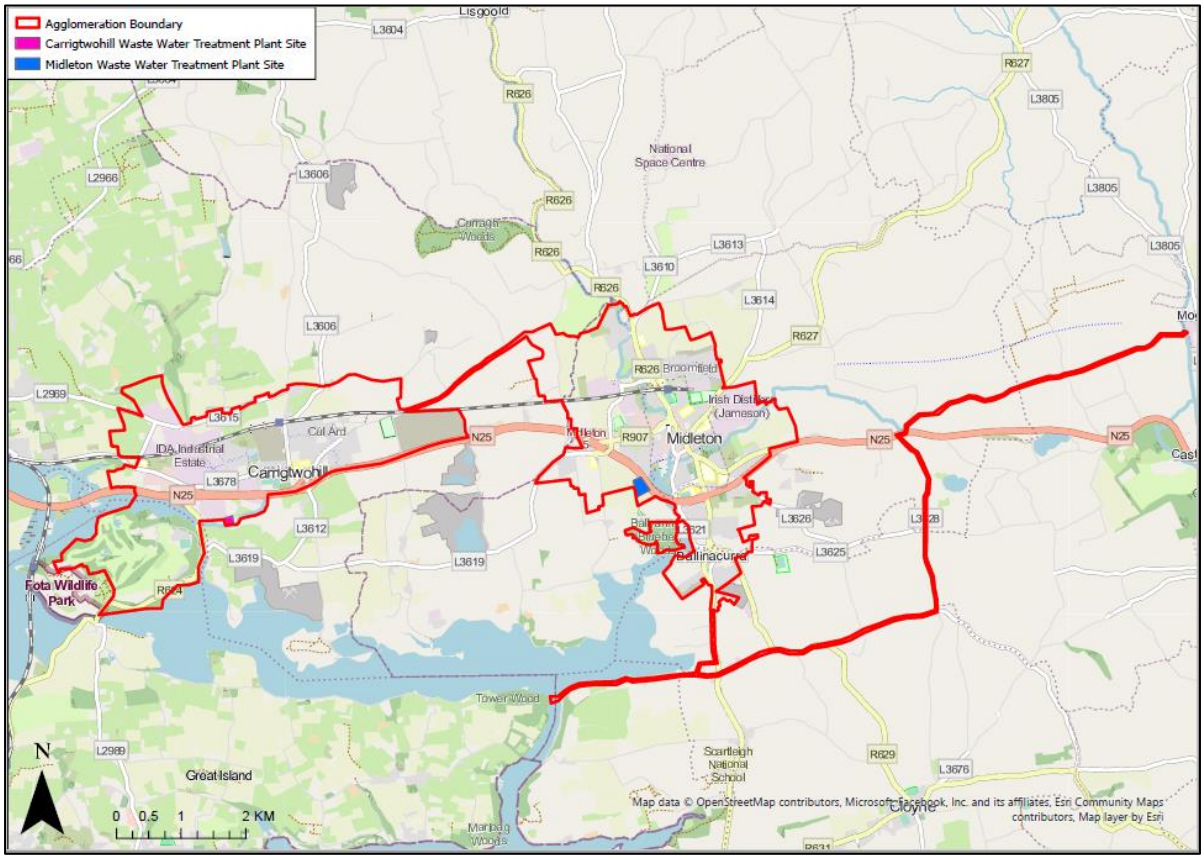
MIDLETON WASTE WATER DISCHARGE LICENCE REVIEW – D0056-01

ENVIRONMENTAL IMPACT ASSESSMENT REPORT - NON-TECHNICAL SUMMARY



JULY 2023

UISCE ÉIREANN

MIDLETON WASTE WATER DISCHARGE LICENCE REVIEW

EIAR NON-TECHNICAL SUMMARY

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JULY 2023

PROJECT NO. 20893-12					
Revision	**Reason for Revision**	**Prepared by**	**Reviewed by**	**Approved by**	**Issue Date**
A	Internal Review	NOD	UD/JM	CAS	22/06/2023
B	Version for Client Review	NOD	JM	CAS	12/07/2023
Final	Final for WWDL Review	NOD	JM	CAS	17/07/2023

CONTENTS

1. INTRODUCTION

An Environmental Impact Assessment Report (EIAR) has been prepared in support of an application made to the Environmental Protection Agency (EPA) by Uisce Éireann (UÉ) for the Midleton Waste Water Discharge Licence (WWDL) D0056-01 Review Application.

The subject matter of this EIAR solely relates to the amalgamated Midleton and Carrigtwohill agglomeration operational discharges, namely, (i) a Primary Discharge (SW009) from the existing Carrigtwohill Waste Water Treatment Plant (WwTP), (ii) Secondary Discharge (SW001) from the existing Midleton WwTP (iii) Dual Function Overflows (SW003, SW004, SW008, SW010, SW011, SW012, SW014, SW016, SW017, SW018, and SW019), iv) Storm Water Overflows (SW005, SW006, SW007, SW020, and SW021), and v) Emergency Overflows (SW013, SW015, and SW022). These existing operational discharges are herein referred to as the "*The Project*" in this document.

This document is a summary of the information contained in the EIAR. For detailed information please consult the main EIAR document.

1.1. Need for D0056-01 Review

UÉ is submitting a licence review of the existing WWDL (Reg No. D0056-01) for the Midleton Agglomeration in accordance with Regulation 14(1)(b) of the European (Waste Water Discharge) Regulations, 2007- 2020 (as amended) to the Environmental Protection Agency (EPA).

UÉ has concluded that a Waste Water Licence Review of the current WWDA D0056-01 is required due to the following:

1. Industrial connection (P1103-01) into the UÉ network downstream of the Midleton WwTP
2. The amalgamation of Carrigtwohill and Environs licence into the Midleton licence, thereby resulting in an increase in PE over that which is authorised in the Midleton Licence
3. Change to Emission Limit Values (ELVs) (*e.g,* replacing TON and NH_3 ELVs with DIN for Carrigtwohill deemed necessary to support the water quality objectives of the receiving waterbodies and pH range change for Midleton deemed necessary to ensure consistency with pH ELV's on a national basis).

Some relevant changes to the Midleton Licence as a result of this review include:

4. The regularisation of a number of additional overflows
5. Agglomeration boundary changes
6. Change to the Carrigtwohill downstream ambient monitoring station

As part of the WWDL Review, the Carrigtwohill Agglomeration (D0044-01) will be amalgamated into the current Midleton Agglomeration (D0056) and hence revoked once the revised Midleton licence is issued.

1.2. Location of the Project

Midleton is a settlement located approximately 20km east of Cork City on the Owennacurra River and the N25 road, connecting Cork to Rosslare. It is an important metropolitan of Cork City. The WwTP is located at National Grid Reference (NGR) 187505E, 72801N in the

townland of Garryduff in the southeast of Midleton and serves the agglomeration of Midleton.

Carrigtwohill is a town located 14km east of Cork City situated along the N25. Carrigtwohill is an important hub for many pharmaceutical and biotechnology industries in Cork. The WwTP is located to the south of the town at NGR 181177E, 72228N and can be accessed *via* the R624.

Figure 1.1 shows the proposed amalgamated Midleton and Carrigtwohill agglomeration boundary, including the location of the Midleton and Carrigtwohill WwTPs.

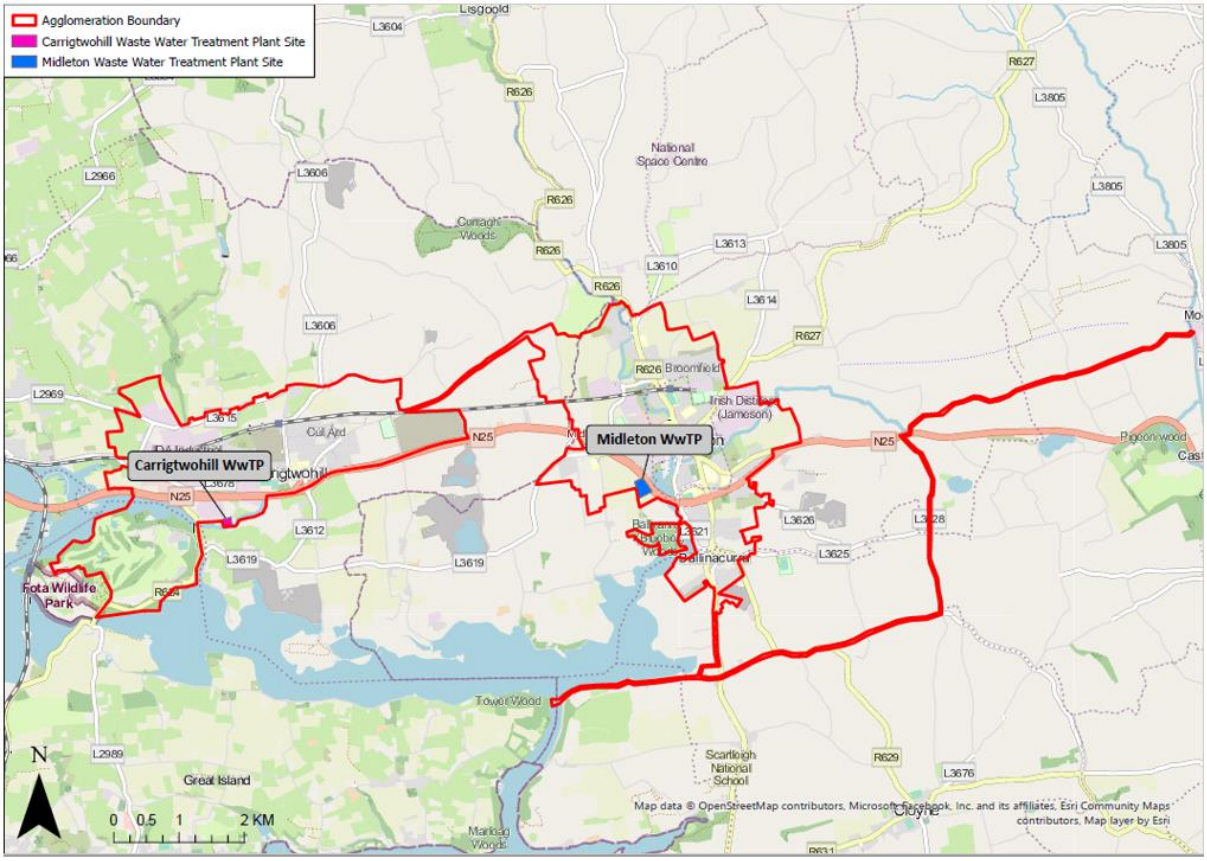


Figure 1.1 Location of proposed amalgamated Midleton and Carrigtwohill Agglomeration Boundary (red line), Midleton WwTP, and Carrigtwohill WwTP

1.3. Background

1.3.1. Amalgamation of Agglomerations

The Midleton agglomeration (D0056-01) (*i.e.*, the area in Midleton which is connected *via* a pipe network to the Midleton WwTP), is served by a sewerage system that comprises combined foul and surface water drainage network, Pumping Stations, rising mains and the aforementioned Midleton WwTP.

The Carrigtwohill agglomeration (D0044-01) which is connected *via* a pipe network to the Carrigtwohill WwTP), is served by a partially combined drainage network that also consists of Pumping Stations, rising mains and the aforementioned Carrigtwohill WwTP.

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). Midleton WwTP has a design capacity of 15,000 population equivalent (p.e.) and is currently organically overloaded with a peak weekly loading of 16,652 p.e. (Source:

2022 Annual Environmental Report (AER) D0056-01), and therefore the plant 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 UÉ 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 will divert waste water loads from the Midleton agglomeration to the existing Carrigtwohill and Environs WwTP (Design p.e. 30,000). The current organic loading (peak weekly load) is 8,654 p.e. (Draft 2022 AER D0044-01) and therefore the plant is not organically overloaded and has a large amount of remaining capacity.

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 Carrigtwohill WwTP for treatment. This will provide immediate relief at the Midleton WwTP.

From the new Water Rock Pumping Station, a new network will be constructed to Carrigtwohill to divert future loads from the UEA Housing site (*ca.* 7,000 p.e) in North Midleton. There will be no SWO or EO at this new Pumping Station.

In the absence of The Project, there would continue to be inadequate capacity at Midleton WwTP to effectively treat waste water from the area served, therefore this Project is essential to the future social and economic growth of residents and businesses in the Midleton and Carrigtwohill area.

Further details on the above projects and infrastructure are provided in **Section 1.2.4** of the Main EIAR Document.

1.3.2. Existing Waste Water Works

Midleton

The Midleton WwTP provides secondary treatment using extended aeration followed by clarification, and tertiary treatment *via* UV disinfection of the final effluent. It has a design capacity of 15,000 p.e. As cited above, the current organic loading (peak weekly load) is 16,652 p.e. and therefore the plant is currently organically overloaded and does not have the capacity to cater for additional loads from proposed development sites in Midleton. There are 13 no. overflows within the Midleton agglomeration, of which 4 no. are licensed under D0056-01 (*i.e.,* SW03MIDL, SW04MIDL, SW05MIDL, SW07MIDL). Refer to **Table 1.1**.

Midleton agglomeration is the subject of a European Courts of Justice (ECJ) ruling citing non-compliance with Article 3 of Urban Waste Water Treatment Directive (UWWTD), *i.e*., SWO non-compliance. There are 3 no. non-compliant SWOs at Bailick No.1 Pumping Station, Bailick No.2 Pumping Station, and Riversfield Estate. UÉ reports regularly to the European Union on ECJ agglomerations and has committed that all works necessary to achieve network compliance in Midleton will be completed by Q4 2029 for the three non-compliant SWOs. Refer to **Section 3.7** of the Main EIAR Document.

Table 1.1 Overflows Relating to the Midleton Functional Area

Current Licence Name	Asset	SWO/EO	Overflow Discharge Location Coords (NGR)
SW03MIDL*	Bailick No. 1 Pumping Station	SWO/EO	187975, 73109
SW04MIDL*	Bailick No. 2 Pumping Station	SWO/EO	188047, 72518
SW05MIDL	Ballinacurra No. 2 Pumping Station	SWO/EO	188518, 71783
Not Available	Bailick No. 3 Pumping Station	EO	188272, 72060
SW07MIDL	Dwyers Road Pumping Station	SWO/EO	187475, 72902
Not Available	Oakwood Pumping Station	EO	188573, 73373
Not Available	Roxboro Mews Pumping Station	SWO/EO	188346, 73332
Not Available	The Rock Pumping Station	SWO/EO	188265, 73232
Not Available	Roxboro Housing Estate Pumping Station	SWO/EO	188332, 73316
Not Available	Old Youghal Road Pumping Station	SWO/EO	188703, 73401
Not Available	Riversfield Estate SWO (Network)	SWO	187687, 73025
Not Available	Drury's Avenue SWO (Network)	SWO	188346, 73332
Not Available	Ballinacurra No.1 Pumping Station	EO	188366, 71791

**Not Meeting DoEHLG SWO criteria.*
Note: Additional overflows to be regularised as part of D0056-01 WWDL review

The Midleton WWDL was granted on the 6th of January 2011 and was subsequently amended on the 19th of December 2016 (Technical Amendment A), 20th October 2020 (Technical Amendment B) and on the 2nd of December 2021 (Technical Amendment C).

Treated effluent from the Midleton WwTP currently discharges to the North Channel Great Island at NGR 186177N, 69506E *via* primary discharge outfall SW001 at Rathcoursey Point.

The proposed amalgamation of Midleton and Carrigtwohill agglomerations will result in diversion of loads (max. *ca*. 11,177 p.e) from the Midleton agglomeration to the existing Carrigtwohill WwTP (Design p.e. 30,000). The current organic loading of the Carrigtwohill

WwTP is 8,654 p.e. (Source: 2022 AER) meaning there is significant spare capacity to cater for these proposed diverted loads.

The **existing** licensed ELVs for the primary discharge from Midleton WwTP as per D0056-01 are as per **Table 1.2** below:

Table 1.2 Existing ELVs 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	6.5 - 9

The current primary discharge (SW01 MIDL) for the Midleton agglomeration is to the North Channel Great Island 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 industry (Industrial Emission licence Reg. No. P0442-02 and No. P1103-01). The combined Midleton WwTP and Industrial flows are conveyed to the Rathcoursey Holding Tank.

The storage capacity of the Rathcoursey Tidal Holding Tank (total storage capacity including inlet pipe storage is 2,175.5m^3) and is insufficient to manage the peak hydraulic loadings from the Middleton agglomeration. The existing Rathcoursey Tidal Holding Tank does not have capacity to cater for more than 5 hours sustained peak discharges from Midleton WwTP without overflowing.

UÉ 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 applications for planning permission to facilitate upgrades to the tank.

Carrigtwohill

Carrigtwohill WwTP provides tertiary N and P removal and has an operational plant capacity of 30,000 p.e. As previously stated, the current organic loading (peak weekly load) is 8,654 p.e. and therefore the plant is not organically overloaded and has a large amount of remaining capacity. There are 6 no. overflows within the agglomeration, of which 2 no. are licensed under the D0044-01 licence (*i.e.,* SW003 and SW004) (see **Table 1.3** below).

Table 1.3 Overflows Relating to the Carrigtwohill Functional Area

Current Licence Name	Asset	SWO/EO	Overflow Discharge Location Coords (NGR) as per WWDL
Not Available *	Located at Carrigtwohill WwTP	SWO	179911, 72605
SW003	Barryscourt Pumping Station	SWO/EO	181276, 72256
Not Available *	Church Lane (Network)	SWO	181544, 73040
Not Available *	Elm Road (Network)	SWO	181544, 73040
SW004	IDA Pumping Station No.1	SWO/EO	181133, 72310
Not Available	Old Cobh Road Pumping Station	SWO/EO	180594, 72283

**Not Meeting DoEHLG "Procedures and Criteria in Relation to Storm Water Overflows",* 1995.
Note: "Not Available" are additional overflows to be regularised as part of D0056-01 WWDL review

The Carrigtwohill and 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 of December 2021 (Technical Amendment B).

At the time of the grant of the licence, the plant 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 179911E, 72583N *via* primary discharge outfall SW009.

All flows arriving to Carrigtwohill WwTP receive tertiary treatment with Phosphorus and Nitrogen removal.

The **existing** licensed ELVs for the primary discharge from Carrigtwohill WwTP as per D0044-01 are shown in **Table 1.4** below:

Table 1.4 Existing ELVs for Carrigtwohill WwTP (SW001)

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
TON	20 mg/l
Ammonia (Total)	5 mg/l
pH	6 – 9

1.3.3. Other Projects

Midleton Waste Water Network Upgrade Project

Midleton agglomeration is the subject of a ECJ ruling citing non-compliance with Article 3 of UWWTD, *i.e.,* SWO non-compliance. UÉ reports regularly to the European Union (EU) on ECJ agglomerations and has committed that all works necessary to achieve network compliance in Midleton will be completed by Q4 2029.

Addressing Midleton network non-compliance is also on the EPA Priority Action List (PAL). This infringement notice relates to the collecting systems (sewers and pumping stations). Currently, the Midleton agglomeration does not have sufficient capacity to collect and retain wastewater, and therefore at times releases waste water into the environment before it can reach the treatment plant.

The main aim of the Midleton Waste Water Networks Upgrade Project will be to reduce flood risk and ensure all SWOs meet DoEHLG Criteria, UÉ technical standards, and the EPA issued Waste Water Discharge Authorisation (WWDA). Furthermore, completion of the upgrade project will improve waste water treatment and therefore ensure Midleton is removed from the EPA PAL and will ensure compliance with EU treatment standards (Article 3 of UWWTD, *i.e*., SWO non-compliance).

Rathcoursey Tidal Holding Tank

As mentioned above, treated effluent from the Midleton WwTP discharges to the North Channel Great Island at Rathcoursey Point via a diffuser after passing through Rathcoursey Tidal Holding Tank. This Tidal Holding Tank is insufficient in size to manage the peak hydraulic loading from the Middleton agglomeration. UÉ is currently examining options to provide additional storage capacity and limit the discharges from the tank to the periods as defined in the Foreshore Licence (FS 004170).

1.3.4. Subject Matter of EIAR

As mentioned, the EIAR being submitted with the WWDA Review Application considers the impact of the **existing operational discharges** associated with the amalgamated Midleton and Carrigtwohill agglomeration on the receiving environment.

It does not assess the impacts associated with the construction of the above-mentioned projects which have already received planning permission, or are in the process of obtaining planning permission, or have been classed as exempted development.

A description of The Project, *i.e*., the existing operational discharges of the amalgamated Midleton and Carrigtwohill agglomeration, is provided in **Chapter 3** of the main EIAR document.

1.3.5. The EIAR Team

Table 1.5 lists the competent experts who were involved in the preparation of each Chapter of the EIAR.

Table 1.5: EIA Chapters and Competent Experts

EIA Chapter	Company	Name & Qualifications
Chapter 1 - Introduction	Nicholas O'Dwyer Ltd	

EIA Chapter	Company	Name & Qualifications
Chapter 2 - The EIA Process		Krista Farrugia, Principal EIA Consultant, BSc, MSc, PgDip, PIEMA John Morris, Senior Environmental Consultant, Nicholas O' Dwyer Ltd., BSc, PgDip Robbie Clarke, Senior Environmental Consultant, Nicholas O' Dwyer Ltd., BSc, MSc
Chapter 3 - Description of The Project and Site		
Chapter 4 – Policy & Legislative Context		
Chapter 5 - Biodiversity	Thorne Ecology	Kate Harrington, Principal Ecologist, MSc, MCIEEM
Chapter 6 - Water	AWN Consulting Ltd	Marcelo Allende, Senior Environmental Consultant, BSc, BEng
Chapter 7 - Population & Human Health	Enviroguide Consulting	Louise Hewitt, Environmental Consultant, BSc, MSc
Chapter 8 - Material Assets	Enviroguide Consulting	Louise Hewitt, Environmental Consultant, BSc, MSc
Chapter 9 - Traffic and Transport	Nicholas O'Dwyer Ltd	Graham Young, Nicholas O' Dwyer Ltd., Senior Engineer, CEng, Dip. PM, BA BAI
Chapter 10 - Air Quality and Climate	AWN Consulting Ltd	Ciara Nolan, Senior Air Quality Consultant, MSc, BSc, AMIAQM, AMIEnvSc
Chapter 11 - Noise and Vibration	AONA Environmental Consulting Ltd	Mervyn Keegan, Director, MSc, BSc, MIAQM, MIOA
Chapter 12 - Odour	AWN Consulting Ltd	Ciara Nolan, Senior Air Quality Consultant, MSc, BSc, AMIAQM, AMIEnvSc
Chapter 13 - Archaeology, Architectural and Cultural Heritage	Courtney Deery Heritage Consultancy Ltd.	Clare Crowley Senior Archaeologist and Heritage Consultant, PhD, BA
Chapter 14 - Lands, Soils and Geology	AWN Consulting Ltd	Marcelo Allende, Senior Environmental Consultant, BSc, BEng

EIA Chapter	Company	Name & Qualifications
Chapter 15 - Landscape and Visual	Stephenson Halliday	Daniel Leaver, Associate Director, BSc, MSc, CMLI
Chapter 16 - Risk of Major Accidents and/or Disasters	Nicholas O'Dwyer Ltd	Krista Farrugia, Principal EIA Consultant, Nicholas O' Dwyer Ltd., BSc, MSc, PgDip, PIEMA
Chapter 17 - Interactions	Nicholas O'Dwyer Ltd.	Krista Farrugia, Principal EIA Consultant, Nicholas O' Dwyer Ltd., BSc, MSc, PgDip, PIEMA
Chapter 18 – Schedule of Mitigation Measures	Nicholas O'Dwyer Ltd.	John Morris, Senior Environmental Consultant, Nicholas O' Dwyer Ltd., BSc, PgDip
Chapter 19 - Bibliography	Nicholas O'Dwyer Ltd.	John Morris, Senior Environmental Consultant, Nicholas O' Dwyer Ltd., BSc, PgDip
Chapter 20 – Abbreviations	Nicholas O'Dwyer Ltd.	John Morris, Senior Environmental Consultant, Nicholas O' Dwyer Ltd., BSc, PgDip

In addition to the main contributors to the EIAR, information on the contents of this EIAR was sought from relevant stakeholders in an EIA scoping consultation process. Refer to **Section 2.3** below for further details.

2. EIA PROCESS

2.1. Introduction

The process by which the *likely significant effects* of a Project on the environment are assessed is set out in the EU EIA Directive 2011/92/EU and has been transposed to Irish law in terms of Waste Water Discharges by S.I. No. 214/2020 - European Union (Waste Water Discharge) Regulations 2020.

The EIA process includes a number of key characteristics:

- It is systematic, comprising a sequence of tasks defined both by regulation and by practice;
- It is analytical, requiring the application of specialist skills from the environmental sciences;
- It is impartial, its aim being to inform the decision-makers;
- It is consultative, with provision being made for obtaining feedback from interested parties, including local authorities and statutory agencies; and

- It is interactive, allowing opportunities for environmental concerns to be addressed during the planning, design, and implementation of a project.

The structure and general sequence of this EIAR follows the EPA Guidelines (2022). The process may be summarised succinctly as follows:

- Screening – determines what aspects of the environment should be considered and to what extent.
- Scoping – determines what aspects of the environment should be considered and to what extent.
- Preparation of EIAR – a tool to inform the decision-maker, which presents baseline information, impact assessment, and mitigation measures.

The EIAR informs the EIA process being conducted by the Competent Authority (CA), which in this case is the EPA, as part of the WWDA process.

2.2. EIA Screening

This is a WWDL Review Application for a WwTP with a capacity of greater than 10,000 p.e as defined in Article 2, point (6), of the UWWTD. Therefore, a mandatory EIA, and the preparation of an EIAR is required for The Project to inform the WWDA process.

2.3. EIA Scoping Process

The scoping stage of an EIA is a process of determining the content and extent of the matters which should be covered in the environmental information to be assessed in the EIAR.

Nicholas O' Dwyer Ltd., on behalf of UÉ, prepared a Scoping Report describing the nature of the operational discharges from the Midleton and Carrigtwohill agglomeration, the need for The Project, and for each environmental factor as listed in the EIA Directive, the baseline environment, proposed assessment methodology and potential for likely significant effects.

On 27th September 2022, in accordance with Regulation 17C of the European Union (Waste Water Discharge) Regulations 2007, as amended, UÉ submitted an EIA Scoping Report to the EPA with a request for the Agency to provide its opinion in writing on the scope and level of detail of the information required to be included in the EIAR.

The Agency consulted with the below listed bodies on 28th September 2022:

- Health Service Executive (HSE);
- Health and Safety Authority (HSA);
- An Taisce;
- Fáilte Ireland;
- Cork County Council (Planning Section and Environment Section);
- Environmental Co-ordination (Department of Agriculture);
- Marine Institute (MI);
- Sea Fisheries Protection Authority (SFPA);
- An Bord Pleanála (ABP);

- Inland Fisheries Ireland (IFI); and
- Teagasc.

A summary of the comments and recommendations received from the agencies and organisations has been provided in **Table 2.1.** below.

Table 2.1:Scoping Responses

Consultee	Date of Response	Summary of Response	Acknowledgement of Response
Sea Fisheries Protection Authority (SFPA)	21/10/2022	The consultee raised no topics for attention.	Noted
Inland Fisheries Ireland (IFI)	14/10/2022	The IFI state that 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 failed to see how a *'notionally clean river approach'* could be applied when assessing the environmental impact of the Midleton and Carrigtwohill Agglomeration WwTPs.	The assessment contained herein has taken full regard of the IFI submission. The Water Quality Modelling Intertek, 2023 prepared to inform this WWDA application has applied two scenarios to understand the potential impact of the Carrigtwohill and Midleton primary and secondary discharges on the receiving water environment. The Water Quality Modelling represents the proposed ELV (Emission Limit Value) scenario. This includes an assessment of the maximum potential impact under future operating conditions of UÉ continuous discharges and industrial discharges. The calibrated and validated model provides a baseline condition representing typical winter / summer conditions validated against EPA routine WFD water quality sampling. In addition to this approach, it was considered that the *'Notionally Clean approach'* should also be applied to determine the potential impact of the Carrigtwohill primary discharge alone on the mixing zone.

Consultee	Date of Response	Summary of Response	Acknowledgement of Response
Health Service Executive (HSE)	20/10/2022	The HSE recommended that public consultation and the wider determinants of health and wellbeing are considered, including: Population and Human Health; Hydrology and Hydrogeology; Noise and Vibration; Air and Climate; Odour; Land, Soils and Geology; and Ancillary Facilities. The HSE also referred to guidance documents to utilise when preparing the EIAR.	The assessment contained herein has taken full regard of the HSE submission.

The scoping responses received, and the Scoping Opinion received from the EPA, as detailed in **Sections 2.2.2** and **2.3** of the main EIAR document, were taken into consideration throughout the process of preparing this EIAR.

2.4. EIAR Structure

The composition of this EIAR is in accordance with EPA Guidelines (2022) which requires that information contained within an EIAR should be in accordance with the EIA Directive 2014/52/EU.

This EIAR has been prepared with consideration of the EPA's *"Guidelines on the Information to be Contained in Environmental Impact Assessment Reports"* (May 2022), and the *"Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment",* Department of Housing, Planning and Local Government (August 2018).

The overfall structure of the EIAR is as:

- Chapter 1 - Introduction
- Chapter 2 – The EIA Process
- Chapter 3 - Description of The Project and Site
- Chapter 4 – Policy & Legislative Context
- Chapter 5 - Biodiversity
- Chapter 6 - Water
- Chapter 7 – Population & Human Health
- Chapter 8 - Material Assets
- Chapter 9 – Traffic and Transportation
- Chapter 10 - Air Quality and Climate Change
- Chapter 11 - Noise and Vibration
- Chapter 12 – Odour
- Chapter 13 - Archaeology, Architectural and Cultural Heritage
- Chapter 14 – Lands, Soils and Geology
- Chapter 15 - Landscape & Visual
- Chapter 16 – Risk of Major Accidents and/or Disasters

- Chapter 17 – Interactions
- Chapter 18 – Schedule of Mitigation Measures
- Chapter 19 – Bibliography
- Chapter 20 – Abbreviations
- Appendix 1 – Criteria for Rating Site Attributes – Estimation of Importance of Hydrology Attributes
- Appendix 2 – Water Quality Modelling Report, July 2023
- Appendix 3 – Water Framework Directive Screening Assessment, July 2023

3. DESCRIPTION OF PROJECT – OPERATIONAL DISCHARGES

Chapter 1 of this EIAR provides details on the background to the need for the amalgamation of the Midleton and Carrigtwohill agglomerations, and to the existing operational discharges from both functional areas.

Chapter 3, **Section 3.3** of the main EIAR document provides details on the operational discharges of the Midleton and Carrigtwohill agglomeration *i.e.*, the subject matter of this EIAR.

A summary of the operational discharges is provided in **Table 3.1**. below.

Table 3.1 Operational Discharges Relating to The Midleton WWDA Review

Current Licensed Discharge Name	Proposed Name in WWDL Review	Type	Asset	Discharge Location (NGR)
Carrigtwohill Functional Area				
SW001	SW009	Primary Discharge from amalgamated Agglomeration	Carrigtwohill WwTP	179911, 72583
N/A	SW005	SWO	Located at Carrigtwohill WwTP	179911, 72605
SW003	SW003	SWO and EO	Barryscourt Pumping Station	181276, 72256
SW004	SW004	SWO and EO	IDA Pumping Station No.1	181133, 72310
N/A	SW006	SWO	Church Lane (Network)	181544, 73040
N/A	SW007	SWO	Elm Road (Network)	181544, 73040
N/A	SW008	SWO and EO	Old Cobh Road Pumping Station	180594, 72283
Midleton Functional Area				
SW01MIDL	SW001	Secondary discharge from amalgamated Agglomeration	Midleton WwTP	186177, 69506
SW03MIDL	SW010	SWO/EO	Bailick No. 1 Pumping Station	187975, 73109
SW04MIDL	SW011	SWO/EO	Bailick No. 2 Pumping Station	188047, 72518
SW05MIDL	SW012	SWO/EO	Ballinacurra No. 2 Pumping Station	188518, 71783
N/A	SW013	EO	Bailick No. 3 Pumping Station	188272, 72060

Current Licensed Discharge Name	Proposed Name in WWDL Review	Type	Asset	Discharge Location (NGR)
SW07MIDL	SW014	SWO/EO	Dwyers Road Pumping Station	187475, 72902
N/A	SW015	EO	Oakwood Pumping Station	188573, 73373
N/A	SW016	SWO/EO	Roxboro Mews Pumping Station	188346, 73332
N/A	SW017	SWO/EO	The Rock Pumping Station	188265, 73232
N/A	SW018	SWO/EO	Roxboro Housing Estate Pumping Station	188332, 73316
N/A	SW019	SWO/EO	Old Youghal Road Pumping Station	188703, 73401
N/A	SW020	SWO	Riversfield Estate SWO (Network)	187687, 73025
N/A	SW021	SWO	Drury's Avenue SWO (Network)	188346, 73332
N/A	SW022	EO	Ballinacurra No.1 Pumping Station	188366, 71791

For information purposes only, **Table 3.1** shows the operational discharges associated with both Carrigtwohill and Midleton functional area.

3.1. Proposed Primary Discharge (SW009)

The proposed primary discharge (SW009) from the amalgamated Midleton-Carrigtwohill agglomeration will be the current primary discharge from the Carrigtwohill WwTP as per D0044-01 *i.e.,* discharge to Lough Mahon (Harper's Island) transitional waters at NGR 179911E, 72583N.

The location of the Primary Discharge (SW009) is shown in **Table 3.1** and on **Figure 3.1.**

The Project will result in flows (max *ca*. 11,177 p.e.) being diverted from the Midleton functional area to Carrigtwohill WwTP for treatment, prior to the discharge of treated effluent to the Lough Mahon (Harper's Island) *via* SW009 in accordance with the proposed ELVs as detailed in **Section 3.2** below. Refer to **Section 1.2.3** for details on the Midleton Waste Water Load Diversion Project.

3.2. Proposed Secondary Discharge (SW001)

The secondary discharge (SW001) for the agglomeration will be from Midleton WwTP and will continue to discharge to the North Channel Great Island transitional waters at NGR 186177N, 69506E at Rathcoursey Point.

The location of the Secondary Discharge (SW001) is shown in **Table 3.1** and on **Figure 3.1**.

3.3. Dual Function Overflow from Barryscourt Pumping Station (SW003)

There is a single Dual Function Overflow (SW003) at Barryscourt Pumping Station *i.e.,* an overflow which can act as an SWO or an EO depending on the event. The location of the Dual Function Overflow (SW003) is shown in **Table 3.1** and on **Figure 3.1**.

SWO

The SWO (SW003) at Barryscourt Pumping Station discharges to the Tibbotstown River at NGR 181276E, 72256N.

SW003 has been designed and meets the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995.

EO

Barryscourt is connected to Carrigtwohill WwTP *via* telemetry and has a backup permanent generator present to provide for continued operation of the Pumping Station in the event of an interruption in the power supply.

In event of a power failure or pump failure, or the capacity of the Pumping Station being exceeded, then flows will be discharged to the Tibbotstown River *via* EO SW003.

3.4. Dual Function Overflow from IDA Pumping Station No. 1 (SW004)

There is a single Dual Function Overflow (SW004) at the IDA Pumping Station. The location of the Dual Function Overflow (SW004) is shown in **Table 3.1** and on **Figure 3.1**.

SWO

The SWO (SW004) at IDA No.1 Pumping Station discharges to the Tibbotstown River at NGR 181133E, 72310N.

There are two Storm Tank compartments at the IDA No.1 Pumping Station. The combined capacity of the pumps, rising mains and Storm Tanks is 1,110 m^3, these tanks have screened overflow facilities. This will provide primary treatment in the event that effluent spills to the outfall.

SW004 has been designed and meets the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995.

EO

A standby power generator is present at the IDA No. 1 Pumping Station to provide for continued operation of the pumping station in the event of an interruption in the power supply.

If there was a "*catastrophic failure*" whereby there was a power failure, and the backup generator was to fail then flows would enter the stormwater storage tank. In the event that the capacity of the storm Pumping Station wet well is exceeded then excess flows will be pumped directly to the Tibbotstown River *via* EO SW004.

3.5. SWO from Carrigtwohill WwTP (SW005)

There is a single SWO (SW005) at Carrigtwohill WwTP which discharges to Lough Mahon at NGR at 179911E, 72605N. The location of SW005 is shown in **Table 3.1** and on **Figure 3.1**.

The WwTP provides 1,702 m^3 of Storm Water Storage, flows in excess of the Storm Water Holding Tank capacity will overflow to the Lough Mahon (Harper's Island) *via* SW005.

SW005 has been designed and meets the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995.

3.6. SWO – Church Lane (SW006)

There is a single network SWO (SW006) at Church Lane which discharges to the Tibbotstown River at NGR 181544E, 73040N. The location of SW006 is shown in **Table 3.1** and on **Figure 3.1**.

SW006 has been designed and meets the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995.

3.7. SWO – Elm Road (SW007)

There is a single network SWO (SW007) at Elm Road which discharges to the Tibbotstown River at NGR 181544E, 73040N. The location of SW007 is shown in **Table 3.1** and on **Figure 3.1**.

SW007 has been designed and meets the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995.

3.8. Dual Function Overflow from Old Cobh Road Pumping Station (SW008)

There is a single Dual Function Overflow (SW008) at the Old Cobh Road Pumping Station. The location of the Dual Function Overflow (SW008) is shown in **Table 3.1** and on **Figure 3.1**.

SWO

The SWO (SW008) at Old Cobh Road Pumping Station discharges to Lough Mahon transitional waters at NGR 180594E, 72283N.

There are two Storm Tank compartments at the Old Cobh Road Pumping Station. The combined capacity of the pumps, rising mains and Storm Tanks is 1,600m³. These tanks have screened overflow facilities which provide primary treatment in the event that effluent spills *via* the overflow.

SW008 has been designed and meets the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995.

EO

A standby power generator is present at the Old Cobh Road Pumping Station to provide for continued operation of the pumping station in the event of an interruption in the power supply. If there was a "*catastrophic failure*" whereby there was a power failure, and the backup generator was to fail then flows would enter the stormwater storage tank. In the event that the capacity of the storm pumping station wet well is exceeded then excess flows shall be pumped directly to the Lough Mahon (Harper's Island) *via* EO SW008.

3.9. Dual Function Overflow from Bailick No.1 Pumping Station (SW010)

There is a single Dual Function Overflow (SW010) at the Bailick No.1 Pumping Station. The location of the Dual Function Overflow (SW010) is shown in **Table 3.1** and on **Figure 3.2.**

SWO

The SWO (SW010) at Bailick No.1 Pumping Station discharges to the Owennacurra Estuary transitional waters at NGR 187975E, N73109N.

SW010 is currently not meeting the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995. As part of the Midleton Wastewater Network Project, UÉ has committed to the rehabilitation and upgrading of all SWOs in the Midleton agglomeration to ensure meeting DoEHLG criteria. Current programmed completion dates indicate that these works will be completed by Q4 2029. This EIAR and the current licence review application does not relate to, or include, for any aspect of this Midleton Wastewater Networks Project.

EO

A standby power generator is present at the Bailick No.1 Pumping Station to provide for continued operation of the pumping station in the event of an interruption in the power supply. If there was a "*catastrophic failure*" whereby there was a power failure, and the backup generator was to fail then flows will discharge to the Owennacurra Estuary *via* EO SW010.

3.10. Dual Function Overflow from Bailick No.2 Pumping Station (SW011)

There is a single Dual Function Overflow (SW011) at the Bailick No.2 Pumping Station. The location of the Dual Function Overflow (SW011) is shown in **Table 3.1** and on **Figure 3.2**.

SWO

The SWO (SW011) at Bailick No.2 Pumping Station discharges to the Owennacurra Estuary transitional waters at NGR 188047E, 72518N.

SW011 is currently not meeting the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995. SW011 will be upgraded as part of the Midleton Wastewater Network Project to ensure meeting DoEHLG criteria, and as noted above, these works are expected to be completed by Q4 2029.

EO

A connection point to a temporary mobile generator is available at the Bailick No.2 Pumping Station in the event of an interruption in the power supply. If there was a "*catastrophic failure*" whereby there was a power failure, and the backup generator was to fail, or the capacity of the Pumping Station is exceeded, flows will then discharge to the Owennacurra Estuary *via* EO SW011.

3.11. Dual Function Overflow from Ballinacurra No.2 Pumping Station (SW012)

There is a single Dual Function Overflow (SW012) at the Ballinacurra No.2 Pumping Station. The location of the Dual Function Overflow (SW012) is shown in **Table 3.1** and on **Figure 3.2**.

SWO

The SWO (SW012) at Ballinacurra No.2 Pumping Station discharges to the Owennacurra Estuary transitional waters at NGR 188518E, 71783N.

SW012 has been designed and meets the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995.

EO

In the case of minor or major outages affecting Ballinacurra No.2 Pumping Station, depending on the duration of the outage, tankering or the use of generators is an option and will be determined on a case-by-case basis. Any power outages are expected to be relatively short in duration, therefore any potential discharges are also expected to be short in duration. In event of a power failure or pump failure, or the capacity of the Pumping Station is exceeded, flows will then discharge to the Owennacurra Estuary *via* EO SW012.

3.12. EO from Bailick No.3 Pumping Station (SW013)

There is a single EO (SW013) at the Bailick No. 3 Pumping Station. The location of the EO (SW013) which discharges to Owennacurra Estuary transitional waters at 188272E, 72060N is shown in **Table 3.1** and on **Figure 3.2**.

A connection point to a temporary mobile generator is available at the Bailick No.3 Pumping Station in the event of an interruption in the power supply. If there was a "*catastrophic failure*" whereby there was a power failure, and the backup generator was to fail, or the capacity of the Pumping Station is exceeded, flows will then discharge to the Owennacurra Estuary *via* EO SW013.

3.13. Dual Function Overflow from Dwyer's Road Pumping Station (SW014)

There is a single Dual Function Overflow (SW014) at the Dwyer's Road Pumping Station. The location of the Dual Function Overflow (SW014) is shown in **Table 3.1** and on **Figure 3.2**.

SWO

The SWO (SW014) at Dwyers Road Pumping Station discharges to the Owennacurra River at NGR 187475E, 72902N.

SW014 has been designed and meets the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995.

EO

There is no standby generator or connection point to a temporary mobile generator at Dwyers Road Pumping Station. In the case of minor or major outages affecting the Pumping Station, depending on the duration of the outage, tankering or the use of generators is an option and is determined on a case-by-case basis. Any power outages are expected to be relatively short in duration, therefore any potential discharges are also expected to be short in duration. In event of a power failure or pump failure, or the capacity of the Pumping Station is exceeded, flows will then discharge to the Owennacurra River *via* EO SW014.

3.14. EO from Oakwood Pumping Station (SW015)

There is a single EO (SW015) at the Oakwood Pumping Station. The location of the Emergency Overflow (SW015) which discharges to Dungourney River at NGR 188573E, 73373N is shown in **Table 3.1** and on **Figure 3.2**.

There is no standby generator or connection point to a temporary mobile generator at Oakwood Pumping Station. In the case of minor or major outages affecting this Pumping Station, depending on the duration of the outage, tankering or the use of generators is an option and is determined on a case-by-case basis. Any power outages are expected to be relatively short in duration, therefore any potential discharges are also expected to be short in duration. In event of a power failure or pump failure, or the capacity of the Pumping Station is exceeded, flows will then discharge to the Dungourney River *via* EO SW015.

3.15. Dual Function Overflow from Roxboro Mews Pumping Station (SW016)

There is a single Dual Function Overflow (SW016) at the Roxboro Mews Pumping Station. The location of the Dual Function Overflow (SW016) is shown in **Table 3.1** and on **Figure 3.2**.

SWO

The SWO (SW016) at Roxboro Mews Pumping Station discharges to the Dungourney River at NGR 188346E, 73332N.

SW016 has been designed and meets the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995.

EO

There is no standby generator or connection point to a temporary mobile generator at Roxboro Mews Pumping Station. In the case of minor or major outages affecting this Pumping station, depending on the duration of the outage, tankering or the use of generators is an option and is determined on a case-by-case basis. Any power outages are expected to be relatively short in duration, therefore any potential discharges are also expected to be short in duration. In event of a power failure or pump failure, or the capacity of the Pumping Station is exceeded, flows will then discharge to the Dungourney River *via* EO SW016.

3.16. Dual Function Overflow from The Rock Pumping Station (SW017)

There is a single Dual Function Overflow (SW017) at the Rock Pumping. The location of the Dual Function Overflow (SW017) is shown in **Table 3.1** and on **Figure 3.2**.

SWO

The SWO (SW017) at the Rock Pumping Station discharges to the Dungourney River at NGR 188265E, 73232N.

SW017 has been designed and meets the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995.

EO

There is no standby generator or connection point to a temporary mobile generator at The Rock Pumping Station. In the case of minor or major outages affecting this Pumping station, depending on the duration of the outage, tankering or the use of generators is an option and is determined on a case-by-case basis. Any power outages are expected to be relatively short in duration, therefore any potential discharges are also expected to be short in duration. In event of a power failure or pump failure, or the capacity of the

Pumping Station is exceeded, flows will then discharge to the Dungourney River *via* EO SW017.

3.17. Dual Function Overflow from Roxboro Housing Estate Pumping Station (SW018)

There is a single Dual Function Overflow (SW018) at the Roxboro Housing Estate Pumping Station. The location of the Dual Function Overflow (SW018) is shown in **Table 3.1** and on **Figure 3.2**.

SWO

The SWO (SW018) at the Roxboro Housing Estate Pumping Station discharges to the Dungourney River at NGR 188332E, 73316N.

SW018 has been designed and meets the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995.

EO

There is no standby generator or connection point to a temporary mobile generator at the Roxboro Estate Pumping Station. In the case of minor or major outages affecting this Pumping Station, depending on the duration of the outage, tankering or the use of generators is an option and is determined on a case-by-case basis. Any power outages are expected to be relatively short in duration, therefore any potential discharges are also expected to be short in duration. In event of a power failure or pump failure, or the capacity of the Pumping Station is exceeded, flows will then discharge to the Dungourney River *via* EO SW018.

3.18. Dual Function Overflow from Old Youghal Road Pumping Station (SW019)

There is a single Dual Function Overflow (SW019) at the Old Youghal Road Pumping Station. The location of the Dual Function Overflow (SW019) is shown in **Table 3.1** and on **Figure 3.2**.

SWO

The SWO (SW019) at Old Youghal Road Pumping Station discharges to the Dungourney River at NGR 188703E, 73401N.

SW019 has been designed and meets the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995

EO

There is no standby generator or connection point to a temporary mobile generator at Old Youghal Road Pumping Station. In the case of minor or major outages affecting this Pumping station, depending on the duration of the outage, tankering or the use of generators is an option and is determined on a case-by-case basis. Any power outages are expected to be relatively short in duration, therefore any potential discharges are also expected to be short in duration. In event of a power failure or pump failure, or the capacity the Pumping Station is exceeded, flows will then discharge to the Dungourney River *via* EO SW019.

3.19. SWO – Riversfield Estate (SW020)

There is a single network SWO (SW020) at the Riversfield Estate. The location of SW020 which discharges to the Owennacurra Estuary transitional waters at NGR 187687E, 73025N is shown in **Table 3.1** and on **Figure 3.2**.

SW020 is currently not meeting the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995. SW020 will be upgraded as part of the Midleton Wastewater Network Project to ensure meeting DoEHLG criteria and as noted above these works are expected to be completed by Q4 2029.

3.20. SWO – Drury's Avenue (SW021)

There is a single network SWO (SW021) at Drury's Road. The location of SW021 which discharges to the Dungourney River at NGR 188346E, 73332N is shown in **Table 3.1** and on **Figure 3.2**.

SW021 has been designed and is meeting the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995.

3.21. EO from Ballinacurra No.1 Pumping Station (SW022)

There is an EO (SW022) from Ballinacurra No.1 Pumping Station which discharges to the Owennacurra Estuary at NGR 188366E, 71791N is shown in **Table 3.1** and on **Figure 3.2.**

There is no standby generator or connection point to a temporary mobile generator at Ballinacurra No.1 Pumping Station. In the case of minor or major outages affecting this Pumping station, depending on the duration of the outage, tankering or the use of generators is an option and is determined on a case-by-case basis. Any power outages are expected to be relatively short in duration, therefore any potential discharges are also expected to be short in duration. In event of a power failure or pump failure, or the capacity the Pumping Station is exceeded, flows will then discharge to the Owennacurra Estuary *via* the EO SW022.

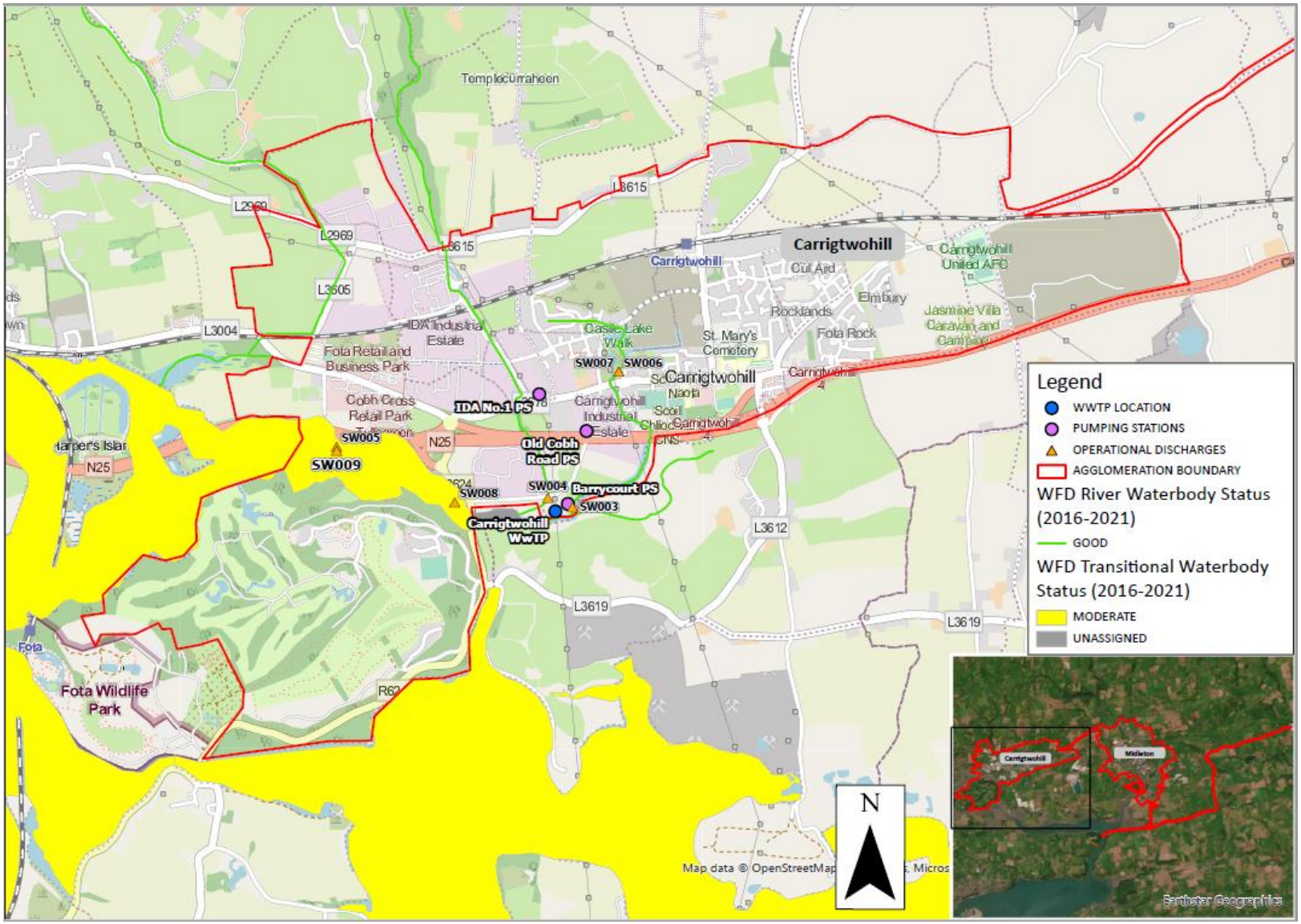


Figure 3.1 Operational Discharges Relating the Carrigtwohill Functional Area

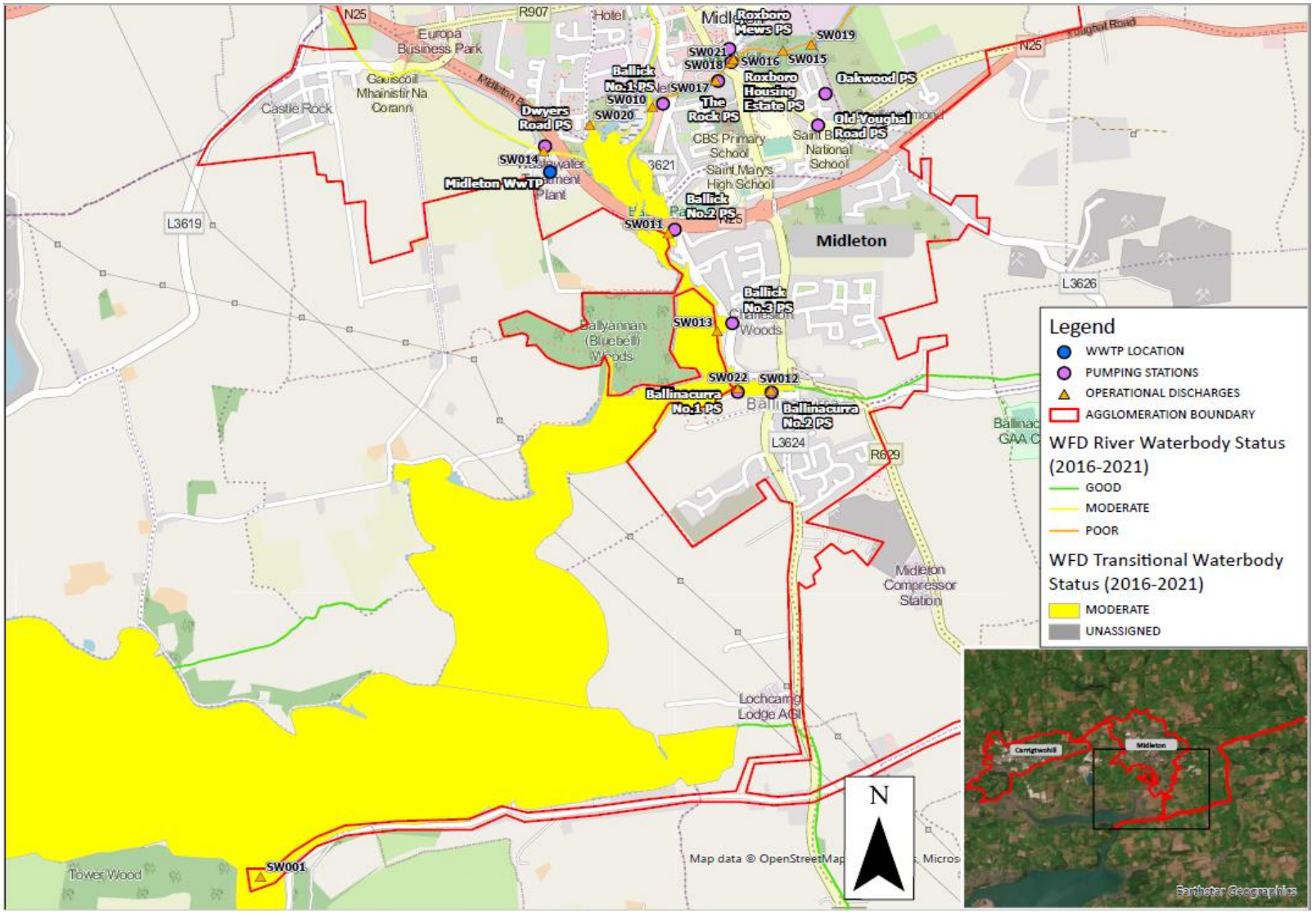


Figure 3.2 Operational Discharges Relating the Midleton Functional Area

3.22. Carrigtwohill Waste Water Treatment Plant

As part of the WWDL Review, the current primary discharge SW001 at Carrigtwohill will become the primary discharge (SW009) for the proposed amalgamated Midleton and Carrigtwohill agglomeration.

The **proposed** Emission Limit Value (ELVs) for the Carrigtwohill WwTP are shown in **Table 3.2** below:

Table 3.2 Proposed ELVs for Carrigtwohill WwTP (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

These standards give effect to the principle of the Combined Approach as defined in Waste Water Discharge (Authorisation) Regulations, 2007 to 2020 in that they accommodate the Urban Waste Water Treatment Regulations, 2001 (as amended) and the status of the receiving waterbody, Lough Mahon (Harper's Island).

3.23. Midleton Waste Water Treatment Plant

The current primary discharge outfall *via* SW001 at Midleton will become the secondary discharge point (SW001) for the amalgamated agglomeration.

The **proposed** ELVs for the Midleton combined secondary effluent discharge are shown in **Table 3.3** below:

Table 3.3 Proposed ELVs for Midleton Combined Discharge (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 3.4** will continue to apply directly at the Midleton WwTP (SW100) in order to comply with the UWWTD requirements. There are no proposed changes to the ELVs that apply directly at the WwTP.

Table 3.4 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

All flows arriving to Midleton WwTP will continue to receive tertiary treatment with N removal.

These standards give effect to the principle of the Combined Approach as defined in Waste Water Discharge (Authorisation) Regulations, 2007 to 2020 in that they accommodate the Urban Waste Water Treatment Regulations, 2001 (as amended) and the status of the receiving waterbody, the North Channel Great Island.

3.24. Consideration of Alternatives

3.24.1. "*Do Nothing*" Scenario

The primary driver of this WWDL review is for the inclusion of the industrial connection P1103-01 into the UÉ network downstream of the Midleton WwTP. This industrial discharge is already in place, and therefore this review will regularise this discharge. The "*Do Nothing*" scenario for this industrial discharge, therefore, is not relevant to the Project.

In the absence of the Midleton Waste Water Load Diversion Project, there would continue to be inadequate capacity at Midleton WwTP to effectively treat waste water from the area served, which poses a risk to the environment and public health. The works, which includes the construction of two new Pumping Stations, one at Midleton North and one at Water Rock, and the Water Rock pipeline which will divert loads from the Midleton WwTP to the Carrigtwohill WwTP will ensure the effective management of waste water, by using the existing treatment processes in place. It is therefore considered that the "*Do-Nothing*" scenario is not an option.

If these works are not completed, this will restrict the social and economic growth of residents and businesses in the Midleton and Carrigtwohill area as identified under the Draft County Development Plan 2022-2028, which includes the need to secure investment in essential infrastructure including water services as an objective. The Plan states that the delivery of required residential development is, in many cases, dependent on the delivery of new water services infrastructure. Furthermore, as previously highlighted, there would continue to be inadequate capacity within Midleton WwTP to effectively treat waste water from the area served, which poses a risk to the environment and public health. These two factors reiterate why the "*Do-Nothing*" scenario is not an option.

3.24.2. Alternative Locations

As noted above, the primary driver of this WWDL review is for the inclusion of the existing industrial connection P1103-01 into the UÉ network downstream of the Midleton WwTP. Consideration of alternative locations for this industrial discharge therefore is not relevant to The Project.

In terms of the WwTPs and operational discharges pertaining to this review, all are existing and functioning and therefore alternative locations are not relevant for the subject matter of this EIAR.

The option of catering for existing and future loads from Midleton at a separate treatment facility was not realistic, given the configuration of the sewer network in Midleton. Therefore, the construction of two new pumping stations, one at Water Rock and Midleton North, and the Water Rock pipeline to Carrigtwohill WwTP was identified as the most feasible option to support objectives for this area as identified under National and Local Policy and Plans.

However, as highlighted in **Section 1.3.4**, the subject matter of this EIAR is the operational discharges associated with the proposed amalgamated Midleton and Carrigtwohill agglomeration only and therefore, this EIAR is only concerned with the likely significant effects on the receiving environment associated with the existing operational discharges of the Midleton and Carrigtwohill functional areas.

4. BIODIVERSITY

Chapter 5 of the EIAR, prepared by Thorne Ecology, provides an Ecological Impact Assessment (EcIA) of the Midleton and Carrigtwohill agglomeration operational discharges.

The ecological receptors of the agglomeration and surrounding area of the operational discharges were informed by as desk study and a site visit conducted in January 2023. The assessment was completed with regard to the following guidance:

- CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester. Version 1.2 - Updated April 2022.
- EPA (2022), Guidelines on the information to be contained in Environmental Impact Assessment Reports, EPA, May 2022.
- NRA (2009) Guidelines for the Assessment of Ecological Impacts of National Road Schemes Rev. 2, National Roads Authority ; and
- DHPLG (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment. Department of Housing, Planning and Local Government.

The assessment focuses on Key Ecological Receptors (KERs) which were identified by determining the potential Zone of Influence (ZoI) of the operational discharges for each potential receptor, in the context of the scale and nature of the discharges. The ZoI varies for each ecological feature and their relative sensitivity to the operational discharges.

There are 2 no. European Sites within the immediate zone of influence of The Project *i.e.,* Great Island Channel Special Area of Conservation (SAC) (Site code: 001058) and Cork Harbour Special Protection Area (SPA) (Site code: 004030).

The Primary Discharge from the Carrigtwohill WwTP (SW009) discharges directly to the Great Island Channel SAC and the Cork Harbour SPA. The Secondary Discharge (SW009) from Midleton WwTP (SW009) does not discharge directly into an SAC or SPA. However, the Great Island Channel SAC (*ca*.15m u/s) and the Cork Harbour SPA (*ca*. 70m u/s) are within the immediate zone of influence of the discharge.

The Great Island Channel Special Area of Conservation SAC is designated for Tidal Mudflat and Sandflat habitat, and Atlantic salt meadows, while the SPA is designated for a range of wintering waterbirds and breeding tern. Both designations include the tidal mudflats into which the discharges enter directly or indirectly. This SAC and SPA are of international

value and are therefore considered KERs. As per the Natura Impact Statement which supports this WWDL Review there will be no adverse effects on the conservation objectives or integrity of these, or any other European Sites, once the proposed upgrades to the Midleton network as part of the Midleton Waste Water Network Upgrade Project are completed. Full details of the assessment on European Sites are provided in a combined AA Screening and NIS Report prepared for the Midleton WWDL Review Application. Refer to **Attachment D.2.2** of the WWDA Review Application Documentation.

The primary discharge from Carrigtwohill WwTP and the secondary discharge from Midleton WwTP both discharge directly into the Great Island Channel proposed Natural Heritage Area (pNHA) which overlaps with the SAC and SPA boundaries.

In terms of Nationally Designated sites, The primary discharge from Carrigtwohill WwTP discharges directly into the Great Island Channel pNHA. The pNHAs within the surrounding environment and which have a hydrological connection to the primary discharge include:

- The Douglas River Estuary pNHA (Site Code: 001046) *ca.* 5.5km downstream;
- Monkstown Creek pNHA (Site Code: 001979) *ca.* 8km downstream;
- Lough Beg pNHA (Site Code: 001066) *ca.* 12km downstream;
- Cuskinny Marsh pNHA (Site Code: 001987) *ca.* 13km downstream;
- Whitegate Bay pNHA (Site Code: 001084) *ca.* 14km downstream.

The secondary discharge from the Midleton WwTP discharges directly into the Great Island Channel pNHA. The pNHAs within the surrounding environment include:

- Rostellan Lough, Aghada Shore and Poulnabibe Inlet pNHA *ca.* 2.3km downstream;
- Cuskinny Marsh pNHA (Site Code: 001076) *ca.* 6.2km downstream;
- Whitegate Bay pNHA *ca.* 5.7km downstream;
- Lough Beg pNHA *ca.* 9.9km downstream;
- Monkstown Creek pNHA (Site Code: 001990) *ca.* 12km downstream;
- Owenboy River pNHA (Site Code: 001990) *ca.* 13km downstream.

On review of mapping resources, the following Natural Heritage Area (pNHA) was considered:

- Great Island Channel (001058) which overlaps with the SAC and SPA boundaries.

Sites designated as pNHA's are considered to have National value. While there is a paucity of information on pNHA's in general, these sites appear to have been designated based on the information summarised in Goodwillie (1986) which points to selection on the basis of mudflats and birdlife. As there are direct discharges to the NHA it is considered a KER of National Importance.

The Dungourney River which is the receiving water of several operational discharges, in terms of its physical attributes and vegetation, while clearly under pressure from upstream sources, is of physically in good condition within the ZoI of the discharges and has the potential to support diverse aquatic life. The Dungourney River habitat is therefore considered to be a KER of County Importance.

Several waterbirds, or birds that could be associated with the river environment, have been recorded from the Midleton study 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).

Waterbirds, or birds that could be associated with the river environment, have also been recorded from the Carrigtwohill study area. Notable species in the Carrigtwohill area 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, 2017), the Fota channel locations being over 3km southwest of the closest discharge points to the Slatty Water Channel.

There are records of Otter throughout the Cork Harbour area. Cork Harbour area indicated that Harpers Island, *ca.* 1km west of the closest discharges in the Slatty Water channel, as hotspot of otter activity. While no signs of otter were found during the current survey, this population is considered to be a KER of Local Importance (Higher Value).

The latest published fish survey dates from 2010 (IFI, 2010). 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.

Sweeney (2011) 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. Salmon, trout, lamprey and eel are protected under the Fisheries Act (1959, as amended), with salmon and lamprey additionally protected under the Habitats Directive. These species would all be sensitive to eutrophication impacts. The salmon, trout, lamprey and eel populations in the river are KER's evaluated as being of County Importance.

In terms of likely significant effects, the assessment in this Chapter mainly considers the KERs identified for The Project as listed above, *i.e.*, ecological receptors of local (higher) value and above. In the context of impacts, the assessment considers the nature of the effects that could arise and if mitigation is required.

Water quality results of the receiving environment of the operational discharges are compared against the Environmental Quality Standards specified in the Surface Waters Regulations 2009 (as amended) in **Section 5.3.1.** of the main EIAR document.

Water Quality Modelling (refer to **Appendix 2 of EIAR**) based on the proposed primary and secondary discharge ELVs and background water quality conditions against the baseline conditions, was undertaken to establish the impact of the existing discharges on key receptors in the Cork Harbour. The Future Scenario (as defined in **Attachment D.2.3** Water Quality Modelling Report (July 2023)) in comparison to the baseline scenario indicate that the water quality impacts from Midleton WwTP are minimal. The predictions for Carrigtwohill primary discharge indicate that the water quality impacts from Carrigtwohill WwTP are minimal with respect to BOD. However, elevated concentrations

for Dissolved Inorganic Nitrogen (DIN) and Molybdate Reactive Phosphorus (MRP) parameters assessed are simulated within a mixing zone around the Carrigtwohill WwTP discharge, it should be noted there will be minimal change relative to the baseline scenario and that the conservation objectives for both SAC habitats would be met. The authors of the modelling report note that the applications scenario presented is conservative and models the proposed permitted ELV.

A *'Notionally Clean'* River scenario was also carried out and provides an assessment of the maximum potential impact of Carrigtwohill WwTP on the trophic status in Lough Mahon and the mixing zone around Harper's Island. 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 proposed future scenario as overall concentrations of DIN and MRP decrease significantly. The impacts from Midleton WwTP are minimal. However, elevated concentrations for DIN and MRP are simulated around the Carrigtwohill WwTP discharge. To quantity this, outside of the mixing zone with a maximum longitudinal extent of approx. 800m in winter and 1,200m in summer, Good or High indicative quality for DIN is achieved around the Carrigtwohill discharge. For MRP, outside of a mixing zone with a maximum longitudinal extent of approx. 600m which is present in summer scenario only, Good or High indicative quality is achieved around the Carrigtwohill discharge. There is no mixing zone under this scenario for winter.

The potential significant effects upon waterbird species using the agglomeration waterbodies, determined to be of international value owing the SPA designation, are assessed in the NIS for this application. In line with that assessment, and the assessment above, the primary and secondary discharges are not predicted to result in significant effects to the waterbirds or their wetland habitats, with site usage or prey resources being maintained by future water quality scenarios. In contrast, the non-complaint overflows in the Owennacurra estuary present a risk to waterbirds and their wetland habitats directly should they interact with the untreated sewage, or indirectly *via* impacts to estuarine habitats and prey species. This could affect a range of waterbird species including piscivorous birds such as the breeding tern population. Significant effects to the waterbirds KER of international value could therefore occur.

In summary, no negative effects upon KERs are predicted to arise from the proposed primary and secondary operational discharges, or compliant overflows, associated with the Midleton and Carrigtwohill agglomeration. The existing non-compliant overflows in the Owennacurra estuary however are likely to significantly impact several KER's at a local scale.

The primary mitigation measure to address the risk is to KER's is to upgrade the non-compliant overflows to the Owennacurra estuary and bring them into compliance with DoEHLG criteria.

No further significant effects to KER's have been identified and therefore no further mitigation measures are required to avoid or reduce the potential impacts of The Project on KER's are therefore not required.

To ensure continued 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.

As no potential unmitigated significant effects have been identified, there are no residual significant effects.

No cumulative effects arising with any other plans or projects are predicted.

Monitoring of effluent and the receiving watercourses will be specified by the revised WWDL issued by the EPA. Water quality will continue to be monitored as required to determine the impact of the discharges from the WwTPs to ensure they comply with relevant legislation and the proposed ELVs specified in this application.

5. WATER

This Chapter, prepared by AWN Consulting Ltd, assesses and evaluates the likely significant effects associated with the operational discharges on the water environment. An overarching component of this Chapter is assessing the impact of the operational discharges against the pertinent objectives of relevant Directives and Regulations, including but not limited to the Water Framework Directive (WFD) [2000/60/EC], UWWT Directive [91/271/EEC] European Communities Environmental Objectives (Surface Waters) Regulations 2009, as amended [S.I. No. 272 of 2009, S.I. No. 77 of 2019 & S.I No. 288 of 2022].

A site-specific detailed WFD Screening Assessment was carried out for the operational discharges and is attached to the EIAR as **Appendix 3 – Water Framework Directive Screening Assessment.** The WFD Screening Assessment has shown that there is no potential for change in the water body status and risk as a result of the operational discharges.

There are 21 operational discharges associated with the agglomeration which discharge to 6 no. receiving waterbodies, refer to **Table 5.1**. below.

Figure 5.1 Waterbodies Hydrologically Linked to operational discharges.

Receiving Waterbody	Type of Waterbody	Operational Discharges	WFD Status 2016–2021
Lough Mahon – Harper's Island	Transitional	SW009 (Primary), SW005, SW008	Moderate
North Channel Great Island	Transitional	SW001 (Secondary)	Moderate
Tibbotstown_010	River	SW003, SW004, SW006, SW007	Good
Owennacurra Estuary	Transitional	SW010, SW011, SW012, SW013, SW020, SW022	Moderate
Owennacurra_040	River	SW014	Moderate

Receiving Waterbody	Type of Waterbody	Operational Discharges	WFD Status 2016–2021
Dungourney_020	River	SW015, SW016, SW017, SW018, SW019, SW021	Poor

As noted previously, a Water Quality Modelling Assessment was carried out by Intertek in 2023 (see **Appendix 2 of EIAR**) 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 the primary discharge (SW009) and secondary discharge (SW001) from the amalgamated agglomeration. The modelling assessment does not include for overflows and the effects of episodic events due to high rainfall. However, UÉ will be delivering a Strategic Modelling Assessment of potential SWO microbial impacts on bathing waters and shellfish waters in accordance with UÉ technical standards in the near future to fully assess the storm water overflow impacts from the Midleton network. It should be noted that there are no designated bathing waters in the vicinity of the operational discharges from the amalgamated agglomeration.

The predictions of the proposed ELV Scenario indicate that the water quality impacts from Midleton WwTP are minimal. However, elevated concentrations particularly for DIN and MPR parameters are simulated as occurring around the Carrigtwohill WwTP discharge with consideration for the mixing zones as described in **Section 5**. The results show that the WFD status of both transitional waterbodies would not be affected by the proposed ELV discharges and will not impede achieving "*Good*" status for the receiving waterbodies by 2027.

The "*notionally clean*" scenario was undertaken for DIN and MRP in order to obtain the actual contribution of the Midleton and Carrigtwohill WwTPs in the water quality of the receiving waterbodies. Results illustrate that the WwTP will not drive EQS exceedances, and just a minor fraction of available assimilative capacity is utilised by the WwTPs in question.

Regarding the current assigned "*Moderate*" WFD status for both Lough Mahon (Harper's Island) and the North Channel Great Island waterbodies, it is not expected that treated effluent from the existing Midleton and Carrigtwohill WwTP will affect this classification as the contribution of these treated discharges to the waterbodies is minor. Furthermore, the quality of the treated effluent is monitored in accordance with the ELVs in the associated EPA licence which support the water quality objectives of the receiving waterbodies.

In relation to designated shellfish waters (Great Island North Channel and Rostellan designated shellfish waters), the Water Quality Modelling concludes that bacteria concentrations in Cork Harbour are generally low and predicted impacts from Uisce Éireann assets and Industries do not significantly impact water quality in these designated shellfish waters. Therefore, the overall risk of proposed primary and secondary discharges to designated shellfish waters is classified as Low Risk.

In terms of residual impacts, it has been concluded that there will be no degradation of the current water body status (chemically, ecologically and quantitatively) or its potential to meet the requirements and/or objectives and measures in the second [current] 2018-2021 River Basin Management Plan (RBMP) and draft third RBMP 2022-2027. The Carrigtwohill primary discharge (SW009) and Midleton secondary discharge (SW001) will

be adequately treated *via* proper treatment measures. This will have a neutral impact to the WFD water quality status of the receiving watercourse.

During storm conditions, any discharges from discharge points will be diluted, settled, and screened prior to being discharged. The storm water will enter the receiving waterbodies which will have increased flows driven by sustained rainfall. In this context, the discharges will be diluted and dispersed effectively and will have no long-term negative impact to the WFD water quality status of the receiving waterbodies.

As outlined in **Chapter 5** of the EIAR, the non-compliant overflows to the Owennacurra estuary (SW010, SW011, and SW020) are currently having a localised impact on the Water Environment. These overflows, which have been identified as a significant pressure on this waterbody, will be upgraded as part of the Midleton Wastewater Network Upgrade Project to meet the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995, thus addressing the existing risk to the water environment.

In terms of EOs while a theoretical risk of malfunction is possible (as the failure of any infrastructure in catastrophic situations), such scenarios are not reasonably predicted to occur. Should they occur, however, these overflows will be temporary (short-lived) and no long-term negative impact on the waterbody quality is predicted.

In summary, post mitigation (*i.e.*, upon completion of the Midleton Wastewater Network Upgrade Project), no significant residual impacts are predicted from the operational discharges from the Midleton and Carrigtwohill agglomeration.

There are no cumulative impacts with other plans and projects predicted.

Monitoring of effluent and the receiving watercourses will be specified by the revised WWDL issued by the EPA. Water quality will continue to be monitored as required to determine the impact of the discharges from the WwTPs to ensure they comply with relevant legislation and the proposed ELVs specified in this application.

6. POPULATION & HUMAN HEALTH

Chapter 7 of the EIAR was prepared by Enviroguide Consulting and is concerned with the likely significant effects of operational discharges on human beings, living, working, and visiting in the vicinity of the Midleton and Carrigtwohill agglomeration. This Chapter details the potential direct and indirect effects of the discharges on Population and Human Health. It includes an overview of the socio-economic climate of Midleton, Carrigtwohill and County Cork focusing on pertinent issues such as residential amenity, economic activity, tourism, and population levels.

In terms of the likely significant effect on Human Health and Water Quality, it is considered based on the rehabilitation and upgrading of the 3 no. non-compliant SWOs, and the conclusion of **Chapter 6 Water**, the impact on human health and water quality as a result of operational discharges will be not significant, positive and long term. The impact of all SWOs meeting the DoEHLG criteria on human health will be slight and positive.

In terms of the likely significant effect on Socio Economics, as per the current situation, it is proposed that approximately 3 people will continue to be employed during the operational phase of The Project having an imperceptible, neutral impact on the local economy and employment.

Noise has been assessed in **Chapter 11** and this Chapter concluded that the operational discharges will not have a significant impact in relation to Noise and Vibration. As such there will be no significant impact on human health as a result of noise.

Potential odour effects have been assessed in **Chapter 12** of this EIAR whereby it was concluded that there will be no significant Odour impact as a result of the operational discharges and as such there will be no significant impact on Population and Human Health in relation to odour.

As a result of the above, no specific mitigation measures are required in relation to Population and Human Health, given the lack of direct effects resulting from the operational discharges. However, it is noted that all workers employed with The Project will comply in full with the relevant HSE guidelines and any Government protocols that may be in place at that point in time in relation to COVID-19.

No negative residual impacts in the context of Population and Human Health are anticipated regarding the operational discharges from the Midleton and Carrigtwohill agglomeration. The impact on human health and water quality as a result of operational discharges will be not significant, positive and long term. The impact of all SWOs meeting the DoEHLG criteria on human health will be slight and positive. The amalgamation of the Midleton and Carrigtwohill agglomeration and the diversion of existing and future loads to Carrigtwohill for treatment will facilitate future social and economic growth, in line with National, Regional and County Development Plans outlined in **Section 4.3.4** of the main EIAR document.

There are no cumulative impacts with other plans and projects predicted.

In terms of Monitoring, **Section 3.5.4** of the EIAR main document has detailed general "*Measures to Prevent Unintended Discharge*".

The monitoring regime to be carried out in relation to other environmental factors, such as ecology and water will be sufficient to inform population and human health factors. No specific monitoring measures are required in relation to Population and Human Health, given the lack of direct effects resulting from the operational discharges.

7. MATERIAL ASSETS

Chapter 8 of the EIAR was prepared by Enviroguide Consulting and is concerned with the likely significant effects of operational discharges on relevant Material Assets of the Midleton and Carrigtwohill agglomeration.

No protected views, rights of way or planned pieces of strategic infrastructure or any important tourist sites will be affected by The Project.

Based on the subject matter of this EIAR, it is considered that there will a non-significant, neutral, and long-term impact on the built services and infrastructure (*e.g.,* surface water drainage, water supply, power, information and communications technology, waste management) as a result of The Project.

In the absence of potential negative significant effects, no mitigation is required.

There are no residual impacts or cumulative impacts with other projects or plans predicted.

No specific monitoring measures are required, given the lack of direct effects resulting from the operational discharges.

In summary, due to their nature, no significant Material Assets impacts are predicted from the operational discharges.

8. TRAFFIC & TRANSPORT

Chapter 9 of the EIAR was prepared by Nicholas O'Dwyer Ltd. and is concerned with the likely significant effects of the Midleton and Carrigtwohill agglomeration operational discharges on Traffic and Transportation.

Given that the Midleton and Carrigtwohill WwTPs, and operational discharges are already in operation, there will be no significant change to traffic movements on the existing network or to the existing access arrangements during their operation. The operational discharges in themselves do not generate any traffic movements.

In the absence of potential negative significant effects on the transport network and traffic itself, there is no scope for mitigation.

There are no residual impacts or cumulative impacts with other projects or plans predicted.

No specific monitoring measures are required, given the lack of direct effects resulting from the operational discharges.

In summary, due to their nature, no significant Traffic and Transportation impacts are predicted from the operational discharges.

9. AIR QUALITY & CLIMATE

Chapter 10 of the EIAR prepared by AWN Consulting Ltd. is concerned with the likely significant effects of the Midleton and Carrigtwohill agglomeration operational discharges on Air Quality and Climate.

In terms of Air Quality, due to the nature of the operational discharges, there will be no air quality emissions to atmosphere associated with the discharges. Therefore, there is no predicted impact to Air Quality under normal operations.

Operational discharges associated with The Project are outlined in **Chapter 3** of the main EIAR document. The Midleton and Carrigtwohill agglomeration consists of the following set up in terms of generators:

- Carrigtwohill and Midleton WwTPs are equipped with backup permanent generators to provide for the continued operation of the pumping equipment in the event of an interruption in the power supply. This will enable an automatic switch over in such events.
- Provision for a standby power supply is available at 4 no. Pumping Stations (SW003, SW004, SW008, and SW010) for continued operation of the pumping equipment in the event of an interruption in the power supply.
- 2 no. Pumping Stations are generator ready, which includes a connection point to a temporary mobile generator, if required. This set-up is in place at Bailick No.2 (SW011) and Bailick No.3 (SW013). In the extremely unlikely event that a backup generator is required, one will be brought to site.
- In the case of minor or major outages affecting smaller Pumping Stations, depending on the duration of the outage, tankering or the use of generators is an option and is determined on a case-by-case basis. In most cases any power cuts to date have been relatively short in duration and power has been restored quickly. Therefore, any potential discharges will be short in duration. This procedure is in place at 8 no. Pumping Stations where standby generators or a connection point to a temporary mobile generator are not in place. This includes Ballinacurra No.2

(SW012), Dwyers Road (SW014), Oakwood (SW015), Roxboro Mews (SW016), The Rock (SW017), Roxboro Housing Estate (SW018), Old Youghal Road (SW019), and Ballinacurra No.1 (SW022).

In terms of air quality and climate, there will be no air quality emissions or GHG emissions associated with the discharges themselves. Therefore, there is no predicted impact to air quality or climate as a result of the operational discharges during normal operations.

There will be some emissions to atmosphere in relation to the back-up generators if required in the form of NO_2, PM, CO and CO_2 emissions. However, emissions from the generators will have an imperceptible impact on air quality and climate due to the small number of generators required at each site, and these generators will only be required to operate in emergency scenarios where deemed necessary which will be a very rare occurrence.

In the absence of potential negative significant effects, no mitigation is required.

There are no residual impacts or cumulative impacts with other projects or plans predicted.

No specific monitoring measures are required, given the lack of direct effects resulting from the operational discharges.

In summary, due to their nature, no significant Air Quality and Climate impacts are predicted from the operational discharges.

10. NOISE & VIBRATION

Chapter 11 of the EIAR, prepared by AONA Environmental Consulting Ltd. is concerned with the likely significant effects of the Midleton and Carrigtwohill agglomeration operational discharges on Noise and Vibration. This includes a brief overview of the proximity of the nearest residential properties to the operational discharges and an assessment of potential noise impacts.

The operational discharges will be completely inaudible, other than the sound of the flow of the operational discharges, which is akin to the sound of the existing flows in the receiving waterbodies. Therefore, the noise and vibration impact from the operational discharges will be negligible.

Noise emissions from back-up generators are not predicted to have any significant noise impacts. The generators will be required to be used in emergency events only, when there is an interruption to the power supply for the Midleton and Carrigtwohill WwTP and/or Pumping Stations, which will be a very rare occurrence. If the generators were required to provide power supply, their use would be expected to last a maximum of a few hours. The impact is therefore considered to be negligible.

Otherwise, occasional noise impacts may occur during maintenance of the outfall which may include occasional operation of plant and equipment to remove trapped detritus from the discharge points. It is expected that while such maintenance works may generate short-term periods with audible noise levels in the surrounding proximity, it would be expected that such maintenance works would last a maximum of a few hours and may only occur once or twice a year during the daytime period. The impact of these activities is therefore considered to be negligible.

In the absence of potential negative significant effects, no mitigation is required.

There are no residual impacts or cumulative impacts with other projects or plans predicted.

No specific monitoring measures are required, given the lack of direct effects resulting from the operational discharges.

In summary, due to their nature, no significant Noise & Vibration impacts are predicted from the operational discharges.

11. ODOUR

Chapter 12 of the EIAR, prepared by AWN Consulting Ltd, is concerned with the likely significant effects of the Midleton and Carrigtwohill agglomeration operational discharges on Odour.

The primary discharge, SW009, and secondary discharge, SW001 will be treated prior to release thereby minimising the potential for odour. In terms of SWOs, a SWO event will lead to a highly diluted screened effluent being discharged to the receiving waters. In this context, the SWO discharges will not be odorous. Any odours associated with the primary discharge, secondary discharge or an SWO event are expected to be imperceptible.

Should an EO be activated, the overflow event will be short (few hours) in duration, and it is considered that odours associated with such an event will be imperceptible.

In the absence of potential negative significant effects, no mitigation is required.

There are no residual impacts or cumulative impacts with other projects or plans predicted.

No specific monitoring measures are required, given the lack of direct effects resulting from the operational discharges.

In summary, due to their nature, no significant Odour impacts are predicted from the operational discharges.

12. ARCHAEOLOGY, ARCHITECTURAL & CULTURAL HERITAGE

Chapter 13 of the EIAR, prepared by Courtney Deery Archaeological Consultants, is concerned with the likely significant effects of the Midleton and Carrigtwohill agglomeration operational discharges on Archaeology, Architectural & Cultural Heritage.

The operational discharges will take place within the existing built infrastructure of the Midleton and Carrigtwohill agglomeration. Due to the nature of The Project *i.e.*, operational discharges, no physical impacts are anticipated on Archaeology, Architectural & Cultural Heritage assets.

In the absence of potential negative significant effects, no mitigation is required.

There are no residual impacts or cumulative impacts with other projects or plans predicted.

No specific monitoring measures are required, given the lack of direct effects resulting from the operational discharges.

In summary, due to their nature, no significant Archaeology, Architectural & Cultural Heritage impacts are predicted from the operational discharges.

13. LAND, SOILS & GEOLOGY

Chapter 14 of the EIAR, prepared by AWN Consulting Ltd, is concerned with the likely significant effects of the Midleton and Carrigtwohill operational discharges on Land, Soils and Geology, including Hydrogeology.

There are no sensitive soil receptors, and no identified areas of geological heritage or groundwater supplies in the vicinity of The Project.

A site-specific WFD Screening Assessment was carried out for the operational discharges and is attached as **Appendix 3 - Water Framework Directive Screening Assessment** of the main EIAR document.

Overall, this WFD Screening Assessment has shown that there is no potential for change in the groundwater water body status, and no risk as a result of the operational discharges.

Due to the nature of the operational discharges, no potential impacts to the land, soil, geological or hydrogeological environment were identified as there is no discharge to ground or active dewatering associated with the discharges.

It can be concluded that the Midleton and Carrigtwohill agglomeration operational discharges, will have an imperceptible impact on Land, Soil, and the Geological and Hydrogeological environment.

In the absence of potential negative significant effects, no mitigation is required.

There are no residual impacts or cumulative impacts with other projects or plans predicted.

No specific monitoring measures are required, given the lack of direct effects resulting from the operational discharges.

In summary, due to their nature, no significant Land, Soils and Geology, including Hydrogeology impacts are predicted from the operational discharges.

14. LANDSCAPE AND VISUAL

Chapter 14 of the EIAR, prepared by Stephenson Halliday Ltd, is concerned with the likely significant effects of the Midleton and Carrigtwohill agglomeration operational discharges on Landscape and Visual factors.

The Cork County Draft Landscape Strategy identifies the study area relating to the operational discharges as Landscape Character Area (LCA) 1: City Harbour and Estuary. LCA 1 is deemed to be of national importance and to have a very high sensitivity and very high value. It is noted that the operational discharge points are contained within a peri-urban environment and do not impinge to any great extent on the surrounding countryside.

The strategy makes the following recommendation relevant to The Project:

- *Promote sustainable growth in the existing main settlements of Cobh, Passage West, Carrigtwohill, and Midleton by encouraging new development, which respects the existing character of these settlements in terms of both scale and design.*

There are no upgrade works associated with the operational discharges. All discharge points, use the previously existing outfalls.

In terms of Landscape, there are no changes to the existing landscapes in terms of vegetation removal or changes to topography and there will be no changes to the existing infrastructure of the operational discharges and therefore no change in scale and nature to structures. The operational discharge points are already present at the current locations, hence, there is no change to land use. It is therefore considered that the existing landscape would be tolerant to the infrastructure type.

Overall, there will be no changes to LCA 1. It is therefore considered that landscape effects would not be greater than negligible. It is also concluded that the High Value Landscape would be retained intact.

In terms of the Visual aspect, views of the operational discharge points are screened by existing topography, built form and vegetation and, where they are present there would be no change to views. There would therefore be no changes to the visual amenity of users, including those using the area for recreational and amenity use. All operational discharges have retained their existing locations and form and there would be no changes in views which are currently barely perceptible to road and footway users.

Overall, it is considered that there would be no changes to visual amenity. It is thus concluded that visual effects would not be greater than negligible.

In the absence of potential negative significant effects, no mitigation is required.

There are no residual impacts or cumulative impacts with other projects or plans predicted.

No specific monitoring measures are required, given the lack of direct effects resulting from the operational discharges.

In summary, due to their nature, no significant Landscape and Visual impacts are predicted from the operational discharges.

15. RISK OF MAJOR ACCIDENTS AND/OR DISASTERS

Chapter 16 has been prepared by Nicholas O'Dwyer Ltd. and presents a consideration of risk of major accidents and/or disasters relevant to the Midleton and Carrigtwohill agglomeration operational discharges, as required in the EIA Directive, and as described in the EPA's EIAR 2022 Guidelines.

Risks were identified through a review of the EIAR environmental factor Chapters and consultation with experts, as required. As set out in the EU guidance document, risks are identified both in respect of (i) the potential vulnerability of The Project (in this case in the context of the operational discharges) to major accidents and disasters; and (ii) the potential for The Project to cause accidents and/or disasters.

Moderate risks were identified with respect to potential clogging of inlet screens without the design mechanisms in place (which would alert the system and divert the discharge to the holding tank until the screens were unclogged). Industrial accidents can result in spills or overflows that can be discharged to the sewer system, which could cause significant damage including (i) by creating an explosive or flammable situation, or (ii) killing the biological process. Potential damage to the biological treatment process as a result of an event whereby highly concentrated toxic influent is sent to the WwTP was also identified as a moderate risk given that it is unlikely but with potentially serious consequences. A fire or explosion is unlikely but effects could result in damage to the WwTP or Pumping Stations, as well as potential contamination of the receiving waterbodies unless runoff is contained. Potential flooding will result in a limited consequence as dilution of any untreated discharge will limit effect from contamination, with effects of a short duration.

It was concluded that the resultant risk level for the potential events from the Midleton and Carrigtwohill WwTW relating to operational discharges are considered to be low with all mitigation and design measures in place.

UÉ will regularly assess the risk of major accidents and/or disasters.

16. INTERACTIONS

This Chapter of the EIAR has been prepared by Nicholas O'Dwyer Ltd. and considers the potential for interactions and inter-relationships between the factors of the environment, that have been examined individually throughout this EIAR, which could result in an impact being either positive or negative, as well as having varying levels of significance.

Biodiversity, Water and Population & Human Health are the factors identified where interaction of effects may occur as a result of the operational discharges, as summarised below.

Table 16.1 Interactive Effects of The Operational Discharges

Operational Discharge	Environmental Factors	Summary of Effect	Further Information
SW009 (Carrigtwohill) SW001 (Midleton)	Water Biodiversity Population & Human Health	Water Quality Modelling carried out in 2023 predicts that the effluent discharge standards for both SW009 and SW001 are appropriate in terms of ensuring that the Carrigtwohill and Midleton WwTPs do not impinge on the achievement of Good WFD Status of Lough Mahon (Harper's Island) or the North Channel Great Island by 2027 in accordance the European Communities Environmental Objectives (Surface Water) Regulations, 2009 (as amended), and thereby will ultimately ensure that there is no environmental risk posed to the receiving water environment, including the water dependent sensitive species and habitats (*e.g.,* otter, wintering birds, Salmon, trout, lamprey, mudflats). In relation to designated shellfish waters (Great Island North Channel and Rostellan designated shellfish waters), the Water Quality Modelling concludes that bacteria concentrations in Cork Harbour are generally low and predicted impacts from UÉ assets do not significantly impact water quality in these designated shellfish waters. Therefore, the overall risk of primary and secondary discharge to designated shellfish waters is classified as Low Risk. The Project will have an overall positive and long-term impact on population and human health. The amalgamation of the Midleton and Carrigtwohill agglomeration allows for future	Refer to **Chapters 5, 6** and **7** of the Main EIAR Document**.**

Operational Discharge	Environmental Factors	Summary of Effect	Further Information
		development to take place and depending on the nature of the development this could have a positive effect on population and human health in the form of socio-economic improvements, community amenities or residential developments to supply housing.	
Overflows meeting DoEHLG SWO criteria. SW003 SW004 SW005 SW006 SW007 SW008 SW012 SW013 SW014 SW015 SW016 SW017 SW018 SW019 SW021 SW022	Water Biodiversity Population & Human Health	The compliant SWOs and their operational design will not compromise the achievement of the objectives and EQSs established for any water dependant species and natural habitats and designations (*e.g.*, European sites) within, and in the wider environs, of the amalgamated agglomeration. The risks of sewer or outfall failure associated with extreme events resulting in the activation of EOs, while a theoretical risk, 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. Appropriate design measures and mitigation to prevent EOs that can be applied have been incorporated in the design and operation of the agglomeration. These overflows, on the rare event should they occur, are temporary (short-lived) and will have no long-term negative impact on the Water environment, Biodiversity or Population & Human Health.	Refer to **Chapters 5, 6** and **7** of the Main EIAR Document**.**
Overflows not meeting DoEHLG SWO criteria. SW010 SW011 SW020	Water Biodiversity Population & Human Health	There are 3 no. overflows entering the Owennacurra estuary that are not meeting DoEHLG SWO criteria (*i.e.,* SW010, SW011 and SW020) and are having a localised observable impact on water quality in the Owennacurra estuary. These overflows are considered a significant pressure on this waterbody and therefore are considered an ongoing risk to water dependent Key Environmental Receptors (*e.g.*, waterbird species, including piscivorous birds such as the breeding tern, otter, salmonids,	Refer to **Chapters 5, 6** and **7** of the Main EIAR Document**.**

Operational Discharge	Environmental Factors	Summary of Effect	Further Information
		lamprey, trout). To address this existing risk these overflows will be upgraded as part of the Midleton Wastewater Network Upgrade Project to ensure they meet the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995, with the upgrades expected to be complete by Q4 2029. The resultant improvement in water quality resulting from the upgrading of SW010, SW011 and SW020 will have a slight positive long-term impact on the Owennacurra estuary Key Environmental Receptors *i.e.,* the river habitat, aquatic sensitive water dependent fauna, otter, and birds that rely on the estuary. Based on the rehabilitation and upgrading of the 3 no. non-compliant SWOs by Q4 2029, and the conclusion of Chapter 6 Water, the impact on human health and water quality as a result of operational discharges will be not significant, positive and long term. The impact of all SWOs meeting the DoEHLG criteria on human health will be slight and positive.	

17. SCHEDULE OF MITIGATION MEASURES

Following an examination, analysis, and evaluation of the direct and indirect effects of the Midleton and Carrigtwohill operational discharges (*i.e.*, SW001 and SW003 – SW022) on the receiving environment and taking on board the design and prevention measures in place, along with the completion of the Midleton Wastewater Network Upgrade Project by Q4 2029, it has been determined that the operational discharges would have no likely significant adverse effects on any environmental factors.

In order to ensure the satisfactory operation of the Midleton and Carrigtwohill WwTWs in line with the current WWDL D0056-01 and D0044-01, and future reviewed licence requirements, the authors of this EIAR have put forward the following recommendations to be implemented:

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

- All workers attending the Midleton and Carrigtwohill WwTPs are network Pumping Stations will comply in full with the relevant HSE guidelines and any Government protocols that may be in place at that point in time in relation to COVID-19.

18. NEXT STEPS

The findings of the EIA process to date are fully documented in the EIAR accompanying the Midleton WWDL D0056-01 Review Application.

A copy of –

(i) The application for a waste water discharge licence review

(ii) The Environmental Impact Assessment Report (EIAR) and Natura impact Statement (NIS)

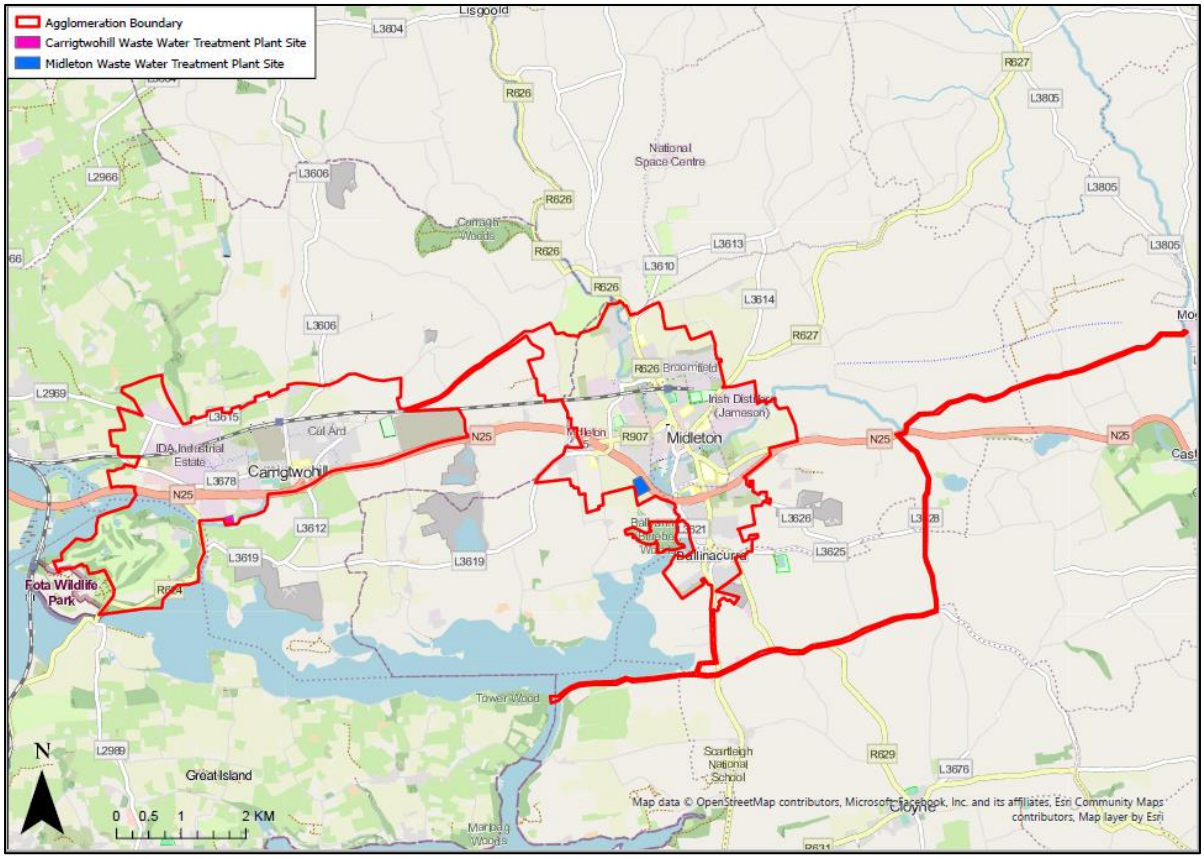
(iii) Such further information relating to the application as may be furnished to the EPA in the course of the Agency's consideration of the application

will, as soon as is practicable after receipt by the Agency of the application, be available for inspection or purchase at a fee not exceeding the reasonable cost of making a copy at the headquarters of the Environmental Protection Agency, P.O. Box 3000, Johnstown Castle Estate, Co. Wexford; at Uisce Éireann, Colvill House, 24-26 Talbot Street, Dublin 1.

Submissions in relation to Midleton Waste Water Discharge Licence (WWDL) D0136-01 Review Application may be made to the EPA at its headquarters at P.O. Box 3000, Johnstown Castle Estate, Co. Wexford, in writing within the period of 5 weeks beginning on the date of receipt by the EPA of the application.

MIDLETON WASTE WATER DISCHARGE LICENCE REVIEW – D0056-01

ENVIRONMENTAL IMPACT ASSESSMENT REPORT



July 2023

UISCE ÉIREANN

MIDLETON WASTE WATER DISCHARGE LICENCE REVIEW

EIAR

Nicholas O'Dwyer Ltd
Consulting Engineers
Nutgrove Office Park
Nutgrove Avenue
Dublin 14

July 2023

PROJECT NO. 20893-12					
Revision	**Reason for Revision**	**Prepared by**	**Reviewed by**	**Approved by**	**Issue Date**
A	Initial Internal Review	NOD, AWN Consulting Ltd, Thorne Ecology, Enviroguide Consulting, AONA, Courtney Deery Heritage Consultancy Ltd., Stephenson Halliday	RC/JM/KF	KF/CAS	22/05/2022
B	Version for UÉ Review	NOD, AWN Consulting Ltd, Thorne Ecology, Enviroguide Consulting, AONA, Courtney Deery Heritage Consultancy Ltd., Stephenson Halliday	RC/JM/KF	KF/CAS	12/06/2023
Final	For WWDL Review	NOD, AWN Consulting Ltd, Thorne Ecology, Enviroguide Consulting, AONA, Courtney Deery Heritage Consultancy Ltd., Stephenson Halliday	RC/JM/KF	KF/CAS	17/07/2023

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1. INTRODUCTION

1.1. Overview

This Environmental Impact Assessment Report (EIAR) for the amalgamated Midleton and Carrigtwohill agglomeration operational discharges has been prepared by Nicholas O'Dwyer Ltd., (NOD) and supporting Environmental Consultants (*i.e.*, Thorne Ecology, AWN Consulting Ltd., Enviroguide Consulting, AONA Environmental Consulting Ltd., Courtney Deery Heritage Consultancy Ltd., and Stephenson Halliday) on behalf of Uisce Éireann (UÉ) in support of the Midleton Waste Water Discharge Licence (WWDL) D0056-01 Review Application.

The subject matter of the review application involves a WWDL application from a Waste Water Treatment Plant (WwTP) with a capacity of greater than 10,000 population equivalent (p.e.) Therefore, a mandatory Environmental Impact Assessment Report (EIAR) is required, as per Regulation 17 of the relevant European Union Waste Water Discharge Regulations, 2007- 2020.

1.2. Background Information

This EIAR relates to the operational discharges from the proposed amalgamated Midleton and Carrigtwohill agglomeration.

1.2.1. Amalgamation of Agglomerations

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. (Source: 2022 Annual Environmental Report (AER) D0056-01), and therefore the plant is 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 UÉ to grant connection agreements to future developments.

In order to relieve the capacity of the Midleton Wastewater Treatment Plant (WwTP), the Midleton Local Infrastructure Housing Activation Fund (LIHAF) Wastewater Project will divert waste water loads from the Midleton agglomeration to the existing Carrigtwohill 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) and therefore the plant is not organically overloaded and has a large amount of remaining capacity.

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 Carrigtwohill 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, 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 Carrigtwohill to divert future loads from the 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.

Further details on the above projects and infrastructure are provided in **Section 1.2.4.**

1.2.2. Location of Amalgamated Agglomeration

Midleton is a settlement located approximately 20km east of Cork City on the Owennacurra River and the N25 road, connecting Cork to Rosslare. It is an important metropolitan of Cork City. The WwTP is located at National Grid Reference (NGR) 187505E, 72801N in the townland of Garryduff in the southeast of Midleton and serves the agglomeration of Midleton.

Carrigtwohill is a town located 14km east of Cork City situated along the N25. Carrigtwohill is an important hub for many pharmaceutical and biotechnology industries in Cork. The WwTP is located to the south of the town at NGR 181177E, 72228N and can be accessed *via* the R624.

Figure 1.1. shows the proposed amalgamated Midleton and Carrigtwohill agglomeration boundary, including the locations of the Midleton WwTP and Carrigtwohill WwTP.

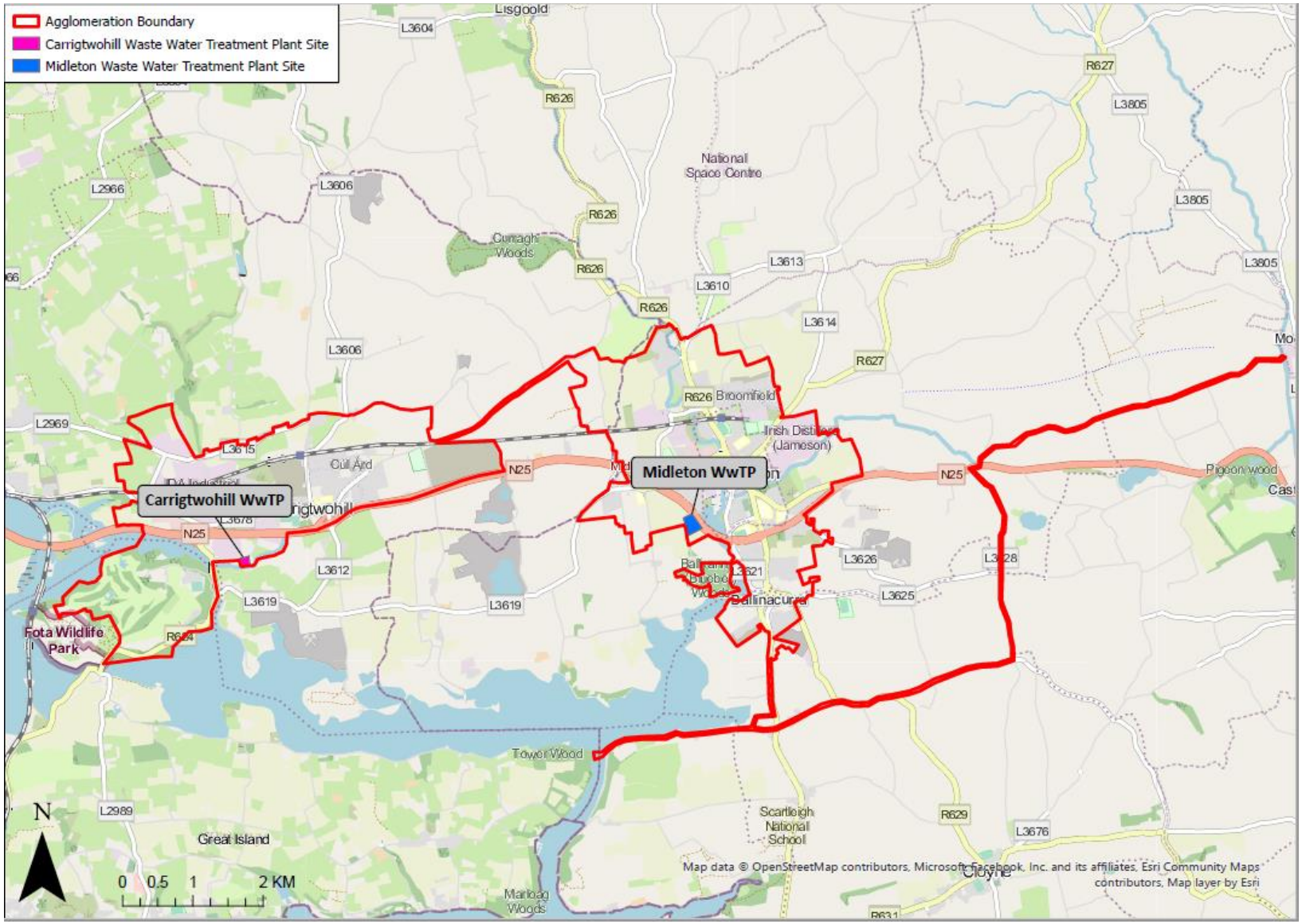


Figure 1.1 Midleton and Carrigtwohill Amalgamated Agglomeration

1.2.3. Existing Waste Water Works

1.2.3.1 Midleton Waste Water Works

The Midleton agglomeration is served by a sewerage system comprising a partially combined foul and surface water drainage network.

The treated wastewater arising from the Midleton agglomeration is a mix of domestic, commercial, and industrial (Irish Distillers Limited - IE licence Reg. No. P0442-02 and Dairygold Co-operative Society Ltd./TINE - IE licence Reg. No. P1103-01), and varies daily, weekly, and seasonally. Both Industries treated effluent bypasses the Midleton WwTP and combines with treated effluent from the Midleton WwTP before discharging to the North Channel Great Island transitional waterbody at Rathcoursey Point (NGR 186177E, 69506N) *via* a diffuser after passing through Rathcoursey Tidal Holding Tank. The P0442-02 discharge into the UÉ network downstream of the Midleton WwTP was regularised under WWDL D0056-01, as granted on the 19th of December 2016 (Technical Amendment A), 20th October 2020 (Technical Amendment B) and on the 2nd of December 2021 (Technical Amendment C). Unlike the P0442-02 discharge, the industrial connection P1103-01 into the UÉ network was not considered in the determination of D0056-01. The inclusion of this industrial connection into the D0056 licence, 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 Midleton WwTP provides secondary treatment using extended aeration followed by clarification, and tertiary treatment *via* UV disinfection of the final effluent. It has a design capacity of 15,000 p.e, following an upgrade to the plant in 2012. As cited above, the current organic loading (peak weekly load) is 16,652 p.e. and therefore the plant is currently organically overloaded and does not have the capacity to cater for additional loads from proposed development sites in Midleton.

There are 13 no. overflows within the Midleton agglomeration, of which 4 no. are licensed under D0056-01 (*i.e.,* SW03MIDL, SW04MIDL, SW05MIDL, SW07MIDL). Refer to **Table 1.1**.

8 no. overflows act as Dual Function Overflows (*i.e.*, an overflow which can act as a SWO or as an EO depending on the event), namely SW03MIDL, SW04MIDL, SW05MIDL, SW07MIDL, and 4 no. to be regularised at Roxboro Mews Pumping Station, The Rock Pumping Station, Roxboro Housing Estate Pumping Station, and Old Youghal Road Pumping Station.

2 no. overflows act as network SWO's, *i.e.*, overflows from Drury's Avenue and Riversfield Estate.

3 no. overflows act as EOs *i.e.*, overflows from Bailick No. 3 Pumping Station, Ballinacurra No. 1 Pumping Station, and Oakwood Pumping Station.

7 no. of the 10 SWO's are meeting the criteria as set out in the Department of Environment, Heritage, and Local Government (DoEHLG) '*Procedures and Criteria in Relation to Storm Water Overflows*', 1995. 3 no. SWO's (SW03MIDL, SW04MIDL, and an unlicensed SWO at Riversfield Estate) are not meeting with DoEHLG SWO criteria.

Table 1.1 Overflows Relating to the Midleton Functional Area

Current Licence Name	Asset	SWO/EO	Overflow Discharge Location Coords (NGR)
SW03MIDL*	Bailick No. 1 Pumping Station	SWO/EO	187975, 73109
SW04MIDL*	Bailick No. 2 Pumping Station	SWO/EO	188047, 72518
SW05MIDL	Ballinacurra No. 2 Pumping Station	SWO/EO	188518, 71783
Not Available	Bailick No. 3 Pumping Station	EO	188272, 72060
SW07MIDL	Dwyers Road Pumping Station	SWO/EO	187475, 72902
Not Available	Oakwood Pumping Station	EO	188573, 73373
Not Available	Roxboro Mews Pumping Station	SWO/EO	188346, 73332
Not Available	The Rock Pumping Station	SWO/EO	188265, 73232
Not Available	Roxboro Housing Estate Pumping Station	SWO/EO	188332, 73316
Not Available	Old Youghal Road Pumping Station	SWO/EO	188703, 73401
Not Available*	Riversfield Estate SWO (Network)	SWO	187687, 73025
Not Available	Drury's Avenue SWO (Network)	SWO	188346, 73332
Not Available	Ballinacurra No.1 Pumping Station	EO	188366, 71791

**Not Meeting DoEHLG SWO criteria.*
Note: Additional overflows to be regularised as part of D0056-01 WWDL review

The agglomeration is currently non-compliant with Article 3 of the Urban Wastewater Treatment Directive (UWWTD) (91/271/EEC) and as such is the subject of an infringement notice from the European Court of Justice (ECJ).

The Midleton WWDL was granted on the 6th of January 2011 and was subsequently amended on the 19th of December 2016 (Technical Amendment A), 20th October 2020 (Technical Amendment B) and on the 2nd of December 2021 (Technical Amendment C).

Treated effluent from the Midleton WwTP currently discharges to the North Channel Great Island at NGR 186177N, 69506E *via* primary discharge outfall SW001 at Rathcoursey Point.

The proposed amalgamation of Midleton and Carrigtwohill agglomerations will result in diversion of loads (max. *ca*. 11,177 p.e) from the Midleton agglomeration to the existing Carrigtwohill WwTP (Design p.e. 30,000). The current organic loading of the Carrigtwohill WwTP is 8,654 p.e. (Source: 2022 AER) meaning there is significant spare capacity to cater for these proposed diverted loads.

Table 1.2 Existing ELVs for Midleton Combined Effluent 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	6.5 - 9

The current primary discharge (SW01 MIDL) for the Midleton agglomeration is to the North Channel Great Island 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 (Reg No. P0442-02 and No. P1103-01). The combined Midleton WwTP and Industrial flows are conveyed to the Rathcoursey Holding Tank.

The storage capacity of the Rathcoursey Tidal Holding Tank (total storage capacity including inlet pipe storage is 2,175.5m^3) and is insufficient to manage the peak hydraulic loadings from the Middleton agglomeration. The existing Rathcoursey Tidal Holding Tank does not have capacity to cater for more than 5 hours sustained peak discharges from Midleton WwTP without overflowing.

UÉ 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 applications for planning permission to facilitate upgrades to the tank.

1.2.3.2 Carrigtwohill Waste Water Works

The waste water in Carrigtwohill is collected in a partially combined drainage network. 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). UÉ, under Section 99E of the EPA Act, as amended, have given consent for these discharges, specifying the ELVs.

Carrigtwohill WwTP provides tertiary N and P removal and has an operational plant capacity of 30,000 p.e. As previously stated, the current organic loading (peak weekly load) is 8,654 p.e. and therefore the plant is not organically overloaded and has a large amount of remaining capacity.

There are 6 no. overflows within the agglomeration (see **Table 1.3** below). 3 no. of these overflows are associated with Pumping Stations and act as Dual Function Overflows. There are 3 no. SWOs, 2 no. associated with the network and 1 no. located at the Carrigtwohill WwTP. All 6 no. SWOs in the Carrigtwohill agglomeration are meeting DoEHLG SWO criteria. 2 no. overflows (*i.e.*, SW003 and SW004) in the Carrigtwohill functional area are currently licenced as part of the D0044-01 licence, these 2 no. overflows and 4 no. additional overflows will be regularised as part of the D0056-01 WWDL review.

Table 1.3 Overflows Relating to the Carrigtwohill Functional Area

Current Licence Name	Asset	SWO/EO	Overflow Discharge Location Coords (NGR) as per WWDL
Not Available*	Located at Carrigtwohill WwTP	SWO	179911, 72605
SW003	Barryscourt Pumping Station	SWO/EO	181276, 72256
Not Available*	Church Lane (Network)	SWO	181544, 73040
Not Available*	Elm Road (Network)	SWO	181544, 73040
SW004	IDA Pumping Station No.1	SWO/EO	181133, 72310
Not Available	Old Cobh Road Pumping Station	SWO/EO	180594, 72283

**Not Meeting DoEHLG "Procedures and Criteria in Relation to Storm Water Overflows",* 1995.
Note: "Not Available" are additional overflows to be regularised as part of D0056-01 WWDL review

The **existing** licensed ELVs for the primary discharge from Carrigtwohill WwTP as per D0044-01 are shown in **Table 1.4** below:

Table 1.4 Existing ELVs for Carrigtwohill WwTP (SW001)

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
TON	20 mg/l
Ammonia (Total)	5 mg/l
pH	6 - 9

The following sub-sections provide details of infrastructure projects relating to the amalgamated Midleton and Carrigtwohill agglomeration. These projects are being/have been subjected to separate consenting processes and provide the background/rationale for the amalgamation of the two agglomerations.

1.2.4. Midleton Waste Water Load Diversion Project

As mentioned previously the Midleton WwTP (design p.e. 15,000) is currently organically overloaded at 16,652 p.e. and does not have the capacity to cater for current loads in the Midleton agglomeration. In addition, there is a significant demand for housing development in Midleton and therefore wastewater upgrades are required to cater for future population and economic growth.

To support future social and economic growth in the area, and provide relief at Midleton WwTP, the Midleton Local Infrastructure Housing Activation Fund (LIHAF) Wastewater Project, which commenced construction in June 2022 (on the Water Rock pipeline for to Carrigtwohill), will divert loads from the Midleton agglomeration to the existing Carrigtwohill and Environs WwTP (design p.e. 30,000).

The current p.e. of the Carrigtwohill and Environs WwTP is 8,654 meaning there is significant spare capacity to cater for these proposed diverted loads (*ca*. 7,000 p.e. from the future UEA Housing site and *ca*. 4,177 p.e. from the existing sewerage network to Carrigtwohill WwTP). This proposed diversion of loads from the Midleton agglomeration to the Carrigtwohill WwTP necessitates the amalgamation of the Carrigtwohill agglomeration into the Midleton agglomeration (WWDL D0056-01), thereby leading to the surrender of Carrigtwohill licence D0044-01.

In order to cater for the above diversions of loads, two new Pumping Stations, one at Water Rock and the other at Midleton North are required to be constructed. Along with the above the following new network will be required to be:

- *ca.* 30m of underground pipeline to connect the existing foul network on the Mill Road to the new Midleton North Pumping Station;
- *ca.* 650m of underground pipeline to connect the new Midleton North Pumping Station to the new Water Rock Pumping Station;
- *ca.* 7km of underground pipeline to connect to the Water Rock Pumping Station to the existing foul sewer network in Carrigtwohill north of the N25 to the east of Fota Rock.

Details of the above projects are provided below:

Midleton North Pumping Station and Network:

The Midleton North Pumping Station and Network will consist of:

- A new pumping station with below ground wet well chambers, 2 no. above ground kiosks, vent stack (*ca.* 6.2m in height), telemetry pole (*ca.* 6m in height), boundary fencing, retaining wall, and modifications to an existing entrance from Mill Road, including new gates to facilitate vehicular and pedestrian access.
- The construction of a below ground pipeline (*ca.* 650m long) connecting the proposed wastewater Pumping Station to the previously approved Water-Rock Pumping Station.
- The construction of *ca.* 30m of an underground pipeline to connect the existing foul network on the Mill Road to the proposed foul Pumping Station.
- All access site development, landscaping, and site excavation works above and below ground, including the demolition of the existing boundary wall, fence, and gates along the Mill Road.

The Midleton North Pumping Station, which will be sized for future growth, will draw an existing wastewater load (*ca.* 4,177 p.e) from the existing sewerage network system in Midleton and will divert this load to the Water Rock Pumping Station and onto Carrigtwohill WwTP for treatment. This will provide immediate relief at the Midleton WwTP.

There will be no storage, SWO or EO at the new Midleton North Pumping Station. 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.

On the 13th of February 2023, Uisce Éireann obtained a conditional grant of planning from Cork County Council (Planning Ref: 22/05032) for the Midleton North Pumping Station and Network. This was subsequently appealed to An Bord Pleanála (Planning Ref: ABP-316013-23). 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. Timeframes for construction and commissioning are contingent on successful grant of planning.

Water Rock Pumping Station:

The Water Rock Pumping Station will comprise the following below and above ground features:

- An inlet manhole.
- Valve and meter chambers.
- A wet well.
- An emergency overflow storage tank.
- A control building which will include welfare facilities for operatives.
- Two kiosks (wet kiosk & control kiosk).
- A galvanised steel decorative vent stack with protective grill.
- Ground level chamber and manhole covers.

The Pumping Station will be located within a compound. A 2.4-metre-high green mesh fence will surround the pumping station with both vehicular and pedestrian access gates. An access road will be provided from the existing access road to the hardstanding storage area. This will allow for private off-road parking.

This Pumping Station will facilitate the development of the Water Rock Urban Expansion Area (UAE) (*ca.* 7,000 p.e.) and will relieve the current overloading of the Midleton WwTP by conveying the foul wastewater to the Carrigtwohill WwTP *via* the new 7km Water Rock pipeline.

At this Pumping Station, 24-hour emergency storage and a high-level connection to the Northern Relief sewer will be provided.

Part 8 planning approval for the *Water Rock Pumping Station* was obtained by Cork County Council in 2019. The planning approval was obtained as part of the Water Rock UEA Infrastructure Works, which included several projects. It is expected that the construction of this Pumping Station will be complete by December 2023.

Water Rock Pipeline to Carrigtwohill:

The proposed Water Rock to Carrigtwohill rising main will comprise the following:

- The construction of a new 450mm diameter foul pipe network of *ca.* 7km in length, and all associated ancillary works. The pipeline will connect the Water Rock Pumping Station previously consented by Cork County Council under S179 of the Planning and Development Act, 2000, to the existing foul sewer network in Carrigtwohill north of the N25 to the east of Fota Rock.
- The proposed pipeline will cross under the Cork-Midleton railway line at Water Rock in Carrigtwohill through a new sleeve underneath the railway and enter the redline boundary of the permitted UEA Project. Within this boundary, it will travel west immediately parallel to the Rail Corridor until it reaches Castle Rock Avenue, the pipeline with then turn north and head along Castle Rock Avenue until it reaches the junction with the Carrigane Road.
- The pipeline will exit the redline boundary of the Water Rock UEA at the junction between Castle Rock Avenue and the Carrigane Road and go west for *ca.* 2,800m along the Carrigane Road until it reaches Ballyadam where it enters private lands and continues west adjacent to the rail corridor for *ca.* 480m. At this point it will traverse the rail corridor for a second time through a new sleeve and head south through private lands until it re-enters onto the Carrigane Road at the junction with the Bog Road. The pipeline continues west for *ca.* 370m where it turns south through the new Elmbury Residential Development until it reaches the existing foul sewer network immediately north of the N25.
- The development site includes Northern Point Business Park, Castle Rock Avenue, Carrigane Road, the Bog Road, Ballyadam Bridge, agricultural lands in Ballyadam adjacent to the rail corridor and Cork-Midleton railway line.
- Two vent stacks will be installed in the verge adjacent to the pipe. These are considered as accessories to the pipe.

In April 2021, UÉ applied to Cork County Council for exempted development under Section 5 of the Planning and Development Act 2000 for the Water Rock Rising Main to Carrigtwohill, Co. Cork. This new network is expected to be constructed by *ca.* December 2023.

1.2.5. Other Projects

Midleton Waste Water Network Upgrade Project

Midleton agglomeration is the subject of a ECJ ruling citing non-compliance with Article 3 of UWWTD, *i.e.*, SWO non-compliance. UÉ reports regularly to the European Union (EU) on ECJ agglomerations and has committed that all works necessary to achieve network compliance in Midleton will be completed by Q4 2029.

Addressing Midleton network non-compliance is also on the EPA Priority Action List (PAL). This infringement notice relates to the collecting systems (sewers and pumping stations). Currently, the Midleton agglomeration does not have sufficient capacity to collect and retain wastewater, and therefore at times releases waste water into the environment before it can reach the treatment plant.

The main aim of the Midleton Waste Water Networks Upgrade Project will be to reduce flood risk and ensure all SWOs meet DoEHLG Criteria, UÉ technical standards, and the EPA

issued Waste Water Discharge Authorisation (WWDA). Furthermore, completion of the upgrade project will improve waste water treatment and therefore ensure Midleton is removed from the EPA PAL and will ensure compliance with EU treatment standards (Article 3 of UWWTD, *i.e.,* SWO non-compliance).

Rathcoursey Tidal Holding Tank

Treated effluent from the Midleton WwTP discharges to the North Channel Great Island at Rathcoursey Point *via* a diffuser after passing through Rathcoursey Tidal Holding Tank. This Tidal Holding Tank is insufficient in size to manage the peak hydraulic loading from the Middleton agglomeration. UÉ is currently examining options to provide additional storage capacity and limit the discharges from the tank to the periods as defined in the Foreshore Licence (FS 004170).

1.2.6. Scope of EIAR

This EIAR being submitted with the WWDA Review Application considers the impact of the **existing operational discharges** associated with the amalgamated Midleton and Carrigtwohill agglomeration on the receiving environment. It does not assess the impacts associated with the construction of the above-mentioned projects which have already received planning permission, or are in the process of obtaining planning permission, or have been classed as exempted development.

Therefore, the scope of this EIAR comprises the operational discharges associated with the proposed Midleton WWDA D0056-01 Review Application which will be henceforth referred to as "*The Project".*

A description of The Project, *i.e*., the existing operational discharges of the amalgamated Midleton and Carrigtwohill agglomeration, is provided in **Chapter 3.**

1.2.7. Need for D0056-01 WWDA Review

UÉ is submitting a licence review of the existing WWDL (Reg No. D0056-01) for the Midleton Agglomeration in accordance with Regulation 14(1)(b) of the European (Waste Water Discharge) Regulations, 2007- 2020 (as amended) to the Environmental Protection Agency (EPA).

UÉ has concluded that a Waste Water Licence Review of the current WWDA D0056-01 is required due to the following:

1. Industrial connection (P1103-01) into the UÉ network downstream of the Midleton WwTP
2. The amalgamation of Carrigtwohill and Environs licence into the Midleton licence, thereby resulting in an increase in PE over that which is authorised in the Midleton Licence
3. Change to Emission Limit Values (ELVs) (*e.g*, replacing TON and NH_3 ELVs with DIN for Carrigtwohill deemed necessary to support the water quality objectives of the receiving waterbodies and pH range change for Midleton deemed necessary to ensure consistency with pH ELV's on a national basis).

Some relevant changes to the Midleton Licence as a result of this review include:

4. The regularisation of a number of additional overflows
5. Agglomeration boundary changes
6. Change to the Carrigtwohill downstream ambient monitoring station

1.3. The EIA Team

Article 5(3)(a) of the amended EIA Directive (2014/52/EU) (EIA Directive) states that *"the developer shall ensure that the environmental impact assessment report is prepared by competent experts"*. The Guidelines on the Information to be contained in Environmental Impact Assessment Reports issued by the EPA in May 2022 highlights the need for competent experts to be involved in the EIA process and in the preparation of the EIAR.

Working closely with the UÉ WWDA Specialists, Environmental Specialists from NOD coordinated and managed the preparation of this EIAR and led a team of competent experts in the preparation of the EIAR specialist chapters. Each contributing expert provides a statement of authority, and an explanation of the methods of data collection and assessments that were carried out with reference to applicable discipline or industry standards and government guidance.

Table 1.3 lists the competent experts who were involved in the preparation of each Chapter of the EIAR.

Table 1.5 EIA Chapters and Competent Experts

EIA Chapter	Company	Name & Qualifications
Chapter 1 - Introduction	Nicholas O'Dwyer Ltd	Krista Farrugia, Principal EIA Consultant, BSc, MSc, PgDip, PIEMA John Morris, Senior Environmental Consultant, Nicholas O' Dwyer Ltd., BSc, PgDip Robbie Clarke, Senior Environmental Consultant, Nicholas O' Dwyer Ltd., BSc, MSc
Chapter 2 - The EIA Process		
Chapter 3 - Description of The Project and Site		
Chapter 4 – Policy & Legislative Context		
Chapter 5 - Biodiversity	Thorne Ecology	Kate Harrington, Principal Ecologist, MSc, MCIEEM
Chapter 6 - Water	AWN Consulting Ltd	Marcelo Allende, Senior Environmental Consultant, BSc, BEng
Chapter 7 - Population & Human Health	Enviroguide Consulting	Louise Hewitt, Environmental Consultant, BSc, MSc
Chapter 8 - Material Assets	Enviroguide Consulting	Louise Hewitt, Environmental Consultant, BSc, MSc
Chapter 9 - Traffic and Transport	Nicholas O'Dwyer Ltd	Graham Young, Nicholas O' Dwyer Ltd., Senior Engineer, CEng, Dip. PM, BA BAI

EIA Chapter	Company	Name & Qualifications
Chapter 10 - Air Quality and Climate	AWN Consulting Ltd	Ciara Nolan, Senior Air Quality Consultant, MSc, BSc, AMIAQM, AMIEnvSc
Chapter 11 - Noise and Vibration	AONA Environmental Consulting Ltd	Mervyn Keegan, Director, MSc, BSc, MIAQM, MIOA
Chapter 12 - Odour	AWN Consulting Ltd	Ciara Nolan, Senior Air Quality Consultant, MSc, BSc, AMIAQM, AMIEnvSc
Chapter 13 - Archaeology, Architectural and Cultural Heritage	Courtney Deery Heritage Consultancy Ltd.	Clare Crowley Senior Archaeologist and Heritage Consultant, PhD, BA
Chapter 14 - Lands, Soils and Geology	AWN Consulting Ltd	Marcelo Allende, Senior Environmental Consultant, BSc, BEng
Chapter 15 - Landscape and Visual	Stephenson Halliday	Daniel Leaver, Associate Director, BSc, MSc, CMLI
Chapter 16 - Risk of Major Accidents and/or Disasters	Nicholas O'Dwyer Ltd	Krista Farrugia, Principal EIA Consultant, Nicholas O' Dwyer Ltd., BSc, MSc, PgDip, PIEMA
Chapter 17 - Interactions	Nicholas O'Dwyer Ltd.	Krista Farrugia, Principal EIA Consultant, Nicholas O' Dwyer Ltd., BSc, MSc, PgDip, PIEMA
Chapter 18 – Schedule of Mitigation Measures	Nicholas O'Dwyer Ltd.	John Morris, Senior Environmental Consultant, Nicholas O' Dwyer Ltd., BSc, PgDip
Chapter 19 - Bibliography	Nicholas O'Dwyer Ltd.	John Morris, Senior Environmental Consultant, Nicholas O' Dwyer Ltd., BSc, PgDip
Chapter 20 – Abbreviations	Nicholas O'Dwyer Ltd.	John Morris, Senior Environmental Consultant, Nicholas O' Dwyer Ltd., BSc, PgDip

In addition to the main contributors to the EIAR, information on the contents of this EIAR was sought from relevant stakeholders in an EIA scoping consultation process. The findings from the scoping process are presented in **Section 2.2** below.

1.3.1. Difficulties Encountered

No difficulties were encountered during the preparation of this EIAR.

2. THE EIA PROCESS

2.1. General

The process by which the likely significant effects of a project on the environment are assessed is set out in the EU EIA Directive 2011/92/EU on the assessment of the effect of certain public and private projects on the environment (codification) (transposed to Irish law through the Planning and Development Regulations 2001, as amended), as amended by EIA Directive 2014/52/EU (transposed to Irish law through the European Union (Planning and Development) (Environmental Impact Assessment) Regulations S.I. 296 of 2018 and in terms of Waste Water Discharges in S.I. No. 214 of 2020 - European Union (Waste Water Discharge) Regulations 2020.

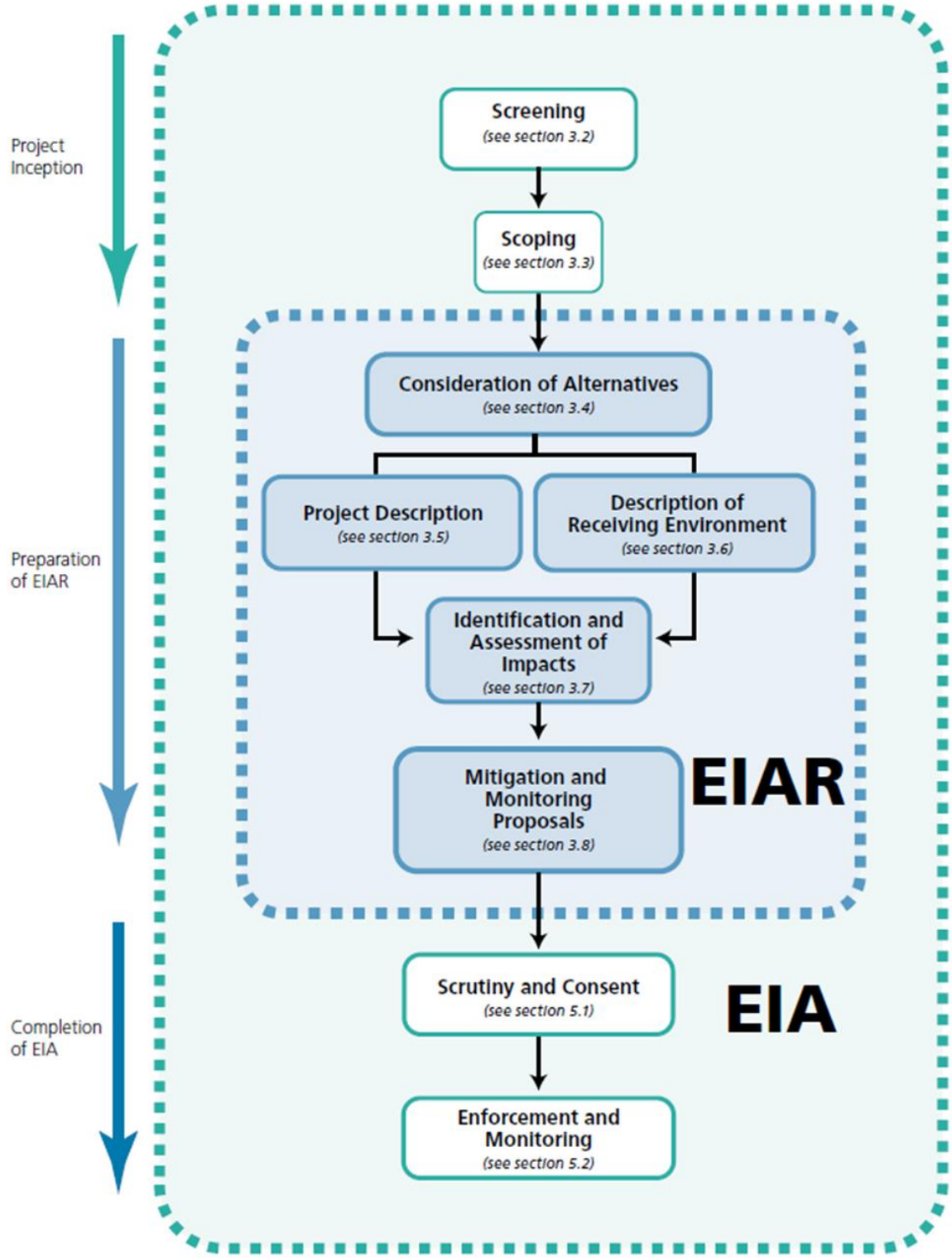
The EIA process includes a number of key characteristics:

- It is systematic, comprising a sequence of tasks defined both by regulation and by practice;
- It is analytical, requiring the application of specialist skills from the environmental sciences;
- It is impartial, its aim being to inform the decision-makers;
- It is consultative, with provision being made for obtaining feedback from interested parties, including local authorities and statutory agencies; and
- It is interactive, allowing opportunities for environmental concerns to be addressed during the planning, design, and implementation of a project.

The structure and general sequence of this EIAR follows the EPA Guidelines (2022), as illustrated in **Figure 2.1** below. The process may be summarised succinctly as follows:

1. Screening – determines what aspects of the environment should be considered and to what extent.
2. Scoping – determines what aspects of the environment should be considered and to what extent.
3. Preparation of EIAR – a tool to inform the decision-maker, which presents baseline information, impact assessment, and mitigation measures.

The EIAR informs the EIA process being conducted by the Competent Authority (CA), which in this case is the EPA as part of the WWDA process.



[1]*Figure 2.1 The Position of The EIAR Within the EIA Process*

[1] *Environmental Protection Agency, Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, May 2022, https://bit.ly/3SUhQCY , [accessed 03/04/2023].*

2.1.1. EIA Directive, Legislation and Guidelines

The development of this EIAR has been informed by the EIA Directive (2014/52/EU), National Legislation, EU and EPA guidelines and other guidelines and circulars.

This EIAR adheres to the fundamental principles of the EIA process as outlined in the EU Guidelines (2017)[2] and EPA Guidelines (2022). The Guidelines set out the matters that must be addressed in an EIAR which include:

- Anticipating, avoiding, and reducing significant effects;
- Assessing and mitigating effects;
- Maintaining objectivity;
- Ensuring clarity and quality;
- Providing relevant information to decision makers; and
- Facilitating consultation.

2.1.2. EIA Screening

The Project has been screened against Regulation 17 of the Waste Water Discharge Regulations (S.I. No. 214/2020) which state the following: -

> *'17. The principal Regulations are amended by substituting the following Regulation for Regulation 17 –*
>
> *"Certain applications to be accompanied by an EIAR*
>
> *17. An application in respect of the waste water discharge from—*
>
> *(i) a waste water treatment plant with a capacity of greater than 10,000 population equivalent as defined in Article 2, point (6), of the Urban Waste Water Treatment Directive, and*
>
> *(ii) a waste water treatment plant specified in accordance with paragraph (6)(c) or (8)(b)(ii) of Regulation 18 or paragraph (3)(c) or (5)(b)(ii) of Regulation 25,*
>
> *shall, subject to and in addition to compliance with the requirements of Regulation 16, be accompanied by a copy of an EIAR, which shall be submitted in electronic form (which shall be searchable by electronic means as far as practicable) and such other form as may be specified by the Agency".*

The Project involves a WWDA application for a WwTP with a capacity of greater than 10,000 population equivalents as defined in Article 2, point (6), of the UWWTD. Therefore, a mandatory EIA, and the preparation of an EIAR is required for this Project to inform the WWDA process.

[2] *European Commission. 2017. Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU). European Union.*

2.2. EIA Scoping Process

The scoping stage of the EIA is a process of determining the content and extent of the matters which should be covered in the environmental information to be assessed in the EIAR.

The EPA (2022) document *'Guidelines on the Information to be contained in Environmental Impact Assessment Reports'* states that *'All parties should be aware of the need to keep the EIAR as tightly focussed as possible. This focusses the effort and resources of all parties on the key significant issues. Scoping is usually guided by the following criteria: -*

- *Use 'Likely' and 'Significant' as the principal criteria for determining what should be addressed. Any issues that do not pass this test should be omitted (scoped out) from further assessment. A section of the EIAR should describe the scoping process explaining why such issues have been scoped out and they are not being considered further. All the prescribed environmental factors need to be listed in the scoping section of the EIAR. It is important to note that the environmental factors themselves cannot be scoped out and must feature in the EIAR. Only topics and headings related to each factor can be scoped in or out. Each environmental factor should be clearly covered by one or more specific section headings in the EIAR. If scoping determines that no likely significant issues arise under any heading, then an explanatory text should be included;*
- *Precedence - where EIARs for similar projects on similar sites or for other project proposals for the same site are available, these can be useful references; and,*
- *Interactions – assessors need to be vigilant for pathways – direct and indirect – that can magnify effects through the interaction or accumulation of effects – for instance the potential for cumulative significant effects to arise from multiple non-significant impacts.*

It is important to reiterate that the scope of this EIA relates solely to the operational discharges from the amalgamated Midleton and Carrigtwohill agglomeration, as detailed in **Section 1.2.6** and **Chapter 3**.

This EIAR identifies, describes, and assesses in an appropriate manner the direct and indirect potential significant effects of the operational discharges from amalgamated agglomeration on each of the factors listed in Article 3 of Directive 2011/92/EU as amended by Directive 2014/52/EU as below:

> *'Article 3*
>
> *1. The environmental impact assessment shall identify, describe, and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:*
>
> *(a) population and human health;*
>
> *(b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;*
>
> *(c) land, soil, water, air and climate;*
>
> *(d) material assets, cultural heritage and the landscape;*
>
> *(e) the interaction between the factors referred to in points (a) to (d).*

2. The effects referred to in paragraph 1 on the factors set out therein shall include the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned".

The EIAR includes an assessment of the 21 no. operational discharges from the Midleton and Carrigtwohill amalgamated agglomeration, including the proposed Primary Discharge and proposed Secondary Discharge (*i.e.*, Primary Discharge (SW009) from the Carrigtwohill WwTP and the Secondary Discharge (SW001) from the Midleton WwTP) and 19 no. overflows, to the 6 no. receiving waters *i.e.,* Lough Mahon (Harper's Island), North Channel Great Island, Owennacurra Estuary, Tibbotstown_010, Owennacurra_040, and Dungourney_020 Rivers.

2.2.1. Scoping Report

NOD, on behalf of UÉ, prepared a Scoping Report describing the nature of the operational discharges from the amalgamated Midleton and Carrigtwohill agglomeration, the need for The Project, and for each environmental factor as listed in the EIA Directive, the baseline environment, proposed assessment methodology and potential significant impacts.

On 27th of September 2022, in accordance with Regulation 17C of the European Union (Waste Water Discharge) Regulations 2007 to 2020, UÉ submitted an EIA Scoping Report to the EPA with a request for the Agency to provide its opinion in writing on the scope and level of detail of the information required to be included in the EIAR.

In accordance with the requirements of Regulation 17C & 17D of the European Union (Waste Water Discharge) Regulations 2007 to 2020 (hereafter referred to as WWD Regulations), the Agency consulted with the below listed bodies on 28th September 2022 who were advised that a submission in relation to the information to be contained in the EIAR may be made to the Agency within four weeks beginning on the date of the notice:

- Health Service Executive (HSE);
- Health and Safety Authority (HSA);
- An Taisce;
- Fáilte Ireland;
- Cork County Council (Planning Section and Environment Section);
- Environmental Co-ordination (Department of Agriculture);
- Marine Institute (MI);
- Sea Fisheries Protection Authority (SFPA);
- An Bord Pleanála (ABP);
- Inland Fisheries Ireland (IFI); and
- Teagasc.

A summary of the comments and recommendations received from the agencies and organisations has been provided in **Table 2.1**.

2.2.2. Scoping Response

Three consultees provided a submission, namely the SFPA, IFI and the HSE. A summary of each scoping response is provided below.

Table 2.1 Scoping Responses

Consultee	Date of Response	Summary of Response	Acknowledgement of Response
Sea Fisheries Protection Authority (SFPA)	21/10/2022	The consultee raised no topics for attention.	Noted
Inland Fisheries Ireland (IFI)	14/10/2022	The IFI state that 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 failed to see how a *'notionally clean river approach'* could be applied when assessing the environmental impact of the Midleton and Carrigtwohill Agglomeration WwTPs.	The assessment contained herein has taken full regard of the IFI submission. The Water Quality Modelling Intertek, 2023 prepared to inform this WWDA application has applied two scenarios to understand the potential impact of the Carrigtwohill and Midleton proposed primary and secondary discharges on the receiving water environment. The Water Quality Modelling represents the Future Scenario. This includes an assessment of the maximum potential impact under future operating conditions of UÉ continuous discharges and industrial discharges. The calibrated and validated model provides a baseline condition representing typical winter / summer conditions validated against EPA routine WFD water quality sampling. In addition to this approach, it was considered that the *'Notionally Clean approach'* should also be applied to determine the potential impact of the Carrigtwohill primary discharge alone on the mixing zone.
Health Service Executive (HSE)	20/10/2022	The HSE recommended that public consultation and the wider determinants of health and	The assessment contained herein has taken full regard of the HSE submission.

Consultee	Date of Response	Summary of Response	Acknowledgement of Response
		wellbeing are considered, including: Population and Human Health; Hydrology and Hydrogeology; Noise and Vibration; Air and Climate; Odour; Land, Soils and Geology; and Ancillary Facilities. The HSE also referred to guidance documents to utilise when preparing the EIAR.	

The scoping responses received were taken into consideration when preparing this EIAR.

2.2.3. Scoping Opinion

In relation to the information in paragraph 2 of Schedule 6 to the Planning and Development Regulations of 2001, as amended, and having regard to the specific characteristics of the project, including location and technical capacity, and likely impact on the environment, the EPA provided the following opinion:

(i) identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of a project on each of the factors listed in Article 3 of Directive 2011/92/EU as amended by Directive 2014/52/EU on the assessment of the effects of certain public and private projects on the environment (EIA Directive). It is important to note that the environmental factors themselves cannot be scoped out and must feature in the EIAR. Only subtopics and headings related to each factor can be scoped in or out. Each environmental factor should be clearly covered by one or more specific section headings in the EIAR. If scoping determines that no likely significant issues arise under any heading, then an explanatory text should be included;

(ii) address the matters raised in the responses received from the bodies detailed above;

(iii) address the requirements of Regulation 17A of the WWD Regulations;

(iv) address compliance with the requirements of the Urban Waste Water Treatment Directive and Water Framework Directive including the programme of measures;

(v) include an assessment of all discharges from the wastewater works (primary, storm water overflow and emergency overflows) including a cumulative assessment that demonstrates that The Project aims to achieve the Water Framework Directive environmental objectives for the receiving waters including objectives and standards for associated protected areas;

(vi) address monitoring of waste water discharges and the receiving water;

(vii) give the location (name of townlands and map) and a description of the waste water works that serves the agglomeration to which The Project relates. In particular, address industrial installations including Dairygold Co-Operative Society Ltd and TINE Ireland Ltd installation and the Rathcoursey tank capacity;

(viii) have regard to the EPA's Guidelines on the information to be contained in Environmental Impact Assessment Reports.

(ix) have regard to the relevant topics contained in the EPA's Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) September 2003;

(x) satisfy the requirements of the EIA Directive.

All of the points listed above were taken into consideration throughout the process of preparing this EIAR.

2.3. EIAR Structure

This EIAR has been prepared with consideration of the EPA's "*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports"* (May 2022), and the *"Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment",* Department of Housing, Planning and Local Government (August 2018). Thus, this EIAR is in accordance with EPA Guidelines (2022) which requires that information contained within an EIAR should be in accordance with Article 3(1), Article 5(1) and any additional information specified under Annex IV under the Directive 2014/52/EU.

The EIAR is presented in the format set out in the EPA's "*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports"* (May 2022). It is presented as follows:

Volume I. Non-Technical Summary provides a non-technical summary of the EIAR laid out in a similar but condensed format to the main EIAR.

Volume II. Main Report of the EIAR, provides a general introduction and background to The Project, describes the EIA process, provides a project description, including alternatives considered, and policy and legislative context (**Chapters 1 to 4**). **Chapters 5 to 15** describe the potential environmental impacts of The Project in relation to each environmental factor. **Chapter 16** assesses risks of major accidents and/or disasters. **Chapters 17** is a summary of how the different environmental effects interact and **Chapter 18** provides a schedule of mitigation measures, representing the environmental commitments associated with the operational discharges from the agglomeration. A Bibliography is provided in **Chapter 19** and Abbreviations are presented in **Chapter 20**.

- Chapter 1 - Introduction
- Chapter 2 – The EIA Process
- Chapter 3 - Description of The Project and Site
- Chapter 4 – Policy & Legislative Context
- Chapter 5 - Biodiversity
- Chapter 6 - Water
- Chapter 7 – Population & Human Health

- Chapter 8 - Material Assets
- Chapter 9 – Traffic and Transportation
- Chapter 10 - Air Quality and Climate Change
- Chapter 11 - Noise and Vibration
- Chapter 12 – Odour
- Chapter 13 - Archaeology, Architectural and Cultural Heritage
- Chapter 14 – Lands, Soils and Geology
- Chapter 15 - Landscape & Visual
- Chapter 16 – Risk of Major Accidents and/or Disasters
- Chapter 17 – Interactions
- Chapter 18 – Schedule of Mitigation Measures
- Chapter 19 – Bibliography
- Chapter 20 – Abbreviations

Volume III. Appendices contains, in a separate volume, the technical appendices related to each EIAR chapter as relevant.

- Appendix 1 – Criteria for Rating Site Attributes – Estimation of Importance of Hydrology Attributes
- Appendix 2 – Water Quality Modelling Report, July 2023
- Appendix 3 – Water Framework Directive Screening Assessment, July 2023

2.3.1. Environmental Factors Chapter Layout

Each Environmental Factor Chapter contained within this EIAR has been structured according to EPA Guidelines (2022) and is generally structured as outlined below.

1.1.1.1 Introduction

This section introduces the environmental factor to be assessed and the areas to be examined in the assessment.

1.1.1.2 Methodology

This section will contain the specific topic related methodologies. This will include the methodology and raw data used in describing the existing environment and undertaking the impact assessment.

1.1.1.3 Receiving Environment

An accurate description of the existing baseline environment is necessary to predict the likely significant impacts of a proposed development. To describe the existing environment, desktop reviews of existing data sources were undertaken for each specialist area, as required. The literature review includes published reference reports and datasets. Desktop studies, as required, were supplemented by specialised field surveys to confirm the accuracy of the desktop study or to gather further, site-specific baseline environmental information. The sensitivity of the environment to the operational discharges is also described and sensitive receptors identified as relevant.

1.1.1.4 Description of Likely Significant Effects

This section predicts how the receiving environment will be impacted by the operational discharges and describes the potential significance of the impact.

1.1.1.5 Mitigation Measures

This section provides the recommendations for mitigation measures to reduce or eliminate any significant negative impacts identified.

1.1.1.6 *Residual Impacts*

This section describes the assessment of the specific direct and indirect impacts of the operational discharges. Residual Impacts are predicted impacts remaining after mitigation measures have been applied. The predicted impacts are discussed having regard to their character, magnitude, duration, consequences, and significance, and also their cumulative impacts.

Table 2.2 below outlines the approach to describing environmental impacts and effects in this EIAR. This methodology follows that set out in the EPA guidelines (2022).

1.1.1.7 *Monitoring*

This section provides a description of any proposed project monitoring of effects on the environment which might be deemed necessary.

2.3.2. Risk of Major Accidents and/or Disasters

Chapter of the EIAR identifies how the potential for accidents and disasters relevant to the operational discharges have been identified and how those risks have been managed. This is in accordance with Article 3(2) of the EIA Directive, which states:

"The effects referred to in paragraph 1 on the factors set out therein shall include the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned".

The Risk of Major Accidents and/or disasters is outlined in **Chapter 16** of this EIAR.

2.3.3. Environmental Interactions

Chapter 17 of the EIAR covers the interactions between each of the environmental factors covered in **Chapters 5** to **15** of the EIAR. This Section is directed by Article 3(1)(g) of the EIA Directive 2014/52/EU, which requires "*the interaction between the factors referred to in points (a) to (d)*".

2.3.4. Schedule of Mitigation Measures

This Chapter of the EIAR summarises the mitigation measures that have been identified in the individual sections. Implementation of these measures will prevent the discharges from polluting the receiving waterbody. The Schedule of Mitigation Measures is outlined in **Chapter 18**. A summary of recommendations is also provided in this Chapter.

2.4. Assessment of Impacts

The purpose of this EIAR is to present an assessment of the likely significant effects of The Project (*i.e.*, the operational discharges) on the environment. This will inform the EPA's assessment process on whether to grant consent for a WWDA review for the Midleton agglomeration and will assist the EPA in identifying conditions that may be attached to the licence. The type and characteristics of the impacts are set out in Annex III (3), while Annex IV (5) of the EIA Directive defines how significance of effects should be described.

Table 2.2 below outlines the approach to describing environmental impacts and effects in this EIAR. This methodology follows that set out in the EPA guidelines (2022). This table provides information about the assessment methodology described in the corresponding chapters for each environmental component. Impacts will vary from negative to neutral or positive and will vary in significance. The significance of effects has been determined based on the severity of potential disturbance to existing material assets. Where significant potential impacts were identified, mitigation measures are proposed to minimise impacts. Where applicable, environmental factor chapters have modified the criteria to be specific to the environmental factor assessed (including in the context of relevant guidance). Then, significance matrices are defined. Each chapter describes the assessment approach used.

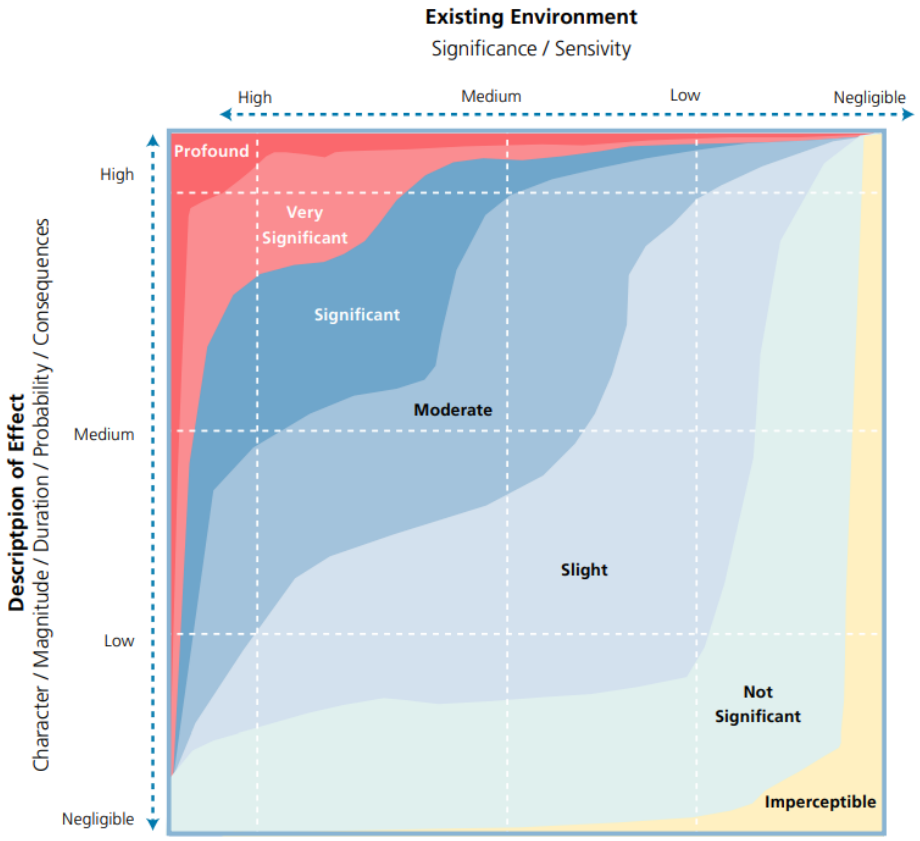
Furthermore, in determining impact significance, magnitude of change is considered in relation to the sensitivity of the receiving environment, as shown in **Figure 2.2**.

Table 2.2 Description of Effects

Quality of Effects It is important to inform the non-specialist reader whether an effect is positive, negative or neutral.	**Positive Effects** A change which improves the quality of the environment (for example, by increasing species diversity, or improving the reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
	Neutral Effects No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
	Negative/Adverse Effects A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem, or damaging health or property or by causing nuisance).
Describing the Significance of Effects 'Significance' is a concept that can have different meanings for different topics – in the absence of specific definitions for different topics the following definitions may be useful (also see *Determining Significance*).	**Imperceptible** An effect capable of measurement but without significant consequences.
	Not Significant An effect which causes noticeable changes in the character of the environment but without significant consequences.
	Slight Effects An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
	Moderate Effects An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
	Significant Effects An effect which, by its character, magnitude, duration or intensity, alters a sensitive aspect of the environment.
	Very Significant An effect which, by its character, magnitude, duration or intensity, significantly alters most of a sensitive aspect of the environment.
	Profound Effects An effect which obliterates sensitive characteristics.
Describing the Extent and Context of Effects Context can affect the perception of significance. It is important to establish if the effect is unique or, perhaps, commonly or increasingly experienced.	**Extent** Describe the size of the area, the number of sites and the proportion of a population affected by an effect.
	Context Describe whether the extent, duration or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)

Describing the Probability of Effects Descriptions of effects should establish how likely it is that the predicted effects will occur so that the CA can take a view of the balance of risk over advantage when making a decision.	**Likely Effects** The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
	Unlikely Effects The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Describing the Duration and Frequency of Effects 'Duration' is a concept that can have different meanings for different topics – in the absence of specific definitions for different topics the following definitions may be useful.	**Momentary Effects** Effects lasting from seconds to minutes.
	Brief Effects Effects lasting less than a day.
	Temporary Effects Effects lasting less than a year.
	Short-term Effects Effects lasting one to seven years.
	Medium-term Effects Effects lasting seven to fifteen years.
	Long-term Effects Effects lasting fifteen to sixty years.
	Permanent Effects Effects lasting over sixty years.
	Reversible Effects Effects that can be undone, for example through remediation or restoration.
	Frequency of Effects Describe how often the effect will occur (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually).

Source: EPA Guidelines (2022)



Source: EPA Guidelines (2022)

Figure 2.2 Determining Significance of Impact

3. DESCRIPTION OF PROJECT AND SITE

3.1. Characteristics of the Existing Environment

The subject matter of this EIAR comprises the operational discharge activities from the proposed amalgamated Midleton and Carrigtwohill agglomeration, as described in **Chapter 1**. Therefore, this EIAR is only concerned with the likely significant effects on the receiving environment associated with the operational discharges (see **Table 3.1**) from the agglomeration. The Project does not include the construction or relocation of any operational discharges. Therefore, demolition and construction related impacts are not relevant to this EIAR process.

There are several environmental receptors and constraints associated with The Project that will be taken into account as part of the EIAR process. These include, but are not limited to, the following designated features:

- There are 2 no. European Sites within the immediate zone of influence of The Project *i.e.,* Great Island Channel Special Area of Conservation (SAC) (Site code: 001058) and Cork Harbour Special Protection Area (SPA) (Site code: 004030). The Primary Discharge from the Carrigtwohill WwTP (SW009) discharges directly to the Great Island Channel SAC and the Cork Harbour SPA. The proposed Secondary Discharge (SW001) from Midleton WwTP does not discharge directly into an SAC or SPA. However, the Great Island Channel SAC (*ca.*15m u/s) and the Cork Harbour SPA (*ca.* 70m u/s) are within the immediate zone of influence of the discharge;
- The proposed primary discharge from Carrigtwohill WwTP discharges directly into the Great Island Channel pNHA. The pNHAs within the surrounding environment and which have a hydrological connection to the proposed primary discharge include:
    - The Douglas River Estuary pNHA (Site Code: 001046) *ca.* 5.5km downstream;
    - Monkstown Creek pNHA (Site Code: 001979) *ca.* 8km downstream;
    - Lough Beg pNHA (Site Code: 001066) *ca.* 12km downstream;
    - Cuskinny Marsh pNHA (Site Code: 001987) *ca.* 13km downstream;
    - Whitegate Bay pNHA (Site Code: 001084) *ca.* 14km downstream.
- The proposed secondary discharge from the Midleton WwTP discharges directly into the Great Island Channel pNHA. The pNHAs within the surrounding environment include:
    - Rostellan Lough, Aghada Shore and Poulnabibe Inlet pNHA *ca.* 2.3km downstream;
    - Cuskinny Marsh pNHA (Site Code: 001076) *ca.* 6.2km downstream;
    - Whitegate Bay pNHA *ca.* 5.7km downstream;
    - Lough Beg pNHA *ca.* 9.9km downstream;
    - Monkstown Creek pNHA (Site Code: 001990) *ca.* 12km downstream;
    - Owenboy River pNHA (Site Code: 001990) *ca.* 13km downstream.
- The Tibbotstown_010 and the Owennacurra_040 Rivers are designated Drinking Water Abstraction Rivers. The Tibbotstown_010 discharges to the Lough Mahon (Harper's Island) and the Owennacurra_040 discharges to the Owennacurra Estuary.

The drinking water abstraction points from the Tibbotstown and the Owennacurra Rivers are upstream of the operational discharges from the Midleton and Carrigtwohill WwTPs and do not pose a risk to drinking water supplies.

- The Owennacurra Estuary / North Channel and Lee Estuary / Lough Mahon are designated as '*sensitive*' under the Urban Treatment Regulations 2001 (as amended). For the Owennacurra Estuary / North Channel, N is the limiting nutrient and for the Lee Estuary / Lough Mahon, P is the limiting nutrient.
- There are a number of aquaculture and fishing practices in the Midleton and Carrigtwohill agglomeration including the Great Island North Channel, Lough Mahon and the following river waterbodies; Owennacurra_040, the Dungourney_020, and Tibbotstown_010. These waterbodies are popular fishing spots which support angling activities for both tourists and locals.
- The proposed Carrigtwohill WwTP primary discharge discharges *ca*. 2 km from the boundary of the Great Island North Channel designated shellfish waters, and *ca*. 8 km from the boundary of the Rostellan designated shellfish waters. The proposed Midleton WwTP secondary discharge discharges *ca*. 1.5 km from the boundary of the Great Island North Channel designated shellfish waters, and *ca*. 3 km from the boundary of the Rostellan designated shellfish waters.
- The main river waterbody within the Carrigtwohill functional area is the Tibbotstown_010. The WFD status (2016-2021) of this waterbody is Good. The Lough Mahon (Harper's Island) is the receiving water for the proposed primary discharge and is of Moderate status. The main river waterbodies within the Midleton functional area are the Owennacurra_040 and the Dungourney_020. The WFD status (2016-2021) of these waterbodies is Moderate and Poor respectively. The Owennacurra Estuary (transitional waterbodies) and the North Channel Great Island, receiving waterbody for the Midleton WwTP proposed secondary discharge is Moderate status. The WFD objective of the above waterbodies is to achieve Good WFD status by 2027.
- P0442-02 and P1103-01 treated effluent bypasses the Midleton WwTP and combines with treated effluent from the Midleton WwTP before discharging to the North Channel at NGR 186177E, 69506N. Unlike the Irish Distillers (P0442-02) discharge, the industrial connection from P1103-01 into the UÉ network downstream of the Midleton WwTP was not considered in the determination of D0056-01. The inclusion of this industrial connection into the D0056 licence, is one of the key drivers of the WWDL review.

Figure 3.1 shows some of the key receptors and sensitivities associated with the Midleton and Carrigtwohill operational discharge activities.

The EIAR, has been prepared in accordance with Directive 2011/92/EU as amended by Directive 2014/52/EU (the EIA Directive) and S.I. No. 214 of 2020 - European Union (Waste Water Discharge) Regulations 2020, and assesses the likely significant effects on the environment from the operational discharges on the above receptors, alone and in combination with other plans and projects.

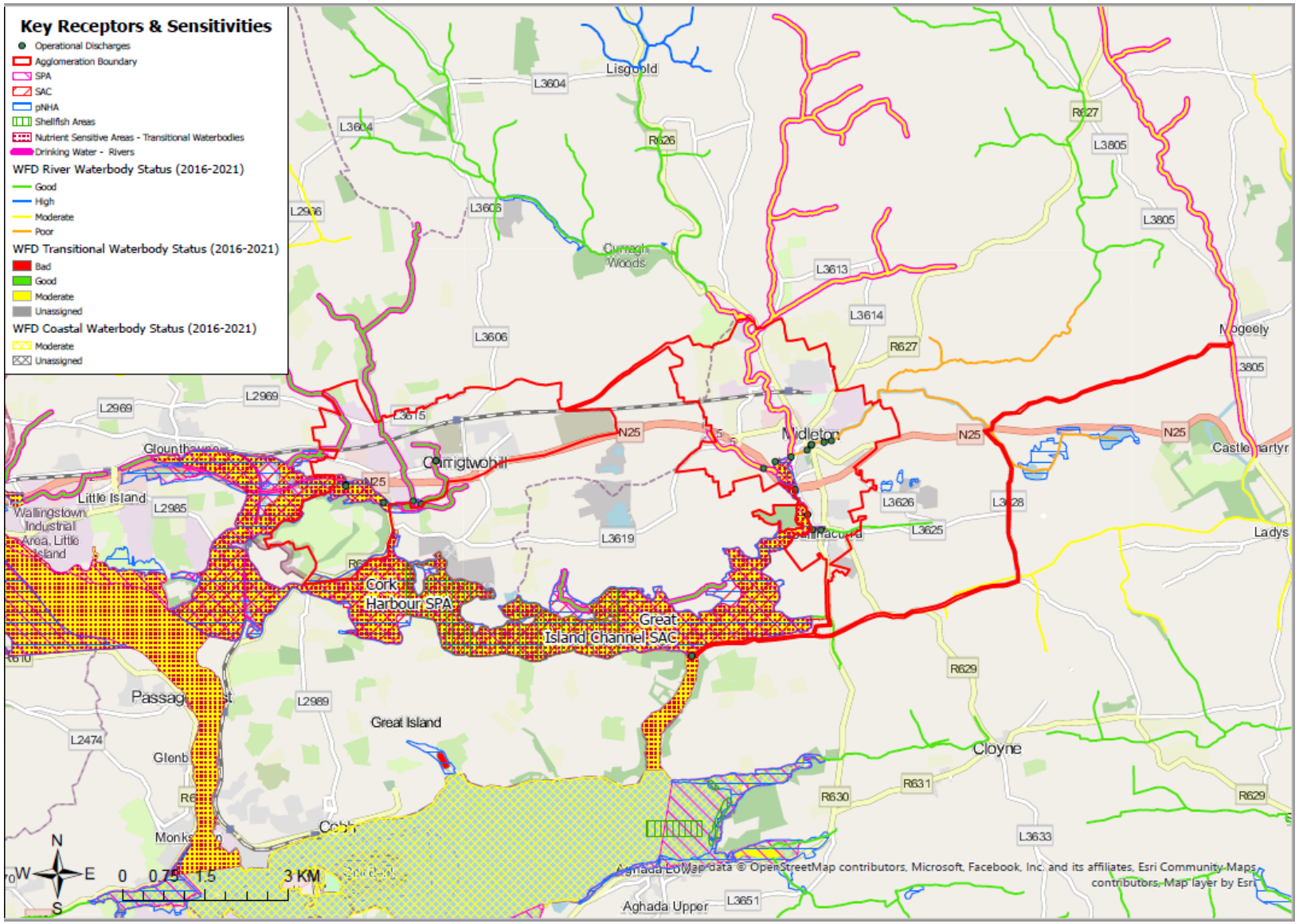


Figure 3.1 Key Receptors and Sensitivities in Relation to the Midleton and Carrigtwohill Agglomeration & Associated Operational Discharges

3.2. Consideration of Alternatives

Article 5 of the amended EU EIA Directive 2011/92/EU requires that the EIAR shall contain *"a description of the reasonable alternatives studied by the developer, which are relevant to The Project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of The Project on the environment." As* per Annex IV of the amended Directive, information in the EIAR should include a description of the reasonable alternatives relevant for The Project in terms of design, technology, location, size and scale; and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.

3.2.1. "*Do Nothing*" Scenario

The primary driver of this WWDL review is for the inclusion of the industrial connection P1103-01 into the UÉ network downstream of the Midleton WwTP. This industrial discharge is already in place, and therefore this review will regularise this discharge. The "*Do Nothing*" scenario for this industrial discharge, therefore, is not relevant to the Project.

In the absence of the Midleton Waste Water Load Diversion Project, there would continue to be inadequate capacity at Midleton WwTP to effectively treat waste water from the area served, which poses a risk to the environment and public health. The works, which includes the construction of two new Pumping Stations, one at Midleton North and one at Water Rock, and the Water Rock pipeline which will divert loads from the Midleton WwTP to the Carrigtwohill WwTP will ensure the effective management of waste water, by using the existing treatment processes in place. It is therefore considered that the "*Do-Nothing*" scenario is not an option.

If these works are not completed, this will restrict the social and economic growth of residents and businesses in the Midleton and Carrigtwohill area as identified under the Draft County Development Plan 2022-2028, which includes the need to secure investment in essential infrastructure including water services as an objective. The Plan states that the delivery of required residential development is, in many cases, dependent on the delivery of new water services infrastructure. Furthermore, as previously highlighted, there would continue to be inadequate capacity within Midleton WwTP to effectively treat waste water from the area served, which poses a risk to the environment and public health. These two factors reiterate why the "*Do-Nothing*" scenario is not an option.

3.2.2. Alternative Locations

As noted above, the primary driver of this WWDL review is for the inclusion of the existing industrial connection P1103-01 into the UÉ network downstream of the Midleton WwTP. Consideration of alternative locations for this industrial discharge therefore is not relevant to the Project.

In terms of the WwTPs and operational discharges pertaining to this review, all are existing and functioning and therefore alternative locations are not relevant for the subject matter of this EIAR.

In order to ensure there is sufficient capacity at the Midleton WwTP, the Midleton Waste Water Load Diversion Project, will divert existing loads (*ca*. 4,177 p.e.) from the Midleton agglomeration to the existing Carrigtwohill WwTP in order to provide spare capacity at Midleton WwTP and reduce the current overloading being experienced at this WwTP. To cater for the above, along with future loads from the Water Rock UAE Housing site (*ca*.

7,000 p.e.) in North Midleton, two new Pumping Stations, one at Midleton North and one at Water Rock are required to be constructed.

The option of catering for existing and future loads from Midleton at a separate treatment facility was not realistic, given the configuration of the sewer network in Midleton. Therefore, the construction of two new pumping stations, one at Water Rock and Midleton North, and the Water Rock pipeline to Carrigtwohill WwTP was identified as the most feasible option to support objectives for this area as identified under National and Local Policy and Plans.

However, as highlighted **Section 3.1**, the subject matter of this EIAR are the operational discharges associated with the proposed amalgamated Midleton and Carrigtwohill agglomeration only and therefore, this EIAR is only concerned with the likely significant effects on the receiving environment associated with the existing operational discharges, all of which are current in place, of the Midleton and Carrigtwohill functional areas.

3.3. Project Description: Operational Discharges

Chapter 1 of this EIAR provides details on the background to the need for the amalgamation of the Midleton and Carrigtwohill agglomerations, and to the existing operational discharges from both functional areas.

This section provides details on the operational discharges of the amalgamated Midleton and Carrigtwohill agglomeration *i.e.*, the subject matter of this EIAR.

A summary of the operational discharges is provided in **Table 3.1**. below.

Table 3.1 Operational Discharges Relating to The Midleton WWDA Review

Current Licensed Discharge Name	Proposed Name in WWDL Review	Type	Asset	Discharge Location (NGR)
Carrigtwohill Functional Area				
SW001	SW009	Primary Discharge from amalgamated Agglomeration	Carrigtwohill WwTP	179911, 72583
N/A	SW005	SWO	Located at Carrigtwohill WwTP	179911, 72605
SW003	SW003	SWO and EO	Barryscourt Pumping Station	181276, 72256
SW004	SW004	SWO and EO	IDA Pumping Station No.1	181133, 72310
N/A	SW006	SWO	Church Lane (Network)	181544, 73040
N/A	SW007	SWO	Elm Road (Network)	181544, 73040
N/A	SW008	SWO and EO	Old Cobh Road Pumping Station	180594, 72283
Midleton Functional Area				
SW01MIDL	SW001	Secondary discharge from amalgamated Agglomeration	Midleton WwTP	186177, 69506
SW03MIDL	SW010	SWO/EO	Bailick No. 1 Pumping Station	187975, 73109

Current Licensed Discharge Name	Proposed Name in WWDL Review	Type	Asset	Discharge Location (NGR)
SW04MIDL	SW011	SWO/EO	Bailick No. 2 Pumping Station	188047, 72518
SW05MIDL	SW012	SWO/EO	Ballinacurra No. 2 Pumping Station	188518, 71783
N/A	SW013	EO	Bailick No. 3 Pumping Station	188272, 72060
SW07MIDL	SW014	SWO/EO	Dwyers Road Pumping Station	187475, 72902
N/A	SW015	EO	Oakwood Pumping Station	188573, 73373
N/A	SW016	SWO/EO	Roxboro Mews Pumping Station	188346, 73332
N/A	SW017	SWO/EO	The Rock Pumping Station	188265, 73232
N/A	SW018	SWO/EO	Roxboro Housing Estate Pumping Station	188332, 73316
N/A	SW019	SWO/EO	Old Youghal Road Pumping Station	188703, 73401
N/A	SW020	SWO	Riversfield Estate SWO (Network)	187687, 73025
N/A	SW021	SWO	Drury's Avenue SWO (Network)	188346, 73332
N/A	SW022	EO	Ballinacurra No.1 Pumping Station	188366, 71791

3.3.1. Proposed Primary Discharge (SW009)

The proposed primary discharge (SW009) from the amalgamated Midleton-Carrigtwohill agglomeration will be the current primary discharge from the Carrigtwohill WwTP as per D0044-01 *i.e.,* discharge to Lough Mahon (Harper's Island) transitional waters at NGR 179911E, 72583N.

The location of the proposed Primary Discharge (SW009) is shown in **Table 3.1** and on **Figure 3.4.**

The Project will result in flows (max *ca*. 11,177 p.e.) being diverted from the Midleton functional area to Carrigtwohill WwTP for treatment, prior to the discharge of treated effluent to the Lough Mahon (Harper's Island) *via* SW009 in accordance with the proposed ELVs as detailed in **Section 3.5** below. The p.e. of 11,177 represents *ca*. 4,177 p.e. of flows being diverted from the existing Midleton agglomeration to Carrigtwohill WwTP for treatment, and a further *ca.* 7,000 p.e. being diverted on completion of Water Rock UEA and supporting infrastructure. Refer to **Section 1.2.4.** for details on the Midleton Waste Water Load Diversion Project.

3.3.2. Proposed Secondary Discharge (SW001)

The proposed secondary discharge (SW001) for the agglomeration will be from Midleton WwTP and will continue to discharge to the North Channel Great Island transitional waters at NGR 186177N, 69506E at Rathcoursey Point.

The location of the proposed Secondary Discharge (SW001) is shown in **Table 3.1** and on **Figure 3.4**.

3.3.3. Dual Function Overflow from Barryscourt Pumping Station (SW003)

There is a single Dual Function Overflow (SW003) at Barryscourt Pumping Station *i.e.,* an overflow which can act as an SWO or an EO depending on the event. The location of the Dual Function Overflow (SW003) is shown in **Table 3.1** and on **Figure 3.4**.

SWO

The SWO (SW003) at Barryscourt Pumping Station discharges to the Tibbotstown River at NGR 181276E, 72256N.

SW003 has been designed and meets the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995.

EO

Barryscourt is connected to Carrigtwohill WwTP *via* telemetry and has a backup permanent generator present to provide for continued operation of the Pumping Station in the event of an interruption in the power supply.

In event of a power failure or pump failure, or the capacity of the Pumping Station being exceeded, then flows will be discharged to the Tibbotstown River *via* EO SW003.

3.3.4. Dual Function Overflow from IDA Pumping Station No. 1 (SW004)

There is a single Dual Function Overflow (SW004) at the IDA Pumping Station. The location of the Dual Function Overflow (SW004) is shown in **Table 3.1** and on **Figure 3.4**.

SWO

The SWO (SW004) at IDA No.1 Pumping Station discharges to the Tibbotstown River at NGR 181133E, 72310N.

There are two Storm Tank compartments at the IDA No.1 Pumping Station. The combined capacity of the pumps, rising mains and Storm Tanks is 1,110 m³, these tanks have screened overflow facilities. This will provide primary treatment in the event that effluent spills to the outfall.

SW004 has been designed and meets the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995.

EO

A standby power generator is present at the IDA No. 1 Pumping Station to provide for continued operation of the pumping station in the event of an interruption in the power supply.

If there was a "*catastrophic failure*" whereby there was a power failure, and the backup generator was to fail then flows would enter the stormwater storage tank. In the event that the capacity of the storm Pumping Station wet well is exceeded then excess flows will be pumped directly to the Tibbotstown River *via* EO SW004.

3.3.5. SWO from Carrigtwohill WwTP (SW005)

There is a single SWO (SW005) at Carrigtwohill WwTP which discharges to Lough Mahon at NGR at 179911E, 72605N. The location of SW005 is shown in **Table 3.1** and on **Figure 3.4**.

The WwTP provides 1,702 m^3 of Storm Water Storage, flows in excess of the Storm Water Holding Tank capacity will overflow to the Lough Mahon (Harper's Island) *via* SW005.

SW005 has been designed and meets the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995.

3.3.6. SWO – Church Lane (SW006)

There is a single network SWO (SW006) at Church Lane which discharges to the Tibbotstown River at NGR 181544E, 73040N. The location of SW006 is shown in **Table 3.1** and on **Figure 3.4**.

SW006 has been designed and meets the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995.

3.3.7. SWO – Elm Road (SW007)

There is a single network SWO (SW007) at Elm Road which discharges to the Tibbotstown River at NGR E181544, N73040. The location of SW007 is shown in **Table 3.1** and on **Figure 3.4**.

SW007 has been designed and meets the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995.

3.3.8. Dual Function Overflow from Old Cobh Road Pumping Station (SW008)

There is a single Dual Function Overflow (SW008) at the Old Cobh Road Pumping Station. The location of the Dual Function Overflow (SW008) is shown in **Table 3.1** and on **Figure 3.4**.

SWO

The SWO (SW008) at Old Cobh Road Pumping Station discharges to Lough Mahon transitional waters at NGR 180594E, 72283N.

There are two Storm Tank compartments at the Old Cobh Road Pumping Station. The combined capacity of the pumps, rising mains and Storm Tanks is 1,600m^3. These tanks have screened overflow facilities which provide primary treatment in the event that effluent spills *via* the overflow.

SW008 has been designed and meets the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995.

EO

A standby power generator is present at the Old Cobh Road Pumping Station to provide for continued operation of the pumping station in the event of an interruption in the power supply. If there was a "*catastrophic failure*" whereby there was a power failure, and the backup generator was to fail then flows would enter the stormwater storage tank. In the event that the capacity of the storm pumping station wet well is exceeded then excess flows shall be pumped directly to the Lough Mahon (Harper's Island) *via* EO SW008.

3.3.9. Dual Function Overflow from Bailick No.1 Pumping Station (SW010)

There is a single Dual Function Overflow (SW010) at the Bailick No.1 Pumping Station. The location of the Dual Function Overflow (SW010) is shown in **Table 3.1** and on **Figure 3.5.**

SWO

The SWO (SW010) at Bailick No.1 Pumping Station discharges to the Owennacurra Estuary transitional waters at NGR 187975E, N73109N.

SW010 is currently not meeting the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995. As part of the Midleton Wastewater Network Project, UÉ has committed to the rehabilitation and upgrading of all SWOs in the Midleton agglomeration to ensure meeting DoEHLG criteria. Current programmed completion dates indicate that these works will be completed by Q4 2029.

EO

A standby power generator is present at the Bailick No.1 Pumping Station to provide for continued operation of the pumping station in the event of an interruption in the power supply. If there was a "*catastrophic failure*" whereby there was a power failure, and the backup generator was to fail then flows will discharge to the Owennacurra Estuary *via* EO SW010.

3.3.10. Dual Function Overflow from Bailick No.2 Pumping Station (SW011)

There is a single Dual Function Overflow (SW011) at the Bailick No.2 Pumping Station. The location of the Dual Function Overflow (SW011) is shown in **Table 3.1** and on **Figure 3.5**.

SWO

The SWO (SW011) at Bailick No.2 Pumping Station discharges to the Owennacurra Estuary transitional waters at NGR 188047E, 72518N.

SW011 is currently not meeting the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995. SW011 will be upgraded as part of the Midleton Wastewater Network Project to ensure meeting DoEHLG criteria, and as noted above, these works are expected to be completed by Q4 2029.

EO

A connection point to a temporary mobile generator is available at the Bailick No.2 Pumping Station in the event of an interruption in the power supply. If there was a "*catastrophic failure*" whereby there was a power failure, and the backup generator was to fail, or the capacity of the Pumping Station is exceeded, flows will then discharge to the Owennacurra Estuary *via* EO SW011.

3.3.11. Dual Function Overflow from Ballinacurra No.2 Pumping Station (SW012)

There is a single Dual Function Overflow (SW012) at the Ballinacurra No.2 Pumping Station. The location of the Dual Function Overflow (SW012) is shown in **Table 3.1** and on **Figure 3.5**.

SWO

The SWO (SW012) at Ballinacurra No.2 Pumping Station discharges to the Owennacurra Estuary transitional waters at NGR 188518E, 71783N.

SW012 has been designed and meets the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995.

EO

In the case of minor or major outages affecting Ballinacurra No.2 Pumping Station, depending on the duration of the outage, tankering or the use of generators is an option and will be determined on a case-by-case basis. Any power outages are expected to be relatively short in duration, therefore any potential discharges are also expected to be short in duration. In event of a power failure or pump failure, or the capacity of the Pumping Station is exceeded, flows will then discharge to the Owennacurra Estuary *via* EO SW012.

3.3.12. EO from Bailick No.3 Pumping Station (SW013)

There is a single EO (SW013) at the Bailick No. 3 Pumping Station. The location of the EO (SW013) which discharges to Owennacurra Estuary transitional waters at 188272E, 72060N is shown in **Table 3.1** and on **Figure 3.5**.

A connection point to a temporary mobile generator is available at the Bailick No.3 Pumping Station in the event of an interruption in the power supply. If there was a "*catastrophic failure*" whereby there was a power failure, and the backup generator was to fail, or the capacity of the Pumping Station is exceeded, flows will then discharge to the Owennacurra Estuary *via* EO SW013.

3.3.13. Dual Function Overflow from Dwyer's Road Pumping Station (SW014)

There is a single Dual Function Overflow (SW014) at the Dwyer's Road Pumping Station. The location of the Dual Function Overflow (SW014) is shown in **Table 3.1** and on **Figure 3.5**.

SWO

The SWO (SW014) at Dwyers Road Pumping Station discharges to the Owennacurra River at NGR 187475E, 72902N.

SW014 has been designed and meets the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995.

EO

There is no standby generator or connection point to a temporary mobile generator at Dwyers Road Pumping Station. In the case of minor or major outages affecting the Pumping Station, depending on the duration of the outage, tankering or the use of generators is an option and is determined on a case-by-case basis. Any power outages are expected to be relatively short in duration, therefore any potential discharges are also expected to be short in duration. In event of a power failure or pump failure, or the capacity of the Pumping Station is exceeded, flows will then discharge to the Owennacurra River *via* EO SW014.

3.3.14. EO from Oakwood Pumping Station (SW015)

There is a single EO (SW015) at the Oakwood Pumping Station. The location of the Emergency Overflow (SW015) which discharges to Dungourney River at NGR 188573E, 73373N is shown in **Table 3.1** and on **Figure 3.5**.

There is no standby generator or connection point to a temporary mobile generator at Oakwood Pumping Station. In the case of minor or major outages affecting this Pumping Station, depending on the duration of the outage, tankering or the use of generators is an option and is determined on a case-by-case basis. Any power outages are expected to be relatively short in duration, therefore any potential discharges are also expected to be short in duration. In event of a power failure or pump failure, or the capacity of the Pumping Station is exceeded, flows will then discharge to the Dungourney River *via* EO SW015.

3.3.15. Dual Function Overflow from Roxboro Mews Pumping Station (SW016)

There is a single Dual Function Overflow (SW016) at the Roxboro Mews Pumping Station. The location of the Dual Function Overflow (SW016) is shown in **Table 3.1** and on **Figure 3.5**.

SWO

The SWO (SW016) at Roxboro Mews Pumping Station discharges to the Dungourney River at NGR 188346E, 73332N.

SW016 has been designed and meets the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995.

EO

There is no standby generator or connection point to a temporary mobile generator at Roxboro Mews Pumping Station. In the case of minor or major outages affecting this Pumping station, depending on the duration of the outage, tankering or the use of generators is an option and is determined on a case-by-case basis. Any power outages are expected to be relatively short in duration, therefore any potential discharges are also expected to be short in duration. In event of a power failure or pump failure, or the capacity of the Pumping Station is exceeded, flows will then discharge to the Dungourney River *via* EO SW016.

3.3.16. Dual Function Overflow from The Rock Pumping Station (SW017)

There is a single Dual Function Overflow (SW017) at the Rock Pumping. The location of the Dual Function Overflow (SW017) is shown in **Table 3.1** and on **Figure 3.5**.

SWO

The SWO (SW017) at the Rock Pumping Station discharges to the Dungourney River at NGR 188265E, 73232N.

SW017 has been designed and meets the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995.

EO

There is no standby generator or connection point to a temporary mobile generator at The Rock Pumping Station. In the case of minor or major outages affecting this Pumping

station, depending on the duration of the outage, tankering or the use of generators is an option and is determined on a case-by-case basis. Any power outages are expected to be relatively short in duration, therefore any potential discharges are also expected to be short in duration. In event of a power failure or pump failure, or the capacity of the Pumping Station is exceeded, flows will then discharge to the Dungourney River *via* EO SW017.

3.3.17. Dual Function Overflow from Roxboro Housing Estate Pumping Station (SW018)

There is a single Dual Function Overflow (SW018) at the Roxboro Housing Estate Pumping Station. The location of the Dual Function Overflow (SW018) is shown in **Table 3.1** and on **Figure 3.5**.

SWO

The SWO (SW018) at the Roxboro Housing Estate Pumping Station discharges to the Dungourney River at NGR 188332E, 73316N.

SW018 has been designed and meets the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995.

EO

There is no standby generator or connection point to a temporary mobile generator at the Roxboro Estate Pumping Station. In the case of minor or major outages affecting this Pumping station, depending on the duration of the outage, tankering or the use of generators is an option and is determined on a case-by-case basis. Any power outages are expected to be relatively short in duration, therefore any potential discharges are also expected to be short in duration. In event of a power failure or pump failure, or the capacity of the Pumping Station is exceeded, flows will then discharge to the Dungourney River *via* EO SW018.

3.3.18. Dual Function Overflow from Old Youghal Road Pumping Station (SW019)

There is a single Dual Function Overflow (SW019) at the Old Youghal Road Pumping Station. The location of the Dual Function Overflow (SW019) is shown in **Table 3.1** and on **Figure 3.5**.

SWO

The SWO (SW019) at Old Youghal Road Pumping Station discharges to the Dungourney River at NGR 188703E, 73401N.

SW019 has been designed and meets the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995.

EO

There is no standby generator or connection point to a temporary mobile generator at Old Youghal Road Pumping Station. In the case of minor or major outages affecting this Pumping station, depending on the duration of the outage, tankering or the use of generators is an option and is determined on a case-by-case basis. Any power outages are expected to be relatively short in duration, therefore any potential discharges are also expected to be short in duration. In event of a power failure or pump failure, or the capacity

the Pumping Station is exceeded, flows will then discharge to the Dungourney River *via* EO SW019.

3.3.19. SWO – Riversfield Estate (SW020)

There is a single network SWO (SW020) at the Riversfield Estate. The location of SW020 which discharges to the Owennacurra Estuary transitional waters at NGR 187687E, 73025N is shown in **Table 3.1** and on **Figure 3.5**.

SW020 is currently not meeting the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995. SW020 will be upgraded as part of the Midleton Wastewater Network Project to ensure meeting DoEHLG criteria and as noted above these works are expected to be completed by Q4 2029.

3.3.20. SWO – Drury's Avenue (SW021)

There is a single network SWO (SW021) at Drury's Road. The location of SW021 which discharges to the Dungourney River at NGR 188346E, 73332N is shown in **Table 3.1** and on **Figure 3.5**.

SW021 has been designed and is meeting the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995.

3.3.21. EO from Ballinacurra No.1 Pumping Station (SW022)

There is an EO (SW022) from Ballinacurra No.1 Pumping Station which discharges to the Owennacurra Estuary at NGR 188366E, 71791N is shown in **Table 3.1** and on **Figure 3.5.**

There is no standby generator or connection point to a temporary mobile generator at Ballinacurra No.1 Pumping Station. In the case of minor or major outages affecting this Pumping station, depending on the duration of the outage, tankering or the use of generators is an option and is determined on a case-by-case basis. Any power outages are expected to be relatively short in duration, therefore any potential discharges are also expected to be short in duration. In event of a power failure or pump failure, or the capacity the Pumping Station is exceeded, flows will then discharge to the Owennacurra Estuary *via* EO SW022.

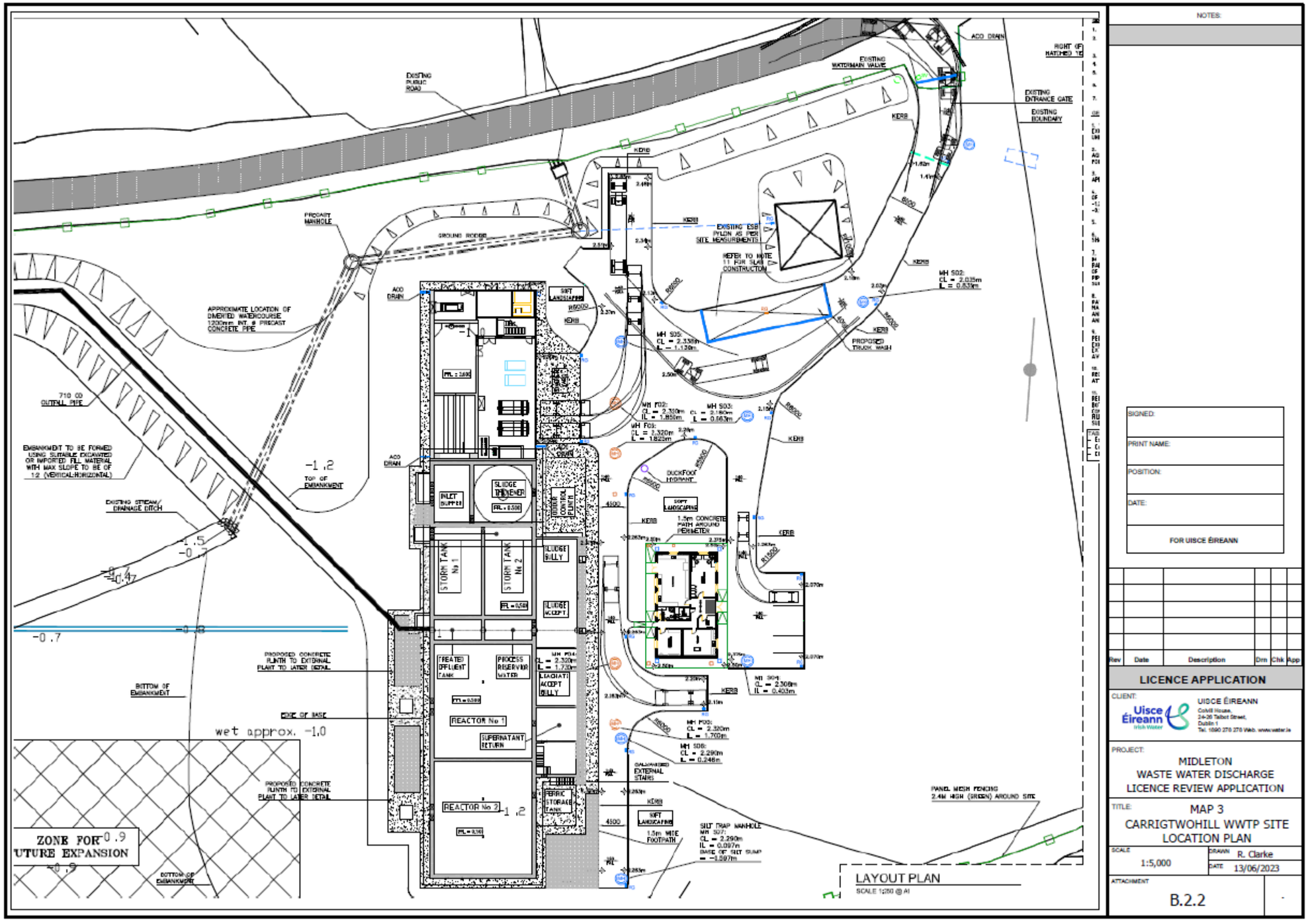


Figure 3.2 Carrigtwohill Wastewater Treatment Plant Layout

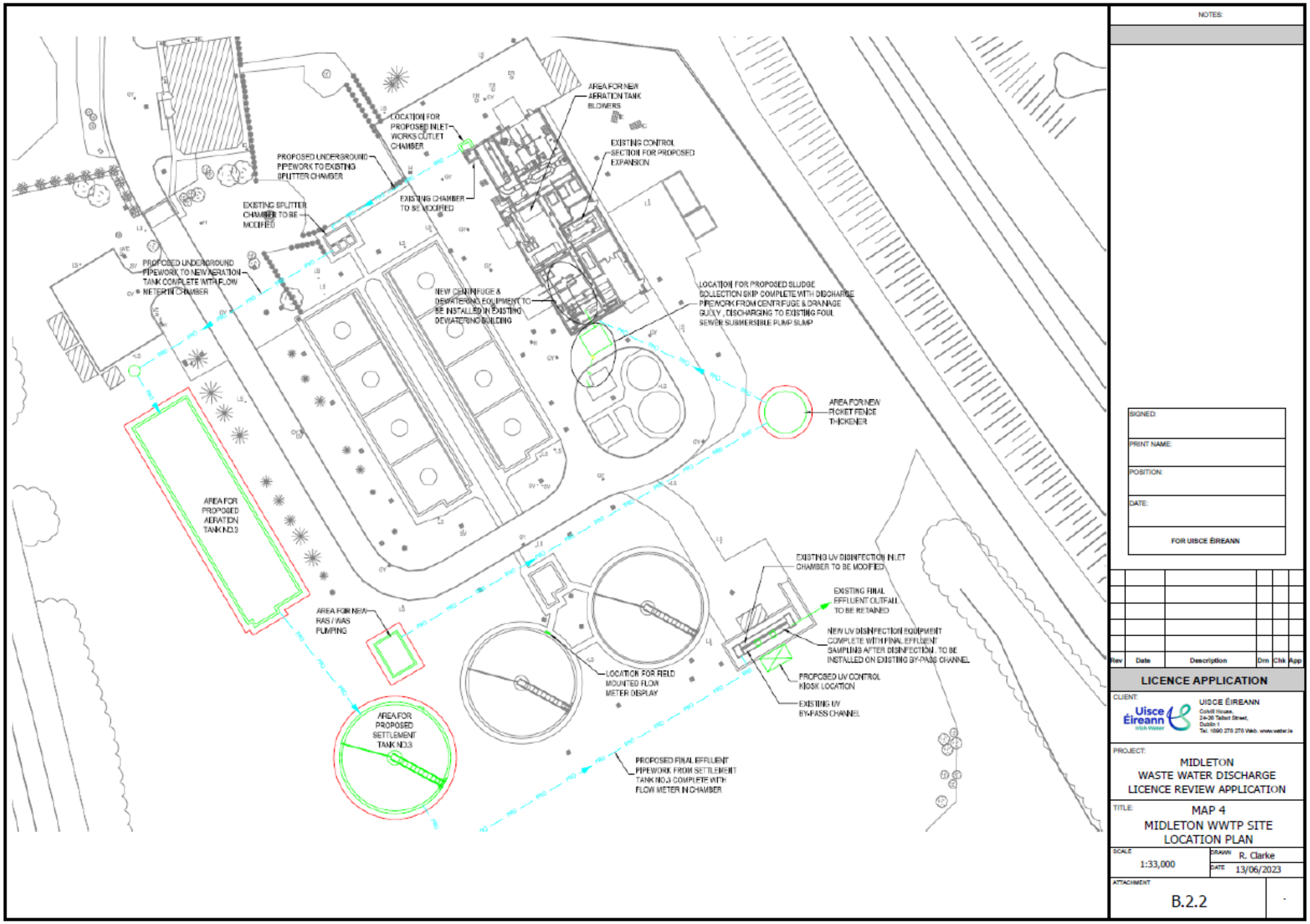


Figure 3.3 Midleton Wastewater Treatment Plant Layout

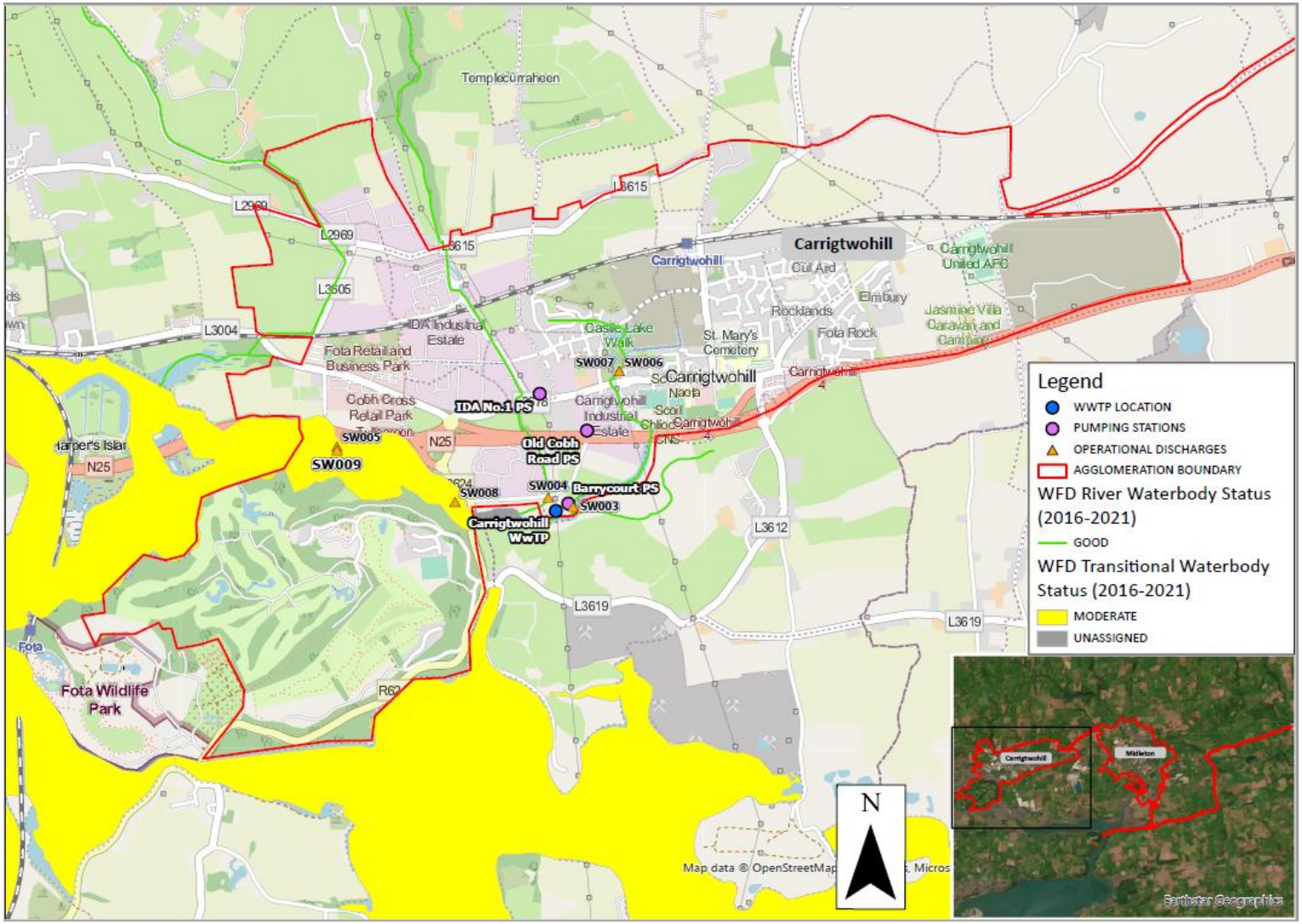


Figure 3.4 Operational Discharges Relating the Carrigtwohill Functional Area

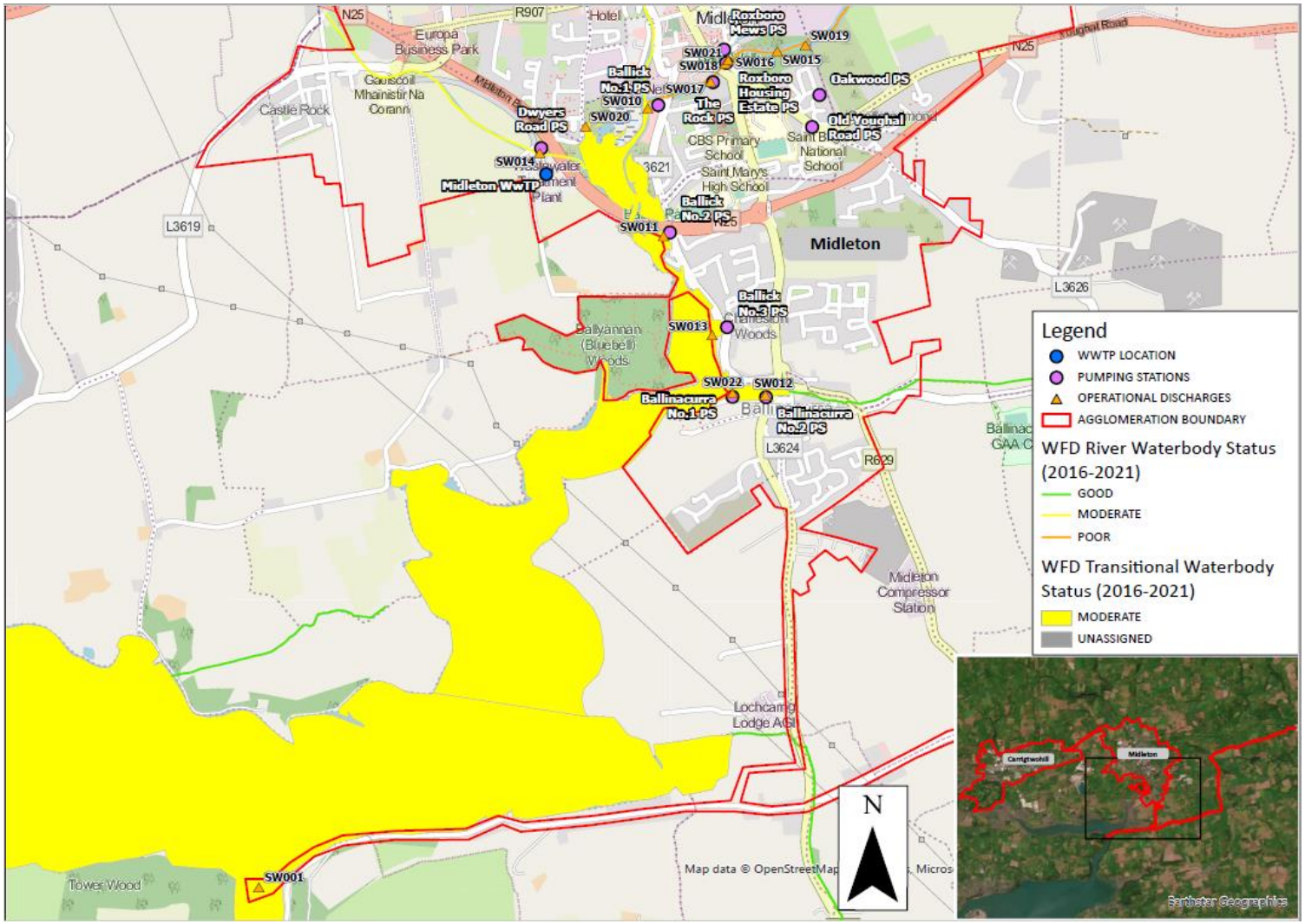


Figure 3.5 Operational Discharges Relating the Midleton Functional Area

3.4. Measures to Prevent Unintended Discharges

The Waste Water Treatment Works at Midleton and Carrigtwohill have been designed and incorporate the following key measures to prevent unintended discharges to the six receiving water environment.

- 13 of the 16 no. SWOs meet the definition of '*Storm Water Overflow'* as per Regulation 3 of the Waste Water Discharge (Authorisation) Regulations, 2007, as amended and the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995. The remaining 3 no. of SWO's (SW010, SW011, and SW020) will be upgraded as part of the Midleton Waste Water Network Upgrade Project to ensure they meet DoEHLG criteria, and this is expected to be completed by Q4 2029.
- Provision of 1,702m^3 of storm water storage at Carrigtwohill WwTP. Flows in excess of the storm water holding tank capacity will overflow to Lough Mahon (Harper's Island) *via* SW005 which meets DoEHLG criteria.
- Alarms for both Carrigtwohill WwTP and Midleton WwTP are linked to SCADA with alarms sent to operators in the result of an emergency event.
- Midleton and Carrigtwohill are a manned site during the hours of 8:00 and 16:30 Monday to Thursday and 08:00 to 16:00 on Fridays with 24 hours call out response where the amount of time spent on site will vary depending on various factors *e.g.*, weather or breakdowns in plant or maintenance works required such as cleaning of the intake screens *etc.*
- Midleton and Carrigtwohill WwTP are equipped with backup permanent generators to provide for the continued operation of the pumping equipment in the event of an interruption in the power supply. This will enable an automatic switch over in such events.
- Provision of standby generators at 4 no. Pumping Stations to provide continued operation of the Pumping Station in the event of an interruption in the power supply (Barryscourt, IDA No.1, Old Cobh Road, and Bailick No.1).
- 2 no. of Pumping Stations include a connection point for a temporary mobile generator. This set-up is in place at Bailick No.2 and Bailick No.3.
- In the case of minor or major outages affecting smaller Pumping Stations, depending on the duration of the outage, tankering is an option and is determined on a case-by-case basis. In most cases any power cuts to date have been relatively short in duration and power has been restored quickly. Therefore, any potential discharges will be short in duration. This procedure is in place at 8 no. Pumping Stations where standby generators or a connection point to a temporary mobile generator are not in place (Ballinacurra No.2, Dwyers Road, Oakwood, Roxboro Mews, The Rock, Roxboro Housing Estate, Old Youghal Road and Ballinacurra No.1).
- Midleton and Carrigtwohill WwTP are equipped with standby pumps in place, including RAS/WAS pumps, and storm tank pumps at Carrigtwohill WwTP. The provision of standby pumps is also available at a number of Pumping Stations with auto-change over of pumps where applicable.
- Where available, all flows will be monitored continuously and recorded at the electromagnetic flowmeters at the Midleton and Carrigtwohill WwTPs and several Pumping Stations *via* flowmeter telemetry.

- An Emergency Response Plan and Procedures, Operation and Maintenance Procedures for all equipment is in place and will be implemented by the appointed plant operator for both WwTPs, as required.
- All operatives are fully familiar with all operational plans and procedures pertaining to the plant and network *etc.*

3.5. Carrigtwohill Waste Water Treatment Plant Design

Existing Scenario as per D0044-01

The Carrigtwohill and 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 of December 2021 (Technical Amendment B).

At the time of the grant of the licence, the plant 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 179911E, 72583N *via* primary discharge outfall SW009.

All flows arriving to Carrigtwohill WwTP receive tertiary treatment with Phosphorus and Nitrogen removal.

The **existing** licensed ELVs for the primary discharge from Carrigtwohill WwTP are shown in **Table 3.2** below:

Table 3.2 Existing ELVs for Carrigtwohill WwTP (SW001)

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
TON	20 mg/l
Ammonia (Total)	5 mg/l
pH	6 - 9

Proposed Scenario as per Licence Review

As discussed in **Section 1.2.1** the proposed amalgamation of Midleton and Carrigtwohill agglomerations will result in a maximum *ca*. 11,177 p.e. to be diverted from the existing Midleton agglomeration to Carrigtwohill WwTP for treatment, on completion of the Midleton Waste Water Load Diversion Project. This p.e. reflects *ca*. 4,177 p.e. from the existing sewerage network in Midleton, and 7,000 *ca*. from the future delivery of UEA.

As part of the WWDL Review, the current primary discharge (SW001) at Carrigtwohill will become the primary discharge (SW009) for the proposed amalgamated Midleton and Carrigtwohill agglomeration.

The **proposed** ELVs for the Carrigtwohill WwTP are shown in **Table 3.3** below:

Table 3.3 Proposed ELVs for the primary discharge at Carrigtwohill WwTP (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

These standards give effect to the principle of the Combined Approach as defined in the European Union (Waste Water Discharge) Regulations, 2007 to 2020 in that they accommodate the Urban Waste Water Treatment Regulations, 2001 (as amended) and the status of the receiving waterbody, Lough Mahon (Harper's Island).

3.6. General Operations and Management (Carrigtwohill WwTP)

3.6.1. Operations and Maintenance Staff

Alarms for Carrigtwohill WwTP run automatically and are linked to SCADA (Supervisory Control And Data Acquisition) with alarms sent to operators in the result of an emergency event. The WwTP is a manned site during the hours of 08:00 and 16:30 Monday to Thursday and 08:00 to 16:00 on Fridays with 24-hour call out response where the amount of time spent on site will vary depending on various factors *e.g.,* weather or breakdowns in plant or maintenance works required such as cleaning of the intake screens *etc*. There is also a maintenance team on site for roughly one week a month to carry out any repairs or any other scheduled larger maintenance that may be required. There is a full-time operator and lab technician situated at Carrigtwohill.

3.6.2. Environmental and Incident Management

The Operator of Carrigtwohill WwTP has, and will continue to have in place, certified Health, and Safety (OHSAS 18001) and Environmental (ISO 14001) management systems. The management systems provide for the monitoring of environmental and safety performance and implementation of continuous improvement through associated action programmes. These programmes are frequently and routinely monitored by UÉ and will continue to be developed over the operating life of the WwTP.

In accordance with its EPA WWDL, procedures are in place to notify the EPA of emergencies, exceedance of licence conditions, and where environmental pollution has, or may have, taken place.

3.6.3. Environmental Monitoring

A monitoring programme of the effluent discharge and ambient water quality is currently in place. Refer to Schedule A: *Discharges & Discharge Monitoring*, and Schedule B: *Ambient Monitoring* of WWDL D0044-01 and D0056-01 for details on the current monitoring regime.

The results from this monitoring programme are provided in the conditioned Annual Environmental Report (AER) which is submitted to the EPA on an annual basis.

Upon approval and grant of the licence by the EPA, the D0056-02 licence will outline the Discharges and Monitoring requirements for both Midleton and Carrigtwohill proposed as part of this licence review. The results of the monitoring requirements set out under the D0056-02 licence will be provided in the AER to be submitted to the EPA.

3.7. Midleton Waste Water Treatment Plant Design

Existing Scenario as per D0056-01

The Midleton WWDL was granted on the 6th of January 2011 and was subsequently amended on the 19th of December 2016 (Technical Amendment A), 20th October 2020 (Technical Amendment B) and on the 2nd of December 2021 (Technical Amendment C).

Treated effluent from the Midleton WwTP currently discharges to the North Channel Great Island at NGR 186177N, 69506E *via* primary discharge outfall SW009 at Rathcoursey Point.

The proposed amalgamation of Midleton and Carrigtwohill agglomerations will result in diversion of loads (max. *ca*. 11,177 p.e) from the Midleton agglomeration to the existing Carrigtwohill WwTP (Design p.e. 30,000). The current organic loading of the Carrigtwohill WwTP is 8,654 p.e. (Source: 2022 AER) meaning there is significant spare capacity to cater for these proposed diverted loads.

The **existing** licensed ELVs as per Schedule A and Condition 2.1 of the D0056-01 licence for the primary discharge (SW001) from Midleton WwTP combined discharge are as per **Table 3.4** below:

Table 3.4 Proposed ELVs for the 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	6.5 - 9

Proposed Scenario as per Licence Review

The current primary discharge outfall *via* SW001 at Midleton will become the secondary discharge point (SW001) for the amalgamated agglomeration.

The **proposed** ELVs for Midleton combined secondary effluent discharge are shown in **Table 3.5** below:

Table 3.5 Proposed ELVs for the 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

Parameter	Emission Limit Value
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

Under this licence review a change to the pH ELV for the Midleton discharge point (e.g., pH range change) is proposed. This is deemed necessary to ensure consistency with pH ELVs on a national basis.

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 3.6** will continue to apply directly at the Midleton WwTP (SW100) as per Condition 4.16 of the original licence in order to comply with the UWWTD requirements. There are no proposed changes to the ELVs that apply directly at the WwTP.

Table 3.6 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

All flows arriving to Midleton WwTP receive tertiary treatment with N removal.

These standards give effect to the principle of the Combined Approach as defined in the European Union Waste Water Discharge Regulations, 2007 to 2020 in that they accommodate the Urban Waste Water Treatment Regulations, 2001 (as amended) and the status of the receiving waterbody, the North Channel Great Island.

The current primary discharge (SW01 MIDL) for the Midleton agglomeration is to the North Channel Great Island at Rathcoursey Point *via* a diffuser after passing through Rathcoursey Tidal Holding Tank. As discussed in **Section 1.2.3.1,** the treated wastewater arising from Midleton agglomeration is a mix of domestic, commercial, and industries - IE licence Reg. No. P0442-02 and IE licence Reg. No. P1103-01.

The discharges to Rathcoursey are pumped from Ballinacurra Pumping Station *via* a 750mm diameter rising main/pressure pipe. The treated effluent from Midleton WwTP and P0442-02 is pumped from Ballinacurra Pumping Station to Rathcoursey Tidal Holding Tank *via* the 750mm rising main/pressure pipe. The treated process effluent from Dairygold is pumped from Mogeely *via* a separate rising main into the 750mm pressure pipe at Bawnard. The discharge from P1103-01 is restricted to periods during which the lunar penstock at Rathcoursey Tidal Holding Tank is open and discharging. The combined Midleton WwTP, P0442-02, and P1103-01 flows are conveyed to the Rathcoursey Holding Tank.

The storage capacity of this tank is calculated as 2,012.5m^3 and the storage volume available in the inlet pipe is calculated at 163m^3. The effective total storage capacity of the tank system is therefore estimated as 2,175.5m^3. This is insufficient to manage the peak hydraulic loading from the Middleton agglomeration. The maximum licensed hourly discharge from P0442-02 and P1103-01 is 270 m^3/hr and 370 m^3/hr which would equate

to 1,620m^3 and 2,220 m^3/hr respectively over a 6-hour tidal cycle. The maximum hourly discharge from Midleton WwTP is 432m^3/hr which would equate to 2,250m^3. The existing Rathcoursey Tidal Holding Tank does not have capacity to cater for more than 5 hours sustained peak discharges from Midleton WwTP without overflowing. When both Industries are discharging the period before the tank overflows (*i.e.,* 5 hours) occurs is reduced.

UÉ 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 applications for planning permission to facilitate upgrades to the tank.

3.8. General Operations and Management (Midleton WwTP)

3.8.1. Operations and Maintenance Staff

Alarms for both Midleton WwTP run automatically and are linked to SCADA with alarms sent to operators in the result of an emergency event. The WwTP is a manned site during the hours of 08:00 and 16:30 Monday to Thursday and 08:00 to 16:00 on Fridays with 24 hours with 24-hour call out response where the amount of time spent on site will vary depending on various factors *e.g*., weather or breakdowns in plant or maintenance works required such as cleaning of the intake screens *etc*. There is also a maintenance team on site for roughly one week a month to carry out any repairs or any other scheduled larger maintenance that may be required.

3.8.2. Environmental and Incident Management

The Operator of the Midleton WwTP has, and will continue to have in place, certified Health, and Safety (OHSAS 18001) and Environmental (ISO 14001) management systems. The management systems provide for the monitoring of environmental and safety performance and implementation of continuous improvement through associated action programmes. These programmes are frequently and routinely monitored by UÉ and will continue to be developed over the operating life of the WwTP.

In accordance with its EPA WWDL, procedures are in place to notify the EPA of emergencies, exceedance of licence conditions, and where environmental pollution has, or may have, taken place.

3.8.3. Environmental Monitoring

A monitoring programme of the effluent discharge is currently in place and will continue to be in place as per the WWDL requirements. Refer to Schedule A: *Discharges & Discharge Monitoring*, of WWDL D0056-01 for details on the current monitoring regime.

The results from this monitoring programme are provided in the AER which is submitted to the EPA on an annual basis. UÉ will continue to submit results from designated ambient monitoring points upstream and downstream of the Midleton discharge to the EPA on an annual basis.

4. POLICY AND LEGISLATIVE CONTEXT

4.1. Introduction

This Chapter of the EIAR summarises the key relevant legislation, policy and guidance at EU, national, regional, and local levels in the context of The Project *i.e*., in relation to the proposed amalgamated Midleton and Carrigtwohill agglomeration operational discharges. Reference to planning and policy related to The Project (*i.e.,* the two new Pumping Stations, one at Water Rock and Midleton North, and *ca.* 7km of new rising main) itself is only included where relevant to The Project.

4.2. European Legislation

4.2.1. EU Urban Waste Water Treatment Directive

Council Directive 91/271/EEC concerning Urban Waste Water Treatment (known as the Urban Waste Water Treatment (UWWT) Directive) aims to protect human health and the environment from adverse effects of discharges from urban wastewater and certain industrial discharges, setting standards to ensure that Member States' urban cities, towns, and settlements, properly collect and treat wastewater prior to discharge. Directive 98/15/EC amends Directive 91/271/EEC and clarifies the requirements of the Directive in relation to discharges from urban wastewater treatment plants to sensitive areas that are vulnerable to eutrophication.

The Urban Waste Water Treatment Regulations, 2001, S.I. No. 254 of 2001 (as amended) transpose the UWWT Directive into Irish legislation.

The Owennacurra Estuary / North Channel and Lee Estuary / Lough Mahon are designated as '*sensitive'* under the Urban Treatment Regulations 2001 (as amended). The proposed primary discharge enters directly into the Lee Estuary / Lough Mahon Nutrient Sensitive Area. The proposed secondary discharge enters directly into the Owennacurra Estuary / North Channel Nutrient Sensitive Area. For the Owennacurra Estuary / North Channel, N is the limiting nutrient and for the Lee Estuary / Lough Mahon, P is the limiting nutrient.

As described in **Chapter 3**, the Midleton Carrigtwohill WwTPs are designed with sufficient treatment processes to allow for the removal of Phosphorus and Nitrogen *via* tertiary treatment processes. Sampling is conducted as required from Carrigtwohill (SW001) and Midleton (SW100) WwTP's to ensure compliance with UWWTD and will continue to be upon approval and grant of the licence by the EPA, D0056-02.

Midleton agglomeration is currently the subject of a ECJ infringement notice citing non-compliance with Article 3 of the UWWTD (*i.e.,* SWO non-compliance) for 3 no. of SWOs which are not meeting DoEHLG criteria for SWOs. UÉ reports regularly to the EU on ECJ agglomerations and has committed that all works necessary to achieve network compliance in Midleton will be completed by Q4 2029. The remaining SWOs are meeting the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995.

Thus, once upgrades to the non-compliant SWOs are completed, the proposed Midleton and Carrigtwohill agglomeration will be compliant with the UWWT Directive.

4.2.2. EU Water Framework Directive

The EU Water Framework Directive (WFD) (2000/60/EC) establishes a framework for the protection of all waters including rivers, lakes, estuaries, coastal waters and groundwater and their dependent wildlife/habitats under one piece of environmental legislation. It requires the achievement of '*Good Status*' for all these waters to be achieved through a system of river basin management planning and extensive monitoring by 2015 or, at the latest, by 2027. '*Good status'* means both *'Good Ecological Status'* and '*Good Chemical Status*'*.* The classification for water quality is described based on biological, physico-chemical and hydromorphological quality elements.

The main tool for Member States' implementation of the WFD, is River Basin Management Plans (RBMP). The next River Basin Management Plan to be implemented is the draft 3rd River Basin Management Plan (2022-2027). Water bodies identified as being '*At Risk'* of not achieving their environmental objectives need to have targeted measures implemented to achieve objectives under this Plan. The manner and the timeframe in which these targeted measures are implemented need to be prioritised to take account of the finite resources available and of the time and resources needed to develop appropriate measures.

UÉ are committed to ensuring that water services infrastructure operates in a manner that supports the achievement of the water body objectives under the WFD.

As identified in **Chapter 3**, the operational discharges will discharge to Lough Mahon (Harper's Island), Tibbotstown_010, North Channel Great Island, Owennacurra Estuary, Owennacurra_040, and the Dungourney_020. The proposed primary discharge point is *ca.* 1.3km downstream of Carrigtwohill WwTP and discharges to Lough Mahon (Harper's Island) which has a WFD 2016-2021 designation of Moderate status. The Tibbotstown_010 which is the receiving waters for a number of overflows is designated as "*Good"* status in the WFD 2016-2021 assessment. The North Channel Island which is the receiving water for the proposed Midleton secondary discharge is designated as Moderate status for the WFD 2016-2021 and is located *ca.* 4.5km downstream of the WwTP. The Owennacurra Estuary and Owennacurra_040 are designated as Moderate status. The Dungourney_020 is designated as Poor status in the WFD 2016-2021 assessment.

A separate WFD Assessment was carried out on The Project (refer to **Appendix 3**). The WFD Assessment informed **Chapter 6** which assesses the likely significant effects on surface water.

This Assessment concluded that based on the operational discharges and overflows, there is no potential for adverse or long-term effects on the receiving waterbodies. However, there is potential for minor temporary impact during SWO events. These events will contain diluted sewage and will not have a long-term impact on the receiving waterbodies. These events will contain diluted sewage and will not have a long-term impact on the receiving waterbodies.

Therefore, it has been assessed that the operational discharges will not cause any significant deterioration or change in water body status or prevent attainment, or potential to achieve, future good status or to meet the requirements and/or objectives in the second RBMP 2018-2021 (River Basin Management Plan) and draft third RBMP 2022-2027.

4.2.3. EU Nature Directives

The EU Habitats Directive (92/43/EEC) and Birds Directive (2009/147/EC) are the core pieces of legislation implementing the EU's Biodiversity Strategy. The Habitats Directive provides the framework for legal protection for habitats and species of European conservation significance while the Birds Directive focuses on the protection of all wild bird species occurring in the EU. The nature directives provide the legislative means to establish a network of sites (known as the Natura 2000 network) throughout the EU with the objective of conserving habitats and species deemed of conservation significance both at community level, and on an international scale. The Natura 2000 network includes Special Area of Conservation (SACs) designated under the Habitats Directive, and Special Protection Areas (SPAs) designated under the Birds Directive.

The EU Habitats Directive was transposed into Irish legislation through the European Union (Natural Habitats) Regulations, S.I. No. 94 of 1997. These Regulations were amended by S.I. No. 233 of 1998 and S.I. No. 378 of 2005. The European Communities (Birds and Natural Habitats) Regulations 2011 consolidate the European Communities (Natural Habitats) Regulations 1997 to 2005 and the European Communities (Birds and Natural Habitats) (Control of Recreational Activities) Regulations 2010, as well as addressing transposition failures identified in the Court of Justice of the European Union (CJEU) judgments.

Article 6, paragraphs 3 and 4 of the EU Habitats Directive require that an Appropriate Assessment (AA) is carried out for plans and projects that are not directly connected with or necessary to the management of the designated European site that could, however, result in a potential significant effect on the designated site. Regulation 42 of the European Communities (Birds and Natural Habitats) Regulations 2011, sets out the requirements for screening and conducting AA in Ireland.

A combined Appropriate Assessment (AA) Screening Report and Natura Impact Statement (July 2023) was prepared to accompany the Midleton WWDL review application. This Report will enable the EPA as the CA to conduct an AA Screening Determination and Stage 2 AA in respect of the Midleton-Carrigtwohill amalgamated agglomeration operational discharges, for the purposes of the European Union (Waste Water Discharge) Regulations 2007 to 2020.

Please refer to **Attachment D.2.2** of the WWDL Review Application for a copy the AA Screening and NIS Report (July 2023).

4.3. National Policy and Plans

4.3.1. Water

4.3.1.1 Water Services Strategic Plan: A Plan for the Future of Water Services (2015-2040)

The Water Services Strategic Plan (WSSP) sets out UÉ's strategic objectives in its provision of water services. The six objectives are to:

- meet customer expectations;
- ensure a safe and reliable water supply;
- provide effective management of wastewater;

- protect and enhance the environment;
- support social and economic growth; and
- invest in the future of UÉ.

The plan identifies how information published by the Central Statistics Office (CSO) forecasts increased national population growth in the coming decades, and the delivery of appropriate infrastructure to meet the required demand, where and when it is needed, supports the social and economic growth of the country.

To meet these strategic objectives, the WSSP states how UÉ will maximise the capacity in existing assets through effective management and invest in interconnection of networks and additional capacity and ensure appropriate headroom (spare capacity above demand) is maintained to cater for new demands. The Midleton Waste Water Load Diversion Project, which utilises the existing capacity at Carrigtwohill and will provide interconnectivity through the construction of new pumping stations and pipeline from Midleton to Carrigtwohill, aligns with the WWSP strategic objective under supporting social and economic growth.

As described in **Chapter 3**, the Midleton Waste Water Load Diversion Project allows the diversion of flow from Midleton to Carrigtwohill WwTP for treatment using the existing spare capacity available.

4.3.1.2 Uisce Éireann Growth and Development Programme

As the national public water services utility, UÉ is responsible for providing and developing water services throughout Ireland. The Midleton Waste Water Load Diversion Project is being delivered under the UÉ Growth and Development Programme which commenced in June 2022.

4.3.1.3 River Basin Management Plan for Ireland

The second cycle RBMP covers the period 2018-2021. The third cycle RBMP is currently in draft and covers 2022-2027. Under the requirements of the WFD, the RBMP must include a programme of measures to protect and restore most water bodies to at least '*good*' status by 2027. The WFD Screening Assessment (**Appendix 3**) and **Chapter 6** Water assess the potential impacts as a result of The Project. It has been concluded that the operational discharges will not cause any significant deterioration or change in the overall receiving water bodies WFD status or prevent attainment, or potential to achieve, future good status or to meet the requirements and/or objectives in the second RBMP 2018-2021 (River Basin Management Plan) and draft third RBMP 2022-2027.

4.3.2. Biodiversity

4.3.2.1 National Biodiversity Action Plan

The National Biodiversity Action Plan (NBAP) for Ireland provides a framework for government, civil society, and private sectors to track and assess progress towards Ireland's Vision for Biodiversity over a five-year timeframe from 2017 to 2021 in the context of the Convention on Biological Diversity. The National Biodiversity Action Plan (2017-2021) lists seven objectives:

- Objective 1: Mainstream biodiversity into decision-making across all sectors

- Objective 2: Strengthen the knowledge base for conservation, management, and sustainable use of biodiversity;
- Objective 3: Increase awareness and appreciation of biodiversity and ecosystem services;
- Objective 4: Conserve and restore biodiversity and ecosystem services in the wider countryside;
- Objective 5: Conserve and restore biodiversity and ecosystem services in the marine environment;
- Objective 6: Expand and improve management of protected areas and species;
- Objective 7: Strengthen international governance for biodiversity and ecosystem services.

Target 4.2 under Objective 4 aims to ensure that principal pollutant pressures on terrestrial and freshwater biodiversity are substantially reduced by 2020. Three actions are identified to reach the target. Action 4.2.1 calls for the continued protection, enhancement, and monitoring of the ecological status under the WFD, including reducing risks to water quality. Action 4.2.2 calls for UÉ to implement its WSSP.

Target 6.3 is to ensure that *no protected species are in a worsening status by 2020; majority species, in or moving towards, favourable status by 2020.* Action 6.3.3 focuses on the development, adoption, and implementation of restoration programmes for a number of fish species including salmon, which is of county importance and recorded the receiving waterbodies, most notably in the Dungourney and Owennacurra rivers. The action includes focusing on the improvement of passage of migratory fish species. Potential impacts to the fish ecology are assessed in **Chapter 5**.

The consultation stage for the draft fourth National Biodiversity Action Plan has recently been concluded, and review of feedback is currently underway.

Ireland's 4th National Biodiversity Action Plan will set the national biodiversity agenda for the period 2023-2027. The draft plan has six objectives as follows:

- Objective 1: Adopt a whole of government, whole of society approach to biodiversity;
- Objective 2: Meet urgent conservation and restoration needs;
- Objective 3: Secure nature's contribution to people;
- Objective 4: Embed biodiversity at the heart of climate action;
- Objective 5: Enhance the evidence base for action on biodiversity; and
- Objective 6: Strengthen Ireland's contribution to international biodiversity initiatives.

4.3.2.2 Uisce Éireann's Biodiversity Action Plan

Uisce Éireann's Biodiversity Action Plan (BAP) sets out a national programme of measures to protect and enhance biodiversity across UÉ sites. UÉ recognises the need to urgently increase and accelerate efforts to halt the decline of biodiversity and are fully committed to ensuring that they build and manage their infrastructure responsibly so that our ecosystems are protected, and where possible enhanced.

Refer to **Chapter 5** Biodiversity of this EIAR for further details.

4.3.3. Climate

4.3.3.1 Climate Agreements

Ireland ratified the United Nations Framework Convention on Climate Change (UNFCCC) in April 1994 and the Kyoto Protocol in principle in 1997 and formally in May 2002.

The UNFCCC is continuing detailed negotiations in relation to GHG reductions and in relation to technical issues such as emissions trading and burden sharing. The most recent Conference of the Parties to the Convention (COP27) took place in Egypt from Nov 6, 2022 – Nov 18, 2022, and a final decision text, known as the Sharm el-Sheikh Implementation Plan was published on 20th November 2022 after negotiations overran the conference. The text reaffirms the commitment to limit global temperature rise to 1.5 degrees Celsius above pre-industrial levels.

4.3.3.2 National Policy Position 2014

In 2014, the Government adopted the National Policy Position on Climate Action and Low Carbon Development. The National Policy Position provides a high-level policy direction for the adoption and implementation by Government of plans to enable the State to pursue the transition to a low carbon, climate resilient and environmentally sustainable economy by 2050. It sets out the context for the objective, clarifies the level of greenhouse gas mitigation ambition envisaged and establishes the process to pursue and achieve the overall objective.

4.3.3.3 Climate Action and Low Carbon Development Act 2015

The Climate Action and Low Carbon Development Act 2015 seeks to address the issue of climate change and establishes the national goal to move to a low carbon, climate resilient and environmentally sustainable economy. The Act sets out a roadmap for Ireland's transition towards a low carbon economy and details mechanisms for the implementation of the National Mitigation Plan (2017) to lower Ireland's level of greenhouse emissions and a National Adaptation Framework (2018).

4.3.3.4 National Adaptation Framework 2018

The National Adaptation Framework (NAF) sets out the national strategy which seeks to reduce the vulnerability of the country to the negative effects of climate change and to avail of positive impacts. The NAF was developed under the Climate Action and Low Carbon Development Act 2015.

4.3.3.5 Climate Action and Low Carbon Development Act (Amendment) 2021

The Climate Action and Low Carbon Development (Amendment) Act 2021 has been enacted committing Ireland to 2030 and 2050 targets for reducing greenhouse gas (GHG) emissions and providing the governance framework. The country is now on a legally binding path to net-zero emissions no later than 2050, and to a 51% reduction in emissions by 2030.

4.3.3.6 Climate Action Plan (2023)

The Climate Action Plan 2023 (CAP 23), launched in December 2022, is the second annual update of Climate Action Plan 2019 and the first plan to be prepared under the Climate Action and Low Carbon Development (Amendment) Act 2021. The CAP23 sets out a plan of action with a target to achieve a 51% reduction in overall greenhouse gas (GHG)

emissions by 2030 and net-zero emissions by 2050 as committed in the Programme for Government and set out in the Climate Action and Low Carbon Development (Amendment) Act 2021.

The Plan aims to address various sectors and challenges both on land and in the marine environment. The Project falls within the Water Resource and Flood Risk Management scheme as Water Services Infrastructure. Potential climate change impacts that could affect the sector are identified including the potential for increased waterborne disease from contamination of drinking water resulting from overland flows of pollutants. The Plan will be updated annually to ensure alignment with carbon budgets and sectoral ceilings.

Refer to **Chapter 10** Air Quality and Climate of this EIAR.

4.3.3.7 Cork County Council Climate Adaptation Strategy

The Cork County Council's Climate Adaptation Strategy 2019-2024 seeks to enhance resilience to climate hazards. The Strategy presents actions to address challenges and develop innovative and sustainable solutions that address adaptation and enhance resilience to climate change. The Strategy lists seven high level goals:

- Local adaptation governance and business operations;
- Infrastructure and built environment;
- Land use and development;
- Drainage and flood management;
- Natural environment, built and cultural heritage;
- Community, health and wellbeing; and
- Other sectors and agencies.

The strategy includes a risk register that identifies hazards and consequences of extreme climate events and the services and business functions that could be impacted. In the context of drainage and flood management, wastewater is included on the risk register. The register identifies that rainfall or heatwave events could affect inflow and infiltration to the wastewater network and could cause interruptions to the anaerobic process.

Chapter 16 assesses potential risks, including from extreme events, and specifically from heavy rainfall.

4.3.4. Planning Framework

4.3.4.1 Project Ireland: National Planning Framework (2040)

The National Planning Framework (NPF), published in February 2018, is the Government's high-level strategic plan for shaping the future growth and development of Ireland to the year 2040. The NPF is a region-focused strategy for managing growth, using state lands for certain strategic purposes, and supporting this with strengthened, more environmentally focused planning at local level. The NPF is given effect with a 10-year capital investment programme in the National Development Plan 2018 – 2027 (NDP).

4.3.4.2 Regional Spatial and Economic Strategy for the Southern Region

The Regional Spatial and Economic Strategy (RSES) for the Southern Region provides the tool for implementation of the vision and objectives of the National Planning Framework for the Region. The sustainable management of Water Supply and Waste Water needs is

a key objective under the Water & Energy Utilities section of the RSES. Midleton and Carrigtwohill are identified as two areas with projects requiring advancement under the lifetime of the RSES, reinforced by the current population of Carrigtwohill and Midleton, and future projected growth. Both towns are in the top eleven largest settlements in County Cork with a population >5000 (5,080 and 12,496 respectively).

The RSES outlines how UÉ have a key role in supporting appropriately located development and the delivery of NPF and RSES policies and objectives. Furthermore, it is an objective of the RSES under RPO 26 to support co-ordination between local authorities, UÉ, and other stakeholders to deliver investment in the sustainable development of water and wastewater and other infrastructure for towns and villages, prioritising retrofitting an improvement in the quality of existing services. The RES also identifies the Water Rock UEA Project, Waste Water Pumping Stations, and the rising main from Midleton to Carrigtwohill as key deliverables to support the targeted growth for Midleton. The amalgamation of Midleton and Carrigtwohill agglomeration and the utilisation of existing capacity at Carrigtwohill WwTP aligns with the fundamental values of the RSES.

4.3.4.3 <u>County Cork Development Plan</u>

Chapter 11 of the County Cork Development Plan 2022-2028 addresses water management and considers *the provision and improvement of water, wastewater, surface water and flood alleviation services so as to facilitate development, support the delivery of population, housing and growth targets and prioritised so as to protect public health and protect, restore and improve the receiving environment and water quality.*

Policy WM11-1 addresses the WFD and the River Basin Management Plan. It calls for the prioritisation of the provision of water services infrastructure in all settlements where services are not meeting current needs and are failing to meet the requirements of the UWWT Directive, and where there is a threat to breaches in the WFD and European sites requirements as a result. This policy also restricts development if appropriate wastewater treatment, which meets the requirements of the WFD and Habitats Directives, is not available. Restricting further development in the absence of adequate wastewater is reiterated through policy WM11-9. As mentioned previously, Midleton agglomeration is the subject of an ECJ infringement notice citing non-compliance with Article 3 of the UWWTD (*i.e.,* SWO non-compliance) for SWOs), it is anticipated that the upgrades to these non-compliant SWOs will be complete by Q4 2029.

Policy WM11-7 requires that the design and planning of water services infrastructure will consider the potential impacts of climate change and the need to increase the resilience of this infrastructure to any such impacts.

With respect to ELVs, Chapter 11 (para. 11.5.16) identifies that *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 Irish Water* (now Uisce Éireann) *and the EPA.* This is supported by the diversion of waste water loads to Carrigtwohill WwTP for treatment, utilising the existing spare capacity available as per current set-up to ensure compliance with UWWTD and WWDL ELVs.

Refer also to **Chapter 5** Biodiversity and **Chapter 6** Water of this EIAR for further details.

The upgrades to the Midleton and Carrigtwohill network, including the delivery of two new pumping stations, and 7km of rising main to divert flows from Midleton to Carrigtwohill for

treatment as per current set-up under the Waste Water Load Diversion Project, as described in **Chapter 3,** are in line with the above local planning policy objectives.

4.3.4.4 Carrigtwohill Municipal District: Local Area Plan

The Local Area Plan (2017) highlights Carrigtwohill as a main town in the Cobh Municipal District. In order to secure sustainable population growth as outlined in General Objective CT-GO-01 of the Local Area Plan, General Objective CT-GO-02 specifies that development in the town will only be permitted where it is shown that it is compatible with the requirements of the relevant River Basin Management Plan as well as Cork Harbour SPA and the Great Island Channel SAC. The plan also recognises the upgrade to the existing Carrigtwohill WwTP completed in 2016 to provide a capacity of 30,000 p.e. and highlights this as sufficient to cater for existing and projected future growth of Carrigtwohill. It also highlights the need to deliver the waste water pumping stations and rising main as a key project to support CT-GO-01 for Carrigtwohill.

The upgrades to the Midleton and Carrigtwohill network, including the delivery of two new pumping stations, and 7km of rising main to divert flows from Midleton to Carrigtwohill for treatment as per current set-up under the Waste Water Load Diversion Project, as described in **Chapter 3**, are in line with the above local planning policy objectives.

4.3.4.5 Midleton Municipal District: Local Area Plan

The Local Area Plan (2017) highlights Midleton as a main town in the East Cork Municipal District. In order to secure sustainable population growth as outlined in General Objective MW-GO-01 of the Local Area Plan, General Objective MW-GO-02 outlines the need to secure the delivery of the Water Rock UEA and supporting infrastructure. The plan also recognises the current capacity of 15,000 p.e. at the WwTP located at Garryduff. The vision for Midleton in the Local Area plan is to build on the success of its rail connections to Metropolitan Cork and to manage the development in the environs in order to support the town centre. One of the key aims in delivery of this is to secure investment in essential water infrastructure, this has been secured through projects such as the LIHAF and UEA projects, respectively.

The upgrades to the Carrigtwohill and Midleton WwTW, including the delivery of two new pumping stations, and 7km of rising main to divert flows from Midleton to Carrigtwohill for treatment as per current set-up under the Waste Water Load Diversion Project, as described in **Chapter 3**, are in line with the above local planning policy objectives.

4.4. National Legislation

National legislation relevant to each environmental factor is referenced in the specialist chapters as relevant in the context of the proposed operational discharges**.**

5. BIODIVERSITY

5.1. Introduction

This Chapter prepared by Thorne Ecology provides an Ecological Impact Assessment (EcIA) of the Midleton and Carrigtwohill agglomeration operational discharges, the subject matter of the D0156-01 WWDL Application review.

The purpose of this Chapter of the EIAR is to assess the potential ecological impacts of "*The Project" i.e.,* operational discharges arising from the Midleton and Carrigtwohill agglomeration, in accordance with the relevant legislation and guidance.

Carrigtwohill Town lies *ca.* 14km east of Cork City along the N25. The WwTP is located in the townland of Tullagreen to the south of the town and can be accessed *via* the R624. The operational discharges under consideration discharge into Lough Mahon (Harper's Island) transitional waters and the Tibbotstown_10 river (refer to **Figure 3.4** in **Chapter 3**).

Midleton Town lies within an agricultural landscape *ca.* 20km east of Cork City on the Owennacurra River and the N25 road, connecting Cork to Rosslare. The WwTP is in the townland of Garryduff in the southeast of Midleton and serves the agglomeration. The operational discharges under consideration discharge into the North Channel Great Island and Owennacurra Estuary transitional waters, and the Owennacurra_40 and Dungourney_20 rivers (refer to **Figure 3.5** in **Chapter 3**).

This report will:

- Describe and evaluate the baseline ecological environment relevant to the operational discharges;
- Identify and assess all potentially significant ecological effects associated with the operational discharges;
- Set out the mitigation measures required to ensure compliance with nature conservation legislation and to address any potentially significant ecological effects;
- Provide an assessment of the significance of any residual effects; and
- Where relevant, identify any monitoring requirements.

5.1.1. Statement of Authority

This Chapter 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 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.

5.2. Methodology

5.2.1. Legislative & Policy Context

The assessment was conducted with regard to current legislation including:

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) and Directive 2009/147/EC (codified version of Directive (79/409/EEC as amended (Birds Directive)) – transposed into Irish law as European Communities (Birds and Natural Habitats) Regulations 2011 as amended;
- European Communities (Quality of Salmonid Waters) Regulations, 1988 (S.I. No. 293 of 1988);
- European Union Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009;
- Flora Protection Order, 2015;
- Water Framework Directive (2000/60/EC) & the European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. 272 of 2009), as amended; and
- Wildlife Act 1976, as amended.

Policies and Objectives in the following Plans were also considered:

- The National Biodiversity Action Plan 2017-2021 (NBAP) & Irelands 4th National Biodiversity Action Plan - Draft for Public Consultation September 2022;
- UÉ's Biodiversity Action Plan;
- River Basin Management Plan (2nd Cycle & Draft 3rd Cycle Plans); and
- Cork County Development Plan 2022-2028.

5.2.2. 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 EPA 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.

5.2.3. Field Study

A walkover survey was carried out by the author on January 30th, 2023. The relevant operational discharge locations (SW001, SW003 – SW022) were visited with the aim of identifying the aquatic habitats in the receiving waters, and determining what ecological receptors 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)[3] and the Annex I interpretation manual. [4] Searches for protected species followed NRA (2009)[5] guidance. Salmonid habitat was assessed for adult, juvenile and nursery habitat potential following DANI guidelines[6], while lamprey habitat potential was assessed following Harvey & Cowx (2003)[7].

Biological water quality assessment involved kick sampling for macroinvertebrates and subsequent application of the EPA Q-rating scheme (Toner et al, 2005[8]). The Q rating scheme involves assigning a water quality rating considering the relative abundance[9] 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.

5.2.4. Assessment Methodology

The assessment was completed with regard to the following guidance:

- CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Chartered Institute of Ecology and Environmental Management, Winchester. Version 1.2 - Updated April 2022.
- EPA (2022), Guidelines on the information to be contained in Environmental Impact Assessment Reports, EPA, May 2022.

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[3] https://www.npws.ie/sites/default/files/publications/pdf/A%20Guide%20to%20Habitats%20in%20Ireland%20-%20Fossitt.pdf

[4] Interpretation Manual of European Union Habitats – EUR28 https://ec.europa.eu/environment/nature/legislation/habitatsdirective/docs/Int_Manual_EU28.pdf

[5] 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

[6] https://www.daera-ni.gov.uk/sites/default/files/publications/dcal/provision-of-salmon-and-trout-habitat-leaflet.pdf

[7] 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

[8] 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.

[9] Based on the DAFOR scale

- NRA (2009) Guidelines for the Assessment of Ecological Impacts of National Road Schemes Rev. 2, National Roads Authority[10]; and
- DHPLG (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment. Department of Housing, Planning and Local Government.

An Ecological Impact Assessment focuses on Key Ecological Receptors (KERs) which are identified by determining the potential Zone of Influence (ZoI) of The Project for each potential receptor, in the context of the scale and nature of The Project. The ZoI will vary for each ecological feature and their relative sensitivity to the development, but the central consideration is whether source-pathway-receptor connectivity could be established, where:

- A '*source*' is defined as the individual element of the proposed works that has the potential to impact on an ecological receptor.
- A *'pathway'* is defined as the means or route (*i.e.,* land, air, hydrological, hydrogeological pathways, *etc*.) by which a source can affect the ecological receptor; and
- A '*receptor*' is defined ecological sites, habitats, features, assemblages, species or individuals that occur in the vicinity of a project and upon which impacts are likely.

KERs will include those habitats and species permanently or temporarily within the development site and surrounding area, as well as those potentially connected *via* air, noise or water pathways outside the site.

Ecological receptors are evaluated on the basis of the ecological assessment scheme set out in NRA (2009) and CIEEM (2018) guidance. This scheme considers the rarity, status and distribution of the habitat, species, or groups of species within a geographic spatial framework. Ecological receptors are then assigned international, national, county, high local or low local value.

Following CIEEM guidance, impacts to KER's are then characterised considering whether they are positive/negative and the extent, magnitude, duration, frequency, timing, and irreversibility.

Mitigation is prescribed for potentially significant effects in order to avoid, reduce or offset the effects. This is followed by an assessment of residual effects and a conclusion regarding the significance of the effects. A significant effect is one which supports or undermines the conservation objectives[11] for KER's or for biodiversity in general (CIEEM, 2018). Significant effects should be qualified with reference to the appropriate geographic scale (CIEEM, 2018) noting impacts may be significant at a lower geographic level than that at which the receptor has been valued.

Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location (CIEEM, 2018). Different types of actions can cause cumulative impacts and effects:

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[10] National Roads Authority (NRA) is now Transport Infrastructure Ireland (TII)

[11] While government-defined conservation objectives are central to assessing sites designated under the Habitats and Birds Directives, the concept also applies to EcIA in that any ecological receptor will have associated structural, composition and functional requirements, including interactions with other receptors, that must be met in order to sustain its ecological value.

- Additive/incremental – in which multiple activities/projects (each with potentially insignificant effects) added together to give rise to a significant effect due to their proximity in time and space (CIEEM, 2018).
- Associated/connected – a development activity enables another development activity *e.g.,* phased development as part of separate planning applications. Associated developments may include different aspects of the project which may be authorised under different consent processes. It is important to assess impacts of the project as a whole and not ignore impacts that fall under a separate consent process (CIEEM, 2018).

Cumulative effects are considered with the following types of future development within the ZoI; proposals for which consent has been applied which are awaiting decision including those subject to appeal; projects which have been granted consent (not limited to planning permissions) but which have not yet been started or which have been started but are not yet completed (*i.e.*, under construction) and proposals by public authorities that can be reasonably foreseen (*e.g*. specified in development plans).

5.2.5. EIAR Scoping

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.

5.3. Receiving Environment

The Project has been described in full in **Chapter 3** of this EIAR.

5.3.1. Water Quality

The agglomeration discharges to waterbodies as presented below (**Table 5.1**). These include the proposed primary discharge from Carrigtwohill WwTP (SW009), a proposed secondary discharge from Midleton WwTP (SW001), and a total of 19 overflows comprising of SWO's, EO's, or Dual Function (SWO and EO) Overflows from 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, Lough Mahon (Harpers Island) is designated as Moderate status (2016-2021) and Tibbotstown_010 is designated 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 shown in **Table 5.1**.

Urban Waste Water 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 Tibbotstwon_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.

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 Owenacurrra_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 River 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 "Poor" value in 2020, is *ca.* 460m downstream of SW019, with several other discharges (SW015, SW016, SW018, SW021) entering the intervening stretch of the river adjacent to the distillery.

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 (Old Youghal Road Pumping Station), 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 an 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 proposed 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 5.2 – 5.5**. Monitoring locations are shown on **Figure 5.3 – 5.4.**

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

Table 5.1 Operational Discharges Relating to The Midleton WWDA Review

Current Licensed Discharge Name	Proposed Name in WWDL Review	Type	Asset	Discharge Location (NGR)	Receiving Waterbody	WFD Status (2016-2021)
Carrigtwohill Functional Area						
SW001	SW009	Primary Discharge from amalgamated Agglomeration	Carrigtwohill WwTP	179911E, 72583N	Lough Mahon (Harper's Island)	Moderate
N/A	SW005	SWO	Located at Carrigtwohill WwTP	179911E, 72605N	Lough Mahon (Harper's Island)	Moderate
SW003	SW003	SWO and EO	Barryscourt Pumping Station	181276E, 72256N	Tibbotstown_010	Good
SW004	SW004	SWO and EO	IDA Pumping Station No.1	181133E, 72310N	Tibbotstown_010	Good
N/A	SW006	SWO	Church Lane (Network)	181544E, 73040N	Tibbotstown_010	Good
N/A	SW007	SWO	Elm Road (Network)	181544E, 73040N	Tibbotstown_010	Good
N/A	SW008	SWO and EO	Old Cobh Road Pumping Station	180594E, 72283N	Lough Mahon (Harper's Island)	Moderate
Midleton Functional Area						
SW01MIDL	SW001	Secondary discharge	Midleton WwTP	186177, 69506	North Channel Great Island at	Moderate

		from amalgamated Agglomeration			Rathcoursey point	
SW03MIDL	SW010	SWO/EO	Bailick No. 1 Pumping Station	187975, 73109	Owennacurra Estuary	Moderate
SW04MIDL	SW011	SWO/EO	Bailick No. 2 Pumping Station	188047, 72518	Owennacurra Estuary	Moderate
SW05MIDL	SW012	SWO/EO	Ballinacurra No. 2 Pumping Station	188518, 71783	Owennacurra Estuary	Moderate
N/A	SW013	EO	Bailick No. 3 Pumping Station	188272, 72060	Owennacurra Estuary	Moderate
SW07MIDL	SW014	SWO/EO	Dwyers Road Pumping Station	187475, 72902	Owennacurra _040	Moderate
N/A	SW015	EO	Oakwood Pumping Station	188573, 73373	Dungourney_020	Poor
N/A	SW016	SWO/EO	Roxboro Mews Pumping Station	188346, 73332	Dungourney_020	Poor
N/A	SW017	SWO/EO	The Rock Pumping Station	188265, 73232	Dungourney_020	Poor
N/A	SW018	SWO/EO	Roxboro Housing Estate Pumping Station	188332, 73316	Dungourney_020	Poor
N/A	SW019	SWO/EO	Old Youghal Road Pumping Station	188703, 73401	Dungourney_020	Poor
N/A	SW020	SWO	Riversfield Estate SWO (Network)	187687, 73025	Owennacurra Estuary	Moderate
N/A	SW021	SWO	Drury's Avenue SWO (Network)	188346, 73332	Dungourney_020	Poor
N/A	SW022	EO	Ballinacurra No.1 Pumping Station	188366, 71791	Owennacurra Estuary	Moderate

Table 5.2 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 mg/l N	Chloro-phyll
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 EQS [3]					0.026				
Good/moderate EQS [3]					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		
High/Good EQS [3]					0.026				
Good/moderate EQS [3]					0.044				

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 mg/l N	Chloro-phyll
EQS			**≤3.0 (high) ≤4.0 (good)[2]**	**80-120 (high)**	**See below[3]**				
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 5.3 Dungourney River RS19D070700 Monitoring Data 2021-2022

Sample Date	Ammonia-Total mg/l N	BOD mg/l	DO % Sat	ortho-Phosphate (as P) mg/l P	pH	Total Oxidised Nitrogen mg/l 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 5.4 Owennacurra River RS19O030500 Monitoring Data 2021-2022

Sample Date	Ammonia-Total mg/l N	BOD mg/l	DO % Sat	ortho-Phosphate (as P) mg/l P	pH	Total Oxidised Nitrogen mg/l 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 5.5 Owennacurra Estuary Monitoring Data 2021-2022

Sample Date [1]		Ammonia-Total mg/l N	BOD mg/l	Chloro-phyll	DO % Sat	ortho-Phosphate (as P) 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 Midleton (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			

Sample Date [1]		Ammonia-Total mg/l N	BOD mg/l	Chloro-phyll	DO % Sat	ortho-Phosphate (as P) 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]**			
Good/moderate EQS [3]						0.075			
WFD Indicative quality						High			
LE510 – Owennacurra Est, New Road Br Midleton									
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
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

Sample Date [1]		Ammonia-Total mg/l N	BOD mg/l	Chloro-phyll	DO % Sat	ortho-Phosphate (as P) 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	0.073	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
16/08/2022	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
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	

Sample Date [1]	Ammonia-Total mg/l N	BOD mg/l	Chloro-phyll	DO % Sat	ortho-Phosphate (as P) 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]**			
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.

5.3.2. 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 5.6**).

Table 5.6 TSAS Summary

Parameter	Lough Mahon	North Channel
BOD	Fail	Fail
DIN (Dissolved Inorganic Nitrogen)	Winter Fail	Winter Fail
MRP	Pass	Pass

5.3.3. Water Quality Modelling

Water Quality Modelling (refer to **Appendix 2 of EIAR**) based on the proposed primary and secondary discharge ELVs and background water quality conditions against the baseline conditions, was undertaken to establish the impact of the existing discharges on key receptors in the Cork Harbour.

The Modelling was based on the Future Scenario and was simulated using mean flows as follows: 0.086 m^3/s summer flow, 0.112 m^3/s winter flow Midleton, 0.048 m^3/s summer flow, 0.066 m^3/s winter flow Carrigtwohill).

As relating to this Chapter, these investigations included:

- Deterministic assessments of the mixing zone of Uisce Éireann discharges in terms of key WFD parameters of BOD, un-ionised ammonia, DIN and MRP against EQS and WFD standards.
- 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 (BW) and Designated Shellfish Waters (SFWs) in Cork Harbour.

The key model predictions for nutrients from the **Future Scenario** (as defined in **Attachment D.2.3** Water Quality Modelling Report (July 2023) 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 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 Harper's 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/Harper's Island, where Carrigtwohill WwTP discharges, an indicative quality of Moderate was modelled. From 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 proposed 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 proposed 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 Waters and Bathing Waters.

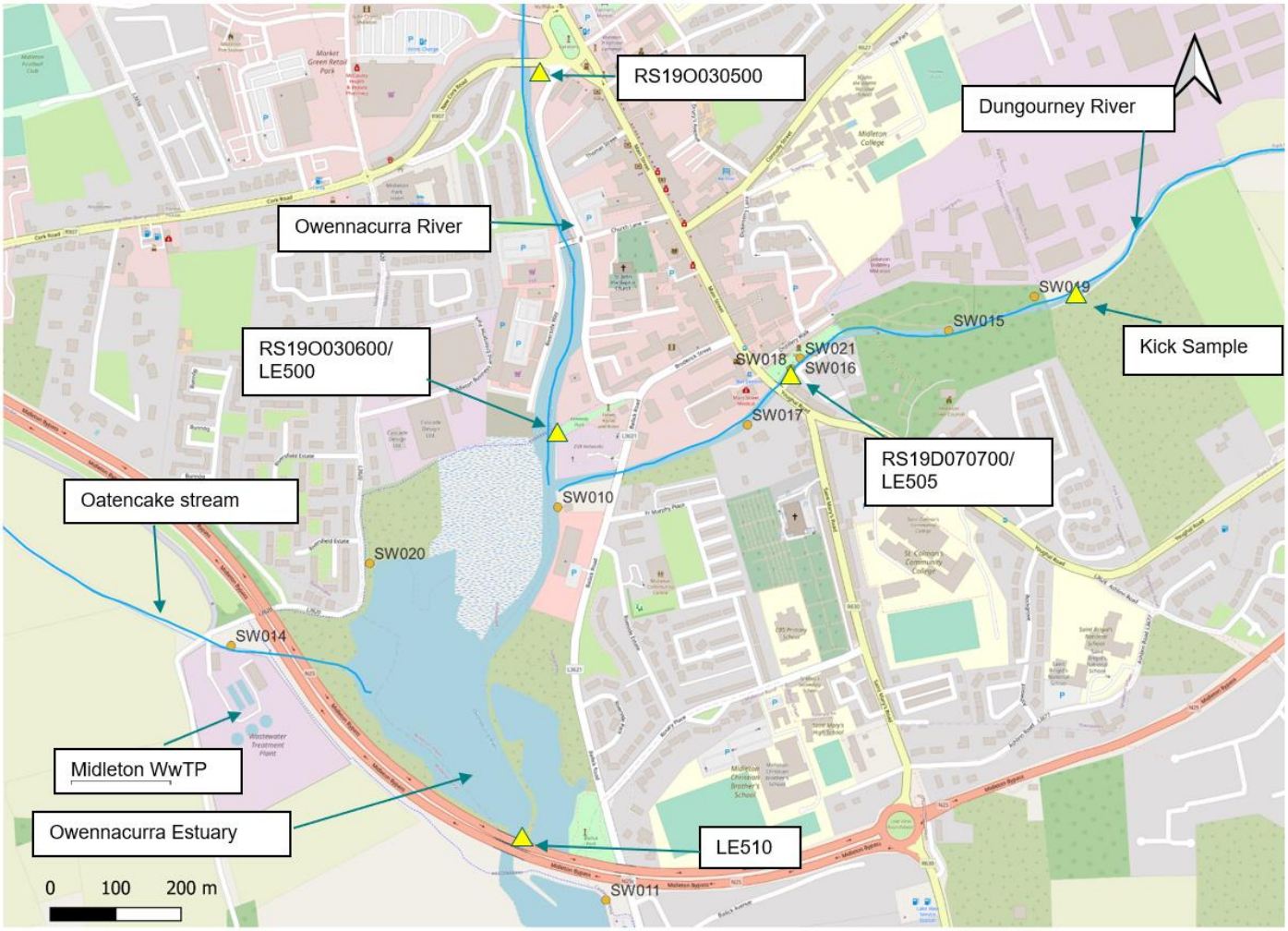

Figure 5.1 Owennacurra River/Upper Estuary & Dungourney River Monitoring Stations and Operational Discharge Points

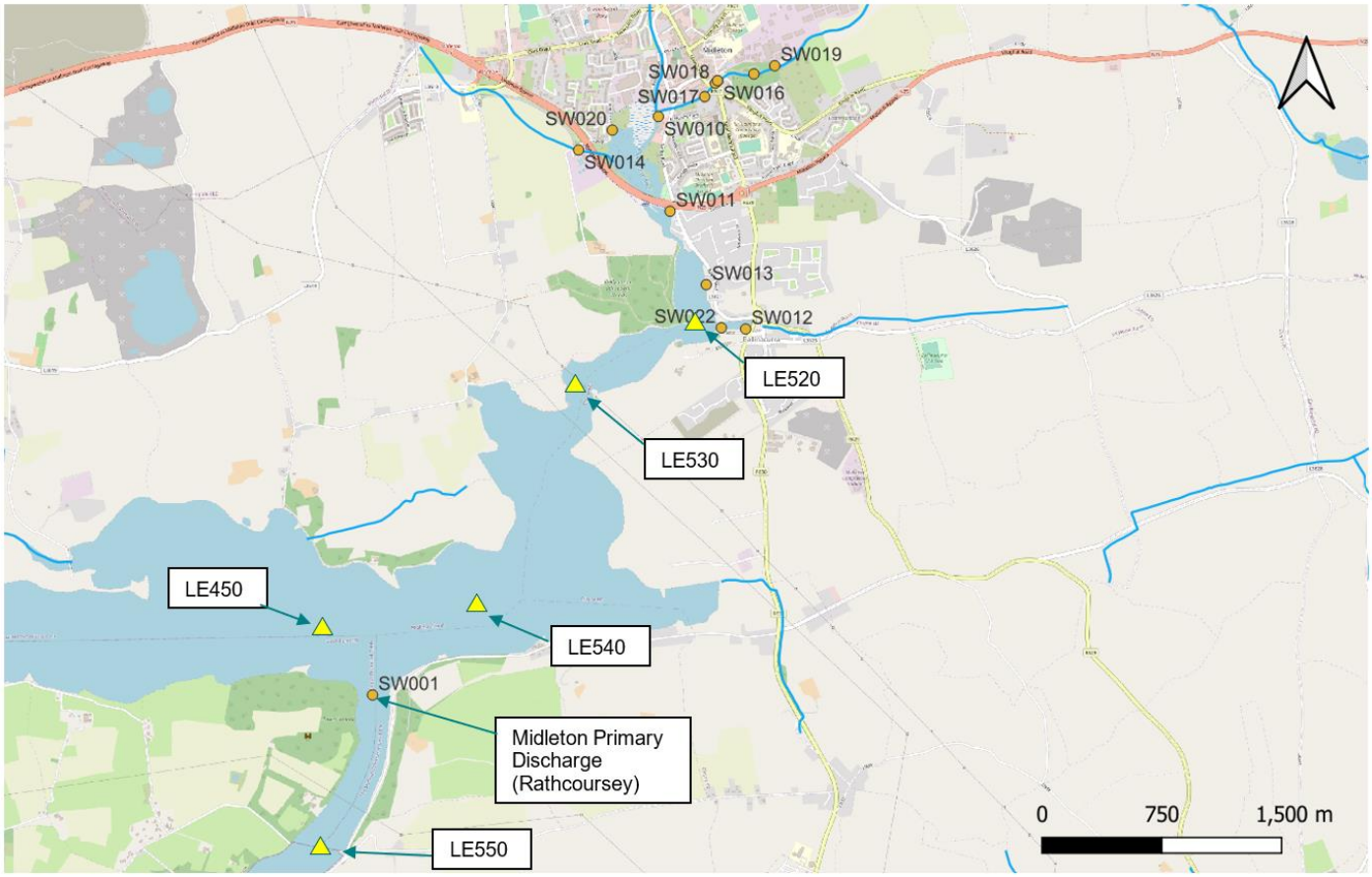

Figure 5.2 Lower Owennacurra Estuary and North Channel Monitoring Stations and Operational Discharges Points

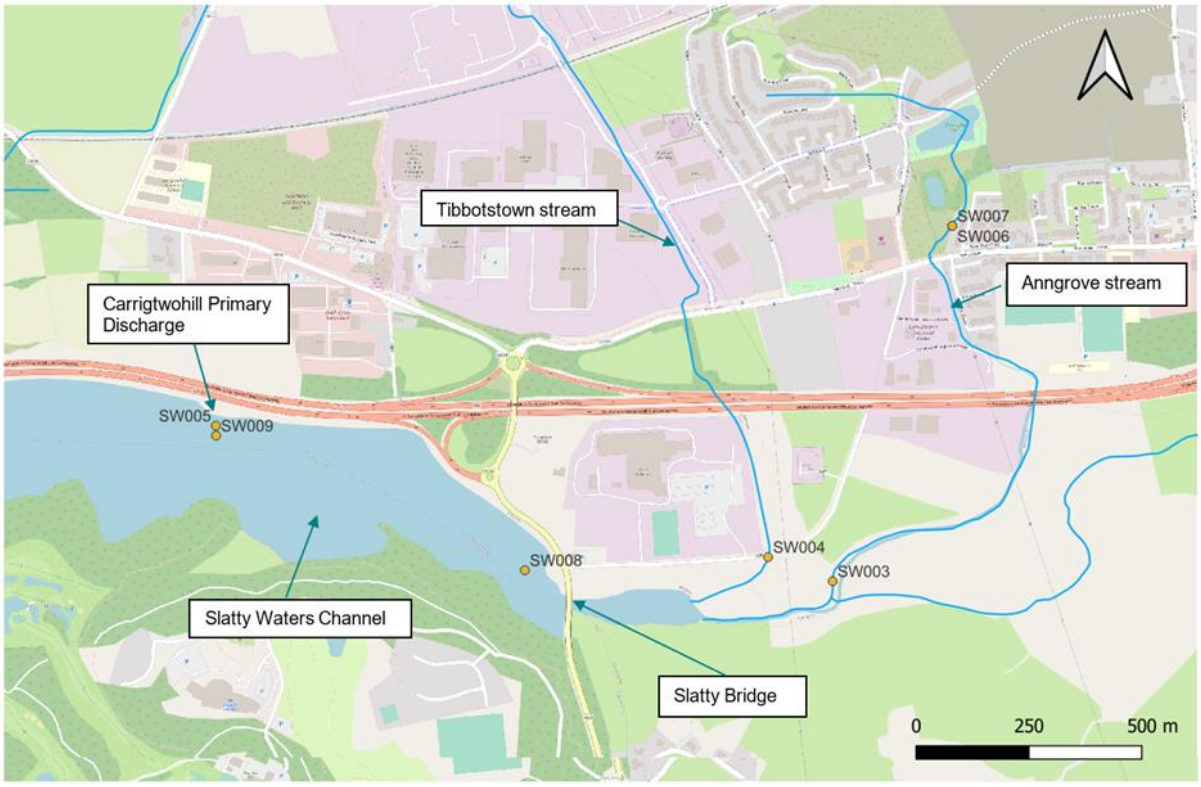

Figure 5.3 Carrigtwohill Operational Discharge Points

5.3.4. Ecological Desktop & Field Survey

The ecological receptors of the site and surrounding area of the operational discharges are described below, informed by the desk study and site visit. On the basis of the survey results, and as described under *'Assessment Methodology'*, Key Ecological Receptors (KERs) are identified by determining the potential ZoI of The Project for each potential receptor, in the context of the scale and nature of The Project and the presence of a source-pathway-receptor connection. In the context of this Project, the survey focuses on aquatic species, or those terrestrial species which may interact with the aquatic environment.

5.2.4.1. Designated Sites

European Sites

Full details of the assessment on European Sites are provided in the combined AA Screening and NIS report prepared for the Midleton WWDL review application. "*The Project*" was screened in for AA on the following basis:

- *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.*

The SAC is designated for Tidal Mudflat and Sandflat habitat, and Atlantic salt meadows, while the SPA is designated for a range of wintering waterbirds and breeding tern. Both designations include the tidal mudflats into which the discharges enter directly or indirectly.

This SAC and SPA are of international value and are therefore considered KER's. The NIS concluded that there will be no adverse effects on the conservation objectives or integrity of these or any other European Site once the proposed upgrades to the Midleton network are completed. The relevant KER's are also considered herein.

Nationally Designated Sites

On review of mapping resources, the following Natural Heritage Area (pNHA) was considered:

- Great Island Channel (001058) which overlaps with the SAC and SPA boundaries.

Sites designated as pNHA's are considered to have National value. While there is a paucity of information on pNHA's in general, these sites appear to have been designated based on the information summarised in Goodwillie (1986)[12] which points to selection on the basis of mudflats and birdlife. As there are direct discharges to the NHA it is considered a KER of National Importance.

5.2.4.1. 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 slackwater 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 s*pp., and watercress *Nasturtium officinale*. There were no signs of pollution or organic sediment build-up on the river bed at either discharge location.

[12] https://www.npws.ie/sites/default/files/publications/pdf/Goodwillie_1986_ASI_Cork.pdf

Figure 5.4 Dungourney River upstream of all discharges

Figure 5.5 Dungourney River upstream of all discharges

Figure 5.6 Dungourney River at SW015

Figure 5.7 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.

Figure 5.8 Dungourney River at SW016/SW018/SW021

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

Figure 5.9 Dungourney River at SW016/SW018/SW021

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.

The river habitat, in terms of its physical attributes and vegetation, while clearly under pressure from upstream sources, is in physically in good condition within the ZoI of the discharges and has the potential to support diverse aquatic life. The Dungourney River habitat is therefore considered to be a KER of County Importance.

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.

Figure 5.10 Owennacurra Estuary at SW010

SW020 Riversfield Estate: 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.

Figure 5.11 Owennacurra Estuary at SW010

Figure 5.12 Owennacurra Estuary at SW020

Figure 5.13 Upper Owennacurra Estuary

SW014 Dwyers Road Pumping Station: 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.

Figure 5.14 Downstream of SW014

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

SW011 Bailick No. 2 Pumping Station: A significant sewage slick is present at this location indicating pollution impacts affecting the estuary at this location.

Figure 5.15 Downstream of SW011

SW012, SW013 & SW022: These discharges are from the quay walls on the eastern side of the Owennacurra 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.

Figure 5.16 Owennacurra Estuary at SW013

Figure 5.17 Owennacurra Estuary at SW012

Figure 5.18 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. The Owennacurra estuary habitat is therefore considered to be a KER of International Importance.

Rathcoursey

The proposed secondary discharge 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 Cork Harbour SPA. As part of the wider Cork Harbour estuary system, the estuarine channel is considered to be a KER of County Importance.

Figure 5.19 Channel at SW001 Secondary Discharge

SW006 (Church Lane) and SW007 (Elm Road) 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* and 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 provide some aquatic habitat of local importance and serves as a wildlife corridor linking the small lakes at Castlelake with the estuary to the south. The Anngrove stream is considered to be a KER of Local (Lower) Importance.

Figure 5.20 Anngrove Stream downstream of SW006/SW007

Figure 5.21 Anngrove Stream at Road Culvert

Carrigtwohill – Slatty Bridge & Channel

SW003 at Barryscourt Pumping Station enters the Anngrove stream *ca.* 300m upstream of the estuary inlet at Slatty Bridge. SW004 at IDA Pumping Station No.1 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.

SW008 enters the estuary immediately downstream of Slatty Bridge. Located at the Carrigtwohill WwTP the proposed primary discharge (SW009) and WwTP SWO (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 Tibbotstown stream is considered to be a KER of Local (Higher) Importance.

The estuary habitat of the Slatty Bridge Inlet and Slatty Water Chanel is designated as part of Great Island Channel SAC and Cork Harbour 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. The Slatty Water estuary habitat is therefore considered to be a KER of International Importance.

Figure 5.22 Slatty Bridge Inlet

Figure 5.23 Slatty Waters Channel

Invasive Species

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

- Himalayan balsam *Impatiens glanduilfera* (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).
- Nutall'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

5.3.4.3. 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. A 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, 2017[13]), 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 road kill from 2012 around close to Slatty Bridge Carrigtwohill. A recent survey of the

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

Cork Harbour area indicated that Harpers Island, *ca.* 1km west of the closest discharges in the Slatty Water channel, is a hotspot of otter activity (Dalton et al, 2022)[14].

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. Otter using the streams and estuary are versatile feeders but could be affected by severe eutrophication impacts damaging fish stocks. This population is considered to be a KER of County Importance.

There are records of invasive American Mink on the Owennacurra River north of Midleton town (2012). As an invasive species, they are not considered as an ecological receptor in the context of this assessment.

The latest published fish survey dates from 2010 (IFI, 2010[15]). 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.

Sweeney (2011)[16] 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.

Salmon, trout, lamprey and eel are protected under the Fisheries Act (1959, as amended), with salmon and lamprey additionally protected under the Habitats Directive. These species would all be sensitive to eutrophication impacts. The salmon, trout, lamprey and eel populations in the river are KER's evaluated as being of County Importance.

Table 5.7 Summary of Ecological Evaluation

Ecological Receptor	Ecological Valuation
Designated Sites	
Great Island Channel SAC	International
Cork Harbour SPA	International
Great Island Channel NHA	National
Habitats & Flora	
Dungourney River – Lowland Depositing River FW2	County importance

[14] 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

[15] 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

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

Ecological Receptor	Ecological Valuation
Anngrove Stream – Lowland Depositing River FW2	Local importance (lower value)
Tibbotstown River - Lowland Depositing River FW2	Local importance (higher value)
Owennacurra & Slatty Water Estuary – Mudflats LS3/LS4	International
Slatty Water Estuary – Saltmarsh CM1/CM2	International
Fauna	
Otter	County importance
Wintering Waterbirds	International
Breeding Tern	International
Salmon, trout, lamprey & eel	County importance
Other aquatic fauna (other fish & invertebrates)	Local importance (lower value)

5.4. Description of Likely Significant Effects

5.4.1. Overview of Potential Impacts

The primary impact under consideration is the potential pollution of surface waters arising from the 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 proposed secondary discharge, located in a large marine channel at Rathcoursey, does not pose a threat to water quality at this location, providing 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)**), 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)**. 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, 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 not meeting 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 from Bailick No. 2 Pumping Station. These overflows, which have been identified as a significant pressure on this waterbody.

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 EO's that can be applied has been incorporated in the design and operation of the agglomeration.

5.4.2. Assessment Of Effects

This assessment focuses on the KER's identified for The Project *i.e.*, those ecological receptors of local (higher) value and above, considering the nature of the effects that could arise and whether mitigation is required.

With regard to the 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*, 201517). Nash *et al* (2011)[18] 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 relevant KER's.

The potential significant effects upon those habitats of international value, *i.e.,* Annex I mudflat and saltmarsh habitats, are assessed in the NIS for this application which found that despite the presence of a dilution/dispersion zone around the proposed Carrigtwohill primary discharge, that there will be minimal change relative to the baseline scenario, and

17 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.
18 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

that the conservation objective targets for both habitats would be met. In line with the thresholds for significance identified in the NIS, in the context of EcIA, the elevation of nutrients within the dispersion zone of the Carrigtwohill outfall will not represent a significant effect on the mudflat or saltmarsh KER's at a local scale.

The proposed Midleton secondary discharge outfall does not impact water quality locally and there is no potential for significant effects on the adjacent mudflat habitats.

Currently, the non-compliant overflows to the Owennacurra estuary (SW010, SW011, and SW020) are likely to be having a localised impact on the marine community within the Annex I mudflat habitat in this area, the extent of which is unquantified. As such on a precautionary basis a waterbody scale impact is presumed, potentially resulting significant ongoing effects on the mudflat KER.

The overflows to the Dungourney River, a KER of county value, do not appear to be affecting water quality or be having a localised impact on the river habitat. The overflows to the Tibbotstown River, a KER of local (higher) value, discharge to the estuarine reaches of this river, and are compliant with standards.

The Dungourney River and the Owennacurra River support aquatic-dependant species which are identified as KER's of county value *i.e.,* otter, salmonids, lamprey, and eel. The Tibbotstown River is a minor watercourse, though its potential to support these species upstream of the overflow discharges cannot be excluded. The estuary areas will support these aquatic species on passage, as well as provide habitat for range of estuarine fish and invertebrate species. The existing and predicted water quality conditions across most of the agglomeration area waterbodies will not significantly effect these species, though the fish/lamprey species are unlikely to spawn in the lower reaches of the Dungourney or Owennacurra as conditions are not optimal due to other catchment pressures. The non-complaint overflows in the Owennacurra estuary present a direct risk to these aquatic species on passage should they interact with untreated effluent, and an indirect risk *via* impacts to food/prey species in these areas. Under certain flow conditions, the untreated effluent may pose a barrier to migration for aquatic species.

Ammonia arising from the Carrigtwohill and Midleton discharge points, must be considered further as it is known to pose the most risk to fish and the marine environment, particularly in its unionized form, and reductions in fish species abundance or diversity could affect piscivorous KER's. The toxicity of ammonia (96 h LC50) to freshwater fish species is in the range 0.068–2.0 mgl^{-1} NH_3, similar to the range for marine species, 0.09–3.35 mgl^{-1} NH_3, and it is likely that the toxicity of ammonia to estuarine fish falls within these ranges (Eddy, 2005[19]). The Water Quality Modelling Report demonstrates that unionised ammonia in the areas around the Middleton and Carrigtwohill discharges are below these levels. These areas are also below the protective limit of 0.025 mg/l proposed in other jurisdictions[20] aside from the immediate mixing zone of the Carrigtwohill discharge. In terms of Ammonia, 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.

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

[20] 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

The potential significant effects upon waterbird species using the agglomeration waterbodies, determined to be of international value owing the SPA designation, are assessed in the NIS for this application. In line with that assessment, and the assessment above, the proposed primary and secondary discharges are not predicted to result in significant effects to the waterbirds or their wetland habitats, with site usage or prey resources being maintained by future water quality scenarios. In contrast, the non-complaint overflows in the Owennacurra estuary present a risk to waterbirds and their wetland habitats directly should they interact with the untreated sewage, or indirectly *via* impacts to estuarine habitats and prey species. This could affect a range of waterbird species including piscivorous birds such as the breeding tern population. Significant effects to the waterbirds KER of international value could therefore occur.

In summary, no negative effects upon KERs are predicted to arise from the proposed primary and secondary operational discharges, or compliant overflows, associated with the Midleton and Carrigtwohill agglomeration. The existing non-compliant overflows in the Owennacurra estuary however are likely to significantly impact several KER's at a local scale.

5.5. Mitigation Measures

The primary mitigation measure to address the risk to KER's is to upgrade the non-compliant overflows to the Owennacurra estuary and bring them into compliance with DoEHLG criteria.

No further significant effects to KER's have been identified and therefore no further mitigation measures are required to avoid or reduce the potential impacts of The Project on KER's are therefore not required.

To ensure continued 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 continue to operate in compliance with the proposed ELVs; and
- Continue monitoring the effluent and receiving waters, on a consistent and regular basis.

5.6. Residual Impacts

Residual ecological impacts are those that remain once the proposals have been implemented. The main aim of ecological mitigation is to avoid, minimise or offset impacts following the mitigation hierarchy. As no potential unmitigated significant effects have been identified, there are no residual significant effects.

5.7. Cumulative Impacts

Cumulative effects that may arise from the effects (significant or otherwise) of The Project in-combination with other plans or projects are provided below.

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.

5.7.1.1. Plans

Plans of relevance include UÉ's **Water Services Strategic Plan** (WSSP), the Cork County Development Plan, and the National River Basin Management Plan.

In 2015, UÉ published the WSSP, 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 UÉ's Investment Plan, a multi annual plan covering a five-year horizon, currently 2020-2024. Midleton Wastewater Treatment Plan and the Network Extensions Projects are listed on the current investment plan.

Uisce Eireann's **Capital Investment Plan 2020-2024** – Proposals to upgrade and secure water services and water treatment services countrywide. This plan will result in positive cumulative effects with The Project.

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)
    - *11.5.15 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.*
    - *11.5.16 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 assessment[21] points to UÉ's infrastructural improvements in Midleton, initially expected to be complete by 2024, as an action to address the significant pressure of the overflows to the Owennacurra estuary [*Note: As of the time of the preparation of this EIAR, the Midleton Wastewater Network Project is now programmed for completion by Q4 2029]*.

The above plans have themselves been subject to Strategic Environmental Assessment and 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), or impact negatively on the environment. The plans 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 ecological receptor.

5.7.1.2. Projects

A conditional planning grant was obtained by Uisce Éireann from Cork County Council (Planning Ref: 22/05032) for the Midleton North Pumping Station and Network. This was subsequently appealed to An Bord Pleanála (Planning Ref: ABP-316013-23). This project involves the diversion of a wastewater load totalling approximately 4,177 p.e. from Midleton wastewater network to Carrigtwohill WwTP *via* the Water Rock pipeline.

The new Water Rock Pumping Station will facilitate the development of the Water Rock UEA) (*ca.* 7,000 p.e.) and will relieve the current overloading of the Midleton WwTP by

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

conveying the foul wastewater to the Carrigtwohill WwTP *via* the new 7km Water Rock pipeline.

The Water Rock pipeline to Carrigtwohill is also underway and is expected to be constructed by *ca.* December 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 meeting DoEHLG criteria.

The Cork Lower Harbour Project[22] 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.

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 ecological receptor.

Other notable developments in Midleton include a quarry restoration (Planning Ref: 21966), solar farm developments (215089, 216789), temporary wastewater treatment plants (Planning Refs: 215136, 215664) and residential development (Planning Refs: 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 (Planning Refs: 215150, 216000, 217130, 224440, 225005) and industrial developments (Planning Refs: 217424, 234159).

A range of other small development residential, business, and agricultural developments within the Midleton-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 ecological receptor.

5.8. Monitoring

Monitoring of effluent and the receiving watercourses will be specified by the revised WWDL issued to the EPA. Water quality will continue to be monitored as required to determine the impact of the discharges from the WwTP's to ensure they comply with relevant legislation and the proposed ELVs specified in this application.

[22] https://www.water.ie/projects/local-projects/cork-lower-harbour/

6. WATER

6.1. Introduction

This Chapter, prepared by AWN Consulting Ltd, assesses and evaluates the likely significant effects associated with the operational discharges on the water environment. An overarching component of this Chapter will be assessing the impact of the operational discharges against the pertinent objectives of relevant Directives and Regulations, including but not limited to the WFD [2000/60/EC], UWWT Directive [91/271/EEC], and European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2022 [S.I No. 288/2022].

In assessing likely potential and predicted effects, account is taken of both the importance of the attributes and the predicted scale and duration of the likely effects.

Full details of The Project can be found in **Chapter 1**. A description of the Midleton and Carrigtwohill Operational Discharges can be found in **Section 3.3**.

6.1.1. Statement of Authority

This report was prepared by Marcelo Allende (BSc, BEng), and Teri Hayes (BSc MSc PGeol EurGeol). Marcelo is a Senior Environmental Consultant (Hydrologist) at AWN Consulting Ltd. with over 17 years of experience in Environmental Consulting as well as hydrological and hydrogeological technical studies. Marcelo holds a degree in Water Resource Civil Engineering from the University of Chile. He has worked on a wide of range of projects including multi-aspect environmental investigations, geo-environmental impact assessments, groundwater resource management, hydrological and hydrogeological conceptual and numerical modelling, strategic and site specific flood risk assessments, Due Diligence reporting, baselines studies, soils, surface water and groundwater monitoring and field sampling programmes on a variety of brownfield and greenfield sites throughout Ireland as well as overseas in Chile, Argentina, Peru and Panama. He also has detailed knowledge of environmental guidance, legislation, regulations & standards, and expertise in GIS (expert level) and MATTE studies at COMAH establishments. He is currently a member of the International Association of Hydrogeologists (IAH, Irish Group) and a member of Engineers Ireland (MIEI).

Teri is a hydrogeologist with over 25 years of experience in water resource management and impact assessment. She has a Masters in Hydrogeology and is a former President of the Irish Group of the Association of Hydrogeologists (IAH) and has provided advisory services on water related environmental and planning issues to both public and private sector bodies. She is a professional member of the Institute of Geologists Ireland and European Federation of Geologists and has qualified as a competent person as recognised by the EPA in relation to contaminated land assessment (IGI Register of competent persons www.igi.ie). Her specialist area of expertise is water resource management eco-hydrogeology, hydrological assessment, and environmental impact assessment.

6.2. Methodology

6.2.1. General

This Chapter evaluates the effects, if any, which the operational discharges will have on Hydrology as defined in the EPA '*Guidelines on the Information to be contained in Environmental Impact Assessment Reports'* (EPA, 2022). The Draft EPA document entitled '*Advice Notes for Preparing Environmental Impact Statements*' (EPA, 2015) is also followed in this hydrological assessment and classification of environmental effects. In addition, the document entitled '*Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes*' by the TII, 2009 (previously NRA) is referenced where the methodology for assessment of impact is appropriate.

The rating of potential environmental effects on the hydrological environment is based on the standard EIAR impact predictions which takes account of the quality, significance, duration, and type of effect identified (in accordance with impact assessment criteria provided in the EPA Guidelines (2022) publication).

The duration of each effect is assigned as either momentary, brief, temporary, short-term, medium term, long-term, or permanent. Momentary effects are considered to be those that last from seconds to minutes. Brief effects are those that last less than a day. Temporary effects last less than one year. Short term effects are seen as effects lasting one to seven years; medium-term effects lasting seven to fifteen years; long-term effects lasting fifteen to sixty years; and permanent effects lasting over sixty years.

The TII criteria for rating the magnitude and significance of impacts and the importance of hydrological attributes during the EIA stage are also relevant in assessing the impact and are presented in **Appendix 1 – Criteria for Rating Site Attributes – Estimation of Importance of Hydrology Attributes, Table 1**.

6.2.2. Policy Context & Legislation

The WFD requires *'Good Water Status'* for all European waters to be achieved through a system of river basin management planning and extensive monitoring by 2015 or, at the least, by 2027. '*Good status*' means both *'Good Ecological Status'* and *'Good Chemical Status'.* In 2009 the Eastern River Basin District (ERBD) River Management Plan (RMP) 2009-2015 was published. In the SWRBD RMP, the impacts of a range of pressures were assessed including diffuse and point pollution, water abstraction and morphological pressures (*e.g.,* water regulation structures).

This second-cycle RBMP aims to build on the progress made during the first cycle. Key measures during the first cycle included the licensing of urban waste-water discharges (with an associated investment in urban waste-water treatment) and the implementation of the Nitrates Action Programme (Good Agricultural Practice Regulations).

Water bodies identified as being '*At Risk'* of not achieving their environmental objectives need to have targeted measures implemented to achieve objectives under this Plan. The manner and the timeframe in which these targeted measures are implemented need to be prioritised to take account of the finite resources available and of the time and resources needed to develop appropriate measures.

During the development of this Plan, a prioritisation exercise was undertaken by the local authorities, the EPA, and other stakeholders to identify those water bodies that require

immediate action within this plan cycle to 2021. During the catchment characterisation, the EPA identified those water bodies either *'At Risk'* of not achieving their objectives or *'Under Review'*. The outcome of this prioritisation process was the selection of 190 Areas for Action across the 5 Local Authority regions. Within these 190 areas, a total of 726 water bodies were selected for initial actions during this RBMP cycle. There are 832 water bodies identified as being *'At Risk'* of not achieving their environmental objectives under this Plan that have not been included in the Areas for Action. For most of these water bodies, targeted actions will be undertaken in the third cycle RBMP from 2022-2027. The draft 3rd cycle RBMP has been reviewed in the context of ensuring mitigation measures comply with current and expected future measures required to be implemented for protection of water body status within the context of the operational discharges from the Midleton and Carrigtwohill agglomeration.

The strategies and objectives of the WFD in Ireland have influenced a range of national legislation and regulations. These include the following:

- European Communities (Water Policy) Regulations, 2003 (S.I. No. 722 of 2003);
- European Communities (Drinking Water) Regulations 2014 (S.I. 122 of 2014) and amended in 2017 (S.I. No. 464/2017);
- European Communities Environmental Objectives (Surface Waters); Regulations, 2009 (S.I. No. 272 of 2009) & 2015 (S.I. No. 386 of 2015) & S.I. No. 77/2019 - European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2019, & S.I.288 of 2022;
- European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010) & 2016 (S.I. No. 366 of 2016);
- European Communities (Good Agricultural Practice for Protection of Waters) Regulations, 2010 (S.I. No. 610 of 2010);
- European Communities (Good Agricultural Practice For Protection of Waters) Regulations 2022 (S.I. No. 113 of 2022); and
- European Communities (Technical Specifications for the Chemical Analysis and Monitoring of Water Status) Regulations, 2011 (S.I. No. 489 of 2011)

6.2.3. Sources of Information

This assessment was considered in the context of the available baseline information, potential impacts, consultations with statutory bodies and other parties, and other available relevant information. In collating this information, the following sources of information and references were consulted:

- Environmental Protection Agency (EPA) – website mapping and database information. Envision water quality monitoring data for watercourses in the area;
- River Basin Management Plan for Ireland 2018-2021.
- Draft River Basin Management Plan for Ireland 2022-2027.
- Cork County Development Plan 2022-2028.
- The Planning System and Flood Risk Management, Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW).

- Office of Public Works (OPW) flood mapping data (www.floodmaps.ie)
- South Dublin City Council (2005), Greater Dublin Strategic Drainage Study: Technical Documents of Regional Drainage Policies. Dublin: Dublin City Council; and
- National Parks and Wildlife Services (NPWS) – Protected Site Register.

6.2.4. EIAR Scoping

The scope of this Chapter and assessment contained therein has taken full regard of the submissions made during consultation on the Scoping Report, as presented in **Section 2.2** of this EIAR.

6.3. Receiving Environment

6.3.1. Existing Environment

The operational discharges relating to the WWDL review, and the subject matter of the EIAR are presented in **Section 3.3**. These include licenced and additional overflows to be regularised as part of the WWDL Review. There are 21 operational discharges associated with the agglomeration. The operational discharges include the proposed primary discharge from Carrigtwohill WwTP (SW009), the proposed secondary discharge from Midleton WwTP (SW001) and 19 no. overflows associated with the amalgamated agglomeration, 6 no. overflows associated with the Carrigtwohill Functional area, and 13 no. associated with the Midleton Functional area.

The proposed primary discharge SW009 and the overflows SW005 and SW008 enter the Lough Mahon (Harper's Island) transitional waterbody which is assigned '*Moderate*' WFD status (2013-2018 & 2016-2021). The significant pressures identified for this waterbody are associated to urban run-off and urban waste water.

The overflows SW003, SW004, SW006 and SW007 discharge into the Tibbotstown_010 surface waterbody which is assigned '*Good'* WFD status (2016-2021; it had '*Moderate*' status during 2013-2018). This status is based on modelling and therefore has been qualified as '*low confidence'* by the EPA. The significant pressures identified for this waterbody are associated to urban run-off and urban waste water.

The proposed secondary discharge SW001 enters the North Channel Great Island transitional waterbody which is assigned '*Moderate*' WFD status (2016-2021; it had '*Good*' status during 2013-2018). The significant pressure identified for this waterbody is associated to agricultural activities.

The overflows SW010, SW011, SW012, SW013, SW020 and SW022 discharge into the Owennacurra Estuary transitional waterbody which is assigned '*Moderate*' WFD status (2013-2018 & 2016-2021). The significant pressure identified for this waterbody is associated to industrial activities, urban run-off and urban waste water.

Likewise, the overflow SW014 enters the Owennacurra_040 surface waterbody which is assigned '*Moderate*' WFD status (2013-2018 & 2016-2021). The significant pressure identified for this waterbody is associated to urban run-off.

Finally, the overflows SW015, SW016, SW017, SW018, SW019 and SW021 discharge into the Dungourney_020 surface waterbody which is assigned *'Poor'* WFD status (2013-2018 & 2016-2021). The significant pressure identified for this waterbody is associated to

industrial and agricultural activities. The Tibbotstown_010 and the Owennacurra_040 Rivers are designated Drinking Water Rivers. The drinking water abstraction points from the Tibbotstown and the Owennacurra Rivers are upstream of the operational discharges and therefore do not pose a risk to drinking water supplies.

The Owennacurra Estuary / North Channel and Lee Estuary / Lough Mahon are designated as 'sensitive' under the Urban Treatment Regulations 2001 (as amended). The proposed primary discharge enters directly into the Lee Estuary / Lough Mahon Nutrient Sensitive Area. The proposed secondary discharge enters directly into the Owennacurra Estuary / North Channel Nutrient Sensitive Area. For the Owennacurra Estuary / North Channel, N is the limiting nutrient and for the Lee Estuary / Lough Mahon, P is the limiting nutrient.

The proposed Carrigtwohill WwTP primary discharge discharges *ca.* 2 km from the boundary of the Great Island North Channel designated shellfish waters, and *ca.* 8 km from the boundary of the Rostellan designated shellfish waters. The proposed Midleton WwTP secondary discharge discharges *ca.* 1.5 km from the boundary of the Great Island North Channel designated shellfish waters, and *ca.* 3 km from the boundary of the Rostellan designated shellfish waters

Scoping has identified the impact of all the operational discharges on the receiving surface waters as being the only likely potential significant environmental impact on water quality. Consequently, the existing environment to be assessed is limited to the Lough Mahon (Harper's Island), North Channel Great Island and Owennacurra transitional waterbodies as well as Tibbotstown_010, Owennacurra_040 and Dungourney_020 surface waterbodies.

6.3.2. Receiving Surface Waters

The agglomeration discharge directly to the following waterbodies:

- Lough Mahon (Harper's Island), North Channel Great Island and Owennacurra Estuary transitional waterbodies.
- Tibbotstown_010, Owennacurra_040 and Dungourney_020 surface waterbodies.

Refer to

Figure 6.1 and **Figure 6.2** below, and **Chapter 3** for location and a full description of the operational discharges from the Midleton and Carrigtwohill Agglomeration Operational Discharges.

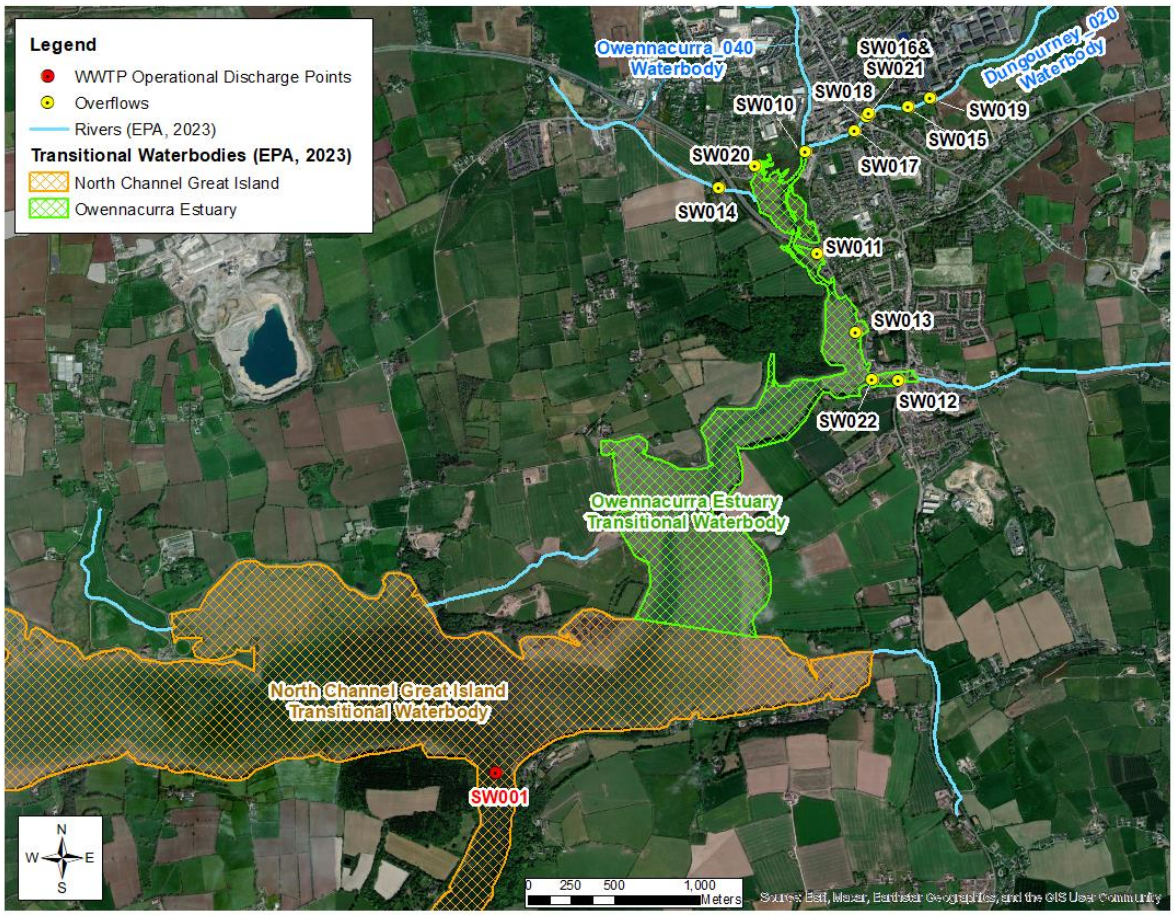

Figure 6.1 Hydrological Environment. Midleton Area (EPA, 2023)

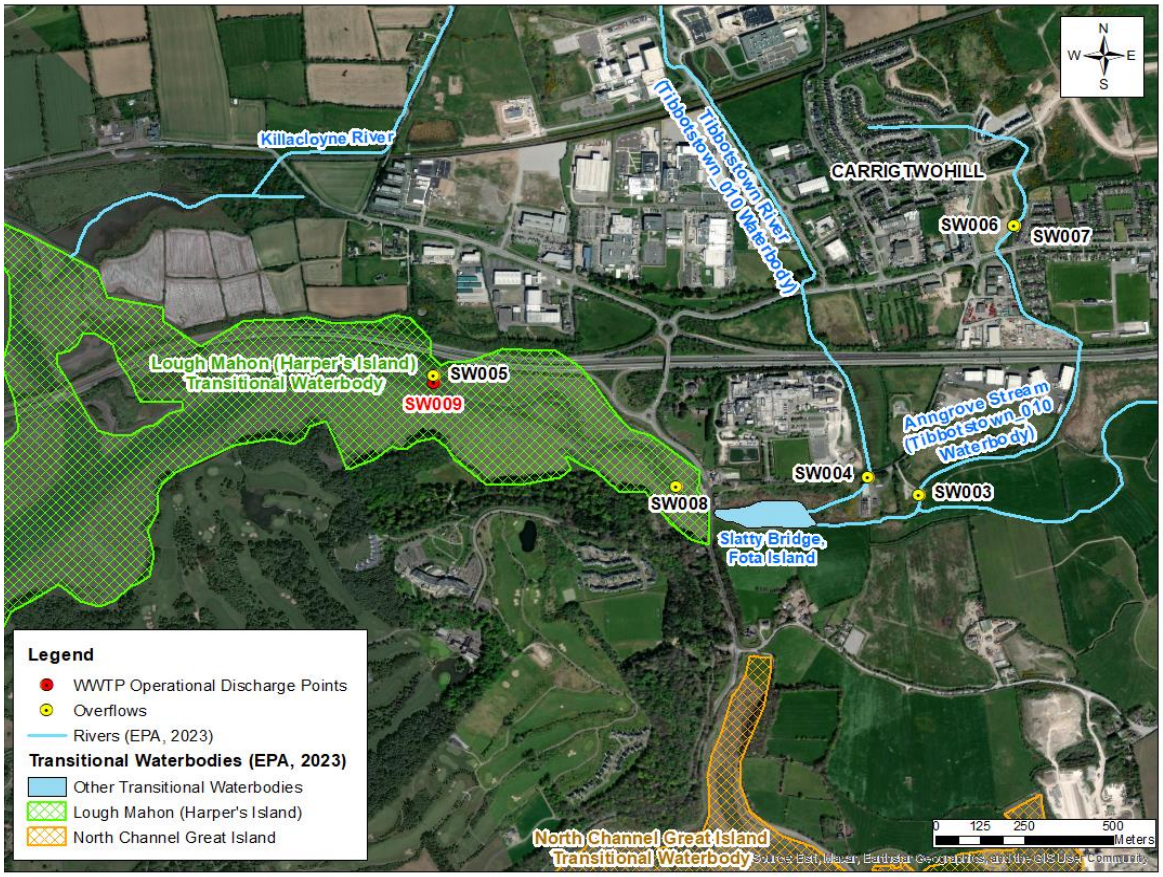

Figure 6.2 Hydrological Environment. Carrigtwohill Area (EPA, 2023)

Figure 6.3 Local Hydrological Environment. Midleton Area (EPA, 2023)

6.3.2.1. Surface Water Quality

The operational discharges are located within the former South Western River Basin District (SWRBD, now the Irish River Basin District in line with the 3rd and 2nd cycles), as defined under the European Communities Directive 2000/60/EC, establishing a framework for community action in the field of water policy – this is commonly known as the Water Framework Directive (WFD). They are situated downgradient of Hydrometric Area No. 19 (Lee, Cork Harbour and Youghal Bay) of the Irish River Network.

Figure 6.4 and **Figure 6.5** below presents the EPA quality monitoring points for all receiving waterbodies in the context of the 21 no. operational discharges.

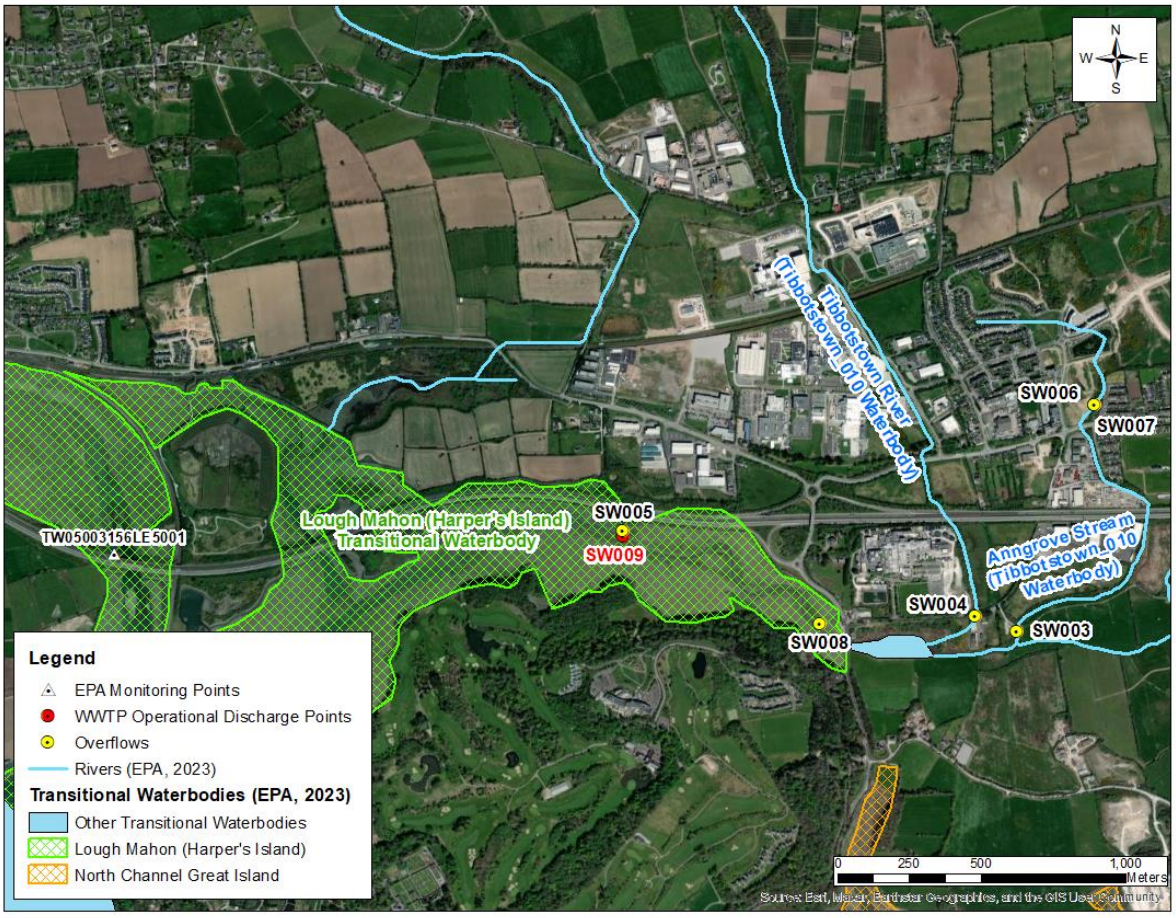

Figure 6.4 Water Quality Monitoring Points. Carrigtwohill Area (EPA,2023)

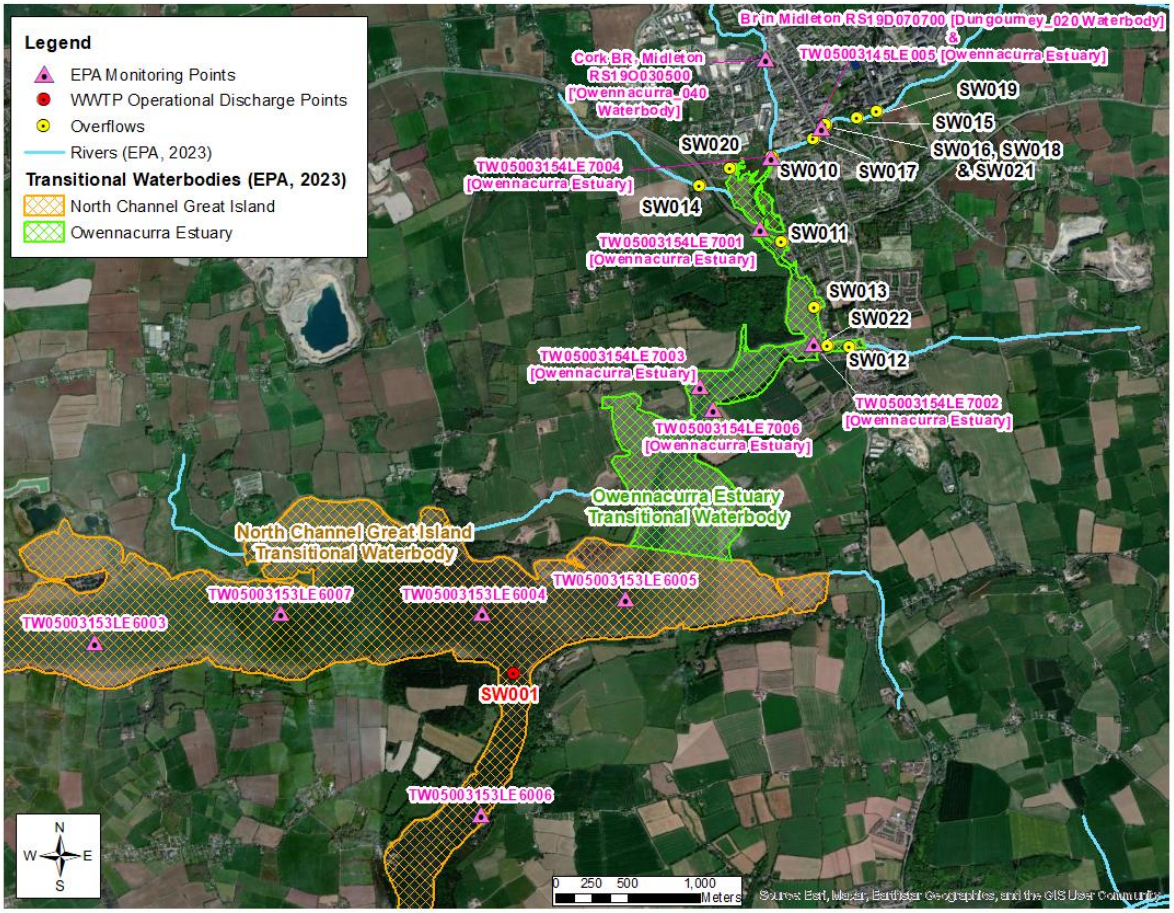

Figure 6.5 Water Quality Monitoring Points. Midleton Area (EPA,2023)

Transitional water quality is monitored periodically by the EPA at various regional locations along the receiving waterbodies. With reference to the site setting, there are a number of EPA monitoring stations located in Lough Mahon (Harper's Island), North Channel Great Island and Owennacurra Transitional Waterbodies as can be seen in figures above.

Surface water quality is also monitored periodically by the EPA at various regional locations along principal and other smaller watercourses. With reference to the Carrigtwohill Area, the Tibbotstown_010 surface waterbody does not have an associated monitoring station; as mentioned above, its current WFD status (2016-2021) has been estimated on the basis of modelling techniques.

In relation to the Midleton area, there are two (2) no. monitoring stations associated to the Owennacurra_040 and Dungourney_020 surface waterbodies. These are Cork Br. (RS19O030500, which is located *ca.* 660m upstream of SW010) and Br in Midleton (RS19D070700, located *ca.* 40m downstream of SW018), respectively.

The EPA assesses the water quality of rivers and streams across Ireland using a biological assessment method, which is regarded as a representative indicator of the status of such waters and reflects the overall trend in conditions of the watercourse. The biological indicators range from Q5 - Q1. Level Q5 denotes a watercourse with good water quality and high community diversity, whereas Level Q1 denotes very low community diversity and bad water quality. The two (3) no. water quality monitoring stations mentioned above have quality ratings available within the last ten years. The station associated to the Owennacurra_040 surface waterbody (Cork Br. (RS19O030500)) obtained a Q3-4 –

Moderate Status in 2020 (which is consistent with its historical records since 2008). The station associated to the Dungourney_020 (Br in Midleton (RS19D070700)) obtained Q3 – Poor Status at last measurement (2020) which is also consistent with its historical records since 1999.

In accordance with the WFD, each river catchment in line with the RMB 2nd and 3rd cycle was assessed by the EPA and a water management plan detailing the programme of measures was put in place for each. **Figure 6.6** and **Figure 6.7** below present the operational discharge points of the Carrigtwohill and Midleton WwTPs and the WFD Status' of the surrounding waterbodies.

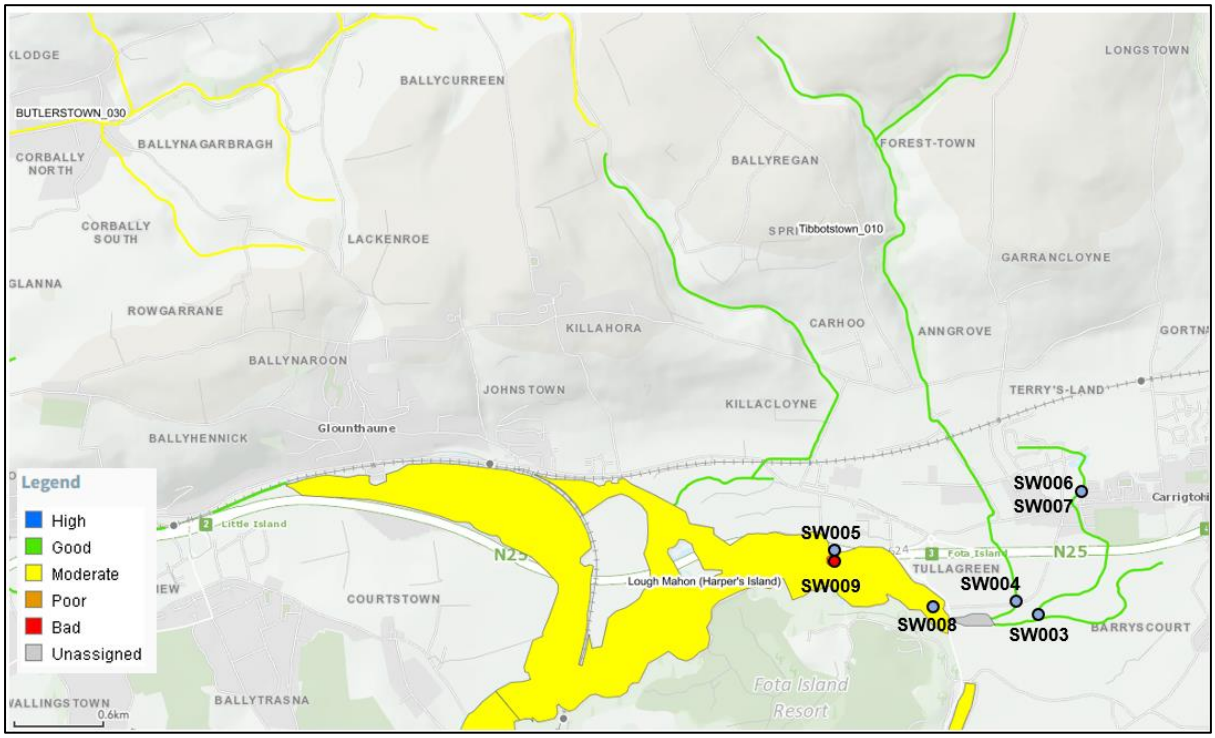

Figure 6.6 Operational Discharges Relating to Carrigtwohill Functional Area and WFD Status of The Surrounding Waterbodies

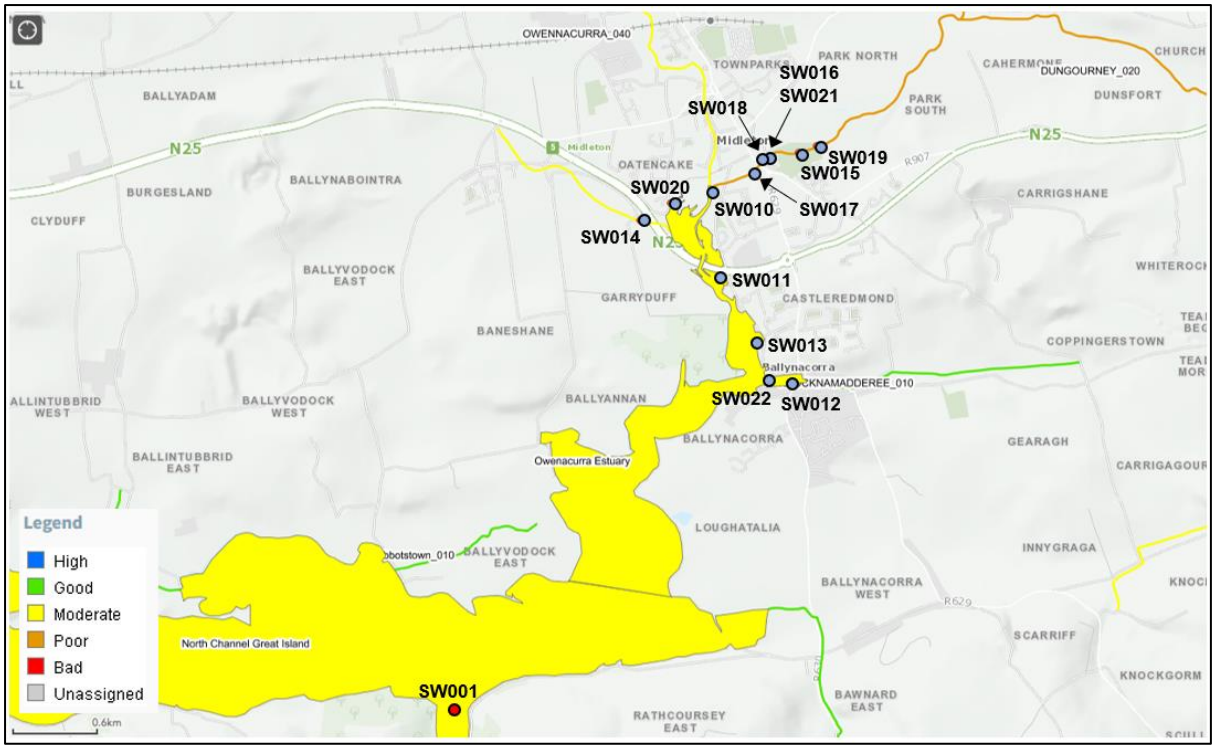

Figure 6.7 Operational Discharges Relating to Midleton area and WFD Status of The Surrounding Waterbodies

According to the EPA database (www.catchments.ie), in general Moderate status conditions are present in both areas. The current WFD target objective for all these waterbodies is to reach Good status by 2027. **Figure 6.8** and **Figure 6.9** below present the nutrient sensitive areas in both areas.

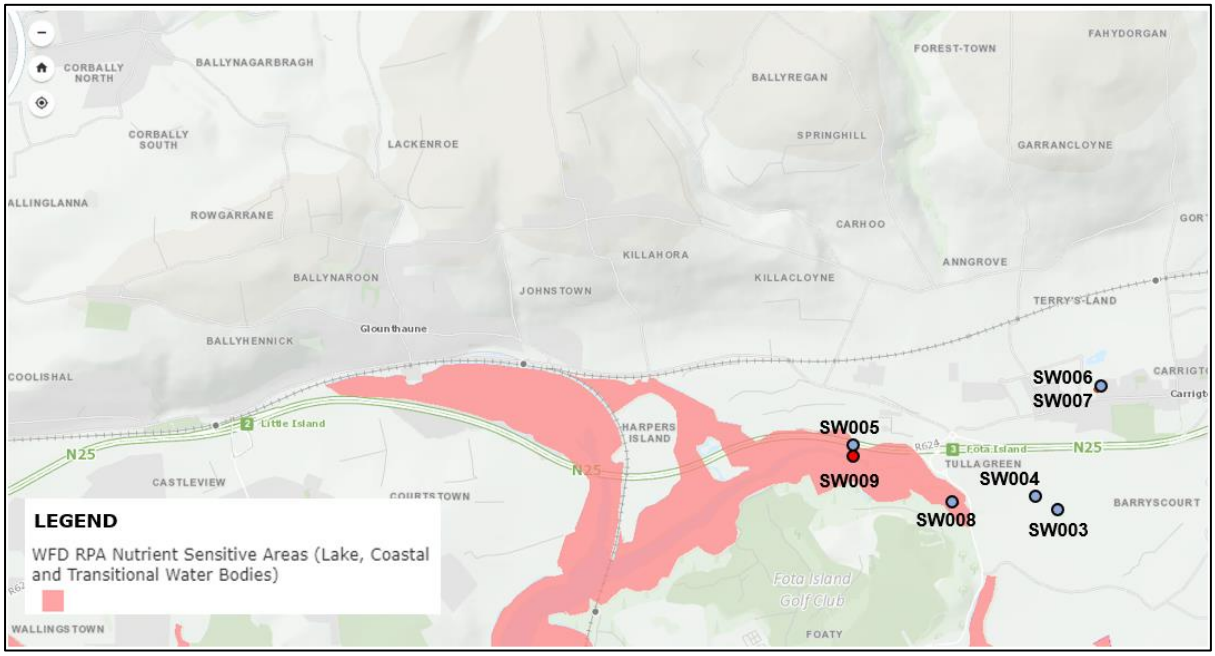

Figure 6.8 Nutrient Sensitive Area for the Carrigtwohill Function Area

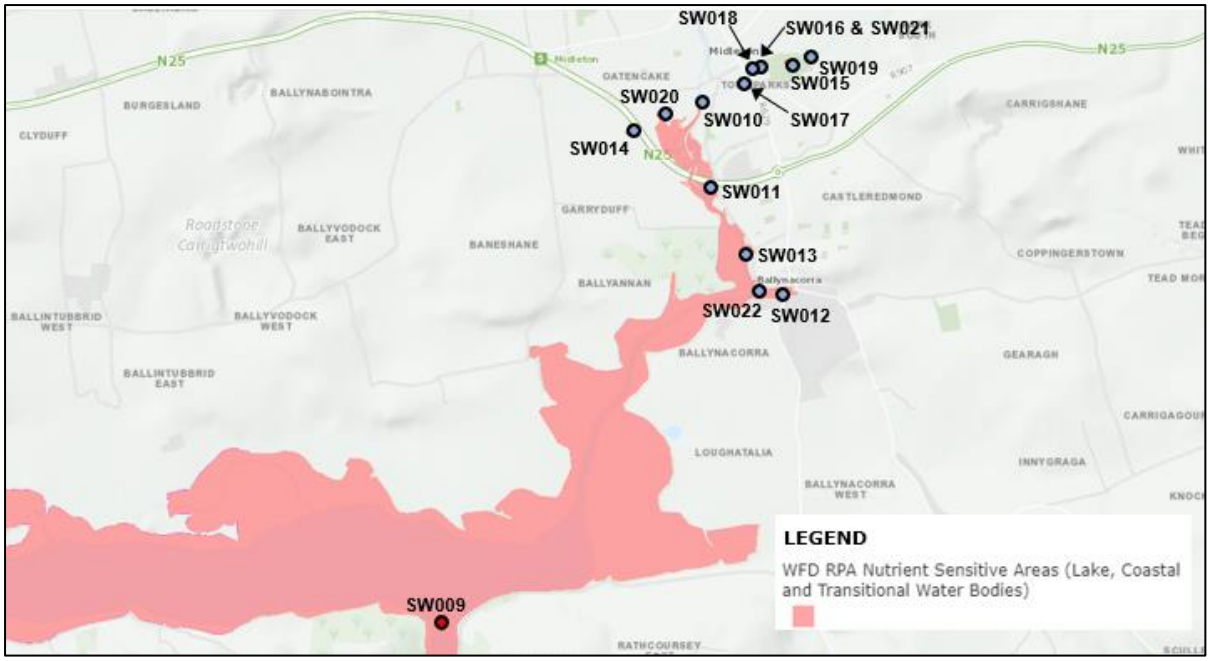

Figure 6.9 Nutrient Sensitive Area for the Midleton Function Area

6.3.2.2. Areas of Conservation

The discharge points are located within or close proximity to 2 no. European sites *i.e.*, Great Island Channel Special Areas of Conservation (SAC) and Cork Harbour Special Protection Area (SPA). Refer to **Figure 6.10** and

Figure *6.11* below.

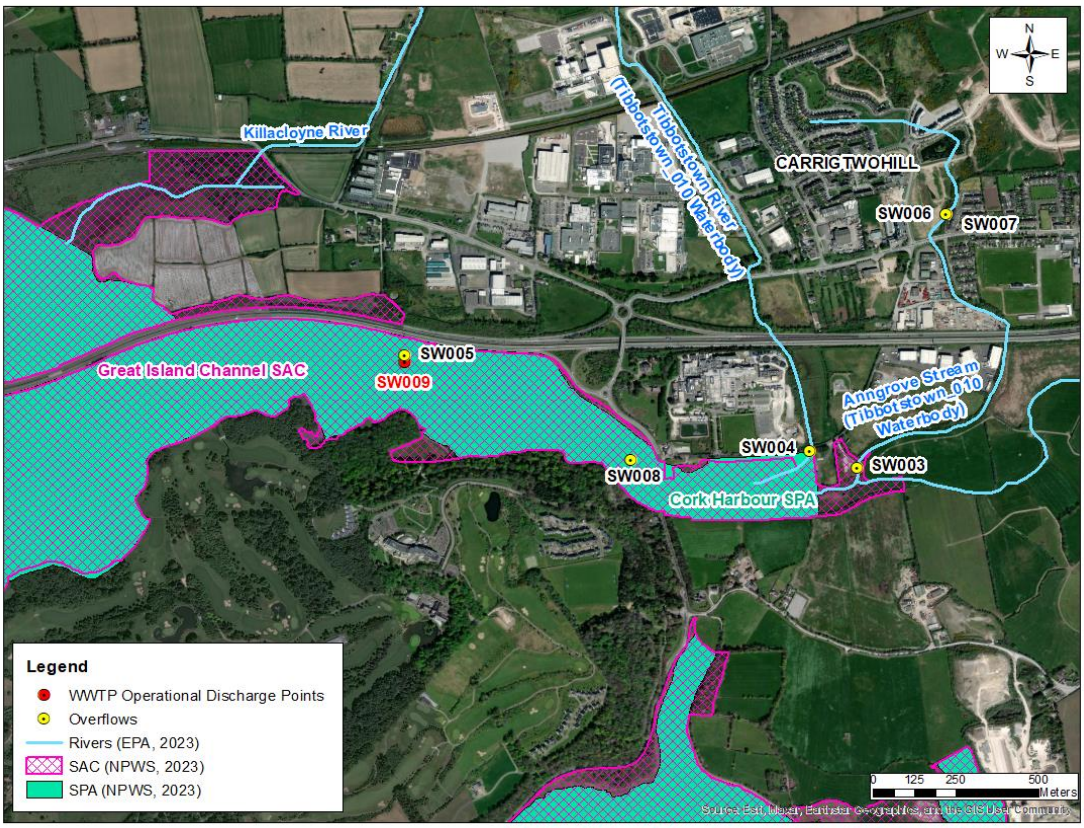

Figure 6.10 Areas of Conservation for Carrigtwohill Functional Area

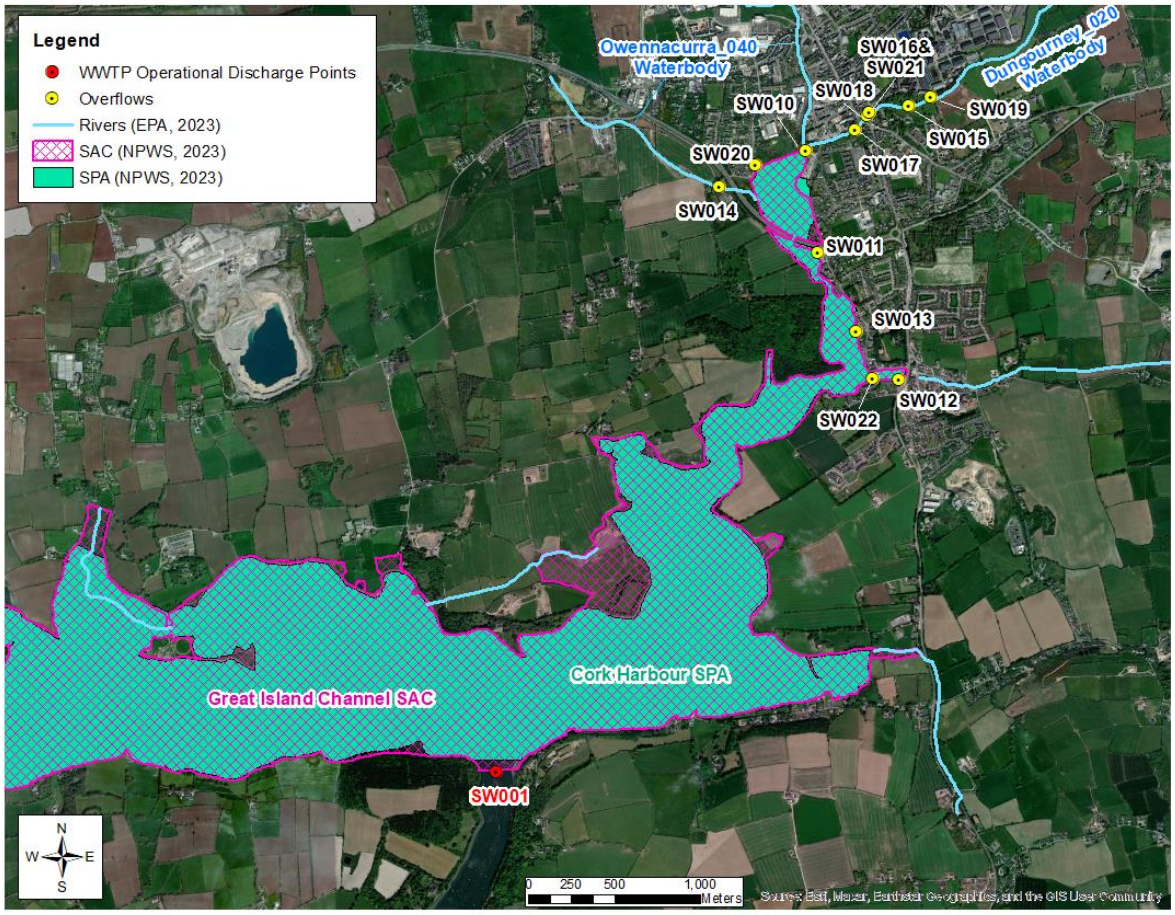

Figure 6.11 Areas of Conservation for Midleton Functional Area

6.2.2.3. Overflows

There are 19 no. of overflows associated with the amalgamated agglomeration, 6 no. of overflows associated with the Carrigtwohill Functional Area, and 13 no. of overflows associated with the Midleton Functional Area.

13 of the 16 no. SWOs have been identified as meeting criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995. The remaining 3 no. of SWO's (SW010, SW011, and SW020) will be upgraded as part of the Midleton Wastewater Network Project to be meeting DoEHLG criteria and this is expected to be complete by Q4 2029. As highlighted in **Section 1**, this EIAR and the current licence review relates to the existing operational discharges for the Midleton and Carrigtwohill agglomeration.

The risks of sewer or outfall failure associated with extreme events resulting in the activation of EOs, 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 EOs that can be applied has been incorporated in the design and operation of the discharges.

6.4. Description of Likely Significant Effects

The potential impacts from the existing operational discharges are outlined below, and the assessment of effects defined based on the description of effects as set out in the EPA EIA Report Guidelines (2022) and the NRA criteria detailed in **Appendix 1 - Criteria For Rating Site Attributes – Estimation Of Importance Of Hydrology Attributes**.

6.4.1. Primary (SW009) & Secondary (SW001) Discharges

As mentioned in Chapter 5, a Water Quality Modelling Assessment was carried out by Intertek in 2023 (see **Appendix 2**) 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 the proposed primary discharge (SW009) and proposed secondary discharge (SW001) from the amalgamated agglomeration. The modelling assessment does not include for overflows and the effects of episodic events due to high rainfall.

The calibrated and validated Cork Harbour model carried out by Intertek in 2023 has been used to establish the impact of the permitted UÉ continuous discharges on key receptors in the harbour. The results of Future Scenario are included in the Intertek report, where the input loads have been modified to represent the maximum permitted ELV for UÉ discharges and future average flows and concentrations for industrial discharges.

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.

Nevertheless, the results show that the status of both transitional waterbodies would not be affected by the Future Scenario and discharges. It should be noted that the applications scenario presented is conservative and models the average flows over a 3 year period,

In addition, a "*notionally clean*" scenario was undertaken for Dissolved Inorganic Nitrogen (DIN) and Molybdate Reactive Phosphorus (MRP) in order to obtain the actual contribution of the Midleton and Carrigtwohill WwTPs in the water quality of the receiving waterbodies. Results illustrate that the WwTP's will not drive EQS exceedances, and just a minor fraction of available assimilative capacity is utilised by the WwTPs in question.

Regarding the current assigned "*Moderate*" WFD status for both Lough Mahon (Harper's Island) and the North Channel Great Island waterbodies, it is not expected that treated effluent from the existing Midleton and Carrigtwohill WwTP will affect this classification. Furthermore, the quality of the treated effluent is monitored on the basis of actual discharge activities as per the associated EPA licence.

Discharges into the receiving Lough Mahon (Harper's Island) and North Channel Great Island waterbodies will be at a controlled rate to ensure that there is no increase in flow during these discharges so there will be no change to the morphology of the waterbodies and any increase in downstream flooding will be avoided.

In relation to designated shellfish waters (Great Island North Channel and Rostellan designated shellfish waters), the Water Quality Modelling concludes that bacteria concentrations in Cork Harbour are generally low and predicted impacts from Uisce Éireann assets and Industries do not significantly impact water quality in these designated shellfish waters. Therefore, the overall risk of proposed primary and secondary discharges to designated shellfish waters is classified as Low Risk.

6.4.2. Overflows

During storm events, surface water and a portion of foul water can accumulate which results in storm overflows which ultimately discharges into receiving waterbodies. As outlined in **Chapter 3**, SWO's are a necessary part of sewerage networks and serve to prevent uncontrolled spillages from arising within the agglomeration and to prevent the biological processes necessary to treat effluent from 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. As noted in **Chapter 3**, 13 of the 16 no. SWOs in the amalgamated agglomeration are meeting DoEHLG criteria.

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.

As mentioned previously the risks of sewer or outfall failure associated with extreme events resulting in the activation of EOs, 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 EOs that can be applied have been incorporated in the design and operation of the agglomeration.

These overflows are temporary (short-lived) and have no long-term negative impact on the waterbody quality.

Refer to **Section 3.4** for details on measures to prevent unintended discharges from the amalgamated agglomeration.

As outlined in **Chapter 5**, the non-compliant overflows to the Owennacurra estuary (SW010, SW011, and SW020) are likely to be having a localised impact on the Water Environment. These overflows, which have been identified as a significant pressure on this waterbody, will be upgraded as part of the Midleton Wastewater Network Upgrade Project to they meet the criteria as set out in the DoEHLG '*Procedures and Criteria in*

Relation to Storm Water Overflows', 1995, with the upgrades expected to be complete by Q4 2029.

6.5. Mitigation Measures

The non-compliant overflows to the Owennacurra estuary are being addressed by the Midleton Wastewater Network Upgrade Project, which is expected to be complete by Q4 2029, thus addressing the existing risk to the water environment as described above.

No further mitigation measures to avoid or reduce the potential impacts of The Project on the water environment are therefore required.

To ensure continued satisfactory operation of the Midleton and Carrigtwohill agglomeration in line with the discharge licence the authors recommend the following:

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

6.6. Residual Impacts

Residual impacts are those that remain once any proposed mitigation measures have been implemented. The main aim of mitigation is to avoid, minimise, or offset residual impacts following the mitigation hierarchy.

In terms of the operational discharges, this assessment has considered the current water status of all relevant water bodies (**Section 6.3.2** above), and potential impacts have been considered (**Section 6.5** above). It has been concluded that there will be no degradation of the current water body status (chemically, ecologically and quantitatively) or its potential to meet the requirements and/or objectives and measures in the second [current] RBMP 2018-2021 (River Basin Management Plan) and draft third RBMP 2022-2027. The proposed primary discharge (SW009) will be adequately treated *via* proper treatment measures (*i.e.,* Tertiary treatment with Phosphorous and Nitrogen removal) within the Carrigtwohill WwTP. The proposed secondary discharge (SW001) will also be adequately treated appropriately by Tertiary treatment and Nitrogen removal (with UV Disinfection). This will have a neutral impact to the WFD water quality status of the receiving watercourse.

During storm conditions, any discharges from discharge points will be diluted, settled, and screened prior to being discharged. The stormwater will enter the receiving waterbodies which will itself have increased flows driven by sustained rainfall. In this context, the discharges will be diluted and dispersed effectively and will have no-long-term negative impact to the WFD water quality status of the receiving watercourse.

In terms of the non-compliant overflows to the Owennacurra estuary, these are being addressed by the Midleton Wastewater Network Upgrade Project, which is expected to be complete by Q4 2029, thus addressing the existing risk they pose to the water environment.

In terms of EOs, while a theoretical risk (as the failure of any infrastructure in catastrophic situations is theoretically possible), they are not reasonably predicted to occur. Should

they occur however, these overflows will be temporary (short-lived) and have no long-term negative impact on the waterbody quality.

A site-specific detailed WFD Screening Assessment was carried out for the operational discharges and is attached as **Appendix 3 – Water Framework Directive Screening Assessment.** The WFD Screening Assessment has shown that there is no potential for change in the water body status and risk as a result of the operation discharges.

In summary, post mitigation (*i.e.,* upon completion of the Midleton Wastewater Network Upgrade Project), no significant residual impacts are predicted from the operational discharges from the Midleton and Carrigtwohill agglomeration.

6.7. Cumulative Impacts

Cumulative effects may arise from the effects (significant or otherwise) of The Project in-combination with other plans or projects are provided in **Chapter 5, Section 5.7**.

6.8. Monitoring

Section 3.4 of this EIAR details general "*Measures to Prevent Unintended Discharges*". These measures will be implemented which will subsequently act as monitoring measures to prevent significant negative effects on the water environment.

Specific monitoring will be carried out in accordance with the WWDL requirements.

7. POPULATION & HUMAN HEALTH

7.1. Introduction

This Chapter of the EIAR, prepared by Enviroguide Consulting, considers the potential effects of The Project on human beings, living, working and visiting in the vicinity of the Midleton and Carrigtwohill agglomeration. This Chapter details the potential direct and indirect effects of the operational discharges on Population and Human Health. It also examines the socio-economic impacts focusing on pertinent issues such as economic activity, tourism, and population levels.

The Chapter on Population and Human Health is broad ranging and covers the existence, wellbeing, and activities of people living in the area through the format of considering people as '*groups'* or '*populations*'. The assessment of impacts on human beings involves the identification of relevant key populations that may be affected by the proposal and quantifiable documentary research. Health, as defined by the World Health Organization (WHO), is "*a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*".

Key populations have been identified as persons residing and engaging in activities near the operational discharges, persons with a stake in the general economy of the local and regional area, and persons enjoying the recreational and cultural amenities of the area.

7.1.1. Statement of Authority

This Chapter was prepared by Louise Hewitt, Environmental Consultant, with Enviroguide Consulting. Louise has a Master of Science (Hons) in Environmental Resource Management from University College Dublin and a Bachelor of Science (Hons) in Biology from Maynooth University. Louise has worked as an Environmental Consultant with Enviroguide since 2021 and has experience preparing Environmental Impact Assessment EIA Screening Reports, and Chapters of EIARs, including Population and Health.

7.2. Methodology

A desk-based study was undertaken in March 2023 to assess information regarding population, age structure, economic activity, employment, and unemployment within the vicinity of the operational discharges.

The 2022 Census of Ireland was held on Sunday the 3rd of April 2022. The preliminary results were released on the 23rd of June 2022; however, the full suite of results will be published over several months starting in April 2023. The preliminary 2022 census results have been reviewed; however, they do not contain the required region-specific information for the purposes of this assessment of demographic profile. As such, the more robust and complete 2016 census results have been used in this assessment (accessed March 2023). The remaining information analysed as part of the desktop study was accessed in March 2023. The scope of the evaluation is based on a review of data available from the Central Statistics Office (CSO), legislation, guidance documents and any relevant EIARs that are in the public domain. The aim of the desktop study was to determine the current baseline environment.

The potential impact of The Project on the local population is assessed in this EIAR in relation to:

- Population;
- Socio Economic status;
- Tourism and Amenity;
- Air quality;
- Water;
- Noise;
- Traffic; and
- Risk.

In line with the EPA's "Guidelines *on the information to be contained in Environmental Impact Assessment Reports*" (EPA, 2022), the terms are defined in **Section 2.4** when quantifying the quality of effects.

7.2.1. Study Area

In order to capture the Midleton and Carrigtwohill agglomeration boundary the following Electoral Divisions (EDs) have been chosen as the study area (refer to **Figure 7.1**):

- Midleton Urban;
- Midleton Rural;
- Carrigtwohill;
- Cobh Rural; and
- Cloyne.

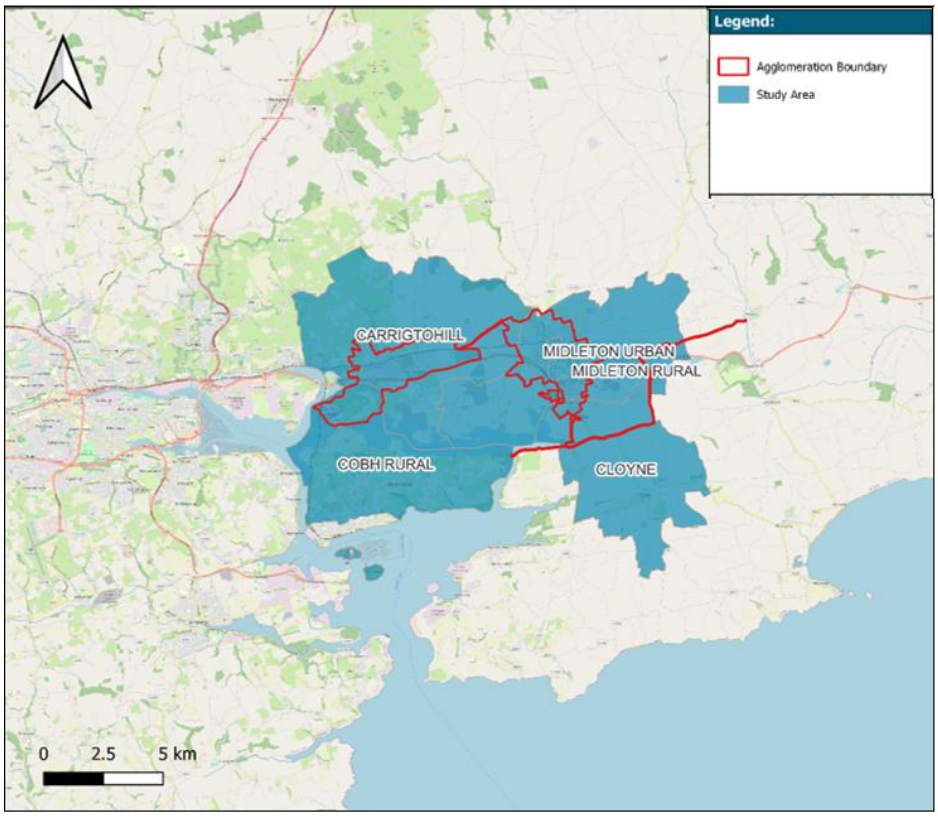

Figure 7.1 Map of Midleton and Carrigtwohill including agglomeration boundary

7.2.2. Information Sources

The principal sources of information are as follows:

- Census and employment information published by the Central Statistics Office (CSO). Available at https://data.cso.ie/;
- Cork County Development Plan 2022-2028, Available at: https://www.corkcoco.ie/en/resident/planning-and-development/cork-county-development-plan-2022-2028; and
- Ordinance Survey Ireland (OSI) mapping and aerial photography.

The Institute of Public Health in Ireland has issued a document "*Health Impact Assessment Guidance*" which details the link between human health and the built environment (Refer to **Figure 7.2**). This document also details the negative health impacts associated with unemployment. Unemployment affects both physical and mental health and is an important determinant of health inequalities in adults of working age. Unemployed people have a higher risk of lower levels of psychological wellbeing ranging from symptoms of depression and anxiety to self-harm and suicide. Unemployment can also impact other health determinants, for example, housing and nutrition. Based on this information, employment generated as a result of The Project has been assessed throughout this Chapter.

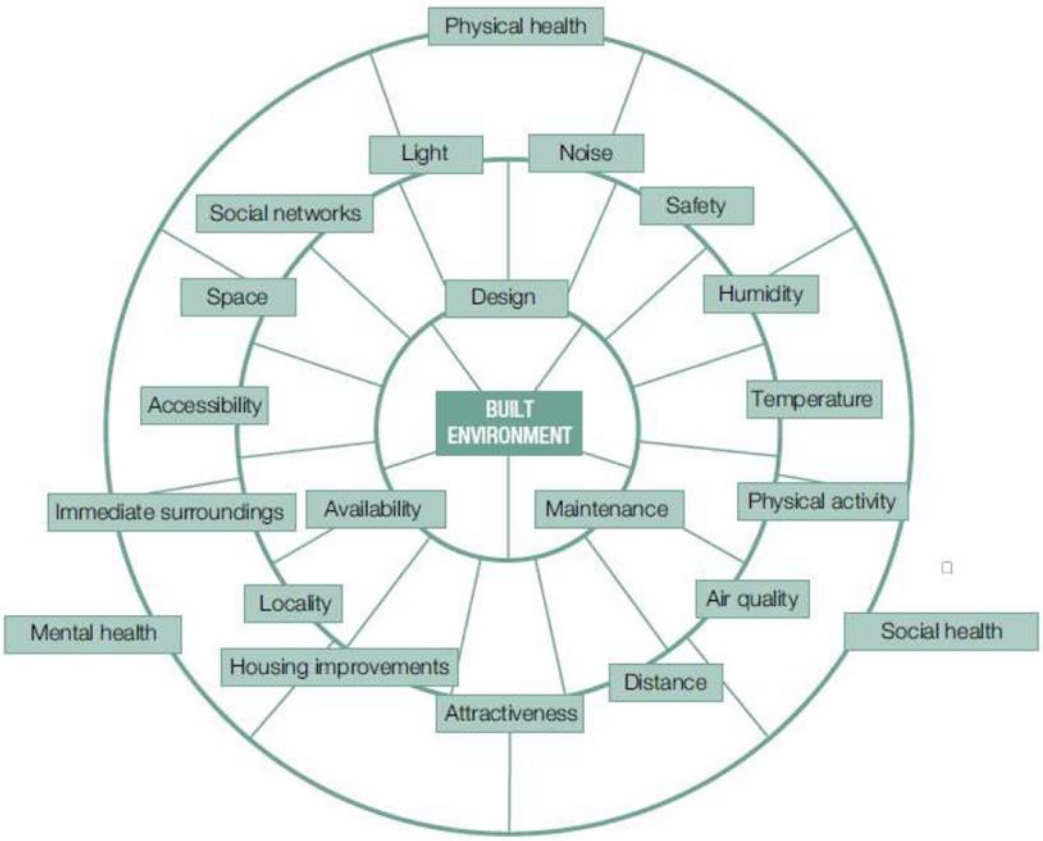

Figure 7.2 Health Impact Of The Built Environment

The European Commission (EC) has published the "*Guidance on The Preparation Of The Environmental Impact Assessment Report*" (EC, 2017). This document defines human

health as "*a very broad factor that would be highly Project dependent. The notion of human health should be considered in the context of the other factors in Article 3(1) of the EIA Directive and thus environmentally related health issues (such as health effects caused by the release of toxic substances to the environment, health risks arising from major hazards associated with the Project, effects caused by changes in disease vectors caused by the Project, changes in living conditions, effects on vulnerable groups, exposure to traffic noise or air".*

7.2.3. EIAR Scoping

The scope of this Chapter and assessment contained therein has taken full regard of the submissions made during consultation on the Scoping Report, as presented in **Section 2.2** of this EIAR.

7.3. Receiving Environment

7.3.1. Population and Demographic Analysis

In terms of the County, Region and the State, population structure and change are more strongly influenced by migration and emigration rates than by birth and death rates. The mid to late 1980s in Ireland was a period of heavy population outflow, mainly due to the poor economic and employment situation in the country at that time.

The most recent population estimates (June 2022) published by the CSO indicate that the combination of a net inward migration and high birth rates has resulted in the population of Ireland exceeding 5 million for the first time since 1851. Population projections for Ireland up to 2046 anticipate a population of approximately 5 million under the most pessimistic scenario and over 6.7 million under the most optimistic scenario. Population projections for Northern Ireland up to 2034 anticipate a population of approximately two million.

The population of the EDs covering Midleton and Carrigtwohill (as described in **Section 7.2** above) is presented in **Table 7.1** for the 2006, 2011, 2016 and 2022 Census. The population has been steadily increasing year on year, most recently with an 8.6% increase from 2016 to 2022.

Table 7.1 Total population of EDs covering Midleton and Carrigtwohill in the 2016 Census

Electoral Divisions	2006 Total Population	2011 Total Population	2016 Total Population	2022 Total Population
Cloyne, Co. Cork, 18252	3196	3859	4374	4711
Cobh Rural, Co. Cork, 18085	6339	7534	8353	9010
Carrigtwohill, Co. Cork, 18249	4875	6665	7334	8138
Midleton Rural, Co. Cork, 18260	6381	8316	8922	10048
Midleton Urban, Co. Cork, 18008	3934	3733	3881	3784
Total	**24725**	**30107**	**32864**	**35691**

The Cork County Development Plan 2022-2028 provides target population values for towns and villages for the year 2028. However, there are no such estimations for electoral divisions. The target population for Midleton for 2028 is 19,423 and to facilitate this

expansion, 2,647 new housing units are required. The target population for Carrigtwohill is 9,749 and to facilitate this expansion 1,784 new housing units are required (refer to **Table 7.2**).

Table 7.2 Population, Households and Net New Houses For Midleton and Carrigtwohill (Volume 4 South Cork, Cork County Development Plan 2022-2028)

Table 4.3.4: Midleton Population and Housing Supply

	Population and Housing Requirement			Housing Supply Units			
	Population Census 2016	Population Target (to 2028)	New Units Required (to 2028)	Housing Supply from Residential and Mixed-Use Zoning including Compact Growth Sites	Housing Supply from Residential Additional Provision Sites	Housing Supply from Residential Further Additional Provision Sites	Housing Supply from Residential Reserve Sites
Midleton	12,496	19,423	2,647	3,152	603	390	90

Table 4.2.3: Carrigtwohill Population and Housing Supply

	Population and Housing Requirement			Housing Supply Units		
	Population Census 2016	Population Target (to 2028)	New Units Required (to 2028)	Housing Supply from Residential and Mixed-Use Zoning including Compact Growth Sites	Housing Supply from Residential Additional Provision Sites	Housing Supply from Residential Further Additional Provision Sites
Carrigtwohill	5,080	9,749	1,784	1,784	218	2,390

According to the Preliminary 2022 Census results, County Cork has experienced a growth of 7.07% in population from 542,868 in 2016 to 581,231 in 2022.

Table 7.3 Population Change in County Cork From 2016 To 2022 Census

Area	Population 2016 Census Data	Preliminary 2022 Census Data	Change in Number of Persons	Percentage change in Population
Cork	542,868	581,231	**+** 38,363	**+** 7.07

7.3.2. Population and Age

CSO data records that there were 65,728 people living in the study area in 2016 and 417,211 in County Cork. **Table 7.4** shows the breakdown of the population in the study area compared with County Cork and the State.

Table 7.4 shows that people aged 5-24 make up the majority of the population (28.01%) which is slightly higher than the values for County Cork (26.59%) and the State (26.28%). The next largest group covers those aged 35-44 years (19.95%) followed by people aged 25-34 (13.88%) and people aged 45-54 (12.14%). People aged 55 years and older make up 16.91% of the population of the study area.

Overall, the population of the study area has a younger demographic than that of County Cork and the State. There are more people aged 0-44 years in the study area for each age

group when compared with the County and State averages. Similarly, there are less people aged 45 and over in the study area for each age group compared to the County and State averages.

Table 7.4 Population categories by age for the EDs covering Midleton and Carrigtwohill, County Cork and the State

Age Range	EDs covering Midleton and Carrigtwohill		County Cork		State	
	No. of People	% of People	No. of People	% of People	No. of People	% of People
0-4 years	2987	9.09	31,337	7.51	331,515	6.96
5-24 years	9,205	28.01	110,957	26.59	1,251,489	26.28
25-34 years	4,562	13.88	50,259	12.05	659,410	13.85
35-44 years	6,558	19.95	68,029	16.31	746,881	15.68
45-54 years	3,991	12.14	57,769	13.85	626,045	13.15
55-64 years	2,555	7.77	44,744	10.72	508,958	10.69
65-74 years	1,894	5.76	32,186	7.71	373,508	7.84
75 years and over	1,112	3.38	21,930	5.26	264,059	5.55
Total	**32,864**		**417,211**		**4,761,865**	

7.3.3. Economic Activity and Employment

The labour force is defined as the number of people above the legal working age that are available to work. The labour force participation rate is the number of people who are employed and unemployed but looking for a job, divided by the total working-age population.

In 2016, there were 2,304,037 persons in the labour force in Ireland. This represented an increase of 71,834 (3.2%) on 2011 statistics. The substantial increase in retired persons (up 19.2% to 545,407) has impacted on the labour force participation rate, which fell to 61.4%.

Table 7.5 shows the percentage of the total population aged 15+ who were in the labour force during the 2016 Census. This figure is further broken down into the percentages that were at work or unemployed. It also shows the percentage of the total population aged 15+ who were not in the labour force*, i.e.,* those who were students, retired, unable to work or performing home duties.

When assessing the percentage of people in the labour force it is noted that 59.12% of the study area are ”At work” which is higher than the values seen in County Cork (55.93%) and the State (53.43%).

The number of people classed as *Unemployed having lost or given up previous job* (6.58%) is higher than the average for County Cork (5.12%) but lower than the State average (7.08%).

The number of *Students* in the study area (10.19%) is slightly lower than the average for County Cork (11.17%) and the State (11.37%). The number of *Retired* people in the study area (10.79%) is lower than the average for County Cork (14.18%) and the State (14.52%) which corresponds with the lower-than-average number of people aged 55 and over in the study area.

Table 7.5 Economic Status of The Population Aged 15+ In 2016

Economic Status	EDs covering Midleton and Carrigtwohill	%	County Cork	%	State	%
At work	14,236	59.12	179,890	55.93	2,006,641	53.43
Looking after home/family	2,059	8.55	27,965	8.70	305,556	8.14
Looking for first regular job	165	0.69	1,827	0.57	31,434	0.84
Other	88	0.37	1,007	0.31	14,837	0.40
Retired	2,598	10.79	45,612	14.18	545,407	14.52
Student	2,453	10.19	35,933	11.17	427,128	11.37
Unable to work due to permanent sickness or disability	894	3.71	12,926	4.02	158,348	4.22
Unemployed having lost or given up previous job	1,585	6.58	16,460	5.12	265,962	7.08
Total	**24,078**		**321,620**		**3,755,313**	

Table 7.6 shows the highest level of education reached in the EDs. The majority of people have reached an Upper secondary (19.68%), Lower secondary (13.44%) or Technical or vocational qualification (10.77%) level of education.

Table 7.6 Highest Level of Education Reached

Highest Level of Education Reached	Cloyne, Co.Cork, 18252	Cobh Rural, Co.Cork, 18085	Carrigtohill, Co.Cork, 18249	Midleton Rural, Co.Cork, 18260	Midleton Urban, Co.Cork, 18008	Grand Total	%
No formal education	30	57	33	47	38	205	1.04
Primary education	189	271	260	288	246	1254	6.34
Lower secondary	421	737	488	632	378	2656	13.44
Upper secondary	486	1112	806	961	525	3890	19.68
Technical or vocational qualification	286	503	498	548	294	2129	10.77
Advanced certificate/Completed apprenticeship	234	440	327	382	135	1518	7.68

Highest Level of Education Reached	Cloyne, Co.Cork, 18252	Cobh Rural, Co.Cork, 18085	Carrigtohill, Co.Cork, 18249	Midleton Rural, Co.Cork, 18260	Midleton Urban, Co.Cork, 18008	Grand Total	%
Higher certificate	145	332	256	323	119	1175	5.94
Ordinary bachelor degree or national diploma	202	413	451	549	152	1767	8.94
Honours bachelor degree, professional qualification or both	267	454	539	573	171	2004	10.14
Postgraduate diploma or degree	229	388	448	548	161	1774	8.97
Doctorate(Ph.D) or higher	22	42	41	66	7	178	0.90
Not stated	137	270	190	290	330	1217	6.16
Total	**2648**	**5019**	**4337**	**5207**	**2556**	**19767**	**100**

Table 7.7 details the Broad Industrial Groups that make up the Labour Force in the study area. Of the 14,236 people in the workforce the largest industry group is Commerce and trade (22.25%) followed by Professional services (20.89%) and Manufacturing industries (19.59%).

Table 7.7 Broad Industrial Group in the EDs covering Midleton and Carrigtwohill

Industry	Cloyne, Co. Cork, 18252	Cobh Rural, Co. Cork, 18085	Carrigtwohill, Co. Cork, 18249	Midleton Rural, Co. Cork, 18260	Midleton Urban, Co. Cork, 18008	Total no of people	%
Commerce and trade	428	773	725	885	356	3167	22.25
Professional services	373	691	708	874	328	2974	20.89
Manufacturing industries	347	664	714	798	266	2789	19.59
Other	315	556	466	582	375	2294	16.11
Transport and communications	126	298	300	294	118	1136	7.98
Public administration	93	527	149	162	58	989	6.95
Building and construction	102	128	160	172	75	637	4.47
Agriculture, forestry and fishing	59	32	72	68	19	250	1.76
Total	**1843**	**3669**	**3294**	**3835**	**1595**	**14236**	**100**

Midleton Social Welfare Office is located within the study area and covers Midleton town and hinterlands (including Carrigtwohill). The monthly unemployment release contains a series of monthly unemployment rates and volumes. These series are based primarily on the Labour Force Survey and are compiled in accordance with agreed international practice. These statistics are the definitive measure of monthly unemployment. The Live Register is used to provide a monthly series of the numbers of people (with some exceptions) registering for Jobseekers Benefit or Jobseekers Allowance or for various other statutory entitlements at local offices of the Department of Social Protection.

Table 7.8 details the most recent information available from the CSO (May 2023). The number of people on the Live Register has increased by 60 (5.7%) from October 2022 to March 2023.

Table 7.8 Number of people on the Live Register in catchment area of Midleton social welfare office

Month	Oct 22	Nov 22	Dec 22	Jan 23	Feb 23	March 23
Number of Persons on Live Register	1038	1083	1184	1177	1152	1098

7.3.4. Tourism and Amenities

As described, Midleton and Carrigtwohill are both towns in east County Cork. They are located within approximately 7.7km or a 9-minute drive of each other and share many of the same tourist locations and amenities.

Fota Wildlife Park is located on 100 acres at Fota Island and first opened in June 1983. The park has an annual attendance of approximately 460,000 visitors. It is currently the second largest visitor attraction in Ireland outside of Leinster. The park offers a range of educational and guided tours and is open to the public Monday to Sunday from 9.30am to 6pm (Fota Wildlife Park, 2023).

The Jameson Distillery is an Irish whiskey museum and visitor centre located in the Old Midleton Distillery in Midleton, County Cork. The distillery offers a range of tours, the most popular being the Jameson Distillery Experience Tour and Behind the Scenes Tour, which between them attract 90% of all visitors. The distillery has received approximately 100,000 guests per year and is open 10:00-18:00 daily (Jameson, 2023).

There are a number of parks and outdoor spaces in the two towns of Midleton and Carrigtwohill including Ballyannan Woodlands Walk, Curragh Wood, South and East Cork Bird Trail. Sporting facilities in the two towns also include East Cork Golf Club, Midleton Football Club, Midleton Rugby Football Club, Carrigtwohill United AFC, Ballinacurra GAA Club and Quirke's Farm Stables (Google Maps, 2023).

Aquaculture and fishing practices are carried out within the receiving waters of the Midleton and Carrigtwohill agglomeration including the Great Island North Channel, Lough Mahon and the following river waterbodies; Owennacurra_040, the Dungourney_020, and Tibbotstown_010. These waterbodies are popular fishing spots which support angling activities for both tourists and locals.

Cork is Ireland's second largest city and has a rich historical and archaeological heritage. Cork City Gaol is a former 19th century prison, now a museum, located in Cork City which offers guided and self-guided tours year-round. The English Market is an indoor food market located in the city centre which has been officially trading since 1788. The market offers a mix of quality meats and fish, herbs, spices, fruit, vegetables, baked delicacies, and speciality cheeses.

7.3.5. Travel and Commuting

Table 7.9, Table 7.10, and **Table 7.11** show commuter information in the study area including time of commute, duration of commute and means of transport. The total number and percentage of people is detailed in the following tables.

Most people in the study area leave home for work, school, or college between 08:01 and 08:30 (25.85%). The second most popular time to leave home is between 08:31 and 09:00 with 18.81% of people leaving at this time followed by 16.49% of people between 07:31 and 08:00. A further 25.85% of people leave before 07:31 and 8.86% of people leave home after 09:01.

Table 7.9 Time Leaving Home from the EDs covering Midleton and Carrigtwohill

Time Leaving Home	Total no of people	%
Before 06:30	1273	5.81
06:30 - 07:00	1903	8.69
07:01 - 07:30	2463	11.25
07:31 - 08:00	3611	16.49
08:01 - 08:30	5661	25.85
08:31 - 09:00	4119	18.81
09:01 - 09:30	633	2.89
After 09:30	1308	5.97
Not Stated	925	4.22
Total	**21896**	**100.00**

A total of 34.55% of people commute for less than 15 minutes to work, school or college followed by 27.79% of people commuting between 15 and 30 minutes and 21.73% of people commuting between 30 and 45 minutes. Altogether this results in 84.07% of people commuting for less than 45 minutes. A total of 9.96% of people commute for longer than 45 minutes (**Table 7.10**). This shows that the majority of people in the study area live in close proximity (less than 45 minutes) to their place of work, school or college.

Table 7.10 Duration of Travel Times in the EDs covering Midleton and Carrigtwohill

Duration of Travel	Total	Percent
< ¼ hour	7564	34.55
¼ hour - < ½ hour	6085	27.79
½ hour - < ¾ hour	4757	21.73
¾ hour - < 1 hour	1169	5.34
1 hour - < 1½ hours	700	3.20
1½ hours and over	310	1.42
Not stated	1311	5.99

Duration of Travel	Total	Percent
Total time travelling	**21896**	

The majority of people in the study area commute to work, school or college as a *Car Driver* (46.63%) followed by 23.12% of people commuting as *a Car Passenger.* This totals to 69.75% travelling by car either as a driver or passenger. In terms of public transport use, 7.97% of people travel by bus or Train or Luas (**Table 7.11**).

Table 7.11 Means of Travel in the EDs covering Midleton and Carrigtwohill

Row Labels	Total	Percent
Car Driver	10420	46.63
Car passenger	5167	23.12
On Foot	2583	11.56
Bus, minibus or coach	1026	4.59
Not stated	874	3.91
Van	770	3.45
Train or LUAS	756	3.38
Work mainly at or from home	452	2.02
Bicycle	161	0.72
Other (incl. lorry)	88	0.39
Motorcycle or scooter	51	0.23
Total	**22348**	**100.00**

7.3.6. Landscape and Visual

Midleton and Carrigtwohill are both located on the N25 forming the route from Cork to Rosslare Port *via* Waterford City. The Midleton and Carrigtwohill agglomeration covers the towns of Midleton and Carrigtwohill and their environs. A full assessment of landscape and visual effects has been carried out in **Chapter 15 Landscape and Visual.**

7.3.7. Human Health

The Healthy Ireland Framework 2013-2025 defines health as '*everyone achieving his or her potential to enjoy complete physical, mental and social wellbeing. Healthy people contribute to the health and quality of the society in which they live, work and play'*. This framework also states that health is much more than an absence of disease or disability, and that individual health, and the health of a country affects the quality of everyone's lived experience.

Health is an essential resource for everyday life, a public good and an asset for human development. A healthy population is a major asset for society and improving the health and wellbeing of the nation is a priority for Government. Healthy Ireland Framework 2013-2025 is a collective response to the challenges facing Ireland's future health and wellbeing. **Table 7.12** shows that 89.44% of people have declared themselves as having Very Good

or Good health in the study area which is slightly lower than the same categories in County Cork (89.5%).

Table 7.12 Health Status in the EDs covering Midleton and Carrigtwohill And County Cork

Health Status	Midleton and Carrigtwohill No. of People	%	Cork County	%	State	%
General health - Very good	21038	64.02	263057	63.05	2827544	59.38
General health - Good	8354	25.42	110351	26.45	1316467	27.65
General health - Fair	2018	6.14	28786	6.90	382905	8.04
General health - Bad	284	0.86	4276	1.02	62697	1.32
General health - Very Bad	62	0.19	967	0.23	13738	0.29
Not stated	1108	3.37	9774	2.34	158514	3.33
General health - All	**32864**		**417211**		**4761865**	

7.3.8. Social Health

According to the WHO, poor social and economic circumstances affect health throughout life. Good health involves reducing levels of educational failure, reducing insecurity and unemployment, and improving housing standards. Health is influenced, either positively or negatively, by a variety of factors. Some of these factors are genetic or biological and are relatively fixed. '*Social determinants of health*' arise from the social and economic conditions in which people live. They are not so fixed such as type of housing and environments, access to health or education services, incomes generated and the type of work people do, can all influence a person's health, and the lifestyle decisions people make.

A range of factors have been identified as social determinants of health. These can include the wider socio-economic context, inequality, poverty, social exclusion, socioeconomic position, income, public policies, health services, employment, education, housing, transport, the built environment, health behaviours or lifestyles, social and community support networks and stress.

People who are less well off or who belong to socially excluded groups tend to fare badly in relation to these social determinants. Being at work on the other hand provides not only an income, but also access to social networks, a sense of identity and opportunities for development or progression.

Figure 7.3 presents the social determinants of health adapted from Dalghren and Whitehead (1991) and Grant and Barton (2006) as presented in Healthy Ireland.

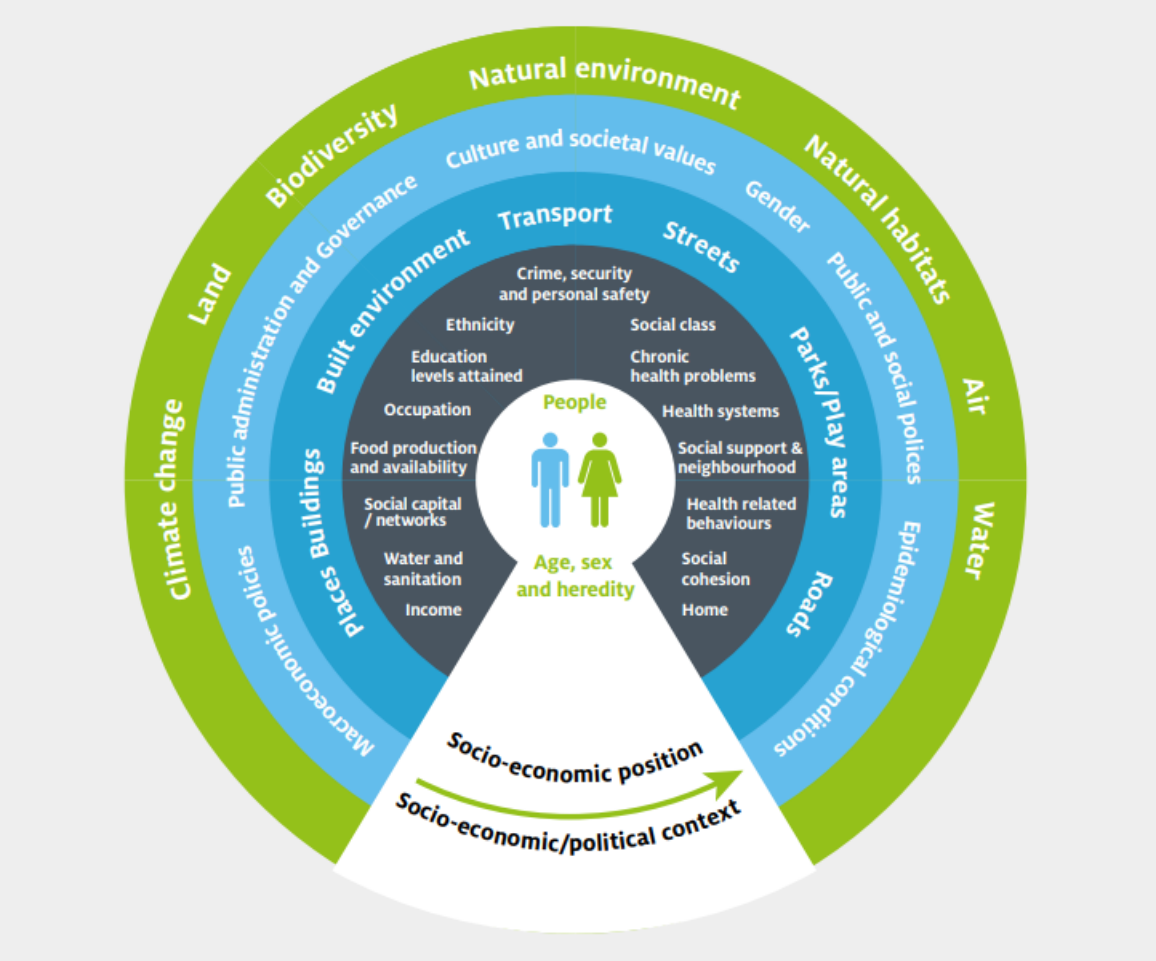

Figure 7.3 Social Determinants Of Health (Healthy Ireland, DOH 2013)

Section 7.3.3 of this Chapter states that 59.12% of people in the study area are at work. This reflects the high number of people of a working profile living within the area as identified in **Table 7.5**.

As per the current situation, there is currently one full-time operator and lab technician situated at Carrigtwohill WwTP and one Operator at Midleton WwTP which will remain unchanged. The impact of this is detailed in **Section 7.4** of this Chapter.

As detailed in **Table 7.12**, the majority of people in the study area have self-identified themselves in the 2016 Census as having '*very good health'* or '*good health'*. The high employment levels, coupled with the self-identification of health status indicate that positive social health conditions exist.

7.3.9. Water Quality and Water-related Diseases

Water-related diseases, as defined by the Protocol on Water and Health, are *"any significant adverse effects on human health, such as death, disability, illness or disorders, caused directly or indirectly by the condition, or changes in the quantity or quality, of any waters*". Consumption of contaminated water through drinking water, waste water or recreational water can cause serious human health effects.

The WHO has reviewed water-related infectious diseases in the pan-European region, which comprises 53 countries including Ireland. Diseases with the highest number of

reported outbreaks are viral gastroenteritis, hepatitis A, *E. coli* diarrhoea and legionellosis. In the WHO European Region, waterborne diseases constitute a significant health burden, with approximately 18% of reported infectious disease outbreaks associated with the water exposure pathway (WHO, 2016).

Over 95% of Ireland's drinking water can be described as "*safely managed*" with "*Drinking-water from an improved water source that is located on premises, available when needed and free from faecal and priority chemical contamination*". The EPA has published a report titled "*Drinking Water Quality In Public Supplies 2021*" which found that Ireland's drinking water was safe to drink with 99.7% of supplies complying with microbiological and chemical standards for drinking water. While water quality remains high, drinking water treatment in many supplies is still not as resilient as it needs to be to ensure the supply is safe into the future (EPA, 2022).

7.3.10. Conclusion

- There is a high working age profile in the study area which is reflected in the percentage of people at work (59.12%).
- The majority of people (34.55%) spend less than 15 minutes commuting to work, school or college in the study area indicating that most people work or study in the surrounding area.
- There is a large reliance on cars as a means of travel with 69.75% of people travelling by car either as a driver or passenger. A total of 7.97% of people utilise public transport in the form of bus or rail.
- The majority of people have declared themselves as being in very good or good health (89.44%) in the study area.

7.4. Description of Likely Significant Effects

7.4.1. Human Health and Water Quality

Based on the results of the Water Quality Modelling Report (July, 2023), it is considered that the operation of the proposed primary (SW009) and proposed secondary (SW001) discharges from the amalgamated agglomeration, in line with their current licenced ELVs, do not pose a significant risk water quality and to human health (refer to **Appendix 2**).

The Midleton Functional Area contains 3 no. SWOs which are having a localised observable impact on water quality in the Owennacurra estuary and are considered a pressure on the water environment. Untreated wastewater contains bacteria and viruses that can cause infection and disease. However, as part of the Midleton Wastewater Network Upgrade Project, UÉ has committed to the rehabilitation and upgrading of the 3 no. SWOs (including SW010, SW011, and SW020) to ensure they meet DoEHLG criteria '*Procedures and Criteria in Relation to Storm Water Overflows*', See **Chapter 3.3**).

Based on the above rehabilitation and upgrading of the 3 no. non-compliant SWOs by Q4 2029, and the conclusion of **Chapter 6 Water**, the impact on human health and water quality as a result of operational discharges will be not significant, positive and long term. The impact of all SWOs meeting the DoEHLG criteria on human health will be slight and positive.

7.4.2. Pandemic Related Diseases

It is expected that all workers employed during the operational phase of The Project will comply with the relevant Health Service Executive (HSE) guidelines and any Government protocols that will be in place at that point in time in relation to pandemic related disease such as Covid-19. If all safety protocols and hygiene measures that may be in place are adhered to it is considered that The Project poses no additional risk to human health.

7.4.3. Socio-economic

Carrigtwohill and Midleton WwTP run automatically and are capable of being monitored on a daily basis *via* the SCADA system. The WwTP is a manned site during the hours of 08:00 and 16:30 Monday to Thursday and 08:00 to 16:00 on Fridays with 24 hours call out response where the amount of time spent on site will vary depending on various factors *e.g.*, weather or breakdowns in plant or maintenance works required such as cleaning of the intake screens *etc*. There is currently one full-time operator and lab technician situated at Carrigtwohill WwTP and one operator at Midleton WwTP. There will be no change to the number of employees resulting in an imperceptible, neutral impact to the local economy and employment.

There is significant demand for housing development in Midleton with several development sites seeking planning permission in the area, including the Water Rock UEA. The Project will redirect existing loads from the Midleton WwTP to the existing Carrigtwohill and Environs WwTP thus providing spare capacity at Midleton WwTP. This newly increased capacity will also allow for future development to take place in the town of Midleton and, depending on the nature of the development, this could have a positive effect, long term on population and human health in the form of socio-economic improvements, community amenities or residential developments to supply housing. The amalgamation of the Midleton and Carrigtwohill agglomeration and the diversion of existing and future loads to Carrigtwohill for treatment will facilitate future social and economic growth, in line with National, Regional and County Development Plans outlined in **Section 4.3.4**.

7.4.4. Odour

Odour has the potential to negatively impact the general amenity at surrounding sensitive receptors such as residential homes, hospitals, nursing homes, creches, businesses (retail/commercial), industry and schools. Wastewater arising from the Midleton agglomeration and the Carrigtwohill WwTP will be treated prior to discharge thus it is not predicted that there will be associated odorous emissions. Potential odour effects have been assessed in **Chapter 12** of this EIAR and concluded that there will be no significant odour impact as a result of the operational discharges, and as such there will be no significant impact on population and human health.

7.4.5. Noise and Vibration

Noise exposure can cause a variety of human health effects including annoyance, sleep disturbance, raised stress levels, work impacts for commercial receptors or individuals who work from home. Noise associated with operational discharges will be limited to occasional maintenance works which will be short term in duration and have a negligible impact on human health. In the case of minor or major outages and depending on the duration of the outage, tankering or the use of generators is an option and is determined on a case-

by-case basis. Power outages are expected to be short in duration and any associated noise impact will be temporary. Noise has been assessed in **Chapter 11** and it was concluded that the operational discharges will not have a significant impact in relation to noise and vibration. As such there will be no significant impact on human health as a result of noise.

7.4.6. Aquaculture and Fishing

Ammonia gas, when dissolved in water, is known to pose a risk to fish in the marine environment. Water Quality Modelling based on the Future Scenario, and background water quality conditions was undertaken by Intertek in 2023 (see **Appendix 2**) to establish the impact of the existing discharges on key receptors in Cork Harbour. The modelling study demonstrates that unionised ammonia in the areas around the Middleton and Carrigtwohill discharges are below toxicity levels for estuarine fish and freshwater fish species.

There are currently 3 no. non-compliant overflows in the Owennacurra Estuary which present a direct risk to aquatic-dependant species such as salmon, trout, lamprey and eel. These overflows are scheduled to be upgraded in order to address this issue which is described in further detail in **Chapter 5 Biodiversity**.

Based on the above, in terms of Ammonia, the discharges do not have the potential to significantly affect populations of marine or estuarine fish, or significantly impact any migratory species passing through the estuary to the rivers. **Chapter 6 Water** has also concluded that no negative effects to the Water Environment have been identified.

In relation to designated shellfish waters (Great Island North Channel and Rostellan designated shellfish waters), the Water Quality Modelling concludes that bacteria concentrations in Cork Harbour are generally low and predicted impacts from Uisce Éireann assets do not significantly impact water quality in these designated shellfish waters. Therefore, the overall risk of proposed primary and secondary discharges to designated shellfish waters is classified as Low Risk.

Based on the above, the impact of operational discharges will not have a significant negative impact on the aquaculture and the fishing amenities in the surrounding waterbodies.

7.5. Mitigation Measures

All workers employed as part of The Project will comply in full with the relevant HSE guidelines and any Government protocols that may be in place at that point in time in relation to Covid-19.

Section 3.4 of this EIAR has detailed general "*Measures to Prevent Unintended Discharge*". The Waste Water Treatment Works at Carrigtwohill and Midleton have been designed and incorporate these measures which will subsequently prevent significant, negative, long-term impacts on Population and Human Health.

No specific mitigation measures are required in relation to population and settlements, given the lack of direct effects resulting from the Midleton and Carrigtwohill agglomeration operational discharges.

7.6. Residual Impacts

No negative residual impacts in the context of Population and Human Health are anticipated regarding the operational discharges from the amalgamated Midleton and Carrigtwohill agglomeration. The Project will have an overall positive and long-term impact on population and human health. The amalgamation of the Midleton and Carrigtwohill agglomeration allows for future development to take place and depending on the nature of the development this could have a positive effect on population and human health in the form of socio-economic improvements, community amenities or residential developments to supply housing.

7.7. Cumulative Impacts

There are no cumulative impacts with other plans and projects predicted.

7.8. Monitoring

Section 3.4 of this EIAR has detailed general "*Measures to Prevent Unintended Discharge*". The general measures below will be implemented which will subsequently act as monitoring measures to prevent significant effects on Population and Human Health.

- All flows will be monitored continuously and recorded at the electromagnetic flowmeters.
- Ensure the primary and secondary discharges continue to operate in compliance with the proposed ELVs; and
- Continue monitoring the effluent and receiving waters, on a consistent and regular basis in line with WWDL requirements.

No specific monitoring measures are required in relation to Population and Human Health, given the lack of direct effects resulting from the operational discharges.

8. MATERIAL ASSETS

8.1. Introduction

Material Assets have been defined as '*Resources that are valued and that are intrinsic to specific places, they may be either human or natural origin and the value may arise for either economic or cultural reasons'* (EPA 2002).

This definition is further expanded by the EPA in 2022 in '*Guidelines on the information to be contained in Environmental Impact Assessment Reports*' which states;

'In Directive 2011/92/EU this factor included architectural and archaeological heritage. Directive 2014/52/EU includes those heritage aspects as components of cultural heritage. Material assets can now be taken to mean built services and infrastructure. Traffic is included because in effect traffic consumes roads infrastructure. Sealing of agricultural land and effects on mining or quarrying potential come under the factors of land and soils.'

The scope and definition of Material Assets within the context of the EIA process has been defined by the EIA Directive as including Archaeology, Architectural and Cultural Heritage. These elements are assessed separately in **Chapter 13** under Archaeology, Architectural and Cultural Heritage.

This Chapter of the EIAR, prepared by Enviroguide Consulting, provides an assessment of the potential impacts of the operational discharges on Material Assets or physical resources in the environment of human origin including built services and infrastructure comprising:

- Electricity Supply;
- Gas Supply;
- Information and Communications Technology;
- Storm Water Drainage Infrastructure;
- Water Supply and Demand;
- Wastewater Management; and
- Waste Management.

Natural resources (Biodiversity (**Chapter 5**), Water (**Chapter 6**), Air Quality (**Chapter 10**), and Land (**Chapter 14**) are addressed in their respective Chapters. Traffic and Transport are addressed in **Chapter 9**.

In line with the EPA's "Guidelines *on the information to be contained in Environmental Impact Assessment Reports*" (EPA, 2022), the terms are defined in **Section 2.2** when quantifying the quality of effects. Refer also to **Table 2.2 i**n **Chapter 2**.

8.1.1. Statement of Authority

This Chapter was prepared by Louise Hewitt, Environmental Consultant, with Enviroguide Consulting. Louise has a Master of Science (Hons) in Environmental Resource Management from University College Dublin and a Bachelor of Science (Hons) in Biology from Maynooth University. Louise has worked as an Environmental Consultant with Enviroguide since 2021 and has experience preparing Environmental Impact Assessment (EIA) Screening Reports, and Chapters of EIARs, including population and health.

8.2. Methodology

The methodology adopted for the assessment takes cognisance of the following relevant guidelines:

- EPA (2022) Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR);
- EPA (2003) Advice Notes on Current Practice in the preparation of Environmental Impact Statements; and
- EPA (2002) Guidelines on the information to be contained in Environmental Impact Statements.

The scope of work undertaken for the assessment included a desk-based study of material assets. Built services and infrastructure associated with the existing development and The Project were considered in the assessment of potential impacts on material assets.

Information on built assets in the vicinity of the Midleton-Carrigtwohill agglomeration was assembled by the following mean:

- A desktop review of ESB Networks Utility Maps, UÉ Utility Plans, Gas Networks Ireland Service plans, EIR E-Maps.

Assessment of the likely impact of features of The Project, including surface water runoff, foul water discharge and water usage was carried out in accordance with the following guidelines:

- IS EN752, "*Drain and Sewer Systems Outside Buildings*".

8.2.1. Prediction and Assessment of Impacts

In line with the EPA's "*Guidelines on the information to be contained in Environmental Impact Assessment Reports*" (EPA, 2022), the terms are defined when quantifying the quality of effects. Impacts will vary from negative to neutral or positive and will vary in significance. The significance of effects has been determined based on the severity of potential disturbance to existing material assets. Where significant potential impacts were identified, mitigation measures are proposed to minimise impacts.

8.3. Receiving Environment

8.3.1. Land-use and Local Settlement

As described in **Chapter 7**, The Project is located across several Electoral Divisions (ED) including Carrigtwohill, Cobh Rural, Midleton Rural, Midleton Urban and Cloyne which are located within the Cobh Local Electoral Area (LEA) – 6 and the Midleton LEA -7. Refer to **Figure 8.1**.

Midleton and Carrigtwohill are located *ca.* 20km and 14km east of Cork City, respectively. The land use within the towns of Midleton and Carrigtwohill varies and is typical of small to medium sized towns. Land use varies from residential, commercial, industrial, and open space. The land surrounding the town centres is primarily agricultural land with wooded and natural land use located to the south of Midleton.

Midleton and Carrigtwohill are located on the N25 which connects Cork to the port of Rosslare, County Wexford. Carrigtwohill is located *ca.* 8.8km east and Midleton is located *ca.*14.5km east of the M8 motorway which connects Cork to Dublin.

Midleton and Carrigtwohill are in the administrative centre of Cork County Council (specifically South Cork under the Cork County Development Plan 2022-2028).

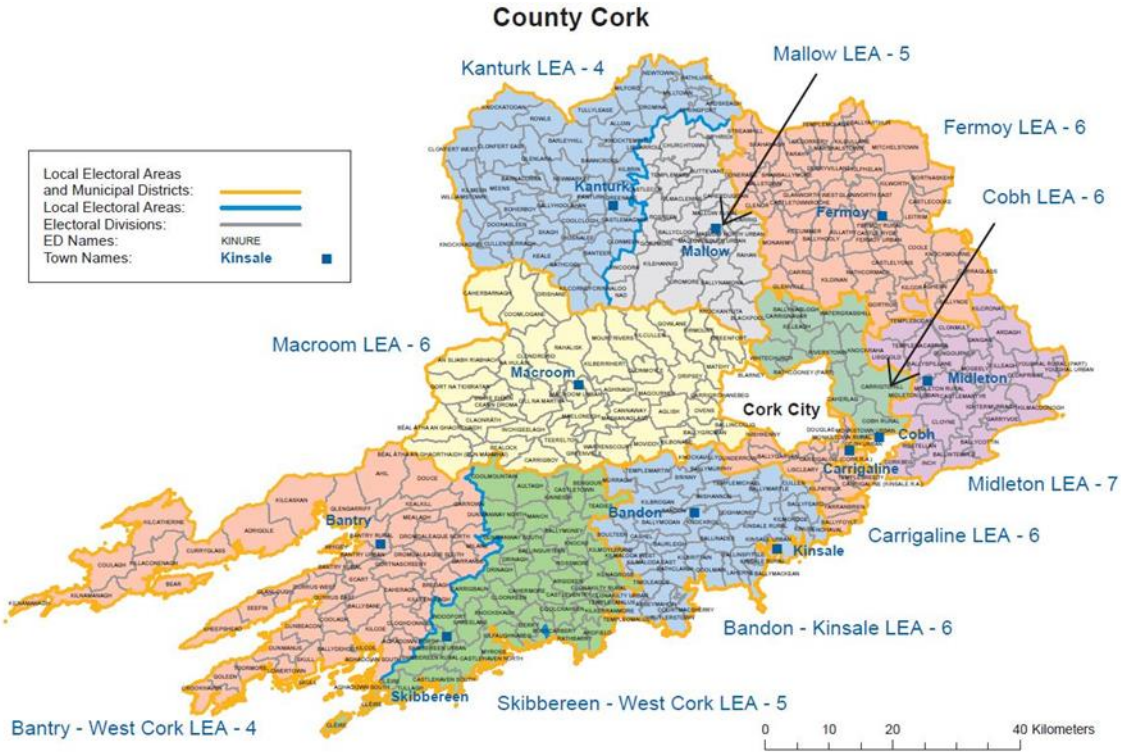

Figure 8.1 Map of Electoral Divisions and Local Electoral Areas

8.3.2. Land-use History

Historical mapping and aerial photography available from the Ordnance Survey of Ireland website (OSI, 2020) were reviewed and key observations of the study area are summarised in **Figure 8.1**.

Table 8.1 Historical Land Use

Date	Information Source	Site Description
Late 19th and early 20th centuries	**OSi Cassini 6-inch (colour) 4th Edition**	Midleton is a market town with numerous businesses operating in the town. Old Midleton Distillery is visible in the centre of the town adjacent to the Dungourney River. Avoncore Flour Mills is visible on the northern outskirts of the town, adjacent to the Owennacurra River (Ballynacorra River). The train station and railway line runs north of the town centre. Other features include the Sisters of Mercy Convent, Our lady of the Most Holy Rosary Catholic Church, Christian Brothers School, and Presentation Convent School. Carrigtwohill is visible as a smaller town east of Midleton. There are minimal businesses or industries

Date	Information Source	Site Description
		visible on the map with the most prominent features being St. Mary's Catholic Church, St. Aloysius Convent and Carrigtwohill railway line situated north of the town. Fota House is visible on Fota Island to the southeast of the town. Barry's Court Castle is visible to the south of the town.
1888-1913	**OSi Historic 25-inch Mapping**	No significant changes.
1995	**OSI Aerial photography**	In Midleton, industrial development began to the northwest of the town replacing Avoncore Mill. To the east of the town, previously undeveloped land now contains the new Midleton Distillery. Residential development has spread to the south of the town. In Carrigtwohill, residential development began in the north of the town. Fota Wildlife Park has been developed to the southwest of Carrigtwohill.
2000	**OSI Aerial photography**	No significant changes. Further development and peripheral expansion of the town limits.
2005	**OSI Aerial photography**	No significant changes. Further development and peripheral expansion of the town limits.
2011-2013	**Digital Globe**	No significant changes. Further development and peripheral expansion of the town limits.
2013-2018	**MapGenie Imagery**	No significant changes. Further development and peripheral expansion of the town limits.
2022	**Google Maps Photography** (*Imagery©2023, Google*)	No significant changes. Further development and peripheral expansion of the town limits. Carrigtwohill Railway Station has been developed and includes car park.

8.3.3. Electricity Supply

The electricity supply grid infrastructure on the island of Ireland is owned and maintained by ESB Networks and operated on a day-to-day basis by EirGrid. EirGrid published a Transmission System Map (March 2021).

Electricity to the study area is supplied by a combination of 110kV and 220kV overhead lines from the Midleton 110kV station and the Knockraha 220kV station.

8.3.4. Gas Supply

Gas Networks Ireland has been developing the gas network since 1978. The distribution and transmission network of gas pipeline consists of over 14,617km and links the UK and European gas markets to Ireland through two Interconnector pipelines with Scotland. Natural gas accounts for 30% of Ireland's primary energy requirements (Gas networks Ireland, 2022).

Midleton and Carrigtwohill are serviced by piped gas from Interconnector 1 *via* Curraleigh West. IC1 is a gas pipeline running between Moffat, Scotland and Loughshinny, Ireland. A public compressed natural gas (CNG) station is located in Carrigtwohill which services gas-powered vehicles.

8.3.5. Information and Communications Technology (ICT)

In terms of mobile telecommunication for transmission and reception, there are a number of mobile masts or base stations in the local area. The Commission for Communications Regulation (ComReg) has published a map showing the location of every mobile telephone mast, the operators who own or control each mast and the types of mobile services provided at each mast. These include the providers Meteor, Vodafone and Three. Based on aerial imagery, there are overhead telecommunication cables running along the lands that service the Carrigtwohill WwTP. Overhead telecommunication cables are not visible on aerial imagery in proximity to the Midleton WwTP and it is therefore assumed that ICT services are provided underground. There are no other ICT cables of relevance to the operational discharges.

8.3.6. Water Supply

Water supply for Midleton is provided by UÉ's Midleton Public Water Supply (PWS)(0500PUB2406) and is located *ca.* 1.5 km north of Midleton town. The supply has one raw water source; the Owennacurra River. The abstraction point is located *ca.* 1.5 km upstream of Midleton town centre. The most recent EPA figures from the Midleton Drinking Water Audit Report state that the Midleton PWS serves a population of 8,851 (EPA, 2015). This abstraction point is located upstream of all operational discharges.

Water supply for Carrigtwohill is provided by UÉ's Tibbotstown PWS (0500PUB2408) and is located *ca*. 3km north of Carrigtwohill. The most recent EPA figures from the Tibbotstown Drinking Water Audit Report state that the Tibbotstown PWS serves a population of 8,718 however the population served varies from time to time as the distribution network can be extended if capacity or other issues arise in adjacent supplies (EPA,2014). Tibbotstown River is identified as a drinking water river by the EPA (Tibbotstown_010) and originates *ca*. 4.2km north of Carrigtwohill. This abstraction point is located upstream of all operational discharges.

8.3.7. Storm Water Drainage

The operational discharges from the Midleton and Carrigtwohill agglomeration are detailed in **Table 3.1**, these include the Primary discharge, secondary discharge, Dual Function Overflows, SWOs, and EOs.

13 no. of the 16 existing SWO's in the network are meeting DoEHLG criteria for SWOs. The remaining 3 no. of overflows, which are currently not meeting this criteria (SW010, SW011, and SW020), will undergo rehabilitation and upgrades to ensure that they meet DoEHLG criteria as part of the Midleton Waste Water Network Upgrade Project. Current completion dates indicate that these works will be completed by Q4 2029. These works are outside the scope of this EIAR.

EOs associated with the amalgamated agglomeration (refer to **Table 3.1**) will only operate in emergency events and will be short and temporary in duration. Refer to **Section 3.4** for details of Measures to Prevent Unintended Discharges from the amalgamated agglomeration.

8.3.8. Foul Water Drainage

As this Project relates to the potential effects to the environment of the operational discharges from the Midleton-Carrigtwohill agglomeration, the aspects of the existing WwTPs and operational discharges are provided in **Chapter 3.** Where relevant, context will be given to the Midleton Waste Water Load Diversion Project, however, there are no upgrades associated with the Midleton and Carrigtwohill WwTPs or existing operational discharges, as part of this EIAR.

8.3.9. Waste Management

This subject matter of this EIAR relates to operational discharges and therefore has no solid waste management requirements.

8.4. Description of Likely Significant Effects

This section assesses the impact of The Project on the material assets of the area.

8.4.1. Land Use and Settlement

As the principal infrastructure is already in place within the study area, the discharges from the amalgamation of the Midleton and Carrigtwohill agglomerations will have no potential effects on the land-use for the area.

As a result of The Project, there will be relief to the capacity of the Midleton WwTP which will facilitate future population and economic growth in the area and enable UÉ to grant connection agreements to future developments.

Due to the nature of The Project, and the fact there are no construction works associated with the operational discharges, no protected views, rights of way or any important tourist sites will be affected by The Project.

Based on the subject matter of this EIAR, it is considered that there will be a non-significant, neutral, and long-term impact on land use and settlement as a result of operational discharges from the Midleton and Carrigtwohill agglomeration.

8.4.2. Storm Water Drainage

Storm water in the amalgamated agglomeration will continue to be collected as per the current scenario. As highlighted, 13 of the 16 no. are meeting DoEHLG criteria. The remaining 3 no. of SWO's (*i.e.*, SW010, SW011, and SW020) will be upgraded as part of the Midleton Wastewater Network Project, estimated to be complete by Q4 2029.

During storm events, surface water and a portion of foul water can accumulate which results in storm overflows which ultimately discharges into receiving waterbodies. As outlined in **Chapter 3**, SWO's are a necessary part of sewerage networks and serve to prevent uncontrolled spillages from arising within the agglomeration and to prevent the biological processes necessary to treat effluent from 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.

As mentioned previously, the risks of sewer or outfall failure associated with extreme events resulting in the activation of EOs, 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 EOs that can be applied have been incorporated in the design and operation of the agglomeration.

These overflows are temporary (short-lived) and have no long-term negative impact on the waterbody quality.

Refer to **Chapter 6, Section 6.4.2** for further details.

8.4.3. Foul Water Management

WwTP capacity overloading at a WwTP can increase the risk that discharges from the WwTP may not comply with the standards set out by the UWWTD or other associated standards set by the EPA such as the WwTP's WWDL. Through the amalgamation of the Midleton and Carrigtwohill agglomeration, the Midleton WwTP will no longer be overloaded therefore reducing the risk of non-compliant discharges.

This will have a permanent, positive, long-term effect on foul water management for Midleton and Carrigtwohill.

8.4.4. Water supply

It is not anticipated that the operational discharges will have any significant effects on water supply for the Midleton and Carrigtwohill Towns.

8.4.5. Power

Based on the scale and nature of The Project, it is not anticipated that the power demand from the operational discharges will have any significant effects on the power supply.

8.4.6. ICT

There will be no effects on Information and Communications Technology from the operational discharges.

8.4.7. Waste Management

It is not anticipated that operational discharges will have any significant effects on solid waste management as there is no construction phase associated with The Project. The subject matter of this EIAR only considers operational discharges.

8.5. Mitigation Measures

There are no specific mitigation measures in relation to Material Assets required.

8.6. Residual Impacts

Compliance with the EPA WWDL requirements and the intrinsic design measures to prevent unintended discharges and compliance with the proposed ELVs will ensure that there will be no significant adverse residual impacts associated with The Project in relation to

material assets. Overall, there will be a permanent, positive, long-term impact on foul water management due to The Project.

8.7. Cumulative Impacts

There are no predicted significant cumulative impacts with other projects or plans.

8.8. Monitoring

No specific monitoring measures are required in relation to material assets, given the lack of direct effects resulting from the operational discharges.

Section 3.4 of this EIAR detail general "*Measures to Prevent Unintended Discharge*". The implementation of these measures will subsequently act as monitoring measures to prevent significant effects on Material Assets.

- All flows will be monitored continuously and recorded at the electromagnetic flowmeters.
- Ensure the primary and secondary discharges continue to operate in compliance with the proposed ELVs; and
- Continue monitoring the effluent and receiving waters, on a consistent and regular basis in line with WWDL requirements.

9. TRAFFIC & TRANSPORTATION

9.1. Introduction

This Chapter of the EIAR, prepared by Nicholas O'Dwyer Ltd, is concerned with the likely significant effects of the proposed amalgamated Midleton and Carrigtwohill agglomeration operational discharges on Traffic and Transportation.

Given that the subject matter of this EIAR involves operational discharges only, which in themselves do not generate any traffic, a detailed traffic and transport assessment has been scoped out. As a result, no traffic counts were required to inform this assessment.

This Chapter presents the existing road network and access arrangements at the Midleton and Carrigtwohill WwTPs and associated pumping stations with overflows.

9.1.1. Statement of Authority

This Traffic and Transport Chapter has been prepared by Graham Young. Graham is a Senior Engineer of the civil and structural consultancy, Nicholas O'Dwyer Ltd. His areas of professional expertise are in pipeline and roads civil works design, including traffic and Transport Impact Assessment and mitigation design. Graham has over 23 years of civil consultancy experience. Graham is a Chartered member of Engineers Ireland, with a bachelor's degree in engineering (Civil, Structural and Environmental), and a postgraduate Diploma in Project Management. Graham has attended the National Roads Authority (NRA) three-day Road Safety Audit course.

9.2. Receiving Environment

Carrigtwohill is located *ca*. 14km east of Cork City along the N25 to Waterford route. Carrigtwohill town is located *ca.* 8.8km east of the M8 motorway which connects Cork to Dublin. The WwTP and Barryscourt Pumping Station are located to the south of the town at NGR 181177E, 72228N and can be accessed *via* the R624 as illustrated in **Figure 9.1**.

Midleton Town is located *ca.* 20 km east of Cork City along the N25 to Waterford route, and *ca*. 14.5km east of the M8 Cork to Dublin motorway. The WwTP in Midleton and Dwyers Road Pumping Station (SW014) are located along the N25 opposite the Owennacurra River and can be accessed directly from the L7649 road (refer to **Figure 9.2**).

Figure 9.3 illustrates the access arrangements to the IDA No.1 (SW004) and Old Cobh Road (SW008) Pumping Stations which are part of the Carrigtwohill Functional Area. Both Pumping Stations are slightly north of the N25 road. Both Pumping Stations can be accessed directly from the L3678 West End Road towards the N25.

Figure 9.4 illustrates the access arrangements to the Bailick No.2 Pumping Station (SW011). It can be accessed from the L3621 road towards Midleton town.

Figure 9.5 illustrates the access to the Ballinacurra No.2 (SW013), Bailick No.3 (SW013), and Ballinacurra No.1 Pumping Stations (SW022), which can all be accessed off the R630 road. Ballinacurra No.2 and No.1 Pumping Stations can be accessed by the L96303 road west of the R630. Bailick No.3 Pumping Station can be accessed by the L3621 road.

Figure 9.6 shows the access arrangements to the Oakwood (SW015) and Old Youghal Road (SW019) Pumping Stations. Both Pumping Stations are located in Midleton town on the old Youghal Road (R907) *ca.* 500m from the N25.

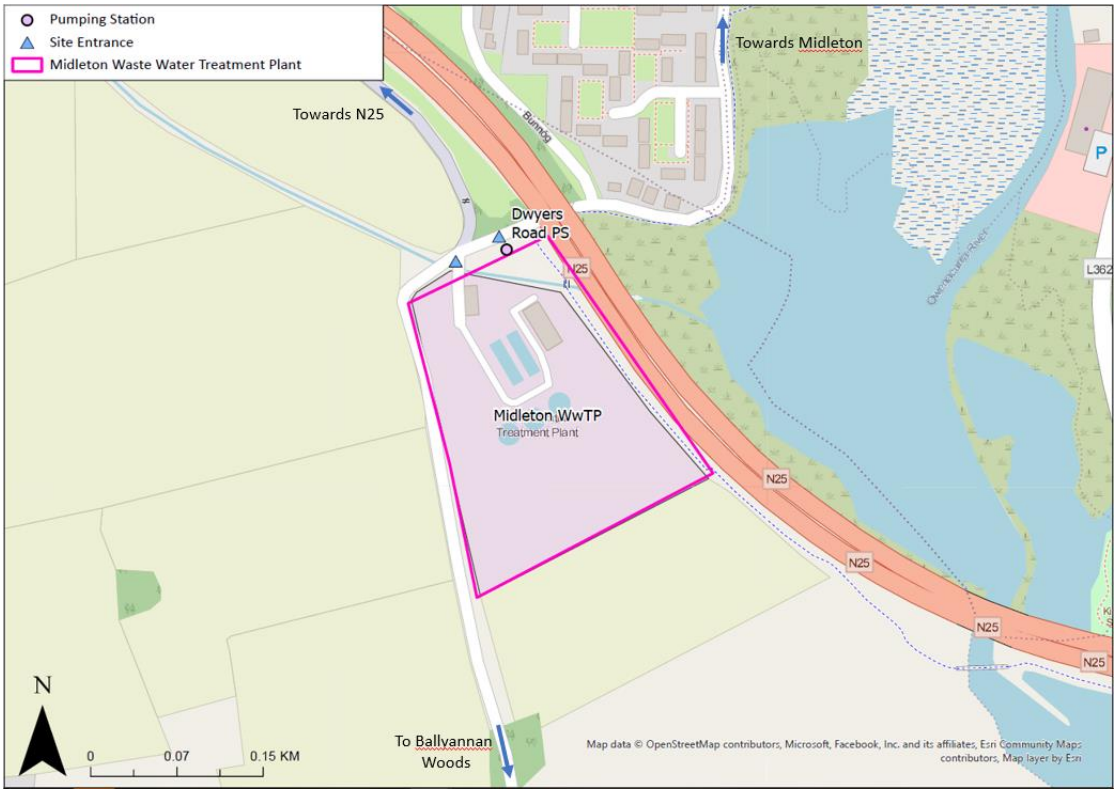

Figure 9.1 Access Arrangements to the Carrigtwohill WwTP and Barryscourt Pumping Station

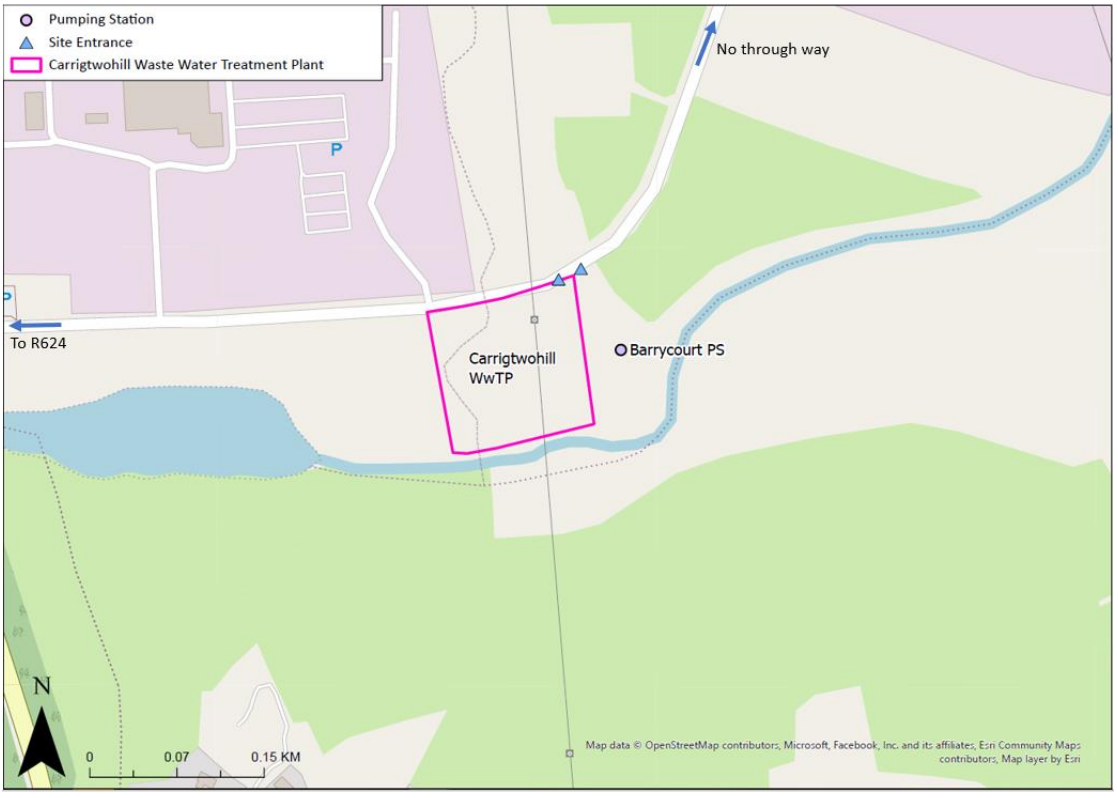

Figure 9.2 Access Arrangements to the Midleton WwTP and Dwyers Road Pumping Station

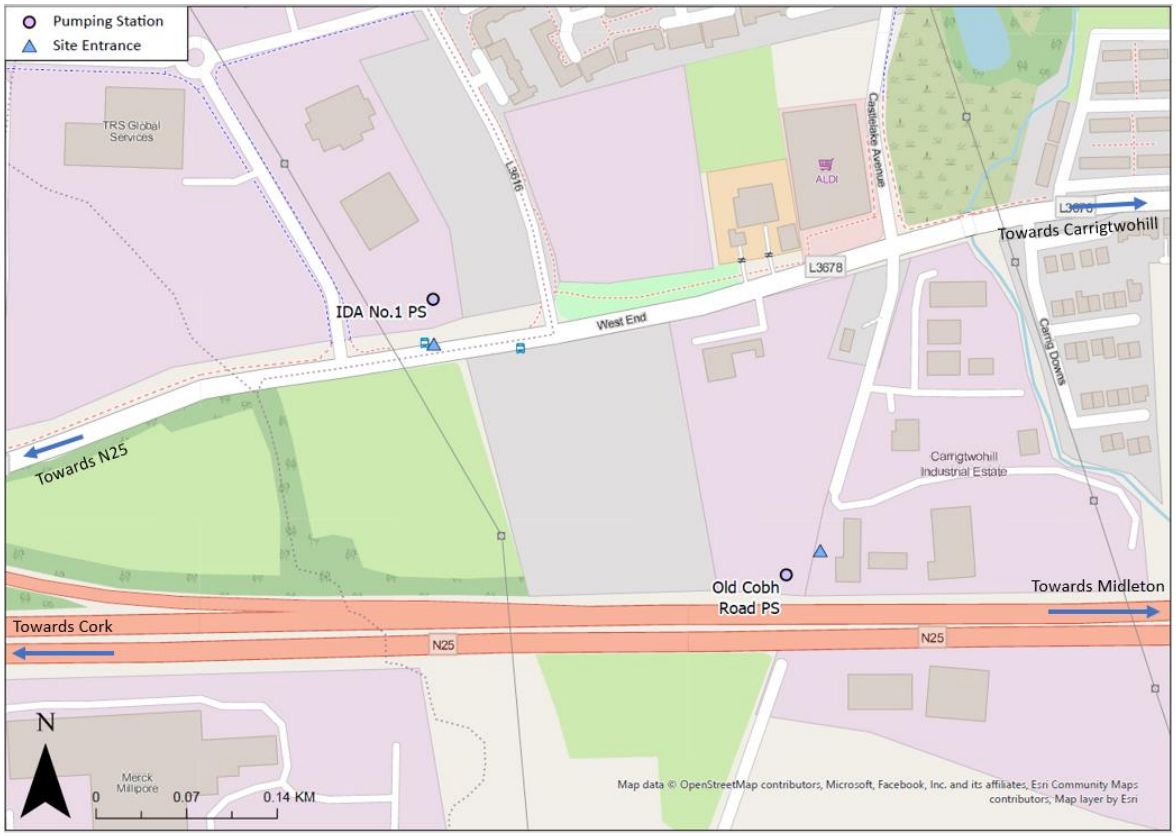

Figure 9.3 Access Arrangements to the IDA No.1 and Old Cobh Road Pumping Station

Figure 9.4 Access Arrangements to Bailick No.2 Pumping Station

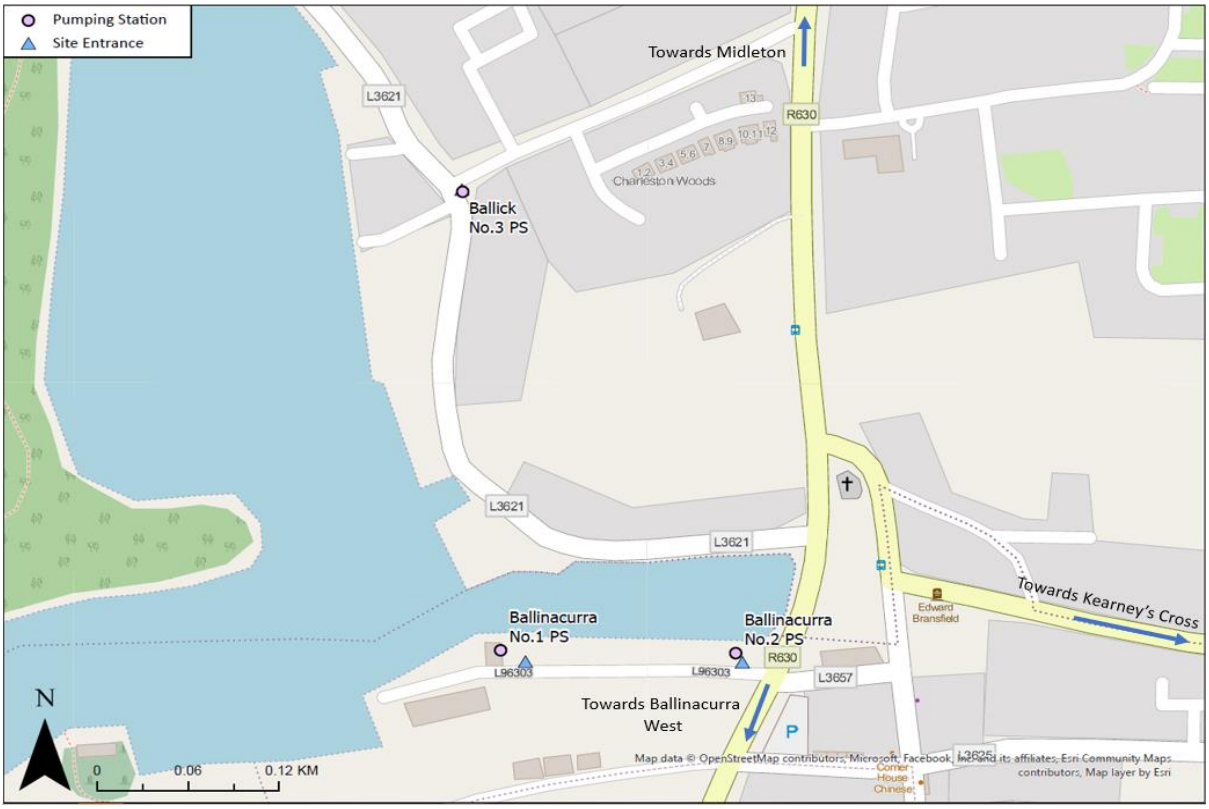

Figure 9.5 Access Arrangements to Bailick No.3, Ballinacurra No.1, and Ballinacurra No.2 Pumping Stations

Figure 9.6 Access Arrangements to Oakwood and Old Youghal Road Pumping Stations

Bailick No.1, Roxboro Mews, The Rock, and Roxboro Housing Estate Pumping Stations are all located relatively close to each other, in the south of Midleton Town. Ballick No.1 can be accessed *via* the L3621 road off the R907 towards Midleton town. Roxboro Mews, The Rock, and Roxboro Housing Estate Pumping Stations can all be accessed from the R907, as shown in **Figure 9.7**.

Figure 9.7 Access Arrangements to Bailick No.1, Roxboro Mews, The Rock, and Roxboro Housing Estate Pumping Stations

9.3. Description of Likely Significant Effects

The operational discharges in themselves do not generate any traffic movements. Given that Midleton and Carrigtwohill WwTPs and associated pumping stations are already in operation, no potential significant changes to traffic movements on the existing network or to the existing access arrangements during their operation were identified. Therefore, no potential negative significant effects on the transport network and traffic were identified.

9.4. Mitigation Measures

In the absence of potential negative significant effects on the transport network and traffic itself, there is no scope for mitigation.

9.5. Residual Impacts

No residual impacts were predicted.

9.6. Cumulative Impacts

No cumulative impacts with other projects or plans were predicted.

9.7. Monitoring

No specific monitoring measures are required in relation to traffic and transport, given the lack of direct effects resulting from the operational discharges.

10. AIR QUALITY & CLIMATE

10.1. Introduction

This Chapter of the EIAR, prepared by AWN Consulting Ltd. is concerned with the potential impact of the Midleton and Carrigtwohill agglomeration operational discharges on Air Quality and Climate. This includes a description of the assessment criteria, a brief overview of the existing environment and an assessment of potential impacts.

10.1.1. Statement of Authority

This assessment was completed by Ciara Nolan, a Senior Environmental Consultant in the air quality section of AWN Consulting Ltd. She holds an MSc. (First Class) in Environmental Science from University College Dublin and has also completed a BSc. in Energy Systems Engineering. She is an Associate Member of both the Institute of Air Quality Management (MIAQM) and the Institution of Environmental Science (MIEnvSc). She has over 6 years of experience working in environmental consultancy focussing on air quality. She has prepared air quality and climate impact assessments for numerous EIARs for a range of projects including commercial, residential, industrial, pharmaceutical and data centre developments.

10.2. Assessment Criteria

10.2.1. Air Quality

Impacts to air quality are assessed against compliance with the Ambient Air Quality Standards Regulations 2022 (S.I. no. 739 of 2022). This incorporates EU directive 2008/50/EC which outlines ambient air quality limit values for a range of pollutants including nitrogen dioxide, particulate matter, lead, sulphur dioxide, benzene, and carbon monoxide. Impacts are assessed against compliance with the relevant limit values. Where non-compliance is determined, significant impacts to air quality, and subsequently human health, can occur. Any potential impacts are typically mitigated to ensure compliance with the relevant limit values is maintained and to ensure impacts are non-significant.

10.2.2. Climate

Ireland has annual greenhouse gas (GHG) emission targets which are set at an EU level and need to be complied with in order to reduce the impact of climate change. Impacts to climate as a result of GHG emissions are assessed against the targets set out by the EU under *Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013*, which has set a target of 30% reduction in non-emissions trading scheme (ETS) sector GHG emissions by 2030 relative to 2005 levels. The CAP 23 details the required governance arrangements for implementation including carbon-proofing of policies, establishment of carbon budgets which allow for sectorial assessment criteria. This first CAP was published in 2019 with further updates published in 2021 and 2022. The sectorial emission ceilings for 2030 were published July in 2022.

10.3. Receiving Environment

10.3.1. Air Quality

Ireland has been divided into four air quality zones for air quality management and assessment purposes. Dublin City and its environs are defined as Zone A, Cork City and environs are defined as Zone B, Zone C comprises twenty-three towns with a population greater than 15,000 and Zone D comprises the remainder of Ireland. Midleton and Carrigtwohill and the area of The Project fall within Zone D.

Data from EPA monitoring reports[23] over the past number of years indicates that there is generally a good level of air quality in Zone D locations, with monitored pollutant concentrations in compliance with the Ambient Air Quality Standards Regulations 2022 limit values. The EPA note that road transport emissions are contributing to increased levels of NO_2 with the potential for breaches in the annual NO_2 limit value in future years at locations within urban centres and roadside locations. In addition, burning of solid fuels for home heating is contributing to increased levels of particulate matter (PM_{10} and $PM_{2.5}$).

10.3.2. Climate

The EPA have stated that, in 2021, the GHG emissions for Ireland that are covered under the Effort Sharing Regulation (EU 2018/842) were 46.19 Mt CO_2eq which is 2.71 Mt CO_2eq more than the annual limit for 2021[24]. EPA projections indicate that Ireland can achieve compliance under the ESR over the 2021-2030 period provided there is full implementation of the 2021 Climate Action Plan[25] (and subsequent updates). The EPA projections indicate that implementation of all climate plans and policies, plus further new measures, are needed for Ireland to meet the 51% emissions reduction target and put the country on track for climate neutrality by 2050.

10.4. Description of Likely Significant Effects

10.4.1. Air Quality

Operational discharges associated with The Project are outlined in **Chapter 3.** Due to the nature of the operational discharges, there are no air quality emissions to atmosphere associated with The Project. Therefore, there is no predicted impact to air quality as a result of the operational discharges under normal operations.

The Midleton and Carrigtwohill agglomeration consists of the following set up in terms of generators:

- Carrigtwohill and Midleton WwTPs are equipped with backup permanent generators to provide for the continued operation of the pumping equipment in the event of an interruption in the power supply. This will enable an automatic switch over in such events.

[23] Environmental Protection Agency (2022) Air Quality in Ireland 2021 (& previous annual reports)
[24] Environmental Protection Agency (2022) Ireland's Provisional Greenhouse Gas Emissions 1990 – 2021
[25] Environmental Protection Agency (2022) GHG Emissions Projections Report - Ireland's Greenhouse Gas Emissions Projections 2021 - 2040

- Provision for a standby power supply is available at 4 no. pumping stations (SW003, SW004, SW008, and SW010) for continued operation of the pumping equipment in the event of an interruption in the power supply.
- 2 no. Pumping Stations are generator ready, which includes a connection point to a temporary mobile generator, if required. This set-up is in place at Bailick No.2 (SW011) and Bailick No.3 (SW013). In the extremely unlikely event that a backup generator is required, one will be brought to site.
- In the case of minor or major outages affecting smaller Pumping Stations, depending on the duration of the outage, tankering or the use of generators is an option and is determined on a case-by-case basis. In most cases any power cuts to date have been relatively short in duration and power has been restored quickly. Therefore, any potential discharges will be short in duration. This procedure is in place at 8 no. Pumping Stations where standby generators or a connection point to a temporary mobile generator are not in place. This includes Ballinacurra No.2 (SW012), Dwyers Road (SW014), Oakwood (SW015), Roxboro Mews (SW016), The Rock (SW017), Roxboro Housing Estate (SW018), Old Youghal Road (SW019), and Ballinacurra No.1 (SW022).

There will be some emissions to atmosphere in relation to the back-up generators if required in the form of NO_2 PM and CO emissions. However, emissions from the generators will have an imperceptible impact on air quality due to the small number of generators required at each site, and these generators will only be required to operate in emergency scenarios where deemed necessary which will be a very rare occurrence (refer to **Chapter 3**).

It can be concluded that The Project will have an imperceptible impact on Air Quality.

10.4.2. Climate

As stated above, the Project will involve a number of operational discharges to the aquatic environment. There will be no GHG emissions associated with the discharges themselves. Therefore, there is no predicted impact to climate as a result of the proposal during normal operations. The Midleton and Carrigtwohill agglomeration consists of the following set up in terms of generators:

There will be some emissions to atmosphere in relation to the back-up generators if required in the form of CO_2 emissions which may impact climate. However, emissions from the generators will have an imperceptible impact on climate due to the small number of generators required at each site, and these generators will only be required to operate in emergency scenarios where deemed necessary which will be a very rare occurrence (refer to **Chapter 3**).

Therefore, CO_2 emissions when compared to national emissions targets will be imperceptible.

10.5. Mitigation Measures

In the absence of potential negative significant effects, no mitigation is required.

10.6. Residual Impacts

There are no residual impacts predicted.

10.7. Cumulative Impacts

There are no cumulative impacts with other projects or plans predicted.

10.8. Monitoring

No specific monitoring measures are required, given the lack of direct effects resulting from the operational discharges.

11. NOISE & VIBRATION

11.1. Introduction

This Chapter of the EIAR, prepared by AONA Environmental Consulting Ltd., is concerned with the potential impact of the proposed Midleton and Carrigtwohill agglomeration operational discharges on Noise & Vibration.

This assessment includes a brief overview of the proximity of the nearest residential properties to the operational discharges and an assessment of potential noise impacts.

11.1.1. Statement of Authority

This assessment has been prepared by Mervyn Keegan. Mervyn Keegan is a Director of the environmental consultancy, AONA Environmental Consulting Ltd. Mervyn Keegan's areas of professional expertise are in Noise Control & Acoustics and Air Quality & Odour consultancy, including Air Quality & Climate impact assessment and mitigation design. Mervyn Keegan has over 23 years of environmental consultancy experience. Mervyn is a full member of the Institute of Acoustics, the Institute of Air Quality Management and the Institute of Environmnetal Sciences, with a Bachelor of Science Degree (Applied Sciences), a Master of Science Degree (Environmental Science) and a Diploma in Acoustics in Noise Control. AONA Environmental Consulting Ltd. is an independent consultancy specialising in Environmental Impact Assessment and Licensing. Mervyn Keegan has prepared in excess of 50 Noise & Vibration and Air Quality & Climate impact assessments per annum for a range of developments in the Republic of Ireland, Northern Ireland and the UK in the last 15 years and is an expert in the awareness and understanding of the relevant legislation and guidance that pertains to best practise in such assessments. Mervyn Keegan has appeared as an Expert Witness at oral hearings, public inquiries and legal hearings. Mervyn Keegan has produced Noise, Air Quality & Odour Impact Assessment reports to assess the impacts of a range of development types including roads, residential developments, industrial developments, quarries and mines and wind energy developments among others.

11.2. Receiving Environment

The proximity of the nearest residential properties to the operational discharges which are the subject matter of the EIAR are listed in **Table 11.1** below.

Table 11.1 Proximity of The Nearest Residential Properties to the Amalgamated Agglomeration Operational Discharges

Discharge Name	Type	Asset	Discharge Location Coords (NGR)	Proximity to the nearest residential property
SW009	Primary Discharge	WwTP	179911, 72583	~467m
SW005	SWO	WwTP	179911, 72605	~488m
SW003	SWO/EO	Barryscourt Pumping Station	181276, 72256	~452m
SW004	SWO/EO	IDA Pumping Station No.1	181133, 72310	~443m

Discharge Name	Type	Asset	Discharge Location Coords (NGR)	Proximity to the nearest residential property
SW006	SWO	Church Lane (Network)	181544, 73040	~15m
SW007	SWO	Elm Road (Network)	181544, 73040	~15m
SW008	SWO/EO	Old Cobh Road Pumping Station	180594, 72283	~104m
SW001	Secondary discharge	Midleton WwTP	186177, 69506	~159m
SW010	SWO/EO	Bailick No. 1 Pumping Station	187975, 73109	~95m
SW011	SWO/EO	Bailick No. 2 Pumping Station	188047, 72518	~70m
SW012	SWO/EO	Ballinacurra No. 2 Pumping Station	188518, 71783	~41m
SW013	EO	Bailick No. 3 Pumping Station	188272, 72060	~15m
SW014	SWO/EO	Dwyers Road Pumping Station	187475, 72902	~131m
SW015	EO	Oakwood Pumping Station	188573, 73373	~157m
SW016	SWO/EO	Roxboro Mews Pumping Station	188346, 73332	~16m
SW017	SWO/EO	The Rock Pumping Station	188265, 73232	~32m
SW018	SWO/EO	Roxboro Housing Estate Pumping Station	188332, 73316	~13m
SW019	SWO/EO	Old Youghal Road Pumping Station	188703, 73401	~110m
SW020	SWO	Riversfield Estate SWO (Network)	187687, 73025	~21m
SW021	SWO	Drury's Avenue SWO (Network)	188346, 73332	~17m
SW022	EO	Ballinacurra No.1 Pumping Station	188366, 71791	~37m

11.3. Description of Likely Significant Effects

No mechanical plant will be required to operate a penstock gate at the operational discharge points. Therefore, the operational discharges will be completely inaudible at both the nearest noise sensitive locations and the nearest public amenity area or walkway, other than the sound of the flows of the operational discharges, which is akin to the sound of the existing flows within the respective receiving waterbodies. Therefore, the potential noise and vibration impact from the operational discharges will be negligible.

Noise emissions from back-up generators are not predicted to have any significant noise impacts. The generators will be required to be used in emergency events only, when there is an interruption to the power supply for the WwTPs and/or Pumping Stations, which will be a very rare occurrence. If the generators were required to provide power supply, their use would be expected to last a maximum of a few hours. The impact is therefore considered to be negligible.

Otherwise, occasional noise impacts during the operational phase of The Project will be limited works associated with maintenance of the outfalls which may include occasional operation of plant and equipment to remove trapped detritus from the discharge point pipework.

It is expected that whilst such maintenance works may generate short-term periods with audible noise levels in the surrounding proximity, it would be expected that these works would last a maximum of a few hours and may only occur once or twice a year during the daytime period. The impact of these activities is therefore considered to be negligible.

Future and / or on-going noise monitoring during the operational phase of the development is not deemed necessary.

11.4. Mitigation Measures

In the absence of potential negative significant effects, no mitigation is required.

11.5. Residual Impacts

There are no residual impacts predicted.

11.6. Cumulative Impacts

There are no cumulative impacts with other projects or plans predicted.

11.7. Monitoring

No specific monitoring measures are required, given the lack of direct effects resulting from the operational discharges.

12. ODOUR

12.1. Introduction

This Chapter of the EIAR prepared by AWN Consulting Ltd. is concerned with the likely significant effects of the Midleton-Carrigtwohill agglomeration operational discharges on Odour.

This includes a description of the assessment criteria used and an assessment of potential impacts.

12.1.1. Statement of Authority

This assessment was completed by Ciara Nolan, a Senior Environmental Consultant in the air quality section of AWN Consulting Ltd. She holds an MSc. (First Class) in Environmental Science from University College Dublin and has also completed a BSc. in Energy Systems Engineering. She is a member of both the Institute of Air Quality Management (MIAQM) and the Institution of Environmental Science (MIEnvSc). She has over 6 years of experience working in environmental consultancy focussing on air quality. She has prepared air quality (including odour) and climate impact assessments for numerous EIARs for a range of projects including commercial, residential, industrial, pharmaceutical and data centre developments.

12.2. Assessment Criteria

The impact to nearby receptors as a result of potential odorous releases depends on the intensity of the odour and the length of time the population may perceive the odour. The EPA has issued guidance in relation to odour assessments entitled "*Odour Emissions Guidance Note (AG9)"*[26]. This guidance recommends that odour standards should vary from 1.5 – 6.0 OU_E/m^3 as a 98^{th}%ile of one hour averaging periods at the worst-case sensitive receptor based on the offensiveness of the odour and with adjustments for local factors such as population density. WwTP processes fall into the" Most *Offensive*" category which has an odour threshold of 1.5 OU_E/m^3 as a 98^{th} %ile of one hour averaging periods at the worst-case sensitive receptor. This odour threshold can be applied to the discharge locations as a conservative approach. However, as the water will be treated prior to discharge it is unlikely to be particularly odorous.

12.3. Receiving Environment

There are a number of sensitive residential properties within 500m of the discharge locations within both Midleton and Carrigtwohill.

12.4. Description of Likely Significant Effects

The proposed primary discharge, SW009, and proposed secondary discharge SW001, will be treated prior to release thereby minimising the potential for odour.

When the wastewater discharges *via* the SWOs, a highly diluted screened effluent is being discharged to the receiving waterbodies. It is not possible to fully retain all stormwater at

[26] *Environmental Protection Agency (2019) Odour Emissions Guidance Note (AG9)*

the Pumping Stations 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, and screened effluent which could be discharged during storm conditions, will have increased flows driven by sustained rainfall. In this context, the SWO discharges will be highly diluted and will not be odorous. Any odours associated with The Project will be imperceptible.

In relation to EOs, in the unlikely event where they occur, they will be short (at most a few hours) in duration. Odours associated with emergency discharges will be imperceptible.

There are 8 no. smaller Pumping Stations (SW012, SW014, SW015, SW016, SW017, SW018, SW019 and SW022) which do not have standby generators or connection points for temporary standby generators to provide power to the site in the event of an emergency power outage. At these stations, in the event of power outages, depending on the duration of the outage, tankering or the use of generators is an option and is determined on a case-by-case basis. However, based on historical data for the sites any previous outages have been very short in duration (a number of hours maximum) and infrequent in nature. Therefore, the potential for odour impacts to occur is minimal and any odour associated with emergency discharges at these locations are likely imperceptible.

In relation to SW010, SW011, and SW020, as discussed in **Section 3**, these discharges are currently not meeting DoEHLG criteria *'Procedures and Criteria in Relation to Storm Water Overflows'*, 1995. These SWO's will be upgraded as part of the Midleton Wastewater Network Project to ensure meeting DoEHLG criteria and this is expected to be complete by Q4 2029, however the Midleton Network's Project does not form part of the grounds for this EIAR or Licence review. Any discharges that may occur from these SWOs will be a highly diluted effluent due to increased rainfall thereby minimising the potential for odour. In addition, discharge events will occur in only very rare circumstances. The upgrading of these SWOs as part of the Midleton Wastewater Network Project will further reduce the potential for odour by ensuring the SWO are designed to the current requirements and specifications from DoEHLG and UÉ. Therefore, the potential for odour impacts to occur is minimal and any odour will be imperceptible.

12.5. Mitigation Measures

In the absence of potential negative significant effects, no mitigation is required.

12.6. Residual Impacts

There are no residual impacts predicted.

12.7. Cumulative Impacts

There are no cumulative impacts with other projects or plans predicted.

12.8. Monitoring

No specific monitoring measures are required, given the lack of direct effects resulting from the operational discharges.

13. ARCHAEOLOGY, ARCHITECTURAL AND CULTURAL HERITAGE

13.1. Introduction

This Chapter of the EIAR prepared by Courtney Deery Archaeological Consultants is concerned with the likely significant effects of the Midleton and Carrigtwohill amalgamated agglomeration operational discharges as described in **Chapter 3** on Archaeology, Architectural & Cultural Heritage.

This Chapter includes a description of the assessment criteria, a brief overview of the existing environment, and an assessment of potential impacts.

13.1.1. Statement of Authority

This Chapter was prepared by Dr. Clare Crowley, Senior Archaeologist and Heritage Consultant at Courtney Deery Heritage Consultancy Ltd. Clare has more than 20 years' experience in cultural heritage management and assessment and holds a PhD in Archaeology (Dublin Institute of Technology, 2009), a BA (Hons) in Ancient History, Archaeology & French (Trinity College Dublin, 1996), a Certificate in Repair and Conservation of Historic Buildings (Dublin Civic Trust, 2004) and a Certificate in Condition Surveys of Historic Buildings (University of Oxford, 2017). Clare has carried out reports for large-scale infrastructural projects and conservation initiatives, her experience demonstrates a capability of characterising the existing historic and archaeological environment and evaluating its significance.

13.2. Assessment Criteria

Cultural heritage sites are considered to be a non-renewable resource and cultural heritage material assets are generally considered to be location sensitive. In this context, any change to their environment, such as construction activity and ground disturbance works, could affect these sites. The likely significance of all effects is determined in consideration of the magnitude of the effects and the baseline rating of the cultural heritage asset (*i.e.,* its sensitivity or value). Having assessed the magnitude of effect with respect to the sensitivity/value of the asset, the overall significance of the effect is then classified as imperceptible, slight, moderate, significant, or profound.

This assessment relates to operational discharges only, and therefore there are no construction activities and/ or ground disturbance works.

13.3. Receiving Environment

13.3.1. Midleton

The earliest evidence for settlement in the vicinity of Midleton points to human occupation during the Bronze Age. A pit burial (Record of Monuments and Places (RMP) CO076-062) containing a cordoned urn was found during drainage work in the 1980s in Oatencake townland, on the west / south-west side of the town, close to the river and estuary. Rivers and riverine environments have long been attractive for settlement, providing natural resources and a means of travel and communication. At a GAA pitch on the east side of the town, a burnt mound was uncovered during archaeological monitoring (Licence No. 19E0359; CO076-138). Burnt mounds or fulachta fia although still somewhat ambiguous, are generally accepted to be ancient cooking places, consisting of a water-filled trough

into which fire-heated stones were placed to heat the water for cooking. The used, and often burnt and fragmented, stones were removed and accumulated in a low kidney or horseshoe-shaped mound around the sides of the trough. They are usually located close to a water source (marshy areas, streams, or springs) and their presence is often indicative of Bronze Age seasonal communal activity in river valleys and boggy ground. They often appear in groups and are represented by small grass-covered mounds of burnt stone or spreads of burnt stone ('burnt spreads') where the field has been ploughed and the mound levelled.

The Irish placename for Midleton derives from the Irish *Mainistir na Corann*, meaning 'monastery at the weir'. This commemorates the Cistercian abbey (CO076-063003) that was founded *ca*. 1180 AD at the weir on the River Owennacurra, which itself derives from the Irish *Abhainn na Cora*, meaning 'river of the weirs' (www.logainm.ie). The abbey became known as Chore Abbey and Castrum Chor, most likely taking its name from the Irish *cora* (weir). The early 19th century St John the Baptist's Church of Ireland church and graveyard (CO076-063001 & -063002), on the west side of the Main Street, occupy the site of an earlier Church of Ireland church and the site of the Cistercian abbey of Chore (CO076-063003).

There was also medieval activity to the south in Ballynacorra, where there is a castle site on the east bank of a tidal stretch of the Owennacurra river, possibly the location of the 15th century Fitzgerald castle (CO076-024). A mound further south, overlooking the Ballynacorra river, could be the remains of a motte referred to in 12th century as the castle of Del Cora (CO076-042001), close to a late medieval church and graveyard (CO076-042002 & -042003). The mound was incorporated into the landscape design of the 18th century Ballynacorra estate.

Captain Walter Raleigh (later Sir Walter) had an association with the Midleton area, living for periods in nearby Youghal between 1585 and 1602. His presence came about due to a distribution of land in reward for helping suppress the Second Desmond Rebellion of 1579-1583. As part of this suppression, he was ordered to seize Barry's Castle at nearby Cahermore. The Desmond FitzGerald Seneschal, or steward of Imokilly, on being expelled from the castle, took refuge in the abbey, but was forced once more to flee by Raleigh.

The lands of Midleton were granted to the FitzGerald's of Cloyne in the 16th century, who held them until the time of the Cromwellian confiscations. The town (CO076-063005) received a charter of incorporation in 1670 which granted the manor of 'Middleton' to Sir John Broderick, who became Viscount of Midleton. It gave the borough the right to send two members to the Irish parliament. Situated on an important routeway between Cork and Youghal, the town also had access to Cork Harbour *via* the port of Ballinacurra, giving it a strategic importance. The town gained the English name Midleton, or 'Middle Town', due to its position on this routeway, as it was the principal midway town, 10 miles between Cork and Youghal.

By the late 17th century, Midleton College (CO076-108; Record of Protected Structures (RPS) 02517) had been established on the east side of the town. The school was founded and endowed in 1696 by Elizabeth Villiers and the building was completed in 1717 as a free school for Protestants. By 1791 the school was described as being in a very unsatisfactory state and it closed in 1821, by which time the school buildings had been allowed to deteriorate into ruins, except one wing, which was inhabited by the Master (Quane 1952 cited in RMP file CO076-108). The school was reconstructed in 1827-29, with a wing in 1878, and it still functions as a school.

Its good hinterland and location close to an estuary of Cork harbour at Bailick and Ballinacurra helped to establish Midleton as a market and post town, on the Great Southern and Western Railway line. Among the industries established in the town were flour mills, distilleries, and malt works. Samuel Lewis's *Topographical Dictionary of Ireland*, published in 1837, describes the town as follows:

> '*The present town, deriving its names from its situation on the road from Youghal to Cork, at a nearby equal distance from each place, is pleasantly situated at the head of the vale of Imokilly, in a healthy and fertile country, screened by lofty hills and embellished with handsome seats; and on an inlet of the north-eastern angle of Cork harbour, which is navigable for vessels of 300 tons' burden to Ballinacurra: it consists principally of one main street, from the centre of which another branches off to the east, and contains 247 houses, most of which are uniformly built and of handsome appearance. The inhabitants are amply supplied with excellent water from springs; and there are two rivers, the Avannachora, or Midleton river, which bounds the town on the west and falls into the inlet about a mile below it; and the Rocks-borough river, which skirts its southern part and flows into the former. Both rivers abound with salmon and trout, and over each is a handsome stone bridge*.'

In 1838, the British Government passed a Poor Law for Ireland in an attempt to deal with poverty and the Midleton Poor Law Union was formally established on 16 February 1839. The Midleton Union Workhouse (CO076-107) opened on the north-east side of the town in 1841.

The railway line to Midleton formed part of the Cork to Youghal branch of the Great Southern and Western Railway, with the Dunkettle to Midleton section opened in 1859 (Midleton Railway Station, RPS 02512). Even before the advent of the railway, the town's position on a strategic routeway had seen it become a prosperous market town, with a dedicated market-house (RMP CO076-063004; National Inventory of Architectural Heritage (NIAH) Ref. 20830021) dating to the mid-18th century. There was a large distillery (the Jameson Distillery) built in 1825 on the east side of the town, incorporating an earlier woollen manufactory of 1796 (RMP CO076-025; RPS 02508). The imposing former distillery has been converted to a new use, as a heritage centre. Sympathetically restored, it retains early fabric such as the brick dressings and regular fenestration rhythm. The Jameson Distillery was an important local employer and had a substantial impact on social and economic development in the town. Other industrial buildings from the late 18th / early 19th centuries include a corn store on the south side (CO076-073001), an iron foundry at Kennedy Park (RPS 02509), and a corn mill on the north side (RMP CO076-112).

Industrial development and the expansion around the town continued into the later 19th and 20th centuries. A gasworks complex (RMP CO076-115) was built in the late 19th century on the east bank of the Owennacurra river. In the mid-20th century, the Midleton Worsted Mill and Woolcombers factory was built by William Dwyer, opening in 1947 (NIAH 20830133).

The principal bridge crossing (Cork Bridge; RMP CO076-106), on the Owennacurra river, on the north-west side of town, is first shown on Taylor and Skinner's 18th century map and elements of this bridge survive in the present, mostly 19th century, structure. Another 18th century bridge is located on the south side of town (Lewis Bridge; CO076-073002; RPS 02546), continuing the line of Main Street and connecting the town with the Youghal road on the south side of the Dungourney river.

Midleton is a planned market town of important townscape value. The traditional town centre largely comprises of a long, wide Main Street laid out on a north/south axis and

intersected by a series of laneways (many of which are listed in the RPS). Buildings are generally two to three storeys high, of various widths and largely demonstrate a consistent frontage. The town contains a total of 51 buildings or sites that are included within the RPS, boasting some fine Georgian public buildings, terraces, and houses, at Broderick Street, St John the Baptist Church, Midleton College, the Distillery buildings, Market House, and Tracton Lodge. There are also examples of one-off Victorian buildings and detached Edwardian houses. Also notable is the railway station, which includes the signal box, station building, platform facings and the remains of the canopy. A number of areas and street frontages within the town are designated as Architectural Conservation Areas. In the vicinity of the railway station, the houses fronting the south side of Railway Street and the eastern side of Mill Road are included within the designation.

The area around Midleton also contained several 18th and 19th century country houses, including Midleton Lodge to the east of the town (RPS 02552), built *ca*. 1820, and Ballynacorra House, built *ca*. 1715 (RPS 00522 & RMP CO076-043). The latter was built on the site of an earlier castle known as Castle Cor and the present country house was probably built by the then Knight of Glin, John Fitzgerald, following his marriage to Catherine Ormsby.

13.3.2. Carrigtwohill

There is evidence for prehistoric occupational activity in Clyduff townland, on the south-east side of Carrigtwohill, where ploughing revealed a lithic scatter (flint arrowheads and waste) (RMP CO076-005). As in Midleton, there is also evidence for Bronze Age activity in the form of a cluster of fulachta fia in Barryscourt (RMP CO075-070 to -072, and -018002).

According to local information the western confines of Clyduff townland form part of the Cliadh Dubh (from the which the townland name derives) (CO076-002), a linear earthwork commonly attributed to the Iron Age. The earthwork stretches in a generally north-south direction between west Munster (Iarmumu) and east Munster (Ormond). Three sections survive, the longest stretching over 20km from the Ballyhoura Hills to the Nagle Mountains, and the other located in north-west Cork where it forms part of the Cork-Limerick County boundary.

A ringfort is also recorded in Clyduff townland (CO076-071), representing early medieval settlement in the area. These were the principal settlement type during this period. They consist of a circular or sub-circular area (although irregular shapes have been noted recently through the excavation of such features) defined by an earthen bank or by a stone wall with an external ditch. These enclosures were essentially habitation sites or farmsteads, which vary in both size and morphology; from simple univallate enclosures measuring 30m diameter to larger bivallate or trivallate sites in strategic locations. They were not simple isolated homesteads, however, and should be considered within their contemporary settlement landscape, which would have consisted of unenclosed settlements, farms, and fields, routeways and natural resources. Typically, they are sited on good, well-drained soils, usually over the 100m contour, close to a water source, and often located in proximity to routeways (ridges, eskers, morraines). As well as settlement and farming related activities, ringforts are also known to act as centres for industry such as weaving, metal working and glass working.

Medieval settlement is evident in the presence of a tower house and bawn (CO075-018001 & -018003) in Barryscourt, the chief seat of the Barrys in the cantred of Olethan (Uí Liatháin) / Barrymore from the 1170s. The castle was reputedly defaced and despoiled

during the Desmond rebellion in 1581 and was briefly occupied by Sir Walter Raleigh. David Barry regained possession *ca*. 1583 and undertook substantial improvements; after his death in 1617 Castlelyons Castle became chief seat in Barrymore. The remains of the medieval parish church patronised by the Barrys survive in the graveyard (CO075-017001 & -017002) located between St Mary's Cemetery and St Aloysius College in Carrigtwohill.

Historically, Carrigtwohill primarily functioned as a small rural village, though it was connected to both Cork city and Midleton by the mid-19th century railway line. The National Inventory of Architectural Heritage contains a number of entries for Carrigtwohill including two bridges along the rail line, the railway station and Station Master's House, the former presbytery, and the Roman Catholic Church (NIAH 20907550 to 58). There are also seven structures in Carrigtwohill listed in the RPS, including the former dispensary and parochial house (RPS 01315 & 16). The historic, rural village townscape of the town centre is an attractive feature of Carrigtwohill's built heritage. There is also a country house in the environs of the town, in Tullagreen to the south-west; the late 18th / early 19th century Tullagreen House (RMP CO075-019, NIAH 20907559), the seat of the Martin family. Located on an elevated site in the landscape Tullagreen house forms an important local landmark, part of the social and architectural history of the area.

13.4. Description of Likely Significant Effects

The subject matter of this EIAR are the operational discharges to the receiving waterbodies, see **Chapter 3**.

There are no construction works associated with the operational discharges. As such, there will be no impact on Archaeology, Architectural & Cultural Heritage assets.

13.5. Mitigation Measures

In the absence of potential negative significant effects, no mitigation is required.

13.6. Residual Impacts

There are no residual impacts predicted.

13.7. Cumulative Impacts

There are no cumulative impacts with other projects or plans predicted.

13.8. Monitoring

No specific monitoring measures are required, given the lack of direct effects resulting from the operational discharges.

14. LAND, SOILS & GEOLOGY

14.1. Introduction

This Chapter of the EIAR prepared by AWN Consulting Ltd, is concerned with the likely significant effects of the Midleton and Carrigtwohill operational discharges on Land, Soils and Geology, including Hydrogeology.

This includes a description of the assessment criteria, a brief overview of the existing environment, and an assessment of potential impacts.

14.1.1. Statement of Authority

This report was prepared by Marcelo Allende (BSc, BEng), a Senior Environmental Consultant (Hydrologist) at AWN Consulting Ltd. with over 17 years of experience in Environmental Consulting as well as hydrological and hydrogeological technical studies. Marcelo holds a degree in Water Resource Civil Engineering from the University of Chile. He has worked on a wide of range of projects including multi-aspect environmental investigations, geo-environmental impact assessments, groundwater resource management, hydrological and hydrogeological conceptual and numerical modelling, strategic and site specific flood risk assessments, Due Diligence reporting, baselines studies, soils, surface water and groundwater monitoring and field sampling programmes on a variety of brownfield and greenfield sites throughout Ireland as well as overseas in Chile, Argentina, Peru and Panama. He also has detailed knowledge of environmental guidance, legislation, regulations & standards, and expertise in GIS (expert level) and MATTE studies at COMAH establishments. He is currently a member of the International Association of Hydrogeologists (IAH, Irish Group) and a member of Engineers Ireland (MIEI).

14.2. Assessment Criteria

The baseline assessment has been carried out in accordance with the following guidance and established best practice:

- EPA Advice notes on current practice in the preparation of Environmental Impact Statement (EPA, 2003) and Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2022a);
- TII/National Roads Authority Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes (TII/formerly NRA, 2009);
- WFD - Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy. This relates to the improvement of water quality across Ireland including rivers and groundwater bodies;
- River Basin Management Plan 2018-2021 (including regional plans by Local Authority Waters Programme (Waters and Communities 2020)). Draft River Basin Management Plan 2022-2027; and

- Institute of Geologists Ireland (IGI) -Geology in Environmental Impact Statements, a guide (IGI, 2002) and Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (IGI, 2013).

Groundwater resource management in Ireland is dealt with in the following key pieces of legislation and guidelines:

- European Communities Environmental Objectives (Groundwater) Regulations 2010 (S.I. No. 9 of 2010);
- European Communities Environmental Objectives (Groundwater) Amendment Regulations 2016 (S.I. No. 366 of 2016); European Communities Environmental Objectives (Groundwater) (Amendment) Regulations 2022 S.I. No. 287 of 2022;
- European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003); and
- Environmental Protection Agency '*Towards Setting Guideline Values for the Protection of Groundwater in Ireland Interim Report'*, (EPA 2003).

14.3. Receiving Environment

The Carrigtwohill WwTP is located at Tullagreen, Carrigtwohill, next to the Tibbotstown River. The Midleton WwTP is located at Garryduff, Midleton, next to the Owennacurra River.

According to the Geological Survey of Ireland (GSI) website, the lithology at both WwTP sites is underlain by cohesive and low permeable deposits (Tills) and granular deposits (Gravels) derived from Devonian sandstones; alluvial and urban deposits are also located beneath the surrounding areas. The bedrock geology underlying the location of the Carrigtwohill WwTP and surrounding area is mapped as Waulsortian Limestones (rock unit code: CDWAUL) which is described as '*pale-grey, crudely bedded or massive limestone*'. The bedrock geology underlying the Midleton WwTP is mapped as Little Island Formation (rock unit code: CDLITT) which is described by the GSI as '*massive calcilutite limestones (mudbank facies) and crinoidal calcilutites*'.

The bedrock geology underlying both WwTP's has been classified by the GSI as a '*Regional Important Aquifer – Karstified (diffuse) (Rkd)*'. There is also a gravel aquifer underlying the Carrigtwohill WwTP and directly adjacent to the east of the Midleton WwTP (across the N25 road). Both gravel aquifers have been classified by the GSI as '*Locally Important Gravel Aquifer (Lg)*' (GSI, 2023).

Groundwater vulnerability in the vicinity of both WwTP's was generally mapped as '*High*' (GSI, 2023). Groundwater vulnerability is based on the thickness of the subsoil overlying the bedrock aquifer. The classification of '*High*' indicates that the soil overlying the bedrock aquifer has a depth between 3-5 metres.

The limestone bedrock which underlies both sites is composed mainly of diffusely karstified, highly permeable pure limestones. More intensive karstification (dissolution of the rock by water) occurred as a result of regional structural deformation accompanied by intense fracturing and high frequency jointing (N-S jointing dominates) within the limestone synclines resulting in karst features such as cave systems, sinking streams, springs, swallow holes and other collapse features.

According to GSI (2023) karst database, there are no karst landform features within the immediate boundaries of the Midleton WwTP or Carrigtwohill WwTP sites. **Tables 14.1**

and **14.2** below list the Karst landforms located in the vicinity of Carrigtwohill WWTP Plant and Midleton WWTP, respectively. The features in closest proximity to both WwTP sites comprise Caves, swallow holes (sinkholes), springs and enclosed depressions (refer to **Tables 14.1** & **14.2**).

Table 14.1 GSI Karst Features / landforms located in close proximity of Carrigtwohill WwTP

GSI Karst Feature Unique ID	Karst Feature Type	Feature Name	Easting	Northing	Location Relative to the Carrigtwohill WwTP site	County
IE_GSI_Karst_40K_2441	Cave	Unknown	582,184.22	57314.89.89	1.2 km northeast	Cork
IE_GSI_Karst_40K_127	Swallow Hole	Carrigtwohill Str. S	582,514.15	573611.79	1.8 km northeast	Cork
IE_GSI_Karst_40K_126	Cave	Sciathan Leathair	582,554.14	573661.78	1.85 km northeast	Cork
IE_GSI_Karst_40K_1703	Cave	Goat Hole	583,473.94	571412.27	2.2 km southeast	Cork
IE_GSI_Karst_40K_3088	Spring	Unknown	583,83.87	571062.34	2.6 km southeast	Cork

Table 14.2 GSI Karst Features / landforms located in close proximity of Midleton WwTP

GSI Karst Feature Unique ID	Karst Feature Type	Feature Name	Easting	Northing	Location Relative to the Midleton WwTP Site	County
IE_GSI_Karst_40K_323	Spring	Unknown	586,347.06	573519.83	1.1 km northwest	Cork
IE_GSI_Karst_40K_1821	Enclosed Depression	Unknown	588,912.80	572941.91	1.2 km east	Cork
IE_GSI_Karst_40K_321	Swallow Hole	Unknown	586,153.38	574161.66	1.6 km northwest	Cork
IE_GSI_Karst_40K_278	Cave	Midleton College Cave	588,502.88	573721.74	1.0 km northeast	Cork
IE_GSI_Karst_40K_325	Cave	Broomfield Q.C. West	587,883.02.02	574521.57	1.5 km north	Cork

The WFD Directive 2000/60/EC was adopted in 2000 as a single piece of legislation covering rivers, lakes, groundwater and transitional (estuarine) and coastal waters. In addition to protecting said waters, its objectives include the attainment of '*Good Status*'

in water bodies that are of lesser status at present and retaining '*Good Status*' or better where such status exists at present. '*Good Status*' was to be achieved in all waters by 2015, or at least by 2027, as well as maintaining '*High Status*' where the status already exists. The EPA co-ordinates the activities of the River Basin Districts, local authorities, and state agencies in implementing the directive, and operates a groundwater quality monitoring programme undertaking surveys and studies across the Republic of Ireland.

There is one (1) no. groundwater body (GWB) in the region of The Project. According to the EPA maps, the Midleton GWB (IE_SW_G_058) is underlying The Project site. Based on the 2016-2021 WFD status, Midleton GWB is classed as having '*Good Status'*, with a Ground Waterbody Risk score '*Under Review*'. The Midleton GWB has a Good Status for quantitative and chemical categories.

The GSI Well Card Index is a record of wells drilled in Ireland, water supply and site investigation boreholes. It is noted that this record is not comprehensive as licensing of wells is not currently a requirement in the Republic of Ireland. This current index does not show any wells drilled or springs at the site agglomeration boundary, with the exception of some exploratory boreholes at the Carrigtwohill IDA Industrial Estate and some single domestic well in Midleton (probably inactive at present). The area is serviced by Local Authority mains; therefore, it is unlikely that any wells are used for potable supply. The agglomeration boundary is not located near any public groundwater supplies or group schemes. There are no groundwater source protection zones in the immediate vicinity of the agglomeration boundary; the nearest groundwater protection area is the Cloyne Aghada Public Water Supply (PWS) and is located *ca*. 4.3km to the south of the Midleton WwTP.

There is a potential pathway through the aquifer to Great Island Channel SAC and Cork Harbour SPA protected areas, however this is limited by attenuation in soil and dilution in the aquifer.

There are no sensitive soil receptors, and no identified areas of geological heritage or groundwater supplies in the vicinity of the operational discharges. The closest geological heritage site is the Baneshane Quarry in Midleton, which is an old quarry located *ca.* 0.4km to the west of the Midleton WwTP.

14.4. Description of Likely Significant Effects

A site-specific WFD Screening Assessment was carried out for the operational discharges and is attached as **Appendix 3 - Water Framework Directive Screening Assessment.**

Overall, this WFD Screening Assessment has shown that there is no potential for change in the groundwater water body status and no risk as a result of the operational discharges.

Due to the nature of the operational discharges, no potential impacts to the land, soil, geological or hydrogeological environment were identified as there is no discharge to ground or active dewatering associated with the discharges.

It can be concluded that the Midleton and Carrigtwohill agglomeration operational discharges will have an imperceptible impact on Land, Soil, and the Geological and Hydrogeological environment.

14.5. Mitigation Measures

In the absence of potential negative significant effects, no mitigation is required.

14.6. Residual Impacts

There are no residual impacts predicted.

14.7. Cumulative Impacts

There are no cumulative impacts with other projects or plans predicted.

14.8. Monitoring

No specific monitoring measures are required, given the lack of direct effects resulting from the operational discharges.

15. LANDSCAPE & VISUAL

15.1. Introduction

This Chapter of the EIAR prepared by Stephenson Halliday, is concerned with the likely significant effects of the Midleton and Carrigtwohill operational discharges on Landscape and Visual factors. It includes a description of the assessment criteria, a brief overview of the existing environment, and an assessment of potential impacts.

15.1.1. Statement of Authority

This Chapter has been prepared by Daniel Leaver, an Associate Director in Stephenson Halliday with over 25 of experience in the field of Landscape Architecture. Dan is a Chartered Landscape Architect with considerable experience of the coordination, delivery, and technical review of LVIAs. He is an experienced project manager and has been involved in work in the UK, Ireland and overseas. Projects have included the assessment of a wide range of developments, including residential and commercial, minerals, waste disposal and energy including renewables, opencast sites, rail, highways, and other infrastructure projects.

15.2. Assessment Criteria

The assessment of landscape and visual effects has been informed by the [27]Landscape Institute's Guidelines for Landscape and Visual Impact Assessment (3rd Edition, 2013). This review has been undertaken through a combination of desk study of plans and relevant reports and the use of aerial photos, Google Earth, and Street View.

15.2.1. Planning Context

The following policies from the Cork County Development Plan 2022 are considered relevant to The Project as follows:

GI 14-9: Landscape

a) Protect the visual and scenic amenities of County Cork's built and natural environment.

b) Landscape issues will be an important factor in all land-use proposals, ensuring that a pro-active view of development is undertaken while protecting the environment and heritage generally in line with the principle of sustainability.

c) Ensure that new development meets high standards of siting and design.

d) Protect skylines and ridgelines from development.

e) Discourage proposals necessitating the removal of extensive amounts of trees, hedgerows and historic walls or other distinctive boundary treatments.

[27] *Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA 3). Landscape Institute (LI) and the Institute for Environmental Management and Assessment (IEMA) (2013)*

GI 14:10: Draft Landscape Strategy

Ensure that the management of development throughout the County will have regard for the value of the landscape, its character, distinctiveness and sensitivity as recognised in the Cork County Draft Landscape Strategy and its recommendations, in order to minimize the visual and environmental impact of development…

In addition, the Carrigtwohill Town Development Plan sets out the following relevant policy:

CT-GO-03 *The green infrastructure, biodiversity and landscape assets of Carrigtwohill include its hedgerows, mature trees, woodlands, wetlands (adjoining Cork Harbour Special Protection Area and Great Island Chanel Special Area of Conservation), and other habitats. New development should be sensitively designed and planned to provide for the protection of these features and will only be permitted where it is shown that it is compatible with the requirements of nature conservation directives and with environmental, biodiversity and landscape protection policies as set out in Volume One Main Policy Material and Volume Two Heritage and Amenity.*

15.3. Receiving Environment

15.3.1. Landscape

The Cork County Draft Landscape Strategy identifies the study area as Landscape Character Area (LCA) 1: City Harbour and Estuary. LCA 1 is deemed to be of national importance and to have a very high sensitivity and very high value. It is noted that the operational discharge points are contained within a peri-urban environment and do not impinge to any great extent on the surrounding countryside.

The strategy makes the following recommendation relevant to the site:

- *Promote sustainable growth in the existing main settlements of Cobh, Passage West, Carrigtwohill, and Midleton by encouraging new development, which respects the existing character of these settlements in terms of both scale and design.*

The operational discharge points are located within an area which is designated as a High Value Landscape.

15.3.2. Visual

The operational discharge points are located within the banks of existing watercourses and are therefore below the general level of the surrounding landscape. In addition, the banks of the receiving watercourses are generally well vegetated with long grassland or tree and shrub vegetation which screens the infrastructure from wider views. Views are therefore limited to a very local area in the vicinity of each discharge point.

15.4. Description of Likely Significant Effects

15.4.1. Landscape

There will be no changes to the existing site landscapes in terms of vegetation removal or changes to topography and there will be no changes to the existing infrastructure of the operational discharges and therefore no change in scale and nature to structures. The operational discharge points are already present at the current locations, hence, there is no change to land use. It is therefore considered that the existing landscape would be tolerant to the infrastructure type.

Overall, there will be no changes to LCA 1. It is therefore considered that landscape effects would not be greater than negligible. It is also concluded that the High Value Landscape would be retained intact.

15.4.2. Visual

Views of the operational discharge points are screened by existing topography, built form and vegetation and, where they are present there would be no change to views. There would therefore be no changes to the visual amenity of users, including those using the area for recreational and amenity use. All operational discharges have retained their existing locations and form and there would be no changes in views which are currently barely perceptible to road and footway users.

Overall, it is considered that there would be no changes to visual amenity. It is thus concluded that visual effects would not be greater than negligible.

15.5. Mitigation Measures

in the absence of potential negative significant effects, no mitigation is required.

15.6. Residual Impacts

There are no residual impacts predicted.

15.7. Cumulative Impacts

There are no cumulative impacts with other projects or plans predicted.

15.8. Monitoring

No specific monitoring measures are required, given the lack of direct effects resulting from the operational discharges.

16. RISK OF MAJOR ACCIDENTS AND/OR DISASTERS

16.1. Introduction

This Chapter has been prepared by Nicholas O'Dwyer Ltd. and presents a consideration of potential risk of major accidents and/or disasters relevant to operational discharges as required in the EIA Directive and described in the EPA's EIAR 2022 Guidelines.

The aim is to assess the risk of major accidents and/or natural disasters that The Project (*i.e.,* the operational discharges from the amalgamated Midleton-Carrigtwohill agglomeration) could (i) cause, and (ii) be vulnerable to, and to determine appropriate measures required to reduce the risk by reducing the probability of an event occurring and/or reducing the effect of the consequence.

As detailed in **Chapter 3, Section 3.4**, the Midleton and Carrigtwohill WwTWs have been designed and incorporate a number of measures to prevent unintended discharges to the receiving water environment.

16.1.1. Statement of Authority

This Chapter has been prepared by Krista Farrugia, a Principal EIA Consultant in Nicholas O'Dwyer Ltd., with 19 years of experience in the field of EIA. As a consultant, Krista has coordinated EIAs, including Risk Assessment chapters, for 16 years. Krista has also conducted risk assessment for projects outside of EIA, as requested by the Competent Authority in Malta. Krista was also responsible for review of risk assessments in her role as Environment Protection Officer for three years with the Malta Environment and Planning Authority (MEPA). Krista holds a Master of Science in Integrated Environmental Management from the University of Bath, a Post Graduate Diploma in Wildlife Biology and Conservation from Edinburgh Napier University, and a Bachelor of Science (Hons) in Chemistry and Biology from the University of Malta. She is a Practitioner with the Institute of Environmental Management with extensive experience in EIA.

16.2. Methodology

Generally, an environmental risk occurs when there is a means, or pathway by which a hazard (source) results in a negative impact to the surrounding environment, *i.e.,* receptor/s. Risk assessment includes identification, classification, and evaluation.

The following reference materials were used to inform and guide the assessment:

- EU (2017) Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report;
- EPA (2022) Guidelines on the information to be contained in Environmental Impact Assessment Reports;
- EPA (2014) Guidance on Assessing and Costing Environmental Liabilities;
- DoEHLG (2010) Guidance Document 1: A Guide to Risk Assessment in Major Emergency Management;
- Dept of Defence (2017) A National Risk Assessment for Ireland 2017;
- IEMA, ARUP (2020) Major Accidents and Disasters in EIA: A Primer; and

- ISO31010 Risk Assessment Techniques.

16.2.1. Risk Identification

Risks were identified through review of EIAR environmental factor Chapters and consultation with experts, and UÉ, as required. As set out in the EU guidance document (2017), risks are identified both in respect of (i) the potential vulnerability of The Project to major accidents and disasters; and (ii) the potential for The Project to cause accidents and/or disasters.

16.2.2. Risk Classification

16.2.2.1 Risk Assessment Criteria

The risk criteria applied in this assessment are based on a consequence/likelihood matrix consistent with *ISO31010: Risk Management: Risk Assessment Techniques*, a supporting standard for the international risk standard ISO31000. Reference was made to the DoEHLG and the EPA (2014) guidance documents; the following risk criteria were adapted for the purposes of this assessment. **Table 16.1** lists the criteria used for assessing environmental consequences. **Table 16.2** presents the criteria to determine the likelihood of an event occurring.

Table 16.1 Criteria for Assessing Scale of Environmental Consequences

Rating	Classification	Effects on natural environment
1	Insignificant	No contamination; localised, short-term effects to land, biodiversity, ecosystem services, water resources, human health
2	Minor	Limited contamination, short duration, localised effects to land, biodiversity, ecosystem services, water resources, human health
3	Moderate	Moderate, medium-term impacts with widespread effects to land, biodiversity, ecosystem services, water resources, human health
4	Major	Medium- to long-term, serious environmental effects with some impairment to ecosystem function, widespread impacts
5	Catastrophic	Permanent, severe impacts to land, biodiversity, ecosystem services, water resources, human health

Table 16.2 Criteria for Assessing Likelihood of Event Occurring

Rating	Classification	Effects description
1	Rare	Consequence may only occur in exceptional circumstances
2	Unlikely	Consequence could occur at some time
3	Occasionally	Consequence should occur at some time
4	Likely	Consequence will probably occur in most circumstances
5	Almost certain	Consequence is expected to occur in most circumstances

16.2.3. Risk Evaluation

The risk matrix was developed with reference to the guidelines, listed above, in particular, the EPA (2014) and the DoEHLG (2010) guidance documents. **Table 16.3** presents the matrix that was applied in carrying out the risk assessment.

Table 16.3 Risk Matrix

	Environmental Consequence				
Likelihood	**1: Insignificant**	**2: Minor**	**3: Moderate**	**4: Major**	**5: Catastrophic**
1: Extremely Unlikely	Very Low	Very Low	Low	Low	Low
2: Unlikely	Very Low	Low	Low	Moderate	Moderate
3: Occasional	Low	Low	Moderate	Moderate	High
4: Likely	Low	Moderate	Moderate	High	Very High
5: Almost Certain	Low	Moderate	High	Very High	Very High

16.3. Overview

As described in **Chapter 3**, The Project involves the operational discharges of the amalgamated Midleton and Carrigtwohill agglomeration (SW001, SW003 to SW022) and therefore solely assesses the potential operational risks related to these discharges.

Should unexpected and unplanned-for events occur during the operation of the amalgamated WwTW's, there is a risk of contamination of the receiving water body that could then result in impacts on the surrounding environment and on ecosystem services.

It should be reiterated, however, that the WwTWs at Midleton and Carrigtwohill have been designed and incorporate a number of key measures to prevent unintended discharges to the receiving water environment, refer to **Chapter 3, Section 3.4** for further details.

16.3.1. Natural Disasters

Given its geographical location, Ireland is relatively less vulnerable to natural disasters such as earthquakes or tsunamis. However, recently there has been an increase in the number of severe weather events, particularly those leading to flooding and flash flood incidents.

16.3.1.1 Swallow holes

As described in **Chapter 14**, the limestone bedrock which underlies the amalgamated agglomeration is composed mainly of diffusely karstified, highly permeable pure limestones. Several karst features are present within the landscape in the Midleton-Carrigtwohill area including sinkholes, depressions, caves and other collapse features. Karst features are created through the dissolution of the rock by water. In the case of swallow holes, once created, they act as funnels, allowing the direct transmission of surface water into the underlying karstic bedrock aquifer. As reported in **Chapter 14**, according to GSI (2023) karst database, there are no karst landform features within the immediate boundaries of the Midleton WwTP or Carrigtwohill WwTP sites. **Table 14.1** and **Table 14.2** list karst landforms in the vicinity. The list includes two sinkholes located *ca.* 2km northeast of the Carrigtwohill WwTP and *ca.* 1.6 km northwest of the Midleton WwTP.

The Geological Survey Ireland note that catastrophic events of buildings falling down into large collapse features are extremely rare. However, minor collapses of roads and fields do occur in Ireland.

16.3.1.2 Flooding

As identified in Arup's Hydrology Report (2022)[28] for the Midleton Flood Relief Scheme, and recorded by the OPW, Midleton has a long history of flooding with recent notable flood events occurring in 2000, 2004, 2012, 2013, three times in 2014 (in January, February, and October), 2015, 2016 and 2018. The December 2015 flood event, which had a significant impact on the town, together with the Lee Catchment Flood Risk Assessment and Management (CFRAM) Study, triggered Cork County Council's (CCC) request to assess the flood risk within the Owennacurra River Catchment and develop a flood scheme to manage it. In preparing the flood relief scheme for Midleton, CCC recognised four sources of flood risk in the Owennacurra and Dungourney River catchments including fluvial, tidal, pluvial and groundwater flooding.

16.3.2. Potential Sources of Offsite Hazards / Major Accidents

The following lists the EPA Industrial Licenced Facilities within the Midleton-Carrigtwohill agglomeration:

- P0442 – Industrial Emissions Licence (IEL), Upper Tier Seveso site located *ca*. 1.75km northeast of the Midleton WwTP;

[28] Arup Ltd. 2022. Midleton Flood Relief Scheme: Hydrology Report. Reference: REP/1. Issue 2. Cork County Council

- P0571 – IEL, Integrated Pollution Prevention Control (IPC), Lower Tier Seveso site, located *ca*. 440m northwest of the Carrigtwohill WwTP;
- P1046 – (pharmaceuticals) – IEL & IPC, located *ca*. 1.2km northwest of the Carrigtwohill WwTP; and
- P1103 – (dairy processor) – IEL, located *ca*. 10.5km northeast of the Midleton WwTP.

The occurrence of a major emission, fire or explosion at any of these facilities could result in a major accident or disaster, which could be immediate or delayed and could result in off-site impacts.

16.4. Risk Assessment

A risk assessment was carried out using the classification and evaluation criteria described in **Table 16.1** to **Table 16.3. Table 16.4** presents the risk assessment in the absence of mitigation measures (or assuming complete failure of measures). Low to very low risk would determine that the risk levels are acceptable, however, potential moderate and high-risk scenarios require further mitigation, apart from the inbuilt design that is related to the operational discharges.

Table 16.4 Risk Levels Without Mitigation

Event	Environmental Consequence	Likelihood	Resultant Risk Level
Clogged inlet screens resulting in direct untreated effluent discharge to the waterbody	Minor, localised effects of short-term duration, limited contamination	Likely	Moderate
Plant failure resulting in direct untreated effluent discharge to sensitive waters	Minor, localised effects of short-term duration, limited contamination	Occasionally	Low
Power failure leading to WwTP shutdown resulting in direct untreated effluent discharge to sensitive waters	Minor, localised effects of short-term duration, limited contamination	Occasionally	Low
Fire or explosion on site	Major, potentially serious resulting in high contamination and of potentially extended duration	Unlikely	Moderate
Flooding of WwTP due to severe weather conditions resulting in uncontrolled releases of	Minor, localised effects of short-term duration, limited contamination	Unlikely	Low

Event	Environmental Consequence	Likelihood	Resultant Risk Level
untreated wastewater into receiving waters			
Damage to the WwTPs / Pumping Stations due to a swallow hole resulting in direct untreated effluent discharge to receiving waters with potential contamination of groundwater as well	Catastrophic, severe impacts to land, biodiversity, ecosystem services, water resources, human health	Extremely unlikely	Low
Incident at nearby industrial / Seveso site resulting in an off-site impact, which could include fire/explosion, or equipment/infrastructure failure if high concentrations of contaminants enter the system	Major, potentially serious resulting in high contamination and of potentially extended duration	Unlikely	Moderate

Moderate risks were identified with respect to potential clogging of inlet screens without the design mechanisms in place (which would alert the system and divert the discharge to the holding tank until the screens were unclogged). Industrial accidents can result in spills or overflows that can be discharged to the sewer system, which could cause significant damage including (i) by creating an explosive or flammable situation, or (ii) killing the biological process. Potential damage to the biological treatment process as a result of an event whereby highly concentrated toxic influent is sent to the WwTP was also identified as a moderate risk given that it is unlikely, however, with potentially serious consequences. A fire or explosion is unlikely, however, effects could result in damage to the WwTP or Pumping Stations, as well as potential contamination of the receiving waterbodies unless runoff is contained. Potential flooding will result in a limited consequence as dilution of any untreated discharge will limit effect from contamination, with effects of a short duration.

16.5. Risk Assessment with Mitigation

As mentioned, where moderate or high risks are identified (as relevant), mitigation measures must be in place to minimise risk. The risk assessment identified three potential moderate risk scenarios.

Table 16.5 presents the risk assessment, re-assessing the moderate risks identified in **Table 16.4** with mitigation measures in place. It should be noted that all mitigation measures will be implemented.

Table 16.5 Risk Levels with Mitigation

Event	Mitigation measures	Environmental Consequence	Likelihood	Resultant Risk Level
Clogged inlet screens resulting in direct untreated effluent discharge to designated sensitive water body	Self-cleaning screens; Stormwater Holding Tank (Storm Tank relevant to Carrigtwohill only) in case of clogging until maintenance can be carried out to unclog the screens.	Minor, localised effects of short-term duration, limited contamination	Unlikely	Low
Incident at nearby industrial / Seveso site resulting in an off-site impact, which could include fire/explosion, or equipment/infrastructure or system failure if high concentrations of contaminants enter the system	Dilution to a treatable concentration; Emergency Plan at industrial site, which details the systems that exist to deal with emergencies and the expected response.	Moderate, with potentially medium-term impacts and widespread effects	Extremely unlikely	Low
Fire or explosion on site	Emergency Response Plans	Moderate, with potentially medium-term impacts and widespread effects	Unlikely	Low

16.6. Residual Risk

As provided in **Table 16.5** above, the resultant risk level for the potential events, relating to operational discharges, are considered to be low with all mitigation and design measures in place.

However, UÉ will regularly assess the risk of major accidents and/or disasters occurring.

16.7. Monitoring

The Environmental Incident Response Plans for the amalgamated agglomeration are live documents that undergo periodic monitoring, review, and update. The risk management and assessment of major accidents and/or disasters will be continued on an ongoing basis.

17. INTERACTIONS OF THE FOREGOING

This Chapter of the EIAR has been prepared by Nicholas O'Dwyer Ltd. and considers the potential for interactions and inter-relationships between the factors of the environment, that have been examined individually throughout this EIAR, which could result in an impact being either positive or negative, as well as having varying levels of significance.

The preceding chapters of this EIAR assessed the likely significant effects that may occur as a result of the Midleton and Carrigtwohill agglomeration operational discharges in terms of Biodiversity, Water, Population and Human Health, Material Assets, Traffic and Transport, Air Quality and Climate, Noise and Vibration, Odour, Archaeology, Architectural and Cultural Heritage, Land, Soils and Geology, and Landscape and Visual.

The Chapter is directed by Article 3 section 1 (e) of Directive 2014/52/EU on the Assessment of the Effects of Certain Public and Private Projects on the Environment. The EPA Guidelines on Information to be contained in Environmental Impact Assessment Reports (2022) and Advice Notes for Preparing Environmental Impact Statements (Draft, September 2015) were also considered.

Article 3 of the Directive states:

> *1. The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:*
>
> *(a) population and human health;*
>
> *(b) biodiversity, with particular attention to species and habitats protected under Directive*
>
> *92/43/EEC and Directive 2009/147/EC;*
>
> *(c) land, soil, water, air and climate;*
>
> *(d) material assets, cultural heritage and the landscape;*
>
> ***(e) the interaction between the factors referred to in points (a) to (d)***

For the assessment of interacting effects, a matrix has been provided in **Table 17.1** identifying, through professional judgment, the specific topics within the EIAR where the effects potentially interact/inter-relate with each other.

Table 17.2 provides the likely interactive effects for the Midleton and Carrigtwohill agglomeration operational discharges based on the individual assessments as contained in **Chapters 5 – 15**, and best scientific knowledge.

This Chapter of the EIAR addresses the interactions between the various environmental aspects of the Midleton and Carrigtwohill operational discharges (*i.e.*, SW001, SW003 – SW022) covered in **Chapters 5 - 15**.

Table 17.1 Interactive Effects Summary Matrix

Interaction With	Biodiversity	Water	Population & Human Health	Material Assets	Traffic & Transport	Air Quality & Climate	Noise & Vibration	Odour	Archaeology, Architecture & Cultural Heritage	Land, Soils & Geology	Landscape & Visual
Biodiversity		✓	✓								
Water			✓								
Population & Human Health											
Material Assets											
Traffic & Transport											
Air Quality & Climate											
Noise & Vibration											
Odour											
Archaeology, Architecture & Cultural Heritage											
Land, Soils & Geology											
Landscape & Visual											
√ =Interactive Effect											

Biodiversity, Water and Population & Human Health are the factors identified where interaction of effects may occur as a result of the operational discharges.

Table 17.2 Interactive Effects of The Operational Discharges

Operational Discharge	Environmental Factors	Summary of Effect	Further Information
SW009 (Carrigtwohill) SW001 (Midleton)	Water Biodiversity Population & Human Health	Water Quality Modelling carried out in 2023 predicts that the effluent discharge standards for both SW009 and SW001 are appropriate in terms of ensuring that the Carrigtwohill and Midleton WwTPs do not impinge on the achievement of Good WFD Status of Lough Mahon (Harper's Island) or the North Channel Great Island by 2027 in accordance the European Communities Environmental Objectives (Surface Water) Regulations, 2009 (as amended), and thereby will ultimately ensure that there is no environmental risk posed to the receiving water environment, including the water dependent sensitive species and habitats (*e.g.,* otter, wintering birds, Salmon, trout, lamprey, mudflats). In relation to designated shellfish waters (Great Island North Channel and Rostellan designated shellfish waters), the Water Quality Modelling concludes that bacteria concentrations in Cork Harbour are generally low and predicted impacts from Uisce Éireann assets do not significantly impact water quality in these designated shellfish waters. Therefore, the overall risk of proposed primary and secondary discharges to designated shellfish waters is classified as Low Risk. The Project will have an overall positive and long-term impact on population and human health. The amalgamation of the Midleton and Carrigtwohill agglomeration allows for future development to take place and depending on the nature of the development this could have a positive effect on population and human health in the form of socio-economic improvements, community amenities or residential developments to supply housing.	Refer to **Chapters 5, 6** and **7.**

Operational Discharge	Environmental Factors	Summary of Effect	Further Information
Overflows meeting DoEHLG SWO criteria. SW003 SW004 SW005 SW007 SW008 SW012 SW013 SW014 SW015 SW016 SW017 SW018 SW019 SW021 SW022	Water Biodiversity Population & Human Health	The compliant SWOs and their operational design will not compromise the achievement of the objectives and EQSs established for any water dependant species and natural habitats and designations (*e.g.*, European sites) within, and in the wider environs, of the amalgamated agglomeration. The risks of sewer or outfall failure associated with extreme events resulting in the activation of EOs, while a theoretical risk, 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. Appropriate design measures and mitigation to prevent EOs that can be applied have been incorporated in the design and operation of the agglomeration. These overflows, on the rare event should they occur, are temporary (short-lived) and will have no long-term negative impact on the Water environment, Biodiversity or Population & Human Health.	Refer to **Chapters 5, 6** and **7.**
Overflows not meeting DoEHLG SWO criteria. SWO10 SWO11 SWO20	Water Biodiversity Population & Human Health	There are 3 no. overflows entering the Owennacurra estuary that are not meeting DoEHLG SWO criteria (*i.e.,* SW010, SW011 and SW020) and are having a localised observable impact on water quality in the Owennacurra estuary. These overflows are considered a significant pressure on this waterbody and therefore are considered an ongoing risk to water dependent Key Environmental Receptors (*e.g.*, waterbird species, including piscivorous birds such as the breeding tern, otter, salmonids, lamprey, trout). To address this existing risk these overflows will be upgraded as part of the Midleton Wastewater Network Upgrade Project to ensure they meet the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm*	Refer to **Chapters 5, 6** and **7.**

Operational Discharge	Environmental Factors	Summary of Effect	Further Information
		Water Overflows', 1995, with the upgrades expected to be complete by Q4 2029. The resultant improvement in water quality resulting from the upgrading of SW010, SW011 and SW020 will have a slight positive long-term impact on the Owennacurra estuary Key Environmental Receptors *i.e.,* the river habitat, aquatic sensitive water dependent fauna, otter, and birds that rely on the estuary. Based on the rehabilitation and upgrading of the 3 no. non-compliant SWOs by Q4 2029, and the conclusion of Chapter 6 Water, the impact on human health and water quality as a result of operational discharges will be not significant, positive and long term. The impact of all SWOs meeting the DoEHLG criteria on human health will be slight and positive.	

18. SCHEDULE OF MITIGATION MEASURES

Following an examination, analysis, and evaluation of the direct and indirect effects of the Midleton and Carrigtwohill operational discharges (*i.e.*, SW001 and SW003 – SW022) on the receiving environment in the foregoing Chapters, and taking on board the design and prevention measures in place (see **Chapter 3 Section 3.4**), along with the completion of the Midleton Wastewater Network Upgrade Project by Q4 2029, it has been determined that the operational discharges would have no likely significant adverse effects on any environmental factors.

In order to ensure the satisfactory operation of the Midleton and Carrigtwohill WwTWs in line with the current WWDL D0056-01 and D0044-01, and future reviewed licence requirements, the authors of this EIAR have put forward the following recommendations to be implemented:

- Ensure that the capacity of Midleton and Carrigtwohill WwTP's are not exceeded.
- Ensure primary and secondary discharges continue to operate in compliance with the ELVs.
- Continue monitoring the effluent and receiving waters, on a consistent and regular basis.
- All workers attending the Midleton and Carrigtwohill WwTPs are network Pumping Stations will comply in full with the relevant HSE guidelines and any Government protocols that may be in place at that point in time in relation to COVID-19.

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20. ABBREVIATIONS & GLOSSARY OF TERMS

AA	Appropriate Assessment
ABP	An Bord Pleanála
ACA	Architectural Conservation Area
AER	Annual Environmental Report
AFA	Area for Action
AMIEnvSc	Associate Member of the Institution of Environmental Science
BAP	Biodiversity Action Plan
BOD	Biochemical Oxygen Demand
BW	Bathing Waters
Ca.	Circa
CA	Competent Authority
CAP	Climate Action Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
CJEU	Court of Justice of the European Union
CO_2	Carbon Dioxide
CNG	Compressed Natural Gas
COD	Chemical Oxygen Demand
ComReg	Commission for Communications Regulation
COP	Conference of the Parties to the United Nations Framework Convention on Climate Change
CSO	Central Statistics Office
DANI	Department of Agriculture for Northern Ireland
DHPLG	Department of Housing, Planning and Local Government
DIN	Dissolved Inorganic Nitrogen
DO	Dissolved Oxygen
DoEHLG	Department of Environment, Housing and Local Government
DWF	Dry Weather Flow
EcIA	Ecological Impact Assessment
EC	European Commission
ECJ	European Court of Justice
ED	Electoral Division
EEC	European Economic Community
EIA	Environmental Impact Assessment

EIAR	Environmental Impact Assessment Report
ELV	Emission Limit Value
EO	Emergency Overflow
EPA	Environmental Protection Agency
ETS	Emissions Trading Scheme
EQS	Environmental Quality Standards
ESB	Electricity Supply Board
EU	European Union
FWPM/FWM	Freshwater Pearl Mussel
GHG	Greenhouse Gas
GIS	Geographic Information System
GLVIA	Guidelines for Landscape and Visual Impact Assessment
GSI	Geological Survey of Ireland
GWB	Ground Waterbody
Ha	Hectare
HSA	Health Service Authority
HSE	Health Service Executive
IAH	International Association of Hydrogeologists
IAH	Irish Group of the Association of Hydrogeologists
IAI	Institute of Archaeologists of Ireland
IDL	Irish Distillers Limited
IEMA	Institute of Environmental Management and Assessment
IEL	Industrial Emission Licence
IFI	Inland Fisheries Ireland
IGI	Institute of Geologists Ireland
IPC	Integrated Pollution Control
KER	Key Ecological Receptors
Km	Kilometre
LC50	Lethal concentration 50
LCA	Landscape Character Area
LEA	Local Electoral Area
LIHAF	Local Infrastructure Housing Activation Fund
LVIA	Landscape and Visual Impact Assessment
m	Metre
m^3	metres cubed

m^3/s	metres cubed per second
MEPA	Malta Environment and Planning Authority
MI	Marine Institute
MIAQM	Member Institute of Air Quality Management
MIEI	Member of Engineers Ireland
MIEnvSc	Member of Institution of Environmental Science
MRP	Molybdate Reactive Phosphorus
Mt CO_2eq	million tonnes carbon dioxide equivalent
N	Nitrogen
NAF	National Adaptation Framework
NBAP	National Biodiversity Action Plan
NBDC	National Biodiversity Data Centre
NDP	National Development Plan
NGR	National Grid Reference
NIAH	National Inventory of Architectural Heritage
NIS	Natura Impact Statement
NO_2	Nitrogen Dioxide
NOD	Nicholas O'Dwyer Limited
NPF	National Planning Framework
NPWS	National Parks and Wildlife Service
NRA	National Roads Authority
OHSAS	Occupational Health and Safety Assessment Series
OPW	Office of Public Works
OU_e/m^3	Odour Units present in one meter cubed
OSI	Ordinance Survey Ireland
P	Phosphorus
PAL	Priority Action List
p.e.	Population Equivalent
$PM_{2.5}$	Particulate Matter (<2.5 microns in diameter)
PM_{10}	Particulate Matter (<10 microns in diameter)
pNHA	Proposed Natural Heritage Area
PWS	Public Water Supply
RAS	Return Activated Sludge
RBMP	River Basin Management Plan
RMP	River Management Plan

RMP	Record of Monuments and Places
RPS	Record of Protected Structures
RSES	Regional Spatial and Economic Strategy
SWRBD	South Western River Basin District
SAC	Special Area of Conservation
SCADA	Supervisory Control And Data Acquisition
SEA	Strategic Environmental Assessment
SFW	Shellfish Waters
S.I	Statutory Instrument
SPA	Special Protection Area
SPFA	Sea Fisheries Protection Authority
SS	Suspended Solids
SWO	Storm Water Overflow
TII	Transport Infrastructure Ireland
TSAS	Trophic Status Assessment Score
UÉ	Uisce Éireann
UEA	Urban Expansion Area
UNFCCC	United Nations Framework Convention on Climate Change
UV	Ultraviolet
UWWT	Urban Wastewater Treatment
UWWTD	Urban Wastewater Treatment Directive
WAS	Waste Activated Sludge
WFD	Water Framework Directive
WHO	World Health Organization
WSSP	Water Services Strategic Plan
WTP	Water Treatment Plant
WWD	Waste Water Directive
WWDA	Waste Water Discharge Authorisation
WWDL	Waste Water Discharge Licence
WwTP	Waste Water Treatment Plant
WwTW	Waste Water Treatment Works
ZoI	Zone of Influence

APPENDIX 1

CRITERIA FOR RATING SITE ATTRIBUTES – ESTIMATION OF IMPORTANCE OF HYDROLOGY ATTRIBUTES

TRANSPORT INFRASTRUCTURE IRELAND (TII, 2009)

EIAR Guideline tables for Hydrology

Table 1: Criteria for rating impact magnitude at EIS stage – Estimation of magnitude of impact on hydrology attributes (NRA, 2009)

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute and/ or quality and integrity of attribute	Loss or extensive change to a water body or water dependent habitat
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Calculated risk of serious pollution incident >1% annually2
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Increase in predicted peak flood level >10mm1
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Negligible change in predicted peak flood level1
Minor Beneficial	Results in minor improvement of attribute quality	Calculated reduction in pollution risk of 50% or more where existing risk is <1% annually2
Moderate Beneficial	Results in moderate improvement of attribute quality	Calculated reduction in pollution risk of 50% or more where existing risk is >1% annually2
Major Beneficial	Results in major improvement of attribute quality	Reduction in predicted peak flood level >100mm1

Additional examples are provided in the NRA Guidance Document
1 Refer to Annex 1, Methods E and F, Annex 1 of HA216/06
1 Refer to Appendix B3 / Annex 1, Method D, Annex 1 of HA216/06

Source: 'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes' by the National Roads Authority (NRA, 2009)

Table 2 Criteria for rating Site Attributes - Estimation of Importance of Hydrology Attributes (NRA)

Importance	Criteria	Typical Examples
Extremely High	Attribute has a high quality or value on an international scale	River, wetland or surface water body ecosystem protected by EU legislation *e.g. 'European sites'* designated under the Habitats Regulations or '*Salmonid waters'* designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988.
Very High	Attribute has a high quality or value on a regional or national scale	River, wetland or surface water body ecosystem protected by national legislation – NHA status Regionally important potable water source supplying >2500 homes Quality Class A (Biotic Index Q4, Q5) Flood plain protecting more than 50 residential or commercial properties from flooding Nationally important amenity site for wide range of leisure activities
High	Attribute has a high quality or value on a local scale	Salmon fishery Locally important potable water source supplying >1000 homes Quality Class B (Biotic Index Q3-4) Flood plain protecting between 5 and 50 residential or commercial properties from flooding Locally important amenity site for wide range of leisure activities
Medium	Attribute has a medium quality or value on a local scale	Coarse fishery Local potable water source supplying >50 homes Quality Class C (Biotic Index Q3, Q2- 3) Flood plain protecting between 1 and 5 residential or commercial properties from flooding
Low	Attribute has a low quality or value on a local scale	Locally important amenity site for small range of leisure activities Local potable water source supplying <50 homes Quality Class D (Biotic Index Q2, Q1) Flood plain protecting 1 residential or commercial property from flooding Amenity site used by small numbers of local people

APPENDIX 2

WATER QUALITY MODELLING REPORT, JULY 2023

APPENDIX 3

WATER FRAMEWORK DIRECTIVE SCREENING ASSESSMENT, JULY 2023

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WATER FRAMEWORK DIRECTIVE (WFD) SCREENING ASSESSMENT FOR MIDLETON WASTEWATER DISCHARGE LICENCE REVIEW

Report Prepared For
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1.0 INTRODUCTION

AWN Consulting Limited (AWN) has prepared this Water Framework Directive (WFD) Assessment as part of the Environmental Impact Assessment Report (EIAR) for the proposed Midleton and Carrigtwohill agglomeration operational discharges. A detailed description of the operational discharges is provided in **Chapter 3** of the EIAR.

This WFD Screening Assessment has been prepared in response to the requirements of the WFD. This WFD Screening Assessment is contained as an Appendix to the EIAR and specifically to supplement the Land, Soils, Geology & Hydrogeology Chapter and Water Chapter of the EIAR and should, therefore, be read together with these chapters.

This report was prepared by Marcelo Allende (BSc, BEng), and Teri Hayes (BSc MSc PGeol EurGeol). Marcelo is a Water Resources Engineer with over 15 years of experience in environmental consultancy and water resources studies. Marcelo is an Environmental Consultant with AWN Consulting, a member of the International Association of Hydrogeologists (Irish Group) and a member of Engineers Ireland (MIEI). Teri is a hydrogeologist with over 25 years of experience in water resource management and impact assessment. She has a Masters in Hydrogeology and is a former President of the Irish Group of the Association of Hydrogeologists (IAH) and has provided advisory services on water related environmental and planning issues to both public and private sector bodies. She is qualified as a competent person as recognised by the EPA in relation to contaminated land assessment (IGI Register of competent persons www.igi.ie). Her specialist area of expertise is water resource management eco-hydrogeology, hydrological assessment, and environmental impact assessment.

1.1 OPERATIONAL DISCHARGES

The subject matter of this WFD screening assessment comprises the operational discharges from the Midleton and Carrigtwohill amalgamated agglomerations.

Primary (SW009)

The proposed primary discharge (SW009) from the amalgamated Midleton-Carrigtwohill agglomeration will be the current primary discharge from the Carrigtwohill WwTP as per D0044-01 *i.e.*, discharge to Lough Mahon (Harper's Island) at NGR 179911E, 72583N.

The proposed ELVs for this primary discharge are tabled below.

Table 1.1. Proposed ELVs for the primary discharge at Carrigtwohill WwTP (SW009)

Parameter	Emission Limit Value
BOD	25 mg/l
COD	125 mg/l
Suspended Solids	35 mg/l
Total Phosphorous (as P)	1 mg/l
DIN	25 mg/l
Ortho-P (as P)	0.5 mg/l
pH	6 - 9

Secondary Discharge (SW001)

The proposed secondary discharge (SW001) will be from the current primary discharge from the Midleton WwTP as per D0056-01 *i.e.*, discharge to North Channel Great Island at Rathcoursey Point at NGR 186177E, 69506N.

The proposed ELVs for this secondary discharge are tabled below.

Table 1.2. Proposed ELVs for the Midleton Combined Discharge Point (SW001)

Parameter	Emission Limit Value
BOD	25 mg/l
COD	125 mg/l
Suspended Solids	35 mg/l
Total Nitrogen (as N)	15 mg/l
Ortho-P (as P)	2 mg/l
E.Coli	GM ≤250 ec/100mls & 95%ile ≤ 1000 ec/100mls
pH	6 - 9

As the proposed secondary discharge is a combined outfall and discharges treated effluent from Midleton WwTP and Industries P0442-02 and P1103-01, the existing ELVs in **Table 1.3** 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 1.3 Proposed UWWTD ELVs for Midleton WwTP (SW100)

Parameter	Emission Limit Value
BOD	25 mg/l
COD	125 mg/l
Suspended Solids	35 mg/l
Total Nitrogen (as N)	15 mg/l

Overflows

There are 19 no. overflows within the agglomeration. 6 no. associated with the Carrigtwohill Functional area, and 13 no. associated with the Midleton Functional area.

Carrigtwohill Functional area

There are 6 no. overflows within the Carrigtwohill Functional Area. 3 no. of these are associated with Pumping Stations and act as Dual Function Overflows. There are 3 no. SWOs, 2 no. associated with the network and 1 no. located at the Carrigtwohill WwTP.

2 no. of overflows (*i.e.,* SW003 and SW004) are currently licenced as part of the D0044-01 licence, these 2 no. of overflows and 4 no. of additional overflows (SW005, SW006, SW007, and SW008) will be regularised as part of the D0056-01 WWDL review.

All 6 no. SWOs in the Carrigtwohill agglomeration meet the definition of 'Storm Water Overflow' as per Regulation 3 of the Waste Water Discharge (Authorisation) Regulations, 2007-2020 and meet the criteria as set out in the DoEHLG *'Procedures and Criteria in Relation to Storm Water Overflows'*, 1995'.

Midleton Functional Area

There are 13 no. overflows within the Midleton Functional area. 11 no. of these are associated with Pumping Stations, of which 8 no. act as Dual Function Overflows. The remaining 3 no. overflows from Pumping Stations act as EOs (*i.e.,* Bailick No. 3 Pumping Station, Ballinacurra No.1 Pumping Station, and Oakwood Pumping Station). There are 2 no. SWOs associated with the network at Riversfield Estate and Drury's Avenue.

4 no. of overflows (*i.e.,* SW03MIDL, SW04MIDL, SW05MIDL, and SW07MIDL) in the Midleton functional area are currently licenced under D0056-01. An additional 9

overflows (SW013, SW015, SW016, SW017, SW018, SW019, SW020, SW021 and SW022) will be regularised as part of the D0056-01 WWDL review.

3 no. overflows in the Midelton Functional Area (*i.e.*, SW010 - Bailick No. 1 Pumping Station, SW011 - Bailick No. 2 Pumping Station, and SW020 - Riversfield Estate Network SWO) do not meet the DoEHLG criteria. These be upgraded as part of the Midleton Waste Water Network Upgrade Project due for completion by Q4 2029, thereby removing them as a significant pressure on this waterbody and addressing their risk to the water environment.

Refer to **Figure 1.1** and **Figure 1.2** below for the location of the operational discharges and the receiving waters and **Table 1.4** for the operational discharges details.

Refer also to the **EIAR, Chapter 3, Section 3.3** for further details.

Table 1.4 Operational Discharges Details.

Overflow	Asset	Type	Discharge Location NGR	Receiving Waters
SW009*	Primary Discharge from Carrigtwohill	Primary	179911, 72583	Lough Mahon (Harper's Island)
SW003*	Barryscourt Pumping Station	SWO/EO	181276, 72256	Tibbotstown_010
SW004*	IDA Pumping Station No.1	SWO/EO	181133, 72310	Tibbotstown_010
SW005	Located at Carrigtwohill WwTP	SWO	179911, 72605	Lough Mahon (Harper's Island)
SW006	Church Lane (Network)	SWO	181544, 73040	Tibbotstown_010
SW007	Elm Road (Network)	SWO	181544, 73040	Tibbotstown_010
SW008	Old Cobh Road PS	SWO/EO	180594, 72283	Lough Mahon (Harper's Island)
SW001**	Secondary Discharge	Secondary	186177, 69506	North Channel Great Island at Rathcoursey point
SW010**	Bailick No. 1 Pumping Station	SWO/EO	187975, 73109	Owennacurra Estuary
SW011**	Bailick No. 2 Pumping Station	SWO/EO	188047, 72518	Owennacurra Estuary
SW012**	Ballinacurra No. 2 Pumping Station	SWO/EO	188518, 71783	Owennacurra Estuary
SW013	Bailick No. 3 Pumping Station	EO	188272, 72060	Owennacurra Estuary
SW014**	Dwyers Road Pumping Station	SWO/EO	187475, 72902	Owennacurra_040
SW015	Oakwood Pumping Station	EO	188573, 73373	Dungourney_020
SW016	Roxboro Mews Pumping Station	SWO/EO	188346, 73332	Dungourney_020
SW017	The Rock Pumping Station	SWO/EO	188265, 73232	Dungourney_020
SW018	Roxboro Housing Estate Pumping Station	SWO/EO	188332, 73316	Dungourney_020

Overflow	Asset	Type	Discharge Location NGR	Receiving Waters
SW019	Old Youghal Road Pumping Station	SWO/EO	188703, 73401	Dungourney_020
SW020	Riversfield Estate SWO (Network)	SWO	187687, 73025	Owennacurra Estuary
SW021	Drury's Avenue SWO (Network)	SWO	188346, 73332	Dungourney_020
SW022	Ballinacurra No.1 Pumping Station	EO	188366, 71791	Owennacurra Estuary

**Discharges SW001 = SW009, SW003 & SW004 are currently licensed under D0044-01*

***Discharges currently licensed under D0056-01. SW001 = SW01MIDL, SW010 = SW03MIDL; SW011 = SW04MIDL; SW012 = SW05MIDL & SW014 = SW07MIDL.*

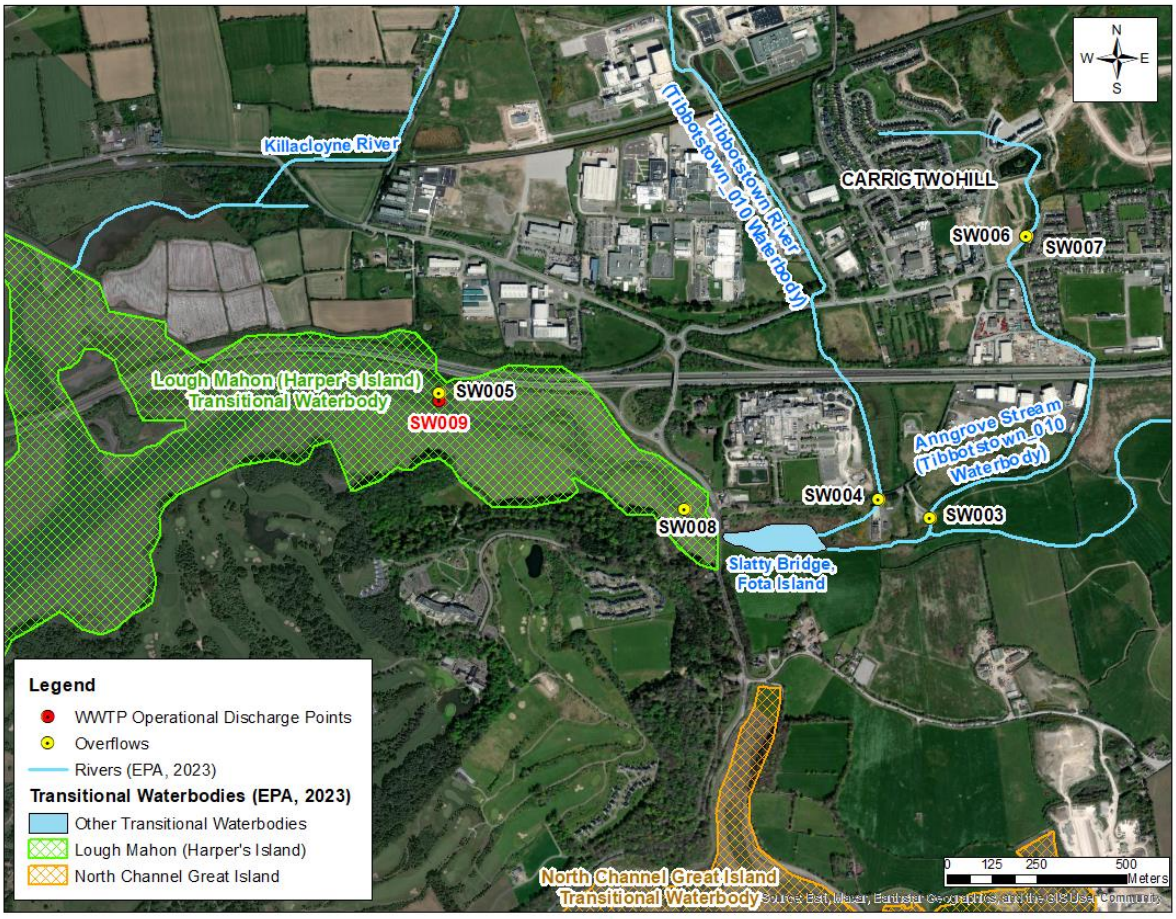


Figure 1.1 Carrigtwohill Operational Discharges & Hydrological Environment

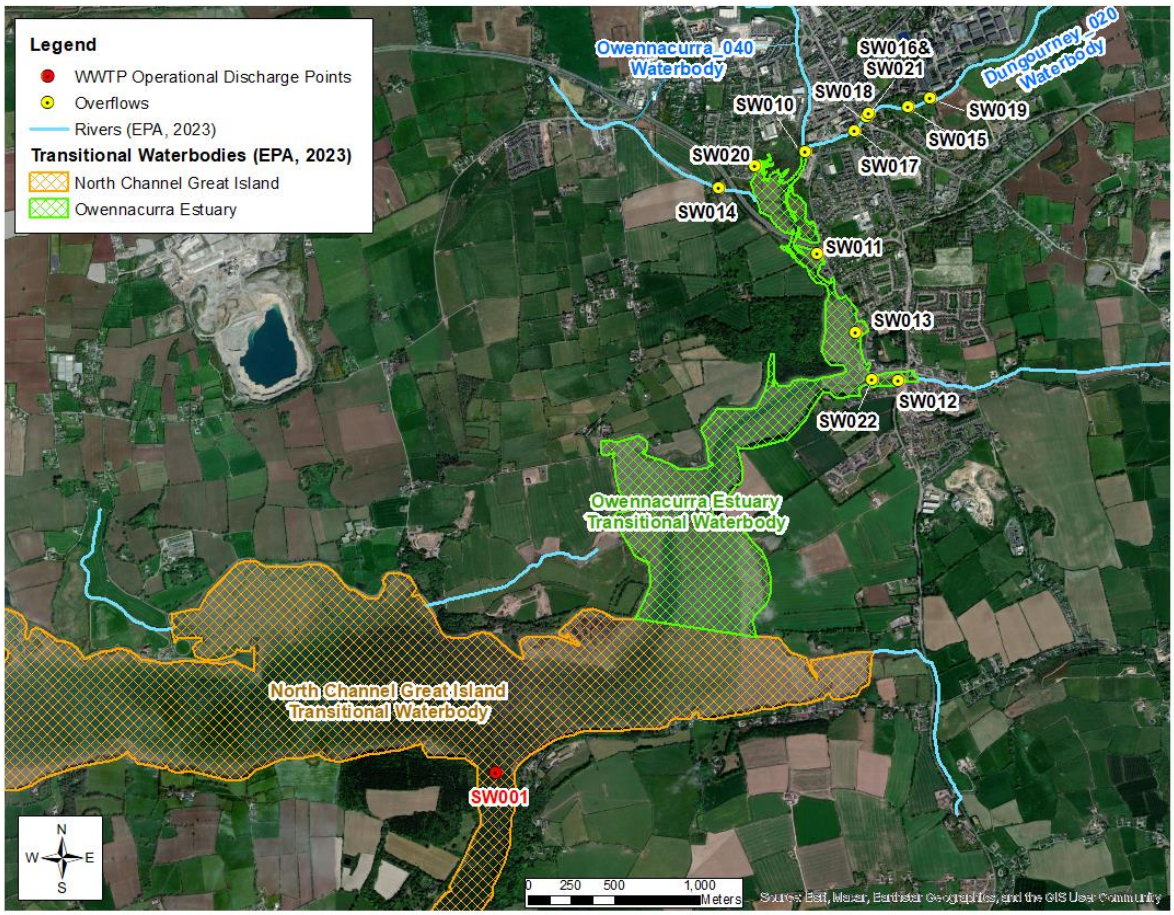


Figure 1.2 Midleton Operational Discharges & Hydrological Environment

Measures to Prevent Unintended Discharges

The following are key measures to prevent unintended discharges to the 6 no. receiving water environments:

- 13 of the 16 no. SWOs meet the definition of '*Storm Water Overflow'* as per Regulation 3 of the Waste Water Discharge (Authorisation) Regulations, 2007, as amended and the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995.
- The remaining 3 no. of SWO's (SW010, SW011, and SW020) will be upgraded as part of the Midleton Waste Water Network Upgrade Project to ensure they meet DoEHLG criteria, and this is expected to be completed by Q4 2029.
- Provision of 1,702m^3 of storm water storage at Carrigtwohill WwTP. Flows in excess of the storm water holding tank capacity will overflow to Lough Mahon (Harper's Island) *via* SW005 which meets DoEHLG criteria.
- Alarms for both Carrigtwohill and Midleton WwTPs are linked to SCADA with alarms sent to operators in the result of an emergency event.
- Midleton and Carrigtwohill are a manned site during the hours of 8:00 and 16:30 Monday to Thursday and 08:00 to 16:00 on Fridays with 24 hours call out response where the amount of time spent on site will vary depending on various factors *e.g.*, weather or breakdowns in plant or maintenance works required such as cleaning of the intake screens *etc.*
- Midleton and Carrigtwohill WwTP are equipped with backup permanent generators to provide for the continued operation of the pumping equipment in the event of an

interruption in the power supply. This will enable an automatic switch over in such events.

- Provision of standby generators at 4 no. Pumping Stations to provide continued operation of the Pumping Station in the event of an interruption in the power supply (Barryscourt, IDA No.1, Old Cobh Road, and Bailick No.1).
- 2 no. of Pumping Stations include a connection point for a temporary mobile generator. This set-up is in place at Bailick No.2 and Bailick No.3.
- In the case of minor or major outages affecting smaller Pumping Stations, depending on the duration of the outage, tankering is an option and is determined on a case-by-case basis. In most cases any power cuts to date have been relatively short in duration and power has been restored quickly. Therefore, any potential discharges will be short in duration. This procedure is in place at 8 no. Pumping Stations where standby generators or a connection point to a temporary mobile generator are not in place (Ballinacurra No.2, Dwyers Road, Oakwood, Roxboro Mews, The Rock, Roxboro Housing Estate, Old Youghal Road and Ballinacurra No.1).
- Midleton and Carrigtwohill WwTP are equipped with standby pumps in place, including RAS/WAS pumps, and storm tank pumps at Carrigtwohill WwTP. The provision of standby pumps is also available at a number of Pumping Stations with auto-change over of pumps where applicable.
- Where available, all flows will be monitored continuously and recorded at the electromagnetic flowmeters at the Midleton and Carrigtwohill WwTPs and several Pumping Stations *via* flowmeter telemetry.
- An Emergency Response Plan and Procedures, Operation and Maintenance Procedures for all equipment is in place and will be implemented by the appointed plant operator for both WwTPs, as required.
- All operatives are fully familiar with all operational plans and procedures pertaining to the plant and network *etc.*

1.2 LEGISLATIVE CONTEXT

The Water Framework Directive (WFD) 2000/60/EC aims to protect and enhance the quality of the water environment (both surface water and groundwater) across all European Union member states. It takes a holistic approach to the sustainable management of water by considering the interactions between surface (including transitional and coastal waters, rivers, streams, and lakes), groundwater and water dependent ecosystems.

Under the WFD, '*waterbodies*' are the basic management units and are defined as all or part of a river system or aquifer. These waterbodies form part of a larger river basin district (RBD), for which '*River Basin Management Plans*' (RBMP) are developed by EU member states and environmental objectives are set. RBMPs are produced every six (6) years, in accordance with the river basin management planning cycle.

The WFD requires all EU member states to classify the current condition or '*status or potentia*l' of surface and groundwater bodies and to set a series of objectives for maintaining or improving conditions so that waterbodies maintain or reach '*good status or potential'* during the next river basin management planning cycle. The EPA and other stakeholders such as local authorities are the competent authority for implementing the WFD in Ireland. Article 4(1) of the WFD states "*to ensure non-deterioration and the achievement of good surface water status*":

- Surface waters: Good chemical and Good Ecological status/potentials
- Groundwater: Good Chemical and Good Quantitative status.

As part of its role, these authorities must consider whether proposals for new developments (other than where exemptions apply Article 4.4 - 4.7) have the potential to:

- Cause a deterioration of a waterbody from its current status or potential; and/ or
- Prevent future attainment of good status or potential where not already achieved.

As a result, new developments that have the potential to impact on current or predicted WFD status are required to assess their compliance against the WFD objectives of the potentially affected waterbodies.

The requirement to demonstrate compliance with the Article 4(1) test for *"no deterioration*" by a development was upheld by the High Court in the Sweetman v An Bord Pleanala (2021 IEHC 16) "*Bradan Beo case*". The court relied on the *Weser judgement in terms of interpretation of Article 4. In that case, the CJEU concluded that:*

Article 4 required that Member states were required to refuse authorisation for a project (other than where exemptions apply) where it may cause deterioration of the status of a body or water or where it jepopardises the attainment of good water status.

- *"deterioration of the status" of the relevant waterbody includes a fall by one class of any element of the "quality elements" even if the fall does not result in the a fall of the classification of the waterbody as a whole;*

- *'Any deterioration' in quality elements in the lowest class constitutes deterioration; and*

- *Certainty regarding a project's compliance with the Directive is required at the planning consent stage; hence, where deterioration 'may' be caused, derogations under Article 4.7 of the WFD are required at this stage.*

While deterioration within a status class does not contravene the requirements of the WFD, (except for Drinking Water Directive parameters in drinking water protected areas), the WFD requires that action should be taken to limit within-class deterioration as far as practicable. For groundwater quality, measures must also be taken to reverse any environmentally significant deteriorating trend, whether or not it affects status or potential.

The *no deterioration* requirements are applied independently to each of the elements that come together to form the waterbody classification as required by Annex V of the Water Framework Directive and Article 4 of the Groundwater Daughter Directive.

The WFD requires *'Good Water Status'* for all European waters to be achieved through a system of river basin management planning and extensive monitoring by 2015 or, at the least, by 2027. In 2009 the SWRBD River Management Plan (RMP) 2009-2015 was published. In the SWRBD RMP, the impacts of a range of pressures were assessed including diffuse and point pollution, water abstraction and morphological pressures (e.g., water regulation structures). The purpose of this exercise was to identify waterbodies at risk of failing to meet the objectives of the WFD by 2015 and include a programme of measures to address and alleviate these pressures by 2015. This was the first River Basin Management planning cycle (2010-2015). The second cycle river basin management plan for Ireland is currently in place and will run between 2018-2022 with the previous management districts now merged into one Ireland River Basin District (Ireland RBD).

The primary aim of the plan is that waterbodies identified as being '*At Risk'* of not achieving their environmental objectives need to have targeted measures implemented to achieve objectives under this Plan. 190 Areas for Action were identified across the 5 Local Authority regions. Within these 190 areas, a total of 726 waterbodies were selected for initial actions during this RBMP cycle. There are 832 waterbodies identified as being '*At Risk'* of not achieving their environmental objectives under this Plan that have not been included in the Areas for Action. For most of these waterbodies, targeted actions will be undertaken in the third cycle RBMP from 2022-2027. The draft 3rd cycle RBMP has been reviewed in the context of ensuring mitigation measures comply with current and expected future measures required to be implemented for protection of waterbody status within the context of the operational discharges.

2.0 METHODOLOGY

This WFD Screening Assessment has been prepared in response to the requirements of the Water Framework Directive. This Assessment relies on information provided in the Land, Soils, Geology, and Hydrogeology Chapter (**Chapter 5),** Water Chapter (**Chapter 6**) and **Appendix 2** Water Quality Modelling Report of the EIAR and should, therefore, be read in conjunction with these chapters.

2.1 DETERMINATION OF WATERBODY STATUS

2.1.1 WFD Risk Status

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

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

2.1.2 Background to Surface Waterbody Status

Under the WFD, surface waterbody status is classified on the basis of chemical and ecological status or potential. Ecological status is assigned to surface waterbodies that

are natural and considered by the EPA not to have been significantly modified for anthropogenic purposes (*i.e.*, culverting). Ecological potential is assigned to artificial and man-made waterbodies (such as canals), or natural waterbodies that have undergone significant modification. The term 'ecological potential' is used as it may be impossible to achieve good ecological status because of modification for a specific use, such as navigation or flood protection. The ecological potential represents the degree to which the quality of the waterbody approaches the maximum it could achieve. The worst-case classification is assigned as the overall surface waterbody status, in a 'one-out all-out' system (*i.e.*, by taking the worst case of all the combined risk outcomes). This system is summarised below in **Figure 2.1**.

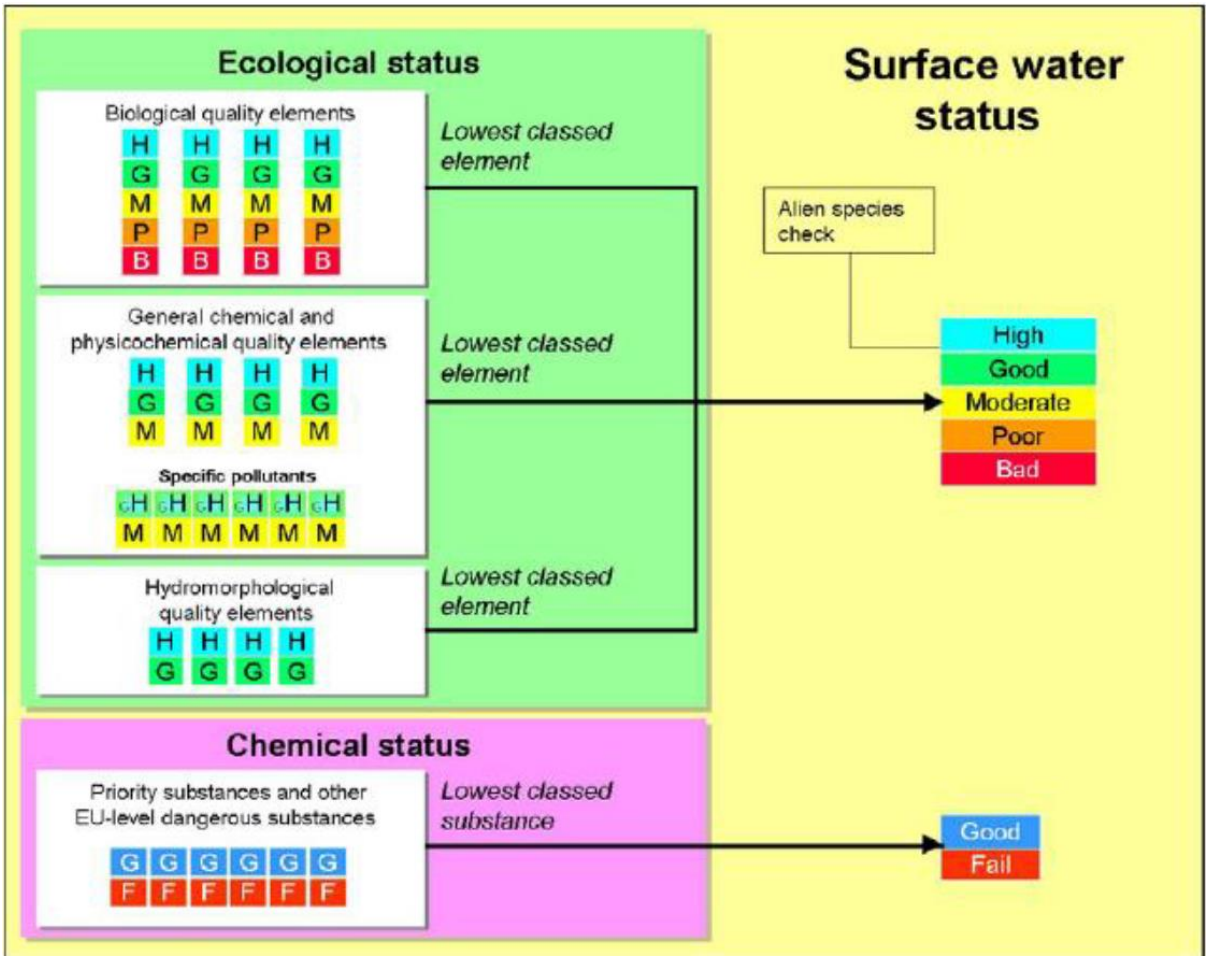


Figure 2.1 WFD classification elements for surface waterbody status (Environmental Agency, 2015)

Chemical Status

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

Ecological Status

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

- **Biological:** This test is designed to assess the status indicated by a biological quality element such as the abundance of fish, invertebrates or algae and by the presence of invasive species. The biological quality elements can influence an overall waterbody status from Bad through to High.
- **Physico-chemical:** This test is designed to assess compliance with environmental standards for supporting physicochemical conditions, such as dissolved oxygen, phosphorus and ammonia. The physicochemical elements can only influence an overall waterbody status from Moderate through to High.
- **Specific pollutants:** This test is designed to assess compliance with environmental standards for concentrations of specific pollutants, such as zinc, cypermethrin or arsenic. As with the physico-chemical test, the specific pollutant assessment can only influence an overall waterbody status from Moderate through to High.
- **Hydromorphology:** For natural, this test is undertaken when the biological and physicochemical tests indicate that a waterbody may be of High status. It specifically assesses elements such as water flow, sediment composition and movement, continuity, and structure of the habitat against reference or 'largely undisturbed' conditions. If the hydromorphological elements do not support High status, then the status of the waterbody is limited to Good overall status. For artificial or highly modified waterbodies, hydromorphological elements are assessed initially to determine which of the biological and physico-chemical elements should be used in the classification of ecological potential. In all cases, assessment of baseline hydromorphological conditions are an important factor in determining possible reasons for classifying biological and physicochemical elements of a waterbody as less than Good, and hence in determining what mitigation measures may be required to address these failing waterbodies.

2.1.3 Background to Groundwater Body Status

Under the WFD, groundwater body status is classified on the basis of quantitative and chemical status. Status is assessed primarily using data collected from the EPA monitoring network; therefore, the scale of assessment means that groundwater status is mainly influenced by larger scale effects such as significant abstraction or widespread/ diffuse pollution. The worst-case classification is assigned as the overall groundwater body status, in a 'one-out all-out' system. This system is summarised in **Figure 2.2** below.

Quantitative Status

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

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

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

Chemical Status

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

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

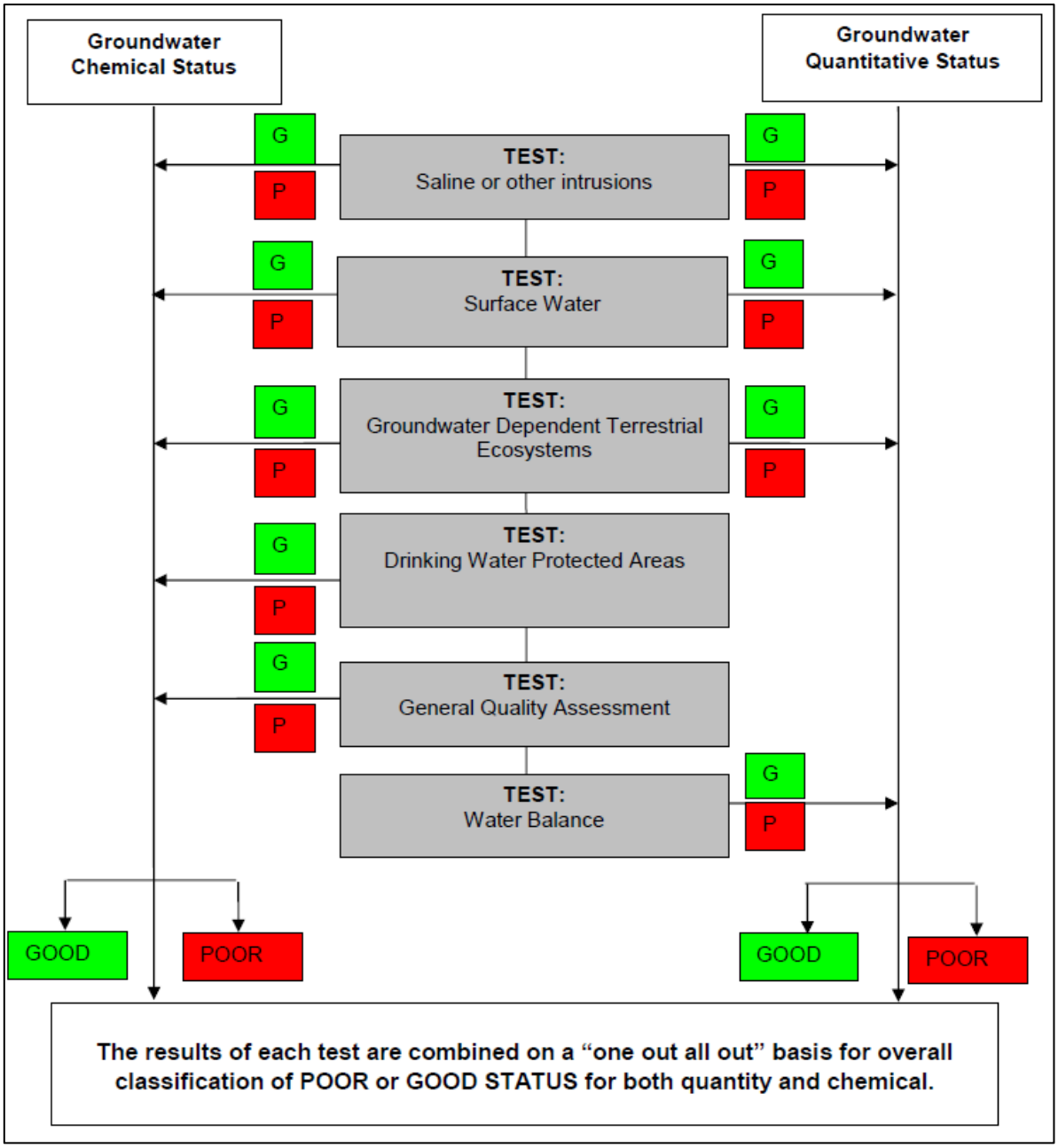


Figure 2.2 WFD classification elements for groundwater body status (Environmental Agency, 2015)

2.2 DETERMINATION OF NO DETERIORATION ASSESSMENT

Proposed developments that have the potential to impact on current or predicted WFD status are required to assess their compliance against the objectives defined for potentially affected waterbodies.

2.3.1 Surface Water No Deterioration Assessment

Table 2.1 below presents the matrix developed by AWN and used to assess the effect of the proposed operational discharges and overflows on surface water status or potential class. It ranges from a major beneficial effect (*i.e.*, a positive change in overall WFD status) through no effect to deterioration in overall status class. The colour coding

used in **Table 2.1** is applied to the spreadsheet assessment in **Appendix A** of this report.

Table 2.1 Surface Water Assessment Matrix

Effect	Description/ Criteria	Outcome
Major Beneficial	Impacts that taken on their own or in combination with others have the potential to lead to the improvement in the ecological status or potential of a WFD quality element for the entire waterbody	Increase in status of one or more WFD element giving rise to a predicted rise in status class for that waterbody.
Minor/ localised beneficial	Impacts when taken on their own or in combination with others have the potential to lead to a minor localised or temporary improvement that does not affect the overall WFD status of the waterbody or any quality elements	Localised improvement, no change in status of WFD element
No Impact	No measurable change to any quality elements.	No change
Localised / temporary adverse effect	Impacts when taken on their own or in combination with others have the potential to lead to a minor localised or temporary deterioration that does not affect the overall WFD status of the waterbody or any quality elements. Consideration will be given to habitat creation measures.	Localised deterioration, no change in status of WFD element when balanced against mitigation measures embedded in the project.
Adverse effect on class of WFD element	Impacts when taken on their own or in combination with others have the potential to lead to the deterioration in the WFD status class of one or more biological quality elements, but not in the overall status of the waterbody. Consideration will be given to habitat creation measures.	Decrease in status of WFD element when balanced against positive measures embedded in the project.
Adverse effect on overall WFD class of waterbody	Impacts when taken on their own or in combination with others have the potential to lead to the deterioration in the ecological status or potential of a WFD quality element, which then lead to a deterioration of status/potential of waterbody.	Decrease in status of overall WFD waterbody status when balanced against positive measures embedded in the project.

2.2.2 Groundwater No Deterioration Assessment

Table 2.2 below presents the matrix used to assess the effect of the proposed development on groundwater status class. It ranges from a beneficial effect but no change in status to deterioration in overall status class. The colour coding used in **Table 2.2** is applied to the final '*No Deterioration Assessment'* spreadsheet in **Appendix A** of this report.

Table 2.2 Groundwater Assessment Matrix

Magnitude of Impact of the proposed development on WFD Element	**Effect on WFD Element within the assessment boundary**	**Effect on Status of WFD element at the Groundwater Body Scale**
Impacts lead to beneficial effect	Combined impacts have the potential to have a beneficial effect on the WFD element.	Improvement but no change to status of WFD element
No measurable change to groundwater levels or quality.	No measurable change to WFD elements.	No change and no deterioration in status of WFD element
Impacts when taken on their own have the potential to lead to a minor localised or temporary effect	Combined impacts have the potential to lead to a minor localised or temporary adverse effect on the WFD element.	Combined impacts have the potential to lead to a minor localised or temporary effect on the WFD element. No change to status of WFD element and no significant deterioration at groundwater body scale.
Impacts when taken on their own have the potential to lead to a widespread or prolonged effect.	Combined impacts have the potential to have an adverse effect on the WFD element.	Combined impacts have the potential to have an adverse effect on the WFD element, resulting in significant deterioration but no change in status class at groundwater body scale.
Impacts when taken on their own have the potential to lead to a significant effect.	Combined impacts in combination with others have the potential to have a significant adverse effect on the WFD element.	Combined impacts in combination with others have the potential to have an adverse effect on the WFD element AND change its status at the groundwater body scale

2.2.2 Assessment against Future Status Objectives

River Basin Management Plans are used to outline waterbody pressures and the actions that are required to address them. The future status objective assessment considers the ecological potential of a surface waterbody and the mitigation measures that defined the ecological potential. Assessments are based on the project (including mitigation measures) risks (during operation) with regard to the objectives for achieving good status as set out in the 2nd Cycle RBMP 2018-2021 and *draft* 3rd Cycle RBMP 2022-2027. The assessment considers whether the proposed development has the

potential to prevent the implementation or impact the effectiveness of the defined measures in these plans.

2.3 SOURCES OF INFORMATION

The following sources of information were used in the preparation of this report:

- Geological Survey of Ireland- online mapping (GSI, 2023).
- GSI - Geological Heritage Sites & Sites of Special Scientific Interest.
- Ordnance Survey of Ireland (OSI).
- Teagasc subsoil database.
- National Parks and Wildlife services (NPWS, 2023).
- Environmental Protection Agency (EPA) – website mapping and database information. Envision water quality monitoring data for watercourses in the area.
- 3rd Cycle Draft Erne Catchment Report (HA 36) (EPA, 2021).
- River Basin Management Plan for Ireland 2018-2021.
- Draft River Basin Management Plan for Ireland 2022-2027.
- Cork County Council Development Plan 2022-2028.
- The Planning System and Flood Risk Management, Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW)).
- Office of Public Works (OPW) flood mapping data (www.floodmaps.ie)
- South Dublin City Council (2005), Greater Dublin Strategic Drainage Study: Technical Documents of Regional Drainage Policies. Dublin: Dublin City Council.
- National Parks and Wildlife Services (NPWS) – Protected Site Register.

This WFD assessment was based on desktop review of the Environmental Protection Agency (EPA) and Local Authority Waters Programme water quality records which were obtained from the portal www.catchments.ie (accessed on 19th April 2023). From the aforementioned source of information, the WFD Status classification and Risk score were obtained for the identified waterbodies.

The River Waterbody Status have been estimated in accordance with European Communities (Water Policy) Regulations 2003 (SI No. 722 of 2003). The regulation objectives include the attainment of good status in waterbodies that are of lesser status at present and retaining good status or better where such status exists.

3.0 DESCRIPTION OF EXISTING HYDROLOGICAL AND HYDROGEOLOGICAL ENVIRONMENT

3.1 HYDROLOGY

The amalgamated agglomeration is located within the former Eastern River Basin District (ERBD) (now the Irish River Basin District), as defined under the Directive 2000/60/EC of the European Parliament commonly known as the Water Framework Directive (WFD). The WFD, establishes a framework for community action in the field of water policy.

According to the EPA mapping database, the amalgamated agglomeration is situated in Hydrometric Area No. 19 of the Irish River Network and lies within the Lee, Cork

Harbour and Youghal Bay (Catchment ID: 19). The Carrigtwohill Area lies within the Tibbotstown_SC_010 WFD Sub-Catchment whilst the Midleton Area is located within the Owennacurra_SC_010 Subcatchment (EPA, 2023).

The agglomerations discharge directly to the following 6 no. waterbodies:

- Lough Mahon (Harper's Island), North Channel Great Island and Owennacurra Estuary transitional waterbodies.
- Tibbotstown_010, Owennacurra_040 and Dungourney_020 surface waterbodies.

Figure 3.1 and **Figure 3.2** below presents the EPA water quality monitoring points in the context of the site and other regional drainage settings.

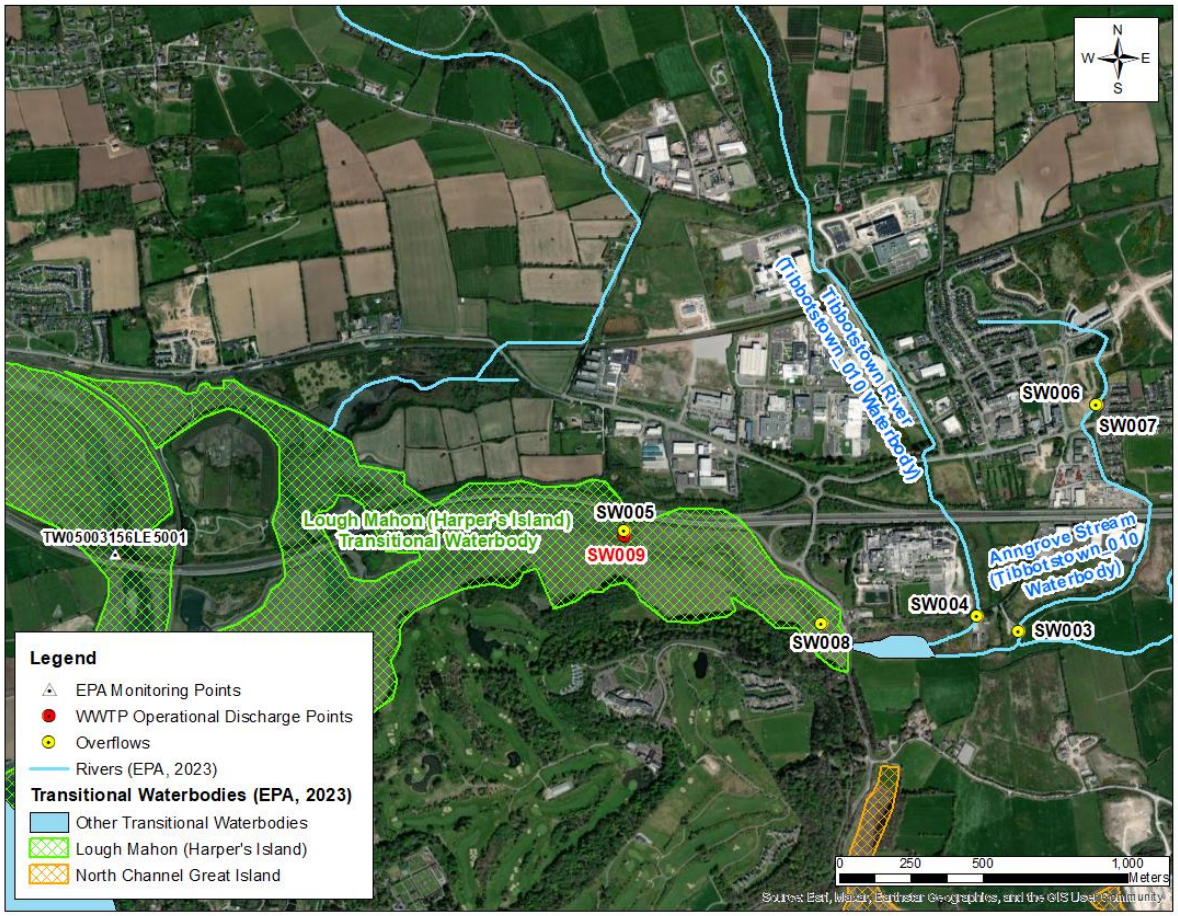


Figure 3.1 Water Quality Monitoring Points. Carrigtwohill Area (EPA,2023)

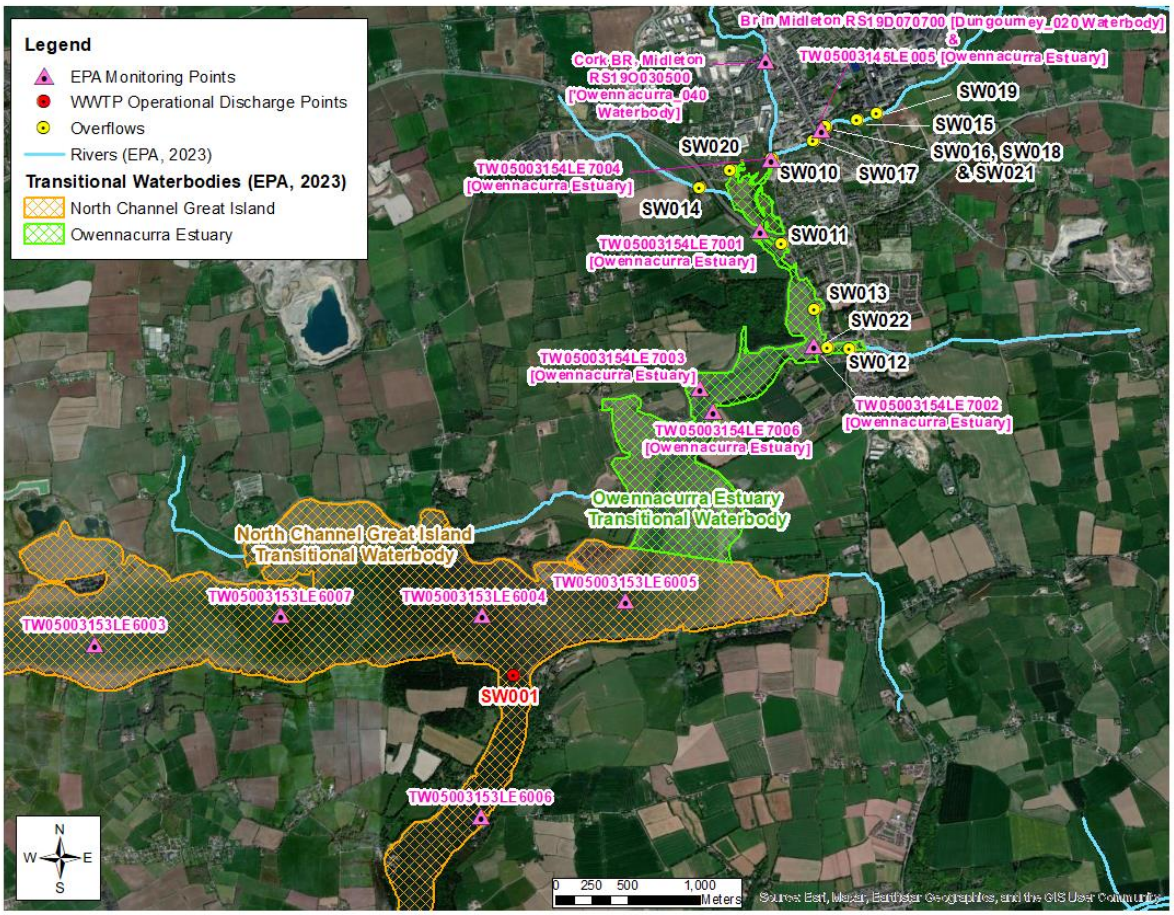


Figure 3.2 Water Quality Monitoring Points. Midleton Area (EPA,2023)

Transitional water quality is monitored periodically by the EPA at various regional locations along the receiving waterbodies. With reference to the site setting, there are a number of EPA monitoring stations located in Lough Mahon (Harper's Island), North Channel Great Island and Owenacurra Transitional Waterbodies as can be seen in Figures above.

Surface water quality is also monitored periodically by the EPA at various regional locations along principal and other smaller watercourses. With reference to the Carrigtwohill Area, the Tibbotstown_010 surface waterbody does not have an associated monitoring station; as mentioned above, its current WFD status (2016-2021) has been estimated on the basis of modelling techniques.

In relation to the Midleton Area, there are two (2) no. monitoring stations associated to the Owenacurra_040 and Dungourney_020 surface waterbodies. These are Cork Br. (RS19O030500, which is located *ca.* 660m upstream of SW010) and Br in Midleton (RS19D070700, located *ca.* 40m downstream of SW018), respectively.

The EPA assesses the water quality of rivers and streams across Ireland using a biological assessment method, which is regarded as a representative indicator of the status of such waters and reflects the overall trend in conditions of the watercourse. The biological indicators range from Q5 - Q1. Level Q5 denotes a watercourse with good water quality and high community diversity, whereas Level Q1 denotes very low community diversity and bad water quality. The two (3) no. water quality monitoring stations mentioned above have quality ratings available within the last ten years. The

station associated to the Owenacurra_040 surface waterbody (Cork Br. (RS19O030500)) obtained a Q3-4 – Poor Status in 2020 (which is consistent with its historical records since 2008). The station associated to the Dungourney_02 (Br in Midleton (RS19D070700)) obtained Q3 – Poor Status at last measurement (2020) which is also consistent with its historical records since 1999.

In accordance with the WFD, each river catchment within the former RBD was assessed by the EPA and a water management plan detailing the programme of measures was put in place for each. Currently, the EPA classifies the WFD Ecological Status for the receiving waterbodies as follows.

The Lough Mahon (Harper's Island) transitional waterbody has a '*Moderate'* WFD status (2013-2018 & 2016-2021). Lough Mahon (Harper's Island) transitional waterbody which is assigned '*Moderate*' WFD status (2013-2018 & 2016-2021) and its WFD Risk Score is '*At risk of not achieving good status*'. The significant pressures identified for this waterbody are associated to urban run-off and urban waste water.

The Tibbotstown_010 surface waterbody is assigned '*Good*' WFD status (2016-2021; it had '*Moderate*' status during 2013-2018). This status is based on modelling and therefore has been qualified as *'low confidence'* by the EPA. Its risk score is currently '*Under review*'. The significant pressures identified for this waterbody are associated to urban run-off and urban waste water.

The North Channel Great Island transitional waterbody is assigned '*Moderate'* WFD status (2016-2021; it had '*good*' status during 2013-2018) and its WFD Risk Score is '*At risk of not achieving good status*'. The significant pressure identified for this waterbody is associated to agricultural activities.

The Owennacurra Estuary transitional waterbody has a '*Moderate*' WFD status (2013-2018 & 2016-2021) and its WFD Risk Score is '*At risk of not achieving good status*'. The significant pressure identified for this waterbody is associated to industrial activities, urban run-off and urban waste water.

The Owennacurra_040 surface waterbody is assigned '*Moderate*' WFD status (2013-2018 & 2016-2021) and its WFD Risk Score is '*At risk of not achieving good status*'. The significant pressure identified for this waterbody is associated to urban run-off.

Finally, the Dungourney_020 surface waterbody is assigned '*Poor*' WFD status (2013-2018 & 2016-2021) and its WFD Risk Score is '*At risk of not achieving good status*'. The significant pressure identified for this waterbody is associated to industrial and agricultural activities.

Figure 3.3 and **Figure 3.4** below present the operational discharges from the Midelton and Carrigtwohill Functional Areas and the WFD Status' of the surrounding waterbodies.

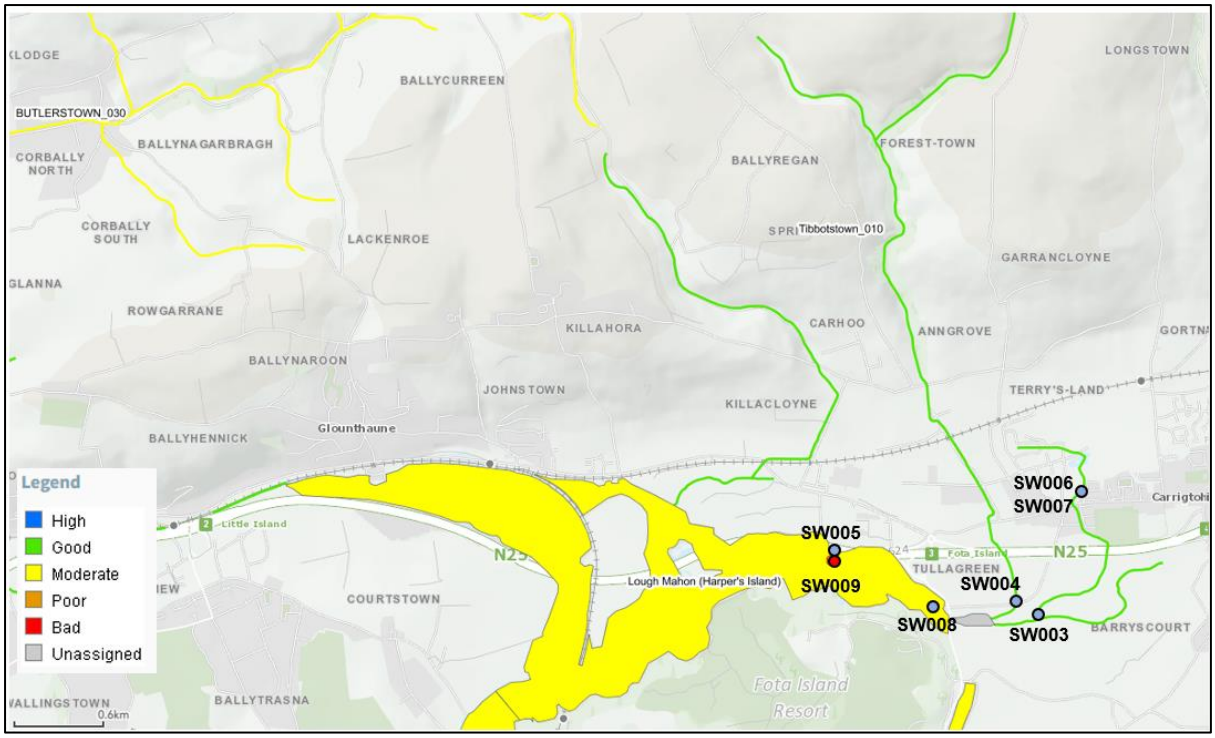


Figure 3.3 Operational Discharges Relating to Carrigtwohill Functional Area and WFD Status of The Surrounding Waterbodies

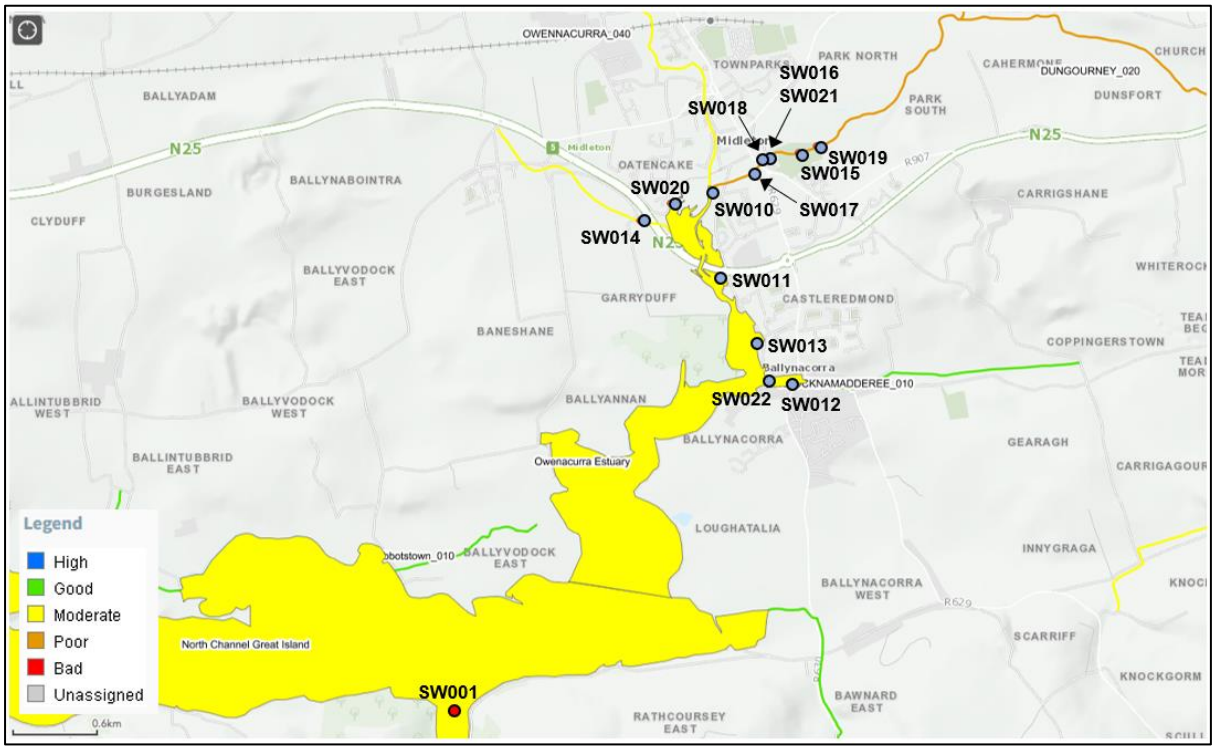
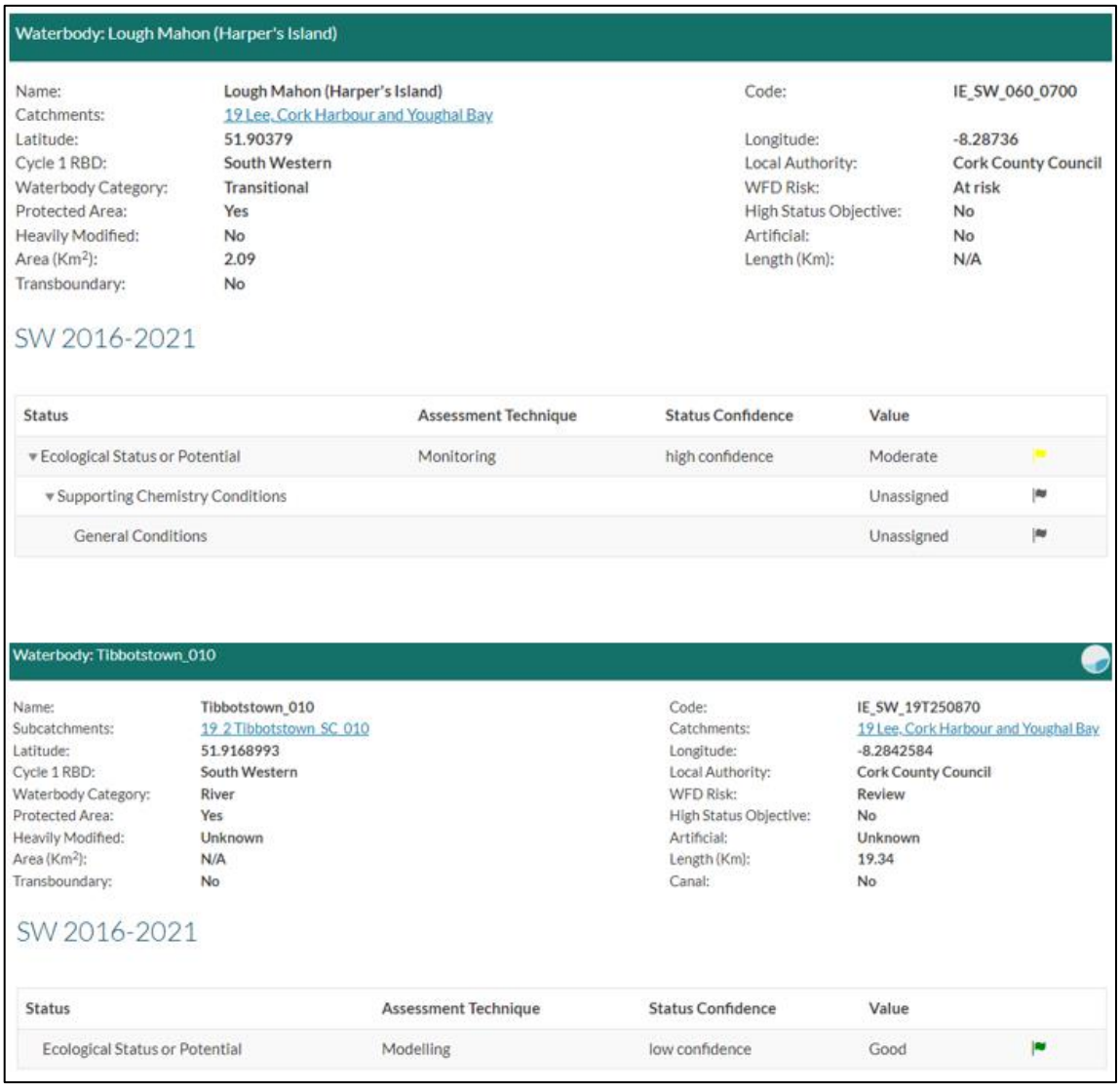


Figure 3.4 Operational Discharges Relating to Midleton Functional Area and WFD Status of The Surrounding Waterbodies

As a whole, the Tibbotstown_SC_010 WFD is considered to have an ecological status of '*Moderate'* to '*Good*'. This is based on current monitoring carried out at the Lough Mahon and North Channel Great Island. The Owennacurra_SC_010 WFD in turn, is

considered to have an ecological status of '*High*' to '*Good*' in its upper area and '*Moderate*' to '*Poor*' to its outlet to the Owennacurra Estuary.

All the receiving waterbodies are examined in terms of water quality. In general, the observed '*Moderate'* status is associated to existing biological (invertebrate and phytoplankton) and nutrient conditions. Refer to **Figure 3.5** to **Figure 3.9** below.



Waterbody: Lough Mahon (Harper's Island)

Name:	Lough Mahon (Harper's Island)	Code:	IE_SW_060_0700
Catchments:	19 Lee, Cork Harbour and Youghal Bay		
Latitude:	51.90379	Longitude:	-8.28736
Cycle 1 RBD:	South Western	Local Authority:	Cork County Council
Waterbody Category:	Transitional	WFD Risk:	At risk
Protected Area:	Yes	High Status Objective:	No
Heavily Modified:	No	Artificial:	No
Area (Km²):	2.09	Length (Km):	N/A
Transboundary:	No		

SW 2016-2021

Status	Assessment Technique	Status Confidence	Value
▾ Ecological Status or Potential	Monitoring	high confidence	Moderate
▾ Supporting Chemistry Conditions			Unassigned
General Conditions			Unassigned

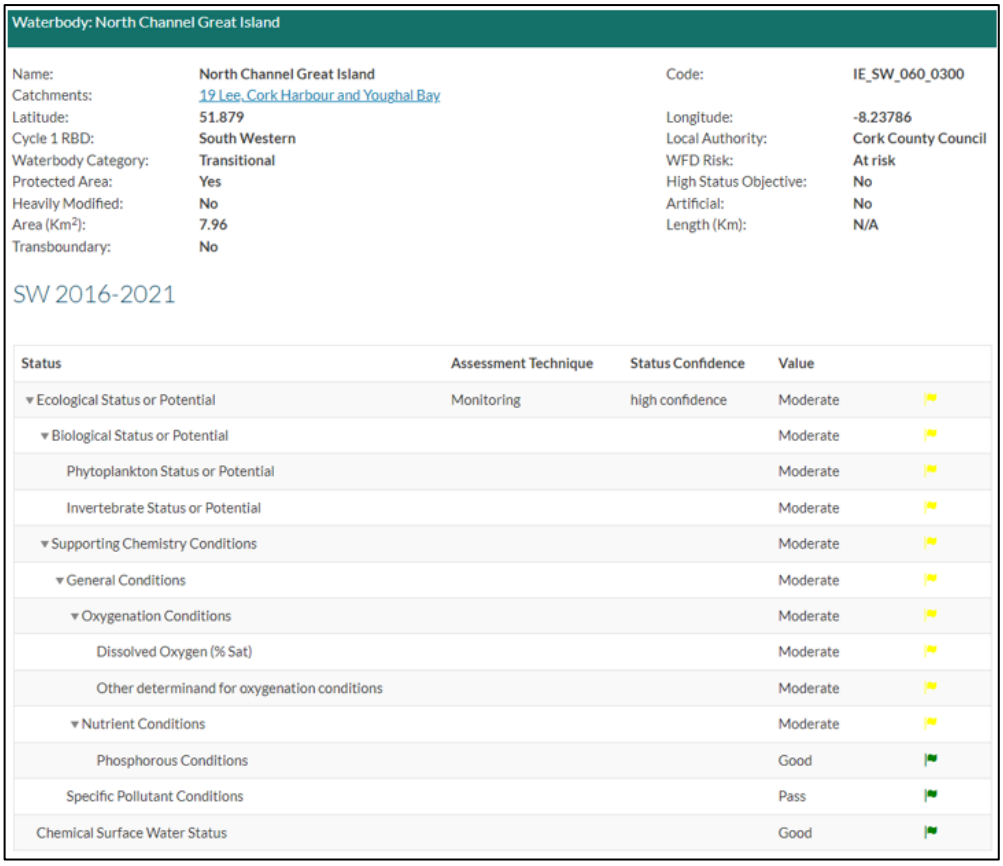
Waterbody: Tibbotstown_010

Name:	Tibbotstown_010	Code:	IE_SW_19T250870
Subcatchments:	19_2 Tibbotstown_SC_010	Catchments:	19 Lee, Cork Harbour and Youghal Bay
Latitude:	51.9168993	Longitude:	-8.2842584
Cycle 1 RBD:	South Western	Local Authority:	Cork County Council
Waterbody Category:	River	WFD Risk:	Review
Protected Area:	Yes	High Status Objective:	No
Heavily Modified:	Unknown	Artificial:	Unknown
Area (Km²):	N/A	Length (Km):	19.34
Transboundary:	No	Canal:	No

SW 2016-2021

Status	Assessment Technique	Status Confidence	Value
Ecological Status or Potential	Modelling	low confidence	Good

Figure 3.5 Surface Water Quality for the Waterbodies in the Carrigtwohill Area, EPA, 2023.



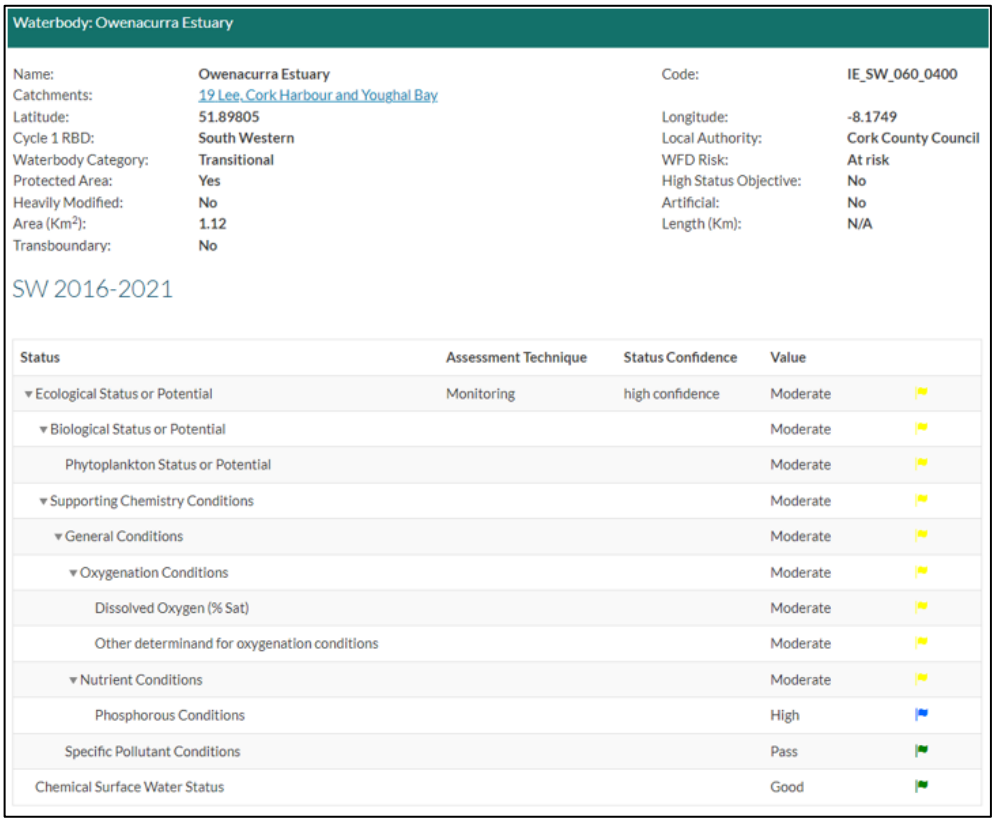
Waterbody: North Channel Great Island

Name:	North Channel Great Island	Code:	IE_SW_060_0300
Catchments:	19 Lee, Cork Harbour and Youghal Bay		
Latitude:	51.879	Longitude:	-8.23786
Cycle 1 RBD:	South Western	Local Authority:	Cork County Council
Waterbody Category:	Transitional	WFD Risk:	At risk
Protected Area:	Yes	High Status Objective:	No
Heavily Modified:	No	Artificial:	No
Area (Km²):	7.96	Length (Km):	N/A
Transboundary:	No		

SW 2016-2021

Status	Assessment Technique	Status Confidence	Value
▾ Ecological Status or Potential	Monitoring	high confidence	Moderate
▾ Biological Status or Potential			Moderate
Phytoplankton Status or Potential			Moderate
Invertebrate Status or Potential			Moderate
▾ Supporting Chemistry Conditions			Moderate
▾ General Conditions			Moderate
▾ Oxygenation Conditions			Moderate
Dissolved Oxygen (% Sat)			Moderate
Other determinand for oxygenation conditions			Moderate
▾ Nutrient Conditions			Moderate
Phosphorous Conditions			Good
Specific Pollutant Conditions			Pass
Chemical Surface Water Status			Good

Figure 3.6 Surface Water Quality for the North Channel Great Island Transitional Waterbody. EPA, 2023



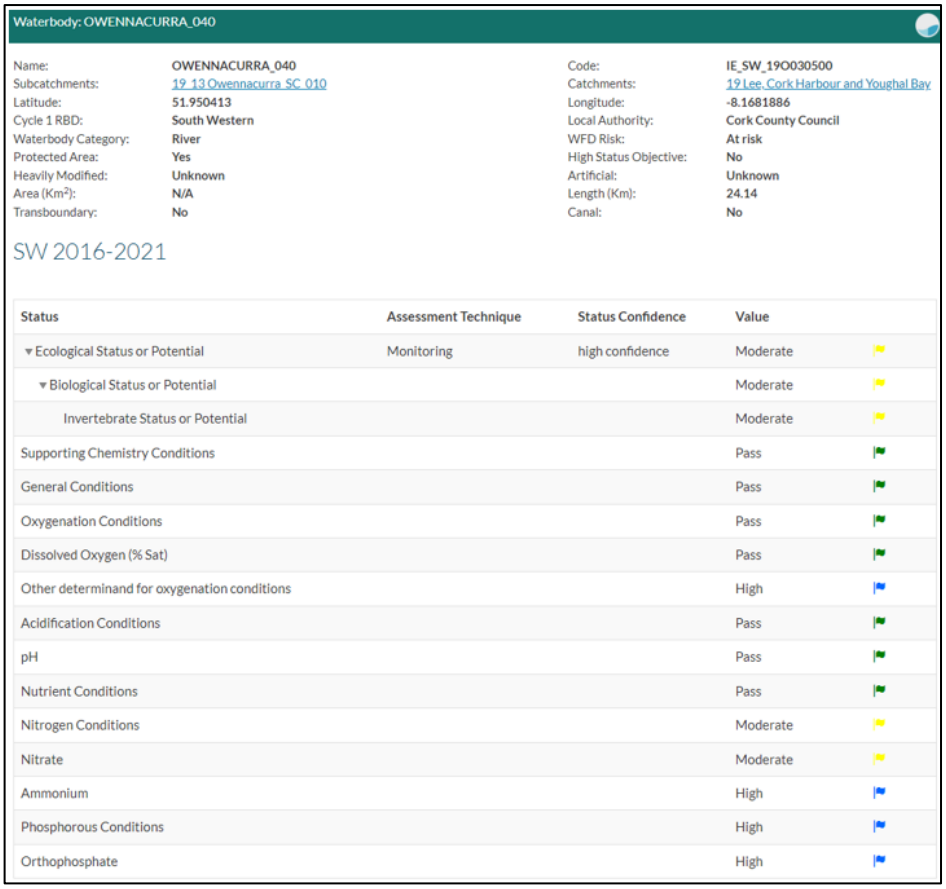
Waterbody: Owenacurra Estuary

Name:	Owenacurra Estuary	Code:	IE_SW_060_0400
Catchments:	19 Lee, Cork Harbour and Youghal Bay		
Latitude:	51.89805	Longitude:	-8.1749
Cycle 1 RBD:	South Western	Local Authority:	Cork County Council
Waterbody Category:	Transitional	WFD Risk:	At risk
Protected Area:	Yes	High Status Objective:	No
Heavily Modified:	No	Artificial:	No
Area (Km²):	1.12	Length (Km):	N/A
Transboundary:	No		

SW 2016-2021

Status	Assessment Technique	Status Confidence	Value
▾ Ecological Status or Potential	Monitoring	high confidence	Moderate
▾ Biological Status or Potential			Moderate
Phytoplankton Status or Potential			Moderate
▾ Supporting Chemistry Conditions			Moderate
▾ General Conditions			Moderate
▾ Oxygenation Conditions			Moderate
Dissolved Oxygen (% Sat)			Moderate
Other determinand for oxygenation conditions			Moderate
▾ Nutrient Conditions			Moderate
Phosphorous Conditions			High
Specific Pollutant Conditions			Pass
Chemical Surface Water Status			Good

Figure 3.7 Surface Water Quality for the Owenacurra Estuary Transitional Waterbody. EPA, 2023



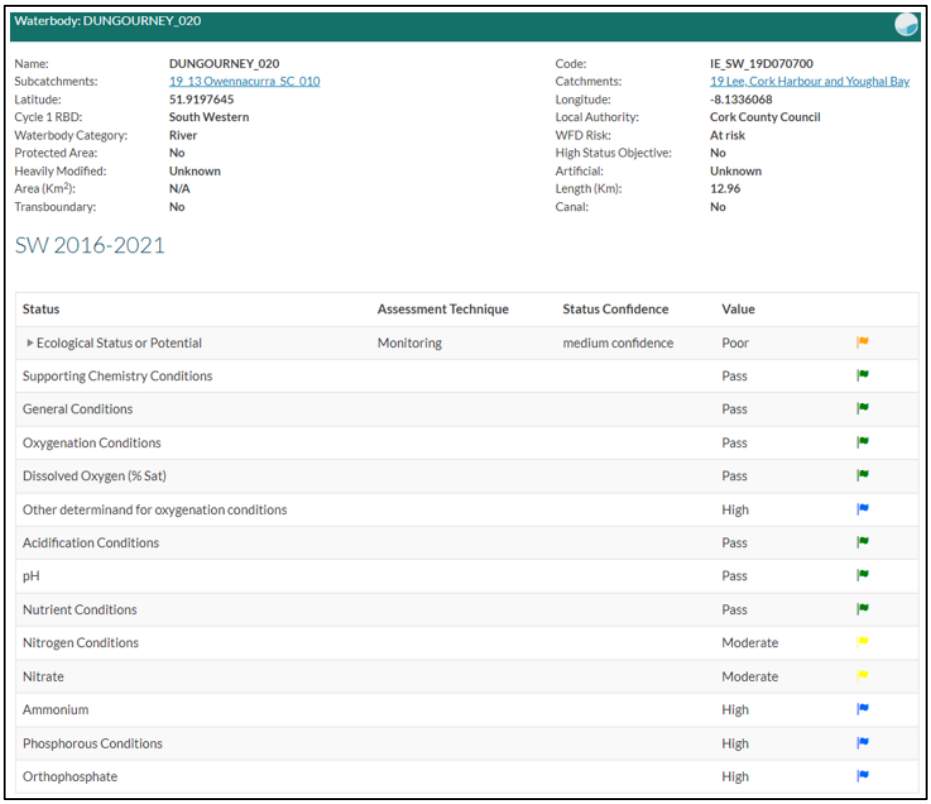
Waterbody: OWENNACURRA_040

Name:	OWENNACURRA_040	Code:	IE_SW_19O030500
Subcatchments:	19_13 Owennacurra_SC_010	Catchments:	19 Lee, Cork Harbour and Youghal Bay
Latitude:	51.950413	Longitude:	-8.1681886
Cycle 1 RBD:	South Western	Local Authority:	Cork County Council
Waterbody Category:	River	WFD Risk:	At risk
Protected Area:	Yes	High Status Objective:	No
Heavily Modified:	Unknown	Artificial:	Unknown
Area (Km²):	N/A	Length (Km):	24.14
Transboundary:	No	Canal:	No

SW 2016-2021

Status	Assessment Technique	Status Confidence	Value
▾ Ecological Status or Potential	Monitoring	high confidence	Moderate
▾ Biological Status or Potential			Moderate
Invertebrate Status or Potential			Moderate
Supporting Chemistry Conditions			Pass
General Conditions			Pass
Oxygenation Conditions			Pass
Dissolved Oxygen (% Sat)			Pass
Other determinand for oxygenation conditions			High
Acidification Conditions			Pass
pH			Pass
Nutrient Conditions			Pass
Nitrogen Conditions			Moderate
Nitrate			Moderate
Ammonium			High
Phosphorous Conditions			High
Orthophosphate			High

Figure 3.8 Surface Water Quality for the Owennacurra_040 Surface Waterbody. EPA, 2023



Waterbody: DUNGOURNEY_020

Name:	DUNGOURNEY_020	Code:	IE_SW_19D070700
Subcatchments:	19_13 Owennacurra_SC_010	Catchments:	19 Lee, Cork Harbour and Youghal Bay
Latitude:	51.9197645	Longitude:	-8.1336068
Cycle 1 RBD:	South Western	Local Authority:	Cork County Council
Waterbody Category:	River	WFD Risk:	At risk
Protected Area:	No	High Status Objective:	No
Heavily Modified:	Unknown	Artificial:	Unknown
Area (Km²):	N/A	Length (Km):	12.96
Transboundary:	No	Canal:	No

SW 2016-2021

Status	Assessment Technique	Status Confidence	Value
▸ Ecological Status or Potential	Monitoring	medium confidence	Poor
Supporting Chemistry Conditions			Pass
General Conditions			Pass
Oxygenation Conditions			Pass
Dissolved Oxygen (% Sat)			Pass
Other determinand for oxygenation conditions			High
Acidification Conditions			Pass
pH			Pass
Nutrient Conditions			Pass
Nitrogen Conditions			Moderate
Nitrate			Moderate
Ammonium			High
Phosphorous Conditions			High
Orthophosphate			High

Figure 3.9 Surface Water Quality for the Dungourney_020 Surface Waterbody. EPA, 2023

According to the sub-catchment assessment of the Tibbotstown_SC_010 sub-catchment carried out by the EPA in January 2019, there are a number of pressures within this sub-catchment that impact on the hydrological environment (refer to www.catchments.ie).

The significant pressures identified for the Lough Mahon (Harper's Island) transitional waterbody are associated to urban run-off and urban waste water. The significant pressures identified for the Tibbotstown_010 surface waterbody are associated to urban run-off and urban waste water. For the Owenacurra Estuary transitional waterbody, the identified significant pressures are associated to industrial activities, urban run-off and urban waste water. The below list is a list of all significant pressures identified in the sub-catchment (**Figure 3.10**).

Code	Name	WFD Risk	Pressure Category	Pressure Sub Category
IE_SW_060_0400	Owenacurra Estuary	At risk	Industry	IE
IE_SW_060_0400	Owenacurra Estuary	At risk	Urban Run-off	Diffuse Sources Run-Off
IE_SW_060_0400	Owenacurra Estuary	At risk	Urban Waste Water	Combined Sewer Overflows
IE_SW_060_0700	Lough Mahon (Harper's Island)	At risk	Urban Run-off	Diffuse Sources Run-Off
IE_SW_060_0700	Lough Mahon (Harper's Island)	At risk	Urban Waste Water	Agglomeration PE > 10,000
IE_SW_060_0750	Lough Mahon	At risk	Urban Waste Water	Agglomeration PE > 10,000
IE_SW_060_0750	Lough Mahon	At risk	Urban Waste Water	Combined Sewer Overflows
IE_SW_060_0750	Lough Mahon	At risk	Urban Waste Water	Agglomeration PE of 2,001 to 10,000
IE_SW_G_092	Industrial Facility (P0028-01)	At risk	Industry	IPC
IE_SW_060_0000	Cork Harbour	Review	Anthropogenic Pressures	Unknown
IE_SW_060_0200	Cuskinny Lake	Review	Anthropogenic Pressures	Unknown
IE_SW_060_0300	North Channel Great Island	Review	Anthropogenic Pressures	Unknown
IE_SW_060_0600	Slatty Bridge, Fota Island	Review	Anthropogenic Pressures	Unknown
IE_SW_19T250870	Tibbotstown_010	Review	Urban Run-off	Diffuse Sources Run-Off
IE_SW_19T250870	Tibbotstown_010	Review	Urban Waste Water	Agglomeration PE > 10,000
IE_SW_G_004	Ballinhassig East	Review	Anthropogenic Pressures	Unknown
IE_SW_G_046	Knockadoon West	Review	Anthropogenic Pressures	Unknown
IE_SW_G_058	Midleton	Review	Anthropogenic Pressures	Unknown
IE_SW_G_090	Littleisland	Review	Anthropogenic Pressures	Unknown

Figure 3.10 List of Main Pressures for all Waterbodies within the Tibbotstown_SC_010 Sub-catchment.

According to the sub-catchment assessment of the Owennacurra_SC_010 sub-catchment carried out by the EPA in December 2018, the significant pressures identified for the Owennacurra_040 surface waterbody are associated to urban run-off. For the Dungournet_020 surface waterbody, the identified significant pressures are associated to industrial activities. The below list is a list of all significant pressures identified in this sub-catchment (**Figure 3.11**).

Code	Name	WFD Risk	Pressure Category	Pressure Sub Category
IE_SW_060_0400	Owenacurra Estuary	At risk	Industry	IE
IE_SW_060_0400	Owenacurra Estuary	At risk	Urban Run-off	Diffuse Sources Run-Off
IE_SW_060_0400	Owenacurra Estuary	At risk	Urban Waste Water	Combined Sewer Overflows
IE_SW_19D070700	DUNGOURNEY_020	At risk	Agriculture	Pasture
IE_SW_19D070700	DUNGOURNEY_020	At risk	Industry	IE
IE_SW_19O030500	OWENNACURRA_040	At risk	Urban Run-off	Diffuse Sources Run-Off
IE_SW_G_004	Ballinhassig East	Review	Anthropogenic Pressures	Unknown
IE_SW_G_037	Glenville	Review	Anthropogenic Pressures	Unknown
IE_SW_G_058	Midleton	Review	Anthropogenic Pressures	Unknown

Figure 3.11 List of main pressures for all Waterbodies within the Owennacurra_SC_010 Sub-catchment.

3.2 HYDROGEOLOGY

3.2.1 Aquifer Classification

The GSI has devised a system for classifying the bedrock aquifers in Ireland. The aquifer classification for bedrock depends on a number of parameters including, the area extent of the aquifer (km^2), well yield (m^3/d), specific capacity ($m^3/d/m$) and groundwater throughput (mm^3/d). There are three main classifications: regionally important, locally important and poor aquifers. Where an aquifer has been classified as regionally important, it is further subdivided according to the main groundwater flow regime within it. This sub-division includes regionally important fissured aquifers (Rf) and regionally important karstified aquifers (Rk). Locally important aquifers are sub-divided into those that are generally moderately productive (Lm) and those that are generally moderately productive only in local zones (Ll). Similarly, poor aquifers are classed as either generally unproductive except for local zones (Pl) or generally unproductive (Pu).

The bedrock geology underlying both treatment facilities has been classified by the GSI as a '*Regional Important Aquifer – Karstified (diffuse) (Rkd)*'. There are also a gravel aquifer underlying the Carrigtwohill WwTP and to the east of the Midleton WwTP (across the N25 road, approximately). Both gravel aquifers have been classified by the GSI as '*Locally Important Gravel Aquifer (Lg)*' (GSI, 2023).

Aquifer vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated generally by human activities. Due to the nature of the flow of groundwater through bedrock in Ireland, which is almost completely through fissures/ fractures, the main feature that protects groundwater from contamination, and therefore the most important feature in the protection of groundwater, is the subsoil (which can consist solely of/ or of mixtures of peat, sand, gravel, glacial till, clays, or silts).

Groundwater vulnerability in the vicinity of both treatment facilities was generally mapped ranging from '*High*' (GSI, 2023). Groundwater vulnerability is based on the thickness of the subsoil overlying the bedrock aquifer. The classification of '*High*' indicates that the soil overlying the bedrock aquifer has a depth between 3-5 m. Local groundwater would therefore be considered as a sensitive receptor due the thickness of this overburden.

3.2.2 Groundwater Quality

The Water Framework Directive (WFD) 2000/60/EC was adopted in 2000 as a single piece of legislation covering rivers, lakes, groundwater, transitional (estuarine) and coastal waters. In addition to protecting said waters, its objectives include the attainment of '*Good Status'* in waterbodies that are of lesser status at present and retaining '*Good Status'* or better where such status exists at present. '*Good Status'* was to be achieved in all waters by 2015, as well as maintaining '*High status'* where the status already exists. The EPA co-ordinates the activities of the River Basin Districts, local authorities and state agencies in implementing the directive, and operates a groundwater quality monitoring programme undertaking surveys and studies across the Republic of Ireland.

There is one (1) no. groundwater body (GWB) in the region of The Project. According to the EPA maps, the Midleton GWB (IE_SW_G_058) is underlying The Project site. Based on the 2016-2021 WFD status, Mitchelstown GWB is classed as having '*Good Status*', with a Ground Waterbody Risk score '*Under Review'*. The Mitchelstown GWB has a "*Good*" Status for quantitative and chemical categories.

3.3 PROJECT DETAILS

The surface water assessment and the groundwater assessment both examine the potential effects of the operational discharges from the amalgamated agglomeration as detailed in **Chapter 1, Section 1.1**.

A full description of The Project is detailed in **Chapter 3, Section 3.3** of the EIAR.

3.4 MITIGATION MEASURES

No significant negative effects to the Water Environment have been identified (refer to **EIAR, Chapter 6 Water**). Bespoke mitigation measures to avoid or reduce potential impacts of the Project on the Water environment are therefore not required.

To ensure continued satisfactory operation of the Midleton and Carrigtwohill agglomeration in line with the discharge licence the authors recommend the following:

- Ensure that the capacity of the WwTP is not exceeded.
- Ensure all discharges continue to operate in compliance with the ELVs.
- Continue monitoring the effluent and receiving waters, on a consistent and regular basis.

3.5 ASSESSMENT OF SOURCE PATHWAY LINKAGES

This section presents the information related to the current waterbody status identified in the amalgamated agglomeration.

The Carrigtwohill Functional Area lies within the Tibbotstown_SC_010 WFD Sub-Catchment whilst the Midleton Functional Area is located within the Owennacurra_SC_010 Subcatchment.

The Groundwater Body (GWB) underlying the agglomeration is the Midleton GWB (EU Groundwater Body Code: IE_SW_G_058).

This WFD Screening Assessment has identified three (3) no. WFD transitional waterbodies, three (3) surface waterbodies and one (1) no. WFD groundwater bodies of relevance due to these waterbodies are linked to the proposed operational discharges.

The waterbodies are listed in **Table 3.1**

Table 3.1 WFD waterbodies located within the study area

Type	WFD Classification	WFD Status (2016-2021)	WFD Risk	Waterbody Name / ID	Location / Relation to discharges
Surface Water	Transitional	Moderate	At Risk of Not Achieving Good Status	Lough Mahon (Harper's Island) (IE_SW_060_0700)	Discharges from SW009, SW005 and SW008
Surface Water	Transitional	Moderate	At Risk of Not Achieving Good Status	North Channel Great Island (IE_SW_060_0300)	Discharges from SW009
Surface Water	Transitional	Moderate	At Risk of Not Achieving Good Status	Owennacurra Estuary (IE_SW_060_0400)	Discharges from SW010, SW011, SW012, SW013, SW020 and SW022
Surface Water	River	Good	Under review	Tibbotstown _010 (IE_SW_19T250870)	Discharges from SW003, SW004, SW006 and SW007
Surface Water	River	Moderate	At Risk of Not Achieving Good Status	Owennacurra_040 (IE_SW_19O030500)	Discharge from SW014
Surface Water	River	Poor	At Risk of Not Achieving Good Status	Dungourney_020 (IE_SW_19D070700)	Discharges from SW015, SW016, SW017, SW018, SW019 and SW021
Ground water	Groundwater	Good	Under Review	Midleton (GWB) (IE_SW_G_058)	Groundwater body immediately underlying the proposed operational discharges

The table below (**Table 3.2**) describes the Source-Pathway-Receptor (S-P-R) model for the agglomeration and includes robust mitigation measures, as appropriate, which will be incorporated into the proposed development throughout the operational phase. It should be noted that the design measures to prevent unintended discharges as outlined

Section 1.1 are considered an integral part of the Project being assessed.

Table 3.2 Pollutant Linkage Assessment

Source	Pathways	Receptors considered	Risk of Impact	Mitigation Measures
Operational Impacts (Summary)				
Primary discharge (SW009) from the Carrigtwohill WwTP Secondary discharge (SW001) from the Midleton WwTP	Direct pathway to hydrological environment *via* wastewater treatment system. Direct pathway to hydrological environment *via* wastewater treatment system.	Hydrological environment (Lough Mahon (Harper's Island) transitional waterbody). Hydrological environment (North Channel Great Island transitional waterbody).	No perceptible risk - Water Quality Modelling carried out in 2023 predicts that the effluent discharge standards for both SW009 and SW001 are appropriate in terms of ensuring that the Carrigtwohill and Midleton WwTPs do not impinge on the achievement of *"Good"* WFD Status of Lough Mahon (Harper's Island) or the North Channel Great Island by 2027 in accordance the European Communities Environmental Objectives (Surface Water) Regulations, 2009 (as amended).	There will be no deterioration of the water quality status of the waterbody. Additional measures to avoid or reduce the potential impacts of the Project on the WFD status are therefore not required.
Discharge from overflows SW005 and SW008 Discharge from overflows SW010, SW011, SW012, SW013, SW020 and SW022 Discharge from overflows SW003, SW004, SW006 and SW007 Discharge from overflow SW014 Discharges from overflows SW015, SW016, SW017, SW018, SW019 and SW021	Direct pathway to hydrological environment via drainage system	Hydrological environment (Lough Mahon (Harper's Island) transitional waterbody). Hydrological environment (Owennacurra Estuary transitional waterbody). Hydrological environment (Tibbotstown _010 surface waterbody) Hydrological environment (Owennacurra_040 surface waterbody) Hydrological environment (Dungourney_020 surface waterbody)	No perceptible risk due to the implementation of the design and prevention measures as detailed in **Section 1.1** of this Report. As outlined in **Section 1.1**, the non-compliant overflows to the Owennacurra estuary (SW010, SW011, and SW020) are currently having a localised impact on the Water Environment. These overflows, which have been identified as a significant pressure on this waterbody, will be upgraded as part of the Midleton Wastewater Network Upgrade Project to they meet the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995, with the upgrades expected to be complete by Q4 2029, thus addressing their existing risk to the Water environment.	There will be no deterioration of the water quality status of the waterbody. Additional measures to avoid or reduce the potential impacts of The Project on the WFD status are therefore not required.

4.0 NO DETERIORATION ASSESSMENT

4.1 HYDROLOGICAL ENVIRONMENT

The Water Quality Modelling Report (Appendix 2 of the EIAR) demonstrates that the current ELV's are sufficient to ensure the existing WFD waterbody status will not be deteriorated as part of the proposed operational primary (SW009) and secondary (SW001) discharges.

The predictions of the Future Scenario (as defined in **Attachment D.2.3** Water Quality Modelling Report (July 2023) indicate that the water quality impacts from Midleton WwTP are minimal. However, elevated concentrations for all parameters assessed in this study are observed around the Carrigtwohill WwTP discharge. Nevertheless, the results show that the status of both transitional waterbodies would not be affected by the Future Scenario and operational discharges. It should be noted that the applications scenario presented is conservative and models the maximum permitted ELV.

In addition, a "*notionally clean*" scenario was undertaken for Dissolved Inorganic Nitrogen (DIN) and Molybdate Reactive Phosphorus (MRP) in order to obtain the actual contribution of the WwTPs in the water quality of the receiving waterbodies. Results illustrate that the WwTPs will not drive of EQS exceedances, and just a minor fraction of available assimilative capacity is utilised by the WwTPs in question.

Regarding the current assigned WFD status for both waterbodies, it is not expected that treated effluent from the existing Midleton and Carrigtwohill WwTPs will affect this classification. Furthermore, the quality of the treated effluent is monitored on the basis of actual discharge activities as per the associated EPA licence.

Discharges into the receiving Lough Mahon (Harper's Island) and North Channel Great Island waterbodies will be at a controlled rate to ensure that there is no increase in flow during these discharges so there will be no change to the morphology of the waterbodies and any increase in downstream flooding will be avoided.

During storm events, surface water and a portion of foul water can accumulate which results in storm overflows which ultimately discharges into receiving waterbodies. SWO's are a necessary part of sewerage networks and serve to prevent uncontrolled spillages from arising within the agglomeration and to prevent the biological processes necessary to treat effluent from 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. As noted, 16 no. SWOs in the amalgamated agglomeration are meeting DoEHLG criteria.

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.

As mentioned previously, the risks of sewer or outfall failure associated with extreme events resulting in the activation of EOs, 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 EOs that can be applied have been incorporated in the design and operation of the agglomeration.

These overflows are temporary (short-lived) and have no long-term negative impact on the waterbody quality.

The non-compliant overflows to the Owennacurra estuary (SW010, SW011, and SW020) are currently having a localised impact on the Water Environment. These overflows, which have been identified as a significant pressure on this waterbody, will be upgraded as part of the Midleton Wastewater Network Upgrade Project so that they meet the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows'*, 1995, with the upgrades expected to be complete by Q4 2029.

There are no changes to the overall hydrological and hydrogeological regime as a result of the operational discharges There are no proposed diversions of any drainage ditches or waterbodies as part of the proposed development.

Overall, the potential effects on the current status of the waterbodies are considered *No Impact i.e., no change to the WFD status or elements in terms of the hydrological environment.*

4.2 HYDROGEOLOGICAL ENVIRONMENT

There are no potential impacts to the hydrogeological environment as there is no discharge to ground or active dewatering associated with the operational discharges.

Overall, the potential effects on the WFD status to the waterbodies are considered *No Impact i.e., no change to the current status or elements in terms of the underlying hydrogeological environment*.

4.3 ASSESSMENT IN TERMS OF FUTURE GOOD STATUS

The following waterbodies are examined in terms of water quality as these sections of waterbodies are connected to the proposed operational discharges and overflows.

- The Lough Mahon (Harper's Island) transitional waterbody is currently classified as having '*Moderate Status*' (2016-2021) with a current WFD River Waterbody risk score of 1a, '*At risk of not achieving good status'*. Therefore, the WFD objective is currently not being achieved. The significant pressures identified for this waterbody are associated to urban run-off and urban waste water.
- The North Channel Great Island transitional waterbody is currently classified as having '*Moderate Status*' (2016-2021) with a current WFD River Waterbody risk score of 1a, '*At risk of not achieving good status'*. Therefore, the WFD objective is currently not being achieved. The significant pressures identified for this waterbody are associated to agricultural activities.
- The Owennacurra Estuary transitional waterbody is currently classified as having '*Moderate Status*' (2016-2021) with a current WFD River Waterbody risk score of 1a, '*At risk of not achieving good status'*. Therefore, the WFD objective is currently not being achieved. The significant pressures identified for this waterbody are associated to industrial activities, urban run-off and urban waste water.
- The Tibbotstown _010 surface waterbody is currently classified as having '*Good Status*' (2016-2021) with a current WFD River Waterbody '*Under review'*. Therefore, the WFD objective is currently being achieved. The significant pressures identified for this waterbody are associated to urban run-off and urban waste water.
- The Owennacurra_040 surface waterbody is currently classified as having '*Moderate Status*' (2016-2021) with a current WFD River Waterbody risk score of 1a, '*At risk of not achieving good status*'. Therefore, the WFD objective is currently not being achieved. The significant pressures identified for this waterbody are associated to urban run-off.
- The Dungourney_020 surface waterbody is currently classified as having '*Poor Status*' (2016-2021) with a current WFD River Waterbody risk score of 1a, '*At risk of not achieving good status'*. Therefore, the WFD objective is currently not being achieved. The significant pressures identified for this waterbody are associated to industrial and agricultural activities.

As mentioned above, the main pressure for obtaining good status is urban run-off, urban waste water and industrial and agricultural activities. The proposed development will discharge treated water as per EPA licence agreement. The discharges associated with the proposed development will be treated and attenuated prior to discharge off-site. Therefore, the proposed development will not have any discharges which will hinder catchment improvement measures.

Based on the above information it is considered that any of the aspects of the operational discharges will not prevent the WFD objectives from being achieved or to meet the requirements and/or objectives in the second RBMP 2018-2021 (River Basin Management Plan) and draft third RBMP 2022-2027.

The objective of the Midleton GWB is '*Good*' for 2021. Therefore, the objective is currently being met.

At present there are no local targeted measures within the catchments to maintain or achieve improvements to the status of the waterbodies. However, the following are some pressures associated with waterbody catchments:

- Management of pollution from agricultural activities.
- Management of pollution from sewage and waste water.

- Management of pollution from urban environments.
- Changes to natural flow and levels of water.
- Managing invasive non-native species.

Based on the above information it is not considered that any of the aspects of the Project will prevent the WFD objectives from being achieved or to meet the requirements and/or objectives in the second RBMP 2018-2021 (River Basin Management Plan) and draft third RBMP 2022-2027.

5.0 CONCLUSIONS

Appendix A contains the surface water and groundwater assessments where the above potential effects are considered. The colour coded system referred to in **Table 2.1** and **Table 2.2** above is used to give a visual impression of the assessment.

The WFD assessment indicates that, based on the operational discharge, there is no potential for adverse or long-term effects on the receiving waterbodies. However, there is potential for minor temporary impact during storm water overflow events. These events will contain diluted sewage and will not have a long-term impact on the receiving waterbodies.

It has been assessed that the operational discharges will not cause any significant deterioration or change in waterbody status or prevent attainment, or potential to achieve, future good status or to meet the requirements and/or objectives in the second RBMP 2018-2021 (River Basin Management Plan) and draft third RBMP 2022-2027.

The WFD assessment indicates that there is no potential for adverse or minor temporary or localised effects on the Midleton groundwater body. Therefore, it has been assessed that it is unlikely that the proposed development will cause any significant deterioration or change on its waterbody status or prevent attainment, or potential to achieve the WFD objectives or to meet the requirements and/or objectives in the second RBMP 2018-2021 (River Basin Management Plan) and draft third RBMP 2022-2027.

No further assessment of WFD is recommended given that no significant deterioration or change in waterbody status is expected based on the current understanding of the proposed operational discharges.

6.0 STUDY LIMITATIONS

The conclusions and recommendations listed above are based on our current understanding of the site. This has been formed from review of historical maps, review of current and previous environmental and engineering reports for the proposed development site. This information is taken as being accurate and true.

Public databases held by the EPA, GSI, OPW, NPWS and OSI have been consulted and the most recent available data has been referenced.

No subsurface or destructive testing was carried out as part of this assessment.

7.0 REFERENCES

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APPENDIX A
WATER FRAMEWORK DIRECTIVE ASSESSMENT MATRIX

Risk Screening of Potential to Cause Deterioration of Current WFD status

	Surface Water	Scheme Elements	**Midleton WWDL (D0056-01) Review Application**				**Mitigation Measures**	**Overall Impact**
	Lough Mahon (Harper's Island) transitional waterbody (IE_SW_060_0700) **North Channel Great Island transitional waterbody (IE_SW_060_0300)** **Owennacurra Estuary transitional waterbody (IE_SW_060_0400)** **Tibbotstown _010 surface waterbody (IE_SW_19T250870)** **Owennacurra_040 surface waterbody (IE_SW_19O030500)** **Dungourney_020 surface waterbody (IE_SW_19D070700)**	Phase (Operation)	**Operational Discharges**					
		Identified Quantitative Impacts	**SW009 Carrigtwohill**	**SW001 Midleton**	**Carrigtwohill Overflows**	**Midleton Overflows**		
WFD Status	**Macrophytes and phytobenthos - combined**	Predicted change to status elements (green = none, amber = possibly, red = likely)	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	**There will be no deterioration of the water quality status of the receiving waterbodies.** **Mitigation measures to avoid or reduce the potential impacts of The Project on the WFD status are therefore not required.** **Rationale:** Water Quality Modelling carried out in 2023 predicts that the effluent discharge standards for both SW001 and SW009 are appropriate in terms of ensuring that the Carrigtwohill and Midleton WwTPs do not impinge on the achievement of Good WFD Status of Lough Mahon (Harper's Island) or the North Channel Great Island by 2027 in accordance the European Communities Environmental Objectives (Surface Water) Regulations, 2009 (as amended). No perceptible risk anticipated due to the implementation of the design and prevention measures as detailed in **Section 1.1** of this Report. The non-compliant overflows to the Owennacurra estuary (*i.e.*, SW010, SW011, and SW020) will be upgraded as part of the Midleton Wastewater Network Upgrade Project so they meet the criteria as set out in the DoEHLG '*Procedures and Criteria in Relation to Storm Water Overflows*', 1995, with the upgrades expected to be complete by Q4 2029, thus addressing their existing risk to the Water environment. All alarms will be linked to level measurement to alert to any spillage and will be linked to SCADA with alarms sent to operators in the result of an emergency event. An Emergency Response Plan and Procedures, Operation and Maintenance Procedures for all equipment is in place and will be implemented by the appointed plant operator, as required. Refer to **Chapter 1 Section 1.1**. of the WFD Screening assessment Report for details of the key measures in place to prevent unintended discharges to the 6 no. receiving water environment.	No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	Macroinvertebrates		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		
	Fish		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		
Physio-Chemical Status	**Total Ammonia**	Predicted change to status elements (green = none, amber = possibly, red = likely)	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		
	Total Nitrogen		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		
	Ortho-Phosphate		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		
Hydromorphological Elements	**Quantity and dynamics of river flow**	Predicted change to status elements (green = none, amber = possibly, red = likely)	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		
	Connection to Groundwater		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		
	River continuity		Not Applicable.	Not Applicable.	Not Applicable.	Not Applicable.		Not Applicable.
	River depth and width variation bed		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		
	Structure and substrate of river bed		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		
	Structure of riparian zone		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status

Risk Screening of Potential to Cause Deterioration of Current WFD status								
	Groundwater	Scheme Elements	**Midleton WWDL (D0056-01) Review Application**				**Mitigation Measures**	**Overall Impact**
	IE_SW_G_058	Phase (Operation)	**Operational Discharges**					
	Midleton GWB	Identified Quantitative Impacts	**SW009 Carrigtwohill**	**SW001 Midleton**	**Carrigtwohill Overflows**	**Midleton Overflows**		
Quantitative Elements	**Saline or other intrusions.** To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Predicted change to status elements (green = none, amber = possibly, red = likely)	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	**There are no potential impacts to the hydrogeological environment as there is no discharge to ground or active dewatering associated with the operational discharges.** **There will be no deterioration of the water quality status of the waterbody.** **Mitigation measures to avoid or reduce the potential impacts of The Project on the WFD status are therefore not required.** All alarms will be linked to level measurement to alert to any spillage and will be linked to SCADA with alarms sent to operators in the result of an emergency event. An Emergency Response Plan and Procedures, Operation and Maintenance Procedures for all equipment is in place and will be implemented by the appointed plant operator, as required.	No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		
	Groundwater Dependent Terrestrial Ecosystems (GWDTE's) To assess the impact of groundwater abstractions on the condition of GWDTE'S.		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		
	Water balance To identify groundwater bodies where abstractions exceed the available resource.		Not Applicable (no water supply from borehole anticipated)	Not Applicable (no water supply from borehole anticipated)	Not Applicable (no water supply from borehole anticipated)	Not Applicable (no water supply from borehole anticipated)		Not Applicable
Chemical Elements	**Saline or other intrusions.** To identify groundwater bodies where the intrusion of poor quality water as a result of groundwater abstraction is leading to sustained upward trends in pollutant concentrations or significant impact on one or more groundwater abstractions.	Predicted change to status elements (green = none, amber = possibly, red = likely)	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		No anticipated impacts to the hydrological environment with no deterioration to the WFD Status
	Surface water. To assess the impact of groundwater abstractions on the ecological status of surface water bodies.		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		
	Groundwater Dependent Terrestrial Ecosystems (GWDTE's) To assess the impact of nutrient concentrations in groundwater (primarily phosphates) on GWDTE's.		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		
	Drinking Water Protected Areas (DrWPAs) To identify groundwater bodies failing to meet the DrWPA objectives defined in Article 7 of the WFD or at risk of failing in the future.		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		
	General quality assessment To identify groundwater bodies where widespread deterioration in quality has or will compromise the strategic use of groundwater.		No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.	No measurable change anticipated.		