environment/nature/legislation/habitatsdirective/docs/Int_Manual_EU28.pdf

³ NRA (2009) Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes <https://www.tii.ie/technical-services/environment/planning/Ecological-Surveying-Techniques-for-Protected-Flora-and-Fauna-during-the-Planning-of-National-Road-Schemes.pdf>

⁴ <https://www.daera-ni.gov.uk/sites/default/files/publications/dcal/provision-of-salmon-and-trout-habitat-leaflet.pdf>

⁵ Harvey J & Cowx I (2003). Monitoring the River, Brook and Sea Lamprey, *Lampetra fluviatilis*, *L. planeri* and *Petromyzon marinus*. Conserving Natura 2000 Rivers Monitoring Series No. 5, English Nature, Peterborough

⁶ Toner, P., Bowman, K., Clabby, G., Lucey, J., McGarrigle, M, Concannon, C., Clenaghan, C., Cunningham, P., Delaney, J., O'Boyle, S., MaCarthaigh, M., Craig, M., and Quinn, R. (2005). Water Quality in Ireland 2001-2003. Environmental Protection Agency, Wexford.

⁷ Based on the DAFOR scale

Description of the Project

Project Context

Midleton has been identified as a regional growth centre by the Cork County Development Plan 2014 and the East Cork Municipal District Local Area Plan 2017, and a Metropolitan Town in the County Metropolitan Strategic Planning Area in the draft Cork County Development Plan 2022-2028. The Draft County Development Plan 2022-2028 includes as an objective the need to secure investment in essential infrastructure including water services. It states that the delivery of required residential development is, in many cases, dependent on the delivery of new water services infrastructure.

There is significant demand for housing development in Midleton with a number of development sites seeking planning permission, including the Water Rock Urban Expansion Area (UEA). The current organic loading (peak weekly load) is 16,652 p.e. and has a plant design capacity of 15,000 p.e. (Source: 2022 Annual Environmental Report (AER) D0056-01). The plant is therefore currently organically overloaded and does not have the capacity to cater for additional loads from proposed development sites in Midleton. Therefore, wastewater upgrades are required to facilitate future population and economic growth of the area and enable Uisce Éireann to grant connection agreements to future developments.

In order to relieve the capacity of the Midleton WwTP, the Midleton Local Infrastructure Housing Activation Fund (LIHAF) Wastewater Project, which commenced in June 2022 (on the Water Rock pipeline to Carrigtohill) will divert waste water loads from the Midleton agglomeration to the existing Carrigtohill and Environs WwTP (Design p.e. 30,000). The current organic loading (peak weekly load) is 8,654 p.e. (Source: 2022 AER D0044-01) meaning there is significant spare capacity to cater for these proposed diverted loads. This will involve the amalgamation of the Carrigtohill and Environs agglomeration into the Midleton licence (D0056-01). To cater for the above, two new Pumping Stations, at Midleton North and Water Rock are required to be constructed, along with approximately 7km of rising main.

The Midleton North Pumping Station which will be sized for future growth will draw an existing wastewater load (ca. 4,177 p.e) off the existing sewerage network system in Midleton and will divert this load to the Water Rock Pumping Station and onto Carrigtohill WwTP for treatment. This will provide immediate relief at the Midleton WwTP. In the event that flows in the existing sewer exceed the pumping capacity of the Midleton North Pumping Station, surplus flows will return back into the Midleton network, via a bifurcation chamber, and ultimately back to the Midleton WwTP for treatment, as per the current treatment situation. This return of surplus flows to the Midleton WwTP will only occur following a storm event in this area of the catchment. There will be no storage, or Storm Water Overflow (SWO) or Emergency Overflow (EO) at this new Midleton North Pumping Station. It is this return of flows back to the Midleton WwTP which is the key driver for the amalgamation of the two agglomerations.

From the new Water Rock Pumping Station, a new network will be constructed to Carrigtohill to divert future loads from the Urban Expansion Area (UEA) Housing site (ca. 7,000 p.e) in North

Midleton. At this Pumping Station 24-hour emergency storage and a high-level connection to the Northern Relief sewer will be provided. There will be no SWO or EO at this new Pumping Station.

Industrial Emissions

Midleton

The treated wastewater arising from the Midleton agglomeration (discharged at the outfall) is a mix of domestic, commercial, and industrial and varies daily, weekly, and seasonally. Treated effluent from industries IPPC Reg. No. P0442-02 and Reg. No. P1103-01 bypasses the Midleton WwTP and combines with treated effluent from the Midleton WwTP before discharging to the North Channel at NGR 186177E, 69506N. The inclusion of the P1103-01 industrial connection into the UÉ network, is one of the key drivers of the WWDL review. There are 15 no. licensed Trade Effluent activities (*i.e.*, UÉ-DTS-901951-01, WP(S)-13-07, WP(S)-15-03, WP(S)20-05, WP(S)33-07, WP(S)-1_06, WP(S)-15-05, WP(S)-18-07, WP(S)18-08, WP(S)-19-05, WP(S)-24-07, WP(S)-26-07, WP(S)-28-07, WP(S)-30-07, and WP(S)-39-07) discharging to the agglomeration sewers under Section 16 of the Local Government (Water Pollution) Acts 1977 and 1990. The WWDL has regard to the water quality standards and objectives for the receiving water and protected areas (including shellfish).

Carrigtwohill

The waste water from the agglomeration arises from domestic and industrial loads. Sewage from industry is collected *via* the public sewer and is combined with domestic waste water before entering the WwTP. There are 7 no. licensed Trade Effluent Activities (*i.e.*, UÉ DTS-685695-02, UÉ-DTS-710239-02, UÉ-DTS-753690-01, UÉ-DTS-753715-02, UÉ-DTS-844820-01, TE-10087-01, and WP(S)-12-98) discharging to the agglomeration sewers under Section 16 of the Local Government (Water Pollution) Acts 1977 and 1990. There are 2 no. Industrial Emissions (IE) licensed facilities discharging to the Carrigtwohill sewers, (Merck Millipore Limited: P0571-04, and Fournier Laboratories Ireland Ltd: P1046-01). Uisce Éireann, under Section 99E of the EPA Act, as amended, have given consent for these discharges, specifying the ELVs.

Water Quality Modelling

A Water Quality Modelling Assessment was carried out by Intertek (refer to **Attachment D.2.3 Water Quality Modelling Report (July, 2023)**) to examine the dilution and the capacity of the Lough Mahon (Harper's Island) and North Channel Great Island transitional waterbodies to receive the treated discharges from primary discharge from Carrigtwohill WwTP, SW009, and the secondary discharge from Midleton WwTP, SW001, without impacting these waterbodies and protected European sites.

The modelling assessment completed takes into account the amalgamated Midleton and Carrigtwohill agglomeration where the input loads have been modified to represent the diversion of future loads to Carrigtwohill WwTP for treatment. This includes the diversion of *ca.* 4,177 p.e. from the existing sewerage network in Midleton to Carrigtwohill for treatment *via* the newly constructed Midleton North Pumping station which will divert these loads to the Water Rock Pumping Station and onto Carrigtwohill. The modelling also accounts for the future development of the Water Rock Urban Expansion Area (*ca.* 7,000 p.e.) which will relieve the overloading of the

Midleton WwTP by conveying the foul wastewater to the Carrigtwohill WwTP *via* the new Water Rock Pumping Station and the proposed 7km Water Rock pipeline to Carrigtwohill. Therefore, the total p.e. load to be diverted to Carrigtwohill for treatment will be *ca.* 11,177 p.e.

In addition, as defined in **Attachment D.2.3** Water Quality Modelling Report (July 2023), this model has been used to evaluate two scenarios:

- The proposed Future Scenario: Summer & Winter conditions: future average flow (DWF *1.25), ELV (BOD) and assumed winter/summer nutrient concentrations.
- A Future '*Notionally Clean*' River Scenario⁸ that retains the future discharge from the outfall but removes all other asset discharges and inputs a calculated natural contributing concentration for all river discharges under summer and winter conditions to allow comparison of modelled water quality.

The modelling assessment therefore represents the future scenario of the proposed Midleton and Carrigtwohill agglomeration.

Planning Permission

Part 8 planning approval for the Water Rock Pumping Station was obtained by Cork County Council in 2019. Uisce Éireann submitted a Section 5 application to Cork County Council in 2021 for the pipeline from the Water Rock Pumping Station to Carrigtwohill and this was confirmed as Exempted Development. A planning application was made under Section 34 of the Planning and Development Act, 2000, as amended for the Midleton North Pumping Station and Network Project (Ref. Planning Register Number: 225032) in May 2022. In February 2023, a conditional planning grant was obtained by Uisce Éireann from Cork County Council. This was subsequently appealed to An Bord Pleanála (Planning Ref: ABP-316013-23). Timeframes for the construction and commissioning of Midleton North Pumping Station and Network are contingent on the successful grant of planning following an appeal to An Bord Pleanála.

Rathcoursey Holding Tank

The current primary discharge (SW01 MIDL) for the Midleton agglomeration is to the North Channel Great Island (SW-060-0300) at Rathcoursey point *via* a diffuser after passing through Rathcoursey Tidal Holding Tank. The treated wastewater arising from Midleton agglomeration is a mix of domestic, commercial, and industrial (P0442-01 and P1103-01). The discharges to Rathcoursey are pumped from Ballinacurra Pumping Station *via* a 750mm diameter rising main. The discharge to the sea is controlled by a lunar timed valve. The storage capacity of the Rathcoursey Tidal Holding Tank is 2,012.5m³ and the storage volume available in its inlet pipe is 163m³, giving a total storage tank system capacity of 2,175.5m³. This is insufficient to manage the peak hydraulic loadings from the Midleton agglomeration. It should be noted that Uisce Éireann is examining options to provide additional storage capacity to prevent overflows when the Rathcoursey Tidal Holding Tank lunar penstock is closed and limit the discharges to the periods as defined in the Foreshore Licence (FS 004170), which will facilitate any future

⁸ A baseline scenario simulating baseline DIN and MRP dynamics was also prepared and is presented in the report

applications for planning permission to facilitate upgrades to the tank. Any future upgrade works to this tidal holding tank do not form part of this WWDL review application.

Construction Programme

The new Midleton North Pumping Station, which will be sized for future growth, will draw an existing wastewater load (ca. 4,177 p.e.) off the existing sewerage network system in Midleton and will divert this load to the Water Rock Pumping Station. The construction of the Water Rock Pumping Station is scheduled for completion in December 2023. However, it should be noted that the scheme cannot come in to operation until such a time both Pumping Stations (Water Rock and Midleton North) are complete. From the new Water Rock Pumping Station, a new network pipeline will be constructed to transfer the abovementioned wastewater load, and also future loads from the Water Rock Urban Expansion Area (UAE) Housing site (ca. 7,000 p.e.) in North Midleton, to the existing foul sewer network in Carrigtwohill. Construction commenced on this pipeline infrastructure in June 2022. Works are estimated to be completed by December 2023.

It is estimated that the Midleton North Pumping Station and Network Project will entail a 12-month construction programme from the date of commencement to completion. A conditional grant of planning was obtained for this Project in February 2023; however, this was subsequently appealed to An Bord Pleanála therefore timeframes for construction and commissioning are contingent on a successful grant of planning.

Licence Review

Uisce Éireann are submitting a licence review of the existing Waste Water Discharge Licence (WWDL) (Reg No. D0056-01) for the Midleton Agglomeration in accordance with Regulation 14(1)(b) of the European Union Waste Water Discharge (Authorisation) Regulations, 2007- 2020 (as amended) to the Environmental Protection Agency (EPA). The primary driver for this WWDL review is the inclusion of the P1103-01 industrial connection into the UÉ network. This review also includes for the amalgamation of the Carrigtwohill agglomeration into the Midleton licence providing interconnectivity between the functional areas, thereby giving an agglomeration with a total design p.e. of 48,750. This p.e. is a combination of the design p.e. for Carrigtwohill Wastewater Treatment Plant (WwTP), Midleton WwTP and Industrial Emission (IE) discharges downstream of the Midleton WwTP.

The subject matter of this AA Screening and NIS ('the Project') is the current operational discharges from the proposed Midleton and Carrigtwohill amalgamated agglomeration (**Figure 1.0, Figure 2.0, Table 1.0 & Table 2.0**). The Project does not include the construction or relocation of any operational discharges. Therefore, demolition and construction related impacts are not relevant to this process.

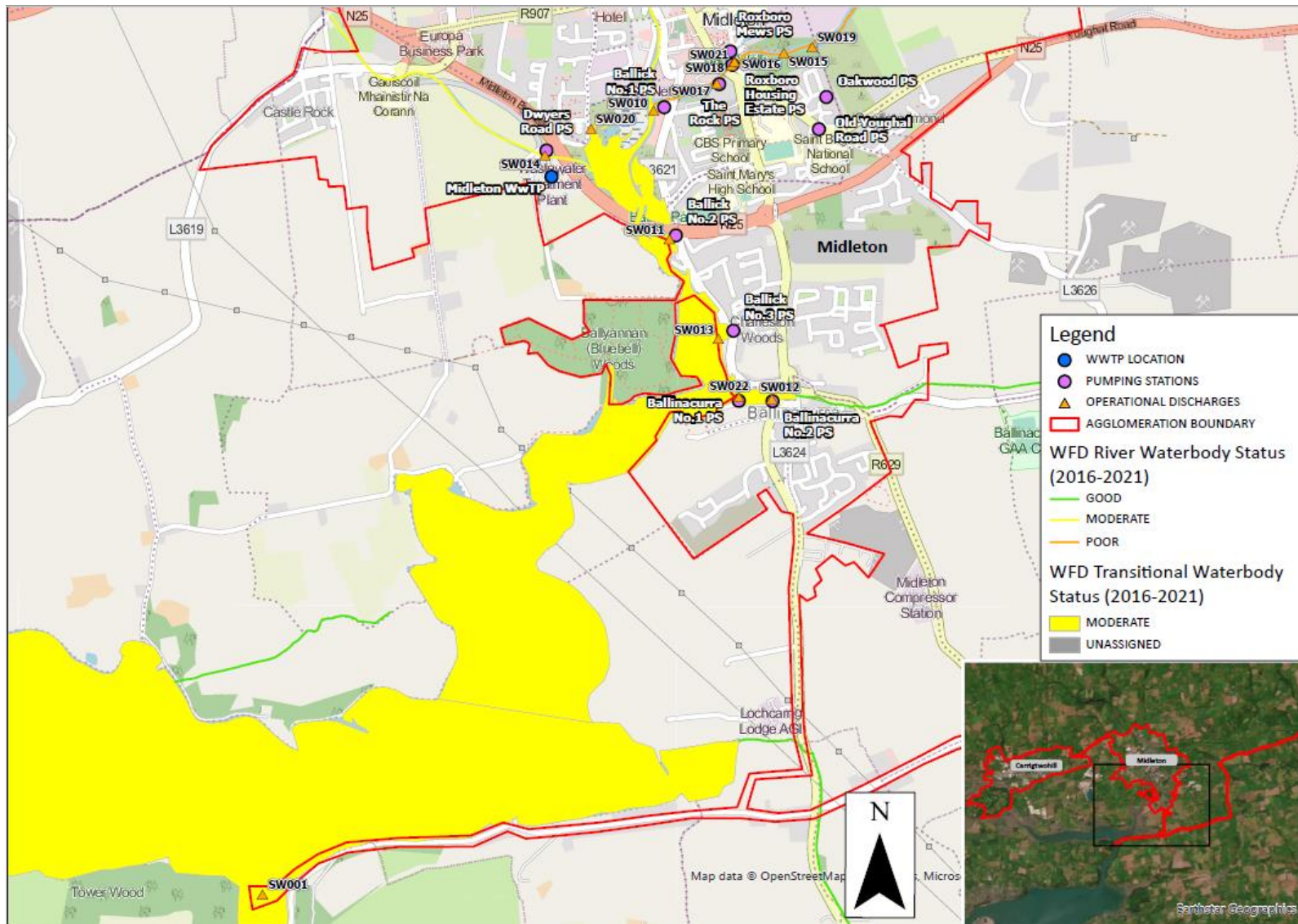


Figure 1.0: Midleton Discharges and Receiving Water Designation

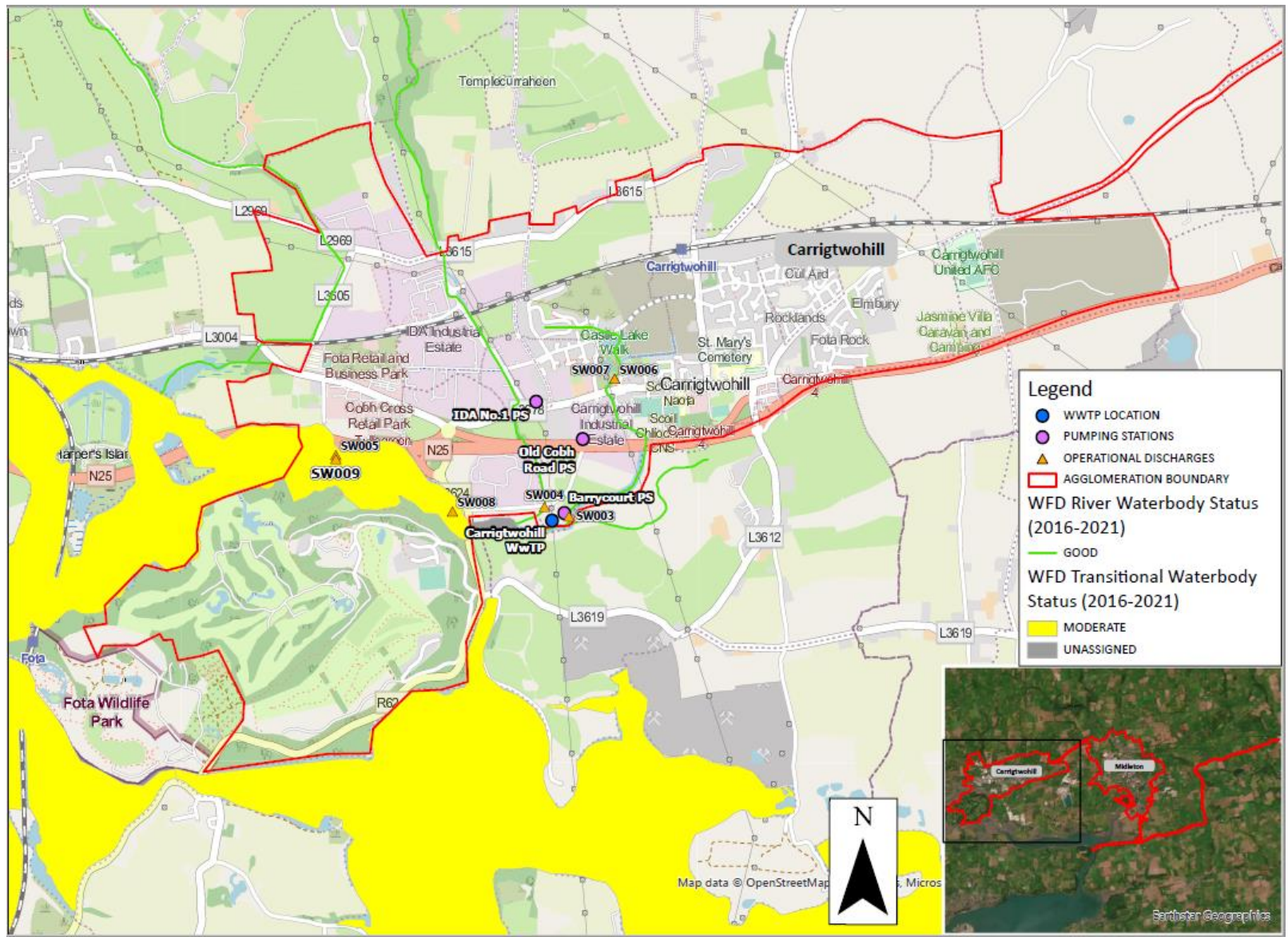


Figure 2.0: Carrigtwohill Discharges and Receiving Water Designation

Table 1.0: Operational Discharges from the Carrigtwohill Functional Area

Current Licence Name	Proposed Name WWDL Review	Type	Asset	Discharge Location (NGR)	Receiving Waterbody	WFD Status (2016-2021)
SW001	SW009	Primary Discharge	Carrigtwohill WwTP	179911 72583	Lough Mahon (Harper's Island)	Moderate
	SW005	SWO	Located at Carrigtwohill WwTP	179911, 72605	Lough Mahon (Harper's Island)	Moderate
SW003	SW003	SWO/EO	Barriscourt Pumping Station	181276, 72256	Tibbotstown_010	Good
SW004	SW004	SWO/EO	IDA Pumping Station No.1	181133, 72310	Tibbotstown_010	Good
	SW006	SWO	Church Lane (Network)	181544, 73040	Tibbotstown_010	Good
	SW007	SWO	Elm Road (Network)	181544, 73040	Tibbotstown_010	Good
	SW008	SWO/EO	Old Cobh Road Pumping Station	180594, 72283	Lough Mahon (Harper's Island)	Moderate

Table 2.0: Operational Discharges from the Midleton Functional Area

Current Licence Name	Proposed Name WWDL Review	Type	Asset	Discharge Location (NGR)	Receiving Waterbody	WFD Status (2016-2021)
SW01MIDL	SW001	Secondary discharge	Midleton WwTP	186177, 69506	North Channel Great Island at Rathcoursey point	Moderate
SW03MIDL	SW010	SWO/EO	Ballick No. 1 Pumping Station	187975, 73109	Owennacurra Estuary	Moderate
SW04MIDL	SW011	SWO/EO	Ballick No. 2 Pumping Station	188047, 72518	Owennacurra Estuary	Moderate
SW05MIDL	SW012	SWO/EO	Ballinacurra No. 2 Pumping Station	188518, 71783	Owennacurra Estuary	Moderate
	SW013	EO	Ballick No. 3 Pumping Station	188272, 72060	Owennacurra Estuary	Moderate
SW07MIDL	SW014	SWO/EO	Dwyers Road Pumping Station	187475, 72902	Owennacurra_040	Moderate
	SW015	EO	Oakwood Pumping Station	188573, 73373	Dungourney_020	Poor
	SW016	SWO/EO	Roxboro Mews Pumping Station	188346, 73332	Dungourney_020	Poor
	SW017	SWO/EO	The Rock Pumping Station	188265, 73232	Dungourney_020	Poor
	SW018	SWO/EO	Roxboro Housing	188332, 73316	Dungourney_020	Poor

Current Licence Name	Proposed Name WWDL Review	Type	Asset	Discharge Location (NGR)	Receiving Waterbody	WFD Status (2016-2021)
			Estate Pumping Station			
	SW019	SWO/EO	Old Youghal Road Pump Station	188703, 73401	Dungourney_020	Poor
	SW020	SWO	Riversfield Estate SWO (Network)	187687, 73025	Owennacurra Estuary	Moderate
	SW021	SWO	Drury's Avenue SWO (Network)	188346, 73332	Dungourney_020	Poor
	SW022	Ballinacurra No. 1 Pumping Station	Ballinacurra No. 1 Pumping Station	188366, 71791	Owennacurra Estuary	Moderate

Carrigtwohill – Proposed Primary Discharge

The Carrigtwohill & Environs WWDL was granted on the 1st of December 2014 and was subsequently amended on the 29th of June 2017 (Technical Amendment A) and on the 2nd December 2021 (Technical Amendment B). The plant at the time of the grant of the licence, provided secondary treatment and was designed for 5,000 p.e. In 2016, the WwTP was upgraded to 30,000 p.e. with the provision of secondary treatment, nutrient removal, and tertiary treatment (Nereda process). Treated effluent from Carrigtwohill WwTP discharges to Lough Mahon at NGR at E179911, N72583 via primary discharge outfall SW001. As part of the WWDL Review, the current primary discharge (SW001) at Carrigtwohill will become the primary discharge for the proposed amalgamated Midleton and Carrigtwohill agglomeration (SW009). All flows arriving to Carrigtwohill WwTP will receive Tertiary Treatment and will have Phosphorus and Nitrogen Removal. The proposed Emission Limit Value (ELV's) for the Carrigtwohill WwTP are shown in **Table 3.0** below.

Table 3.0: Proposed ELV's for Carrigtwohill Primary Discharge (SW009)

Parameter	Emission Limit Value
Biological Oxygen Demand	25 mg/l
Chemical Oxygen Demand	125 mg/l
Suspended Solids	35 mg/l
Total Phosphorus (as P)	1 mg/l
Ortho-P (as P)	0.5 mg/l
DIN	25 mg/l
pH	6 - 9

The European Communities Environmental Objective (Surface Waters) Regulations 2009 (as amended) set a DIN standard depending on the salinity of the coastal water body and do not set EQSs for Ammonia (NH₃) or TON in Coastal or Transitional waters. While it is acknowledged the receiving waters are Transitional, if the Agency require ELVs for Nitrogen, it is proposed that DIN is the stipulated ELV instead of TON and NH₃.

Midleton – Proposed Secondary Discharge at Rathcoursey

The Midleton WWDL was granted on the 6th of January 2011 and was subsequently amended on the 19th December 2016 (Technical Amendment A), 20nd October 2020 (Technical Amendment B) and on the 2nd December 2021 (Technical Amendment C). Treated effluent from the Midleton WwTP along with Industrial discharges ((P0442-01 and P1103-01) currently discharges to the North Channel Great Island at NGR 186177N, 69506E via primary discharge outfall SW001 at Rathcoursey. The proposed amalgamation of Midleton and Carrigtwohill & Environs, will divert loads (ca. 11,177 p.e.) from the Midleton agglomeration to the existing Carrigtwohill and Environs WwTP (Design p.e. 30,000). The current organic loading of the Carrigtwohill and Environs WwTP is 8,654 p.e. (Source: 2022 AER) meaning there is significant spare hydraulic capacity to cater for these diverted loads. The current primary discharge outfall via SW001 at Midleton will thereby become the secondary discharge point for the amalgamated agglomeration as part of the proposed WWDL review with its name remaining as SW001. The proposed Emission Limit Value (ELV's) for Midleton final discharge (SW001) are shown in **Table 4.0** below.

Table 4.0: Proposed ELV's for Midleton Combined Discharge Point (SW001)

Parameter	Emission Limit Value
Biological Oxygen Demand	25 mg/l
Chemical Oxygen Demand	125 mg/l
Suspended Solids	35 mg/l
Total Nitrogen (as N)	15 mg/l
Ortho-P (as P)	2 mg/l
Faecal Coliforms	Geometric mean of < 250 fc/100mls of sample and 95%ile ≤1000fc/100mls.
pH	6 - 9

As the proposed secondary discharge is a combined outfall and discharges treated effluent from Midleton WwTP, Industries P0442-02 and P1103-01, the ELVs in **Table 5.0** will continue to apply directly at the Midleton WwTP (SW100) in order to comply with the Urban Waste Water Treatment Directive requirements. There are no proposed changes to the ELVs that apply directly at the WwTP.

Table 5.0: Proposed UWWTD ELVs for Midleton WwTP (SW100)

Parameter	Emission Limit Value at WwTP
Biological Oxygen Demand	25 mg/l
Chemical Oxygen Demand	125 mg/l
Suspended Solids	35 mg/l
Total Nitrogen (as N)	15 mg/l

SWO's and EO's

The operational discharges relating to the proposed amalgamated agglomeration are shown in **Table 1.0** and **Table 2.0**. These include for previously licenced overflows and the unlicenced overflows in each functional area. This includes for SWOs, EOs, and Dual Function Overflows *i.e.*, an overflow which can act as a SWO or as an EO depending on the event. There are 26 Pumping Stations associated with the agglomeration, 11 of which do not have overflows. At the Pumping Stations with no overflows, wastewater flow is collected from areas within the agglomeration or passed forward further into the network.

There will be 19 no. of overflows associated with the amalgamated agglomeration, 6 no. overflows associated with the Carrigtwohill Functional area, and 13 no. associated with the Midleton Functional area.

These can be categorised as follows:

- 11 no. overflows will act as Dual Function Overflows (*i.e.*, SW003, SW004, SW008, SW010, SW011, SW012, SW014, SW016, SW017, SW018, and SW019).
- 5 no. overflows will act as SWOs. 1 no. from the Carrigtwohill WwTP (SW005) and 4 no. associated with the agglomeration network (SW006, SW007, SW020, and SW021).
- 3 no. will act as EOs, SW013 from Bailick No. 3 Pumping Station, SW015 from the Oakwood Pump Station, and SW022 from the Ballinacurra No.1 Pumping Station.

The Midleton overflows SW010, SW011 and SW020 to the Owennacurra Estuary are currently not meeting the criteria as set out in the DoEHLG 'Procedures and Criteria in Relation to Storm Water Overflows', 1995.

All other SWO's have been designed and will operate in compliance with the definition of 'Storm Water Overflow' as per Regulation 3 of the Waste Water Discharge (Authorisation) Regulations, 2007 to 2020 and the criteria as set out in the DoEHLG 'Procedures and Criteria in Relation to Storm Water Overflows', 1995.

Effluent Data

Effluent data from 2022-2023 is presented in **Table 6.0** and **Table 7.0** together with the **current WWDL ELVs** as per D0056-01 Midleton and D0044-01 Carrigtwohill.

Effluent monitoring data for Midleton (**Table 6.0**) indicates that the final discharge (SW001) is compliant with the relevant standards in the Urban Wastewater Treatment Regulations 2001 (S.I. No. 254/2001) as amended, and the current ELVs, for all parameters in 2022. The 2021 AER was also reviewed, which states that the WwTP was compliant with its ELV's.

Effluent monitoring data for Carrigtwohill (**Table 7.0**) show that the discharge is compliant relevant standards in the Urban Wastewater Treatment Regulations 2001 (S.I. No. 254/2001) as amended. For 2022, it is noted that the WwTP was originally reported as non-compliant with WWDL ELVs for parameters Orthophosphate, Ammonia and Ortho-P, however this was due to a discrepancy in the results and subsequent accredited results show that the Carrigtwohill discharge was compliant with WWDL ELVs for 2022. Carrigtwohill WwTP is compliant with WWDL ELVs for 2023 YTD.

Table 6.0: Effluent Monitoring Data at Midleton Primary Discharge 2022-2023

Sample Date	Ammonia-Total mg/l N	BOD	COD	ortho-Phosphate mg/l P	pH	Suspended Solids mg/l	Total Nitrogen mg/l	Total Oxidised Nitrogen mg/l N
Current ELV	-	25	125	2	6-9	35	15	-
02/02/22	0.1	1.4	29	0.19	8.1	1.767	7	4.94
16/02/22	0.1	1.6	14.84	0.33	8.1	1.767	6.2	4.13
02/03/22	0.1	1.8	22	0.37	8.1	1.767	6.4	4.26
09/03/22	0.2	2.1	30	0.39	8	3	6.1	4.01
23/03/22	0.0707	2.1	14.84	0.44	8.1	1.767	5.8	5.06
06/04/22	1.1	3.3	24	1.27	8	8	7.3	4.07
21/04/22	0.2	2.4	29	0.17	7.7	5	5.7	3.27
05/05/22	0.2	1.8	22	0.4	8.1	1.767	6.5	3.54
18/05/22	0.8	1.6	50	0.68	7.8	3	6.76	1.77
01/06/22	0.2	1.6	14.84	0.22	8.2	1.767	7.59	7.05
15/06/22	0.4	2.1	29	0.9	7.8	4	8.11	4.89
29/06/22	3.9	11	55	1.75	7.5	57	7.57	0.68
13/07/22	1.1	1.3	34	0.29	7.7	1.767	10.06	3.49
27/07/22	0.2	2.4	25	0.61	7.9	3	8.73	2.86
10/08/22	0.0707	1.2	14.84	0.87	8.2	1.767	8.54	4.48
24/08/22	0.1	2.1	14.84	0.48	8.3	3	7.04	1.87
07/09/22	0.4	4.2	14.84	0.18	7.6	18	5.67	5.11
21/09/22	0.6	1.3	14.84	0.25	8	1.767	7.33	1.83
05/10/22	0.2		21	0.18	8.1	1.767	7.26	7.68
20/10/22	0.267	1.3	14.84	0.14	8.1	1.767	6.41	6.51
02/11/22	0.053	1.8	14.84	0.148	7.9	4	5.89	5.63
16/11/22	0.218	2	14.84	0.158	7.9	1.767	5.85	5.91
23/11/22	0.129	2.2	14.84	0.096	7.7	1.767	5.35	5.4
30/11/22	0.38	1.8	14.84	0.376	8	1.767	6.2	5.67
14/12/22	0.262	2.2	14.84	0.383	8	1.767	6.93	6.65
11/01/23	0.041	1.9	14.84	0.2	8.2	1.767	5.65	5.15
25/01/23	0.35	1.3	14.84	0.215	7.8	1.767	5.49	5.72

Table 7.0: Effluent Monitoring Data at Carrigtwohill Primary Discharge 2022-2023

Sample Date	Ammonia mg/l N	BOD mg/l	COD mg/l	ortho-Phosphate mg/l P	pH	Suspended Solids mg/l	Total Nitrogen mg/l	Total Oxidised Nitrogen mg/l N	Total Phosphorus mg/l P
Current ELV	5	25	125	0.5	6-9	35	-	20	1
16/02/22	3.8	4.7	50	0.29	7.4	1.76	12.3	6.63	0.44
02/03/22	1	2.3	65	0.08	7.5	1.76	3.7	1.14	0.13
06/04/22	3	6.6	50	0.12	7.6	7	6.5		0.25
18/05/22	2.97	11	58	0.38	6.65	16	10.6	3.08	0.52
09/06/22	1.1	1.6	55	0.21	7.1	3	4.31	0.96	0.37
06/07/22	3.1	1.9	22	0.2	7.3	7	5.94	2.27	0.39
04/08/22	0.5	1.8	14.85	0.43	7.4	1.76	2.17	0.95	0.49
21/09/22	2.4	2.2	47	0.23	7.3	1.76	7.68	4.04	0.37
05/10/22	1	1	40	0.34	7.6	1.76	7.26	5.53	0.5
09/11/22	3.06	3.9	54	0.26	7.3	3	6.14	2	0.41
08/12/22	0.075	2.3	14.85	0.093	7.5	9	4.94	4.33	0.18
8/01/23	3.89	3.8	47	0.063	7.7	7	7.12	3.03	0.17

Description of the Receiving Environment and Monitoring Results

Water Quality

The agglomeration discharges to local waterbodies are presented below (**Table 1.0** and **Table 2.0**). These include the primary discharge from Carrigtwohill WwTP (SW009), a secondary discharge from Midleton WwTP (SW001), and a total of 19 overflows comprising SWOs, EOs, or Dual Function Overflow (SWO and EO) Overflows from both Pumping Stations and from the network. They enter Cork harbour, directly or indirectly *via* the local stream network. The receiving waterbodies for the Carrigtwohill agglomeration include Lough Mahon (Harpers Island) which is assigned as Moderate Status (2016-2021) and Tibbotstown_010 is assigned as Good Status. With regard to the receiving waterbodies for the Midleton agglomeration, the Owennacurra Estuary, Owennacurra_040, and North Channel Great Island are all assigned Moderate status, while the Dungourney_020 is assigned Poor status. The status of each waterbody is also shown in **Table 1.0** and **Table 2.0**.

Urban Waste Water Stormwater Overflows and Urban Run-off are significant pressures on the Owennacurra Estuary, while Agriculture and Industry are significant pressures on the Dungourney_020, and urban run-off is a significant pressure on the Owennacurra_040. There are no significant pressures identified on the Tibbotstown_010, while Urban Run-off and Urban Waste Water are significant pressures on Lough Mahon (Harpers Island). Agriculture is a significant pressure on North Channel Great Island (**refer to 3rd Cycle Draft Lee, Cork Harbour and Youghal Bay Catchment Report (HA 19) for further details**).

Moderate status in the Owennacurra Estuary and Great Channel North Island is driven by Moderate phytoplankton status or potential together with Moderate supporting conditions. Poor status in the Dungourney_020 and is driven by Poor invertebrate status or potential, with nitrogen conditions Moderate but other conditions passing/High. Moderate status in the Owenacurra_040 is driven by Moderate invertebrate status or potential with nitrogen conditions Moderate but other conditions passing/High.

The EPA monitor biological water quality on the Dungourney at Station RS19D070500 (Br at Ballynascarty) which is *ca.* 5.7km upstream of where SW019 enters the river. This station was assigned a Q4-5 rating in 2020 indicating High status water quality conditions.

Station RS19D070700 (Br in Midleton), which was assigned a Q3 value in 2020, is *ca.* 460m downstream of SW019, with several other discharges (SW015, SW016, SW018, and SW021) entering the intervening stretch of the river.

As it was unclear whether the deterioration in water quality from High to Poor between these stations on the Dungourney may be due to the discharges or other factors, a kick-sample was taken immediately upstream of SW019, which is the first of the Midleton overflow outfalls to enter

the river. The sample contained abundant caseless caddis *Hydropsyche* spp., and frequent Simuliidae fly larvae, *Baetis* spp. mayfly and the freshwater shrimp *Gammarus duebeni*. The snail *Potamopyrgus antipodarum* and the cased caddis Sericostomatidae were occasional, while rare species included Tubifidae fly larvae, the mayfly *Seratella ignita*, the mayfly *Rhithrogena semicolorata*, and the caseless caddis *Rhyacophila* spp. On the basis of the macroinvertebrate assemblage and physical conditions, this site would warrant a Q3-4 rating indicating Moderate water quality conditions.

About 350m downstream of Midleton Bridge, the Dungourney enters the Owennacurra river, just upstream of where it becomes the Owennacurra Estuary. Station RS19O030500 (Cork Br, Midleton) lies ca. 540m upstream of the confluence between the Dungourney, and the Owennacurra Rivers and was assigned a Q3-4 rating in 2020, indicating Moderate water quality conditions.

There is no biological water quality monitoring undertaken in the Tibbotstown or Anngrove streams in Carrigtwohill, or on the Oatencake stream adjacent to the WwTP in Midleton.

Water chemistry is monitored by Cork Co. Co./EPA at the stations referenced above as well as at a number of transitional waters monitoring station in the Owennacurra Estuary and the North Channel. There was no available data for the monitoring station east of Harpers Island which is the closest to the Carrigtwohill primary discharge point in the Slatty Water channel. There is no available data for the Tibbotstown or Anngrove streams (Tibbotstown_010 waterbody) in Carrigtwohill, or for the Oatencake stream in Midleton (Owennacurra_040 waterbody). The most recent 24 months of data for key parameters are shown below in **Table 8.0 - 11.0**. Monitoring locations are shown on **Figure 3.0 & 4.0**.

Results were compared with the Environmental Quality Standards (EQS) specified in the Surface Waters Regulations 2009 (as amended). The current WFD target objective for the relevant waterbodies is to achieve Good status where the receiving waters are currently assigned as Poor or Moderate. Generally, at least Good status water conditions are met upstream and downstream of the discharges with occasional exceedances.

Table 8.0: North Channel Monitoring Data 2021-2022

Sample Date ¹		Ammonia-Total mg/l N	BOD mg/l	DO % Sat	ortho-Phosphate (as P) mg/l P	pH	Salinity psu	Total Oxidised Nitrogen	Chlorophyll
EQS			≤3.0 (high) ≤4.0 (good) ²	80-120 (high)	See below ³				
LE450 - North Channel, Bagwells Hill									
29/06/21	B	0.022	NR	102	0.0025	8.2	33.8	0.035	NR
29/06/21	S	0.02	NR	103	0.0025	8.2	33.7	0.043	3.9
24/08/21	B	0.03	NR	112	0.0054	8.1	32.2	0.031	NR
24/08/21	S	0.054	NR	116	0.0025	8.1	31.9	0.03	8.7
03/11/21	B	0.13	NR	82	0.03	7.9	29.4	0.43	NR
03/11/21	S	0.089	NR	82	0.018	7.9	28.8	0.26	0.25
01/03/22	B	0.062	NR	98	0.018	8	29.2	0.6	NR
01/03/22	S	0.065	NR	96	0.016	8	29.2	0.59	0.73
18/05/22	B	0.045	NR	104	0.0025	8.1	31.1	0.043	NR
18/05/22	S	0.045	NR	108	0.014	8.2	31	0.056	9.9
05/07/22	C	0.026	NR	117	0.0025	8.1	31.3	0.014	5.8
16/08/22	B	0.057	NR	103	0.015	8	33.6	0.015	NR
16/08/22	S	0.045	NR	102	0.021	8	33	0.026	2.4
Median					0.014		33.1		
High/Good EQS³					0.026				
Good/moderate EQS³					0.042				
WFD Indicative quality					High				
LE540 - Ballynacorra Est, Rathcoursey									
29/06/21	B	0.031	NR	104	0.0025	8.2	33.7	0.068	NR
29/06/21	S	0.029	NR	103	0.0025	8.2	33.7	0.066	2.8
24/08/21	B	0.024	NR	121	0.0025	8.2	32.2	0.012	NR
24/08/21	S	0.034	NR	130	0.0025	8.2	32.2	0.015	3.8
03/11/21	B	0.082	NR	85	0.022	7.9	28.7	0.42	NR
03/11/21	S	0.058	NR	83	0.02	7.9	28.7	0.3	0.34
01/03/22	B	0.077	NR	96	0.036	8	27.6	0.72	NR
01/03/22	S	0.068	NR	95	0.022	8	27.6	0.64	1.1
18/05/22	B	0.05	NR	105	0.0025	8.2	31.1	0.028	NR
18/05/22	S	0.03	NR	107	0.0025	8.2	30.9	0.042	8.2
05/07/22	C	0.034	NR	119	0.0025	8	31.4	0.014	7.7
16/08/22	B	NR	NR	104	0.017	8	33.5	0.025	NR
16/08/22	S	0.052	NR	102	0.013	8	33	0.013	1.7
Median					0.0025		31.4		

Sample Date ¹	Ammonia-Total mg/l N	BOD mg/l	DO % Sat	ortho-Phosphate (as P) mg/l P	pH	Salinity psu	Total Oxidised Nitrogen	Chlorophyll	
EQS		≤3.0 (high) ≤4.0 (good) ²	80-120 (high)	See below ³					
High/Good EQS ³				0.026					
Good/moderate EQS ³				0.044					
WFD Indicative quality				High					
LE550 - East Ferry Quay, Rathcoursey West									
29/06/21	B	0.028	0.5	103	0.0025	8.2	33.8	0.057	3.3
29/06/21	S	0.033	0.5	104	0.0025	8.2	33.7	0.054	3.2
24/08/21	B	0.049	1.6	118	0.0052	8.2	31.9	0.043	5.3
24/08/21	S	0.074	1.8	118	0.0071	8.2	31.8	0.079	13
03/11/21	B	0.087	0.5	83	0.021	7.9	29.1	0.39	0.3
03/11/21	S	0.05	0.5	83	0.019	7.9	29.1	0.22	0.14
01/03/22	B	0.054	0.5	99	0.057	8	30.2	0.5	0.71
01/03/22	S	0.064	0.5	96	0.025	8	29.6	0.52	0.37
18/05/22	B	0.067	1.1	104	0.0025	8.1	31.2	0.047	8
18/05/22	S	0.054	1	104	0.0025	8.1	31.2	0.041	6.6
05/07/22	B	0.024	0.5	111	0.0025	8	31.2	0.014	4.4
05/07/22	S	0.027	1.2	111	0.0025	8	31.5	0.018	9.7
16/08/22	B	0.055	0.5	104	0.017	8	33.1	0.027	1.8
16/08/22	S	0.064	1.5	104	0.022	8	33	0.034	3.5
Median					0.00615		31.35		
High/Good EQS ³					0.026				
Good/moderate EQS ³					0.044				
WFD Indicative quality					High				

NR = No Result

Note 1: Sample type. S= surface sample. B= bottom sample. C= composite sample, equal volume surface and bottom.

Note 2: 95%ile value for transitional waters.

Note 3: Boundary based on measured salinity (linearly interpolated). Ortho-P compared to EQS limit value for Molybdate Reactive Phosphorus (MRP) for transitional water body. Orthophosphate measured on unfiltered samples may give a slightly higher reading than MRP.

Table 9.0: Dungourney River RS19D070700 Monitoring Data 2021-2022

Sample Date	Ammonia-Total (as N)	BOD - 5 days (Total)	Dissolved Oxygen	ortho-Phosphate (as P) - unspecified	pH	Total Oxidised Nitrogen (as N)
EQS	95%ile: ≤0.14 (good) ≤0.090 (high) Mean: ≤0.065 (good) ≤0.040 (high)	95%ile: ≤2.6 (good) ≤2.2 (high)	95%ile: 80-120%	95%ile: ≤0.075 (good) ≤0.045 (high) Mean: ≤0.035 (good) ≤0.025 (high)	4.5 < pH < 9.0	
03/02/2021	0.025	0.5	93	0.025	7.7	4.4
08/04/2021	0.01	0.5	101	0.005	7.9	5.4
19/08/2021	0.029	1.4	100	0.028	8.1	4.6
06/10/2021	0.01	1	95	0.027	8.2	4
09/12/2021	0.01	0.5	100	0.03	7.6	4.4
02/02/2022	0.01	1.1	100	0.022	8.3	5.5
06/04/2022	0.01	0.5	103	0.016	7.8	5.1
17/08/2022	0.01	1.3	94	0.018	7.8	3.7
06/10/2022	0.01	0.5	100	0.047	7.7	3.6
08/12/2022	0.02	0.5	91	0.023	7.5	5.1

Table 10.0: Owennacurra River RS19O030500 Monitoring Data 2021-2022

Sample Date	Ammonia-Total (as N)	BOD - 5 days (Total)	Dissolved Oxygen	ortho-Phosphate (as P) - unspecified	pH	Total Oxidised Nitrogen (as N)
EQS	95%ile: ≤0.14 (good) ≤0.090 (high) Mean: ≤0.065 (good) ≤0.040 (high)	95%ile: ≤2.6 (good) ≤2.2 (high)	95%ile: 80-120%	95%ile: ≤0.075 (good) ≤0.045 (high) Mean: ≤0.035 (good) ≤0.025 (high)	4.5 < pH < 9.0	
03/02/2021	0.01	1	99	0.024	7.5	4.7
08/04/2021	0.01	0.5	106	0.01	7.9	4.4
19/08/2021	0.01	1.3	106	0.025	8.1	4.1
06/10/2021	0.01	0.5	94	0.028	8	4
09/12/2021	0.01	1	101	0.031	7.5	4.1
02/02/2022	0.01	1	104	0.026	8.1	4.9
06/04/2022	0.01	0.5	107	0.012	8.2	4.5
17/08/2022	0.01	1.2	95	0.017	7.8	3.7
06/10/2022	0.01	0.5	109	0.027	8	3.8
08/12/2022	0.01	0.5	102	0.021	7.4	4.9

Table 11.0: Owennacurra Estuary Monitoring Data 2021-2022

Sample Date ¹	Ammonia-Total mg/l N	BOD mg/l	Chlorophyll a	DO % Sat	ortho-Phosphate mg/l P	pH	Salinity psu	Total Oxidised Nitrogen mg/l N	
EQS		≤3.0 (high) ≤4.0 (good) ₂		80-120 (high)	See below ³				
LE500- Owennacurra River 0.5km d/s Cork Bridge									
20/05/21	S	0.22	8.6	12	90	0.13	7.4	0.1	1.9
29/06/21	S	0.02	0.5	0.61	102	0.034	8.1	0.1	4.4
24/08/21	S	0.027	1.8	2.5	103	0.038	8.1	0.1	3.8
03/11/21	S	0.01	0.5	0.23	99	0.48	7.6	0.1	4.5
01/03/22	S	0.005	0.5	0.82	94	0.019	7.7	0.1	4.5
18/05/22	S	0.019	0.5	10	119	0.0086	8.7	0.1	4
05/07/22	S	0.028	0.5	2.6	106	0.042	8	0.1	3.8
16/08/22	S	NR	1.3	2.6	91	0.032	7.7	0.3	3.5
Median						0.036		0.1	
High/Good EQS ³						0.035			
Good/moderate EQS ³						0.075			
WFD Indicative quality						Good			
LE505- Dungourney River Br Middleton (Main Street)									
20/05/21	S	0.34	8	12	83	0.2	7.4	0.1	1.8
29/06/21	S	0.012	0.5	0.72	110	0.014	8	0.4	5.1
24/08/21	S	0.042	1	0.33	104	0.041	8	0.2	4.1
03/11/21	S	0.015	0.5	0.71	92	0.078	7.6	0.1	4.4
1/03/22	S	0.005	0.5	0.71	101	0.013	7.7	0.1	4.6
18/05/22	S	0.018	0.5	6	123	0.011	8.7	0.1	4.1
05/07/22	S	0.02	0.5	1.6	108	0.029	8	0.1	3.8
16/08/22	S	0.058	0.5	2.1	90	0.036	7.5	3.1	3.2
Median						0.0325		0.1	
High/Good EQS ³						0.035			
Good/moderate EQS ³						0.075			
WFD Indicative quality						High			
LE510 - Owennacurra Est, New Road Br Middleton									
29/06/21	B	0.048	3.1	17	104	0.012	8.1	32	0.36
29/06/21	S	0.033	1.3	3.9	104	0.011	8	25.3	2.3
24/08/21	B	0.11	1.6	6.7	92	0.033	7.9	17.5	1.9
24/08/21	S	0.092	1.5	8.3	90	0.058	7.9	16.4	1.9
03/11/21	B	0.11	0.5	0.5	91	0.021	7.9	24.7	0.48

Sample Date ¹	Ammonia-Total mg/l N	BOD mg/l	Chlorophyll a	DO % Sat	ortho-Phosphate mg/l P	pH	Salinity psu	Total Oxidised Nitrogen mg/l N
EQS		≤3.0 (high) ≤4.0 (good) ₂		80-120 (high)	See below ³			
03/11/21 S	0.1	0.5	0.42	86	0.028	7.8	11.8	0.51
01/03/22 S	0.005	0.5	1.3		0.017	7.8	0.2	4.6
18/05/22 S	0.029	0.5	3.7	124	0.012	8.4	1.8	4.1
05/07/22 S	0.14	2.2	1.4	103	0.011	7.9	19.8	0.98
16/08/22 S	0.087	1.6	8.7	95	0.028	7.9	28.6	0.53
16/08/22 S	0.12	1.2	2.4	83	0.05	7.5	5.2	3
Median					0.021		17.5	
High/Good EQS ³					0.030			
Good/moderate EQS ³					0.057			
WFD Indicative quality					High			
LE520 - Ballynacorra Est, Ballynacorra								
29/06/21 B	0.034	1.6	NR	105	0.0073	8.1	32.8	0.63
29/06/21 S	0.04	1.5	1.9	101	0.011	8	22.3	1.8
24/08/21 B	0.07	1.3	NR	101	0.037	7.9	21.9	1.7
24/08/21 S	0.081	1.6	6.8	94	0.026	7.9	18	1.6
03/11/21 B	0.11	0.5	NR	86	0.023	7.9	27.6	0.92
03/11/21 S	0.073	0.5	0.48	86	0.031	7.7	3.7	0.26
01/03/22 B	0.067	1	NR	96	0.016	8	20.2	1.2
01/03/22 S	0.044	0.5	1.6	96	0.027	7.8	4.6	3.8
18/05/22 B	0.061	1.4	8.1	101	0.0061	8.1	29.1	NR
18/05/22 S	0.059	1.6	6.9	98	0.011	8.1	27	0.87
05/07/22 B	0.049	NR	NR	124	0.007	8.1	30.3	0.043
05/07/22 S	0.052	14	NR	139	0.0098	8.2	16.4	0.92
16/08/20 22 S	0.076	1.5	6.6	99	0.027	7.9	13.1	0.46
Median					0.016		21.9	
High/Good EQS ³					0.029			
Good/moderate EQS ³					0.053			
WFD Indicative quality					High			
LE530 - Ballynacorra Est, Ballyannan (Pylons)								
29/06/21 B	0.032	1.5	NR	110	0.0051	8.2	33.4	0.091
29/06/21 S	0.031	1.3	3.5	109	0.01	8.2	29.8	0.1
24/08/21 B	0.13	2.6	NR	103	0.034	8	26.2	0.81
24/08/21 S	0.066	1.2	2.8	102	0.03	8	21.8	1.3

Sample Date ¹	Ammonia-Total mg/l N	BOD mg/l	Chlorophyll a	DO % Sat	ortho-Phosphate mg/l P	pH	Salinity psu	Total Oxidised Nitrogen mg/l N
EQS		≤3.0 (high) ≤4.0 (good) ₂		80-120 (high)	See below ³			
03/11/21 B	0.094	0.5	NR	85	0.022	7.9	29.1	0.45
03/11/21 S	0.083	0.5	0.5	84	0.022	7.9	24.3	0.76
01/03/22 B	0.075	0.5	NR	96	0.024	8	26	0.91
01/03/22 S	0.073	0.5	2.7	98	0.029	8	24.1	1.1
18/05/22 B	0.043	1.3	NR	104	0.0025	8.2	30.6	0.07
18/05/22 S	0.032	1.2	8.8	105	0.0025	8.2	30.1	0.13
05/07/22 C	0.031	2.1	15	125	0.0025	8.1	29.9	0.017
Median					0.022		29.1	
High/Good EQS ³					0.027			
Good/moderate EQS ³					0.046			
WFD Indicative quality					High			

NR = No Result

Note 1: Sample type. S= surface sample. B= bottom sample. C= composite sample, equal volume surface and bottom.

Note 2: 95%ile value for transitional waters.

Note 3: Boundary based on measured salinity (linearly interpolated). Ortho-P compared to EQS limit value for Molybdate Reactive Phosphorus (MRP) for transitional water body. Orthophosphate measured on unfiltered samples may give a slightly higher reading than MRP.

Trophic Status Assessment Score

The most recent TSAS (Trophic Status Assessment Score) results for Lough Mahon (inclusive of Harpers Island) and the North Channel Great Island waterbodies indicates that these waterbodies fail for BOD, fail in winter for DIN and passes for MRP (**Table 12.0**).

Table 12.0: TSAS Summary

Parameter	Lough Mahon	North Channel
BOD	Fail	Fail
DIN	Winter Fail	Winter Fail
MRP	Pass	Pass

Water Quality Modelling

Water Quality Modelling (see Appendix A), based on the Future Scenario and background water quality conditions, was undertaken to establish the impact of the existing discharges on key receptors in the harbour.

As relevant to this assessment, these investigations included:

- Deterministic assessments of the mixing zone of Uisce Éireann discharges in terms of key WFD parameters of Biochemical Oxygen Demand (BOD), Dissolved Inorganic Nitrogen (DIN) and Orthophosphate (as Molybdate Reactive Phosphorus (MRP)) against Environmental Quality Standard (EQS), and to determine compatibility with the achievement of Conservation Objectives of the Protected Areas.
- Trophic assessments of the impact of DIN and MRP over the wider Cork Harbour Waterbody, particularly Nutrient Sensitive Waters, against relevant WFD standards in each WFD Waterbody within Cork Harbour.
- Microbiological impacts on Designated Bathing Waters (BWs) and Designated Shellfish Waters (SFWs) in Cork Harbour.

The key model predictions for WFD parameters from the **Future Scenario** based on existing background concentrations are:

- **BOD** concentrations in summer and winter around Cork Harbour are generally <1 mg/l with most areas having an indicative quality of High. There is a clearly defined BOD mixing zone of ca. 200m in length and ca. 100m in width in the immediate vicinity of the Carrigtwohill WwTP outfall. Outside of this mixing zone Good EQS Status is met immediately, transitioning to High EQS compliance with distance from the discharge location. At Midleton WwTP, there is no discernible mixing zone as the EQS value is met immediately at the surface with concentrations (~1 mg/l) around the secondary discharge, but the whole area has an indicative quality of High.
- **Un-ionised ammonia** concentrations around Cork Harbour are generally <0.005 mg/l in summer and winter. In summer in particular, concentrations are slightly elevated around Carrigtwohill discharge (< 0.03 mg/l). From Midleton WwTP, the un-ionised ammonia concentrations around the discharge are low at <0.005 mg/l in both summer and winter.
- **DIN** concentrations around Cork Harbour are generally <0.5 mg/l in summer, with most areas having an indicative quality of High. In summer, elevated DIN concentrations are predicted around Carrigtwohill WwTP discharge, with an indicative quality of Moderate prevailing to the east of Harpers Island. DIN concentrations are generally higher in winter with the majority of areas across Cork Harbour having an indicative quality of Good or Moderate. At Lough Mahon/Harpers Island, where the Carrigtwohill WwTP discharges, an indicative quality of Moderate was modelled. For the Midleton WwTP, there is no predicted elevation in DIN concentrations around the discharge in summer or winter; modelled concentrations are <0.5 mg/l with an indicative quality of High.
- **MRP** concentrations around Cork Harbour are generally <0.02 mg/l in summer, with most areas in Cork Harbour having an indicative quality of High. Outside of an approximately 1,000m mixing zone stretching from the outfall eastwards, MRP concentrations modelled around the Carrigtwohill WwTP discharge are at or below Good indicative quality status. At the Midleton WwTP discharge, there is an indicative quality

of High. MRP concentrations around Cork Harbour are generally higher in winter, with large regions of Cork Harbour having an indicative quality of Good. Compared with summer, elevated MRP concentrations are predicted around Carrigtwohill WwTP in winter, with the mixing zone doubling in length, resulting in an indicative quality of Moderate EQS being observed more widely around the discharge location. Around the Midleton WwTP, the area has an indicative quality of High and Good.

The predictions of the Future Scenario indicate that the water quality impacts from Midleton WwTP are minimal. However, elevated concentrations for DIN and MRP in particular assessed in this study are simulated around the Carrigtwohill WwTP discharge. The authors of the modelling report note that the applications scenario presented is conservative and models the maximum permitted ELVs.

The '**Notionally Clean**' River scenario provides an assessment of the maximum potential impact of Carrigtwohill WwTP outfall at mean discharge on the trophic status in Lough Mahon and the mixing zone around Harper's Island.

The key model predictions from this scenario are:

- **DIN:** Outside of the mixing zone of approx. 800m in winter and 1,200m in summer (mixing zone length) Good indicative quality for DIN is achieved around the Carrigtwohill discharge. At Midleton WwTP, modelled concentrations are low and the indicative quality is High in the surrounding area in summer and winter.
- **MRP:** Outside of a mixing zone of approx. 600m in summer (mixing zone length) Good indicative quality is achieved around the Carrigtwohill discharge. At Midleton WwTP, there is a small patch of elevated MRP concentrations (~ 0.04 mg/l) around the discharge in summer and winter but the surrounding area has an indicative quality of High.

The predictions of the '*Notionally Clean*' River scenario indicate that the rivers are significant contributors to water quality impacts as the indicative quality across Cork Harbour significantly improves as compared to the Future Scenario.

To interrogate DIN and MRP impacts further, a baseline scenario, with current DIN and MRP ELV's and background DIN and MRP concentrations, were assessed, and are also presented in the modelling report for context. These plots show that while there are elevated concentrations around the Carrigtwohill discharge point, that DIN and MRP concentrations in summer and winter vary minimally between the current and future scenarios despite the increased load.

Bacteria concentrations in Cork Harbour are generally low and predicted impacts from Uisce Éireann assets and Industrial discharges do not significantly impact water quality in the Designated Shellfish Water (SFWs) and Bathing Waters (BWs).



Figure 3.0: Owennacurra River/Upper Estuary & Dungourney River Monitoring Stations



Figure 4.0: Lower Owennacurra Estuary and North Channel Monitoring Stations and Discharge Points

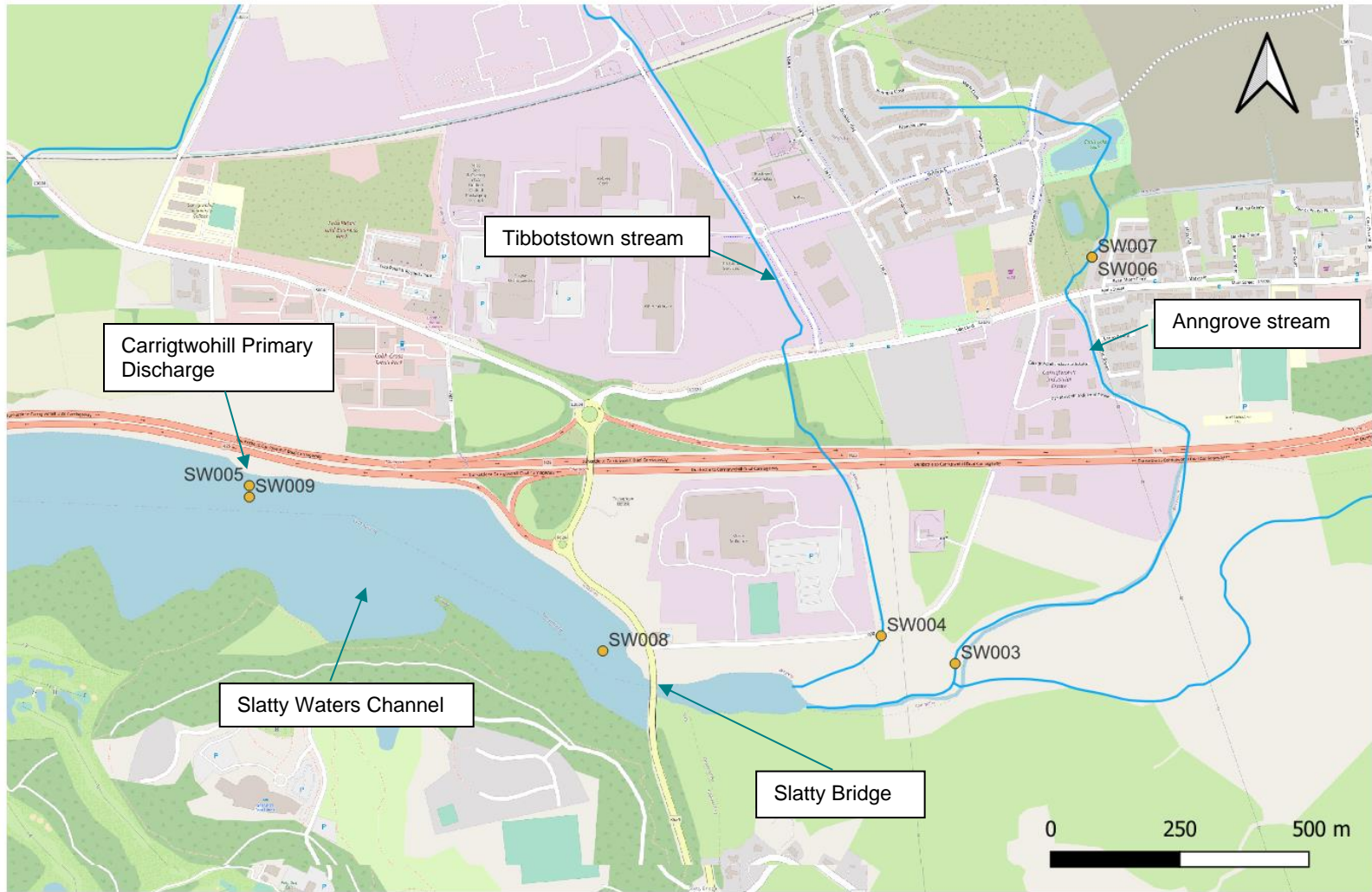


Figure 5.0: Carrigtwohill Discharge Points

Ecological Desktop & Field Survey

The ecological receptors of the site and surrounding area are described below, informed by the desk study and site visit. In the context of this assessment, the survey focused on aquatic habitats and species, or those terrestrial species which may interact with the aquatic environment. Particular attention was paid to identifying habitats or species listed in the Habitats or Birds directives.

Habitats & Flora

Midleton – Dungourney River

The Dungourney River flows into Midleton from the east, passing to the south of the Jameson Distillery through a park and then into the town. The river at this location is ca. 4-5m wide and 0.4-0.7m deep, with a clear fast riffle flow and a substrate varying from rocks and stones, to cobbles and gravels interspersed with silts, and some silt beds in slack water at the margins. A total of 6 no. overflows enter the river over the course of 500m – SW015, SW016, SW017, SW018, SW019 and SW021.

SW015 & SW019: SW019 enters the river on the eastern/upstream end of the park. The headwall is visible in the bank. SW015 enters within the park downstream, though no outfall pipe was visible. Scattered alder occur along both sides of the river. Instream vegetation includes water crowfoot *Ranunculus* spp., starwort *Callitriche* spp., and watercress *Nasturtium officinale*. There were no signs of pollution or organic sediment build-up on the river bed at either discharge location.



Photo 1 Dungourney River upstream of all discharges



Photo 2 Dungourney River at SW019



Photo 3 Dungourney River at SW015



Photo 4 Dungourney River downstream of SW015/SW019 and upstream of other discharges

SW018 & SW016/SW021: Downstream of the park the banks of the river are modified, with stone walls on both sides, and a row of sycamore on the left bank. SW016/SW021 are indicated at the same location and a single outfall was noted. SW018 is ca. 20m downstream, with no outfall visible. There were no signs of pollution or organic sediment build-up on the river bed at either discharge location.



Photo 5 Dungourney River at SW016/SW018/SW021

SW017: This discharge location was inaccessible, being within private grounds, but is located in the river bank 60m downstream of the bridge.



Photo 6 Midleton Bridge u/s SW017

As described above, a kick sample was taken upstream of SW019 (and all other discharges). Significant volumes of settled sediments were notable at this location and in the channel upstream, likely to be associated with agricultural activities upstream.

The river in the area surveyed is physically suitable for supporting salmonid fish and lamprey, with a good diversity of instream habitats and substrates, as well as shading and root-structures in the river from bankside trees. While they are Annex II species, salmon and lamprey are not qualifying interests of the Great Island Channel SAC.

Midleton –Owennacurra Estuary

The Owennacurra River enters the Owennacurra Estuary south of Midleton town centre. A shallow mudflat and reedbed complex occurs in the uppermost section of the estuary north of the Midleton Bypass bridge. The following discharges enter this part of the Estuary:

SW010: Bailick Pumping Station. The discharge here is to the river channel adjacent to reedbeds, which is wide with a mud substrate. Foul odours in the vicinity of the outfall indicate localised pollution impacts.



Photo 7 Owennacurra Estuary at SW010

SW020: Discharges to shallow water at the edge of the mudflats (appears to be above the low tide mark) and adjacent to reedbeds. No signs of significant pollution were noted at this outfall, however the position of the outfall away from the water edge indicates that effluent could impact the local wetland area due to lack of dilution and become entrained in adjacent reedbeds.



Photo 8 Outfall at SW020



Photo 9 Owennacurra Estuary at SW020



Photo 10 Upper Owennacurra Estuary

SW014: This discharge from the WwTP enters a channelised section of the Oatencake stream (part of the Owennacurra_040 waterbody) 180m upstream of the estuary. The stream is 2-3m wide, shallow (ca. 0.3m) with a predominantly gravel/stone substrate interspersed with silts, alder scrub woodland dominates the banksides. No signs of pollution were evident downstream of the discharge which could be clearly viewed but was not physically accessible.



Photo 11 Downstream SW014

The section of the estuary south of the Midleton bypass receives 4 no. discharges:

SW011: A significant sewage slick is present at this location indicating pollution impacts affecting the estuary at this location.



Photo 12 Owennacurra Estuary at SW011

SW013, SW012 & SW022: These discharges are from the quay walls on the eastern side of the estuary. Seaweed *Fucus* spp. occurred on the seabed throughout this area. The outfall pipe was only clearly visible at SW012. No signs of pollution were evident at any of these outfalls.



Photo 13 Owennacurra Estuary at SW013



Photo 14 Owennacurra Estuary at SW012



Photo 15 Owennacurra Estuary at SW022

The Owennacurra estuary habitat is designated as part of Great Island Channel SAC and SPA and supports Annex I Tidal Mudflats and Sandflats habitat which is a qualifying interest of the SAC.

Rathcoursey

SW001 discharges to the channel between Rathcoursey and Great Island. The channel is wide and deep with significant flow of water. The estuary habitat is immediately to the south of the Great Island Channel SAC and SPA designation boundary.



Photo 16 Channel at SW001

Carrigtowhill – Castlelake

SW006 and SW007 are indicated at the same location entering a small stream running adjacent to Castlelake and an active construction site. The Anngrove stream (part of the Tibbotstown_010 waterbody), which is narrow, deep and channelised, could be seen crossing under the L3678 but was not accessible. It appeared to be running clear with a muddy edge and stony bottom with brooklime *Veronica beccabunga*, hemlock water-dropwort *Oenanthe crocata* and watercress *Nasturtium officinale* noted. The stream passes under the N25 and through fields and industrial areas to the south before entering the estuary inlet at Slatty Bridge. The Anngrove stream provides some aquatic habitat of local importance and serves as a wildlife corridor linking the small lakes at Castlelake with the estuary to the south.



Photo 17 Anngrove Stream downstream of SW006/SW007



Photo 18 Anngrove Stream at road culvert

Carrigtwohill – Slatty Bridge & Channel

SW003 enters the Anngrove stream ca. 300m upstream of the estuary inlet at Slatty Bridge. SW004 is indicated as entering the Tibbotstown stream along the industrial estate road ca. 180m upstream of the estuary inlet at Slatty Bridge. Neither of these locations could be accessed, with the only accessible area being the estuary inlet. The estuary inlet is a sheltered estuarine wetland area with abundant reedbeds.

SW009 and SW005 are adjacent to each other and discharge into the north side of the '*Slatty Water*' channel which runs adjacent to the N25. The habitat here comprises exposed mudflats and fringing saltmarsh.

The Tibbotstown stream provides some aquatic habitat of local importance and serves as a wildlife corridor linking the rural area north of Carrigtwohill with the estuary to the south.

The estuary habitat of the Slatty Bridge Inlet and Slatty Water Channel is designated as part of Great Island Channel SAC and SPA and supports Annex I Tidal Mudflats and Sandflats habitat which is a qualifying interest of the SAC. The shoreline immediately adjacent to SW009/SW005 supports Annex I Atlantic Salt meadows habitat.



Photo 19 Slatty Bridge Inlet



Photo 20 Slatty Waters Channel

Invasive Species

Several invasive species commonly associated with watercourses have been recorded in the study area:

- Himalayan balsam *Impatiens glandulifera* (2021) is recorded from Midleton town along the banks of the Owennacurra River upstream of the agglomeration discharges, and in Castlelake Carrigtwohill (2022) ca. 200m north of SW006/SW007,
- Japanese knotweed *Fallopia japonica* also occurs along the banks of the Owennacurra (latest record 2021, with 2016 records in close proximity to SW020).
- Nuttall's waterweed *Elodea nuttallii* (2022) has been recorded from Castlelake Carrigtwohill, and in the Owennacurra upstream of the discharges.
- Common cord-grass *Spartina anglica* (2020) has been recorded from the channel east and west of Slatty Bridge

Fauna

Birds

Several waterbirds, or birds that could be associated with the river environment, have been recorded from the study area (Date of latest record in brackets).

Midleton Area:

Notable species in the Midleton area were the Annex I birds Golden Plover (2016), Little Egret (2021), Merlin (2016), Peregrine Falcon (2016), Dunlin (2016) all protected under the EU Birds Directive, and the red-listed bird of high conservation concern Lapwing (2016), Black-headed Gull (2016), Redshank (2016), Curlew (2021) (with Golden Plover also red-listed). Amber listed waterbirds of medium conservation concern include Black-tailed Godwit(2016), Common Greenshank(2016), Dunlin(2016), Cormorant(2016), Oystercatcher (2021) and Mute Swan (2021).

In the upper estuary there were over 100 mixed gulls together with Lapwing and Redshank using the central area as a roost and foraging in the mudflats during the field visit, while at the Bailick discharge (SW010) two Mute Swans were observed on the river. In the lower estuary on the bank opposite SW011, a Cormorant and a Heron were noted fishing, while further south along

the quays were a further Cormorant and Heron together with 20 Black-headed Gulls. Further 4 no. Black-headed Gulls were observed adjacent to SW012.

Carrigtwohill Area:

Waterbirds recorded in the vicinity of the discharges in Slatty Bridge/Channel area (Desktop records are from 2011 unless otherwise indicated in brackets after the species) include Annex I Bar-tailed Godwit and Little Egret, the red-listed Black-headed Gull, Redshank, Curlew (2018), Lapwing, Red Knot; and the amber-listed Bar-tailed Godwit, Shelduck (2021), Snipe, Oystercatcher, Wigeon, Cormorant, Little Grebe, Mute Swan and Tufted Duck. The Cork Harbour Common Tern population is distributed between a variable number of breeding colonies in the Fota Channel and West Harbour zones (O'Mahony & Smiddy, 2017⁹), the Fota channel locations being over 3km southwest of the closest discharge points to the Slatty Water Channel.

During the field survey of Carrigtwohill at the Slatty Bridge inlet there were over 100 wigeon and 29 Black-headed Gulls, while in the Slatty Water channel an extensive mixed flock of waterbirds and waders, including Teal, Black-headed Gull, Redshank, Oystercatcher, Godwit spp. and Shelduck were using the mudflats and adjacent habitats.

Other Fauna

Otter have been sighted in the Owennacurra River in Midleton town (latest 2017), and there are records throughout the Owennacurra and Dungourney River systems as well as of roadkill from 2012 around close to Slatty Bridge Carrigtwohill. A recent survey of the Cork Harbour area indicated that Harpers Island, ca. 1km west of the closest discharges in the Slatty Water, is a hotspot of otter activity (Dalton *et al*, 2022)¹⁰.

While no signs of otter were found during the current survey, lack of access to private lands precluded a detailed survey. It is evident however from the range of existing records that a local Otter population is well established in the area.

There are records of invasive American Mink on the Owennacurra River north of Midleton town (2012).

The latest published fish survey dates from 2010 (IFI, 2010¹¹). A total of sixteen fish species were recorded in Lough Mahon. Sprat is the most abundant species, followed by sand goby and two-spotted goby. IFI notes that the Owennacurra Estuary is a sheltered, relatively shallow and narrow waterbody that completely empties at low tide leaving behind large mudflats. A total of 11 fish species were recorded from this waterbody, with sandy goby being most abundant followed by thick-lipped grey mullet. A single salmon was recorded during their surveys while European Eel were noted from all survey sites.

⁹ O'Mahony, B. & Smiddy, P. (2017). Breeding of the Common Tern *Sterna hirundo* in Cork Harbour, 1983- 2017. *Irish Birds*, 10, 535–540.

¹⁰ Dalton, R; Healy, T & A. Murphy (2022). A study of Otter in Cork City and the Cork Harbour Area. Cork Nature Network. <https://corknaturenetwork.ie/wp-content/uploads/2022/10/Cork-Nature-Network-Otter-Report-2022.pdf>

¹¹ IFI (2010) Sampling Fish for the Water Framework Directive. Transitional Waters 2020. Greater Cork Harbour. http://www.wfdfish.ie/wp-content/uploads/2011/11/Greater_Cork_Harbour_estuary_report_2010.pdf

Sweeney (2011)¹² highlights that IFI consider the Dungourney River very important for salmon, but that it is likely that due to poor water quality conditions and brackish influences that salmon migrate upstream past the distillery to spawn.

Based on the site survey there is potential spawning and nursery habitat for all lamprey species in the Dungourney River in the vicinity of the discharges. There are no records of Crayfish in the river catchments in question.

While otter, salmon and lamprey are Annex II species, they are not qualifying interests of the Great Island Channel SAC.

¹² Sweeney (2011) Natura Impact Statement. Irish Distillers. Proposed Expansion of Midleton Distillery. November 2011 https://epawebapp.epa.ie/licences/lic_eDMS/090151b280655973.pdf

Screening for AA

European Sites within the potential zone of influence of the Operational Discharges

The Midleton & Carrigtwohill agglomeration operational discharges enter Cork Harbour and its inflowing rivers. All European Sites which could potentially interact with these waterbodies, are considered for source-pathway-receptor connectivity in order to establish the potential zone of influence of the discharges. This zone of influence encompasses European Sites within any potential dilution/dispersion zone or those with mobile species for which any potential *ex-situ* effects must be considered. These 2 no. sites are presented below in **Table 13.0** and shown in **Figure 6.0**.

Terrestrial sites which do not interact with the receiving waterbody have no potential to support connectivity. Short-form habitat names follow NPWS (2019¹³).

Table 13.0: European Sites considered in defining the potential zone of influence

Site Code	Site Name	Qualifying Interests	Pathway and Distance from Primary Discharge
004030	Cork Harbour SPA	Little Grebe (<i>Tachybaptus ruficollis</i>) [A004] Great Crested Grebe (<i>Podiceps cristatus</i>) [A005] Cormorant (<i>Phalacrocorax carbo</i>) [A017] Grey Heron (<i>Ardea cinerea</i>) [A028] Shelduck (<i>Tadorna tadorna</i>) [A048] Wigeon (<i>Anas penelope</i>) [A050] Teal (<i>Anas crecca</i>) [A052] Pintail (<i>Anas acuta</i>) [A054] Shoveler (<i>Anas clypeata</i>) [A056] Red-breasted Merganser (<i>Mergus serrator</i>) [A069] Oystercatcher (<i>Haematopus ostralegus</i>) [A130] Golden Plover (<i>Pluvialis apricaria</i>) [A140] Grey Plover (<i>Pluvialis squatarola</i>) [A141] Lapwing (<i>Vanellus vanellus</i>) [A142] Dunlin (<i>Calidris alpina</i>) [A149] Black-tailed Godwit (<i>Limosa limosa</i>) [A156] Bar-tailed Godwit (<i>Limosa lapponica</i>) [A157] Curlew (<i>Numenius arquata</i>) [A160] Redshank (<i>Tringa totanus</i>) [A162] Black-headed Gull (<i>Chroicocephalus ridibundus</i>) [A179] Common Gull (<i>Larus canus</i>) [A182] Lesser Black-backed Gull (<i>Larus fuscus</i>) [A183] Common Tern (<i>Sterna hirundo</i>) [A193] Wetland and Waterbirds [A999]	Direct discharges to Owennacurra Estuary and Lough Mahon (Harper's Island) waterbodies

¹³ NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill

Site Code	Site Name	Qualifying Interests	Pathway and Distance from Primary Discharge
001058	Great Island Channel SAC	Mudflats and sandflats not covered by seawater at low tide [1140] Atlantic salt meadows (<i>Glaucopuccinellietalia maritima</i>) [1330]	Direct discharges to Owennacurra Estuary and Lough Mahon (Harper's Island) waterbodies

Considering the source-pathway-receptor model, both these sites lie within the zone of influence of the Midleton & Carrigtwohill operational discharges. No further sites are considered hydrologically connected. The potential impacts that could arise for the qualifying interests, and likely significant effects that could result, are considered further below.

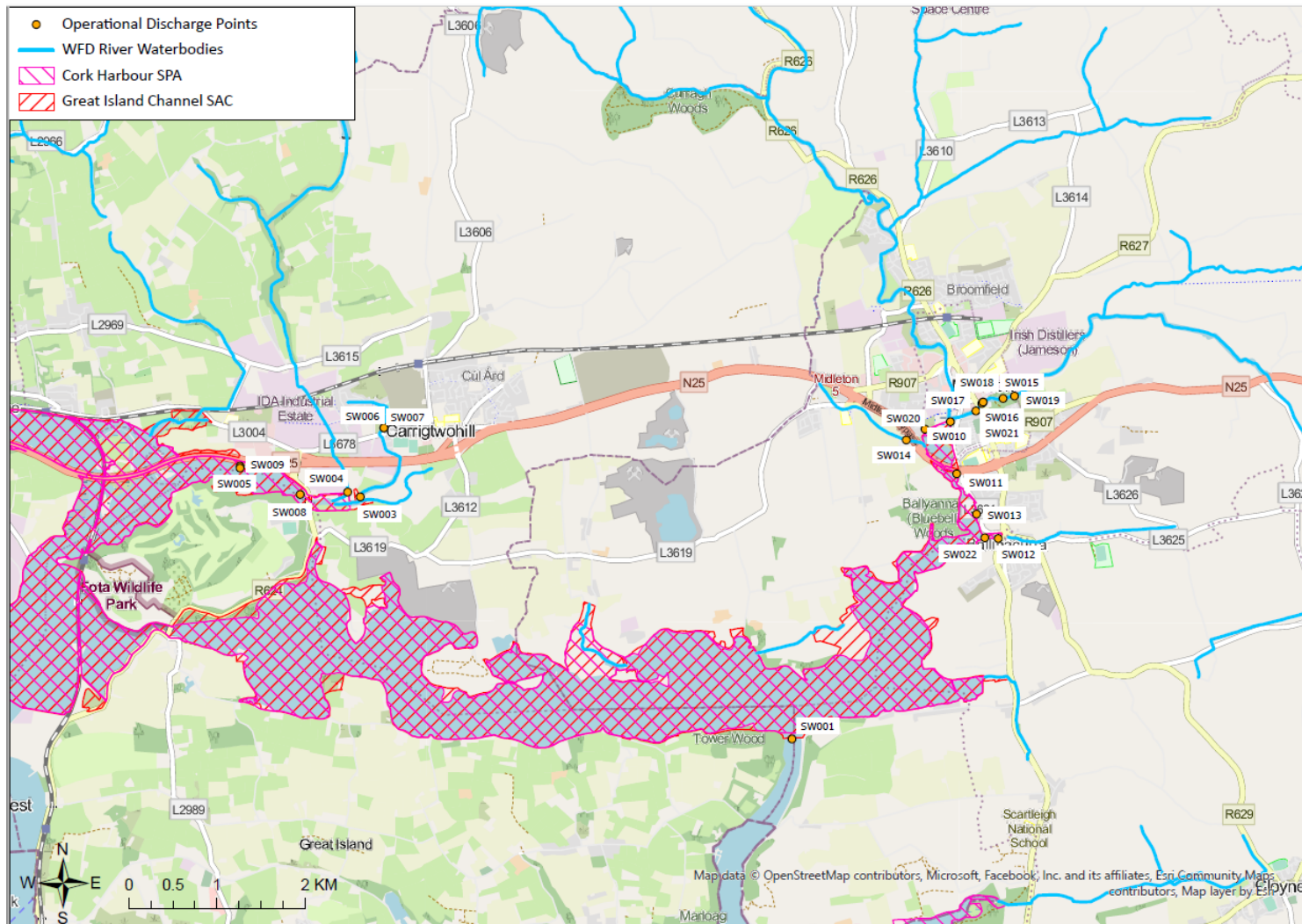


Figure 6.0: European Sites

Identification & Description of Potential Impacts

Elevated nutrient input from wastewater effluent into aquatic environments can lead to an altered nutrient balance (eutrophication), increased primary productivity, and the potential for algal blooms. Such impacts have the potential to affect the qualifying interests of European sites directly, indirectly or cumulatively with other activities, projects or plans.

Water quality modelling based on future loads provides information on the extent of mixing zones (where the waterbody EQS is not met) for the treated discharges within Cork Harbour for various nutrients under existing background and notionally clean (river) scenarios. The results of this modelling study need to be considered in the context of the attributes and targets of the conservation objectives of the relevant European Sites.

In terms of other waterbodies receiving overflow discharges, biological water quality monitoring in the Dungourney River, together with information on significant pressures, indicates that the river is under pressure from a range of sources, potentially including existing overflows. It could not be determined whether there are localised effects within the Tibbotstown stream from overflows due to lack of access and a lack of monitoring data. Some overflows are having a localised observable impact on water quality in the Owennacurra estuary. The potential impacts to water quality from overflow discharges on these waterbodies, in the context of the conservation objectives of the European Sites, needs further consideration.

The likely significant effects (including *ex-situ*) to the qualifying interests of Cork Harbour SPA and Great Island Channel SAC that may directly or indirectly arise from the ongoing discharges are considered below.

Likely Significant Effects

The purpose of this section of the Screening is to examine the possibility whether the agglomeration discharges, either individually or in combination other plans and projects, are likely to result in significant effects to any European Site. It further considers the water dependent qualifying interests which may be sensitive to the potential impacts of the discharges, in the context of the nature and scale of these discharges.

The Conservation Objectives and associated Supporting Documents of the relevant European Sites were reviewed as part of this Screening Assessment:

- NPWS (2014a) Conservation Objectives: Great Island Channel SAC 001058. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
- NPWS (2014b) Conservation Objectives supporting document – coastal habitats: Great Island Channel SAC 001058. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht
- NPWS (2014c) Conservation Objectives supporting document – marine habitats: Great Island Channel SAC 001058. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht
- NPWS (2014d) Conservation Objectives: Cork Harbour SPA 004030. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

- NPWS (2014e) Conservation Objectives Supporting Document: Cork Harbour SPA 004030. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

The discharges are not directly connected with or necessary to the management of any site for nature conservation.

The treated discharges to Cork Harbour from Carrigtwohill WwTP directly enters Annex I mudflat habitat and is in close proximity to Annex I saltmarsh habitat, while the discharge at Midleton occurs on the boundary of the SAC adjacent to Annex I mudflat habitat. These discharges, along with those in the Owennacurra Estuary, also enter the wetlands designated as part of the SPA. The existing discharges and treatment standards, together with water quality modelling findings, need to be assessed in the context of the conservation objectives for the qualifying interests of Great Island Channel SAC and Cork Harbour SPA.

Potential Cumulative or In-combination Effects

As part of AA Screening, in addition to the agglomeration discharges, other relevant projects and plans in the region must also be considered. This report aims to identify at this early stage any likely significant effects on the European Sites from the existing discharge in-combination or cumulatively with other plans and projects.

Plans

Plans of relevance include Uisce Éireann's WSSP, the Cork County Development Plan, and the National River Basin Management Plan.

In 2015, Uisce Éireann published the **Water Services Strategic Plan**, a 25-year Plan which as well as detailing current and future challenges affecting water services, identifies priorities to be addressed in the medium term. Solutions in these priority areas are delivered through capital and other projects outlined in Uisce Éireann's Investment Plan, a multi annual plan covering a five-year horizon, currently 2020-2024. The Midleton Wastewater Treatment Plant Upgrade and the Network Extensions Projects are listed on the current investment plan.

The **Cork County Development Plan 2022-2027** has been recently published. This new plan amalgamates the former municipal area regional plans into the main county plan. The plan has several relevant objectives and statements relating to wastewater:

- WM 11-1: EU Water Framework Directive and the River Basin Management Plan
 - f) Support the prioritisation of the provision of water services infrastructure in: 1. Metropolitan Cork, the Key Towns and Main Towns to complement the overall strategy for economic and population growth while ensuring appropriate protection of the environment. 2. All settlements where services are not meeting current needs, are failing to meet the requirements of the Urban Wastewater Treatment Directive, and where these deficiencies are – interfering with Councils ability to meet the requirements of the Water Framework Directive; or – having negative impacts on Natura 2000 sites; and

- g) Development may only proceed where appropriate wastewater treatment is available which meets the requirements of environmental legislation, the Water Framework Directive and the requirements of the Habitats Directive
- Emission Limit Values (ELVs)
 - 11.5.12 In many instances, the Emission Limit Value standards set by the EPA when licensing treatment plants are significantly higher than the requirements of the Urban Wastewater Directive (UWWD). Some of these ELV standards cannot consistently be achieved even by relatively modern plants without significant upgrades. This is a national issue not unique to Cork but it occurs in several locations across the County.
 - 11.5.13 In assessing the capacity of a WWTP to cater for future development where an ELV issue pertains, the assessment has been based on the hydraulic and organic loadings of the treatment plant relative to its design capacity on the assumption that the ELV issue will be resolved in an approach that will be determined/ agreed at a national level between Uisce Éireann and the EPA.
 - Section 11.9.5 The assimilative capacity of the County's waterbodies is not infinite, and it is considered important, when assessing individual development proposals involving abstraction or dilution of discharges, that sufficient assimilative capacity is retained so as to allow for the continued growth of the overall settlement and avoiding the unsustainable exploitation of the watercourse.
 - Midleton WwTP is identified as a Strategic Infrastructure Deficit, requiring infrastructure investment for planned development. Carrigtwohill's future capacity is subject to the implementation of projects on the Uisce Éireann Investment Plan.

Information on the **River Basin Management Plan** (2018-2021), Draft River Basin Management Plan (2022-2027), and associated information on the catchments available on www.catchments.ie was reviewed:

- The RBMP sets out the measures that are necessary to protect and restore water quality in Ireland. The overall aim of the plan is to ensure that Ireland's natural waters are sustainably managed and that freshwater resources are protected so as to maintain and improve Ireland's water environment. The Draft 3rd cycle plan, identifies that based on 2013-2018 data, 53% of surface waters are in good or high ecological status while the remaining 47% are in unsatisfactory ecological status.
- Continued investment in wastewater infrastructure is highlighted as one of the key actions in the plans. The 3rd cycle plan identifies the Dungourney River, the Owennacurra_040 and Owennacurra Estuary as Priority Area's For Action (AFA) with a Restoration objective. The catchment assessment¹⁴ points to UÉ's infrastructural improvements in Midleton as an action to address the significant pressure of the overflows to the Owennacurra estuary.

The above plans have themselves been assessed in accordance with Article 6(3) of the Habitats Directive and Part XAB of the Planning and Development Act, 2000 and the implementation of those plans will not result in adverse effects to the integrity of any European site(s). The plans

¹⁴<https://catchments.ie/wp-content/files/catchmentassessments/19%20Lee,%20Cork%20Harbour%20and%20Youghal%20Bay%20Catchment%20Summary%20WFD%20Cycle%203.pdf>

support the operation of compliant discharges from the Midleton and Carrigtwohill agglomeration which ongoing upgrades are designed to deliver. The plans also support the prioritisation of actions to deal with significant pressures affecting the catchment, which include the ongoing infrastructural improvements in Midleton, as well as addressing other catchment pressures such as agriculture, industry, and urban run-off. Hence considered cumulatively with the Project, there is no potential for negative cumulative effects on any qualifying interest.

Projects

Cork Co.Co. planning system was reviewed for any recent proposed or permitted projects that could lead to in-combination impacts with the Project.

The Midleton North Wastewater Pumping Station and Network Project (Ref 225031) was granted conditional permission on 13/2/23. This project involves the diversion of a wastewater load totalling approximately 4,177 p.e. from Midleton wastewater network to Carrigtwohill WwTP. The Water Rock Pumping Station project and the Water Rock to Carrigtwohill pipeline project are underway in 2023. As part of the Midleton Wastewater Network Upgrade Project, Uisce Éireann has committed to the rehabilitation and upgrading of all SWOs in the Midleton agglomeration to ensure compliance with DoEHLG criteria. The association of these projects with the subject of this assessment will require further consideration in the Stage 2 Appropriate Assessment.

The Cork Lower Harbour Project¹⁵ was completed in 2021, removing untreated discharges from the agglomerations of Ringaskiddy-Crosshaven-Carrigaline, Ringaskiddy village, Passage-Monkstown and Cobh. The background water quality data used in the assessments reflects any improvements in the harbour due to this scheme.

Other notable developments in Midleton include a quarry restoration (21966), solar farm developments (215089, 216789), temporary wastewater treatment plants (215136, 215664) and residential development (215676, 216874, 217265, 217428, 225104). The temporary wastewater treatment plants are proposed to operate until the Midleton agglomeration is upgraded. Notable developments in Carrigtwohill include residential developments (215150, 216000, 217130, 224440, 225005) and industrial developments (217424, 234159).

A range of other small residential, business, and agricultural developments within the Midleton and Carrigtwohill agglomeration, which may seek connection to the sewerage network, have been recently granted or are seeking planning consent. Uisce Éireann reviews available capacity for treatment prior to any connection to the UÉ network and therefore any local development connecting to the WwTP will be within the treatment capacity which meets WFD requirements. Hence considered cumulatively with the Project, there is no potential for negative cumulative effects on any qualifying interest.

¹⁵ <https://www.water.ie/projects/local-projects/cork-lower-harbour/>

Screening Conclusions

The likely impacts that will arise from the Midleton and Carrigtwohill discharges have been examined in the context of a number of factors that could potentially affect the integrity of the Natura 2000 network.

The existing discharges enter Great Island Channel SAC and Cork Harbour SPA directly or indirectly. The existing discharges and treatment standards, together with water quality modelling findings, need to be assessed in the context of the conservation objectives for the qualifying interests of Great Island Channel SAC and Cork Harbour SPA.

On the basis of the information set out, and documentation referenced, in this AA Screening, the likelihood of significant effects to the Cork Harbour SPA and Great Channel Island SAC cannot be excluded, and a Stage Two Appropriate Assessment is therefore provided.

Appropriate Assessment

The European Sites which have been determined as requiring AA, are described and all the potential impacts resulting from the Midleton and Carrigtwohill operational discharges are discussed in relation to the conservation objectives of Cork Harbour SPA and Great Island Channel SAC. These European Site and their qualifying interests are described below.

Description of the European Sites

Great Island Channel SAC (001058)¹⁶

The Great Island Channel stretches from Little Island to Midleton, with its southern boundary being formed by Great Island. It is an integral part of Cork Harbour which contains several other sites of conservation interest. Geologically, Cork Harbour consists of two large areas of open water in a limestone basin, separated from each other and the open sea by ridges of Old Red Sandstone. Within this system, Great Island Channel forms the eastern stretch of the river basin and compared to the rest of Cork Harbour, is relatively undisturbed. Within the site is the estuary of the Owennacurra and Dungourney Rivers. These rivers, which flow through Midleton, provide the main source of freshwater to the North Channel. The main habitats of conservation interest in Great Island Channel SAC are the sheltered tidal sand and mudflats and the Atlantic salt meadows. Owing to the sheltered conditions, the intertidal flats are composed mainly of soft muds. The saltmarshes are scattered through the site and are all of the estuarine type on mud substrate. The site is extremely important for wintering waterfowl and is considered to contain three of the top five areas within Cork Harbour, namely North Channel, Harper's Island and Belvelly-Marino Point. While the main land use within the site is aquaculture (oyster farming), the greatest threats to its conservation significance come from road works, infilling, sewage outflows and possible marina developments.

Description of the Conservation Interests of the SAC

Annex I Habitats:

- Tidal Mudflats and Sandflats [1140]
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]

With the exception of the discharges to the Tibbotstown stream in Carrigtwohill, or the Dungourney River in Midleton, all other discharges directly enter the SAC. NPWS (2014a) identify that the Mudflats and Sandflats habitat occurs throughout the SAC, though is absent east of Slatty Bridge, and its patchily distributed in the uppermost section of the Owennacurra Estuary in Midleton. The marine community is identified as '*Mixed sediment to sandy mud with polychaetes and oligochaetes community*'. The Atlantic salt meadows, associated with the SAC is mainly confined to the northern shore of Fota Island within the Slatty Waters Channel. Potential saltmarsh is identified at further scattered locations, including the uppermost section of the Owennacurra estuary.

¹⁶ Extracted from NPWS Site Synopsis Version Date 24.09.2013

At a national level, marine pollution from a range of sources (residential, recreational, agriculture, aquaculture) is identified as a pressure for Mudflats and Sandflats (NPWS, 2019). In particular, nutrient enrichment of enclosed bays has been highlighted as an issue, resulting from nutrient sources relating to agriculture, forestry and wastewater discharges. The overall national assessment of conservation status for Tidal Mudflats and Sandflats is Inadequate (*Deteriorating*).

Saltmarshes are stands of vegetation that occur along sheltered coasts, mainly on mud or sand, and are flooded periodically by the sea. They are restricted to the area between mid neap tide level and high water spring tide level. Key pressures identified in NPWS (2019) related to grazing, recreational use and hydrological/coastline modifications. The overall national assessment of conservation status for both saltmarsh habitats is Inadequate (*Deteriorating*), while *Salicornia* mud habitat is Favourable (*Stable*). A survey of the Carrigtwohill saltmarsh site is described in NPWS (2014b), eutrophication or urban waste water was not highlighted as an impact or activity of concern with respect to saltmarsh habitats.

Cork Harbour SPA¹⁷

Cork Harbour is a large, sheltered bay system, with several river estuaries - principally those of the Rivers Lee, Douglas, Owenboy and Owennacurra. The SPA site comprises most of the main intertidal areas of Cork Harbour, including all of the North Channel, the Douglas River Estuary, inner Lough Mahon, Monkstown Creek, Lough Beg, the Owenboy River Estuary, Whitegate Bay, Ringabella Creek and the Rostellan and Poul nabibe inlets. Owing to the sheltered conditions, the intertidal flats are often muddy in character. These muds support a range of macro-invertebrates, notably *Macoma balthica*, *Scrobicularia plana*, *Hydrobia ulvae*, *Nephtys hombergi*, *Nereis diversicolor* and *Corophium volutator*. Green algae species occur on the flats, especially *Ulva* spp. Cordgrass (*Spartina* spp.) has colonised the intertidal flats in places, especially where good shelter exists, such as at Rossleague and Belvelly in the North Channel. Salt marshes are scattered through the site, and these provide high tide roosts for the birds. Some shallow bay water is included in the site. Rostellan Lake is a small brackish lake that is used by swans throughout the winter. The site also includes some marginal wet grassland areas used by feeding and roosting birds. The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Little Grebe, Great Crested Grebe, Cormorant, Grey Heron, Shelduck, Wigeon, Teal, Mallard, Pintail, Shoveler, Redbreasted Merganser, Oystercatcher, Golden Plover, Grey Plover, Lapwing, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank, Black-headed Gull, Common Gull, Lesser Black-backed Gull and Common Tern. The site is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds. Cork Harbour is an internationally important wetland site, regularly supporting in excess of 20,000 wintering waterfowl. Cork Harbour has a nationally important breeding colony of Common Tern. The birds have nested in Cork Harbour since about 1970, and since 1983 on various artificial structures, notably derelict steel barges and the roof of a Martello Tower. The birds are monitored annually, and the chicks are ringed. Cork Harbour is of major ornithological significance, being of international importance both for the total numbers of wintering birds (*i.e.*, > 20,000) and also for its populations of Black-tailed Godwit and Redshank. In addition, it supports nationally important wintering populations of

¹⁷ Extracted from NPWS site synopsis dated 21.1.2015

22 species, as well as a nationally important breeding colony of Common Tern. Several of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, *i.e.*, Whooper Swan, Little Egret, Golden Plover, Bar-tailed Godwit, Ruff, Mediterranean Gull and Common Tern. The site provides both feeding and roosting sites for the various bird species that use it. Cork Harbour is also a Ramsar Convention site and part of Cork Harbour SPA is a Wildfowl Sanctuary.

Description of the Conservation Interests of the SPA

- Little Grebe (*Tachybaptus ruficollis*) [A004]
- Great Crested Grebe (*Podiceps cristatus*) [A005]
- Cormorant (*Phalacrocorax carbo*) [A017]
- Grey Heron (*Ardea cinerea*) [A028]
- Shelduck (*Tadorna tadorna*) [A048]
- Wigeon (*Anas penelope*) [A050]
- Teal (*Anas crecca*) [A052]
- Pintail (*Anas acuta*) [A054]
- Shoveler (*Anas clypeata*) [A056]
- Red-breasted Merganser (*Mergus serrator*) [A069]
- Oystercatcher (*Haematopus ostralegus*) [A130]
- Golden Plover (*Pluvialis apricaria*) [A140]
- Grey Plover (*Pluvialis squatarola*) [A141]
- Lapwing (*Vanellus vanellus*) [A142]
- Dunlin (*Calidris alpina*) [A149]
- Black-tailed Godwit (*Limosa limosa*) [A156]
- Bar-tailed Godwit (*Limosa lapponica*) [A157]
- Curlew (*Numenius arquata*) [A160]
- Redshank (*Tringa totanus*) [A162]
- Black-headed Gull (*Chroicocephalus ridibundus*) [A179]
- Common Gull (*Larus canus*) [A182]
- Lesser Black-backed Gull (*Larus fuscus*) [A183]
- Common Tern (*Sterna hirundo*) [A193]
- Wetland and Waterbirds [A999]

Due to the proximity of the Project to Cork Harbour, the waterbirds and wetlands associated with Cork Harbour SPA are within the zone of influence of the Project. Information on populations (where available), requirements and sensitivities of key species are considered in more detail below with data taken from BirdWatch Ireland's website and I-WeBs data¹⁸, Gilbert *et al* (2021)¹⁹, and the conservation objectives supporting information²⁰.

Little Grebe both breed and winter in Ireland, moving from inland waterways to coastal areas in winter (though some stay inland). The 5year mean I-WeBs data (2016/17-2020/21) indicates numbers are above the national importance threshold on average, but below the international importance threshold.

¹⁸ <https://birdwatchireland.ie/our-work/surveys-research/research-surveys/irish-wetland-bird-survey/> Peak count data for OA401 accessed 13/11/2022

¹⁹ Gilbert G, Stanbury A and Lewis L (2021), "Birds of Conservation Concern in Ireland 2020 –2026". Irish Birds 9:523–544

²⁰ NPWS (2015) Conservation Objectives Supporting Document: Cork Harbour SPA 004030. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

Great-crested Grebe in Ireland are thought to breed at inland lakes and move to coastal sites during the winter period. They are largely piscivorous, diving in a general range of 2-4m. They are an amber-listed species of medium conservation concern for both breeding and wintering populations (Gilbert *et al*, 2021). The 5year mean I-WeBs data (2016/17-2020/21) indicates numbers are above the national importance threshold on average, but below the international importance threshold.

Most Cormorants in Ireland breed primarily on rocky cliffs and offshore Irelands and generally winter on the coast, though also winter on inland freshwater sites. The 5year mean I-WeBs data (2016/17-2020/21) indicates numbers are above the national importance threshold on average, but below the international importance threshold. They are an amber-listed species of medium conservation concern for both breeding and wintering populations (Gilbert *et al*, 2021).

Grey Heron are largely resident in Ireland. As they are usually solitary when feeding a widespread distribution is typical. They are not noted as being a species of conservation concern. The 5year mean I-WeBs data (2016/17-2020/21) indicates numbers are above the national importance threshold on average, but below the international importance threshold.

Shelduck breed and winter in Ireland. They forage in a variety of ways from scything their bill through wet mud on exposed tidal flats, to dabbling and scything in shallow water and up-ending in deeper waters. They can therefore forage throughout the tidal cycle, albeit for different prey items and with differing methods at various tidal stages. They are an amber-listed species of medium conservation concern for both breeding and wintering populations (Gilbert *et al*, 2021). The 5year mean I-WeBs data (2016/17-2020/21) indicates numbers are below both the national and international importance thresholds on average.

Wigeon are common and widespread throughout Ireland in the winter where they occur on the coast and in inland wetlands, lakes and rivers. Away from coasts they graze on algae and also regularly feed on grasslands and cereal crops. They are an amber-listed species of medium conservation concern for both breeding and wintering populations (Gilbert *et al*, 2021). The 5year mean I-WeBs data (2016/17-2020/21) indicates numbers are below both the national and international importance thresholds on average.

Wintering Teal are widespread in Ireland on wetlands both coastal and inland. They feed predominately on small seeds, with algae (*Ulva* spp.) and molluscs also taken. They are an amber-listed species of medium conservation concern for both breeding and wintering populations (Gilbert *et al*, 2021). The 5year mean I-WeBs data (2016/17-2020/21) indicates numbers are below both the national and international importance thresholds on average.

Pintail that winter in Ireland come from breeding grounds between Iceland and Russia. The 5year mean I-WeBs data (2016/17-2020/21) indicates numbers are below both the national and international importance thresholds on average. They are an amber-listed species of medium conservation concern for their wintering populations (Gilbert *et al*, 2021).

Shoveler have a small wintering population in Ireland, with small breeding numbers supplemented by birds from other locations in Europe. They are omnivorous, taking a range of items from planktonic crustaceans and small molluscs, to insects, larvae, plant material and

seeds. A true dabbling duck, Shoveler feed by surface-feeding, swimming with head and neck immersed, up-ending, and less often, by shallow dives. They are a red-listed species of high conservation concern for both breeding and wintering populations (Gilbert *et al*, 2021). The 5year mean I-WeBs data (2016/17-2020/21) indicates numbers are below both the national and international importance thresholds on average.

Red-breasted merganser have a sedentary breeding population in Ireland, supplemented in winter by additional birds from Europe and Greenland. They are sea ducks that feed on fish, obtained by frequent dives from the surface. They prefer shallow waters (3-6m). They are an amber-listed species of medium conservation concern for both breeding and wintering populations (Gilbert *et al*, 2021). The 5year mean I-WeBs data (2016/17-2020/21) indicates numbers are below both the national and international importance thresholds on average.

Oystercatcher that breed in Ireland are partial migrants, with some moving south during winter while others remain on the Irish coast, supplemented by birds which breed further north. They primarily forage on tidal flats although the species can be found foraging along non-estuarine coastline or terrestrially for earthworms. On tidal flats their food consists of Cockles (*Cerastoderma edule*), Mussels (*Mytilus edulis*) and to a lesser degree other bivalve molluscs such as *Macoma balthica*, *Scrobicularia plana* and *Mya arenaria* as well as larger polychaetes such as *Arenicola marina* and *Hediste diversicolor*. They are a red-listed species of high conservation concern for both breeding and wintering populations (Gilbert *et al*, 2021). The 5year mean I-WeBs data (2016/17-2020/21) indicates numbers are below both the national and international importance thresholds on average.

Golden Plover that winter in Ireland are thought to be mostly Icelandic-breeding birds. The 5year mean I-WeBs data (2016/17-2020/21) indicates numbers are above the national importance threshold on average, but below the international importance threshold. They are a red-listed species of high conservation concern for both breeding and wintering populations (Gilbert *et al*, 2021).

Lapwing breeding in Britain and Ireland are partial migrants with some residing over winter and some migrating south. The wintering population is enhanced by Lapwings moving in from continental Europe and northern and western Britain. The 5year mean I-WeBs data (2016/17-2020/21) indicates numbers are above the national importance threshold on average, but below the international importance threshold. They are a red-listed species of high conservation concern for both breeding and wintering populations (Gilbert *et al*, 2021).

Dunlin migrate southwest from Scandinavia and Russia to winter along the coasts of western Europe. Dunlin are generally considered to prefer muddy estuaries but the species is fairly adaptable with a wide prey range including small size-classes of bivalves, gastropod molluscs (*e.g.*, *Hydrobia ulvae*) and crustaceans such as *Corophium volutator* and Gammarid amphipods, although polychaete worms are the most preferred prey items. They are a red-listed species of high conservation concern for both breeding and wintering populations (Gilbert *et al*, 2021). The 5year mean I-WeBs data (2016/17-2020/21) indicates numbers are above the national importance threshold on average, but below the international importance threshold.

Black-tailed Godwit that winter in Ireland are primarily from the population that breeds in Iceland. The 5year mean I-WeBs data (2016/17-2020/21) indicates numbers are above both the national and international importance threshold on average. They are a red-listed species of high conservation concern for their wintering populations (Gilbert *et al*, 2021).

Bar-tailed Godwit that winter in Ireland are primarily from the population that breeds northern Fennoscandia and Russia. The 5year mean I-WeBs data (2016/17-2020/21) indicates numbers are above the national importance threshold on average, but below the international importance threshold. They are a red-listed species of high conservation concern for their wintering populations (Gilbert *et al*, 2021).

Curlew have a small and declining breeding population in Ireland, with winter populations supplemented by migratory birds from Fennoscandia, the Baltic and northwest Russia. Within intertidal areas they seek out larger prey items such as crabs, large worms and bivalves. Their de-curved bill is ideally suited to extracting deep-living worms such as Lugworms (*Arenicola marina*). Curlews also feed amongst damp grasslands for terrestrial worms; this activity perhaps more common during the high tide period, is likely to play an important part in achievement of sufficient energy intake. They are a red-listed species of high conservation concern for both breeding and wintering populations (Gilbert *et al*, 2021). The 5year mean I-WeBs data (2016/17-2020/21) indicates numbers are above the national importance threshold on average, but below the international importance threshold.

Redshank in Ireland include a small population of birds that breed in Ireland, and migratory birds from Iceland and the Faeroes. Redshanks forage mainly by pecking at the surface or probing within intertidal mudflats; favouring the muddier sections of sites where they prey upon species such as the ragworm *Hediste diversicolor* or mud snail *Hydrobia ulvae*. They are a red-listed species of high conservation concern for both breeding and wintering populations (Gilbert *et al*, 2021). The 5year mean I-WeBs data (2016/17-2020/21) indicates numbers are above the national importance threshold on average, but below the international importance threshold.

Black-headed Gull is the most widespread breeding seabird within Ireland, breeding both inland and on the coast. Winter numbers are boosted by birds arriving from northern and eastern Europe. They are an amber-listed species of medium conservation concern for their breeding and wintering populations (Gilbert *et al*, 2021). I-WeBs data (2016/17-2020/21) indicates numbers consistently high with 5 year mean of 3711.

Common Gull in Ireland is most widely seen in the winter when wintering birds arrive from Scotland and continental Europe. They are an amber-listed species of medium conservation concern for both breeding and wintering populations (Gilbert *et al*, 2021). The 5year mean I-WeBs data (2016/17-2020/21) is 218 individuals and was lower in the winter of 2020/21 than the preceding years from 2011/12 (range 111 to 283), though there are no thresholds to compare against.

Lesser Black-backed Gulls that occur as breeding and wintering birds in Britain and Ireland belong to the race that breeds across western Europe, Iceland, the Faeroes and Greenland. The 5year mean I-WeBs data (2016/17-2020/21) is 164 individuals and with numbers from 2011/12 varying from a low of 71 to a high of 220, though there are no thresholds to compare against.

They are an amber-listed species of medium conservation concern for their breeding and wintering populations (Gilbert *et al*, 2021).

Common tern are an amber-listed species of medium conservation concern for their breeding populations (Gilbert *et al*, 2021). The Cork Harbour Common Tern population is distributed between a variable number of breeding colonies in the Fota Channel and West Harbour zones (O'Mahony & Smiddy, 2017²¹), the Fota channel locations being over 3km southwest of the closest discharge points to the Slatty Water Channel. Feeding terns occur widely throughout most of the harbour. Typical foraging range distances from breeding colonies are 4.5 km (mean), 15.2 km (mean max) and 20 km (max) (Thaxter *et al.*, 2012²²), indicating the Carrigtwohill discharge point is within the average feeding range of this species, while the Midleton discharges are also within range.

Wetlands are also listed as a feature of the SPA. Pollution arising from the proposed development has the potential to alter wetland habitats and consequently the foraging resources on which the wintering bird rely.

Conclusion Re. Sensitive Bird Species within the zone of influence of the works

Wintering bird surveys described in NPWS (2014e) for the subsites in the Slatty Water Channel and Owennacurra Estuary suggest that the mudflats and adjacent habitats support important high tide roosts and low tide feeding areas. A number of these qualifying interests were recorded using the mudflats at low tide during the site visit in January 2023.

With regards the 22 non-breeding waterbird species of Special Conservation Interest listed for Cork Harbour SPA, it has been determined that:

- 9 species are currently considered as Highly Unfavourable (Pintail, Shoveler, Red-breasted Merganser, Cormorant, Grey Plover, Lapwing, Black-headed Gull, Common Gull and Lesser Black-backed Gull);
- 6 species are currently considered as Unfavourable (Shelduck, Wigeon, Great Crested Grebe, Dunlin, Curlew and Redshank);
- 3 species are currently considered as (Intermediate) Unfavourable (Teal, Grey Heron and Oystercatcher).
- 4 species are currently considered as Favourable (Little Grebe, Golden Plover, Black-tailed Godwit and Bar-tailed Godwit).

Domestic and urban wastewater is highlighted as an activity or event relevant to the subsites OL557 (Owennacurra Estuary) and OL590/595 (upstream and downstream of Slatty Bridge)

²¹ O'Mahony, B. & Smiddy, P. (2017). Breeding of the Common Tern *Sterna hirundo* in Cork Harbour, 1983- 2017. *Irish Birds*, 10, 535–540.

²² Thaxter, C.B., Lascelles, B., Sugar, K., Cook, A.S.C.P., Roos, S., Bolton, M., Langston, R.H.W. & Burton, N.H.K. (2012). Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas. *Biological Conservation*, 156, 53–61.

Conservation Objectives

The potential for adverse effects on the relevant qualifying habitats and species of Cork Harbour SPA and Great Island Channel SAC, as identified above, are assessed against their site-specific conservation objectives below.

Site specific conservation objectives and associated details have been extracted from NPWS (2014a) and NPWS (2014d) (referenced earlier).

Table 14.0 Conservation Objectives

Qualifying Interest & Conservation Objective	Conservation Objective Attributes & Targets
Great Island Channel SAC	
<p><i>To maintain the favourable conservation condition of Tidal Mudflats and Sandflats in Great Island Channel SAC, which is defined by the following list of attributes and targets:</i></p>	<ul style="list-style-type: none"> • Attribute: Habitat area; Target: The permanent habitat area is stable or increasing, subject to natural processes. • Attribute: Community Distribution; Target: Conserve the following community type in a natural condition: Mixed sediment to sandy mud with polychaetes and oligochaetes community complex.
<p><i>To restore the favourable conservation condition of Atlantic Salt Meadows in Lough Great Island Channel SAC, which is defined by the following list of attributes and targets:</i></p>	<ul style="list-style-type: none"> • Attribute: Habitat Area; Target: The permanent habitat area is stable or increasing subject to natural processes including erosion and succession. For sub-sites mapped: Bawnard - 0.29ha; Carrigtwohill - 1.01ha. • Attribute: Habitat Distribution; Target: No decline or change in habitat distribution, subject to natural processes. • Attribute: Physical structure (Sediment supply)– Physical Barriers; Target: Maintain the natural circulation of sediments and organic matter without any physical obstructions. • Attribute: Physical structure (Creeks & Pans); Target: Maintain/Restore creek and pan structure, subject to natural processes, including erosion and succession. • Attribute: Physical structure – flooding regime; Target: Maintain natural tidal regime. • Attribute: Vegetation structure – Zonation; Target: Maintain range of coastal habitat including transitional zones, subject to natural processes including erosion and succession. • Attribute: Vegetation structure – Vegetation height; Target: Maintain structural vegetation within sward. • Attribute: Vegetation structure – Vegetation cover; Target: Maintain more than 90% of area outside creeks vegetated. • Attribute: Vegetation composition – Typical species and sub-communities; Target: Maintain range of sub-communities with typical species listed in the Saltmarsh Monitoring Project (McCorry and Ryle, 2009). • Attribute: Vegetation composition – Negative Indicator species – <i>Spartina anglica</i>; Target: No significant expansion of common cordgrass (<i>Spartina anglica</i>), with annual spread of less than 1%.

Cork Harbour SPA	
<p>For qualifying interests excluding Common Tern:</p> <p><i>To maintain the favourable conservation condition of waterbird SCI / QI species in Cork Harbour SPA which is defined by the following list of attributes and targets:</i></p>	<ul style="list-style-type: none"> • Attribute: Population trend; Target: Long term population trend stable or increasing. • Attribute: Distribution Target: There should be no significant decrease in the range, timing or intensity of use of areas by the QI, other than that occurring from natural patterns of variation.
<p>For Common Tern</p> <p><i>To maintain the favourable conservation condition of Common Tern in Cork Harbour SPA which is defined by the following list of attributes and targets:</i></p>	<ul style="list-style-type: none"> • Attribute: Breeding population abundance – apparently occupied nests (AONs); Target: No significant decline. • Attribute: Productivity rate: fledged young per breeding pair; Target: No significant decline. • Attribute: Distribution: breeding colonies; Target: No significant decline. • Attribute: Prey biomass available; Target: No significant decline. • Attribute: Barriers to connectivity; Target: No significant increase. • Attribute: Distribution at the breeding site; Target: Human activities should occur at levels that do not adversely affect the breeding common tern population.
<p><i>To maintain the favourable conservation condition of the wetland habitat in Cork Harbour SPA as a resource for the regularly-occurring migratory waterbirds that utilise it. This is defined by the following attributes and targets:</i></p>	<ul style="list-style-type: none"> • Attribute: Wetland habitat; Target: The permanent area occupied by the wetland habitat is stable and not significantly less than the areas of 2,587 hectares, other than that occurring from natural patterns of variation.

Impact Prediction

The potential impacts on water quality from the agglomeration operational discharges, alone and cumulatively with other catchment pressures are discussed below. The potential for water quality impacts to give rise to adverse effects on the integrity of the Cork Harbour SPA and Great Island Channel SAC, in view of their conservation objectives, is then considered.

Impacts on water quality

The primary impact under consideration is the potential pollution of surface waters arising from the amalgamated agglomeration operational discharges. Such impacts could include nutrient enrichment triggering algal or plant growth, deposition of sewage litter, growth of sewage fungus, deposition of organic sediments or zones of altered dissolved oxygen, pH or temperature levels.

On the basis of water quality data and modelling, the Midleton primary discharge, located in a large marine channel at Rathcoursey, does not pose a threat to water quality at this location, due to appropriate dilution and dispersion for the treated effluent.

Carrigtwohill, by virtue of its location, does not benefit from the same degree of dispersion. Under existing background water quality conditions there is a mixing zone with an indicative quality of Moderate for BOD in summer (**Modelling Report Figure 3-5, Appendix A**), grading into an area with an indicative quality of Good extending towards Slatty Bridge, with most of the channel area having an indicative quality of High. There is a limited mixing zone in Winter (**Modelling Report Figure 3-9**).

Based on background water quality conditions, DIN concentrations are not predicted to meet the Good status EQS around the Carrigtwohill discharge in Summer and Winter for the future scenario (**Modelling Report Figure 3-21 & 3-25**) or the existing scenario (**Modelling Report Appendix**). These plots also indicate that high background levels from riverine inputs affect much of the harbour area. Notionally clean plots demonstrate that there remains a localised effect of the discharges in the mixing zone in the shallow tidal channel at Carrigtwohill in summer and winter, with areas of ca. 26ha and 23ha respectively predicted to have an indicative quality of Moderate for DIN, grading into Good status within the rest of the waterbody (**Modelling Report Figure 3-30 & 3-34**). The Carrigtwohill primary discharge contributes just 1% to the overall load in winter, and 2% in summer. Good status DIN conditions are met at the Midleton discharge in winter under background conditions (**Modelling Report Figure 3-24**), while in summer under background conditions, and the summer/winter nationally clean scenarios, meet High status requirements (**Modelling Report Figure 3-20, 3-28 & 3-38**).

The MRP Plots (**Modelling Report Figure 3-37, 3-41 and Modelling Report Appendix**) indicate a region of Moderate status in the Slatty Water Channel based on background conditions in summer and winter. Again this is present for both existing and future load scenarios. Considering notionally-clean river inputs, MRP is elevated in summer with an indicative quality of Moderate in the east of the channel, while in winter there is an improvement to Good throughout the channel (**Modelling Report Figure 3-45 & 3-49**). Notionally clean plots therefore indicate that the discharge is the primary driver of these elevated levels in summer, with the inputting river driving the higher levels in winter. The summer moderate status area (notionally clean river) extends across ca. 14ha of the channel. The load from Carrigtwohill

comprises <1% of the overall load to the waterbody in both summer and winter. The model predicts that the EQS is met at the Midleton discharge under all scenarios (**Modelling Report Figure 3-36, 3-40, 3-44 & 3-48**).

With regard to the potential impact of Midleton overflow discharges on water quality in the Dungourney River, while the macroinvertebrate fauna indicates that quality deteriorates as the river proceeds downstream, water chemistry data downstream of the overflow discharges indicates Good status water quality conditions are maintained. There was a slight drop in Q value from 3-4 to 3 between the uppermost and lowermost overflow, however industry is also a pressure on this reach of the river with cooling waters from the distillery entering the river. There was no visual evidence of altered habitat or pollution at the overflow discharges, and the deterioration in biological water quality over the course of the river is considered to be due to the pressures that have been identified by the EPA *i.e.*, industrial discharges and agriculture. There are three overflows entering the Owennacurra estuary that are non-compliant with SWO criteria (SW010, SW011 and SW020) and are having a localised observable impact on water quality in the Owennacurra estuary. The impact is particularly severe at SW011.

Compliant SWO's are a necessary part of sewerage networks and serve to prevent uncontrolled spillages arising within the agglomeration and to prevent the biological processes necessary to treat effluent being compromised by inundation with excess water. The principal consideration to take account of in the assessment of the impact of overflows for water quality is that overflows will only occur in the event of sustained rainfall. For those overflows with stormwater storage tanks, the initial flushing flow arising from the first 5 mm of rain in a rainfall event is contained in the foul sump initially and will not be passed through to the storm tanks unless the capacity of the foul pumps is exceeded. This initial surface runoff flow will have the highest level of pollutants as it will wash in debris from impermeable surfaces and may dislodge settled solids in the sewer network. Flows entering a storm tank will then pass through a 6 mm upward flow screen between the foul sump and storm sump. This will further retain a significant proportion of the organic matter, solids and rags in the foul sump. Flows will then be retained in the storm tank providing an opportunity for suspended solids to settle out. As flow recedes, the storm tank contents are passed forward to the WwTP for treatment. If the storm tank reaches capacity a highly diluted screened effluent is discharged. It is not possible to fully retain all stormwater due to septicity that arises with storage and the inability of treatment plant biological processes to cater for large volumes of dilute wastewater. Diluted, settled (if passed through a holding tank) and screened effluent which could be discharged during storm conditions, will enter a waterbody which will have increased flows driven by sustained rainfall. In this context, the overflow discharges to the agglomeration waterbodies will be diluted and dispersed effectively.

The risks of sewer or outfall failure associated with extreme events resulting in the activation of EO's, while a theoretical risk (as the failure of any infrastructure in catastrophic situations is theoretically possible), is not reasonably predicted to occur. Their inclusion in the agglomeration prevents the risk of uncontrolled emissions arising from other points in the network and spilling onto land or water in an unpredictable manner. All appropriate design measures and mitigation to prevent emergency overflows that can be applied has been incorporated in the design and operation of the agglomeration.

Adverse effects on Annex I Habitats

This assessment focuses on the qualifying habitats of Great Channel Island SAC, considering the nature of the effects that could arise and whether mitigation may be required to avoid these effects.

With regard to the secondary discharge at Midleton, the location provides excellent dispersion and there is no risk to the mudflat habitats in the vicinity, or aquatic and birdlife using these habitats. The load from Carrigtwohill WwTP, while minimal in the context of the wider waterbody, considered 'alone' results in a predictive indicative quality of Moderate for DIN (summer and winter) and MRP (summer only) in the area of the Slatty Water channel extending east of the discharge point, due to local hydrodynamics.

Phytoplankton and Macroalgal quality indicators can become elevated due to processes triggered by levels of nitrogen and phosphorous and/or the balance between these nutrients linked to the relative inputs of freshwater and seawater, biogeochemical processes (e.g., release of nutrient pools from sediments) within the estuary, as well as other factors such as light, temperature and hydrological processes (Ni Longphuirt *et al*, 2015²³). Nash *et al* (2011)²⁴ showed that phytoplankton blooms are associated with areas of increased residence time in the harbour and identified the Slatty Water Channel as one of those areas. The Slatty Water Channel is designated for Annex I mudflat habitat, with Annex I saltmarsh habitat occurring on its southern side (north edge of Fota Island). Either nitrogen or phosphorus may become the limiting nutrient driving algal growth in the upper parts of estuaries, and so the extent of the dispersion zone is discussed below in the context of the conservation objectives of the qualifying interests.

According to the conservation objectives, the total area of mudflats and sandflats habitats in the SAC is estimated at 723ha. Appropriate Assessment notes (Section 2 of the Conservation Objectives) provide guidance on the degree of ongoing anthropogenic disturbance (e.g., effluent discharge) that may lead to unfavourable conservation status of a broad sedimentary marine community type, stating that such activities should not exceed an approximate area of 15%. The area affected by reduced water quality associated with the discharge (Moderate status) is at most ca. 26ha of the single marine community in this habitat (mixed sediment to sandy mud with polychaetes and oligochaetes community complex), representing ca. 3.5% of this area. As such the impacted area is within the guidance criteria, and meets the targets specified for the conservation objective for this habitat.

Currently, the overflows not meeting DoEHLG criteria discharging to the Owennacurra estuary are having a localised impact on the marine community within the Annex I mudflat habitat in this area. The Owennacurra Estuary waterbody encompasses 112ha, or ca. 15% of the SAC area. The extent to which these overflows contribute to the current Moderate status of the waterbody is unknown, though the obvious impacts caused by SW010, SW011 and SW020 are limited to the uppermost part of the estuary comprising ca. 16ha of the total waterbody, of which ca. 50% of this area is mapped as Annex I habitat (ca. 1% of SAC). On a precautionary basis however the

²³ Ni Longphuirt, S; O'Boyle, S and DB Stengel (2015) Environmental response of an Irish estuary to changing land management practices. *Science of the Total Environment* 521/522: 388-399.

²⁴ Nash, Stephen; Hartnett, Michael; Dabrowski, Tomasz (2011). Modelling phytoplankton dynamics in a complex estuarine system. *Proceedings of the Institution of Civil Engineers - Water Management* 164 (1), 35-54

non-complaint overflows must be assumed to present a disturbance risk to the mudflat habitat across the entire waterbody, potentially causing a failure to meet the 15% conservation objective guideline when considered with the dispersion zone around Carrigtwohill.

With respect to the other qualifying interest of the SAC, Atlantic Saltmarsh, two distinct areas of Annex I habitat are mapped by NPWS, with the majority associated with site 0060 which extends along the north shore of Fota Island opposite the Carrigtwohill discharge location. These mapped sub-sites encompass just 1.3ha of the saltmarsh in the SAC, with an additional 17.6ha unsurveyed saltmarsh, giving a total estimated area of 18.9ha (NPWS, 2014a). The largest-modelled future-scenario dispersion zone extends east of the discharge point and interacts with ca. 3.5% of the total saltmarsh area in the SAC.

There are no specific water quality targets or disturbance thresholds specified in the conservation objectives. While estuaries are naturally rich in nutrients, significant eutrophication could alter the composition of the saltmarsh vegetation community, as more nutrient-tolerant species have a competitive advantage. Studies outside of Ireland have found that nutrient enrichment can alter the community composition and structure of saltmarsh communities (Cardoni *et al*, 2011²⁵; Johnson *et al*, 2016²⁶).

Saltmarsh vegetation has also been shown to vary with respect to soil nutrients in Irish estuaries (Penk *et al*, 2018²⁷), though only a weak link was found with nutrients in the water column (Perrin *et al*, 2020²⁸), with the authors suggesting that this implies that sources other than tidal waters may dominate the nutrient budgets of saltmarsh plant communities in Ireland. On a precautionary basis however, the potential effects of the maintenance of moderate status water quality conditions across ca. 3.5% of the saltmarsh habitat on the vegetation composition conservation objective is considered further below.

The saltmarsh vegetation of the Carrigtwohill sub-site has been described (NPWS, 2014b). Using this species list, the Ellenberg indicator values for nitrogen for each species were reviewed (Hill *et al*, 1999²⁹). These indices score plants on a scale of 1 (indicating very low fertility sites) to 9 (high fertility sites) on the basis of their affinity for nitrogen. The plant species present at Carrigtwohill, which are characteristic of saltmarsh habitat in general, score between 4 and 6 and so are all considered indicators of intermediate fertility sites.

Reviewing the WFD status history of this waterbody, it has been assigned Moderate status since the 2007-2009 monitoring cycle, partially driven by Moderate nutrient conditions. Despite this, the saltmarsh assessments carried out by NPWS assigned the Carrigtwohill saltmarsh site favourable

²⁵ Cardoni, D.A; Isacch, J.P; Fanjul, M.E; Escapa, M & O.O. Iribarne (2011) Relationship between anthropogenic sewage discharge, marsh structure and bird assemblages in an SW Atlantic saltmarsh. *Marine Environmental Research* 71: 122-130

²⁶ Johnson, D.S; Warren, R.S; Deegan, L.A; & T.J Mozdzer (2016) Saltmarsh responses to eutrophication. *Ecological Applications* 26 (8) pp. 2649-2661.

²⁷ Penk, M.R; Perrin, P.M; Kelly, R, O'Neill, F; Waldren, S (2020) Plant diversity and community composition in temperate northeast Atlantic salt marshes are linked to nutrient concentrations. *Applied Vegetation Science*. 2020: 23; 3-13

²⁸ Perrin, P.M; Waldren, S; Penk, M.R. & F.H. O'Neill (2020) Saltmarsh Function and Human Impacts in Relation to Ecological Status (SAMPHIRES) EPA Research Report (2015-W-MS-19)

²⁹ Hill, M.O; Mountford, J.O; Roy, D.B and RGH Bunce (1999) Ellenberg's indicator values for British plants. *ECOFAC* Volume 2 Technical Annex. Institute of Terrestrial Ecology. <http://nora.nerc.ac.uk/64111/1/ECOFAC2a.pdf>

conservation status with respect to structure and functions (inclusive of vegetation composition), and did not identify nutrient enrichment as a threat to the site (NPWS, 2014b). While the overall status of this site is Unfavourable-Bad with a 'restoration' objective, this was due to its extent which has been impacted by land use changes in the past. The modelling results indicate that there will not be a change in the water quality conditions that currently sustain this habitat in the context of background pressures, with minimal difference between the baseline and future scenarios in terms of the extent of the mixing zone. The future discharge is therefore not expected to drive significant changes in species composition relative to the established baseline, with conditions suitable for the locally characteristic saltmarsh plant species (which require sites of intermediate fertility) being maintained. Maintenance of moderate status conditions will not therefore hinder the maintenance of saltmarsh habitat structures and functions or hinder the restoration of the site extent conservation objective.

Adverse effects on Birds

The qualifying waterbird species are most likely to be indirectly affected by effluent discharges via impacts to their estuarine habitats and prey species, while untreated intermittent discharges may also pose a health threat if they occur at inappropriate times e.g., more frequently than intended, into areas of low or no water, or during dry spells. These effects could result in a shift in species range, timing or intensity of use of particular areas, or affect prey biomass, thus compromising their ability to achieve their conservation objectives targets for these attributes (**Table 13.0**).

Following on from the assessment with respect to Annex I habitats above, the treated effluent from the Carrigtwohill and Midleton discharge points will not result in significant effects to qualifying habitats of the SAC in these areas in the context of their conservation objective targets. Their value as supporting wetland habitat for the conservation interests of the SPA will therefore be maintained. Ammonia arising from the Carrigtwohill and Midleton discharge points, must be considered further as it is known to pose the most risk to fish the marine environment, particularly in its unionized form, and reductions in fish species abundance or diversity could affect piscivorous conservation interests. The toxicity of ammonia (96 h LC50) to freshwater fish species is in the range 0.068–2.0 mg^l⁻¹ NH₃, similar to the range for marine species, 0.09–3.35 mg^l⁻¹ NH₃, and it is likely that the toxicity of ammonia to estuarine fish falls within these ranges (Eddy, 2005³⁰). The Water Quality Modelling (**Modelling Report, Figure 3-12 & 13**) demonstrates that unionised ammonia in the areas around the Midleton and Carrigtwohill discharges are below these levels. These areas are also below the protective limit of 0.025 mg/l proposed in other jurisdictions³¹ aside from the immediate mixing zone of the Carrigtwohill discharge. In terms of Ammonia therefore, the discharges do not have the potential to significantly effect populations of marine or estuarine fish, or significantly impact any migratory species passing through the estuary to the rivers. Consequently, there is no significant effects upon bird species associated with the SPA from the Carrigtwohill and Midleton primary and secondary discharges.

As described above however, currently the overflows to the Owennacurra estuary are having an impact on the marine community within the Annex I mudflat habitat in this area, reducing the

³⁰ Eddy, F.B. (2005) Review Paper - Ammonia in Estuaries and effects on fish. *Journal of Fish Biology* (2005) 67, 1495-1513.

³¹ Johnson I, Sorokin N, Atkinson C, Rule K and Hope S-J (2007). Proposed EQS for Water Framework Directive Annex VIII substances: Ammonia (un-ionised). Science Report: SC040038/SR2. Environment Agency, Bristol, UK

value of the supporting wetland habitat for the conservation interests of the SPA. Further to the feeding resources provided by the mudflat habitat, aquatic prey species including salmon, trout, lamprey and eel occur in the Dungourney & Owennacurra river catchments. The overflows present a risk to these aquatic species, and consequently reduce the value of this part of the estuary for the piscivorous conservation interests of the SPA. Data on feeding ranges indicates that terns are likely to forage throughout the harbour (Thaxter *et al.*, 2012), though the Owennacurra estuary may be at the outer edge of their range. The pollution evident in the Owennacurra estuary could also pose a health threat to feeding wintering waterbirds and summer-visiting terns, and impact on their feeding resource should they feed in this area.

Potential Cumulative or In-combination Effects

As described earlier, the County Development Plans and River Basin Management Plan support the prioritisation of actions to deal with significant pressures affecting the catchment, which include the ongoing infrastructural improvements in Carrigtwohill and Midleton, as well as addressing other catchment pressures such as agriculture, forestry, other urban waste water agglomerations and hydromorphology. It is further highlighted that the water quality modelling study used as supporting information for this assessment captured the background pressures in the waterbodies, encompassing ongoing water quality impacts arising across the catchment.

On the 13th of February 2023, a conditional planning grant was obtained by Uisce Éireann from Cork County Council (Planning Ref: 25/05032) for the Midleton North Pumping Station and Network. This was subsequently appealed to An Bord Pleanála (Planning Ref: ABP-316013-23). Timeframes for the construction and commissioning of Midleton North Pumping Station and Network are contingent on the successful grant of planning following an appeal to An Bord Pleanála. This project involves the diversion of a wastewater load totalling approximately 4,177pe from Midleton wastewater network to Carrigtwohill WwTP. The Water Rock Pumping Station project and the Water Rock to Carrigtwohill pipeline project are underway in 2023.

As part of the Midleton Wastewater Network Upgrade Project, Uisce Éireann has committed to the upgrading relevant SWOs in the Midleton agglomeration to ensure compliance with DoEHLG criteria as per Schedule A.4 Condition 5.6. of the WWDL D0056-01.

The developments in-progress will address the infrastructural deficits in the amalgamated agglomeration. Cumulatively these improvements will address the urban wastewater pressures on the relevant waterbodies while catering for increased capacity, ensuring all discharges meet the required discharge standards or SWO criteria. Hence considered cumulatively with the Project, there is no potential for negative cumulative effects on any qualifying interest.

Mitigation Measures

The assessment has concluded that the discharges from the Midleton-Carrigtwohill agglomeration have the potential to adversely affect the qualifying interests of the Great Island Channel SAC and Cork Harbour SPA as a result of the non-compliant overflows within the current Midleton agglomeration.

The primary mitigation measure to address the risk to the European Sites is to upgrade the non-compliant overflows to the Owennacurra estuary and bring them into compliance.

In addition, to ensure satisfactory operation of the Midleton-Carrigtwohill agglomeration in line with the discharge licence the authors recommend the following:

- Ensure that the capacity of the WwTP's are not exceeded;
- Ensure the primary and secondary discharges operate in compliance with the proposed ELVs; and
- Continue monitoring the effluent and receiving waters, on a consistent and regular basis.

NIS Conclusion Statement

This NIS has been prepared following the EPA (2009) '*Note on Appropriate Assessments for the purposes of the Waste Water Discharge (Authorisation) Regulations, 2007 (S.I. No. 684 of 2007)*'. The Department of the Environment, Heritage and Local Government guidance '*Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities*' (DoEHLG, 2009) has also been taken into account. This NIS for the Waste Water Discharge Licence Review investigates the potential adverse effects on the aquatic qualifying interests of the Natura 2000 network arising from the plant discharge, in combination with other plans / projects affecting the aquatic environment. The assessment considers whether the Midleton-Carrigtwohill agglomeration operational discharges, alone or in combination with other projects or plans, will have adverse effects on the *integrity* of a European site in view of its conservation objectives, and includes consideration of any mitigation measures that may be necessary to avoid, reduce or offset negative effects. Its purpose is to assist the competent authority, the EPA, in carrying out its AA of the proposed licence review.

Based on the assessment herein it has been concluded that there will be no adverse effects on the integrity of the Great Island Channel SAC, Cork Harbour SPA, or any other European Site, in view of this site's conservation objectives and that the conservation status of the Annex I habitats, or Annex I bird species, will not be compromised by the agglomeration discharges either directly, indirectly or cumulatively.

It is therefore concluded that the Midleton-Carrigtwohill agglomeration operational discharges, alone or in-combination with other plans and / or projects will not give rise to adverse effects on the integrity of Great Island Channel SAC, Cork Harbour SPA, or any other European Site.

APPENDIX A
INTERTEK WATER QUALITY MODELLING REPORT, JULY 2023