



MORTARSTOWN WASTEWATER TREATMENT PLANT UPGRADE

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PLATES

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Plate 11-2 Waste Water Treatment Plant

Plate 11-3 View of Waste Water Treatment Plant

Plate 11-4 Existing Pumping Station

Plate 11-5 Outfall Location

Plate 11-6 Towpath at Outfall Location

Acronyms

AA	Appropriate Assessment
AADT	Annual Average Daily Traffic
AAR	Average Annual Rainfall
ACA	Architectural Conservation Area
ACP	An Coimisiún Pleanála
ADCO	Archaeological Diving Company
AE	Actual Evaporation
AERs	Annual Environmental Reports
AQS	Air Quality Standards
ASP	Activated Sludge Process
Bgl	Below ground level
BoD	Biochemical Oxygen Demand
cBOD	Carbonaceous biochemical oxygen demand
CCC	Carlow County Council
C&D	Construction and Demolition
CDP	Carlow County Development Plan 2022-2028
CCRA	Climate Change Risk Assessment
CEMP	Construction Environmental Management Plan
CFRAM	Catchment Flood Risk Assessment and Management
CNT	Construction Noise Threshold
COMAH	Control of Major Accident Hazards
CO2	Carbon Dioxide
CRAMP	Closure, Restoration and Aftercare Management Plan
CSRR	Carlow Southern Relief Road
CSO	Central Statistics Office
CTMP	Construction Traffic Management Plan
dB	decibels
DHLGH	Department of Housing, Local Government and Heritage
DMRB	Design Manual for Roads and Bridges
DMP	Dust Management Plan
DOC	Dissolved Organic Carbon
DS	Dry Solids
DWF	Dry weather flow
DWPA	Drinking Water Protected Areas
ECow	Ecological Clerk of Works
ED	Electoral Division
EIAR	Environmental Impact Assessment Report
ELRA	Environmental Liabilities Risk Assessment
ELVs	Emissions Limit Values

EPA	Environmental Protection Agency
ESB	Electricity Supply Board
ER	Effective Rainfall
EU	European Union
FFT	Full Flow to Treatment
FOG	Fats, Oils and Greases
GAC	Generic Assessment Criteria
GDSDS	Greater Dublin Strategic Drainage Study
GHG	Greenhouse Gas
GHGA	Greenhouse Gas Assessment
GLC	Ground Level Concentrations
GPR	Ground Penetrating Radar
GSI	Geological Survey of Ireland
GWB	Groundwater Bodies
GWS	Group Water Scheme
ha	Hectares
HDD	Horizontal Direct Drilling
HGV	Heavy Goods Vehicles
HSA	Health and Safety Authority
HV	High Voltage
ICOMOS	International Council on Monuments and Sites
IBC	Intermediate bulk container
IE	Industrial Emissions
IEMA	Institute of Environmental Management and Assessment
IPC	Integrated Pollution Control
IPCC	Intergovernmental Panel on Climate Change
IVC	Irish Vegetation Classification
JTC	Junction Turning Count
KERs	Key Ecological Receptors
kV	KiloVolts
kW	KiloWatts
l/s	Litres per second
LCT	Landscape Character Type
LED	Light-Emitting Diode
LVIA	Landscape and Visual Impact Assessment
m ³ /h	Metres cubed per hour
m	metres
MEICA	Mechanical, Electrical, Instrumentation, Control and Automation
MV	Medium Voltage
mAOD	Metres Above Ordnance Datum

NAF	National Adaptation Framework
NBDC	National Biodiversity Data Centre
NDP	National Development Plan
NFGWS	National Federation Groundwater Schemes
NHA	Natural Heritage Area
NIAH	National Inventory of Architectural Heritage
NIS	Natura Impact Statement
NMS	National Monuments Service
No.	number
NPWS	National Parks and Wildlife Service
NPF	National Planning Framework
NPO	National Policy Objective
NRA	National Roads Authority
NSL	Noise Sensitive Location
NTS	Non-technical Summary
NWCPO	National Waste Collection Permit Office
OCUs	Odour Control Units
OPW	Office of Public Works
OTMP	Outline Traffic Management Plan
PCU	Passenger Car Unit
PDA	Planning and Development Act 2000
PE	Population Equivalent
PE	Potential Evapotranspiration
pNHA	Proposed Natural Heritage Area
PPE	Personal Protective Equipment
PPV	Peak Particle Velocity
PS	Pumping Station
PSD	Particle Size Distribution
PST	Primary Sludge Tanks
PTF	Picket Fence Thickeners
PV	Photovoltaic
PWS	Public Water Supply
RAS	Return Activated Sludge
Rg	Regionally Important Gravel Aquifer
Rkd	Regionally Important Aquifer - Karstified (diffuse)
RPO	Regional Policy Objective
RPS	Record of Protected Structures
RSES	Regional Spatial and Economic Strategy
RWMP	Resource Waste Management Plan
SAC	Special Area of Conservation

SCADA	Supervisory Control and Data Acquisition
SETU	South East Technological University
SID	Strategic Infrastructure Development
SME	Subject Matter Expert
SMR	Sites and Monuments Record
SOP	Standard Operating Procedure
SPA	Special Protection Area
SSFRA	Site-Specific Flood Risk Assessment
SWB	Surface waterbody
TBM	Tunnel boring machine
TII	Transport Infrastructure Ireland
TTA	Traffic and Transport Assessment
UAIA	Underwater Archaeological Impact Assessment
UE	Uisce Eireann
UV	Ultraviolet
UWWD	Urban Wastewater Treatment Directive
VEC	Vocational Educational College
VOC	Volatile Organic Compounds
WAC	Waste Acceptance Criteria
WAS	Waste Activated Sludge
WEEE	Waste Electrical and Electronic Equipment
WFD	Water Framework Directive
WMP	Waste Management Plan
WSSP	Water Services Strategic Plan
WwDL	Wastewater Discharge License
WwTP	Wastewater Treatment Plant

1. INTRODUCTION

This Environmental Impact Assessment Report (EIAR) has been prepared to accompany the proposed upgrade of the Mortarstown Wastewater Treatment Plant (WwTP). The development will comprise the upgrade of the existing Mortarstown WwTP, including the construction of a new inlet pumping station within the treatment plant site and a new microtunnelled gravity sewer along Kilkenny Road, extending between the existing Kilkenny Road Pumping Station and the proposed inlet pumping station. The development also includes landscaping, boundary treatments, internal roads, lighting, security fencing, and all associated ancillary site works (hereafter referred to as the Proposed Development).

Pre-application consultation (ABP-310980-21) with An Coimisiún Pleanála (ACP) was undertaken in accordance with Section 37B of the Planning and Development Act, 2000 (as amended), to determine whether the Proposed Development for Mortarstown will be classified as Strategic Infrastructure Development (SID).

Infrastructure Developments for the purposes of Section 37A and Section 37B of the Planning and Development Act, 2000, as amended (hereafter referred to as the 'PDA'), are set out under the 7th Schedule of the PDA. The 7th Schedule of the Act defines 'Environmental Infrastructure' as follows:

"A Wastewater treatment plant with a capacity greater than a population equivalent of 10,000 and, for the purpose of this provision, population equivalent will be determined in accordance with Article 2, point 6, of Council Directive 91/271/EEC."

Following consultations outlined in Section 37(B) of the PDA, ACP concluded that the Proposed Development meets the criteria for Strategic Infrastructure Development (SID). An ACP Direction (ABP-310980-21) was issued on 18 December 2025 and is included as part of the accompanying Planning Report. ACP determined that the Proposed Development exceeds the relevant threshold set out in the Seventh Schedule of the Planning and Development Act 2000 (as amended) and therefore satisfies the requirements of Section 37A(1) of the Act. Furthermore, ACP concluded that the Proposed Development is of strategic importance and meets the requirements of Sections 37A(2)(a) and 37A(2)(b) of the Act.

It is noted that a preliminary construction phase of c. 20 months is envisaged, as well as a 3-month commissioning phase. Notwithstanding, a 10-year permission is requested, having regard to:

- The strategic nature and extent and complexity of the Proposed Development.
- To provide adequate time for the planning consent process and other consent processes including a review of Discharge Licence, No D0028-01
- To allow adequate time for the provision of funding and the procurement process.

It is considered reasonable and appropriate to seek a period of the permission in excess of the standard five year period in this context.

The full planning application pack, including this EIAR will be available for public viewing from the ACP Office, Carlow County Council Office, or the SID Application Website www.mortarstownwwtp.ie



1.1 Project Background

1.1.1 Site Context

The site of the proposed upgrades to the Wastewater Treatment Plant (WwTP) is zoned “Utilities and Strategic Infrastructure” under the Carlow County Development Plan 2022–2028 (CDP), with the objective “to provide for the needs of all transport users and other utility providers.” The lands immediately to the north of the WwTP are not zoned.

The area within which the proposed outfall pipe is to be installed is primarily zoned “Amenity and Open Space”, with the objective “to preserve, provide for, and improve active and passive recreational public and private open space.” A small portion of the outfall route also passes through lands zoned “Residential 1 – Established”, with the objective “to protect and enhance the amenity of developed residential communities.”

Lands within the wider vicinity of the site comprise a mix of residential, commercial, and industrial uses. There are no known built heritage features of note within or adjoining the site. The site is located in proximity to the River Barrow and River Nore Special Area of Conservation (SAC) (Site Code: 002162). There is no known history of flooding associated with the site. The site location is presented in Figure 1-1.

1.1.2 Site Location

The Proposed Development is located in Mortarstown within the administrative area of Carlow County Council. The existing site comprises 3.79 hectares and the proposed site will comprise approximately 10.766 hectares of predominantly developed land, currently used for the existing Mortarstown WwTP and associated infrastructure. The Proposed Development will include the developing the vacant area to the west of the existing WwTP

The existing Mortarstown Wastewater Treatment Plant (WwTP) is located approximately 2.2 km south of Carlow Town Centre, within the townland of Mortarstown Upper, off Green Road, Co. Carlow (approximate grid reference: 52°49'09.2"N, 6°56'19.1"W). The site is generally flat, at an elevation of approximately 50 m AOD. The WwTP is predominantly bounded by agricultural lands, with a number of nearby sensitive receptors. The South East Technological University (SETU) campus is located to the north, with Tyndall College situated further to the south. To the west, the site is bounded by the Kilkenny Road (R488), a grazing field, and two existing dwellings. Lands to the east comprise agricultural fields, established residential properties, and a residential development currently under construction.

A strip just Northeast of WwTP has some Construction and Demolition waste and a strip North West has horses and trailers containing equine equipment. UÉ have purchased the vacant cottage which is situated along the western boundary of the existing WwTP. The existing WwTP site comprises infrastructure and equipment, and a mixture of grassed, concreted, hardcore and paved areas throughout. The existing WwTP is screened by mature vegetation along its northern eastern and southern boundaries.

The existing Pumping Station site is located approximately 1.2 km north of the existing WwTP along the R448 (Kilkenny Road), on the southern side of Carlow town centre and adjacent to the River Barrow. The site is bounded to the south by the Kilkenny Road (R448); to the west by vegetation/trees and the River Barrow; and to the north by partially cleared vegetation/trees, the River Barrow and the R448. To the east of the site lies the South East Technological University (SETU) campus and associated student accommodation.



The existing Pump Station is located at approximate grid reference 52°49'37.2"N, 6°56'16.0"W, and the site is generally level at approximately 47 m AOD.

The route of the proposed micro tunnel between the existing Kilkenny Road PS and existing Mortarstown WwTP is within Kilkenny Road. The existing outfall location is in close proximity to three residential houses and the area is grassed with thick vegetation.

1.1.3 The Applicant

The applicant, Uisce Éireann (hereafter referred to as UÉ), is the proposed developer of the upgrade of the Mortarstown Wastewater Treatment Plant. UÉ is a public utility formed as a company under the Water Services (No. 2) Act 2013 and incorporated under the Companies Act, and has established itself as the national single utility responsible for providing public water and wastewater services across Ireland. UÉ assumed responsibility for these services from Local Authorities nationwide and is now accountable for the planning, management, operation, and investment in water supply and wastewater infrastructure. Its statutory responsibilities include the management of approximately 1,000 water treatment plants and 1,000 wastewater treatment plants, the maintenance and operation of water and wastewater networks, investment planning, the delivery and management of capital projects, and customer care and billing, all undertaken to ensure the provision of safe drinking water, the effective collection and treatment of wastewater, and compliance with national and EU regulatory requirements.

UÉ has appointed an experienced multi-disciplinary design team to ensure that the proposed development is delivered in accordance with all relevant planning, environmental, and sustainability requirements. In its corporate business plan, UÉ states its core commitment that *“all of our customers should receive a safe and reliable supply of drinking water and have their wastewater collected and safely returned to the environment,”* a principle that underpins the organisation’s approach to investment, project delivery, and environmental protection in the development of national water services infrastructure.



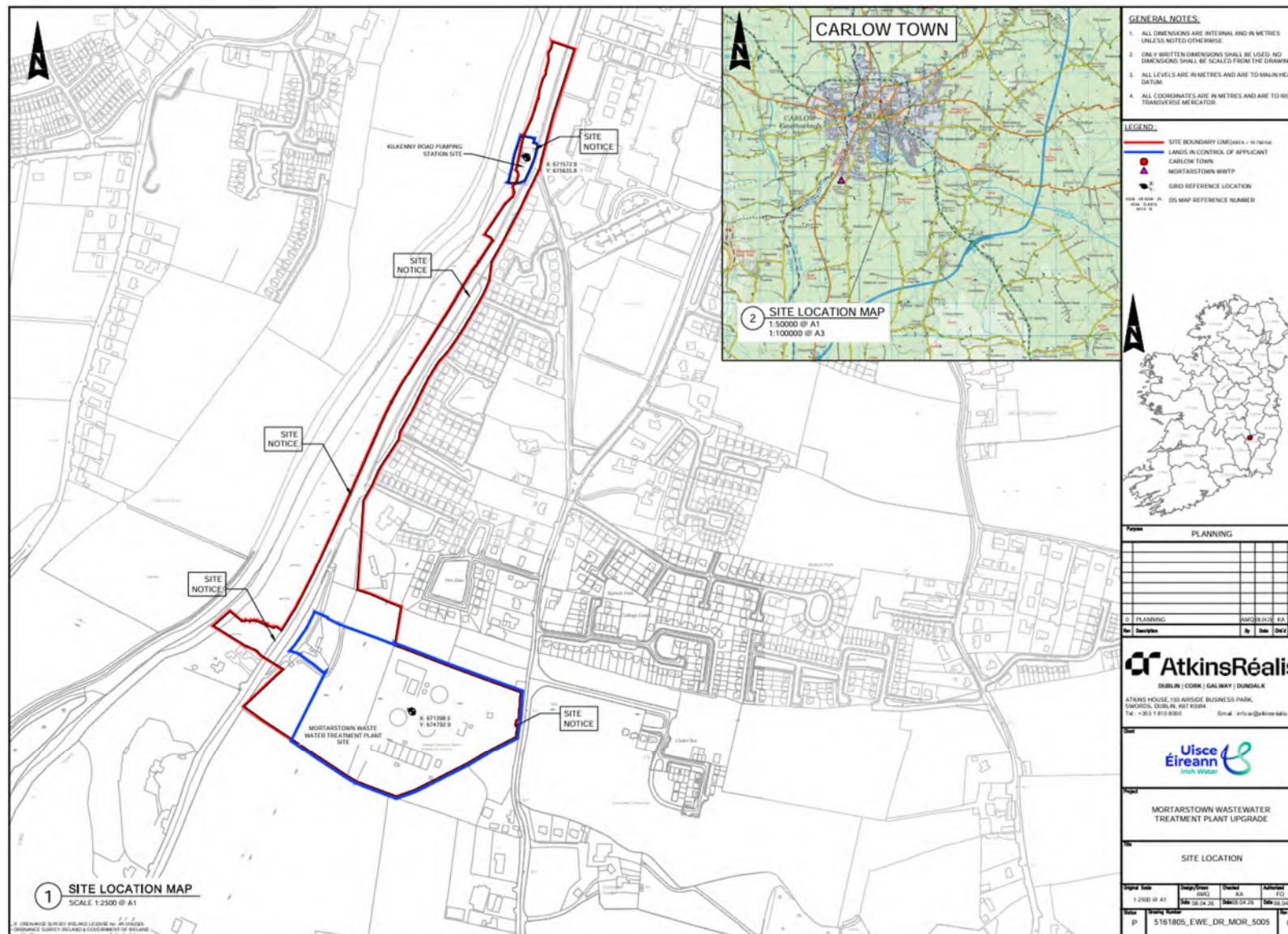


Figure 1-1 - Site Location (including redline boundary)



1.2 Project Description

1.2.1 Existing WwTP

The existing Mortarstown Wastewater Treatment Plant is located 2.2km south of Carlow Town on the eastern bank of the River Barrow and serves the Carlow Town and its environs. The WwTP is predominantly fed from the Kilkenny Road Pumping Station but also accepts flows from the Glen Pumping Station, College Green Pumping Station, Cluain Buí Pumping Station, Maple Court Pumping Station and the Vocational Educational College (VEC) Pumping Station.

The WwTP site consists of the existing wastewater treatment plant and associated buildings, structures, access road and adjacent agricultural land to the west. The current WwTP has a treatment capacity of 36,000 PE. Refer to Figure 1-2 and Figure 1-3.

The Kilkenny Road Pumping Station site consists of the pump house, steel hoist and inlet work. The pumping station is connected to the WwTP via a gravity fed micro tunnel and the WwTP outfall is located to the west on the eastern bank of the River Barrow. Refer to Figure 1-4.

The existing WwTP, with 1no. outfall, currently operates under a Wastewater Discharge Licence (EPA Ref: D0028-01, which was granted by the Environmental Protection Agency (EPA) in 2009, with technical amendments granted in October 2011, December 2016 and December 2021.



Figure 1-2 – Existing WwTP Site (3D Visualisation)¹

¹ Uisce Éireann (2025) Mortarstown WwTP Consultation Report



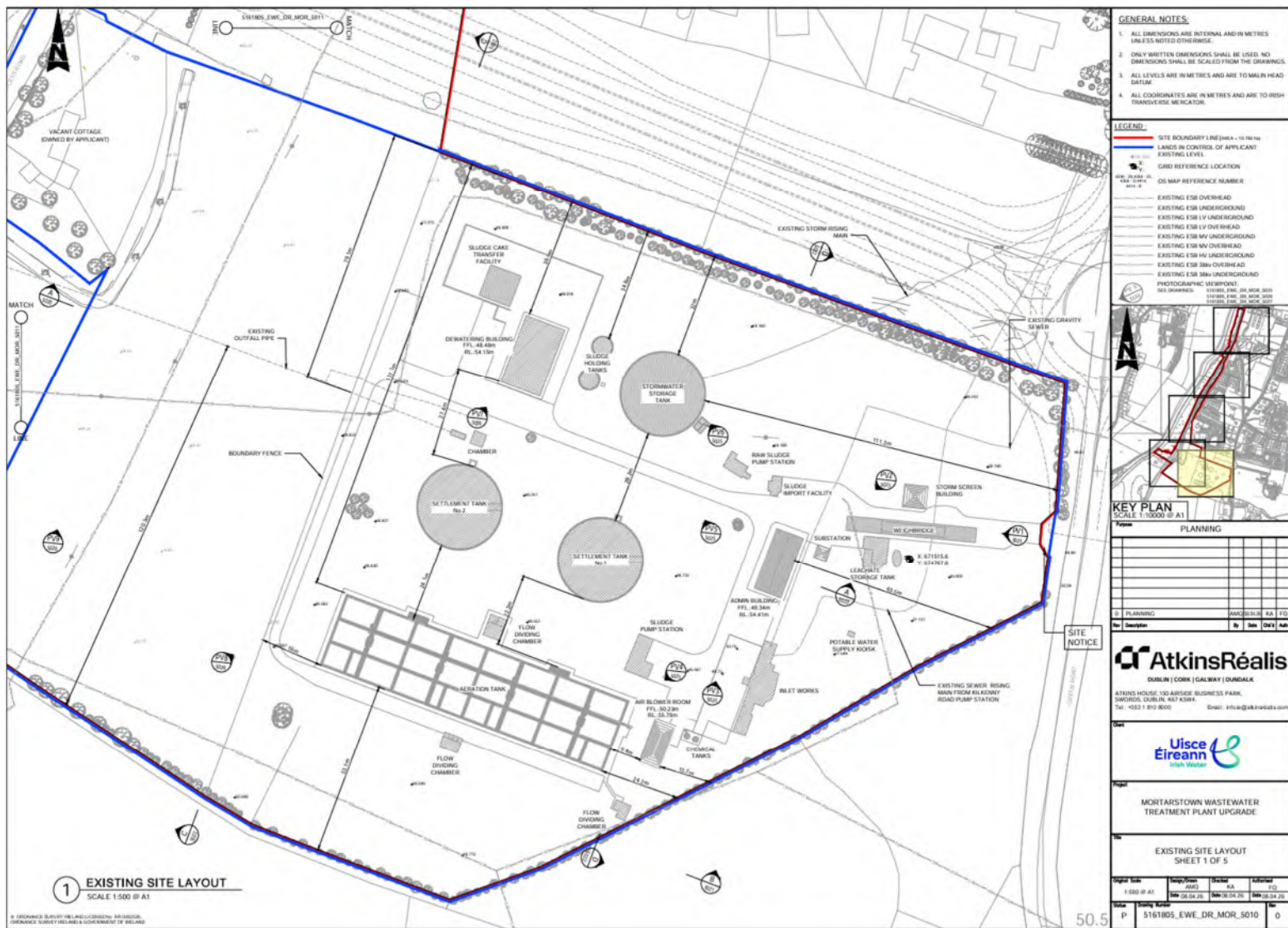


Figure 1-3 – Existing WwTP Layout showing all site infrastructure

1.2.2 Overview of the Proposed WwTP

The Proposed Development involves an increase in treatment capacity to 58,500 PE. It includes the expansion of the existing infrastructure associated with the Mortarstown WwTP into the adjoining land to the west, which forms part of the overall plot accommodating the existing WwTP and is owned by UÉ. The works will include the construction of a new microtunnel gravity sewer from the existing Kilkenny Road Pump Station to the new Pumping Station (located adjacent to the proposed inlet works). A new outfall pipe will also be constructed from the proposed WwTP outfall chamber to the River Barrow. The existing WwTP site covers approximately 3.79 hectares (ha), and following completion of the upgrade works, the site will increase to approximately 5.53 ha. The total Proposed Development area (red-line boundary) is approximately 10.766 ha. The site location and proposed red-line boundary are presented in Figure 1-1. The proposed microtunnel gravity sewer will run along Kilkenny Road and is 775m in length, which runs from the previous Kilkenny Road pumping station location to the new pumping station.

The upgrade works for the Mortarstown WwTP are described in more detail in Chapter 2 of this Report. In summary, the proposed works will comprise the following components:

- Microtunnel Gravity Sewer connecting the decommissioned Pumping Station(PS) to new Pumping Station
- New inlet Pumping station
- Decommissioning of Existing Kilkenny Road Pumping Station
- New Outfall chamber, Outfall Pipe including a microtunnel for the section crossing under the R448
- Provision of various new structures at existing Mortarstown WwTP which comprise the following structures:
 - New foul pumping station for local agglomeration adjacent to existing inlet works (supplemented by standby generator).
 - A new fuel storage tank and standby diesel generator to service the WWTP.
 - New inlet works which includes the provision of an new odour treatment unit.
 - 2 no. stormwater storage tanks and 2 no. stormwater return pumps.
 - New primary settlement tanks and new primary sludge pumps
 - Provision of 4 no. air blowers and modifications to existing air delivery pipework
 - Provision of new air blower building and new bubble diffused air system
 - Provision of 2 no. final settlement tanks with half-bridge scrapers.
 - Provision of new Return Activated Sludge (PAS) / Waste Activated Sludge (WAS) pumping station and station fitted with 2 no. RAS pumps and 2 no. WAS pumps.
 - Provision of 2 no. additional picket fence tank thickener.
 - Provision of 1 no. belt press, polymer prep unit and polymer dosing pumps.
 - Provision of new pumped sludge transfer system.
 - Provision of sludge import facility.
 - Provision of minimum 6 no. odour control units
 - Provision of Mechanical , Electrical , Instrumentation, Control and Automation (MEICA) and Supervisory Control and Data Acquisition (SCADA) upgrades.
 - New storage shed and associated gantry.

The following structures at Mortarstown WwTP will be refurbished:

- Structural refurbishment of picket fence tanks.
- Mechanical and electrical refurbishment of existing picket fence thickener and conversion of second existing tank to a sludge blending tank.



- Modifications to existing administration building.

1.2.2.1 Demolition Works

The following structures will be demolished :

- Demolition of existing inlet works structure.
- Demolition of existing storm tank;
- Demolition of Various small chambers within the site;
- Demolition of Existing sludge cake transfer facility;

1.2.2.2 Decommissioning Works

Existing plant/items to be decommissioned as part of the Proposed Development is as follows:

- Kilkenny Road pumping station;
- Existing rising main; and,
- Existing settlement tanks

1.2.2.3 Associated works

An area of approximately 155 m × 60 m within an existing grassed area located to the western side of the WwTP site has been allocated for the installation of ground-mounted photovoltaic (PV) solar panels. The proposed PV installation will have an installed capacity of approximately 382 kW and is expected to generate sufficient renewable energy to meet approximately 15% of the operational energy demand of the Proposed Development.

1.2.2.4 Potential Future works

The design lifespan of the upgraded plant is 25 years but it is anticipated that it will be maintained, with periodic upgrading undertaken over a longer lifetime to meet future demand and upgrades in technology.

UÉ have purchased the vacant cottage which is situated along western boundary of existing WwTP. No works are proposed for the vacant cottage at this stage. The vacant cottage and surrounding trees will remain in situ and UÉ will apply for the necessary consents should the cottage be repurposed at some point in the future.

1.3 Need for the Project

The existing Mortarstown Wastewater Treatment Plant (WwTP) currently has a treatment capacity of approximately 36,000 population equivalent (PE). In order to sustainably support future residential, commercial and industrial development, and to ensure continued compliance with environmental legislation, an upgrade and expansion of the WwTP to a capacity of 58,500 PE is required.

The Proposed Development is necessary to address current and future hydraulic and organic loading constraints at the plant, to alleviate overloading issues, and to bring the facility into full compliance with the requirements of the Urban Waste Water Treatment Directive, the EPA Wastewater Discharge Licence (D0028-01), and other relevant European and national environmental legislation. Importantly, the upgrade will ensure enhanced protection of the River Barrow, which is designated as a Special Area of Conservation (SAC) under the Habitats Regulations, 2011. By improving treatment performance and effluent quality, the Proposed Development will contribute to safeguarding the ecological integrity of this sensitive receiving environment.

Upon completion, the Proposed Development will deliver the following key benefits:

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- Enable future growth and development within Carlow Town and its environs by providing essential wastewater infrastructure to support an increasing population;
- Enhance Carlow's amenity value through the provision of a cleaner and healthier environment, thereby acting as a platform for sustained social and economic development;
- Improve water quality in the River Barrow, with consequent benefits for biodiversity, ecology, recreation, sporting use and tourism; and
- Ensure that wastewater generated within the catchment is treated in full accordance with European Union Urban Wastewater Treatment Directives and EPA wastewater discharge licensing requirements.

At a strategic level, the Proposed Development is essential to support implementation of the Regional Spatial and Economic Strategy (RSES) for the Southern Region 2020–2032, which identifies Carlow as one of fourteen designated Key Towns. As a Key Town, Carlow performs an important regional function, acting as a major centre for public services, including healthcare, education, judicial services and national government functions, as well as fulfilling significant economic, business and higher-order retail roles. The RSES recognises that such centres require appropriately phased and sustainable infrastructure investment, including wastewater treatment capacity, to facilitate compact growth and environmentally responsible development.

The Proposed Development also aligns with the growth objectives set out in the Carlow County Development Plan 2022–2028, which identifies the provision of adequate wastewater infrastructure as a critical enabling factor for population growth, housing delivery, employment generation and town centre revitalisation.

From a national infrastructure perspective, the Proposed Development forms part of UÉ's Investment Plan 2020–2024, which identifies fifty-one priority “above-ground” wastewater treatment projects required to address strategic capacity and compliance deficits across the country. The Mortarstown WwTP upgrade is listed as one of these priority projects. Furthermore, the development is also identified as a priority capital project in Appendix 4 of the Draft Investment Plan 2025–2029, demonstrating its continued strategic importance.

The Proposed Development is directly underpinned by UÉ's Water Services Strategic Plan (WSSP), which was approved by the Minister in July 2025 under the Water Services (No. 2) Act 2013. The WSSP establishes a long-term framework for the sustainable delivery of water and wastewater services nationwide. In particular, Strategic Objective WW (Wastewater) seeks to ensure the effective management of wastewater services, while Strategic Aim WW1 specifically aims to protect environmental quality and bring wastewater treatment plants into compliance with the Urban Waste Water Treatment Directive.

The UÉ Strategic Funding Plan 2025–2029, together with the Investment Plan 2020–2024 and the Draft Capital Investment Plan 2025–2029, sets out the financial and delivery mechanisms required to implement these strategic objectives. These plans collectively identify the Mortarstown WwTP upgrade as necessary for the effective performance of UÉ's statutory functions.

In summary, the Proposed Development is strategically aligned with national, regional and local planning policy. The upgrade of the Mortarstown WwTP from 36,000 PE to 58,500 PE is essential to address existing capacity limitations, ensure regulatory compliance, protect the River Barrow SAC, and enable sustainable growth in Carlow Town in accordance with adopted planning and investment frameworks.

A detailed Project Description is included in Chapter 2 of this EIAR.

1.4 Legislative Framework

This section details current European Union (EU), national, regional and the relevant local policy and legislation which relates to wastewater treatment, and how the proposed development complies with the legislative framework.

1.4.1 European Framework

1.4.1.1 Water Framework Directive

The Water Framework Directive (WFD) (2000/60/EC) establishes a comprehensive framework for the protection and improvement of surface waters and groundwater across the European Union. Its overarching objective is to prevent further deterioration of the status of EU water bodies and to achieve at least “good” ecological and chemical status for rivers, lakes, transitional waters, coastal waters, and groundwater. The Directive promotes integrated river basin management and requires that water planning and decision-making are undertaken at catchment scale.

In Ireland, the WFD is given legal effect through the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003). These regulations require the protection and enhancement of water quality in all waters, the prevention of deterioration in existing status, and the achievement of good ecological status by 2015, or where justified, by no later than 2027. Compliance with the WFD is a key consideration in the assessment of developments that may interact with the water environment, ensuring that proposed works do not adversely affect water quality or the achievement of WFD objectives.

1.4.1.2 Urban Wastewater Treatment Directive

The Urban Wastewater Treatment Directive (91/27/EEC), revised and recast in November 2024 as Directive (EU) 2024/3019 and effective from 1 January 2025, strengthens the EU framework for the collection and treatment of urban wastewater to protect human health and the environment. The revised Directive introduces enhanced treatment requirements, including controls on emerging pollutants and micropollutants, reinforces the polluter-pays principle, and promotes energy efficiency, circular economy measures, and climate resilience in the wastewater sector. Urban agglomerations of 10,000 population equivalent (PE) or greater discharging to sensitive waters are required to provide treatment capable of removing at least 80% of micropollutants by 2045, supporting compliance with long-term water quality objectives.

1.4.2 National Legislation, Policy and Guidelines

1.4.2.1 National Planning Framework – First Revision (2025)

The NPF First Revision (April 2025) emphasises the delivery of critical strategic infrastructure, including wastewater services, as essential to supporting sustainable growth in the context of climate transition, regional development, demographic change and investment priorities. Under National Strategic Outcome (NSO) 9 – Sustainable Management of Environmental Resources, it seeks to bring and maintain wastewater services to acceptable international standards and to undertake detailed network and capacity assessments to support plan-led housing and economic development in priority towns and urban areas. In addition, National Policy Objective (NPO) 92 requires that planned growth is aligned with the efficient and sustainable use of water resources and services infrastructure, recognising that the environmentally sound treatment and disposal of wastewater is critical to protecting human health, preventing untreated discharges and ensuring coordinated investment to support a cleaner environment and long-term development.

1.4.2.2 National Development Plan 2021-2030 and NDP Review 2025

The National Development Plan (NDP) sets out investment priorities to support the effective implementation of the National Planning Framework and to deliver a high-quality, resilient infrastructure base across Ireland. It places strong emphasis on sustained investment in water and wastewater infrastructure and services to facilitate new connections, aligned with the planning process to support economic growth, priority housing delivery and urban regeneration, while ensuring compliance with public health, safety and environmental standards. The

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NDP Review strengthens this commitment through a dedicated allocation of €12 billion for water services infrastructure, including an additional €4.5 billion above the original provision, reinforcing the critical role of wastewater infrastructure in enabling sustainable and plan-led development.

1.4.2.3 Water Services Policy Statement 2024-2030

The Water Services Policy Statement 2024–2030 provides the national policy framework for the delivery of safe, reliable and sustainable water and wastewater services, setting out objectives for availability and reliability, safety and quality, and long-term sustainability. It confirms the central role of UÉ in planning, delivering and operating wastewater infrastructure in compliance with EU environmental legislation and best international practice, while supporting public health, environmental protection and plan-led growth. The continued operation and any upgrade or capacity enhancement of the Northtown Wastewater Treatment Plant are consistent with these objectives, contributing to improved wastewater treatment standards, protection of receiving waters and the provision of adequate wastewater infrastructure to support housing and economic development within the serving area.

1.4.3 Regional Policy

1.4.3.1 Regional Spatial and Economic Strategy 2020-2032 for the Southern Region

The Regional Spatial and Economic Strategy (RSES) for the Southern Region provides the regional policy context for the proposed development and supports the implementation of the National Planning Framework (NPF). The RSES vision seeks to promote the Southern Region as an attractive, competitive, and sustainable place to live, work, and visit, underpinned by strong cities and towns, high-quality infrastructure, a diverse economy, and protected natural environments. Carlow is designated as a Key Town within the RSES and is prioritised for sustainable compact growth and targeted infrastructural investment to support its role as a regional and inter-regional economic driver.

The RSES places strong emphasis on the delivery of water and wastewater infrastructure to facilitate planned growth. Regional Policy Objective (RPO) 14 supports investment in water and wastewater infrastructure to enable the sustainable development of Carlow as a regional growth centre and to deliver infrastructure requirements subject to appropriate environmental assessment. In addition, RPO 215 requires Development Plans to support strategic wastewater infrastructure investment and the separation of foul and surface water networks to accommodate future growth. Section 8.1 of the RSES further identifies wastewater management as a key regional priority, promoting timely, infrastructure-led growth supported by targeted investment and phased development.

The RSES also establishes a robust environmental framework for wastewater management. RPOs 212 and 214 support investment in strategic wastewater treatment facilities by UÉ while requiring that development be planned to ensure the assimilative capacity of receiving environments is not exceeded and that there are no adverse effects on water quality or the Natura 2000 network. The elimination of untreated discharges and compliance with the EU Urban Wastewater Treatment Directive are identified as regional objectives. In this context, the proposed development aligns with the RSES by supporting essential wastewater infrastructure upgrades required to facilitate sustainable growth in Carlow while safeguarding environmental sensitivity and ecological integrity.

1.4.4 Local Planning Policy

1.4.4.1 Carlow County Development Plan 2022-2028

The Carlow County Development Plan 2022–2028 provides the statutory planning framework for the proposed development. A central objective of the Plan is to promote the sustainable and compact growth of Carlow Town and to strengthen its role as a self-sustaining regional and inter-regional economic driver. Carlow Town is identified as the County's Tier 1 settlement, reflecting its strategic location, accessibility, and function as a key urban centre supporting population growth, regeneration, quality of life, and economic investment. The Plan places particular emphasis on the provision of enabling infrastructure to support this growth in a sustainable manner.

Infrastructure delivery, including wastewater, is identified as a critical component of achieving compact growth. Strategic objectives and policies within the Plan explicitly support the provision, maintenance, and upgrading of wastewater infrastructure by UÉ to service existing and future development in accordance with the Core Strategy and Settlement Hierarchy. Notably, the Plan specifically identifies improvement and upgrade works at Mortarstown Wastewater Treatment Plant as necessary infrastructural works and includes a specific objective to facilitate such upgrades during the lifetime of the Plan, subject to compliance with relevant environmental and planning legislation.

The Plan also places strong emphasis on environmental protection and biodiversity conservation. Policies seek to protect natural heritage, inland waters, designated Natura 2000 sites including the River Barrow and River Nore SAC and features such as woodlands, trees, and hedgerows. Development proposals are required to ensure no adverse effects on designated sites, watercourses, or biodiversity, and to comply with EU and national environmental legislation. In this context, the proposed development aligns with the Plan's strategic objectives by supporting essential wastewater infrastructure upgrades while operating within a robust environmental protection framework.

1.5 Legislative Requirements for Environmental Impact Assessment (EIA)

1.5.1 EIAR Screening

This Environmental Impact Assessment Report (EIAR) has been prepared to accompany the proposed upgrade of the Mortarstown Wastewater Treatment Plant (WwTP) and associated infrastructure, in accordance with the requirements of the Planning and Development Act 2000 (as amended) and the Planning and Development Regulations 2001 (as amended).

Schedule 5 of the Planning and Development Regulations identifies the classes of development for which an Environmental Impact Assessment (EIA) is required. Part 1 of Schedule 5 sets out developments for which the preparation of an EIAR is mandatory, while Part 2 lists developments that are subject to EIA either by mandatory requirement where applicable thresholds are exceeded, or otherwise by way of EIA screening.

Schedule 5, Part 2, Section 11 refers to:

“Wastewater treatment plants with a capacity greater than 10,000 population equivalents as defined in Article 2(6) of Council Directive 91/271/EEC, not included in Part 1 of this Schedule.”

As outlined in Section 1.3.2 of this EIAR, the proposed upgrade works at Mortarstown WwTP will result in a treatment capacity in excess of 10,000 population equivalent. As the relevant statutory threshold is exceeded,

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the proposed development falls within Schedule 5, Part 2, Section 11 and therefore requires the mandatory preparation of an EIAR.

Based on the nature, scale, and capacity of the proposed development, this EIAR has been prepared to assess the likely significant effects of the proposed development on the environment and to inform the decision-making process of the competent authority.

1.5.2 Strategic Infrastructure

The Planning and Development (Strategic Infrastructure) Act 2006 was established to streamline the planning process for significant infrastructure projects. The planning application is made directly to ACP. Under the Act, applications for SID must be accompanied by an EIAR and a Natura Impact Statement (NIS). The process includes a pre-application consultation with ACP.

1.5.3 EIA Directive (2014/52/EU)

The EIA Directive (2014/52/EU) (the EIA Amendment Directive) was adapted by the Council of the European Union and amended Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment. Article 2 of the EIA Amendment Directive required Member States to bring the Directive into force by May 2017. The EU (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018) came into effect in September 2018 and gave effect to Directive 2011/92/EU as amended by the EIA Amendment Directive.

Article 1(2)(g) of the 2014 EIA Directive states that the EIA process consists of the following:

- The preparation of an EIAR by the development.
- Undertaking consultations;
- The examination of the information by the competent authority on the information presented in the EIAR and, any additional information received under an RFI;
- The reasoned conclusion by the Competent Authority on the significant effects of the proposed development on the environment and their reasoned conclusion into its final decision.

The EIAR will provide the following information:

- A baseline assessment of the existing environment;
- Identification of the significant environmental effects (both positive and negative) that are predicted to occur as a result of the proposed development
- A description of suitable mitigation measures that will minimise/remedy the identified significant environmental effects; and,
- A description of all reasonable alternatives that were considered.

1.5.4 Scoping of the EIAR

The scoping study is a key element of the EIAR process and signifies commencement of the development of an EIAR. 'Scoping' is a process of deciding what information should be contained in an EIAR and what methods will be used to gather and assess that information. It is defined in the European Commission Guidance on the Preparation of Environmental Impact Assessment as:

'determining the content and extent of the matters which should be covered in the environmental information to be submitted 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 focuses 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 factor needs 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 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.*
- *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.*
- *Interactions – careful consideration of 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.*

As part of the scoping process, a preliminary environmental scoping exercise has been carried out, to define the preliminary scope of the EIAR. It has been determined during this exercise that the following key topics will require assessment within the EIAR.

- Population & Human Health;
- Biodiversity;
- Landscape and Visual;
- Air Quality & Odour;
- Climate;
- Noise & Vibration;
- Traffic;
- Land, Soils & Geology;
- Water;
- Cultural Heritage,
- Material Assets and;
- Major Accidents and Disasters.

As part of the assessment process, an environmental scoping exercise was carried out. The purpose of the exercise was to define the scope of the EIAR. The environmental factors assessed within this EIAR are detailed in Chapter 4 to Chapter 15. The EIAR scoping report (Appendix 1-1, Volume 3 of the EIAR) was completed and consultation was undertaken with relevant statutory organisations as part of the assessment process (Appendix 1-2, Volume 3 of the EIAR), as detailed further in Chapter 2.

The EIAR considers the demolition, construction and operational phases of the proposed development and takes into consideration the potential for cumulative impacts with other projects / developments, where relevant, which have been granted planning permission, within the surrounding area and within the town of Carlow.

1.5.4.1 Scoping Responses

As part of the EIAR assessment process, consultation was undertaken with statutory organisations at various stages of the pre-planning process. The EIAR Scoping Report (Appendix 1-1, Volume 3 of the EIAR) was circulated to all environmental consultees (except where noted) by email in April 2025 (during the Environmental Scoping phase of EIAR) regarding any environmental or planning interests that they may have in relation to the Mortarstown development. A full list of consultees consulted (2021-2025) including date and method of correspondence is presented in Appendix 1-2.

In addition, as part of the consultation process individual meetings were arranged with a number of key stakeholders to effectively discuss the key potential issues of the project.

A summary of all relevant feedback in relation to the Proposed Development is presented below. A copy of all pre-application consultation correspondence received from statutory organisations as part of the EIAR process is presented in Appendix 1-2.

All relevant comments from the various consultees have been fully addressed as required within this EIAR and the accompanying Natura Impact Statement.

The responses to the comments received from Carlow County Council, Department of Housing, Local Government and Heritage (NPWS and Heritage), Geological Survey Ireland (GSI), Health and Safety Authority (HSA), Transport Infrastructure Ireland (TII), ESB Networks and Failte Ireland are outlined below. These responses in respect of this new planning application remain relevant and have been fully addressed as part of this planning submission.

1.5.4.1.1 Carlow County Council

Earlier engagement included email correspondence from Carlow County Council Planning, Environmental and Traffic in 2021 (refer to Appendix 1-2, Volume 3 of the EIAR). The Council acknowledged receipt of the EIAR Scoping Report on 24 April 2025, with no further formal correspondence received thereafter, while a separate acknowledgement was issued by the Roads Office on 25 April 2025.

The need for design revision arose following a constraint identified on 13 March 2026, when it was specified that the shaft opening could not be located within the road traffic carriageway. Subsequent discussions, including a key meeting on 23 March 2026, explored alternative shaft locations, resulting in a revised tunnel alignment that required an additional shaft located west of the inlet pump station. Updated alignment proposals were circulated to stakeholders. .

Refer to Section 1.9 for further details on the pre-application meeting that took place in July 2025.

1.5.4.1.2 Department of Housing, Local Government and Heritage (NPWS)

In an email correspondence dated 19 August 2025, AtkinsRéalis followed up with the Department for comment and highlighted the link to previous formal communication received in 2021 and the site visit attended by NPWS in June 2024.

In response, a representative of DAU confirmed that the Department has no comment on this particular consultation at this time and that no inference should be drawn from this that the Department is satisfied or otherwise with the proposed activity. It is understood that the Department may submit observations/recommendations at a later stage in the process however no further communication was received.

1.5.4.1.3 Department of Housing, Local Government and Heritage (Heritage)

Email correspondence from the Department was received in 21st July 2021 which included the following:



Underwater Archaeology As part of the Cultural Heritage Assessment in the proposed EIA, all impacts into the River Barrow should be archaeologically assessed, by way an Underwater Archaeological Impact Assessment (UAIA) in advance. The assessment should assess both river bank and in river impacts.

The UAIA should be undertaken by a suitably qualified and experienced underwater archaeologist and should be carried out under licence (Dive Survey Licence and Detection Device Licence), with a detailed method statement submitted to the National Monuments Service's Licencing Section.

The UAIA should fully record river bank and river bed topography via detail survey that includes descriptive and photographic, including the carrying out of a metal detection survey. The UAIA should also address ingress and egress locations in the river by plant and machinery and assess the proposed methodology for placement of rock ramp and large stonework in the river, should they be needed for any outfall works.

The UAIA Report, once submitted, will be reviewed by the Underwater Archaeology Unit and a response will issued when the results of the UAIA have been considered.

The above observations/recommendations are based on the papers submitted to this Department on a pre-planning basis and are made without prejudice to any observations that the Minister may make in the context of any consultation arising on foot of any development application referred to the Minister, by the planning authority/ies, in the role as statutory consultee under the Planning and Development Act, 2000, as amended.

In letter correspondence dated 22 May 2023, the Department noted the following:

Underwater Archaeology

The submission documentation, including the submitted 'Underwater Archaeological Impact Assessment (UAIA) Proposed Outfall Mortarstown WWTP River Barrow, Mortarstown Upper Carlow Town 22D0069, 22R0225' (ADCO April 2023) has been reviewed by the Underwater Archaeology Unit of this Department, who are charged, as statutory consultees in the planning process, on behalf of the Minister for Housing, Local Government and Heritage, with the protection, preservation and promotion of underwater cultural heritage in Ireland.

It is noted that the UAIA concludes that 'No archaeologically significant features, structures, or deposits were observed for either the immediate impact location or the wider assessment area'. As mitigation, it is recommend that construction phase archaeological monitoring of the outfall installation works takes place. Without prejudice to any further iterations of the proposed development design and planning submission, we concur with the recommendations for archaeological mitigation as outlined in the archaeological assessment report and recommend, the following mitigation measures be implemented.

Archaeological Recommendations

1. *Archaeological monitoring is to take place of all works that involve groundworks or an impact to the river bed/banks and their environs, including any geotechnical site investigations, as below:*
 - a) *The services of a suitably qualified and suitably experienced underwater archaeologist shall be engaged to carry out the archaeological monitoring.*
 - b) *The archaeological monitoring shall be licensed by this Department and a detailed method statement that sets out the monitoring strategy is to accompany a licence application.*
 - c) *A Finds Retrieval Strategy shall be included in the methodology and all excavated deposits shall be spread and metal detected (under licence) to recover any archaeological objects that they may contain.*



- d) *The monitoring archaeologist shall obtain a dive/survey licence in order to facilitate investigation of underwater archaeological materials should they be uncovered/identified.*
- e) *Please note vetting of licence applications by the Department takes 3-4 weeks.*
- f) *A communication strategy is to form part of the monitoring strategy to ensure full communication is in place between the monitoring archaeologist and the plant operator(s) at all times during works. The archaeological personnel undertaking the monitoring will be in a position to monitor directly all elements of the works, to ensure they have unobstructed views of the excavations, and the plant and machinery operators shall be prepared to facilitate the archaeological personnel in the undertaking of their monitoring work.*
- g) *Should archaeological materials be found during the course of monitoring, the archaeologist shall have work on the affected area of the site stopped pending further archaeological investigation and a decision by the Department regarding appropriate mitigation. The developer shall be prepared to be advised by this Department with regard to any mitigating action (preservation in-situ and/or excavation). The developer shall facilitate the archaeologist in recording any material found.*
- h) *The planning authority and this Department shall be furnished with a final archaeological report describing the results of the monitoring and any subsequent required archaeological investigative work/excavation required, following the completion of all archaeological work on site and any necessary post-excavation specialist analysis. All resulting and associated archaeological costs shall be borne by the developer.*

1.5.4.1.4 Geological Survey Ireland

Letter correspondence from GSI in 2021 has been included in Appendix 1-2, Volume 3 of the EIAR.

In letter correspondence dated 12 May 2025, the GSI provided the latest GSI data sets to be used when conducting the EIAR, SEA, planning and scoping processes for developments, plans and policies.

1.5.4.1.5 Health and Safety Authority

In an email correspondence dated 28 April 2025, the HSA queried what dangerous substances are proposed to be stored and used in process at the WTP including fuel storage.

In response on the 14th May 2025, AtkinsRéalis confirmed the following:

In terms of fuel storage, it is envisaged that a diesel storage tank of 5,000 litres (estimated max volume) will be housed on-site to fuel the Diesel Powered Standby Generator (as discussed before), this is typical arrangement at large Wastewater Treatment Plants, Water Treatment Plants, Pump Stations, Hospitals, shopping centres etc where a diesel powered standby generator is installed.

The Wastewater Treatment Plant itself treats the wastewater biologically, but a chemical called Ferric Sulphate ($\text{Fe}_2(\text{SO}_4)_3$) with a 40-50% w/w concentration strength, is stored and dosed to the wastewater to allow the chemical precipitation of Phosphorus from the wastewater. The product is non-combustible and is not included in COMAH Schedule 1 of dangerous substances. It is anticipated that 15,000 litres of Ferric Sulphate will be stored on-site in dedicated, bunded storage tanks all designed and installed in accordance with UÉ specifications.

A chemical called polyelectrolyte (poly) is dosed in small quantities to the biological sludge generated at the treatment plant, to facilitate the dewatering of the sludge. Poly can be supplied in powder form (in 25kg bags) or concentrated liquid form (1,000litre IBCs). It is anticipated that a pallet or 40 No. 25kg bags of powder poly would be stored on site or 2 No. to 3 No. 1,000litre IBCs of concentrated liquid poly. The product is not included

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in COMAH Schedule 1 dangerous substances. The liquid is not considered to be flammable and a non explosible (Group B) type powder poly grade is anticipated to be used. Chemicals will be stored in bunded areas designed and installed in accordance with UÉ specifications.

Chlorine Gas, Sodium Hypochlorite are not stored or used at the site, nor is hydrofluosilicic acid (fluorine) which are chemicals that might be stored or used at a Water Treatment Plant.

1.5.4.1.6 Inland Fisheries Ireland

No correspondence was received and a follow up email was sent in July 2025.

1.5.4.1.7 Transport Infrastructure Ireland

In an email correspondence dated 2nd May 2025, TII provided best practice guidance and made reference to previous correspondence from July 2021. The following comments / recommendations were provided:

Having regard to the EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports, 2022 it is recommended as appropriate that the national road and light rail networks be recognized as strategic transport assets under “material assets”. EIAR assessment and mitigation should have regard to the following:

- *National Roads: Official policy for development at or near national roads is set out in the DoECLG Spatial Planning and National Roads Guidelines for Planning Authorities (2012) available at <https://www.gov.ie/en/collection/85b83-planning-guidelines-standards/>,*
- *TII Publications: In addition, as part of TII’s responsibilities for managing and improving the country’s national road and light rail networks, the Authority sets development guidance and standards for traffic and road assessments and construction that may be necessary by reason of proposed development location, scale or typology to be prepared to accompany applications for developments or works. Technical guidance and standards are contained in TII Publications, available at <https://www.tiipublications.ie/>.*

In addition, the EIAR should have regard to, inter alia, the following:

National Road Network

- *TII would be specifically concerned with to potential significant impacts the development would have on the national road network (and junctions with national roads) in the proximity of the proposed development,*
- *Consultations should be had with the relevant Local Authority/National Roads Design Office (RDO) with regard to locations of existing and future national road schemes,*
- *The EIAR should have regard to any prior Environmental Impact Statement or Assessment Report and all conditions and/or modifications imposed by An Bord Pleanála regarding road schemes in the area. The developer should in particular have regard for any potential cumulative impacts,*
- *The EIAR should have regard to the provisions of Chapter 3 of the DoECLG Spatial Planning and National Roads Guidelines in the assessment.*

TII Publications

- *It would be important that, where appropriate, subject to meeting the appropriate thresholds and criteria and having regard to best practice, a Traffic and Transport Assessment be carried out in accordance with relevant guidelines, noting traffic volumes attending the site and traffic routes to/from the site with reference to impacts on the national road network and junctions of lower category roads with national roads. TII’s*

Traffic and Transport Assessment Guidelines (TII Publication No. PE-PDV-02045) should be referred to in relation to the proposed development with potential impacts on the national road network. The scheme promoter is also advised to have regard to Section 2.2 of the Guidelines which addresses requirements for sub-threshold TTA

- *The designers and assessors are asked to consult TII Publications to determine whether a Road Safety Audit is required.*

TII environmental assessment guidance

- *The EIAR should have regard to TII's Environmental Assessment and Construction Guidelines, including the Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (March 2014),*
- *The EIAR should consider the European Communities (Environmental Noise) Regulations 2018 (S.I. No. 549 of 2018)) and, in particular, how the development will affect future action plans by the relevant competent authority. The developer may need to consider the incorporation of noise barriers to reduce noise impacts (see Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (March 2014)*

Haul routes utilising the national road network

Elements of the national road network are operated and managed by a combination of Public-Private Partnership (PPP) Concessions, Motorway Maintenance and Renewal Contracts (MMaRC) and local road authorities in association with TII. In relation to haul route identification, the applicant/developer should clearly identify haul routes proposed and fully assess the network to be traversed to ascertain any operational requirements, including delivery timetabling, etc. to ensure that the strategic function of the national road network is safeguarded,

- *Separate structure approvals/permits and other licences and works-specific deeds of indemnity may be required in connection with the proposed haul route, including where temporary modification to the road network may be required. Consultation with relevant local authorities, PPP Concessions and MMaRC may also be required,*
- *All structures on the haul route should be checked by the applicant/developer to confirm their capacity to accommodate any abnormal load proposed, including abnormal weight load. Additionally, any damage caused to the pavement on the existing national road arising from any temporary works due to the turning movement of abnormal loads (e.g. tearing of the surface course, etc.) shall be rectified in accordance with TII Pavement Standards and details in this regard shall be agreed with the Road Authority prior to the commencement of any development on site.*

National Road Crossings

- *In the interests of maintaining the safety and standard of the national road network, the EIAR should identify the methods/techniques proposed for any works traversing/in proximity to the national road network,*
- *The preferred method of necessary national road network crossings is horizontal directional drilling (HDD). It is appropriate for the designers to contact thirdpartyworks@tii.ie in order to coordinate and process approvals for this type of crossing that may include requirements for Section 53 consent and specific indemnities for the works.*



1.5.4.1.8 ESB Networks

In an email correspondence dated 9th May 2025, ESB provided a reference number from the Kilkenny Local Area Office. A telephone and email follow up with ESB was completed by AtkinsRéalis however no further response was received.

In correspondence dated 9 May 2025, ESB Networks provided a reference number from the Kilkenny Local Area Office in respect of the submitted application. Subsequent follow-up by AtkinsRéalis was undertaken via both telephone and email; however, no further response has been received to date.

An application was submitted to ESB Networks in relation to the Mortarstown WwTP site, comprising a Commercial Capacity Change (change in kVA assigned to the site) and relocation works, including adjustments to overhead lines affecting the location of site equipment and the proposed PV farm, as well as the diversion of main electrical cables currently traversing the site and transitioning to below-ground level.

Notwithstanding the absence of direct communication, the status of the application has been monitored on an ongoing basis. It is noted that the applications have now been assigned ESB Job Numbers, indicating that they are progressing through the ESB Networks review process.

1.5.4.1.9 Failte Ireland

In email correspondence dated 2021, the EIAR Guidelines for the Consideration of Tourism and Tourism related Projects was provided.

A copy of the guidelines in full have been included in Appendix 1-2.

1.5.4.1.10 Other Comments

The following consultees responded with automated receipt notifications, noted that they had no comments, queries, or observations at this time or noted that the consultee would endeavour to respond:

- Birdwatch Ireland via email dated 10th April 2025;
- Commission for Regulation of Utilities dated 14th April 2025;
- Department of Transport dated 14th April 2025;
- Health Service Executive dated 15th April 2025;
- Ireland Wildlife Trust dated 14th April 2025;
- Laois County Council Roads Department dated 24th April 2025;
- National Transport Authority dated 15th April 2025;
- Office of Public Works dated 14th April 2025;
- Department of the Environment, Climate and Communications dated 20th July 2021;
- Eastern and Midland Regional Assembly dated 20th July 2021 and
- Environmental Protection Agency dated 23rd July 2021.

A copy of all correspondence is presented in Appendix 1-2



1.5.5 Appropriate Assessment

Natura 2000 sites, which comprise Special Protection Areas (SPAs) and Special Areas of Conservation (SACs), are a network of sites designated across Europe in order to protect biodiversity within the EU. SACs are designated under the EU Habitats Directive (92/43/EEC), while SPAs are designated under the EU Birds Directive (2009/47/EC).

Article 6(3) and (4) of the Habitats Directive set out the decision-making tests for plans or projects that could potentially affect Natura 2000 sites. Article 6(3) establishes the requirement for Appropriate Assessment:

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

Such an assessment is known as an Appropriate Assessment (AA). Guidance on this process is provided for the wider EU context in EC (2019, 2021), as summarised in DG Env (2022), and in an Irish context in DEHLG (2010a,b) and OPR (2021), as well as in case law, including but not limited to *Waddenzee* (C-127/02), *Sweetman v. An Bord Pleanála* (C-258/11), *Kelly v. An Bord Pleanála* (IEHC 400), *Commission v. Germany* (C-142/16), *People Over Wind* (C-323/17), *Holohan v. An Bord Pleanála* (C-461/17), *Eoin Kelly v. An Bord Pleanála* (IEHC 84), *Heather Hill* (IEHC 450) and *Eco Advocacy v. An Bord Pleanála* (C-721/21).

As the proposed development is not directly connected with or necessary to the management of any Natura 2000 site, an AA Screening Report (AtkinsRealis, 2025) was prepared to determine whether or not it was likely to have a significant effect on any such site. This report concluded as follows:

‘Following the assessment detailed in this report, it is concluded that the proposed development, in the absence of appropriate mitigation, has potential to give rise to impacts which could significantly affect the River Barrow and River Nore SAC, in view of its conservation objectives. Therefore, it recommended that the competent authority should determine that Stage 2 Appropriate Assessment is required in respect of the proposed development and, therefore, that an NIS should be prepared to assess the implications of the proposed development for the integrity of the site concerned and prescribe appropriate mitigation to remove the possibility of any adverse effects on the integrity of the site.’

Accordingly, a Natura Impact Statement (NIS) has been prepared to inform the competent authority’s Appropriate Assessment of the proposed development. The NIS (AtkinsRealis, 2026) has been prepared on the basis of objective information and adhering to the precautionary principle. It examines the details of the proposed development and the Natura 2000 sites in its Zone of Influence, namely the River Barrow and River Nore SAC. The NIS then assesses the implications of the proposed development for the integrity of this site by analysing the impacts and evaluating their effects in view of the site’s conservation objectives. As the ‘integrity’ of the site is defined as the ability of the site to meet its conservation objectives, an ‘adverse effect’ is one which could compromise the achievement of the site’s conservation objectives. Where adverse effects are identified, mitigation is prescribed to avoid or reduce the effects such that they no longer compromise the integrity of the site. The assessment in the NIS considers the effects of the proposed development both individually and in combination with other plans and projects.

Based on the findings of the NIS the following conclusions have been made;

'Given the full and proper implementation of the mitigation detailed in this NIS, it can be concluded beyond reasonable scientific doubt that the proposed development will not, either individually or in combination with other plans or projects, give rise to any impacts that would constitute adverse effects on the River Barrow and River Nore SAC or any other Natura 2000 site, in view of their conservation objectives. Therefore, it is recommended that the competent authority may determine that the proposed development, either individually or in combination with other plans or projects, will not adversely affect the integrity of any Natura 2000 site, provided that the mitigation prescribed in this NIS is fully and properly implemented.'

1.6 Contributors

This EIAR has been prepared by competent experts. The following table clearly sets out a list of the experts who have contributed to this EIAR, showing which parts of the EIAR they have worked on, their qualifications, experience and any other relevant credentials.

Table 1-1 - EIAR Contributors

Name	Company	Area of Expertise	Relevant Chapter/ Input	Relevant Qualifications / Professional Accreditation	Relevant Experience
Deirdre Larkin	AtkinsRéalis	Geology, Hydrogeology, Hydrology, EIAR	EIAR Technical Review	BSc. (Hons) Geology (2003) UCC MSc. Applied Hydrogeology (2012) University of Newcastle. IGI PGeo No. 223 EurGeol No 1064	22 years
Nerita Venketasen	AtkinsRéalis	EIAR Co-ordinator	EIAR Coordination, Chapter 1 – Introduction Chapter 2 – Project Description Chapter 14 – Material Assets (Lead SME) Chapter 16 – Cumulative Effects Chapter 17 – Interactions	BSc Environmental Science, University of KwaZulu-Natal	9 years
Declan Egan	AtkinsRéalis	EIAR and Sustainability	EIAR Reviewer Sustainability Strategy	BSc, MSc, CIWEM, CIWM, C.WEM, CSci, CEnv	30 years
Fiona Quigley	AtkinsRéalis	Engineering	Project Manager Chapter 3 – Alternatives (Lead SME)	BE CEng MIEI	23 years



Name	Company	Area of Expertise	Relevant Chapter/ Input	Relevant Qualifications / Professional Accreditation	Relevant Experience
Kerem Ar	AtkinsRéalis	Engineer and Senior Project Manager	Chapter 2 – Project Description Chapter 3 - Alternatives Chapter 14 – Material Assets	BSc. Civil Engineering, MSc. Civil Engineering, MEIE	18 years
Aidan O'Neill	Coakley O'Neill	Planning	Chapter 2 – Project Description – Project Need (Lead Planner)	BSc(Hons) Environmental Planning (QUB 1993) PG Diploma Town and Country Planning (QUB 1994) Corporate Member of the Irish Planning Institute	29 years
Avril McCollom	AtkinsRéalis	EIAR	Chapter 3 – Alternatives (Technical Support)	B.Sc. (Hons) from ATU Galway (formally GMIT)..	9 years
Eimear Egan	AtkinsRéalis	EIAR and Ecology	Chapter 4 – Population and Human Health (Lead SME)	BSc (Hons) Environmental Science	15 years
Orla Wood	AtkinsRéalis	EIAR	Chapter 4 – Population and Human Health (Technical Support)	BSc (Hons) Environmental Science and Technology, DCU (2023)	3 years
Owen O'Keefe	AtkinsRéalis	Ecology	Chapter 5 – Biodiversity (Lead SME) NIS AA Screening Report	Ecology from University College Cork (2015) Full Member of the Chartered Institute of Ecology and Environmental Management (MCIEEM).	10 years
Niamh Sweeney	AtkinsRéalis	Freshwater Ecology	Chapter 5 – Biodiversity Field Surveys (ca. 2020/2021)	BSc MSc (Res) Freshwater Ecologist	14 years
Emma Nickelson	AtkinsRéalis	Marine Biology	Chapter 5 – Biodiversity	BSc (Hons) in Environmental Biology and an MSc in Marine Biology	9 years

Name	Company	Area of Expertise	Relevant Chapter/ Input	Relevant Qualifications / Professional Accreditation	Relevant Experience
			Field Survey Assistant (ca. 2020/2021)		
Alec Schmidt	AtkinsRéalis	Ecologist	Chapter 5 – Biodiversity (Technical Support)	BSc (Hons) in Zoology University College Cork (2023), MSc in Biodiversity and Conservation, Trinity College Dublin (2024). Qualifying Member of the Chartered Institute of Ecology and Environmental Management (QCIEEM)	3 years
Kevin McCaffrey	AtkinsRéalis	Ecology	Chapter 5 – Biodiversity (Technical Review)	BSc (Hons) in Applied Freshwater and Marine Biology, MSc Environmental Sustainability	13 years
Mary O'Connor	Independent consultant	Ecology/Environmental Science	Chapter 5 – Biodiversity (Field Survey)	PhD Plant Ecology	20 years
Ross Macklin	Triturus Environmental Ltd	Aquatic Ecology and Fisheries Science	Chapter 5 – Biodiversity (Field Survey)	BSc in Applied Ecology, Higher Diploma in Integrated Pest Management and Geographical Information Systems. PhD in fisheries science ongoing at UCC.	18 years
Dr Caroline Shiel	Independent Consultant	Bats	Chapter 5 – Biodiversity (Field Survey)	PhD in Zoology, NUI Galway	30 years
Dr Isobel Abbott	Abbott Ecology	Bats	Chapter 5 – Biodiversity (Field Survey)	BSc Zoology, University College Cork in 2007, PhD(Discipline) 2012	15 years
Pascal Sweeney	Sweeney Consultancy	Ecology	Chapter 5 – Biodiversity (Field Survey)	BSc and MSc in Science and Zoology from University College Dublin Full	30 years

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Name	Company	Area of Expertise	Relevant Chapter/ Input	Relevant Qualifications / Professional Accreditation	Relevant Experience
				Member of the Chartered Institute of Ecology and Environmental Management (MCIEEM)	
Dr Julie Larkin	Envirico	Ecology	Chapter 5 – Biodiversity (Field Survey)	BSc (Hons) in Ecology, MSc in Ecological Assessment from University College Cork, PhD in Agri-ecology from University College Dublin	8 years
Tom O'Donovan	INVAS Biosecurity	Invasive Species Specialist	Invasive Species Report Invasive Treatment Completion Report Biosecurity Management Plan	NPTC Pesticide use	35 years
Dr. William Earle	INVAS Biosecurity	Invasive Species Specialist	Invasive Species Report Invasive Treatment Completion Report Biosecurity Management Plan	Ph. D. in aquatic weed control, IAS Management	15 years
Noel McCarthy	INVAS Biosecurity	IAPS Surveyor and Management	Invasive Species Report Invasive Treatment Completion Report Biosecurity Management Plan	PCA IAPS Surveyor	2 years
Prof. Joe Caffrey	INVAS Biosecurity	Invasive Species Management	Invasive Species Report Invasive Treatment Completion Report Biosecurity Management Plan	PhD from UCD in aquatic plant biology and management	39 years
Cormac Dunne	AtkinsRéalís	EIAR	Environmental walkover survey (redline boundary) on 30 th April 2025	B.A. (Hons) Env. Science (2006) M.Sc. Civil Engineering (2009)	19 years



Name	Company	Area of Expertise	Relevant Chapter/ Input	Relevant Qualifications / Professional Accreditation	Relevant Experience
				Post Grad. Dip. Env. Engineering (2007) Adv. Dip. Planning & Env. Law (2017)	
Eamonn Byrne	Eamonn Byrne Landscape Architects	Landscape & Visual Specialist	Chapter 6 – Landscape and Visual (Lead SME) Appendix 6-1, 6-2 and 6-4	CMLI Chartered Member of the Landscape Institute (2006, UK) Dip. Landscape Design (2003, University of Sheffield) Dip. Hort. Kew (1999, Royal Botanic Gardens Kew, London) HND Landscape Management (1996, Writtle University College, Essex) NCH Hort. (1993, Glasnevin, Dublin)	20 years
John Morgan	Independent Tree Surveys Ltd	Arborist	Appendix H of NIS - Tree Survey	BSc (Hons) Tech Cert (Arbor A) M Arbor A (Membership number PR407)	17 years
Peter Connell	Macroworks	GIS and LVIA Consultant	Appendix 6-3 – Glint and Glare Assessment	BA, MPhil, MSc	20years
Brian Sheridan	Odour Ireland	Air Quality	Chapter 7 – Air Quality & Odour (Lead SME) Appendix 7.1 - Odour Management Plan	B.Sc (Hons) Analytical Science M.SC Eng. Engineering Ph.D Eng Science	25 years
Sarah Berry	AWN Consulting	Air & Climate	Chapter 8 – Climate (Lead SME)	BSc in Physical Geography from the University of Leeds.	9 years
Caolán Leneghan	AWN Consulting	Climate	Chapter 8- Climate (Technical Support)	Geography and International Development	5 years

Name	Company	Area of Expertise	Relevant Chapter/ Input	Relevant Qualifications / Professional Accreditation	Relevant Experience
				(Maynooth University) and Disaster Risk Management & Climate Change Adaptation (Lund University, Sweden).	
Fiona Esmonde	AtkinsRéalis	Sustainability Specialist	Sustainability Strategy (Technical Support)	BSc. Environmental Biology – University College Dublin	2 years
Mike Simms	AWN Consulting	Noise and Vibration	Chapter 9 – Noise and Vibration (Lead SME)	BE and Meng Sc in Mechanical Engineering Member, Institute of Acoustics of the Institution of Engineering and Technology	20 years
James Cousins	Wave Dynamics	Principal Consultant	Appendix 5-13: Underwater Noise and Vibration Assessment (Lead SME)	BSc (Hons), Pg Cert (Const Law), IOA Diploma (Acoustics & Noise Control), MIEI MIOA	15 years
Manish Anand	AtkinsRéalis	Traffic and Transportation	Chapter 10 – Traffic (Lead SME)	Bachelors in Civil Engineering - Birla Institute of Technology (India, 2009-2013) Masters in Sustainable Energy - Trinity College Dublin (Ireland 2017-18)	7 years
Kieran Lynch	Independent consultant	Geo-environmental Engineer & Waste Specialist	Chapter 11 – Land, Soils and Geology (Lead SME)	MSc, BSc. MCIWEM, CWEM, CSci.	30years
Michael Gill	Hydro-Environmental Services (HES)	Hydrology	Chapter 12 – Water (Lead SME)	P.Geo (BA, BAI, Dip Geol., MSc, MIEI)	23 years
Conor McGettigan	Hydro-Environmental Services (HES)	Hydrology and Hydrogeology	Chapter 12 – Water (Technical Support)	M.Sc. in Applied Environmental Science B.Sc. in Geology (2016) from	5 years

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Name	Company	Area of Expertise	Relevant Chapter/ Input	Relevant Qualifications / Professional Accreditation	Relevant Experience
				University College Dublin.	
Nitesh Dalal.	Hydro-Environmental Services (HES)		Chapter 12 – Water (Technical Support)	M.Sc. in Environmental Science from University College Dublin (2024), PG Diploma in Health, Safety and Environment from Annamalai University, India (2021) B.Tech. in Environmental Engineering (2016) from Guru Gobind Singh Indraprastha University, India (2016).	7 years
Micheál Ó Flatharta	IE Consulting	Hydrology and Hydraulic Modelling	Appendix 12-1: Flood Risk Assessment (Lead SME)	MSc Hydrology	7 years
Tony Cummins	John Cronin & Associates	Archaeology and Cultural Heritage	Chapter 13 – Cultural Heritage (Lead SME)	B.A. Archaeology (1992) and M.A in Archaeology (1994), University College Cork (UCC)). Licence eligible archaeologist - the National Monuments Service (1998)	30 years
Padraig Dunne	John Cronin and Associates	Archaeology and Cultural Heritage	Chapter 13 – Cultural Heritage (Technical Support)	B.A. Archaeology (2009 and M.A.Archaeology (2015, University College of Cork). Licensed archaeologist	10 years
Matthew Michie	AWN Consulting	Risk	Chapter 15- Major Accidents and Disasters (Lead SME)	MChem (Hons) Chemistry- University of Liverpool, MSc Physical Chemistry - Michigan State University.	7 years

Name	Company	Area of Expertise	Relevant Chapter/ Input	Relevant Qualifications / Professional Accreditation	Relevant Experience
Rex Bangerter	ADCO	Underwater Archaeology	Appendix 13.2 – Underwater Archaeological Assessment (Lead SME)	(BA 1998), UCL, (MA 2000) University of Southampton. Certified to HSE Part II (Closed Bell/ Saturation diving).	16 years

1.7 Methodology & Structure of this Report

1.7.1 Structure of the EIAR

The EIAR includes all necessary technical studies to address the likely environmental effects of the construction, demolition and operation of the proposed development. The disciplines identified for inclusion in the EIAR, along with the technical content, were determined based on a review of all available baseline information, including the completion of the scoping exercise undertaken by AtkinsRéalis within the EIA Scoping report. The EIA Scoping Report is presented in Appendix 1-1, Volume 3 of the EIAR.

The EIAR is presented in three volumes as follows;

- Volume 1 - Non-Technical Summary;
- Volume 2 - EIAR; and,
- Volume 3 - EIAR Appendices.

Within the main body of the EIAR (Volume 2), Chapter 1 sets out the introduction, identifies the information required in an EIAR and methodology, while Chapter 2 describes the project and characteristics of the proposed development. Chapter 3 identifies the reasonable alternatives.

The environmental topics where there is potential for significant effects to arise are addressed in Chapters 4 to 15, followed by the concluding chapters of the EIAR, as follows:

- Chapter 4 Population and Human Health
- Chapter 5 Biodiversity
- Chapter 6 Landscape & Visual
- Chapter 7 Air Quality & Odour
- Chapter 8 Climate
- Chapter 9 Noise & Vibration
- Chapter 10 Traffic
- Chapter 11 Land, Soil & Geology
- Chapter 12 Water
- Chapter 13 Cultural Heritage;
- Chapter 14 Material Assets
- Chapter 15 Risk of Major Accidents and Disasters



- Chapter 16 Cumulative Effects
- Chapter 17 Interactions
- Chapter 18 Schedule of Commitments;
- Chapter 19 References

Where appropriate, each of the main sections of this report are structured in the same general format, as follows:

- An Introduction describing the purpose of the section;
- A description of the Methodology used in the section;
- A description of the aspects of the existing environment relevant to the environmental topic under consideration (the baseline assessment);
- Characteristics of the Proposed Development under consideration;
- An assessment of the effects of the Proposed Development on the environmental topic (including effects during the construction and operational phases, decommissioning stage, and demolition stage);
- Recommendations for mitigation and monitoring measures to reduce or eliminate any significant negative effects identified;
- An assessment of the Residual Effects that will remain, assuming that recommended mitigation measures are fully and successfully implemented; and,
- Difficulties in Compiling Information.

Cumulative effects and Interactions have been assessed by each SME, and are presented in Chapter 16 and Chapter 17 respectively. A complete list of all required mitigation and monitoring measures is presented in Chapter 18 – Schedule of Commitments.

Sources of information mentioned in the text are either i) listed in full in the bibliography / References section at the end of the document or ii) referenced in full in the text.

1.7.2 Methodology

1.7.2.1 EIAR Guidance

The EIAR has been prepared in accordance with Planning and Development Regulations as amended 2001-2025, and with due regard to the following EIAR Guidance;

- Environmental Protection Agency (EPA) (2022) 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports' published in 2022;
- The Planning and Development (Strategic Infrastructure) Act 2006;
- EU Guidance on EIA:EIS Review, 2001;
- EPA (2015) 'Advice Notes for Preparing Environmental Impact Statements Draft' published in September 2015'.
- Department of Housing, Planning and Local Government (DoHPLG) 'Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment' published in August 2018;
- European Commission 'Environmental Assessments of Plans, Programmes and Project – Rulings of the court of Justice of the European union' published in October 2020;
- European Commission 'Environmental Impact Assessment of Projects – Guidance on the preparation of the Environmental Impact Assessment Report' published in 2017



- European Commission 'Environmental Impact Assessment of Projects – Guidance on Scoping' published in 2017; and,
- European Commission 'Environmental Impact Assessment of Projects – Guidance on Screening' published in 2017.

Additionally, discipline specific best practice guidance have been consulted by each specialist for each of the topics (Population & Human Health; Biodiversity; Landscape and Visual; Air Quality and Odour, Climate; Noise & Vibration; Traffic; Land, Soils & Geology; Water; Cultural Heritage; and, Material Assets) during the preparation of this EIAR. The receiving environment, surveys/site walkovers, methodology, potential effects and mitigation measures have been incorporated and included within each technical chapter in the EIAR. The methodology for each discipline is summarised below and included in detail within each technical chapter of this EIAR report.

1.7.2.2 Assessment of Effects – Evaluation Criteria

The assessment of the effects of the Proposed Development on the environment has been undertaken in accordance with best practice, legislation and guidance. In the assessment of significance, the magnitude of the change in baseline conditions and the sensitivity of the resource and/or receptor(s) has been taken into consideration.

The EPA's 'Guidance on the Information to be Contained in an Environmental Impact Assessment Report'(2022) sets out criteria to determine the significance of an effect. Definitions of effects, taken from the abovementioned EPA Guidance Documents, are shown in Table 1-2 below. Figure 1-5 provides a description of the effects.

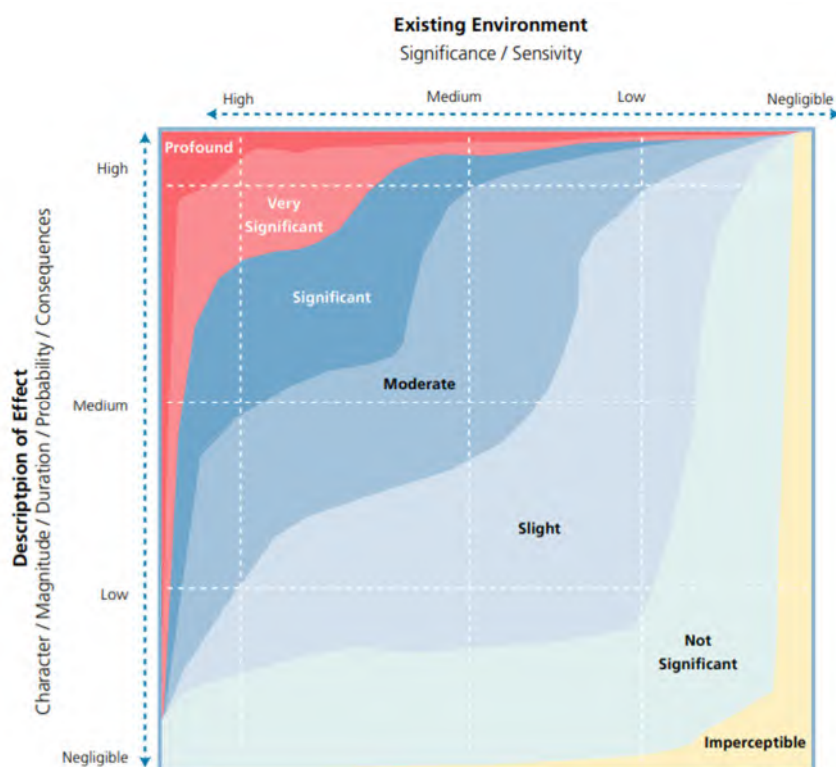


Figure 1-5 - Description of Effects (EPA, 2022)

Table 1-2 below defines the quality of effect of a Proposed Development on the receiving environment.

Table 1-2 – Quality of Effects (EPA, 2022)

Quality of Effect	Description
Positive of 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).

Table 1-3 outlines the definitions of significance of an effect.

Table 1-3 - Definitions of significance of an effect (EPA, 2022).

Classification	Description
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.

Table 1-4 describes the terminology used to describe the extent and context of the effects of a Proposed Development on the environment.

Table 1-4 - Description of the extent and context of Effects (EPA, 2022)

Magnitude	Description
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?)

Table 1-5 illustrates the likelihood of effects.

Table 1-5 - Describing the likelihood of Effects (EPA, 2022)

Magnitude	Description



Likely	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
Unlikely	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.

Table 1-6 describes the duration of effects ranging from brief to permanent.

Table 1-6 - Description of the Duration of the Effects (EPA, 2022)

Magnitude	Description
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).

Table 1-7 defines the types of effects that may arise due to a Proposed Development.

Table 1-7 - Description of the types of Effects (EPA, 2022).

Magnitude	Description
Indirect Effects (a.k.a. Secondary or Off-site Effects)	Effects on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
Cumulative Effects	The addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects.
'Do-nothing Effects'	The effects arising from a project in the case where mitigation measures substantially fail.
Indeterminable Effects	When the full consequences of a change in the environment cannot be described.
Irreversible Effects	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
Residual Effects	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
Synergistic Effects	Where the resultant effect is of greater significance than the sum of its constituents (e.g. combination of SO _x and NO _x to produce smog).

1.7.2.3 Assessment of Cumulative Effects

Annex IV(5) subsection (e) of the 2014 EIA Directive states that:

‘A description of the likely significant effects of the project on the environment resulting from inter alia:

‘The cumulation of effects with other existing and/or approved projects, taking into account and exiting environmental problems relating to areas of particular environmental importance likely to be affected or the natural resources’

Chapter 16 – Cumulative Effects discusses the addition of many minor or insignificant effects, including effects of other projects, and the potential to create more significant cumulative effects on the environment.

Chapter 17 - Interactions includes a matrix to show where interactions between effects on different factors have been addressed.

1.7.2.4 Assessment of Risk and Unplanned Events

Annex IV of the 2014 Directive (Information to be Contained in the Environmental Impact Assessment Report), Section 8 requires:

‘A description of the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or disasters which are relevant to the project concerned. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.’

In accordance with the requirements of the EIA Directive (2014), the EIAR has assessed the effects of risk of accidents or unplanned events which may be caused by or have an effect on the Proposed Development. Specialist reports like the Flood Risk Assessment Report and the climate resilience assessment are addressed in Chapter 15 of the EIAR.

1.8 Description of the Current Setting / Baseline Scenario

Mortarstown Wastewater Treatment Plant is located 2.2km south of Carlow Town on the eastern bank of the River Barrow and serves the Carlow Town and its environs. The WwTP is predominantly fed from the Kilkenny Road Pumping Station but also accepts flows from the Glen Pumping Station, College Green Pumping Station, Cluain Buí Pumping Station, Maple Court Pumping Station and the VEC Pumping Station.

The WwTP site consists of the existing wastewater treatment plant and associated buildings, structures, access road and adjacent agricultural land to the west.

The Kilkenny Road Pumping Station site consists of the pump house, steel hoist and inlet work.

The route for new outfall to the River Barrow consists of agricultural land west of the WwTP site, the R448 Kilkenny Road and woodland next to the River Barrow.

The route of the microtunnel gravity sewer from the Kilkenny Road Pump Station to the new inlet pump station at the WwTP includes a local access road (to UÉ owned property) west of the WwTP site, a treelined verge and the R448 Kilkenny Road corridor up to the Kilkenny Road Pumping Station site.



The baseline scenario including a description of the relevant aspects of the current receiving environment has been considered as part of this EIAR through the collection and collation of baseline data including analytical data where relevant (traffic, air quality, noise levels, soil quality, and surface water and groundwater quality). A detailed description of the current receiving environment is presented in relevant sections for each environmental topic. The predicted changing baseline (i.e. the likely future receiving environment) that could arise as a result of committed development within the vicinity has also been addressed, where relevant, and is presented under the cumulative impacts section for each environmental topic assessed within this EIAR (Chapter 16 –Cumulative Effects and Chapter 17 - Interactions).

1.9 Pre-Application Consultation

1.9.1 Pre-Planning Meetings

A Pre-application meeting with An Coimisiún Pleanála was held on the 21st May 2025. The minutes of the meeting are included Appendix 1-3, Volume 3 of the EIAR.

As part of the consultation process, a meeting with Carlow County Council was held on the 29th July 2025.

All relevant recommendations have been addressed within this EIAR and the accompanying Natura Impact Statement.

1.9.2 Non-statutory Public Consultation

UÉ held a non-statutory public consultation on the proposed Carlow (Mortarstown) Wastewater Treatment Plant (WwTP) Upgrade over the period from Monday 22nd September to Sunday 19th October 2025.

One non-statutory public consultation event (hereafter referred to as the public information event) was held to present the emerging proposals and gather feedback. The public information event allowed the project team to engage with landowners, residents, and stakeholders, in order to present the emerging proposals and obtain detailed feedback from the community. This event also provided an opportunity for stakeholders to learn more about the project, ask questions, and share their views directly with the project team. This event took place on Thursday 9th October 2025, between 16:00 – 20:00 and was held at the Seven Oaks Hotel & Leisure Club in Carlow town. A total of 23 people attended the event.

As part of the public consultation processes the following non-exhaustive scope of work was carried out:

- **Resident letters** - letters provided notification of the planned project and detailed how residents could have their say on the proposals. Letters were provided in both English and Irish in compliance with the Official Languages Act 2003. Letters were issued to all stakeholders within a 500m radius of the treatment plant and planned tunnelled sewer, including local residents, businesses and educational institutions, with 806 Eircodes identified as part of this analysis.^{2, 3}
- **Landowner letters** - letters for landowners identified as potentially impacted by the planned works provided notification of the project and detailed how landowners could have their say in the proposals. Letters were

² The 500m radius was reviewed and refined in some areas based on professional judgement, to account for natural breaks in communities e.g. public roads, edge of residential developments etc. Once the letter drop zone had been determined, the project team used Eircode address data to identify all of the properties within the catchment area. This analysis identified a total of 806 Eircodes, which were subsequently passed on to a specialised letter delivery service. Resident letters were prepared, translated, and distributed to the supplier alongside the list of Eircodes for delivery.

³ A number of letters could not be delivered for various reasons, and these were hand delivered by the project team on 3rd October 2025.

provided in both English and Irish in compliance with the Official Languages Act 2003. A total of nine landowner letters were sent.

- **Stakeholder letters** – letters provided details of the planned project and non-statutory consultation process. Letters were provided in both English and Irish in compliance with the Official Languages Act 2003. Content included a greater degree of technical detail on the proposals than the resident and landowner letters. A total of 29 stakeholders were contacted by letter, sent via the project inbox.
- **Project inbox** - a dedicated project inbox was set up to handle outgoing and incoming emails related to the planned WwTP upgrade, including outgoing stakeholder letters, and any feedback or queries from both members of the public and stakeholders. Alongside the public information event, the project inbox was a key response channel during the consultation period.
- **Press release** - to coincide with the launch of the public consultation, UÉ issued a press release to local and regional media outlets. The press release outlined the purpose of the planned Mortarstown WwTP project, and the opportunity for the local community and stakeholders to provide feedback.
- **Project information leaflet** - to support the public consultation process, a project leaflet was developed to provide stakeholders with a clear and accessible overview of the planned Mortarstown WwTP. The leaflet was designed to explain the planned project in plain language and included visualisations to illustrate key aspects of the development. The leaflet was made available in both digital and hardcopy formats. A downloadable version was published on the dedicated project website, and digital copies were issued to Elected Representatives in advance of the briefing presentation. Printed copies were distributed to attendees at the public information event held in Carlow on Thursday 9th October 2025.
- **Project website** - a dedicated project website was launched to serve as a central hub for all information related to the Mortarstown WwTP non-statutory consultation. The website was designed to be accessible, informative, and user-friendly, enabling stakeholders to engage with the project at their convenience. The website was available in both English and Irish. The website included a secure online feedback form which allowed users to submit comments.
- **Social media update** – UÉ also utilised their social media channels to promote the consultation and highlight/promote the project website. This included a targeted social media post, which outlined the planned upgrade, the timeframes of the public consultation window, and the timing and location details of the public information event.
- **Local print and broadcast advertisements** - to further promote the public consultation and reach a wider audience, a newspaper advertisement was published in the Carlow Nationalist on Tuesday 30th September 2025. The advertisement provided a summary of the planned WwTP and included key details to encourage public participation. Radio advertisements were also provided through local radio stations.
- **An elected representatives briefing presentation** - in advance of the public information event, UÉ issued invitations to local Elected Representatives from Carlow County Council, Laois County Council and relevant TDs in Dáil Éireann to introduce the planned Mortarstown WwTP Upgrade Project and offer opportunities for direct engagement with the project team.
- **Public information event display boards** - A1 public information event boards were designed and printed for the public information event held on Thursday 9th October 2025. There were seven unique boards developed for the public information event. The boards presented key information including the need for and benefits of the Mortarstown WwTP, and visualisations of the plant.
- **3D visualisations** – 3D visualisations were commissioned to provide stakeholders and the community with a clear picture of what the WwTP will look like. These images were included in the project information leaflet, project website and public information event display boards.
- **Consultation report** - prepared to summarise and assess the feedback received during the non-statutory public consultation.

1.9.2.1 Response channels

Members of the public and stakeholders who wanted to formally respond to the consultation or find out more information were able to contact the project team using the following channels:

- By completing the feedback survey via the project website.
- By emailing mortarstownWwTP@water.ie.
- By attending the public information event, held Thursday 9th October 2025.

The main response channel for collecting feedback was via the feedback survey on the project website. The project team also considered discussions and feedback received at the public information event, and queries and responses received via email to the project inbox. The deadline for consultation responses was Sunday 19th October 2025. No responses were received after this deadline.

1.9.2.2 Consultation feedback

The public consultation for the proposed development provided valuable insights into the views and concerns of local residents, landowners, and community stakeholders. The following feedback was received over the course of the non-statutory public consultation period:

- Feedback survey – six responses.⁴
- Emails received from members of the public – five responses.⁵
- Emails received from stakeholders - three responses.
- Verbal feedback provided during in-person discussions at the public information event – 23 attendees.

The feedback received across the above channels covered a wide spectrum of topics, including noise, traffic management, capacity of the WwTP, construction environmental impacts, and aspects of project design. Stakeholders also expressed interest in continued engagement, the protection of the human and natural environment, and potential storage of dangerous substances.

A summary of key issues raised across feedback channels is listed in Table 1-8 below.

Table 1-8 - Summary of key issues raised

Feedback	Description	Response
Noise	Comments relating to noise during construction and operation.	Noise impact assessment and mitigation measures are included in Chapter 9 of this EIAR.
Traffic	Comments relating to traffic during construction and future increase in traffic once the WwTP is operational.	Traffic impact assessment and mitigation measures are included in

⁴ A total of 8 responses were submitted. Two submissions were identical to other responses, so it has been assumed that these were inadvertently submitted twice. The repeated submissions have been considered only once.

⁵ Two submissions were provided from a member of the public in short succession, containing identical letters. These were considered as one response.

		Chapter 10 of this EIAR.
Odour	Comments relating to odour currently and in operation of the upgraded WwTP. Feedback particularly concerned the existing sludge dewatering unit.	Odour impact assessment and mitigation measures are included in Chapter 7 of this EIAR.
Construction	Comments relating to the length and impact of construction, including consideration of noise and traffic	Assessment of the construction phase has been considered in Chapters 4-15 of this EIAR.
Project design	Comments relating to project design including changes to existing signage, improvements to the facility entrance, and wider queries relating to project design and technical aspects.	These concerns have been addressed in Chapter 2 of this EIAR.
Capacity of the WwTP	Comments relating to the capacity of the WwTP in the interim and of the planned upgrade to support future development in Carlow. The catchment of the WwTP was also raised.	These concerns have been addressed in Chapter 2 of this EIAR.
Environmental	Comments relating to the environment including surface water treatment and flooding	Environmental impacts have been assessed in Chapters 4-15 of this EIAR.

UÉ have considered and responded to concerns raised in the feedback received by reviewing technical aspects of design, and ongoing engagement. The project team remains committed to transparency, safety, and environmental responsibility throughout the planning development process.

As part of this analysis, the following issue was identified as requiring further assessment / engagement with relevant stakeholders:

- The alignment of the tunnelled sewer between the WwTP and Kilkenny Pumping Station.

The design was subsequently reviewed, and the pathway of the tunnelled sewer has since been realigned. The relevant feedback has been considered as part of this planning submission and incorporated into the EIAR as required

2. PROPOSED DEVELOPMENT

2.1 Nature and Extent of the Proposed Development

The development will consist of the upgrade the existing Mortarstown WwTP, construction of a new inlet pump station at the treatment plant site, construction of a new microtunnel gravity sewer along Kilkenny Road, between the existing Kilkenny Road Pumping Station and the new inlet pump station, landscaping, boundary treatments, and all ancillary site works. This includes the associated internal roads, lighting, security fencing and landscaping.

The current WwTP access from Green Road will be retained. A new internal vehicle access point will be provided to facilitate entry to the rear of the UÉ-owned property situated to the west of the WwTP boundary. The current Kilkenny Road Pumping Station access will also be retained.

The proposed WwTP upgrade works will be developed to the west of the existing plant footprint, taking in areas of agricultural land and part of the adjoining UÉ property.

The proposal also includes the demolition of the inlet works, the stormwater holding tank, the sludge cake transfer facility, and 2 no. small chambers as well as decommissioning of the Kilkenny Road WwPS, final clarifiers (2 no.) and 2 no. rising mains. In addition, the existing outfall pipe will be replaced with a new outfall pipeline. The existing WwTP site is ca. 3.79 hectares (ha) and after completion of the upgrade works the Site will expand to ca. 5.53ha. The total Proposed Development site area (Red line boundary) is ca. 10.766 ha in size, as presented in Figure 2-1 below.

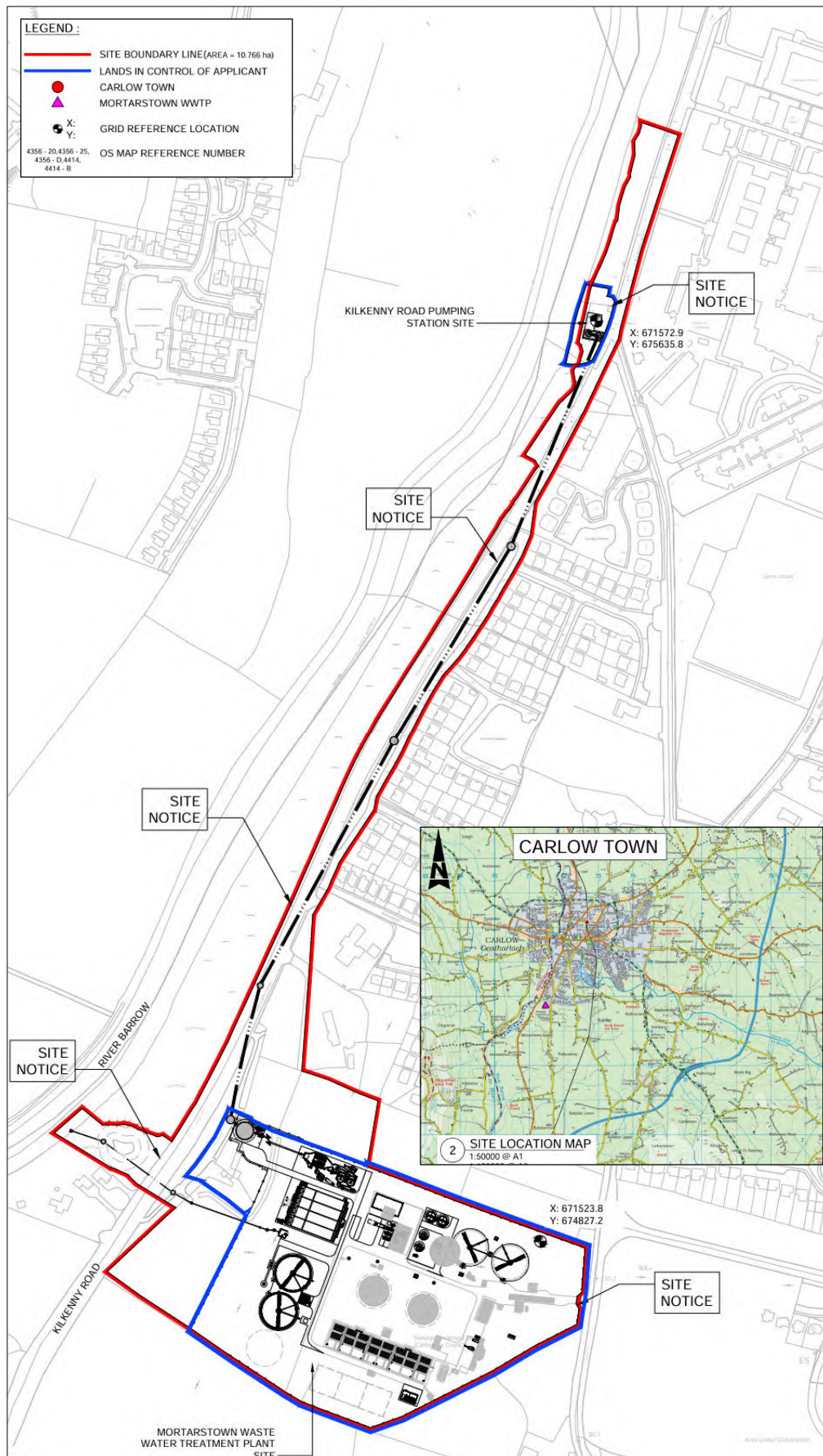


Figure 2-1 - Layout of Proposed Works (including redline boundary)

A summary of the works required is provided in the following sections. The layout of the proposed development and process diagram is presented in Figure 2-5 to Figure 2-11.

The proposed hydraulic loadings for the agglomeration are presented in Table 2-1. To enable ease of future expansion, some elements of the works (primarily civil works) are sized to cater for additional future loading.

Table 2-1 - Proposed Hydraulic Loading Rates (2037)

Parameter	Unit	Hydraulic Loads
Design population served	capita	58,500
Dry Weather Flow Rate QDWF	m ³ /hr	370
Full Flow to Treatment QFFT	m ³ /hr	1,110
Peak Flow (Formula A)	m ³ /hr	3,800

2.1.1 Microtunnel Gravity Sewer

A 785m long microtunnel gravity sewer (Ø1650mm internal diameter) will be constructed from the south side of Kilkenny Road Pumping Station to the wet well of the new inlet pump station adjacent to the new inlet works of the existing WwTP which is proposed to be upgraded. The microtunnel will be routed under the R448 Kilkenny Road before it traverses under a treelined verge and local access road (to UÉ owned property) to connect to the WwTP.

Figure 2-5 to Figure 2-7 illustrates the proposed microtunnel route and associated long sections.

2.1.2 Inlet Pump Station

2.1.2.1 New Inlet Pump Station (PS)

The construction of the new inlet pump station at the Mortarstown WwTP site, located west of the WwTP and north of a vacant cottage, will involve:

- The provision of 1 no. terminal pump station.
- The provision of 4 no. raw sewerage pumps inclusive of Mechanical, Electrical, Instrumentation, Control, and Automation (MEICA) works.
- The provision of 1 no. odour control unit.
- The provision of 1 no. flow meter chamber.

The new pump station will be designed for 4 no. pumps configured on a duty/assist/assist/standby basis to deliver a future 2037 design horizon Formula A flow of 1,055 l/s (3,800 m³/h). Each pump will be rated to deliver 389 l/s (1,400m³/hr) so that 3 no. pumps configured on a duty/assist/standby basis will service the current Formula A flow of 695 l/s (2,503m³/hr).

The size of the pumps dictate that the proposed pump station will be configured as a wet well/dry type pump station. Given that the new pump station at Mortarstown WwTP will also be utilised as the main launch shaft of the microtunnel gravity sewer, a circular structure is proposed.

The circular well is designed based on a 15m diameter circular concrete chamber with a dividing wall and 6m segment for the wet well and an 8.6m segment for the dry well. Refer to Figure 2-8 for the proposed layout of the new pump station at Mortarstown WwTP.

2.1.2.2 Existing Kilkenny Road Pumping Station (PS)

The existing Kilkenny Road pumping station will be decommissioned. The existing building structure will remain. The existing above ground steel gantry structure, access stairs and pumps will be removed from site and repurposed. Incoming flows will be diverted via the existing below-ground holding tank to a newly constructed manhole positioned south of the existing PS, conveying flows to the new gravity microtunnel. Existing overflows at the Kilkenny Road PS will be retained in accordance with the current Wastewater Discharge Licence (EPA WwDL Ref: D0028-01) and utilised in extreme events where the new gravity microtunnel may be at maximum capacity.



Figure 2-2 – View of existing Kilkenny Road Pump Station (Photograph from AtkinsRéalis site visit)

2.1.3 Mortarstown WwTP

The upgrade of the Mortarstown Wastewater treatment plant will require:

- Provision of a new foul pumping station for local agglomeration adjacent to existing inlet works (supplemented by the WwTP standby generator).
- Provision of new fuel storage tank (5000l) and standby diesel generator to service the WwTP (roofed).

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- Provision of new inlet works to include fine screening, mechanically raked by-pass screen, screening compaction and conveyance to skips, grit removal, grit classification and conveyance to skips. The new inlet works will be provided with an odour treatment unit to cater for the maximum pass forward flow rate of the new inlet PS.
- Provision of 2 no. new stormwater storage tanks and 2 no. new stormwater return pumps.
- Existing final settlement tanks and associated Return Activated Sludge (RAS)/ Waste Activated Sludge (WAS) to be retained, cleaned and decommissioned.
- Provision of 4 no. new primary settlement tanks and scraper systems.
- Provision of 4 no. new primary sludge pumps.
- Provision of a new scum pump.
- Provision of 4 no. new air blowers and modifications to existing air delivery pipework
- Provision of a new air blower building (13.6m x 8.6m, roofed) and repurposing of existing blower building for storage purposes.
- Provision of new fine bubble diffused air system in existing aeration tanks.
- Provision of 2 no. new final settlement tanks with half-bridge scrapers.
- Provision of a new RAS/WAS pumping station and station fitted with 2 no. RAS pumps and 2 no. WAS pumps.
- Structural refurbishment of the existing picket fence tanks.
- Mechanical and electrical refurbishment of existing picket fence thickener and conversion of second existing tank to a sludge blending tank.
- Provision of 2 no. additional picket fence thickener tanks.
- Provision of 1 no. belt press, polymer prep unit and polymer dosing pumps in the existing sludge dewatering building.
- Provision of a new pumped sludge transfer system between the sludge blending tank and picket fence thickeners.
- Provision of upgrades to the existing sludge import facility.
- Provision of minimum 6 no. new odour control units
- Provision of upgrade to existing chemical storage tank and dosing facility
- Provision of 1 no. new outfall chamber and outfall pipe.
- Modifications to existing administration building.
- Provision of MEICA and SCADA upgrades.
- New storage shed and associated gantry (24.9m x 12.7m, roofed).
- Demolition of existing inlet works structure.
- Existing utility service relocations.
- General civil site works.
- Future storm tank (not part of this planning consent).
- Future aeration tank (not part of this planning consent).
- Future final settlement tank (not part of this planning consent).
- Provision for PV solar panels,
- Diversion of existing ESB 38kv HV overhead lines and 10kV/20kV MV line on site (carried out by ESB).

Preliminary aerial photographs / 3D Visualisations showing the existing and proposed layout of Mortarstown WwTP site are presented in Figure 2-3 and Figure 2-4 respectively. It should be noted that these graphics do not include the final planting design. For the proposed Site Landscaping Layout drawings (Sheet 1 to Sheet 5)



refer to Drawing Ref: 5161805_EWE_DR_MOR_5180 to Drawing Ref: 5161805_EWE_DR_MOR_5184, submitted as part of this planning application.

Refer also to Figure 2-9 for the proposed layout of the WwTP.





Figure 2-3 - 3D Visualisation of the existing Mortarstown WwTP site



Figure 2-4 - 3D Visualisation of the proposed Mortarstown WwTP development site⁶

⁶ It should be noted that these graphics do not include the final planting design. For the proposed Site Landscaping Layout drawings (Sheet 1 to Sheet 5) refer to Drawing Ref: 5161805_EWE_DR_MOR_5180 to Drawing Ref: 5161805_EWE_DR_MOR_5184, submitted as part of this planning application.

2.1.3.1 Preliminary Treatment – Inlet Works

As part of the upgrade, the existing inlet treatment works will be decommissioned, demolished, and replaced with a newly constructed inlet works, designed to UÉ Standard IW-TEC-700-99-02. The new inlet works will be elevated to allow gravity flow and will include 4 no. fine screens, one mechanical bypass screen, and 2 no. grit removal units with pumps and a classifier. Wastewater from the new Inlet Pump Station (up to 4,100 m³/h) and the new local foul pump station (up to 300 m³/h) will discharge into a flow splitting chamber, monitored by flow meters. A standby generator will be installed to ensure continuous operation. Excess flows will overflow to new stormwater tanks, and Full Flow to Treatment (FFT) will be sampled at SP1. Screenings and grit will be washed and conveyed to enclosed skips for off-site disposal. Offensive odours will be managed using covered units and an air extraction system connected to a dedicated odour treatment facility. The inlet works is numbered as “04” on the drawing no. 5161805_EWE_DR_MOR_5101.

2.1.3.2 Preliminary Treatment – Stormwater Storage

As part of the stormwater management upgrade, flows exceeding the FFT will overflow downstream of screening and grit removal units and be directed to a new stormwater storage tank system with a total effective capacity of 6,231 m³, equivalent to 2.95 hours of Formula A – FFT at 58,500PE. If a storm event exceeds this capacity, the screened and de-gritted wastewater will overflow to the WwTP outlet chamber and discharge via a licensed discharge location to the River Barrow (albeit the proposed design will result in improvement to the current situation by means of increased stormwater storage capacity, as described below).

The existing 1,560 m³ final settlement tanks will be repurposed as stormwater storage tanks and supplemented by 2 no. newly constructed tanks providing an additional 4,650 m³ of storage. If all tanks reach capacity, overflow will be recorded via a flow monitor. Once the storm subsides, stored water will be returned to the inlet works using a duty/standby pump set at 548 m³/h, initiated when inlet flow drops below 2 DWF (1,097 m³/h). The stormwater storage tanks are numbered as “05” on the drawing no. 5161805_EWE_DR_MOR_5101.

2.1.3.3 Primary Settlement

As part of the new works, 4 no. rectangular horizontal-flow primary settlement tanks will be constructed to receive full flow to treatment (1,645 m³/h by 2052). These tanks will feature chain and flight scrapers for sludge collection, with a surface loading rate of 1.25 m/h when all tanks are in service, and will achieve 30% organics and 60% solids removal efficiency. Even with one tank offline, the loading rate will remain below 1.65 m³/m²/h at FFT. Progressive cavity or rotary lobe pumps (12.5 m³/h capacity) will transfer 3%DS sludge to the sludge blending tank, operating around 12 hours daily. The tanks will be covered, with access for maintenance and inspection, and equipped with sludge scrapers, scum skimmers, and a dedicated odour control system to manage emissions. The primary settlement tanks are numbered as “08” on the drawing no. 5161805_EWE_DR_MOR_5101.

2.1.3.4 Secondary Treatment – Biological

The existing A2O biological process will be retained, as it is suitably sized for the projected 58,500 PE loading. This process biologically removes nitrogen and phosphorus through anaerobic, anoxic, and aerobic stages. New flowmeters and modulating penstocks will be installed to control flow to each anaerobic reactor. The system will utilize high-strength Influent from a local microbrewery as a carbon source, eliminating the need for external dosing. Upgrade works include replacing the existing chemical storage tank, installing new dosing pumps and lines, and replacing fine bubble air diffusers. 4 no. new 70 kW variable speed air blowers will be provided, housed in a new blower building with space for future expansion and maintenance access. Air will be distributed via a common main with automated control systems. Return Activated Sludge will be recycled at controlled rates to support biological treatment. The anaerobic reactors will be equipped with mixers to prevent solids settlement, and the anoxic reactors will receive variable internal recirculation flows. Mixed liquor will then pass to the

aeration basins, which are split into two cells with fine bubble diffusers for efficient oxygen transfer. The existing aeration tanks are numbered as “09” on the drawing no. 5161805_EWE_DR_MOR_5101.

2.1.3.5 Secondary Treatment – Chemical

Phosphorus in wastewater exists as ortho-phosphate, polyphosphate, and organic phosphate. During aerobic treatment, polyphosphate and organic phosphate are converted to ortho-phosphate, which is the easiest to remove chemically. While most phosphorus will be removed biologically through the retained A2O process, chemical dosing will be applied at the aeration tank for simultaneous precipitation of residual phosphorus. This approach is optimal as it targets ortho-phosphate formed after biological treatment. The new chemical dosing system will be implemented in accordance with UÉ Standard IW-TEC-700-05. Upgrade works will include replacement of the existing chemical storage tank and installation of new dosing pumps and lines to support effective phosphorus removal. The upgraded chemical storage tanks are numbered as “39” on the drawing no. 5161805_EWE_DR_MOR_5101.

2.1.3.6 Secondary Treatment – Final Settlement and Activated Sludge Pumping

Flows from the biological process will pass through the existing outlet chamber to a new flow splitting chamber upstream of secondary settlement. Secondary treatment will include 2 no. newly constructed 32m diameter radial flow settlement tanks, each equipped with full bridge scrapers and central sludge hoppers. These tanks are designed to treat flows up to 58,500 PE at peak mixed liquor concentrations of 3.4 kg/m³. Sludge will be returned to the biological process (RAS) at variable rates (0.75–2.5 DWF), while excess sludge (WAS) will be transferred to the sludge blending tank at 60 m³/h. Treated effluent will flow to a new Parshall flume fitted with an ultrasonic flow sensor and an autosampler for monitoring, before discharging, via a licensed discharge location to the River Barrow. A new pH/temperature sensor will also be installed. Final settlement will be supported by two new upward-flow tanks with a side wall depth of 3.9 m, designed for peak hydraulic loading of 39,488 m³/day. To mitigate the risk of rising sludge due to gas production from denitrification, a denitrification stage has been included in the process design to optimise carbonaceous biochemical oxygen demand (cBOD) removal and nitrogen reduction prior to settlement. The final settlement tanks and RAS/WAS pumping station are numbered as “13” and “18”, respectively in the drawing no. 5161805_EWE_DR_MOR_5101.

2.1.3.7 Sludge Facility – Sludge Storage and Dewatering

The maximum solids production for the facility is estimated at 4,095 kgDS/day, comprising primary sludge (2,086 kgDS/day), secondary sludge (1,859 kgDS/day), and precipitant sludge (150 kgDS/day). The existing sludge import facility will be upgraded in accordance with IW-TEC-700-99-06 to accept sludge from local treatment plants, with an anticipated volume of 45 m³/day. Imported sludge will be screened and stored in a new underground tank, then pumped to the sludge blending tank, where all sludge streams will be combined to ensure a balanced and homogenous mixture. Blended sludge will be gravity thickened using the existing 6.0mØ picket fence thickener and 2 no. new 7.5mØ thickeners. In the picket fence thickeners, blended sludge will be thickened to approximately 2.5%DS.

Thickened sludge will be pumped directly to both the existing and the new belt press for dewatering to a cake concentration of 18-20%DS. Works will include the provision of 3 No. covered and forced-ventilated skips (6 changes per hour as a minimum). The skips will be suitable for holding the dewatered sludge contents allowing for 7 days storage. The skips will be suitable for collection by standard skip removal vehicles and will be designed for an operating life of 25 years. The skips will have an openable hatch on the roof to facilitate filling with the sludge conveyor and shall also have an integrated auger to allow for even distribution / filling without the need for moving the skip during the fill process. The skips will have a minimum volume capacity of 20m³ each. An internal stainless steel screw conveyor with a stainless-steel chute/hopper will transfer sludge from the sludge dewatering units and transport the cake outside the sludge press building into external sludge skips. The conveyor will be of minimum 300mm Ø with discharge height 2.5m, capable of delivering up to 400kgDS/hr

of dewatered sludge to the sludge skips. Separate conveyors will be supplied for discharging into each of the 3 no. sludge skips.

Centrate and supernatant from thickening and dewatering will be returned to the biological process via the new pumping station, with a bypass to the import tank for maintenance. The system is designed to maintain consistent flow and prevent rising sludge issues in primary tanks. The sludge treatment units are numbered as “19”, “22”, “23”, “24”, and “25” in the drawing no. 5161805_EWE_DR_MOR_5101.

2.1.3.8 Sludge Import

Future sludge imports are projected based on a 1.25% annual population increase, with volumes rising from 10,138 m³ currently to 13,830 m³ over 25 years. The existing site access and weighbridge will be retained, while the existing sludge import facility adjacent to the sludge dewatering building will be upgraded. This upgraded facility will include a packaged sludge reception plant with tanker coupling, grit drop-out box, and enclosed screening with washing and dewatering, mounted above an underground storage tank.

Screened sludge will be pumped to the sludge blending tank, which will be fitted with a mixer to homogenise imported and site-generated sludge. Homogenised sludge from the sludge blending tank shall have a dry solids concentration of approx. 0.85%DS and shall be pumped to the picket fence thickeners. Sludge will be dosed enroute with a polyelectrolyte principally to improve the quality of the supernatant and to aid in the entrapment of FOG and scum. Supernatant will be collected via submerged troughs and returned to the new liquor return pump station, which will feed back to the primary settlement tanks.

2.1.3.9 Administration Building

The existing administration building will be modified to include a larger control room. The proposed arrangement will facilitate the installation of new Form 4 control panels without compromising existing operations. All redundant panels will be removed from site and disposed of. The existing store will be repurposed to include a new office and laboratory. The administration building is numbered as “33” in the drawing no. 5161805_EWE_DR_MOR_5101.

2.1.3.10 Final Effluent Monitoring

At the notch weir of the final settlement tanks, treated effluent overflows and passes by gravity through a flowmeter chamber and onto a sampling chamber from where a flow proportional sampler will collect samples. The flowmeter shall be installed with a bypass to facilitate servicing without interrupting plant flow. The sampling chamber shall be designed and constructed in accordance with IW-TEC-700-99-08 equipped with a pH monitor. The treated water flow meter is numbered as “14” in the drawing no. 5161805_EWE_DR_MOR_5101.

2.1.3.11 Hydraulic Design

Main Stream

Hydraulic design of the main process stream is constrained by the top water level in the biological process of 48.640 mOD. This level cannot be raised as an increase in level may dislodge the air header due to buoyancy effect. As such the treatment works are designed around this top water level. The key levels are as follows:

- Inlet Works 50.439 mOD (IL)
- Primary Settlement 49.730 mOD (TWL)
- Aeration Tank 48.640 mOD (TWL)
- Final Settlement 48.170 mOD (TWL)

- Combined Effluent Chamber 47.162 mOD (Operating Water Level)
- Flood level (1:100 year) 46.187 mOD (at outfall)

Stormwater Stream

Similar to the main process stream, the stormwater stream is constrained by the top water level in the existing final settlement tanks (repurposed stormwater tanks) of 47.700 mOD. All associated levels are designed to ensure that flows can be conveyed without adjusting this level. The key levels associated with the stormwater stream are as follows:

- Inlet Works 50.439 mOD
- New Storm Tank 48.659 mOD
- Existing Storm Tank 47.700 mOD
- Outfall Chamber 47.162 mOD
- Flood level 46.187 mOD

2.1.4 Outfall

The existing 600mm diameter (licenced) outfall pipe will be replaced with a new 900mm diameter gravity outfall pipe 250m in length. The new outfall pipe will be constructed to the south side of the existing outfall (ca. 10m from the existing licenced discharge point). The pipe will cross under the R448 by microtunnelling and enter the previously cleared woodland that is adjacent to the existing residential dwellings to the west of the Kilkenny Road. The locations of the existing outfall and the proposed outfall are shown in Figure 2-10.

A temporary cofferdam / shoring will be required to construct the head wall on the riverbank. The temporary cofferdam installation (sheet pile driving) will be carried out from a barge operating on River Barrow. By this means, it is intended to avoid potential adverse effects of piling from the river bank due to the limited working area at the river bank.

The outfall pipe will enter the river ca. 1.5m below the low water level. Refer to Figure 2-9 for the location of both the existing and proposed outfall pipe. It should be noted that the existing outfall pipe will be retained; however will not be used as part of the proposed development.

The WwTP is designed to comply with the Emission Limit Values (ELV's) which have been calculated in a separate Waste Assimilative Capacity (WAC) Report (*5161805DG0434 rev 5 - Mortarstown WwTP - WAC Assessment Report*), presented in Appendix 12-3, Volume 3 of this EIAR. Results of the Emission Limit Values (ELV's) taken from the Waste Assimilative Capacity Report are presented in Table 2-2.

Table 2-2 - WwTP Design ELVs

Parameter	ELV (mg/l)
Ammonia	2.0 (in line with the current Discharge Licence)
BOD	25 (in line with UWWTD ⁷)

⁷ Urban Waste Water Treatment Directive

2.1.5 Solar Energy Generation

UÉ's recent sustainability and renewable energy policies target generation of minimum 10% of plant's energy demand from renewable energy sources. The implementation of solar PV (Photovoltaic) panels is proposed on the grassed site to the west of the WwTP works (approximate dimensions of the solar array: 155m x 60m). A Renewable Energy Assessment Report has been prepared by AtkinsRéalis in 2025. The report concluded that a 382kW solar PV system can be installed within the available land. The proposed solar panels will provide 15% of the energy demand of the Mortarstown WwTP.

A Glint and Glare Assessment was undertaken by Macro Works Ltd in 2025 to determine the potential for solar reflectance effects upon dwellings and transport route receptors in respect of the proposed ground mounted solar element of the development at the Proposed Development. A copy of the Glint and Glare Assessment is presented in Appendix 6-3, Volume 3 of the EIAR.

2.1.6 Onsite Chemical and Fuel Storage

The chemical materials and fuels will be stored at site during the operational stage and their quantities are listed as follows:

- 2 no. Ferric Sulphate ($\text{Fe}_2(\text{SO}_4)_3$) tanks, 15,000l total (i.e. 2no. 7,500l tanks)
- 1 no. diesel fuel tank, 5,000l (Drawing Ref: 5161805_EWE_DR_MOR_5101)

The tanks are numbered as "39" and "31" respectively in the drawing no. 5161805_EWE_DR_MOR_5101.

- 3no. Polyelectrolyte 1,000l tanks, Intermediate bulk container (IBC tank), industrial-grade container used to store and transport liquids, to be stored in sludge building.

The polymer preparation unit including polyelectrolyte tanks are shown in the drawing no. 5161805_EWE_DR_MOR_5155.

All onsite chemical / fuel storage tanks will be suitably bunded.

2.1.7 Onsite Storage

A new storage shed (ca. 25m x 13m) will be constructed to the north of the sludge dewatering building as part of the proposed WwTP upgrade works. The shed will be used as the primary storage location of machinery and parts for the WwTP.

In addition, the disused blower building will be repurposed as additional storage facility for general materials and spares.

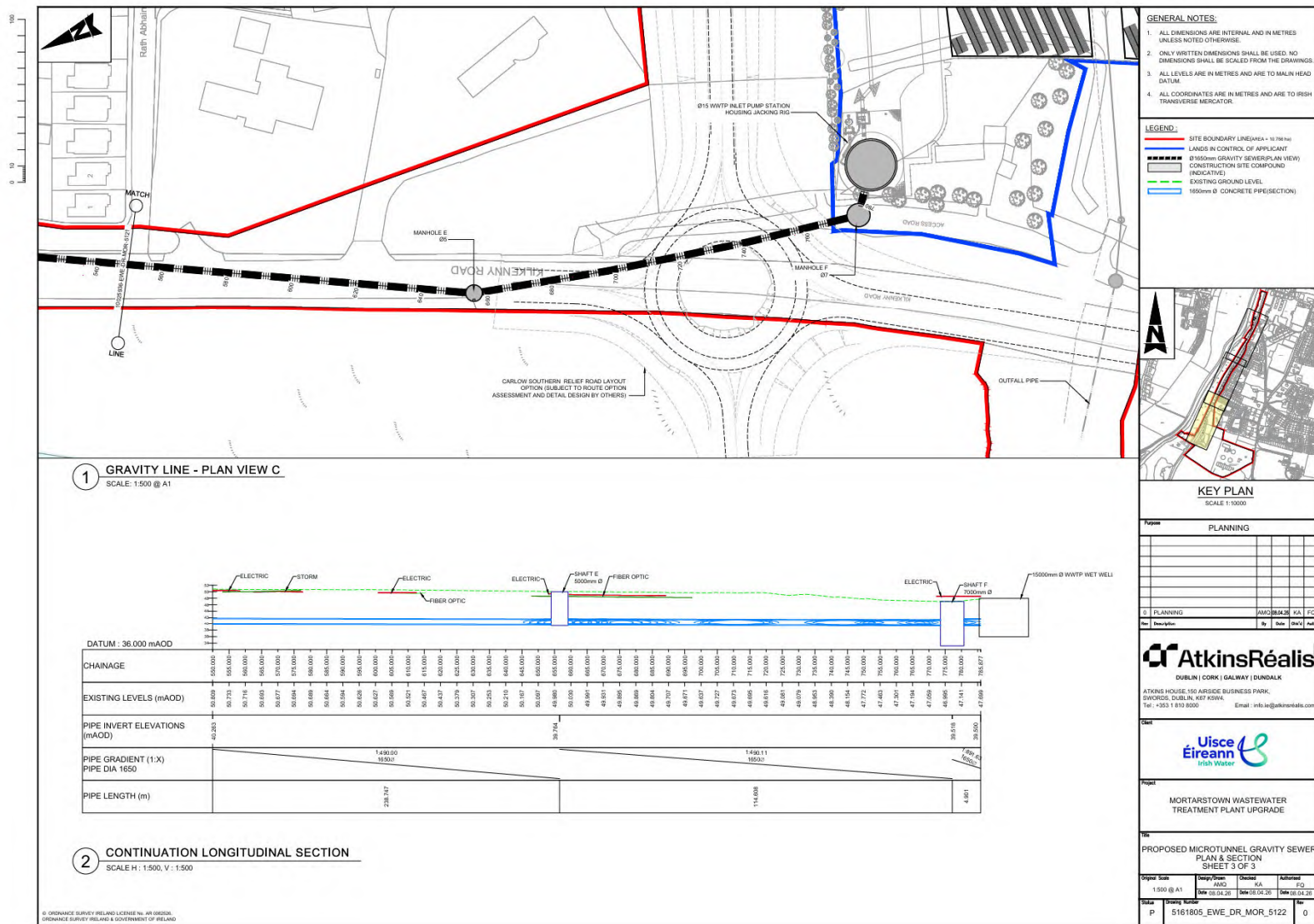


Figure 2-7 – Microtunnel Alignment and section (3)

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AtkinsRéalis - Baseline / Référence

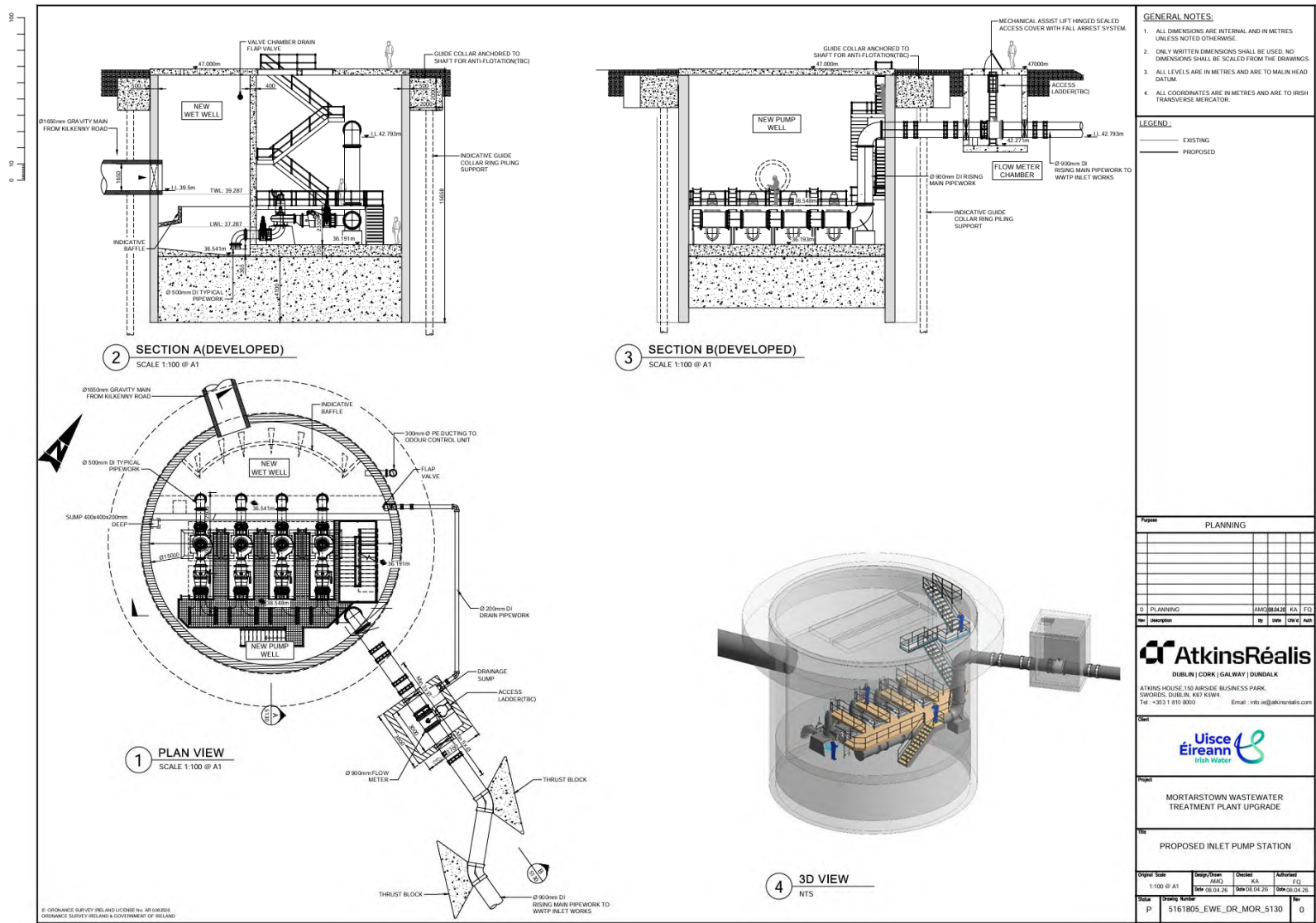


Figure 2-8 – New Inlet Pump Station plan and sections

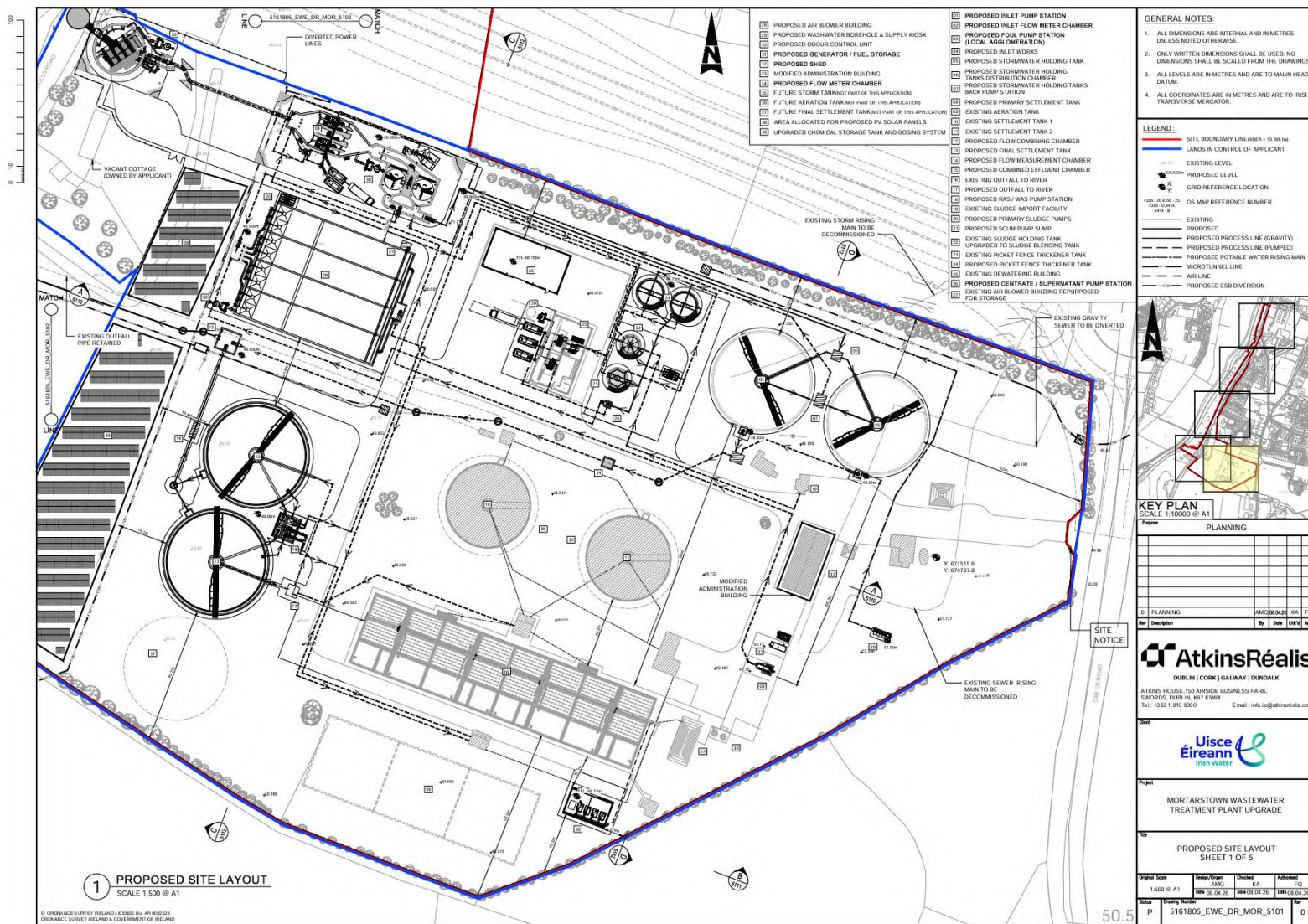


Figure 2-9 – Proposed WwTP Layout

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AtkinsRéalis - Baseline / Référence

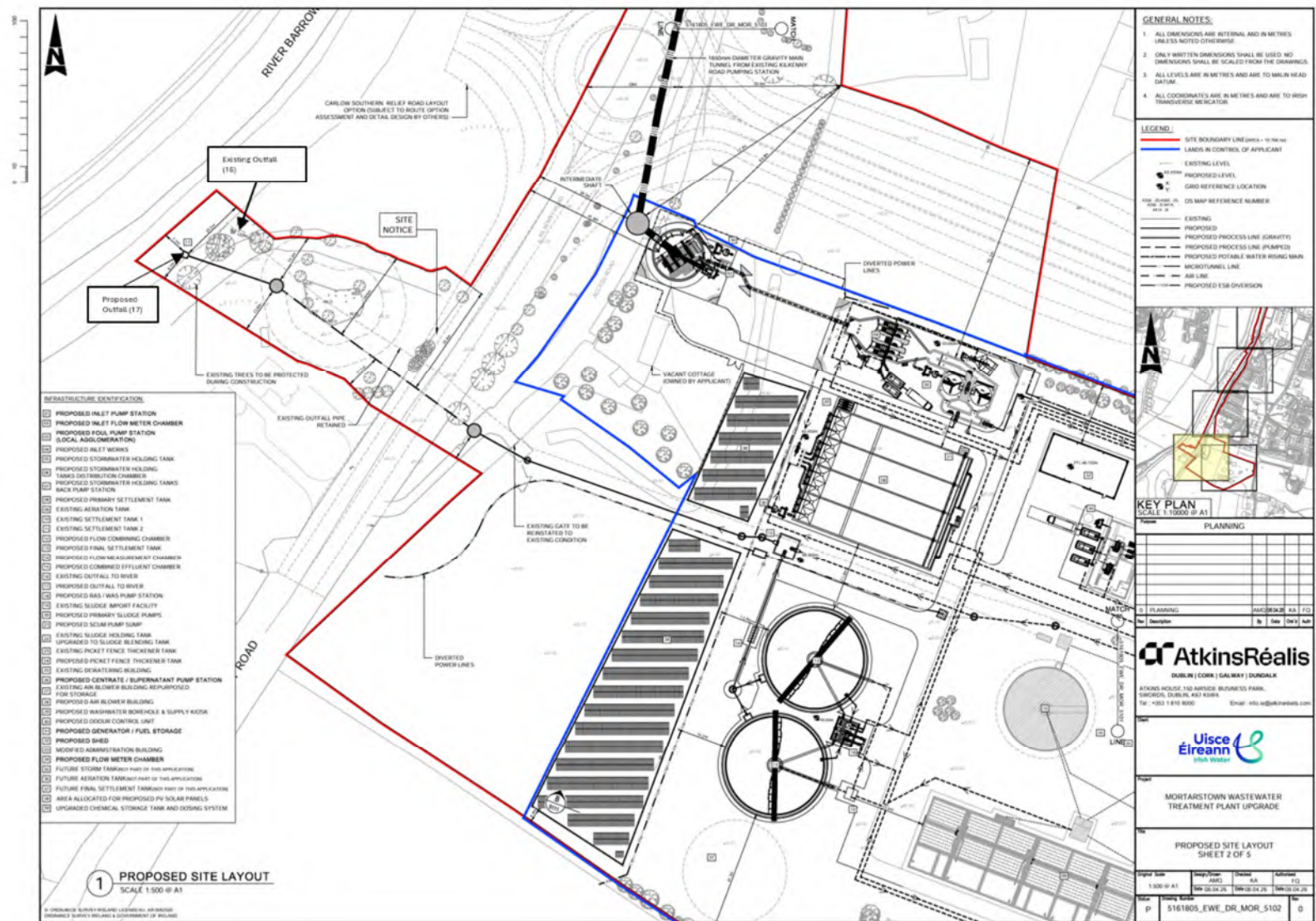


Figure 2-10 – Proposed WwTP outfall location (see text box 17) (as well as existing outfall location – see text box 16).

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AtkinsRéalis - Baseline / Référence

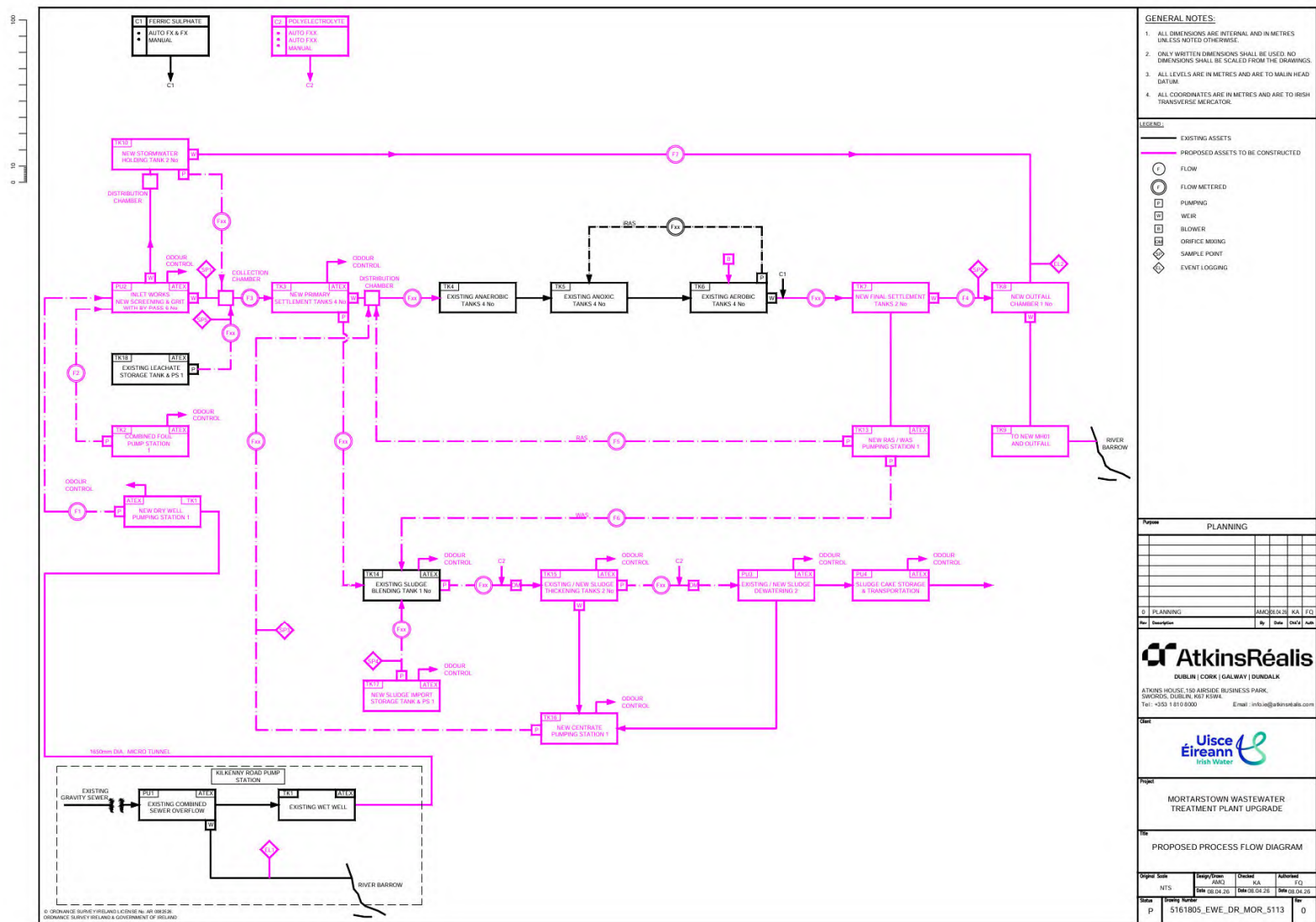


Figure 2-11 - Proposed Process Flow Diagram

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AtkinsRéalis - Baseline / Référence

2.2 Demolition Phase

Existing plant/items to be demolished as part of the Proposed Development are listed as follows, and presented in Figure 2-12 below:

- Storm tank (area 616m²);
- Inlet works (area 166m²);
- Various small chambers within the site (2 no. chambers, area 3m² and 14m²); and,
- Existing sludge cake transfer facility (area 100m²).

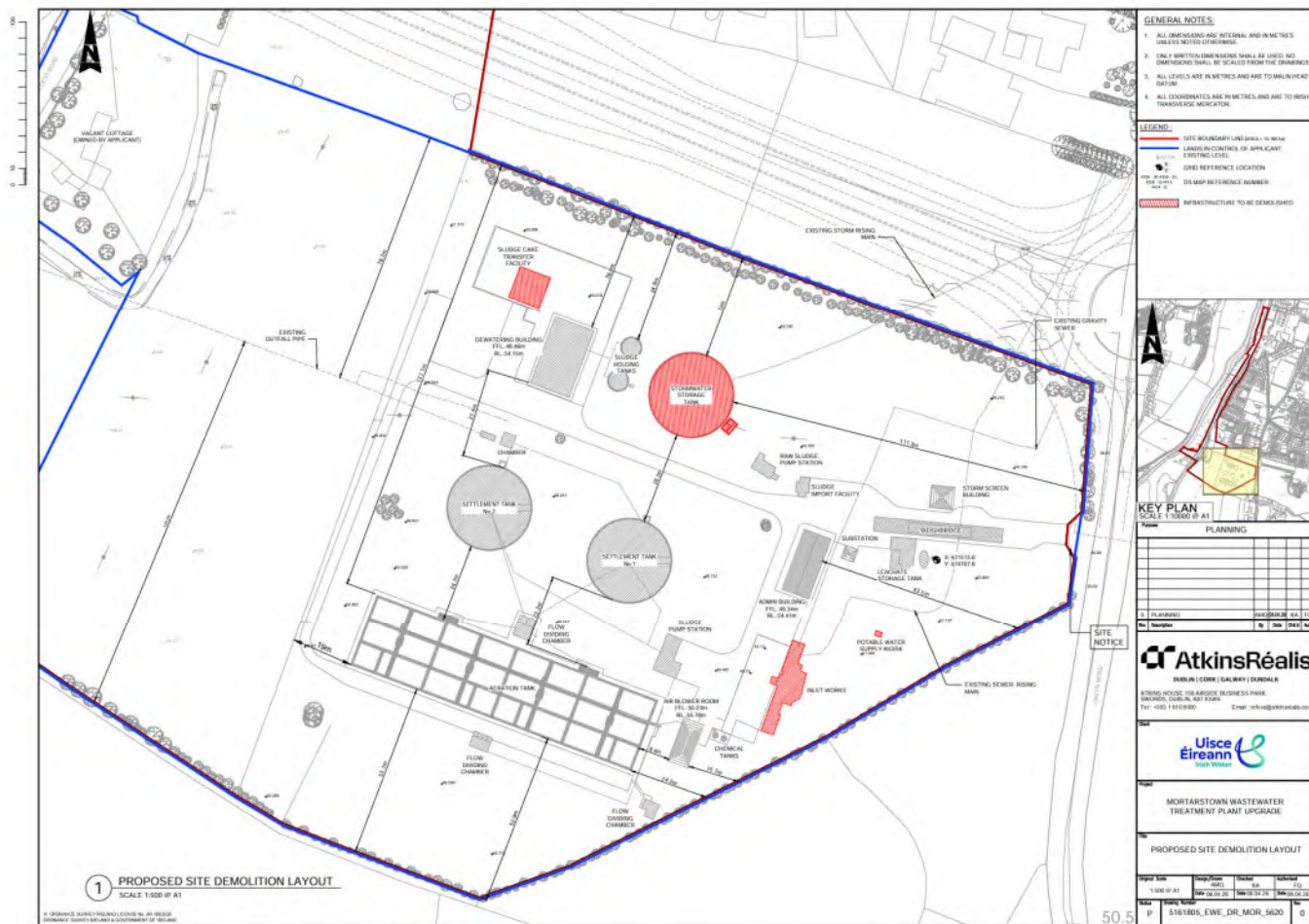


Figure 2-12 - Proposed Site Demolition Plan

2.3 Decommissioning Phase

Existing plant/items to be decommissioned as part of the Proposed Development are listed as follows:

- Kilkenny Road pumping station;
- Existing rising main; and,
- Existing settlement tanks (2no.).

Refer also to Figure 2-9 – Proposed WwTP Layout, which shows the locations of the existing sewer, existing settlement tanks and rising main scheduled to be decommissioned.

An Asbestos Refurbishment Survey Report (OHSS, 2018), presented in Appendix 2-1, Volume 3 of this EIAR, was prepared which identified asbestos containing materials (ACM) within the existing WwTP as shown below. As stated by OHSS, the identified asbestos containing materials are intact and in use. This report recommends that the ACMs are removed in advance of any refurbishment or demolition works within the existing WwTP, and ACMs should only be removed by a competent contractor in compliance with all relevant waste management and Health and Safety legislation.

An Asbestos Survey of the Kilkenny pump station (scheduled to be decommissioned) will be undertaken prior to commencement of the proposed decommissioning works.

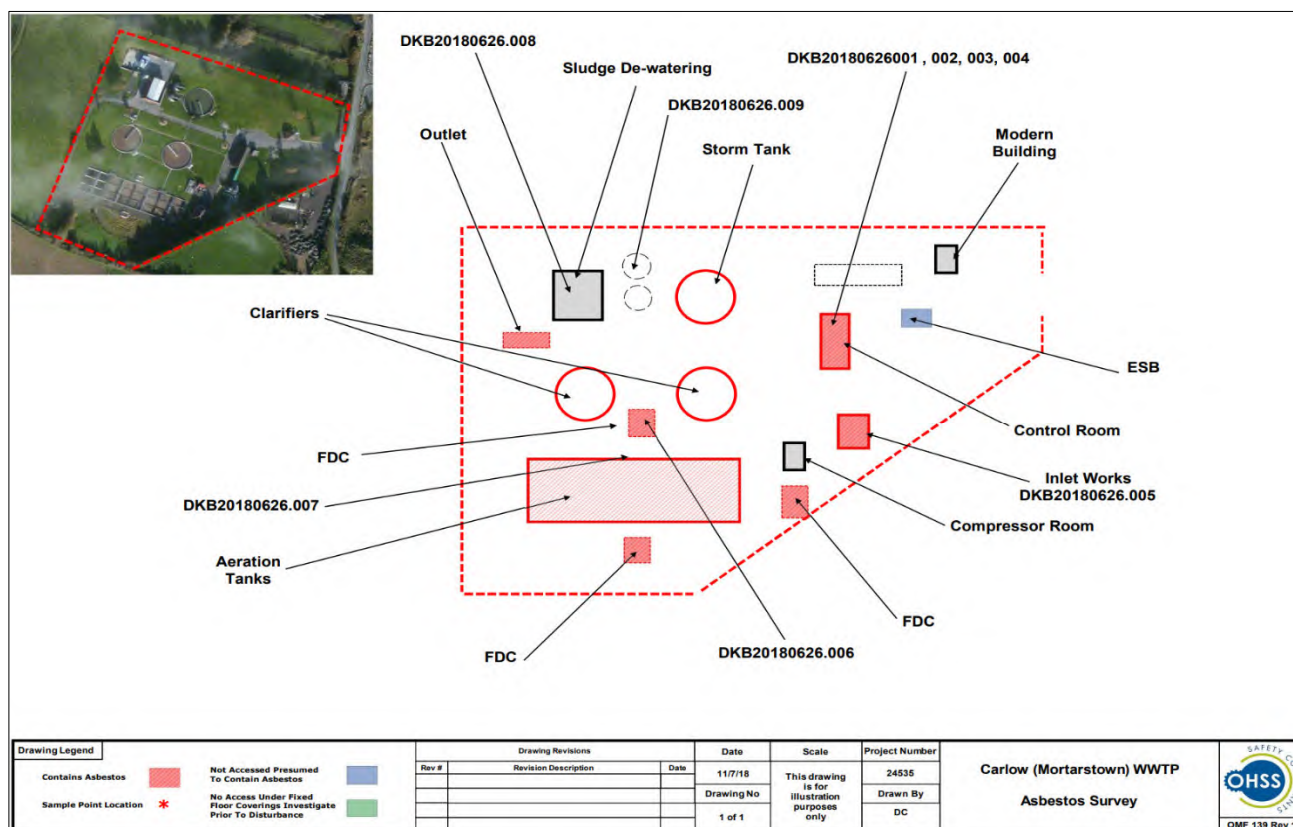


Figure 2-13 - The WwTP site assessed in the Asbestos Survey

2.4 Future Decommissioning of Mortarstown WwTP

Mortarstown WwTP is owned and operated by UÉ. They will be responsible for the future intentions of this facility if the plant were decommissioned. The design lifespan of the upgraded plant is 25 years but it is anticipated that it will be maintained, with periodic upgrading undertaken over a longer lifetime to meet future demand and upgrades in technology.

In the event of facility shutdown UÉ will decommission, render safe or remove for disposal/recovery, all materials, waste, ground, plant and equipment that could result in environmental pollution.

Decommissioning would follow a staged, compliant process focused on safety, environmental protection, and traceable documentation in accordance with prevailing best practice at the time of closure, and all relevant EPA requirements, under the relevant EPA waste licence.

A decommissioning plan will be prepared, including stakeholder notifications, risk assessments (covering odour, confined spaces and residual chemicals), and a method statement for flow diversion. It is anticipated that any shutdown of all or part of the site operations would be preceded by a scaling down of activities therefore further reducing the quantities of materials, particularly chemicals to be dealt with. Wastewater would be gradually rerouted to the replacement works or temporary treatment so the plant could be safely run down.

The decommissioning process would involve the safe isolation of all infrastructure, removal of gas, and the de-energisation of equipment. All tanks and pipelines would be isolated, drained, cleaned, and made gas-safe, with residual sludge dewatered and removed to an approved facility. Above-ground equipment, such as valves, pipework, gantries, platforms, kiosks, and associated infrastructure, would be dismantled and removed from site by suitably qualified contractors. Materials would be segregated and sent for re-use, recycling, or licensed disposal in line with legislative requirements and commercial viability.

MEICA systems would be de-energized, disconnected, and either removed for reuse/recycling or disposed of per Waste Electrical and Electronic Equipment (WEEE) and hazardous waste disposal requirements.

Structural works would then proceed under a demolition plan and civil structures would be demolished using controlled methods, with concrete and steel segregated for recycling. Sub-surface foundations may be broken to a depth of 1m below ground level, with the remainder left in situ.

Odour management would be maintained during cleaning and demolition. Any contaminated soils would be assessed and managed, as per the EPA Guidelines on Waste Classification, and remediated/disposed of to appropriately licenced waste facilities.

Site restoration would include backfilling/compaction, removal or grouting of any redundant below-ground structures to ensure long-term stability, final grading, and reinstatement of lands for future use.

Throughout, waste streams (sludge, screenings, grit, oils/fuels, polymers, electrical/electronic equipment, and general demolition arisings) would be tracked with consignment notes; air, noise, and water controls (silt, spills) would be monitored; and a final closure report would document environmental verification (soil and groundwater testing), and handover of residual buried assets (e.g., sections of microtunnel or outfall retained in situ) per the agreed end-state.

The costs associated with the decommissioning, removal, and disposal of the plant would be met by UÉ.

Successful decommissioning will only be complete when all buildings, infrastructure, equipment, materials, wastes or any other materials, which could result in environmental pollution, are removed from the site and recycled, recovered or disposed of in accordance with all regulations in force, and EPA requirements, at the time.

2.5 Preliminary Construction Sequence

The preliminary construction sequence outlined in Table 2-3 sets out the anticipated programme for the progression of the proposed development from planning through to operational commencement.

Table 2-3 - Estimated Construction Phasing Programme

Milestones	Timeframe*
Submission of planning application	Q2 2026



ACP planning application decision	Q4 2026
Civil, structural, mechanical, electrical design, site survey works & mobilisation start.	Q1 2027 – Q3 2027
Construction and installation.	Q4 2027 – Q2 2029
Commissioning	Q1-2029 – Q2 2029
Operational Date	Q3 2029

**These timelines are estimated at this juncture, and assume that there will be no significant delays to the overall delivery programme through the planning, detailed design, mobilisation, construction and commissioning phases.*

The construction activities for the development are anticipated to run for 18-20 months between Quarter 4 2027 and Quarter 2 2029.

At this preliminary juncture, the proposed construction works will comprise 4 no. key stages, summarised as follows, and presented in Figure 2-14.

- **Phase 1** - Construction of a new microtunnel gravity sewer between the existing Kilkenny Road pumping station and the new inlet pump station and construction of the outfall pipe and the headwall;
- **Phase 2** – Construction of inlet works, primary settlement tank, picket fence thickeners, blower building, storage shed, and other ancillary units;
- **Phase 3** – Decommissioning of the existing Kilkenny Road PS;
- **Phase 4** – Construction of the stormwater holding tanks.

Dry weather flow will be calculated by the Contractor to determine the available downtime for linking new elements of the works to ensure the stormwater storage works are scheduled in a period of dry weather.

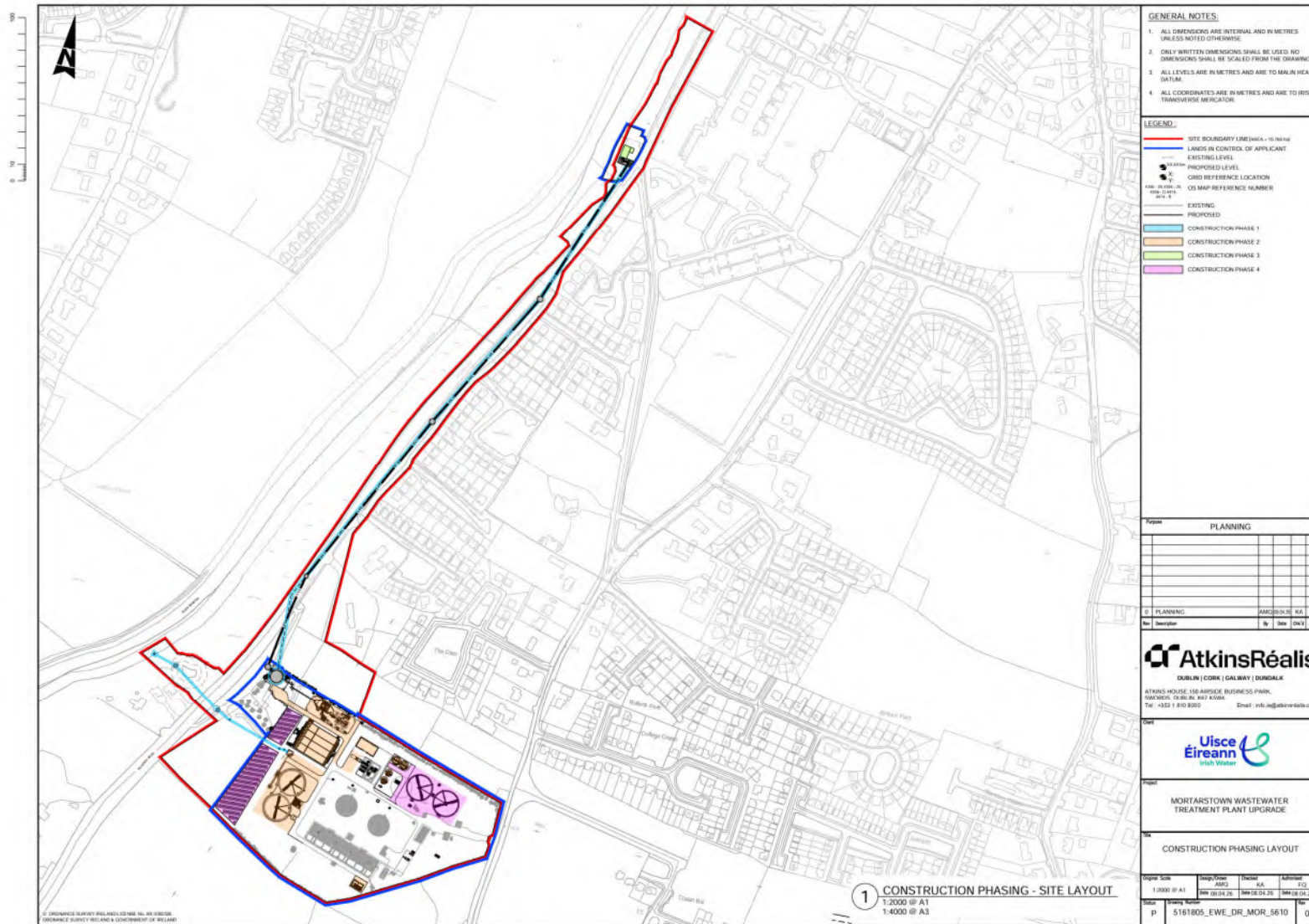


Figure 2-14 - Preliminary Construction Phasing

Details of the proposed sequence of construction works are provided in the following section. It should be noted that this construction sequence is preliminary and may be subject to revision at a later stage of the development.

2.5.1 Microtunnel Gravity Sewer Construction

A trenchless construction methodology, pipe jacking, will be used to install the underground pipeline, by pushing specially designed pipes through the ground using high-capacity hydraulic jacks from a launch shaft. A working area within the red line boundary, will be provided during construction for the installation of the launch chamber, at the existing WwTP site.

The construction of the tunnel will involve 4 no. key stages including:

- Construction of the launch chamber / new inlet pump station .
- Installation the new gravity sewer from the launch chamber (at the existing WwTP site) towards the existing Kilkenny Road Pumping Station wet well.
- Excavation of the reception / exit chamber at the southern side of the existing Kilkenny Road pumping Station wet well and completion of the tunnel connection into the new Shaft B. Note the connection between the new Shaft A and the existing Kilkenny Road wet well is not to be completed at this point. Establishment of the connection is described in Section 2.5.3.2.
- Completion of the construction of the new WwTP inlet pump station including wet well, dry well and downstream pipework offline at new intake works.
- Connection of inlet pump station to the microtunnel.

Refer to Figure 2-15 below for drawings showing the excavation of the reception chamber and construction of the new WwTP Wet Well.

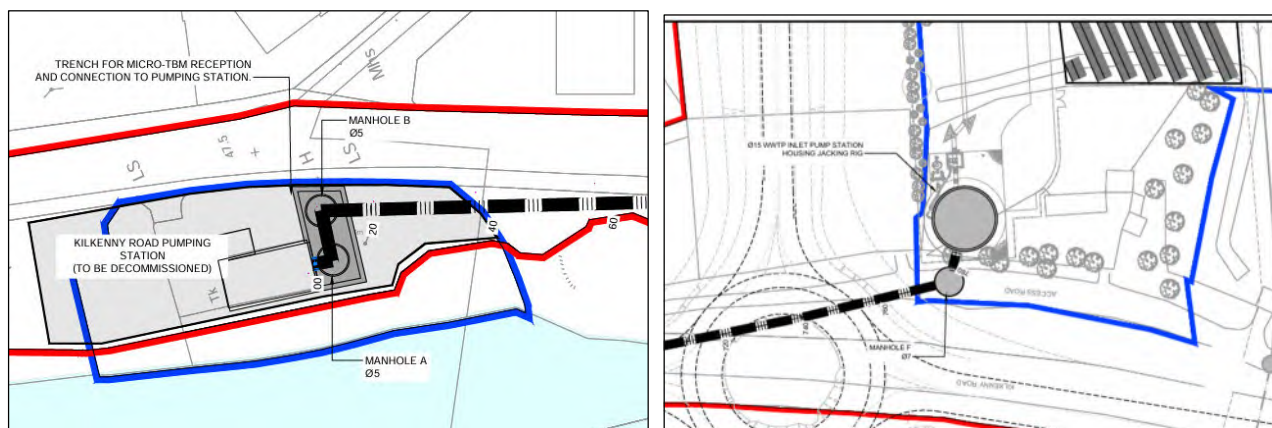


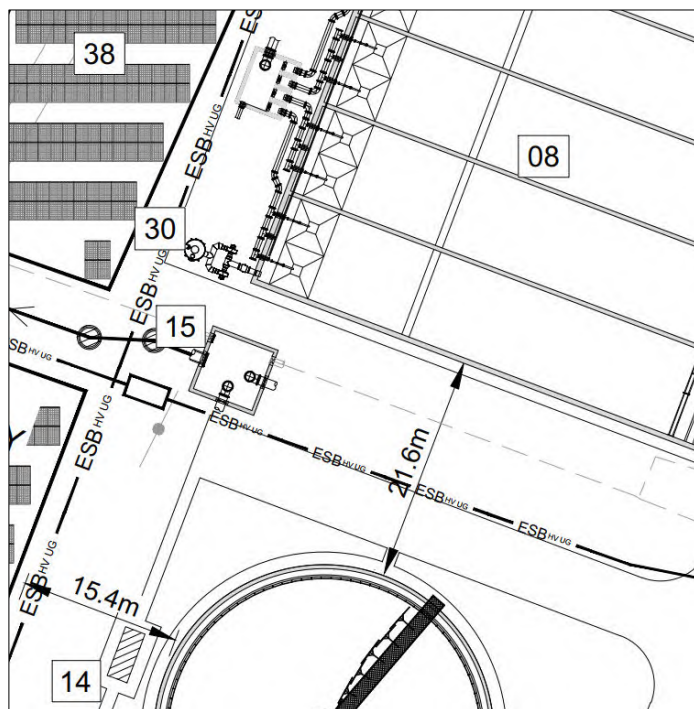
Figure 2-15 - Drawings showing the proposed Micro TBM launch zone location and construction of the new Inlet Pump Station

2.5.2 Waste Water Treatment Plant (WwTP)

The construction of the WwTP will involve 11 no. key stages including:

- Construction of the new screening and grit control inlet works offline.
- Construction of the new Storm Tank 2 (tank at the east)
- Construction of the new Primary Settlement Tanks, Final Settlement Tanks and associated pipework, chambers and pumping stations (RAS / WAS, etc.)

- Installation of sludge thickening tanks, sludge dewatering units, upgrade sludge import facility and installation of all associated chambers offline. Install and connect upstream and downstream pipework to these units offline.
- Installation of the temporary cofferdam on the River Barrow utilising a barge for driving the sheet piles.
- Construction of the proposed outfall pipework, chambers and new outfall chamber and headwall. Note the connection to the new upstream combined effluent chamber (numbered as “15” in Figure 2-16) should be completed at a later stage. Establishment of this connection is described in Section 2.5.4.2.



- Installation of the new dewatering press, new sludge cake pumps and upstream and downstream pipework offline.
- Completion of necessary modifications to thickened sludge feed pumps arrangement and connect thickened sludge pipework upstream and cake pipe work downstream of the new dewatering unit to the existing pipework.
- Commissioning of the new sludge dewatering facilities. This step should be performed outside of normal sludge dewatering operational hours.
- Installation of the new air blower building, 4 no. new air blowers, associated equipment and pipework offline.
- Connection and commission of the air blower pipework to the existing aeration tanks and decommission the existing air blowers and associated building. Commission the new sludge dewatering facilities.

Figure 2-16 - Drawing showing the new combined effluent chamber

2.5.3 Kilkeny Road Pumping Station Connection

2.5.3.1 Temporary Overpumping to Allow Modifications to Existing Wet Well

An existing manhole upstream of the Kilkeny Road pumping station is fed from 3 no. existing pipelines, namely a Ø750mm dia, a Ø600mm dia and a Ø225mm dia. pipe. The Ø225mm dia pipe will be intercepted and diverted to reception Shaft B. The remaining large pipes shall be overpumped to reception Shaft B. This will allow flows to be isolated and the connection to Shaft A be made. Emergency overflows will remain operational, as per the current operational regime.

2.5.3.2 Kilkeny Road Pumping Station Connection to Tunnel

A connection will be made from the southern side of the existing wet well to the new Shaft A. Flows will then be reinstated to the existing wet well and allowed to overflow to the reception Shafts A and B (refer to Figure 2-5) and the new tunnel until testing and commissioning of the tunnel, the new pumping station and the new inlet works are complete. The existing pumping station will serve as a back-up during this period.

2.5.3.3 Wet Well Modifications

Once testing and commissioning are complete, flows will be isolated upstream of the existing wet well and overpumped again to allow modifications to the existing wet well. The invert level of the wet well floor will be raised to provide at grade gravity flows to the outfall. Overflows to be maintained and modifications to be made as required.

Once works are complete, upstream flows will connect via the modified wet well to the new gravity tunnel. All existing infrastructure and equipment will be decommissioned to ensure no hazards remain.

2.5.4 Connection of New Infrastructure into Treatment Process

It is proposed to complete the following 3 no. connections outlined below, to allow for transfer of the flows from the existing process to the new process. It will be required to complete these works during dry weather flow. Current estimates of available attenuation indicate that flows to the WwTP can be isolated for a maximum of ca. 3 hours in the new tunnel to complete these works.

2.5.4.1 WwTP Connection No.1

It is proposed to isolate the flows coming from the existing inlet works to the chamber (pointed by the green arrow), immediately upstream of the aeration tank (numbered as “09” in Figure 2-17). The next step will be to complete the connection of the proposed pipework from the proposed Primary Settlement Tanks to chamber immediately upstream of the aeration tank. Note: The connection of the Kilkenny Road (noted in 2.5.3 above) should be completed to enable the storage in the tunnel and primary settlement tanks to be utilised during these works.

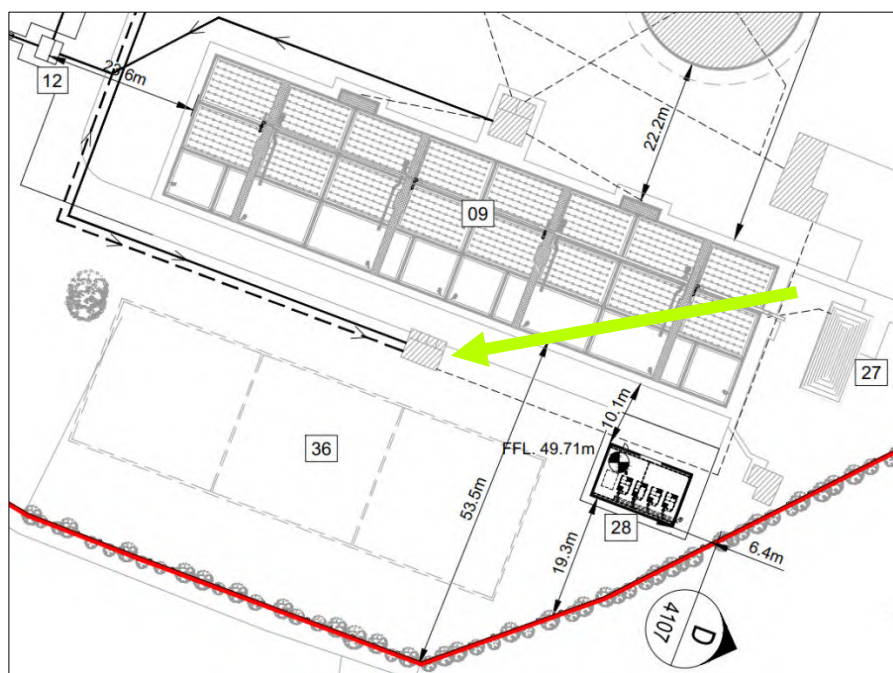


Figure 2-17 - Connection Point 1 - Splitter chamber upstream of Aeration tanks

2.5.4.2 WwTP Connection No.2

It is proposed to isolate the flows coming from the existing aeration tank (numbered as “09” in Figure 2-18). The next stage will complete the connection of the proposed pipework from the proposed Final Settlement Tank into

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the chamber (pointed by green arrow) immediately downstream of the aeration tank. This will enable the diversion of flows to the proposed Final Settlement Tank.

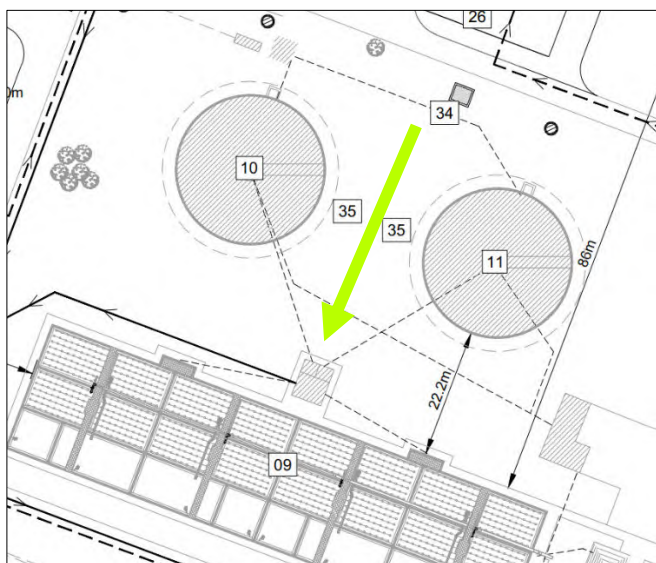


Figure 2-18 - Connection Point 2 - Splitter chamber to Final Settlement Tanks

2.5.4.3 WwTP Connection No.3

Flows coming from the new upstream combined effluent (numbered as “15” in Figure 2-19) chamber will be isolated. The next step will complete the connection of the proposed pipework into this chamber. This will enable the diversion of flows to the new outfall, through the new processes in the WwTP and commencement of the commissioning stage of this infrastructure.

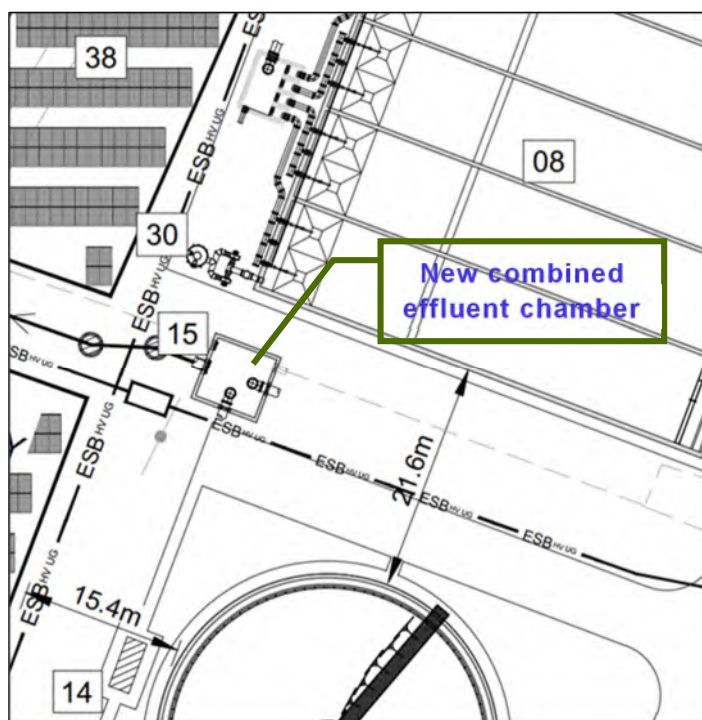


Figure 2-19 - Connection Point 3 - New combined effluent chamber

2.5.4.4 Stormwater Storage

Following the diversion of the flows to the new process stream, the existing storm tank will be demolished and the new stormwater Tanks A and B in Figure 2-20, with associated pipework and chambers will be constructed. Each tank will have a storage capacity of 3,115m³. It is noted that this must be carried out during dry weather flows. Contingency stormwater storage can be provided in the tunnel and potentially the existing final settlement tanks, during the proposed works.

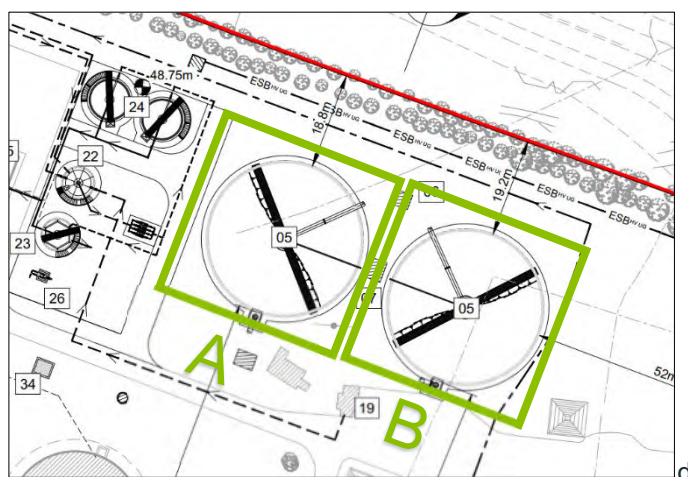


Figure 2-20 – Drawing showing the Stormwater Storage

2.5.5 Commissioning

When the proposed infrastructure is constructed and connected into the process stream, a 3-month commissioning phase will commence. All existing infrastructure proposed for decommissioning will be retained for this period to act as a standby system, in the event of any commissioning issues, the existing infrastructure can be recommissioned into the process to enable to rectification / remedial measure to be completed.

2.6 Construction Aspects

Construction works will take place between 8am and 6pm Mondays to Fridays inclusive, and between 8am and 1pm on Saturdays, with no works taking place on Sundays or Public Holidays. Deviation from these times will only be allowed in exceptional circumstances where prior written approval has been received from Carlow County Council.

2.6.1 Site Compounds

As depicted in Figure 2-21 to Figure 2-22, the site compounds including site offices, material storage and parking will be established in 3 no. locations within the red line boundary, namely 2 no. at the WwTP site and 1 no. immediately north of the existing Kilkenny Road PS.

For the works at the WwTP site, the site compound will be located at the available area to the south of the existing aeration tanks. This will be the primary location for site offices, self-contained temporary welfare facilities, and material storage. A second designated compound for temporary construction stage parking (with 18 no. parking spaces) will be located to the left of the existing site entrance. A designated walkway defines the pedestrian route from the car park to the site compound to the south. All construction traffic will access the WwTP compounds via the existing WwTP entrance.

The third site compound will be located north of the existing Kilkenny Road PS for storage and set down of materials. This compound will be accessed via an existing gate on Kilkenny Road.

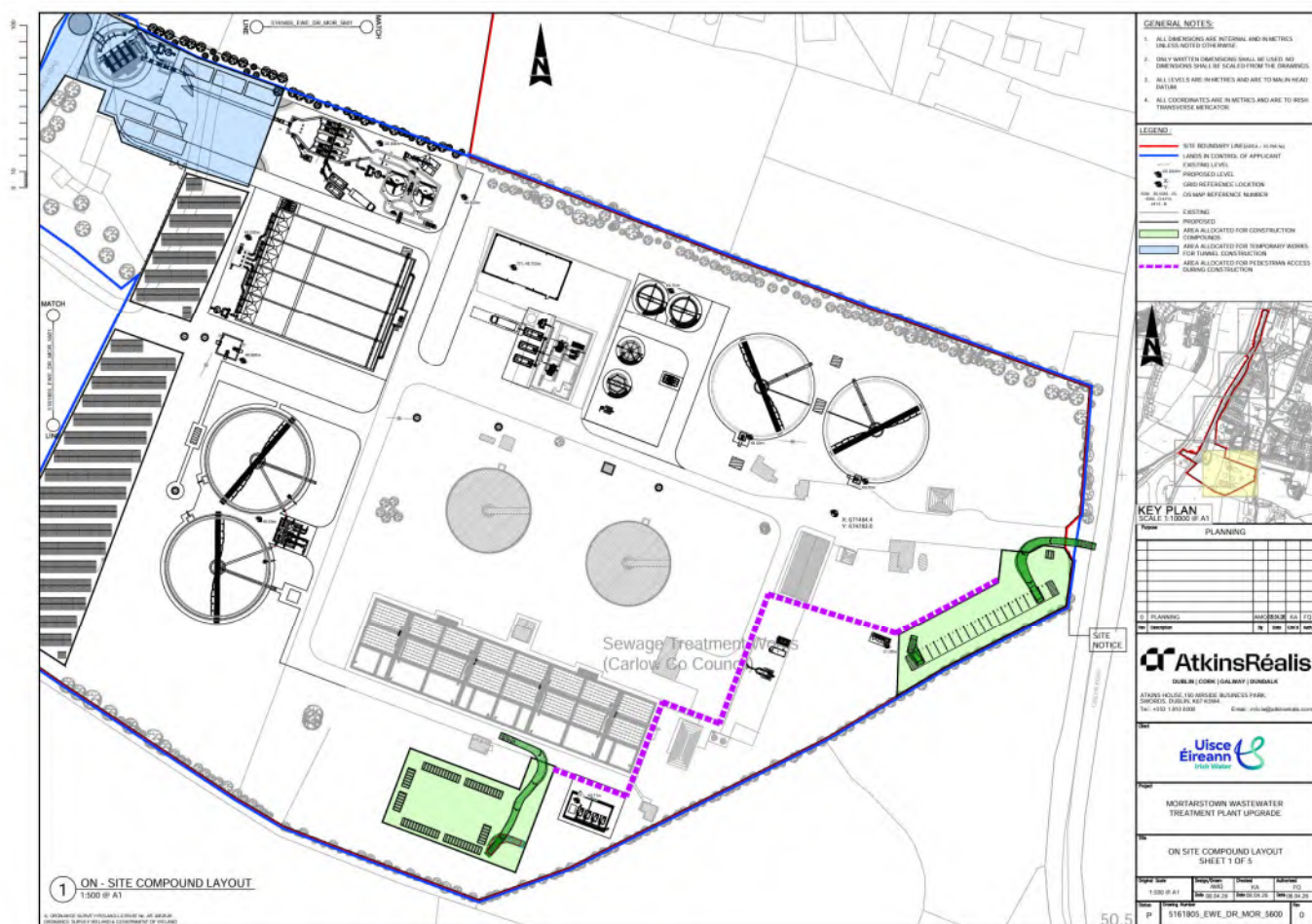


Figure 2-21 - Preliminary Construction Site Compounds (1 of 2)



Figure 2-22 - Preliminary Construction Site Compounds (2 of 2)

2.6.2 Traffic Management

The proposed transport routes for all construction traffic entering and egressing the WwTP site, for the full duration of the ca. 18 - 20 month phased construction period will be through the existing access point to the WwTP site. Construction traffic will access the existing Kilkenny Road PS site via the existing PS entrance and will access the site compound to the north via an existing entrance from Kilkenny Road.

All construction activities will be managed and informed by a Construction Traffic Management Plan (CTMP) which will be implemented by the Contractor. The details of the CTMP will be agreed with the Carlow Co. Council Roads Department in advance of construction activities commencing on site. Refer to Chapter 10 Traffic of this EIAR and the Outline Construction Environmental Management Plan (CEMP) submitted as Appendix 2-2 in Volume 3 of this EIAR.

2.6.3 Environmental Management

The construction of the Proposed Development will comply with the CEMP submitted as Appendix 2-2. Volume 3 of this EIAR (which takes account of the Schedule of Environmental Commitments presented within this EIAR). This document will be further developed and added to within the project specific Detailed CEMP which will be prepared by the Contractor in advance of the construction and demolition works, and will be fully implemented

onsite for the duration of the construction and demolition phase of the project. Environmental monitoring will be carried out during the construction phase as detailed in Chapter 18 of this EIAR - Schedule of Commitments.

2.6.4 Waste Management

The construction of the Proposed Development will be in accordance with the Construction and Demolition Resource and Waste Management Plan (RWMP) (AtkinsRéalis, 2026) submitted as Appendix 2-3. Volume 3 of this EIAR which was prepared in accordance with the relevant following guidance 'Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition projects' (EPA, 2022).

The Construction & Demolition RWMP provides a mechanism for monitoring and auditing waste management performance and compliance for the duration of the project. The document also provides a detailed overview of key waste management considerations for the proposed development at this preliminary stage, while also allowing for further enhancement as the proposed development progresses through to the detailed design and construction stages. This document will be further developed and added to within the project specific Detailed Resource and Waste Management Plan which will be prepared by the Contractor in advance of the construction phase and will be fully implemented onsite for the duration of the construction phase of the project. All waste handling and management will be as the requirements of the Waste Management Act 1996 as amended and other relevant waste management legislation. The Contractor will be required to keep all waste management records including, but not limited to, waste haulage contractors, types and quantities of waste taken off site and final destination for recycling/disposal of the material. Gate tickets will be kept by the Contractor and will be available for review by the competent authority or the Client.

Estimated waste volumes are summarised in Table 2-4 below.

Table 2-4 – Summary of estimated Construction and Demolition Waste Volumes

Construction Phase	m³
Imported fill	45 000
Excavated material	88 834
Material to be reused on site	2 500
Contaminated soil to be removed off site	334
Remaining Material to be removed off site	86 000
Construction & Demolition Waste	m³
Construction	1060
Demolition	876
Demolition Phase	
Total	876m ³



Operational Phase	kg/per month
Screening	7 724
Grit Removal	54 000
Dewatered Sludge	264 000
Admin Building (Dry Recyclables)	72
Future Decommissioning	m ³
	30 000

2.7 Operational Aspects

2.7.1 Discharge Licence

2.7.1.1 Existing Wastewater Discharge Licence (WWDL)

The Urban Wastewater Treatment Directive (UWWD) Regulations 2001 (amended in 2004 and 2010) sets standards to be met in the collection and treatment of wastewater as well as the monitoring requirements for wastewater discharges from urban areas. The Environmental Protection Agency Issues licences for WwTP discharges to environmental waters in accordance with the requirements of the UWWD. The discharge licence for Mortarstown WwTP was most recently granted under this legislative instrument in August 2009 (EPA WwDL Ref: D0028-01), with technical amendments in October 2011, December 2016 and December 2021.

The proposed discharge pipe is ca. 10m from the existing licenced discharge pipe (EPA WwDL Ref: D0028-01). A new discharge licence application / licence amendment will be sought for the proposed upgrade to the WwTP to reflect the proposed uplift in contributing PE.

2.7.1.2 Proposed Development - Treatment Standards / Wastewater Discharge Licence (WWDL)

The WwDL establishes Emissions Limit Values (ELVs) for certain chemical characteristics, which the plant's final effluent discharge is required to comply with.

An update to the existing ELV's will be required within the new discharge licence application / licence amendment for the WwTP. As part of the proposed design, assimilative capacity calculations have been undertaken. The River Barrow has sufficient assimilative capacity to accept the increased discharge from the upgraded WwTP. A full WAC analysis is presented and discussed in Chapter 12 – Water and provided as Appendix 12-3 in Volume 3 of this EIAR.

2.7.2 Landscaping

The proposed planting strategy for Mortarstown WwTP is designed to integrate the site sensitively into the surrounding landscape, enhance visual screening, and support biodiversity. Retention of existing vegetation,

supplemented with additional native hedgerows, grassland management, ponds and tree planting, will mitigate the visual and ecological effects of the works while contributing to the overall landscape character of the area.

All planting proposed within the Mortarstown WwTP site will comprise native species of Irish provenance.

Existing screen planting along the northern, eastern, and southern boundaries of the site will be largely retained. Additional native species hedgerows will be planted along the entire boundary to the extension to the site to increase biodiversity. These hedgerows, as they mature, will also provide screening.

Grassland areas within the site will be managed to enhance biodiversity. Short grassland areas will be managed through a mowing regime of five cuts per year at approximately six-week intervals, with all arisings removed. Long grassland areas will be managed through a single annual cut, with all arisings removed.

Two wildlife ponds, incorporating marginal planting and pondside trees to provide partial shading, will be provided within the Mortarstown WwTP site. Additional orchard tree planting will be provided within the rear garden of the derelict cottage located to the west of the site. Existing vegetation to be retained at the cottage with additional tree planting and hedge planting where its curtilage abuts the new WwTP fence line/boundary .

Replacement tree and hedgerow planting will be provided where sections of existing trees and hedgerows are removed along Kilkenny Road (in the vicinity of Southern Gardens and Carraig Abhainn) to facilitate shafts for micro-tunnelling works.

The small area of woodland removed south of the Kilkenny Road pumping station will be allowed to naturally regenerate following completion of the works. In addition, a native hedgerow will be planted adjacent to the existing stone boundary wall near the Kilkenny Road pumping station.

Refer to the Land Management Plan (Appendix 6-4) submitted as part of this planning submission.

2.7.3 Waste Management

The operation of the Proposed Development will be in accordance with the Operational Waste Management Plan (WMP) (AtkinsRéalis, 2026) provided in Appendix 2.4, Volume 3 of this EIAR .

At present, sludge cake waste from the sludge facility is covered and transported off site by trailers. The sludge is stored 5 km away on a farm known as “Penders yard “ a covered facility, whereby the trailer can be driven in and tipped in large hangar type sheds. It is then land spread , with a land management programme through the waste management contractor ENVA. ENVA also manage the storage at Penders and there is adequate storage here to hold the sludge over the period from October to February when land spreading cannot happen.

Other waste to be considered from the site is the ragging and grit screenings from the inlet works and storm screen. These are 3no. standard skips which are always kept covered as they are filled and transported to a licensed facility.

2.7.4 Surface Water Management

The Mortarstown WwTP has an existing surface water drainage system which drains the existing roadways. The extension of the site to the west including the proposed WwTP will require a new surface water drainage system. This system includes infrastructure such as filter drainage along the access road, a kerb and gully drainage system within the WwTP site and surface drainage outlet pipe to connect to the proposed storm water overflow pipeline which includes an oil/petrol interceptor prior to discharge via the existing outfall pipe to the River Barrow.



The proposed stormwater drainage network for the development is presented on the planning drawing reference: 5161805_EWE_DR_MOR_5190 and 5191 in the planning drawings submitted with this application.

2.7.5 Odour Control

There will be active odour management during the operation of the WwTP by means of the odour control units (OCUs) to be installed to the following process units:

- New Pumping Station
- New Inlet Works
- New Primary Settlement Tank
- Anoxic / Anaerobic Tank
- Sludge Blending Tank and Picket Fence Thickeners (New and Existing)
- Sludge Dewatering Building
- Local Foul Pump Station
- Centrate Pumps.

2.7.6 Potable Water (Mains)

Potable water supply for human consumption and use such as uses in canteen and other welfare facilities is provided from Carlow Town's existing water network mains. The existing potable water supply to the WwTP will be retained to continue the supply of potable water supply to the administration building, emergency shower and eye wash and hydrants at the WwTP site.

2.7.7 Clean Wash Water (Borehole)

The washwater supply to the process units is provided via an existing borehole located in the WwTP site, east of the administration building. The borehole system will be upgraded and washwater network will be expanded to cover the new process units and the inlet pump station during the operational phase.

3. ALTERNATIVES

3.1 Introduction

This Chapter outlines the alternatives considered during the planning and design stages of this project. The requirement to consider alternatives within an EIAR is set out in Annex IV (2) of the EIA Directive (2014/52/EU) which states:

“A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.”

The Mortarstown Wastewater Treatment Plant upgrade in Carlow Town is part of UÉ’s national investment in water and wastewater infrastructure. The wastewater treatment plant has a current capacity to serve approximately 36,000 population equivalent (PE) in Carlow Town and surrounding areas. In order to support anticipated growth in the town and meet the future demands of Carlow and the surrounding area, the treatment capacity of the plant needs to be significantly increased to serve a future projected PE of 58,500.

A number of alternative technologies and design options have been considered as part of the iterative design and assessment process where relevant. These include:

- Do-nothing scenario
- WwTP Upgrade
 - Alternative Treatment Technology scenarios
- Kilkenny Road Pumping Station Upgrade
 - Pump Station Layout Options
 - Pump Station Site Selection Option
- Pipeline from Kilkenny Road Pump Station to WwTP
 - Rising Main Options
 - Gravity Main Options
 - Microtunnel alignment iterations
- WwTP Outfall
 - Outfall Route Selection Assessment
 - Outfall Discharge Options to River Barrow
 - Headwall Construction Options

3.2 Assessment Methodology

3.2.1 Types of Alternatives

The EPA's 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' (2022) (hereafter referred to as 'the EPA Guidelines') outlines different types of alternatives that should be considered in an EIAR. These include; do nothing scenario, alternative processes and alternative locations (where feasible), alternative layouts, alternative designs and alternative mitigation measures.

The approach adopted for this assessment was firstly to identify where there were reasonable alternatives to all elements of the Proposed Development, then to consider the impact of these alternatives (if any) on the environmental factors used in this EIAR. Where an impact was identified, this effect was compared with the assessed effect of the 'Proposed Development'.

An indication of the main reasons for the option chosen, taking into account the effects of the proposed development on the environment and including a comparison of their environmental effects is what is required by the Directive. As the EPA notes: *"It is generally sufficient to provide a broad description of each main alternative and the key issues associated with each option. A detailed assessment (or 'mini-EIA') of each alternative is not required."*

3.2.2 Limitations and Assumptions

The degree to which it is possible to assess alternatives depends on the amount of information available for each alternative. Alternatives discarded at an early stage of the design process necessarily will not have the same level of information as is available for the Proposed Development.

3.3 Do-Nothing Scenario

If the proposed development did not proceed the Mortarstown WwTP would not be upgraded. The WwTP is currently operating at the upper limits of its design capacity. The current plant will not meet the operational demands from expected population growth within the agglomeration i.e. P.E. 58,500. It would therefore be in breach of the EPA Discharge Licence and would not provide sufficient wastewater treatment for the population of Carlow Town and its surroundings. Operating in these overloaded conditions, the discharge concentrations in the final effluent would exceed the emission limit values (ELVs) of the licence and would exceed the assimilative capacity of the receiving waters. This would affect water quality and the WFD status of the river. This would have a knock-on effect on the aquatic environment in the River Barrow SAC.

The absence of additional storage capacity for stormwater would mean that excessive stormwater flows would continue to be discharged into the River Barrow. The WwTP would continue to discharge and be in breach of their wastewater discharge licence.

For these reasons the 'Do Nothing' scenario was not considered further.

3.4 Consideration of Reasonable Alternatives

This section outlines the design options and changes in design over the design period of the proposed development from feasibility, preliminary design and through to specimen design.

3.4.1 WwTP Upgrade

The Proposed Development will be procured as a Design and Build project, with the chosen Contractor responsible for the final detailed design. A number of key design iterations which were considered during the design process, and how the overall design evolved taking account of site-specific design, engineering and environmental constraints, are described below. In order to identify a preferred specimen design, the design team considered the following:

- Process options to ensure compliance with the EPA wastewater discharge licence and the Habitats Directive;
- Area available for the development;



- Possible re-use of existing plant; and,
- Construction and operational costs.

3.4.1.1 Alternative Treatment Technology Scenarios

At Project Feasibility Stage (Feasibility Study Report, Rev 1, June 2018), four technical scenarios were assessed, based on a preliminary calculation of the projected 10 year agglomeration load of 57,000 PE (based on 2019 Census results), as detailed below.

3.4.1.1.1 Scenario A

This scenario considered the treatment of the projected 10 year agglomeration load of 57,000 PE in an upgraded WwTP including primary settlement tanks (PST) and activated sludge process (ASP). This technical solution would have utilised the existing bioreactors, ferric sulphate dosing equipment and Picket Fence Thickeners (PTF) and included (but not limited to) the addition of the following:

- A new inlet works;
- 2 No. stormwater holding tanks;
- 2 No. primary settlement tanks;
- New primary sludge PS;
- Replacement of the existing aeration blowers;
- 2 No. new final clarifiers;
- New Return Activated Sludge (RAS)/ Waste Activated Sludge (WAS) pumping station;
- 2 No. new picket fence thickeners;
- 1 No. new sludge dewatering unit;
- New cross site interconnecting pipework; and,
- A new SCADA/PLC system with additional MCCs, if required.

3.4.1.1.2 Scenario B.1

This scenario considered the treatment of the projected 10 year agglomeration load of 57,000 PE in an upgraded WwTP incorporating 2 no. additional Bioreactors without PSTs. The technical solution would have utilised the existing bioreactors, ferric sulphate dosing equipment and PFTs and included (but not limited to) the addition of the following:

- A new inlet works;
- 2 No. storm holding tanks;
- Additional bioreactor volume by adding 2 No. bioreactors
- 2 No. final clarifiers;
- New RAS/WAS pumping station;
- 2 No. picket fence thickeners;
- 1 No. sludge dewatering unit;
- New site-wide interconnecting pipework; and,
- A new SCADA/PLC system with additional MCCs, if required.

3.4.1.1.3 Scenario B.2

This scenario considered the treatment of the projected 10 year agglomeration load of 57,000 PE in an upgraded WwTP incorporating addition of 4 no. aerobic zones without PSTs. The technical solution would have utilised



the existing bioreactors, ferric sulphate dosing equipment and PFTs and includes (but is not limited to) the addition of the following:

- A new inlet works;
- 2 No. storm holding tanks;
- Additional bioreactor volume by adding and extending the aerobic zones in the existing bioreactors;
- 2 No. final clarifiers;
- New RAS/WAS pumping station;
- 2 No. picket fence thickeners;
- 1 No. sludge dewatering unit;
- New site-wide interconnecting pipework; and,
- A new SCADA/PLC system with additional MCCs, if required.

3.4.1.1.4 Scenario C

This scenario considered the introduction of additional infrastructure required to receive and treat imported leachate and sludge, including the following infrastructure:

- Increased bioreactor aerobic zone capacity;
- Increased blower capacity; and,
- Increased sludge blending and thickening tanks.

3.4.1.1.5 Determination of Preferred Option

A Conceptual Design Workshop was held with UÉ and Carlow County Council on 12th July 2018 where the scenarios presented were reviewed. Feedback from this consultation was included in the assessment and the Feasibility Study Report was revised and finalised.

At this stage, the current and projected future design loads for the agglomeration were updated, as presented in Table 3-1, based on the 2016 Census data and additional inputs provided by UÉ Asset Planning.

Table 3-1 - Revised Feasibility Study Design Loading (PE)

	Agglomeration Loading (PE)		
	Existing (2018)	10 Year (2030)	25 Year (2045)
Total Design Loading	35,537	57,651 rounded to 58,000	66,818 rounded to 67,000

Preferred Option

Scenario A was identified as the preferred treatment solution as it provides primary settlement tanks (PSTs) for load-shedding, which reduce the load on downstream biological treatment processes while meeting compliance requirements. This scenario has a higher estimated CAPEX but significantly lower whole-life cost (WLC) compared with other options. It also offers lower energy requirements compared to other options. All scenarios had similar impacts on environment and constructability.

Increased blower capacity and increased sludge blending and thickening tanks (outlined in Scenario C) was also deemed required and include in scope of works.



This treatment option was approved by UÉ in May 2019 and subsequently progressed to the specimen design stage.

3.4.1.1.6 2022 Population Equivalent

The Feasibility Study Report population equivalent calculation was based on 2016 Census results and known wastewater loads at this stage. During the period between completion of the Feasibility Study Report and revisions to the Specimen Design Report, results of the Census 2022 were published by the Central Statistics Office. Given the actual population figures, design horizon population calculations were revisited based on the recorded 2022 population of Carlow Town, as presented in Table 3-2.

Table 3-2 - Specimen Design Loading (PE)

	Agglomeration Loading (PE)		
	Existing (2023)	10 Year (2037)	25 Year (2052)
Total Design Loading	39,270	52,525 rounded to 52,500	58,426 rounded to 58,500

The design horizon years of the proposed development were also updated in accordance with the updated proposed development programme. The current year of the calculations was set at 2023. Likewise, the new design horizon years were revised to 2037 for 10-yr and 2052 for 25-yr.

3.4.1.2 Specimen Design

The specimen design was developed based on the preferred option identified on conclusion of the feasibility study.

The design basis included:

- All flows to the WwTP are subjected to preliminary treatment comprising duty/standby fine screening, grit removal and storm water storage.
- The screened and dewatered wastewater undergoes preliminary settlement to reduce the organic and solids loading to the secondary state of treatment.
- Biological treatment for carbonaceous and nitrogenous removal will be based on an expansion of the existing activated sludge process.
- Phosphorus removal will be achieved during the A2O process, however any residual phosphorous will be removed using chemical precipitation and all treated effluent will discharge by gravity into the River Barrow.

The developed specimen design concludes a more comprehensive definition of the proposed WwTP upgrade works, as outlined below:

- Provision of a new foul pumping station for local agglomeration adjacent to existing inlet works (supplemented by the WwTP standby generator).
- Provision of new fuel storage tank (5,000L storage capacity) and standby diesel generator to service the WwTP (roofed).
- Provision of new inlet works to include fine screening, mechanically raked by-pass screen, screening compaction and conveyance to skips, grit removal, grit classification and conveyance to skips. The new inlet works will be provided with an odour treatment unit.
- Provision of 2 no. new stormwater storage tanks and 2 no. new stormwater return pumps.



- Existing final settlement tanks and associated Return Activated Sludge (RAS)/ Waste Activated Sludge (WAS) to be retained, cleaned and decommissioned.
- Provision of 4 no. new primary settlement tanks and scraper systems.
- Provision of 4 no. new primary sludge pumps.
- Provision of a new scum pump.
- Provision of 4 no. new air blowers and modifications to existing air delivery pipework
- Provision of a new air blower building (roofed).
- Provision of new fine bubble diffused air system in existing aeration tanks.
- Provision of 2 no. new final settlement tanks with half-bridge scrapers.
- Provision of a new RAS/WAS pumping station and station fitted with 2 no. RAS pumps and 2 no. WAS pumps.
- Structural refurbishment of the existing picket fence tanks.
- Mechanical and electrical refurbishment of existing picket fence thickener and conversion of second existing tank to a sludge blending tank.
- Provision of 2 no. additional picket fence thickener tanks.
- Provision of 1 no. belt press, polymer prep unit and polymer dosing pumps in the existing sludge dewatering building.
- Provision of a new pumped sludge transfer system.
- Provision of upgrades to the existing sludge import facility.
- Provision of minimum 6 no. new odour control units
- Provision of upgrade to existing chemical storage tank and dosing facility
- Provision of 1 no. new outfall chamber and outfall pipe.
- Modifications to existing administration building.
- Provision of MEICA and SCADA upgrades.
- New storage shed and associated gantry (roofed).
- Demolition of existing inlet works structure.
- Existing service relocations.
- General civil site works.
- Future storm tank (not part of this planning consent).
- Future aeration tank (not part of this planning consent).
- Future final settlement tank (not part of this planning consent).
- Provision for PV solar panels,
- Diversion of existing ESB 38kv HV overhead lines and 10kV/20kV MV line on site (carried out by ESB).

3.4.2 Kilkenny Road Pumping Station (PS) Upgrade

The requirement for the upgrade of the existing Kilkenny Road Pumping Station (PS) to deliver and manage Formula A flows for future design horizons was identified during the Feasibility Study.

Initially it was envisaged the upgrade work would be limited to the existing pump station site and the area immediately south of site. The existing Kilkenny Road Pump Station site is a narrow site, constrained by the River Barrow to the west and Kilkenny Road to the east. The site is also congested with a number of incoming pipes discharging at a terminal chamber north of the existing PS. The area to the south is an undeveloped woodland area that has been previously cleared in part to construct overhead power lines.

3.4.2.1 Pump Station Layout

On development of the preliminary layouts, it was determined that additional space, beyond the existing pump station footprint, was required to accommodate a new pump station configured to meet the revised pumping arrangement. Three pump station layout options, located to the south of the existing PS, were initially considered (refer to Figures 3-1 to 3-5 below):

- Circular Pump Station – Wet Well (refer to Figure 3-1, and Figure 3-2);
- Circular Pump Station – Dry Well (refer to Figure 3-3); and,
- Rectangular Pump Station – Dry Well (refer to Figure 3-4 and Figure 3-5).

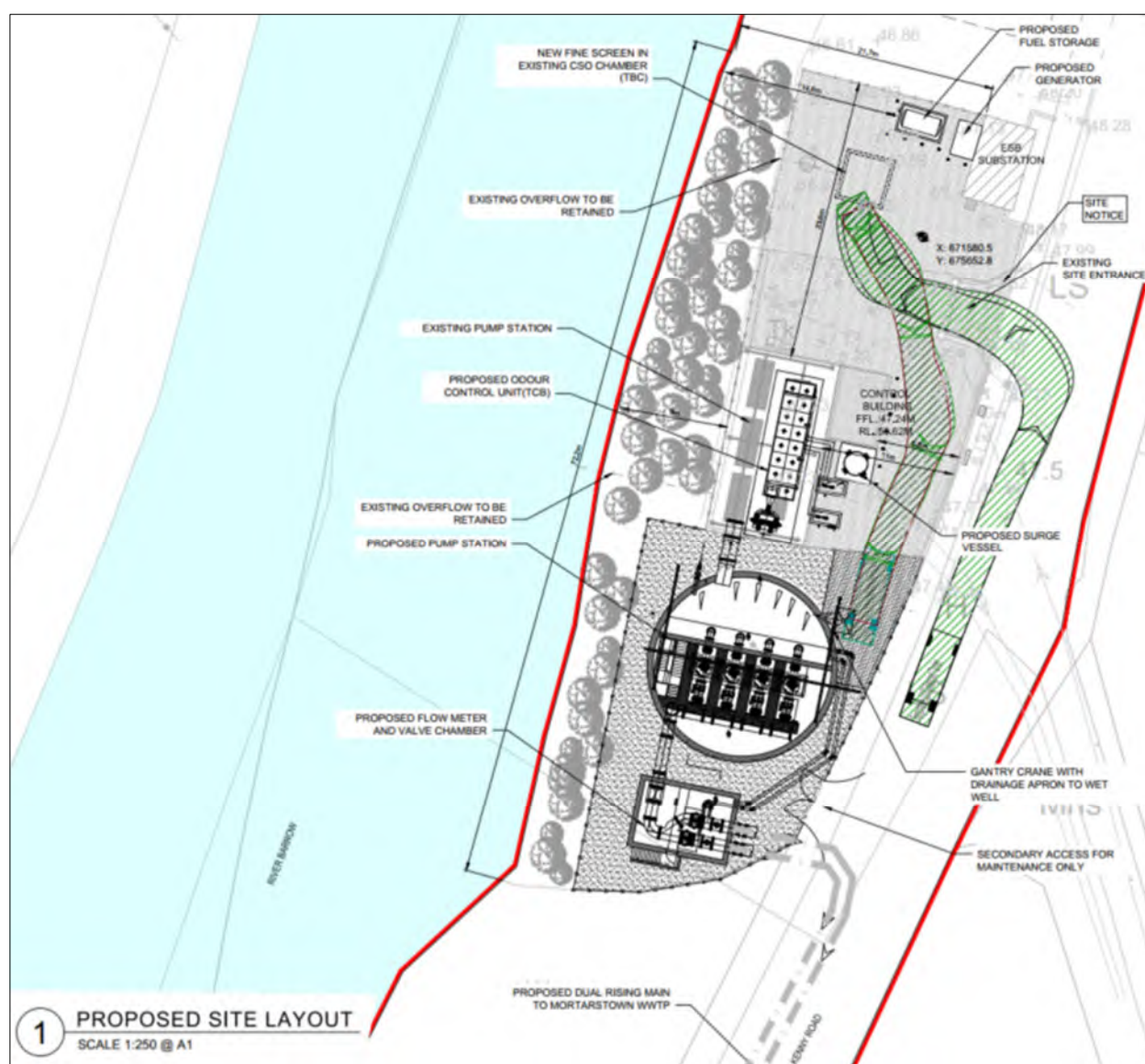


Figure 3-1 - Circular Pump Station - Site Layout Option

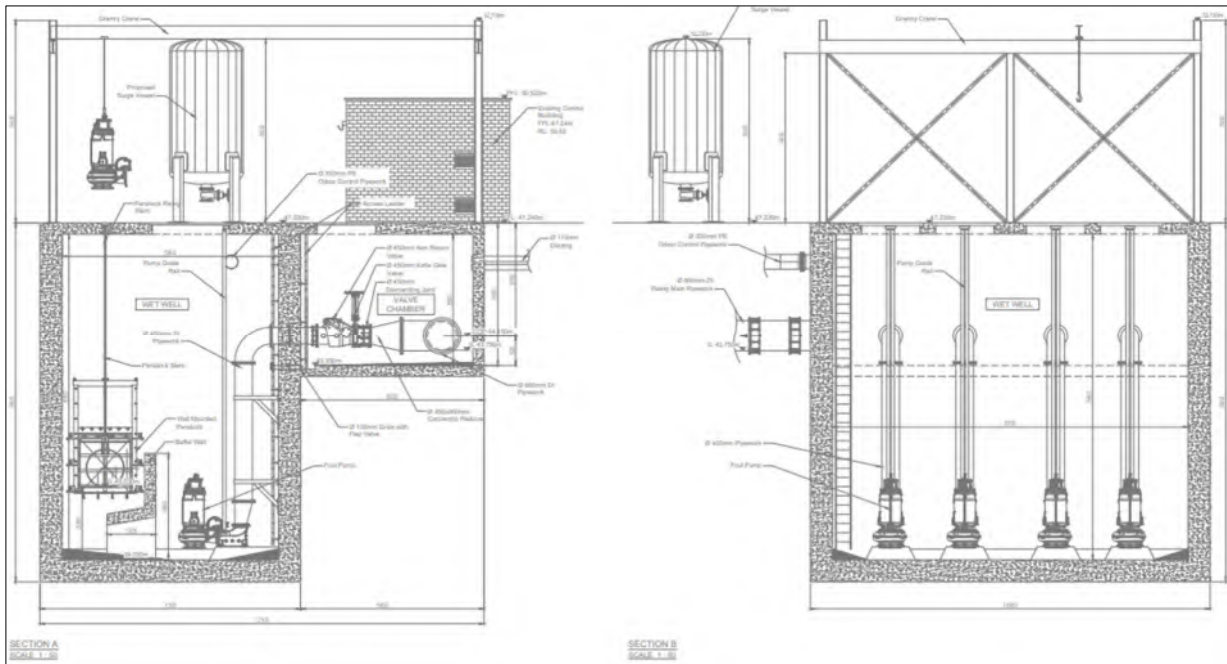


Figure 3-2 - Circular Pump Station – Wet Well Option

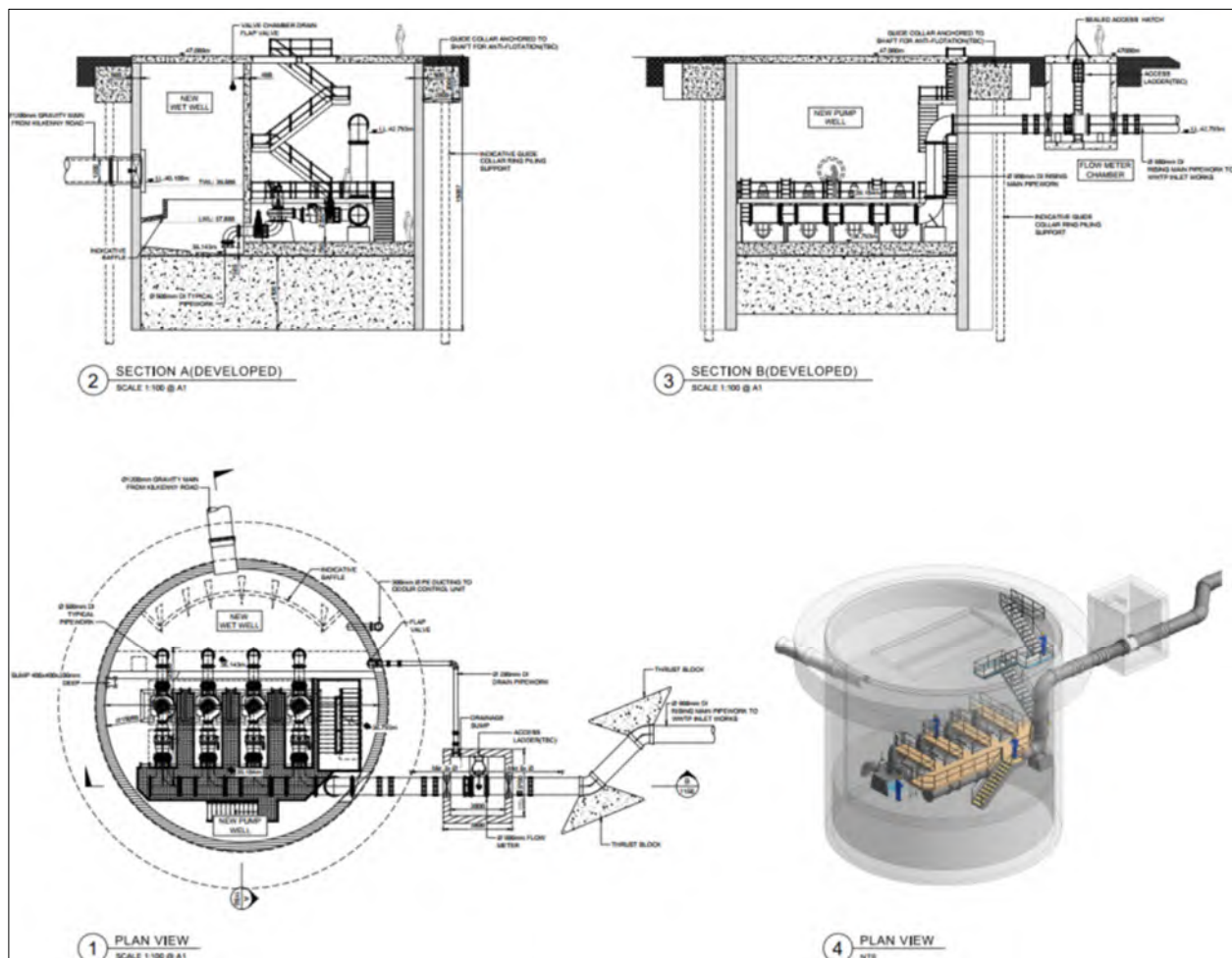


Figure 3-3 - Circular Pump Station – Dry Well Option



Figure 3-4 - Rectangular Pump Station - Site Layout Option

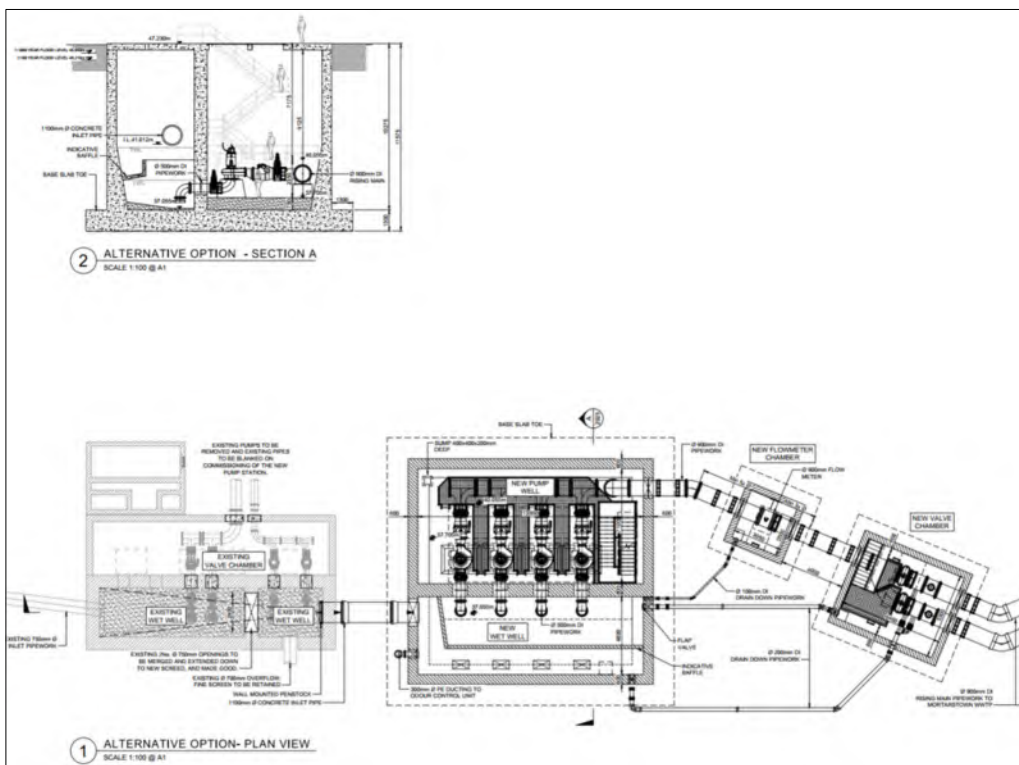


Figure 3-5 - Rectangular Pump Station – Dry Well Option

Preferred Option

The circular pump station with dry well was deemed the preferred option following a comparative analysis and consultation with UÉ. The dry well option provides isolation of pumps in a clean, ventilated mechanical chamber, providing superior equipment protection, easier access, and more reliable long-term operation compared with submergence in a sewage-filled wet well.

The circular structure option provides constructability advantages including:

- Uniform load distribution (thinner walls, simpler reinforcement, no corner stress concentrations).
- More stable excavation (circular geometry naturally resists soil and groundwater pressure).
- Reduced temporary works (typically no need for internal bracing or walers).
- Better watertightness (no corners that require special waterproofing or create crack-prone zones).
- Well-suited to caisson sinking (circular caissons sink evenly and are less likely to distort).

3.4.2.2 Pump Station Site Selection

Following the initial PS layout development, AtkinsRéalis undertook ecological surveys of the proposed PS site location, located in the vicinity of the River Barrow and River Nore SAC, during which Alluvial Woodland, a qualifying interest (QI) of the SAC was identified. This triggered a detailed woodland survey and review of the PS Site Selection process resulting in a detailed site selection assessment.

A detailed site selection assessment was undertaken in accordance with the UÉ Guideline IW-AD-PD-GL-008 A Guide to Route and Site Selection, to determine the most feasible location for a new pump station. The study area identified was in direct interaction with the River Barrow and River Nore SAC, therefore environmental considerations were key parameters for decision making as well as constructability. Land availability is also limited and many potential sites are spatially constrained.

The site selection assessment involved an initial screening including desktop study and constraints-mapping exercise, following which, potential suitable land parcels were identified.

Eight potential sites were identified and considered, as shown on Figure 3-6.

- Site No. 1 – Existing PS Site
- Site No. 2 – South of Existing PS Site
- Site No. 3 – North of Existing PS Site
- Site No. 4 – Across the R448 Kilkenny Road
- Site No. 5 – Landscaped Area in Carlow Southeast Technological University
- Site No. 6 – Across the River Barrow, Crossneen, County Laois (Microtunnelling)
- Site No. 7 – WwTP Site (Microtunnelling)
- Site No. 8 – Land North of Existing Pump Station, 'Otterholt'

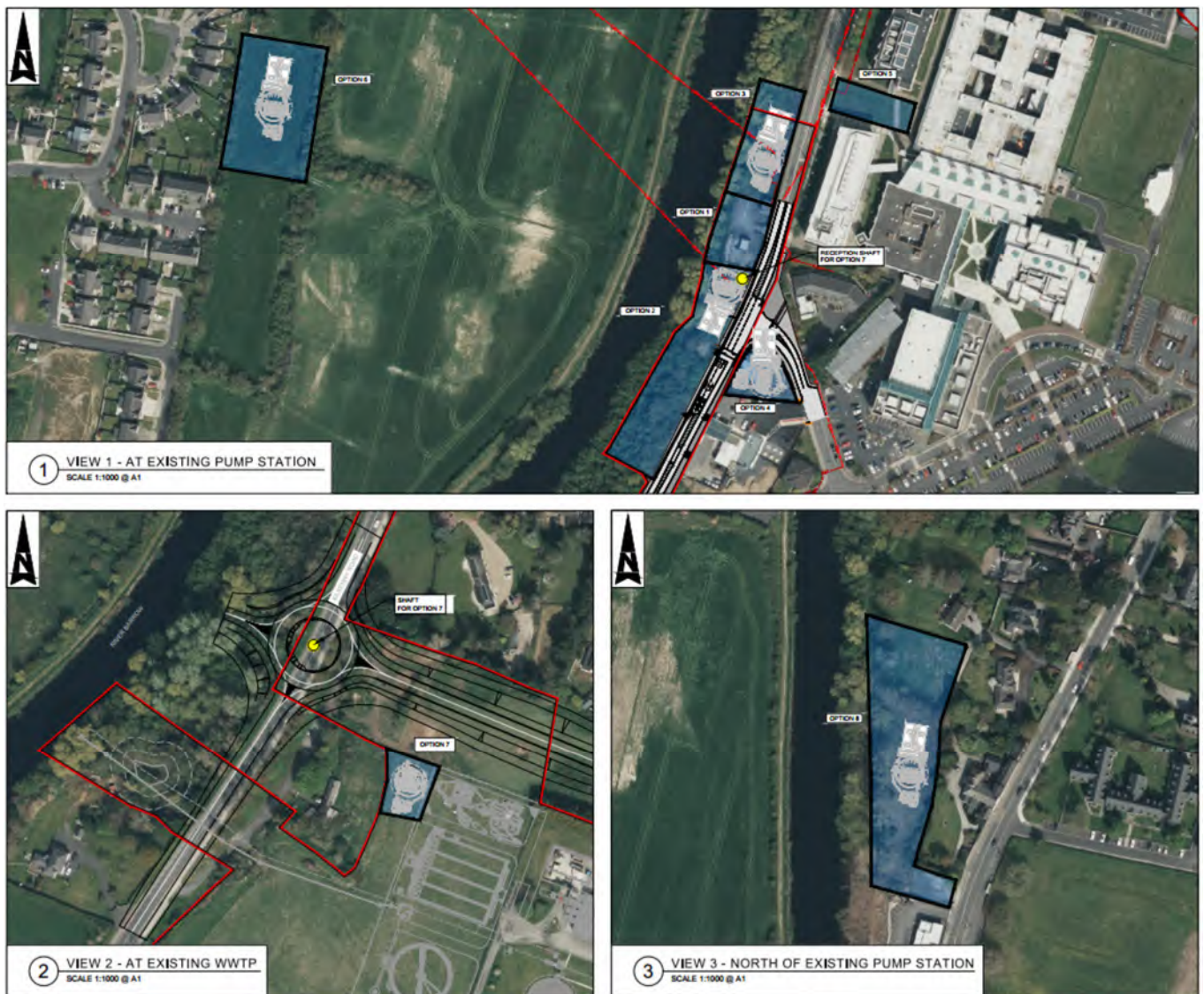


Figure 3-6 - Proposed Pump Station Sites

The potential sites were assessed against a set of defined criteria to shortlist sites for further evaluation. The criteria taken as basis for this options shortlisting study were planning and zoning, land ownership, overflow requirements, energy utilisation, requirements of protected sites, flood risks, and capital and operational costs. As a result of this initial assessment, Site No. 5, 6 and 8 were eliminated from the list as they were either technically unfeasible or had significant disadvantages compared to other options.

The shortlisting study determined that Sites 1, 2, 3, 4, and 7 warranted further detailed assessment. The main categories evaluated in the detailed assessment were environmental, planning, technical/economic, constructability, and health and safety.

The detailed site selection assessment concluded Site No. 7, located at the existing WwTP is the most favourable site option for the new pump station. This option requires microtunnelling from the existing PS to the WwTP site. Site No. 7 was evaluated as the most favourable option in terms of environmental constraints, minimisation of rising main length hence energy use, and minimal impact on existing upstream sewer network.

Preferred Option

The site selection assessment concluded the most favourable site option, based on the criteria assessed, is Site No. 7, a new pump station constructed on the available land in the northwest corner of the Mortarstown WwTP site, as shown in Figure 3-7 - Most Favorable Pump Station Site Location. This option requires microtunnelling a gravity main from a shaft located south of the existing Kilkenny Road PS to Mortarstown WwTP, intercepting the flows at the existing PS and conveying flows to the new inlet pump station. The proposed pumping station site area is used for agricultural purposes.

Site No. 7 was evaluated as the most favourable option in terms of environmental constraints, minimisation of rising main length hence energy use, and minimal impact on existing upstream sewer network. The disadvantages of Option 7 are its initial capital cost, potential disturbance to the traffic due to microtunnel shaft construction on R448 Kilkenny Road and limited traffic diversion route alternatives. This option reduces interaction with alluvial woodlands.



Figure 3-7 - Most Favorable Pump Station Site Location

3.4.2.3 Specimen Design

The specimen design was developed based on the preferred PS layout option and the preferred site location identified.

The existing Kilkenny Road pumping station will be decommissioned. The existing building structure will remain. The existing above ground steel gantry structure, access stairs and pumps will be removed from site and repurposed. Incoming flows will be diverted via the existing below ground holding tank to a newly constructed manhole positioned south of the existing PS, conveying flows to the new gravity microtunnel. Existing overflows at the Kilkenny Road PS will be retained in accordance with the current Wastewater Discharge Licence (EPA WwDL Ref: D0028-01) and utilised in extreme events where the new gravity microtunnel may be at maximum capacity.

The new pump station located at the WwTP site includes:

- The provision of 1 no. terminal pump station (supplemented by the WwTP standby generator).
- The provision of 4 no. raw sewerage pumps inclusive of Mechanical, Electrical, Instrumentation, Control, and Automation (MEICA) works.
- The provision of 1 no. odour control unit.
- The provision of 1 no. flow meter chamber.

3.4.3 Pipeline from Kilkenny Road Pump Station to WwTP

The feasibility study highlighted the need to upgrade the Kilkenny Road Pump Station to cater for Formula A flows within the future design horizon. This upgrade requires increased pipeline capacity to convey increased flows from the existing Kilkenny Road PS to the WwTP.

3.4.3.1 Rising Main Options

During the initial assessment (prior to detailed PS site selection assessment), which considered a new PS located adjacent the existing PS site, two options were assessed:

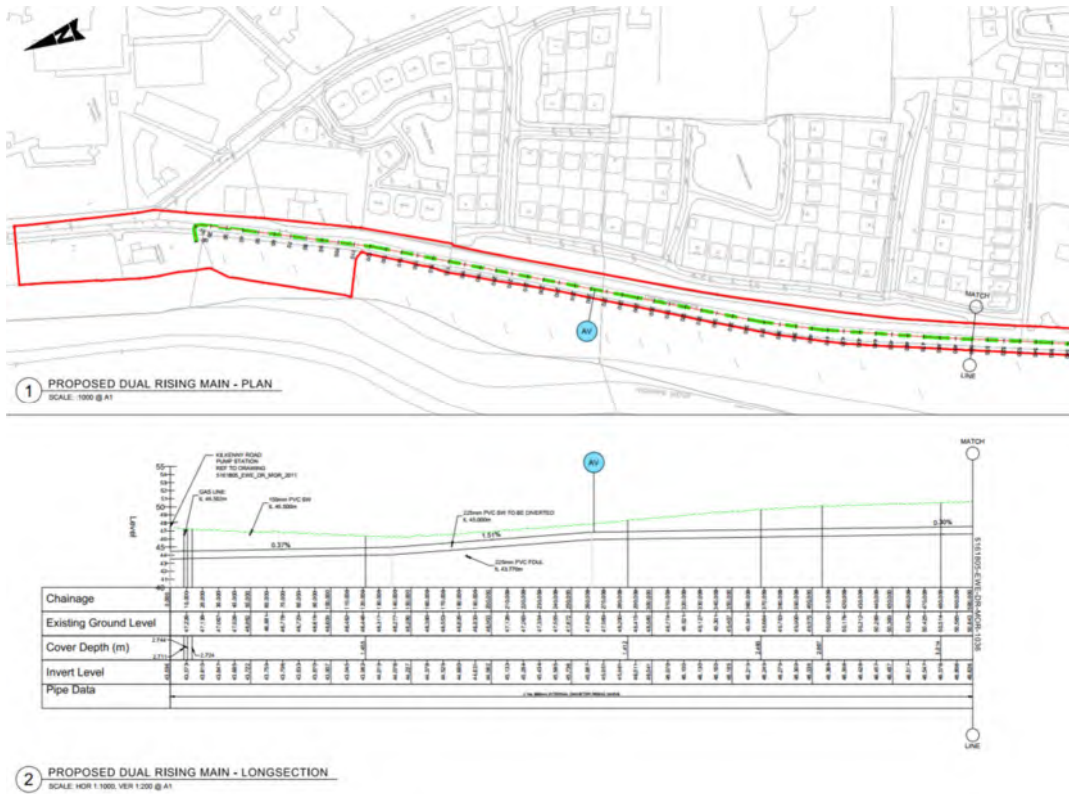
1. Supplement the existing 600mm diameter rising main. This option includes the construction of a new 1,200mm diameter rising main to supplement the existing rehabilitated 600mm diameter rising main.
2. Install 2 No. new 900mm diameter rising mains. This option includes the construction of 2 No. 900mm diameter rising mains along the Kilkenny Road (R448) to the WwTP

Preferred Option

Option 2, the provision of 2 No. new 900mm diameter rising mains was selected after considering the following:

- This option is more cost effective.
- This option is more efficient to operate as there is no requirement for throttle valves resulting in energy dissipation.
- This option eliminates the risk of the existing rising main not being fit for purpose and require further remedial works.
- This option provides a new asset for UÉ and gives long term security to the Carlow Wastewater Infrastructure.

An assessment of the environmental impact was not considered at this stage as both options proposed required open cut trench and installation of new pipework. The layout of the proposed rising mains is illustrated in Figure 3-8 and Figure 3-9.



3.4.3.2 Gravity Option

The detailed PS site selection assessment concluded the most favourable site option includes a gravity main from a proposed shaft located south of the existing Kilkenny Road PS to a new PS located at Mortarstown WwTP. This option supersedes the rising main alternatives previously considered.

A feasibility study was completed on the high-level conceptual tunnel design. This study involved a review of the tunnel alignment and shaft location, the identification of design and construction risks, and the determination of construction site footprints based on the most preferred construction methods. Initially, a 1200mm diameter tunnel was proposed to cater for Formula A flows.

Four methods of trenchless technologies for the installation of pipelines were considered. An open trenching method was not considered as it was discounted based on the depth of gravity pipeline. The trenchless methods considered include:

- Horizontal Directional Drilling (HDD).
- Auger boring.
- Pipe Jacking; and
- Microtunnelling.

Preferred Option

Microtunnelling was identified as the optimal choice based the minimal impact on the alluvial woodland, its compatibility with tunnelling beneath the water table, as well as economic benefits at depths exceeding 6m. Figure 3-10 outlines the microtunnelling route considered at the feasibility stage.

This option provides reduced impact on Kilkenny Road traffic compared to open cut construction options. While CAPEX costs exceeds that of open-cut methods, prioritisation was placed on minimising environmental impacts. E

Environmental impacts have been assessed in Chapters 4-15 of this EIAR. This option minimises the effects, during installation and operation, on the nearby River Barrow. The Contractor will develop a Method Statement for the microtunnelling which will include any additional environmental management measures during the installation works (in addition to all mitigation measures as detailed in the EIAR, NIS and Outline CEMP submitted as part of this planning application).

A proposed horizontal and vertical alignment was developed including consideration of the future Southern Relief Road and position of intermediate shaft locations.

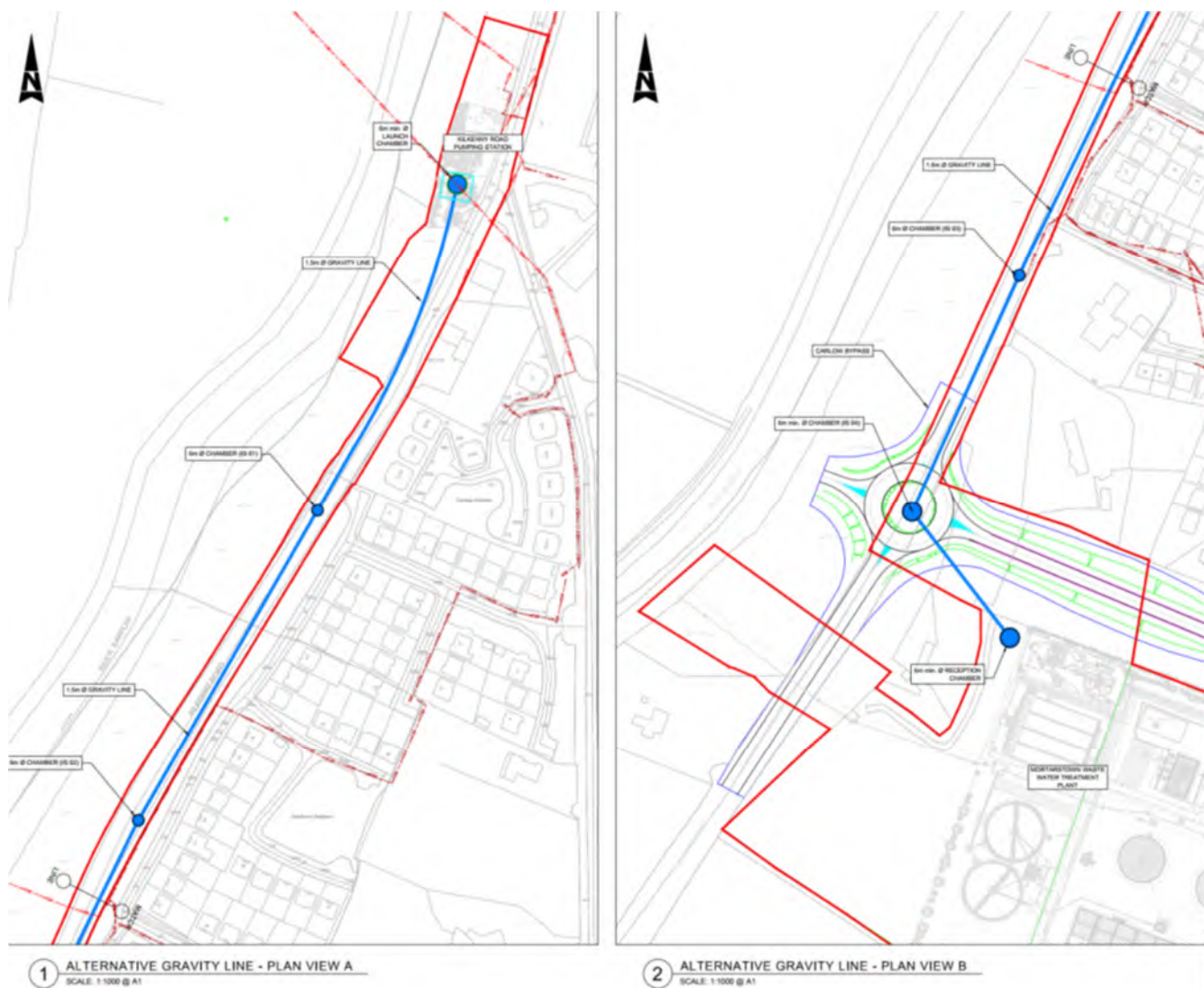


Figure 3-10 - Tunnel Feasibility Study Proposed Layout

3.4.3.3 Design Development of Microtunnel Gravity Main

3.4.3.3.1 Consultation with UÉ Asset Planning

The concept design was reviewed with UÉ and it was agreed to increase the pipe diameter to 1650mm to allow for future increased capacity from Pembroke PS (upstream of Kilkenny Road PS). The specimen design, indicated in Figure 3-11, included this update.

3.4.3.3.2 Consultation with Carlow County Council (2025)

The proposed concept microtunnel solution was presented to Carlow County Council Roads Department in July 2025 and feedback sought. Further to feedback provided at this meeting, shaft locations were adjusted to minimise conflict with the future Southern Relief Road and reduce requirements for road closures, reducing the potential for significant traffic impacts.

The revised layout further developed in specimen design is outlined in Figure 3-11.

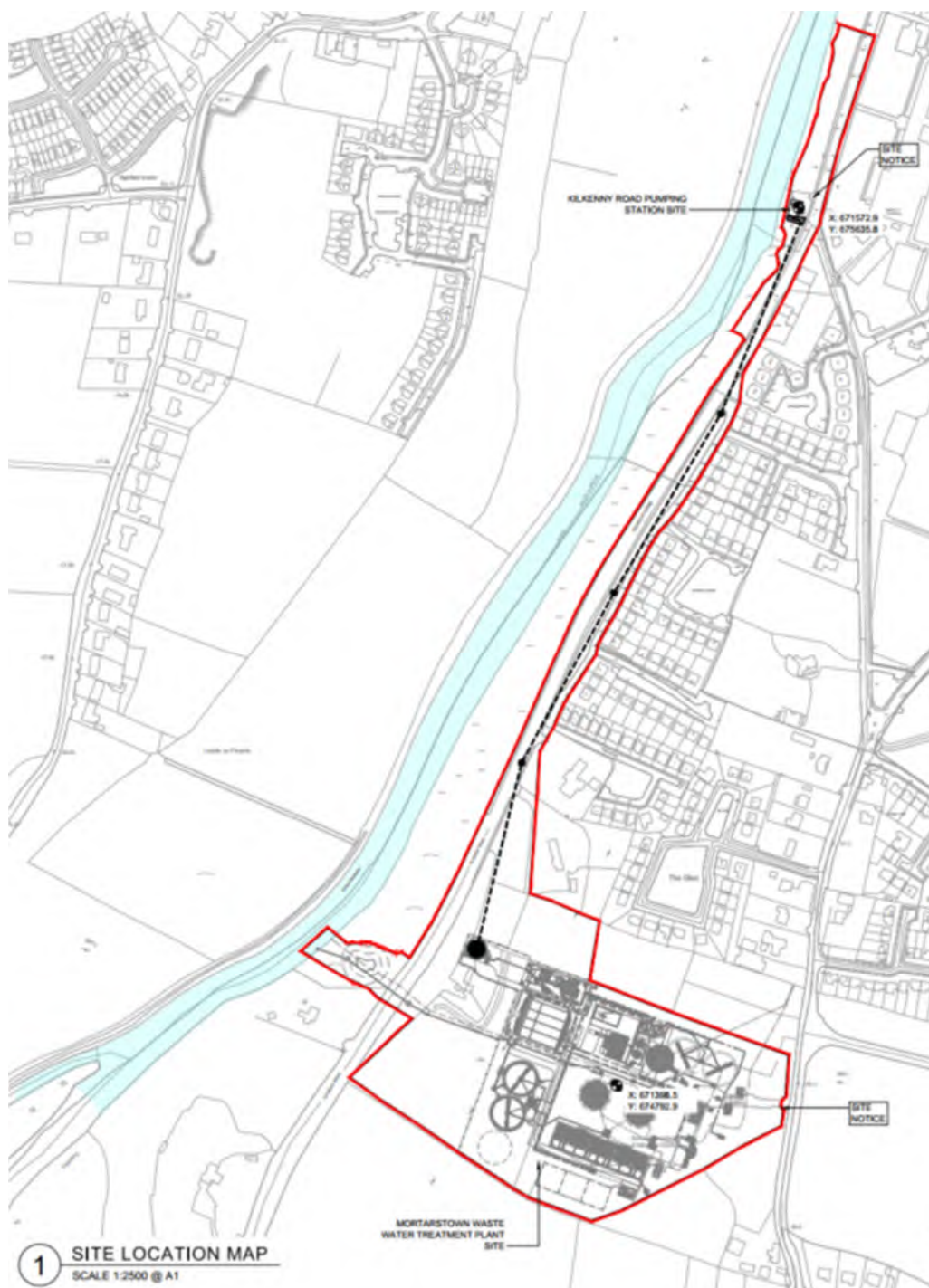


Figure 3-11 - Tunnel Specimen Design Proposed Layout

3.4.3.3.3 Public Consultation

The microtunnel alignment shown in Figure 3-11 was presented to the public during a public consultation period and displayed at a public information event on 9th October 2025. Landowners provided feedback during the consultation process, which led to refinements in the alignment design.

An additional study was conducted to adjust the tunnel alignment and move an intermediate shaft (manhole E) further west on Kilkenny Road resulting in the tunnel shaft being moved southwest. This adjustment provided clearance between the tunnel and a privately owned property boundary. Figure 3-12 shows the revised tunnel alignment incorporating feedback from the public consultation.

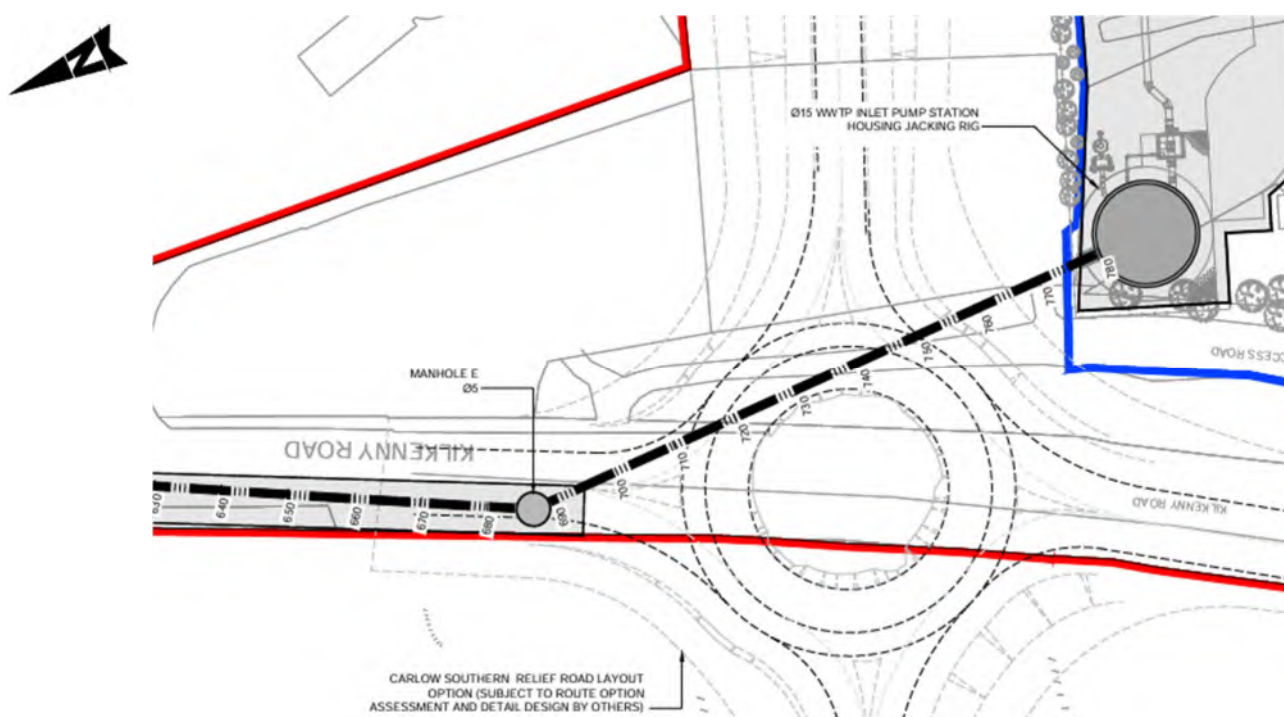


Figure 3-12 - Revised tunnel alignment to avoid encroaching property boundary

3.4.3.3.4 Consultation with Carlow County Council (2026)

Following design revisions arising from the public consultation process, the updated design was subsequently reviewed by Carlow County Council. It was requested that the relocated shaft be repositioned to avoid overlap with the Southern Relief Road layout.

In order to avoid encroaching on the private property boundary and the Southern Relief Road layout, an additional shaft was added (manhole F) and the intermediate shaft (manhole E) was moved further north. Figure 3-13 shows the revised tunnel alignment incorporating feedback from the public consultation and Carlow County Council. This represents the final microtunnel gravity tunnel alignment.

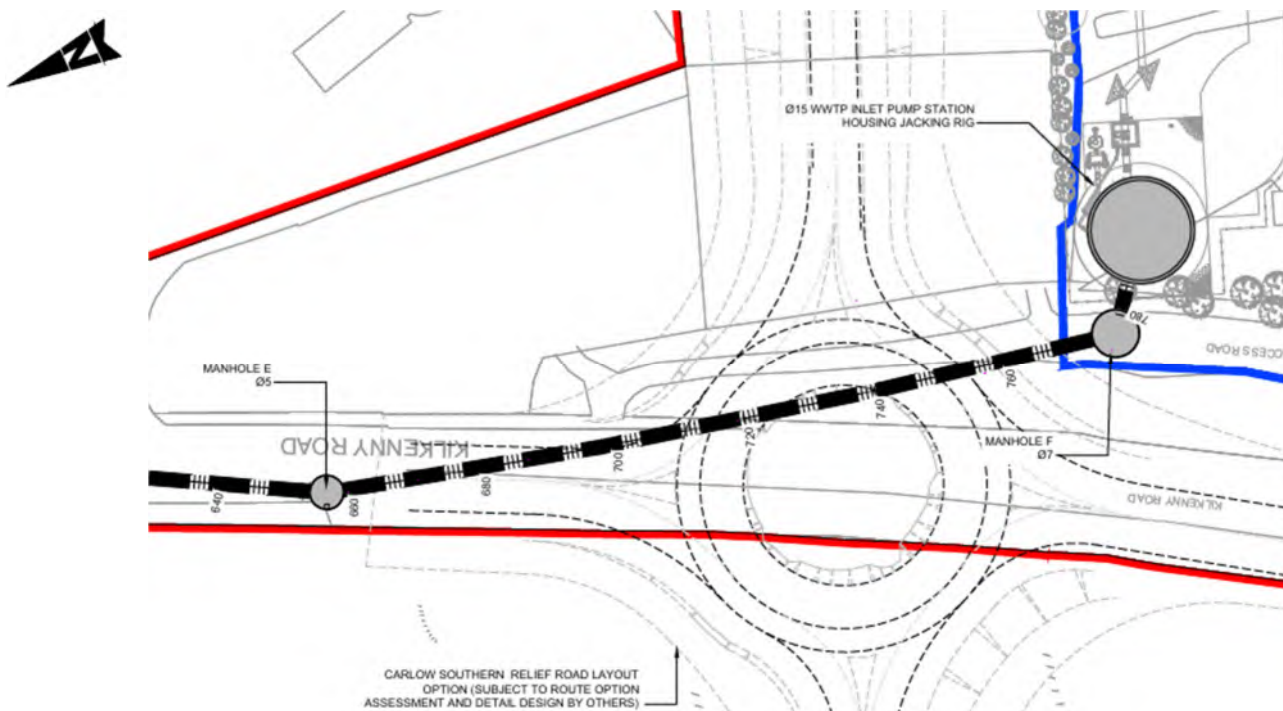


Figure 3-13 - Revised tunnel alignment to avoid encroaching property boundary and Southern Relief Road layout option

3.4.4 WwTP Outfall

The existing outfall pipeline which discharges flows from Mortarstown WwTP to the River Barrow does not have sufficient capacity to convey treated effluent from the upgraded WwTP. It is proposed to replace the existing 600mm diameter outfall pipe with a 900mm diameter gravity outfall pipe approximately 205m in length.

3.4.4.1 Outfall Route Selection Assessment

The River Barrow, into which the outfall pipe discharges, is designated as a Special Area of Conservation: River Barrow and River Nore SAC (site code 002162). An outfall route selection assessment was undertaken in accordance with the UÉ Guideline IW-AD-PD-GL-008 A Guide to Route and Site Selection, to safeguard a compliant discharge to River Barrow, investigate key benefits and disadvantages, and conclude a preferred route option for the outfall pipeline.

The study area comprised a region located to the west of the WwTP and extended in a southwest direction to incorporate potential options with less impeded access to the river, bounded by Kilkenny Road R448 and the River Barrow which is the receiving body for the effluent water. The study area did not extend northwards because the available area between R448 and the River Barrow comprises alluvial woodland, a qualifying interest of the SAC, entirely.

Environmental, technical and economic constraints were assessed within the study area to identify issues which may impact on the suitability of constructing an outfall pipeline along a particular route and identify routes which have the least impact.

Six outfall route options were identified and considered, as illustrated in Figure 3-14.

- Route No. 1 - Using the Existing Outfall Pipe

- Route No. 2 – New Outfall Pipe adjacent to Existing Pipeline Route (Open cut)
- Route No. 3 – New Outfall Pipe adjacent to Existing Pipeline Route (Microtunnel)
- Route No. 4 – Route Diverted North of the Property, Oakfield
- Route No. 5 – Route Avoiding Alluvial Woodland (Diverted South of the Property, Oakfield)
- Route No. 6 – Route Avoiding Alluvial Woodland (Further South).



Figure 3-14 - Outfall Route Options

An initial screening was undertaken where options were assessed on technical feasibility, public impact, land ownership, access, impact on protective sites, flood risk, capital cost and operational cost. As a result of the preliminary screening, Route No. 2, 3, 5, and 6 were selected for more detailed evaluation. The main categories evaluated in the detailed assessment were environmental, planning, technical/economic, constructability, and health and safety.

Route No. 2 and 3 are a gravity pipeline that follow the alignment of the existing WwTP outfall pipe. In terms of technical, economic and constructability criteria considered, Route No. 2 and 3 were found to comprise substantially comparative advantages over the other options considered. A detailed woodland survey identified alluvial woodland in this area, located along the embankment of the river. It was observed, the existing outfall pipeline has, in the medium term, allowed recovery and growth of an alluvial woodland area. The alignment of these options aims to minimise impact on the alluvial woodland by routing through trees identified on the embankment. Operation and maintenance costs are minimal for these options.

Route No. 5 and 6 are both rising main options that require a new pump station at the WwTP site. The alignments follow the R448 Kilkenny Road and then traverse areas prone to flooding before discharging to the River Barrow, at locations where alluvial woodland is avoided. These options require substantially longer length

of pipelines and have a greater traffic impact on Kilkenny Road. Operation and maintenance costs are significantly higher for these options giving it is a pumped solution.

Preferred Route

Route No. 2 and 3 follow the same alignment but vary in construction methodology. This route is favoured from an ecological point of view, as it is located within lands that have been previously disturbed (during construction on new residential properties) and therefore has the least potential to impact the Alluvial Woodland identified within the area.

Route Option No. 3 (microtunnelling) was evaluated as the most favourable option in terms of overall scoring of criteria considered. Route Option No. 2 (open cut) followed closely as the second most favourable option.

3.4.4.2 Outfall Discharge Options to River Barrow

Advantages and disadvantages of two outfall discharge options were also considered, namely a headwall and a diffuser option. The number of disadvantages and the associated impact of installing diffusers under the riverbed is considered significantly more than its potential benefits. The headwall solution presents more advantages and also less risks during operation therefore, it was concluded a conventional outfall headwall is the more favourable outlet structure for the proposed WwTP outfall.

3.4.4.3 Headwall Construction

In terms of the construction methodology of the headwall, it was originally envisaged to carry out the temporary cofferdam installation works from the river bank by constructing a temporary embankment working platform. Alternatively, following review by the ecology SMEs, the design team recommended utilizing a barge to perform sheet pile works in order to avoid adverse effects from the temporary working platform, to the water quality of River Barrow and the surrounding ecosystem. Therefore, the use of a barge was selected as the most appropriate method of installation of the cofferdam at the outfall location.

3.4.5 Proposed Optimal Design Solution

Following consideration of the above design options, the proposed optimal design solution is as follows, as this was determined to be the best overall option from an environmental, constructability and cost perspective;

- **Treatment Plant Technical Scenario** – a combination of technical scenarios are being progressed, with Technical Scenario A being the original preferred option, and following further assessment it was determined that elements from Scenario C were also required;
- **New Pump Station** - a circular dry well design is being progressed, in lands available in the northwest corner of the Mortarstown WwTP site;
- **Mains from Kilkenny Road Pump Station to WwTP** – a 1650mm gravity main is being progressed through design, which will be installed via. micro-tunnelling methodologies. The alignment of this gravity main is located so as to avoid encroaching on a property boundary and the future Southern Relief Road layout; and,
- **WwTP Outfall** - a 900mm gravity pipeline which follows the alignment of the existing WwTP outfall pipe is being progressed through design.

4. POPULATION AND HUMAN HEALTH

4.1 Introduction

This Chapter assesses the likely significant effects of the Proposed Development (herein referred to as the Proposed Development) on the local population and their health. This Chapter also describes the methods used to assess the identified impacts, the existing baseline conditions, the proposed mitigation measures required to prevent, reduce or offset any significant adverse effects and the anticipated likely residual effects after mitigation measures have been applied. This includes a review of relevant aspects of other technical assessments included in this EIAR, as set out further in Section 4.2. more complete description of the Proposed Development is presented in Chapter 2 – Proposed Development.

4.1.1 Legislation and Guidelines

This assessment has been undertaken with consideration of the requirements of key legislative and policy documents. Relevant legislation that was considered during the assessment process for this project are as follows:

- Planning and Development Regulations 2001 (as amended)
- Planning and Development Act, 2000 (as amended)
- European Union (EU) Environmental Impact Assessment (EIA) Directive 2011/92/EU as amended by Directive 2014/52/EU (hereafter referred to as the “EIA Directive”)
- Article 3(1) of the EIA Directive outlines that ‘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’. Schedule 6 of the EIA Regulations includes a requirement that the EIA must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of a Proposed Project on Population and Human Health.

4.1.2 Policy

The overarching policy and guidance relevant to the Proposed Development is outlined in Chapter 1. A summary of the planning policy, legislation, technical guidance and standards relevant to Population and Human Health is provided in Table 4.1.

Table 4-1 - Planning policy, legislation, technical guidance and standards relevant to Population and Human Health

Document Title	Description / Relevance
Policy	
National Planning Framework (NPF), April 2025 ⁸	The National Planning Framework (NPF) is the long-term strategy for strategic planning and sustainable development up to 2040. The NPF was originally published in February 2018 and the first revision was adopted in April 2025. The revised NPF seeks to plan for population growth which is expected to grow by one million between 2022 and 2040. The Site is located within the Southern Regional Assembly Area. Between 2022 and 2040, the NPF seeks to target growth in the region with aims to grow the population by approximately 380,000 people. In Co. Carlow, the target population is targeted to reach 63,000 by 2040. Chapter 6 of the NPF is focused on People, Homes and Communities and 6.2 sets two objectives in relation to ‘Healthy Communities’: ▫ National Policy Objective 36 – seeks to support the objectives of public health policy including the Healthy Ireland Framework and the National Activity Plan through integrating such policies with planning policy. ▫ National Policy Objective 37 – seeks to prioritise walking and cycling accessibility to existing and Proposed Developments, and integrate physical activity for all ages by integrating safe and convenient alternatives to the car into the design of communities. Section 6.3 sets two objectives in relation to ‘Diverse and Inclusive Ireland’: ▫ National Policy Objective 38 – seeks to plan for a more diverse and socially inclusive society that targets equality of opportunity and a better quality of life for all citizens, through improved integration and greater accessibility in the delivery of sustainable communities and the provision of associated services. ▫ National Policy Objective 40 – aims to develop local planning, housing and health facilities and services, transport/ accessibility and leisure policies with a focus on meeting the needs and opportunities of an ageing population. Other relevant National Policy Objectives include: ▫ National Policy Objective 93 – seeks to improve air quality and to prevent people being exposed to unacceptable levels of pollution

⁸ National Planning Framework, 2025. <https://cdn.npf.ie/wp-content/uploads/National-Planning-Framework-First-Revision-April-2025.pdf>

Document Title	Description / Relevance
Policy	in urban and rural areas through integrated land use and spatial planning. ▫ National Policy Objective 94 – seeks to promote the pro-active management of noise where it is likely to have significant adverse impacts on health and quality of life. Chapter 6, Healthy Communities states that <i>‘decisions made regarding land use and the built environment, including transportation, affect these health risks in a variety of ways, for example through influencing air and water quality, traffic safety, opportunities for physical activity and social interactions as well as access to workplace, education, healthcare and other facilities and services such as food and alcohol outlets’</i>.
Project Ireland 2040: The National Development Plan 2021-2030 ⁹	This plan sets out the Government’s over-arching investment strategy and budget for the period 2021–2030. Chapter 15 of the plan focuses on access to quality childcare, education and health Services. The plan sets out several strategic investment priorities including health service capacity, the national cancer strategy, primary care centre programme, enhanced community care, social care for older people, disability services, mental health projects, national maternity strategy as well as paediatric health care services.
Healthy Ireland Strategic Action Plan 2021-2025 ¹⁰	A Government programme to bring about good health, access to services, healthy environments, and the promotion of resilience and to ensure that people can enjoy their physical and mental, health and wellbeing. The programme includes 18 policies targeting different health priorities for the country, these include: ▫ Strategic Action Plan ▫ Healthy Ireland Framework ▫ Healthy Workplace Framework ▫ Healthy Campus Framework ▫ Physical Activity ▫ Obesity

⁹ Department of Public Expenditure, NDP Delivery and Reform, 2021. <https://assets.gov.ie/static/documents/national-development-plan-2021-2030.pdf>

¹⁰ Department of Health, 2025. <https://www.gov.ie/en/healthy-ireland/policy-information/healthy-ireland-policies/>

Document Title	Description / Relevance
Policy	▫ Smoking ▫ Alcohol ▫ Sexual health ▫ Skin Cancer ▫ Vitamin D ▫ Folic Acid ▫ Nutrition Guidelines for Food Parcels ▫ The Healthy Ireland Survey ▫ Healthy Ireland Outcomes Framework ▫ Mental Health Promotion Plan ▫ Sláintecare Healthy Communities ▫ Period Poverty
Healthy Ireland Framework	The Healthy Ireland Framework is based on a vision ‘<i>A Healthy Ireland, where everyone can enjoy physical and mental health and wellbeing to their full potential, where wellbeing is valued and supported at every level of society and is everyone’s responsibility</i>’. The framework sets four goals: ▫ Increase the proportion of people who are healthy at all stages of life ▫ Reduce health inequalities ▫ Protect the public from threats to health and wellbeing ▫ Create an environment where every individual and sector of society can play their part in achieving a healthy Ireland.
Southern Regional Assembly Regional Spatial and Economic Strategy 2020-2032	With respect to Wastewater management, the Southern Regional Spatial and Economic Strategy 2020-2032 has set out the following goals and requirements:

Document Title	Description / Relevance
Policy	▫ Upgrading of the water supply infrastructure and additional investment in wastewater infrastructure to support the economic development and anticipated growth of Carlow; ▫ Providing infrastructure and services in a sustainable, planned and infrastructure led manner to ensure the sustainable management of wastewater and other environmental resources; The Strategy also adopts an approach which embraces an inclusive approach to development and focuses on the aims to integrate economic growth through policies focused on: ▫ Healthy Communities ▫ Diversity and Inclusivity in the region ▫ Age Friendly Communities ▫ Childcare Education and Life Long Learning ▫ Recreational and Sporting Facilities
Carlow County Development Plan 2022–2028	The Carlow County Development Plan 2022–2028 sets out a range of proposed policy objectives with supporting narrative for wastewater collection and treatment: ▫ PW.P1 – support strategic wastewater treatment infrastructure by Irish Water and to support Irish Water in providing and maintaining adequate and appropriate wastewater treatment infrastructure to service zoned lands, towns and villages and developments over the period of the Plan in accordance with the Core Strategy and Settlement Hierarchy; ▫ PW.P2 - Facilitate Irish Water in the delivery of public wastewater services which address the residential, commercial and industrial needs of the county subject to compliance with all relevant EU and national legislation and normal planning and environmental criteria; ▫ PW.O1 - Facilitate the required upgrade of wastewater projects that may arise during the lifetime of this Plan subject to compliance with all relevant EU and national legislation and normal planning and environmental criteria including upgrade and improvement works on current and planned IW schemes for Tullow WWTP, Bagenalstown/Leighlinbridge WWTP, Mortarstown WWTP, and Borris WWTP;

Document Title	Description / Relevance
Policy	- PW.O2 - Work and support Irish Water in progressing the “Small Towns and Villages Growth Programme” which is intended to provide growth capacity at WWTPs (and WTPs) in smaller settlements which would not otherwise be provided for in the current Investment Plan; - PW.O3 - Work and support Irish Water, other public infrastructure agencies and local communities to develop the programme for “new homes in small towns and villages” through land activation and supportive works (e.g. serviced sites) as set out in NPO 18b of the National Planning Framework Policies and objectives set out which consider Population, Human and Health: - CSP. 13 - To support the sustainable development of rural areas in Carlow by encouraging growth and arresting decline in areas that have experienced low population growth or decline in recent decades and by managing the growth of areas that are under strong urban influence to avoid over-development, while sustaining vibrant rural communities. - NPO 26: Support the objectives of public health policy including Healthy Ireland and the National Physical Activity Plan, though integrating such policies, where appropriate and a applicable scale, with planning policy. Chapter 6 of the plan: Infrastructure and Environmental Management highlights goals to provide high quality infrastructure and environmental services in conjunction with statutory bodies which seeks to complement the overall economic and settlement strategy within Co. Carlow. It recognises the impacts of air, noise, water, soil pollution on human health.
Carlow – Graiguecullen Joint Urban Local Area Plan (LAP) 2024 - 2030	The Carlow – Graiguecullen Joint Urban Local Area Plan 2024-2030 has zoned Mortarstown WwTP as Transport and Utilities, with lands surrounding the underground gravity sewer zoned primarily as Open Space and Amenities, Existing / Infill Residential and Commercial / Residential. The Carlow – Graiguecullen Joint Urban Local Area Plan 2024-2030 is a statutory document prepared by the Planning Authority in accordance with the requirements of the Planning and Development Act 2000 (as amended) and the Planning and Development Regulations 2001 (as amended).The Carlow – Graiguecullen LAP sets out the overall Development Strategy and Planning Policy Objectives for the town in the coming years, which seeks to provide medium-term planning and development benefits for areas within the Carlow – Graiguecullen area. It will also support economic growth, education services and community-

Document Title	Description / Relevance
Policy	
	related development in line with proper planning and sustainable development principle. The LAP's policy objectives, guidance and standards have also been informed by best practices, national planning guidance and the CCDP 2022 - 2028, where appropriate.
Guidance	
Health Impact Assessment Guidance: A Manual (2021) ¹¹	Guidance for Ireland and Northern Ireland incorporating recent developments and best practice in Health Impact Assessment. The guidance provides guidance on definitions and determinants of health, and health inequalities. It also provides guidance on undertaking assessments and the full process of screening, through to evaluation.
Determining Significance for Human Health in EIA (IEMA) 2022 ¹⁵	Published in November 2022, this guidance covers the consideration of health as a topic in environmental impact assessment. It presents a framework that supports a proportionate approach that can apply to all scales of EIA. As noted in this guidance, it is applicable to development schemes within Ireland.
Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (2018) ¹²	These Guidelines are issued to planning authorities and An Bord Pleanála (the Board) under section 28 of the Planning and Development Act 2000, as amended (the Act), and both are required to have regard to the Guidelines in the performance of their functions under the Act. Paragraph 4.16 outlines that consideration of human health effects resulting from the construction and operation of a project should focus on health issues arising in the context of other environmental factors listed in Article 3 of the Directive/ Section 171A of the Act, namely: ▪ Population ▪ Biodiversity, with particular attention to protected species and habitats ▪ Land, soil, water, air and climate ▪ Material assets, cultural heritage and the landscape ▪ Interaction between the above factors
Guidelines on the information to be contained in Environmental Impact Assessment Reports,	These guidelines set out what information needs to be contained within an EIAR as well as the methods used in preparing it. This guidance details the process of preparing an EIAR.

¹¹ Institute of Public Health, 2021. https://www.publichealth.ie/sites/default/files/resources/HIA%20Guidance%20A%20Manual_0.pdf

¹² Department of Housing, Planning and Local Government, 2018. <https://assets.gov.ie/static/documents/guidelines-for-planning-authorities-and-an-bord-pleanala-on-carrying-out-environmental.pdf>

Document Title	Description / Relevance
Policy	
Environmental Protection Agency (EPA), 2022 ¹³	
Health Impact Ireland: Institute of Public Health (2021)	HIA is a process used to determine the impact of proposed policies, laws, programmes or plans on the health of communities to ensure they are more inclusive, more equitable, and more sustainable for everyone. The HIA process can be used at national, regional or local level and supports government strategies in Ireland and Northern Ireland to improve population health and reduce health inequalities. The Institute launched the fourth edition of HIA Guidance for Ireland and Northern Ireland, incorporating the most recent developments and best practice in the field. The updated HIA Guidance is endorsed by the International Association for Impact Assessment and by the European Public Health Association. HIA can be used by policy- and decision-makers in government, statutory agencies, community groups and voluntary organisations to ensure new proposals reduce any health risks and promote health opportunities for specific groups as well as the wider community.

In addition to the EPA Guidelines referenced in Table 4-1, the following points are noted:

- Guidelines on the information to be contained in Environmental Impact Assessment Reports, Environmental Protection Agency (EPA), 2022 highlights the amendments to Article 3(1) of amended European Union (EU) Environmental Impact Assessment (EIA) Directive 2011/92/EU as amended by Directive 2014/52/EU (the “EIA Directive”) which states that:

“The environmental impact assessment shall identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of a project on the following factors: a) Population and Human Health; [...]”

- The Guidelines on the information to be contained in Environmental Impact Assessment Reports, hereafter referred to as the EPA Guidelines 2022 state that: *‘in an EIAR, the assessment of impacts on Population and Human Health should refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in this EIAR e.g. under the environmental factors of air, water, soil etc’*
- Moreover, Annex IV, paragraph 5(d) of the Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (2018) requires an EIAR to contain:

¹³ Environmental Protection Agency, 2022. https://www.epa.ie/publications/monitoring--assessment/assessment/EIAR_Guidelines_2022_Web.pdf

“A description of the likely significant effects of the project on the environment resulting from, inter alia, “the risks to human health”

- When outlining the scope of environmental factors covered by the EIA Directive within Guidance on the Preparation of the Environmental Impact Assessment Report (European Commission, 2017), “Population and Human Health” is defined as follows:

“Human health is 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 pollutants) are obvious aspects to study. In addition, these would concern the commissioning, operation, and decommissioning of a Project in relation to workers on the Project and surrounding population.”

4.2 Study Assessment Methodology

This Population and Human Health Assessment has been undertaken in accordance with relevant Environmental Protection Agency’s (EPA) Guidance, as follows:

- Assessment of baseline, including identification and assessment of receiving environment and relevant receptors;
- Identification of environmental design and mitigation measures included in the construction methodology;
- Identification of the potential impacts, and assessment of the magnitude of potential effects, and their significance;
- Consideration of mitigation measures; and,
- Assessment of residual effects.

Despite the requirement to consider ‘Population and Human Health’ amongst the other environmental topics for assessment, Planning and Development Regulations 2001, as amended (Part 10, Environmental Impact Assessment) do not establish the way in which this is to be addressed and there is no prescribed EIA definition for ‘Population and Human Health’.

Using professional judgement and relevant guidance, the assessment is based upon Institute of Environmental Management and Assessment (IEMA¹⁴) guidance, in particular, IEMAs guide to ‘Effective Scoping of Human Health (2022) and IEMAs guide to ‘Determining Significance for Human Health in Environmental Impact Assessment’ (2022)¹⁵. These publications are applicable to Ireland and have been developed by an IEMA Working Group that includes representation from the Institute of Public Health (Ireland), subsequent to (and making reference to) a wide range of other pertinent guidance documents including from the World Health Organisation (WHO), European Commission, International Association for Impact Assessment, and Institute of Public Health (Ireland). It is then considered that the IEMA guidance forms a robust and comprehensive means to scope and assess population health impacts as a result of the Development.

¹⁴ Note that the Institute for Environmental Management and Assessment is now known as The Institute of Sustainability and Environmental Professionals (ISEP).

¹⁵ [IEMA-EIA-Guide-to-Determining-Significance-for-Human-Health \(3\).pdf](#)



IEMA sets out the requirements for assessing the direct and indirect effects, in an appropriate manner, of a Proposed Development on human health. This also notes, along with the WHO, that health can be defined as 'a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity'.

Health is influenced by a range of factors, termed the 'wider determinants of health'. Determinants of health span the bio-physical, social, behavioural, economic and institutional factors. The IEMA guidance document provides a framework for concluding on the significance of population health effects that can be applied across the wider determinants of health.

The IEMA guidance document recognises that significance at the level of individuals is not proportionate, and as such establishes a method for assessing significance at a population level, or disproportionate effects to relevant sub-populations, i.e. groups of more sensitive individuals.

It is to be recognised that many of the effects on Population and Human Health are considered within the specific relevant chapters to this EIAR and these chapters will be in accordance with relevant policy objectives. Potential interactions between health and other environmental factors is recognised in EPA Guidance, with noise, vibration, landscape, roads, traffic and transportation of particular note¹⁶. Consideration based on professional judgement has also been made and specific technical assessments are included within the following chapters:

- Landscape and Visual (Chapter 6)
- Air Quality and Odour (Chapter 7);
- Climate (Chapter 8);
- Noise and Vibration (Chapter 9);
- Traffic (Chapter 10);
- Land, Soils and Geology (Chapter 11);
- Water (including Hydrology and Hydrogeology) (Chapter 12) and
- Risk of Major Accidents and Disasters (Chapter 15).

This chapter therefore considers all relevant information included within the above sections that relate to Population and Human Health and as such relevant chapters should be consulted for further information. This chapter also identifies those health receptors in the area i.e. local residents and those working, visiting or using facilities in the Study Area.

In general terms, the assessment considers the potential significant effects of the Proposed Development on two types of population:

1. The general or wider population / groups (e.g. workers and contractors constructing, operating and decommissioning the Proposed Development, workers at nearby local businesses, residents living in houses, operators and users of community land and facilities, owners and users of commercial premises, users of footpaths and cycle routes, users of open space, recreation and leisure facilities, vehicle travellers, public transport users).
2. Vulnerable groups' identified within the general population who may be more susceptible to changes to the baseline conditions as a result of the Proposed Development. This assessment does not seek to determine significance of effect on individuals – this would not be proportionate and would be inappropriate. Rather it takes a population health approach where the health outcomes of a group are considered.

¹⁶ EPA Guidelines on the information to be contained in EIAR – Section 3.7.6

The assessment has set out to identify the key physical and human receptors in the main Study Area which have potential to be affected by the Proposed Development, including the presence of any human vulnerable or sensitive groups. As such, the assessment considers the potential effects of the Proposed Development on two types of receptors:

1. Physical receptors (e.g. residential properties, schools, community facilities, local businesses, commercial interests, recreation routes or spaces, roads, footpaths etc.) and
2. Human receptors that are present or use these physical receptors.

4.2.1 Study Area

In relation to Population and Human Health, it is to be noted that effects vary between geographical areas. The geographic scope should have regard to the populations within relevant geographic zones of influence or Study Areas. This may include site-specific population, local, regional, national, and international populations. IEMA guidance notes that the populations of relevant geographic areas should be defined to aid understanding of the individual and combined health effects due to the project.

For this assessment on Population and Human Health the Site has been defined as the area within the red line boundary to the Proposed Development and the 'Study Area' has been defined as the area up to 500 m from the red line boundary (Figure 4-1; Figure 4-6). This is considered representative of the local area, however, where it is considered there may be effects beyond this area, these will be described. As such, while there is a focus on the 'Study Area' relevant data from Electoral Divisions and other wider data sets has also been considered in order to provide an overview of the wider surrounding area. The Study Area is shown in Figure 4-6, including an indicative development boundary within the EIAR Study Area. For details on the final Proposed Development boundary please refer to the Proposed Development site layout plan drawings which accompany the planning application documentation. Information on the alternatives considered and how the Proposed Development boundary has been derived are included in Chapter 3.

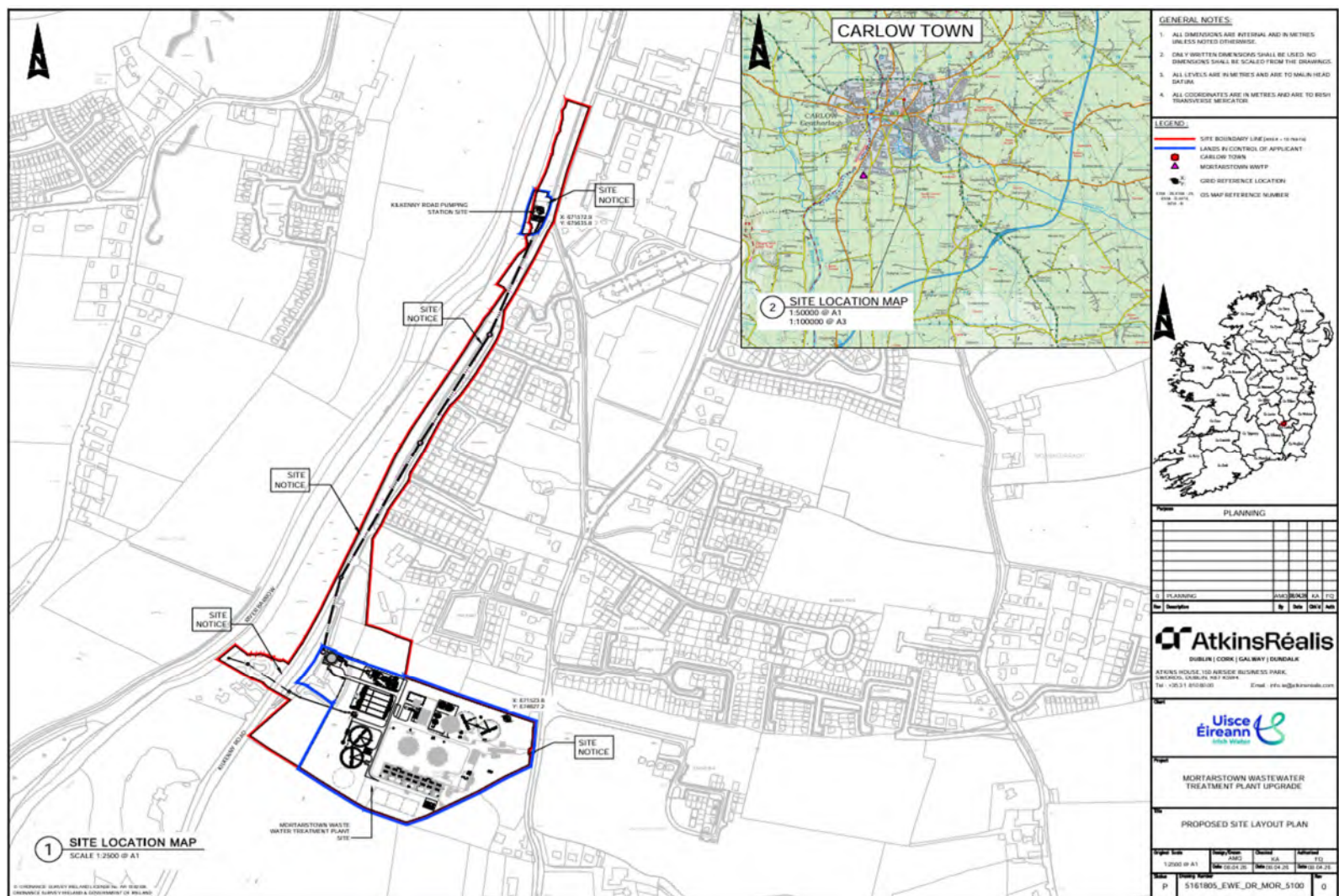


Figure 4-1 – Proposed Development Redline Boundary

4.2.2 Desk Study

The following publications and data sources were consulted in the preparation of this Chapter:

- Central Statistics Office (CSO) data website (2016 and 2022 results) (www.cso.ie);
- Department of Education data website (www.education.ie/en/find-a-school);
- Carlow County Development Plan (2022-2028);
- Carlow – Graiguecullen Joint Urban Local Area Plan (LAP) 2024–2030;
- Southern Regional Assembly Regional Spatial and Economic Strategy (2020–2032);
- Fáilte Ireland (www.failteireland.ie);
- Google Street Mapping;
- Health Service Executive data website (www.hse.ie); and,
- Project Ireland 2040 - National Planning Framework.

All data sources were consulted the week commencing May 2026 except where otherwise stated.

4.2.3 Wider Health Determinants

Wider determinants of health, associated with the WHO definition of health, are set out the IEMA Guidance¹⁷ and are included in Table 4-2 .

Table 4-2 - Wider Determinants of Health

Categories	Wider determinants of health
Health related behaviours	Physical activity
	Risk taking behaviour
	Diet and nutrition
Social Environment	Housing
	Open space, leisure and play
	Transport modes, access and connections
	Social participation, interaction and support
Economic environment	Education and training
	Employment and income
Bio-physical environment	Air quality
	Water quality or availability
	Land quality
	Noise and Vibration
Institutional and built environment	Health and social care services
	Built environment

¹⁷ [iema-eia-guide-to-effective-scoping-of-human-health-nov-2022.pdf](#)

Categories	Wider determinants of health
	Wider societal infrastructure and resources

4.2.3.1 Surveys

While surveys specific to Population and Human Health are not required, this assessment benefits from those surveys undertaken as part of the wider EIA, including those described in:

- Landscape and Visual (Chapter 6)
- Air Quality and Odour (Chapter 7);
- Climate (Chapter 8);
- Noise and Vibration (Chapter 9);
- Traffic (Chapter 10);
- Land, Soils and Geology (Chapter 11);
- Water (including Hydrology and Hydrogeology) (Chapter 12) and
- Risk of Major Accidents and Disasters (Chapter 15).

which have contributed to the Population and Human Health baseline. An Asbestos Refurbishment Survey Report (OHSS, 2018) was prepared which identified asbestos containing materials (ACM) as shown below. As stated by OHSS, the identified asbestos containing materials are intact and in use. This report recommends that the ACMs are removed in advance of any refurbishment or demolition works and ACMs should only be removed by a competent contractor.

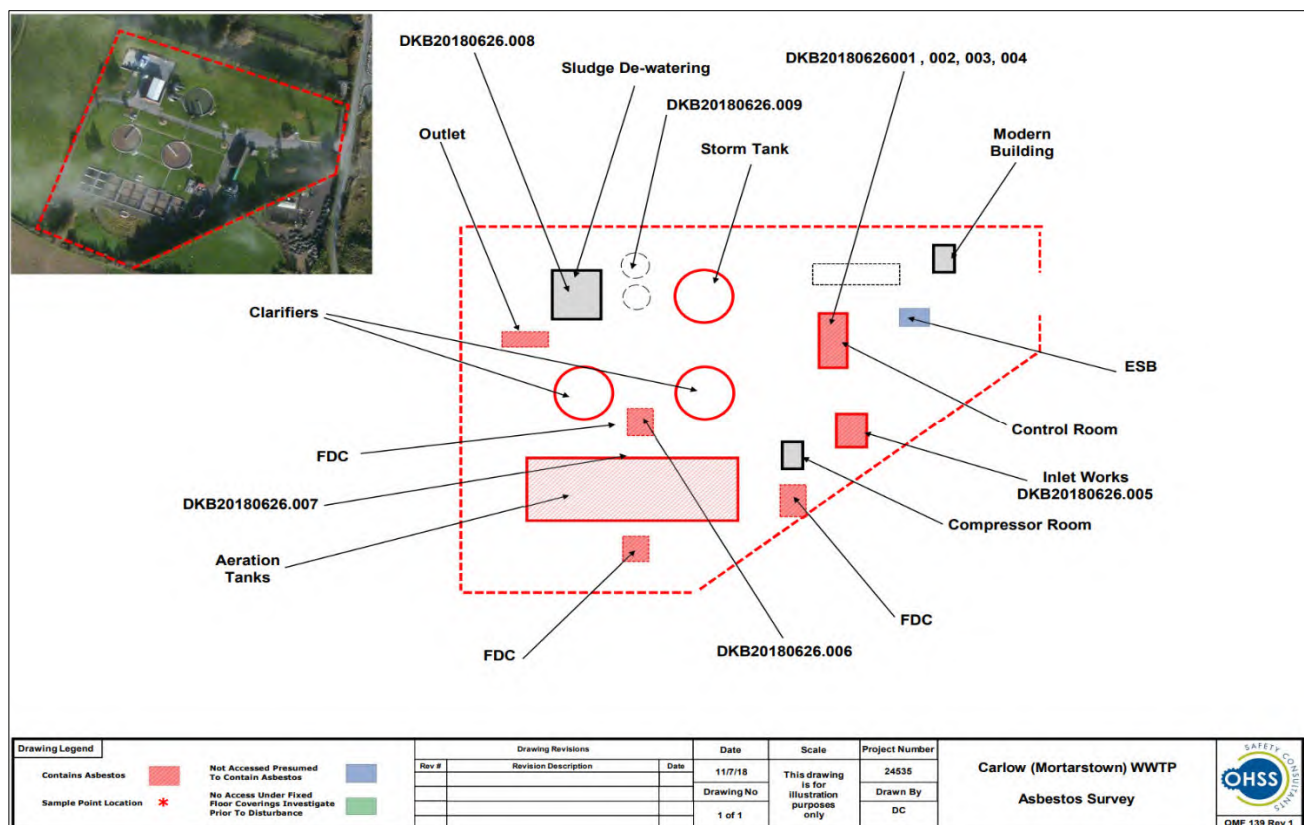


Figure 4-2 - The WwTP Site assessed in the Asbestos Survey

An Asbestos Survey of the Kilkenny pump station to be decommissioned will be undertaken prior to commencement.

4.2.4 Determining Effect Significance

The assessment of EIA health significance is an informed expert judgement about what is important, desirable or acceptable for public health with regards to changes triggered by the Proposed Development. The determination of significance has two stages:

- Firstly, the sensitivity of the receptor affected, and the magnitude of the effect upon it are characterised. This establishes whether there is a relevant population and a relevant change to consider.
- Secondly, a professional judgement is made as to whether the expected change in a population's health outcomes would be significant in public health terms. This judgement is explained using an evidence based narrative setting out reasoned conclusions.

4.2.5 Determining Value and Sensitivity of Human Health Issues

The criteria for determining the sensitivity for health receptors has been taken from the IEMA Guide to Determining Significance for Human Health in Environmental Impact Assessment, as set out in Table 4-3 . Due to the nature of the receptor, it is likely that the sensitivity of many health receptors will span more than one sensitivity. Where this is the case, professional judgement has been applied to determine the most appropriate sensitivity.

Table 4-3 Criteria for determining the sensitivity of physical and human receptors to changes to wider health determinants

Category / Level	Indicative criteria (as set out in IEMA guidance ¹⁸)
High	High levels of deprivation (including pockets of deprivation); reliance on resources shared (between the population and the project); existing wide inequalities between the most and least healthy; a community whose outlook is predominantly anxiety or concern; people who are prevented from undertaking daily activities; dependants; people with very poor health status; and / or people with a very low capacity to adapt.
Medium	Moderate levels of deprivation; few alternatives to shared resources; existing widening inequalities between the most and least healthy; a community whose outlook is predominantly uncertainty with some concern; people who are highly limited from undertaking daily activities; people providing or requiring a lot of care; people with poor health status; and/or people with a limited capacity to adapt.
Low	Low levels of deprivation; many alternatives to shared resources; existing narrowing inequalities between the most and least healthy; a community whose outlook is predominantly ambivalence with some concern; people who are slightly limited from undertaking daily activities; people providing or requiring some care; people with fair health status; and/or people with a high capacity to adapt.
Very Low / Negligible	Very low levels of deprivation; no shared resources; existing narrow inequalities between the most and least healthy; a community whose outlook is predominantly support with some concern; people who are not limited from undertaking daily activities; people who are independent (not a carer or

¹⁸ [iema-eia-guide-to-determining-significance-for-human-health-nov-2022.pdf](#)

Category / Level	Indicative criteria (as set out in IEMA guidance ¹⁸)
	dependant); people with good health status; and/or people with a very high capacity to adapt.

The sensitivity of an individual or population sub-group encompasses its ability to withstand exposures and the range of associated effects, and the physiological (e.g. co-morbidities or disabilities) and socio-economic factors that increase their susceptibility to the exposure. However, it is important to stress that assessment of EIA significance at the level of individuals is not proportionate (IEMA human health significance guidance, para. 5.2) and therefore the assessment of the Proposed Development explores the effects at a population and sub-population level. Table 4-2 sets out the sensitivity to health determinants for wider and vulnerable groups.

4.2.5.1 Determining Impact Magnitude

The magnitude of any change to the baseline conditions has been assessed in accordance with the criteria set out in Table 4-4. Effects are assessed for the construction, operational, demolition and decommissioning phases.

Determining Impact magnitude of human health issues

In respect of Human Health, magnitude is derived through assessment against indicative criteria taken from IEMA (Table 4-4).

Table 4-4 - Criteria for assessing health magnitude of impact

Impact Category/Level	High level description of the magnitude of impact for the physical receptors	High level description of the magnitude of impact for the human receptors
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements.	High exposure or scale; long-term duration; continuous frequency; severity predominantly related to mortality or changes in morbidity (physical or mental health) for very severe illness/ injury outcomes; majority of population affected; permanent change; substantial service quality implications
Medium	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements.	Low exposure or medium scale; medium-term duration; frequent events; severity predominantly related to moderate changes in morbidity or major change in quality-of-life; large minority of population affected; gradual reversal; small service quality implications
Low	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to one (maybe more) key characteristics, features or elements.	Very low exposure or small scale; short-term duration; occasional events; severity predominantly related to minor change in morbidity or moderate change in quality-of-life; small minority of population affected; rapid reversal; slight service quality implications
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements.	Negligible exposure or scale; very short-term duration; one-off frequency; severity predominantly relates to a minor change in quality-of-life; very few people affected; immediate reversal once activity complete; no service quality implication.

Impact Category/Level	High level description of the magnitude of impact for the physical receptors	High level description of the magnitude of impact for the human receptors
No Change	No loss or detrimental alteration to one or more characteristics, features or elements; no observable effects in either direction.	No impact to the wider health determinant or to sensitive groups.

Determining Significance of Impact on Human Health Issues

The impact to human health from the Proposed Development is a function of the impact magnitude (Table 4-4) and receptor sensitivity (Table 4-5). Impacts can be beneficial or adverse. Major or moderate impacts are deemed to be significant, and minor and negligible impacts are deemed to be not significant.

When determining significance, professional judgement is exercised as it is likely in any given analysis that some effects will span categories.

Table 4-5 - EIA significance matrix for determining receptor sensitivity and health effects (source IEMA)

		Sensitivity			
		High	Medium	Low	Very Low
Magnitude	High	Major	Major / moderate	Moderate / minor	Minor / negligible
	Medium	Major / moderate	Moderate	Minor	Minor / negligible
	Low	Moderate / minor	Minor	Minor	Negligible
	Negligible	Minor / negligible	Minor / negligible	Negligible	Negligible

Table 4-6 - Significance conclusion and reasoning related to public health (source IEMA)

Significance	Indicative criteria (judgment based on most relevant criteria, it is likely in any given analysis that some criteria will span categories)
Major (significant)	- Changes, due to the project, have a substantial effect on the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by referencing relevant policy and effect size (magnitude and sensitivity levels), and as informed by consultation themes among stakeholders, particularly public health stakeholders, which show consensus on the importance of the effect. - Change, due to the project, could result in a regulatory threshold or statutory standard being crossed (if applicable). - There is likely to be a substantial change in the health baseline of the population, including as evidenced by the effect size and scientific literature showing there is a causal relationship between changes that would result from the project and changes to health outcomes. - In addition, health priorities for the relevant Study Area are of specific relevance to the determinant of health or population group affected by the project.



Significance	Indicative criteria (judgment based on most relevant criteria, it is likely in any given analysis that some criteria will span categories)
Moderate (significant)	- Changes, due to the project, have an influential effect on the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by referencing relevant policy and effect size, and as informed by consultation themes among stakeholders, which may show mixed views. - Change, due to the project, could result in a regulatory threshold or statutory standard being approached (if applicable). - There is likely to be a small change in the health baseline of the population, including as evidenced by the effect size and scientific literature showing there is a clear relationship between changes that would result from the project and changes to health outcomes. - In addition, health priorities for the relevant Study Area are of general relevance to the determinant of health or population group affected by the project.
Minor (not significant)	- Changes, due to the project, have a marginal effect on the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by effect size of limited policy influence and/or that no relevant consultation themes emerge among stakeholders. - Change, due to the project, would be well within a regulatory threshold or statutory standard (if applicable); but could result in a guideline being crossed (if applicable). - There is likely to be a slight change in the health baseline of the population, including as evidenced by the effect size and/or scientific literature showing there is only a suggestive relationship between changes that would result from the project and changes to health outcomes. - In addition, health priorities for the relevant Study Area are of low relevance to the determinant of health or population group affected by the project.
Negligible (not significant)	- Changes, due to the project, are not related to the ability to deliver current health policy and/or the ability to narrow health inequalities, including as evidenced by effect size or lack of relevant policy, and as informed by the project having no responses on this issue among stakeholders. - Change, due to the project, would not affect a regulatory threshold, statutory standard or guideline (if applicable). - There is likely to be a very limited change in the health baseline of the population, including as evidenced by the effect size and/or scientific literature showing there is an unsupported relationship between changes that would result from the project and changes to health outcomes. - In addition, health priorities for the relevant Study Area are not relevant to the determinant of health or population group affected by the project.

For each judgement of significance made, a narrative has been provided to explain which factors have been considered. The following considerations have been made, where relevant, to provide consistency in the formation of the judgement of significance by the assessor, which is an approach that is advocated in the IEMA guidance:

- Whether there would be a high level of exposure or widespread impact.
- Whether the population exposed to an impact is particularly sensitive due to preexisting vulnerabilities or inequalities.
- The duration of effects and whether they would be reversible.
- The level of acceptability, including whether statutory thresholds for pollutants would be exceeded and/or whether the issue is a public health priority.



- The severity of the related health outcomes (i.e. whether it is related to a change in mortality or morbidity).
- The strength of evidence for an association between a change in a determinant and health outcomes.
- Whether a large proportion of the population would likely be affected.
- Whether the impact is likely to increase or tackle health inequalities at a population level.

4.3 Receiving Environment

4.3.1 Establishing Population Profile

This section provides a description of the known baseline characteristics for Population and Human Health. The baseline conditions are subdivided into subheadings reflecting the Population and Human Health sub-topics considered to be relevant to the Proposed Development.

A range of publicly available data sources (Section 4.3.2) have been used to determine the population and health baseline. These include statistics on population and employment from the Central Statistics Office (CSO)¹⁹ and data from local authorities. It is important to understand the health profile of the local and wider areas. To inform the baseline, 2022 Census data has been utilised.

The local authority of relevance to the Proposed Development is Carlow County Council. The Electoral Division intersecting the Proposed Development is Carlow Rural ED, shown highlighted yellow (Figure 4-3).

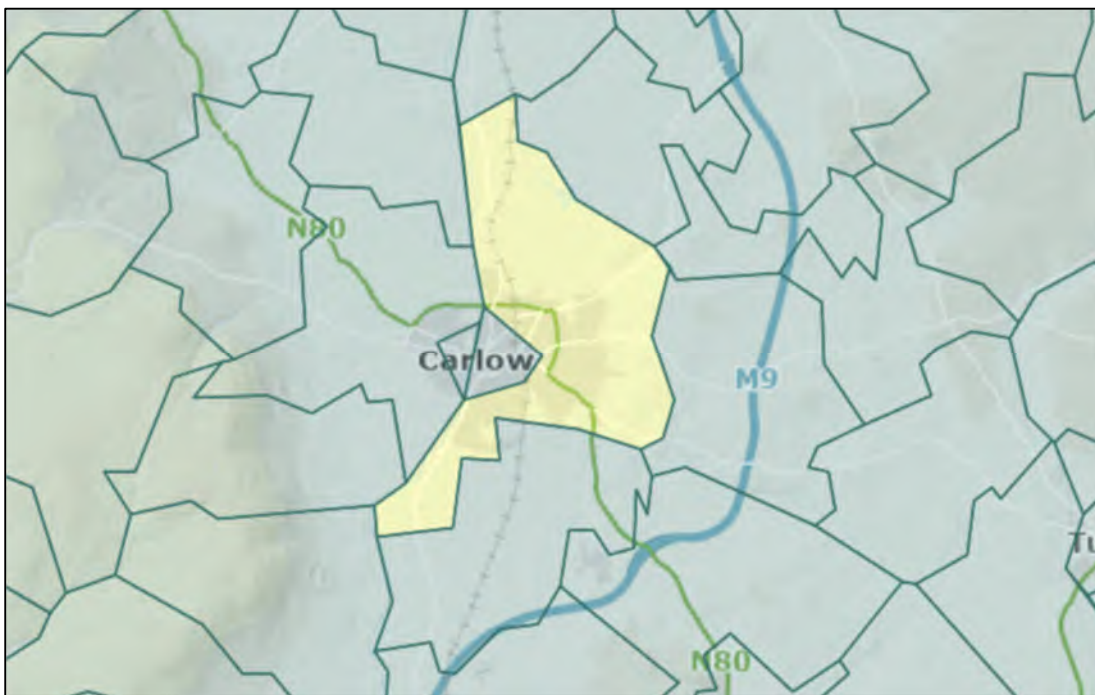


Figure 4-3 - Extract of Electoral Divisions CSO Interactive Map

¹⁹ [Census - CSO - Central Statistics Office](#)

4.3.2 Population Baseline

The Proposed Development is located within the existing Mortarstown WwTP and is located on the southern side of Carlow town centre, with current access to the site located off the Green Road. There is an existing dwelling directly to the west of the existing WwTP that was acquired by UÉ. This dwelling will not be used during the Proposed Development. The WwTP is bounded by agricultural land and the Carlow Institute of Further Education to the South; agriculture land and the Kilkenny Road (R448) to the West; agricultural land and existing residential developments to the North; and agricultural land, residential properties and residential development under construction to the East.

The existing Pumping Station site is bounded by Kilkenny Road (R448) in the east and vegetation/trees to the west and south; the River Barrow to the West; partially cleared vegetation/trees and River Barrow to the North; and Kilkenny Road (R448), Carlow Institute of Technology and student accommodation to the East. The existing Kilkenny Road Pump Station is located on the southern side of Carlow town centre, adjacent to the River Barrow. A 785 m long microtunnel gravity sewer (Ø1650mm internal diameter) will be constructed from the south side of Kilkenny Road Pumping Station to the wet well of the new inlet pump station adjacent to the new inlet works of the existing WwTP which is proposed to be upgraded. The microtunnel will be routed under the R448 Kilkenny Road before it traverses under a treelined verge and local access road (to UÉ owned property) to connect to the WwTP.

The most recent Census of Population was done in April 2022, with previous data dating from 2016. 2022 CSO data indicates that the national population increased by ca. 8% since 2016 to 5,149,139. Demographic trends are analysed at national, regional and local levels for the purposes of the EIAR. Electoral Divisions (ED) which are included within the site were examined. In this regard the site falls within the Carlow Rural Electoral Division.

Given the nature of the Proposed Development it is considered the key areas associated with the site are the 'Local Area' (comprised of Carlow Rural ED) and the County Area (consisting of Carlow). Population growth within the state, County Carlow, and Carlow Rural ED are shown in Table 4-7 for the 2016–2022 period.

Table 4-7 - Population Growth 2016–2022

Area	Total Population 2016	Total Population 2022	% Change 2016–2022
State	4,761,865	5,149,139	+ 8.1
County Carlow	56,932	61,968	+ 8.85
Carlow Rural ED	14,546	16,203	+ 11.4

Source: cso.ie

There has been a consistently high level of population growth within the state, County Carlow and Carlow Rural ED over this period, with this growth anticipated to continue in the future. There has also been significant population growth in County Carlow with a growth of 8.85%, higher than the overall national population growth of 8.1%.

The CSO has a Small Area Population Statistics which are statistics produced for a range of geographical levels from State to Small Areas²⁰. The Proposed Development is located within Small Area: A017010001, which has

²⁰ <https://visual.cso.ie/?body=entity/ima/cop/2022&boundary=C04172V04943&guid=4c07d11e-14af-851d-e053-ca3ca8c0ca7f>

a total population of 229 and Small Area A017010005 which has a total population of 449 persons (CSO, 2022) (Figure 4-4 and Figure 4-5).

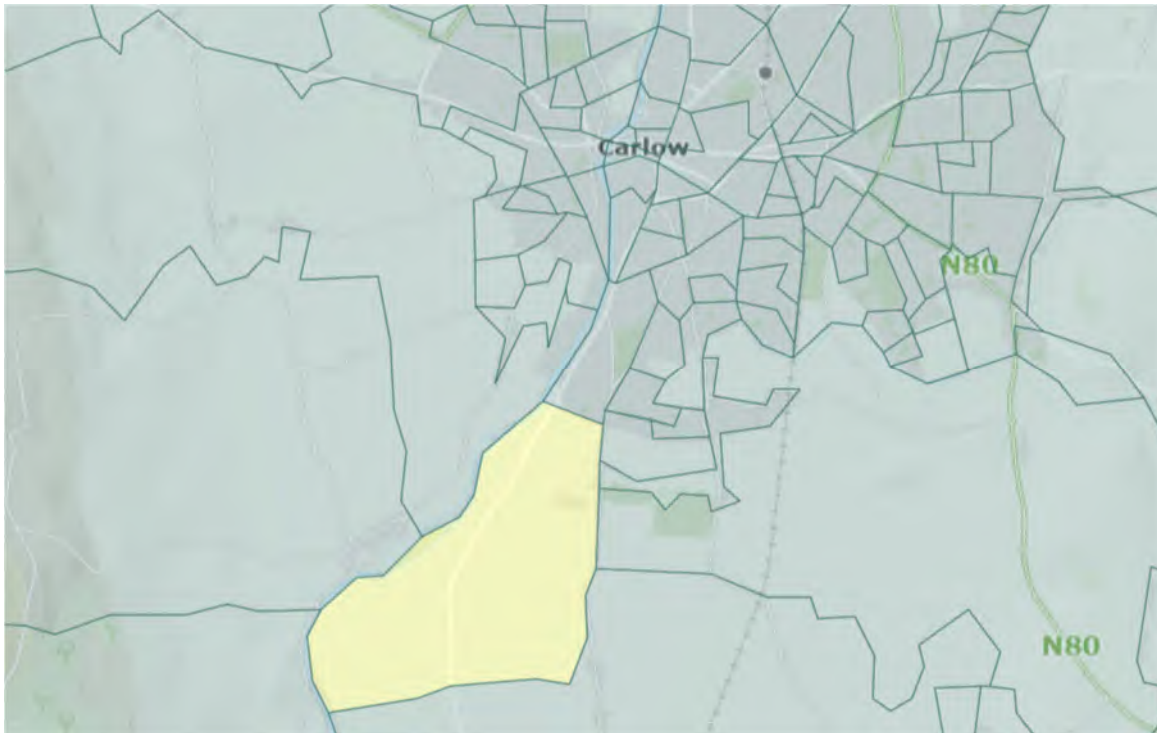


Figure 4-4 - Census Small Area A017010001

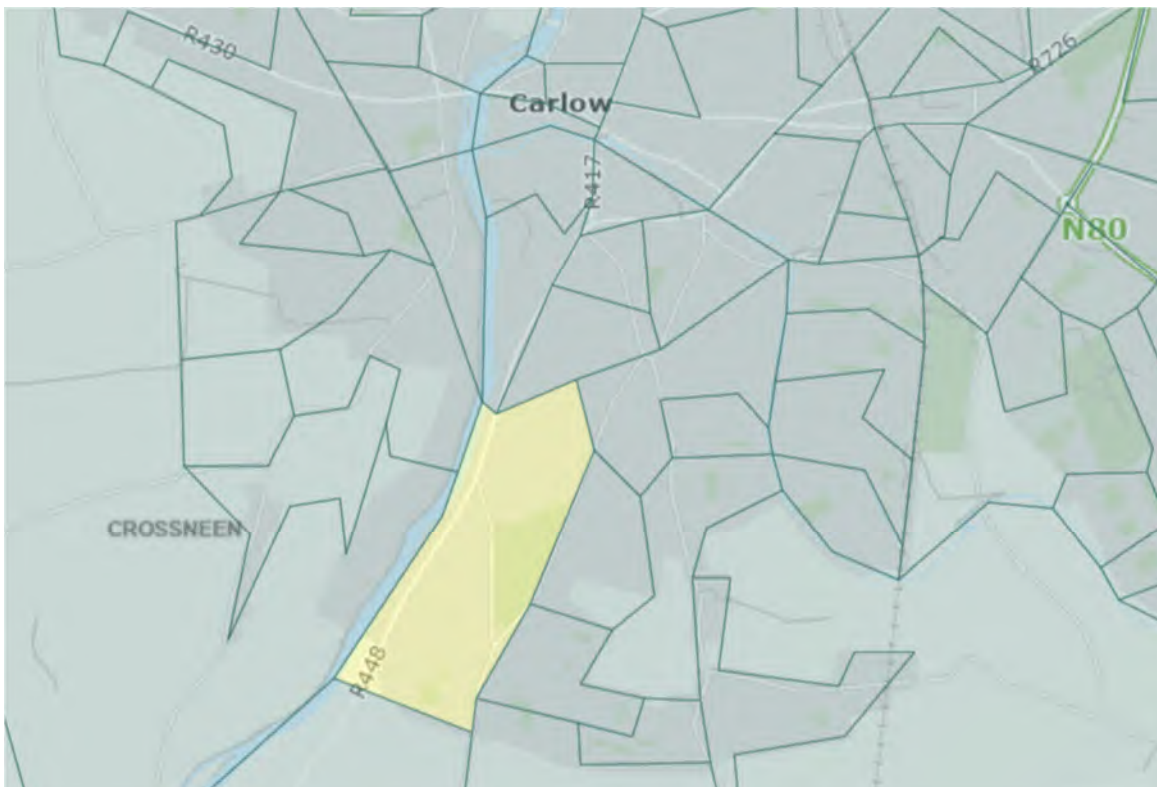


Figure 4-5 - Census Small Area A017010005

4.3.2.1 Age

The age profile of the Study Area is similar to that of the County and State (Table 4-8). There is a slightly higher proportion of the population aged 0-14 in Carlow Rural ED (21%) compared to County Carlow and the State (both 19.8%). Additionally, there is a higher proportion of elderly people living in the State and County Carlow (both 15%) compared to 12.1% within the Study Area (Carlow Rural ED).

Table 4-8 - Population by Age

Area	Population aged 0-14	Population aged 15-24	Population aged 25-44	Population aged 45-64	Population aged 65+
State	19.7%	12.5%	27.6%	25.1%	15.1%
County Carlow	19.8%	13%	26.5%	25.5%	15%
Carlow Rural ED	21%	14.9%	29.3%	22.6%	12.1%

4.3.2.2 Ethnicity

The Ethnic and Cultural background of the population within the Study Area Electoral Division – Carlow Rural was studied and results are presented in Table 4-9 .

Table 4-9 - Ethnic or cultural background

Ethnic or cultural background	Carlow Rural ED Community Health Network	State
White Irish	67%	76.6%
White Irish Traveller	1.8%	0.6%
White Other	15.2%	9.9%
Black or Black Irish	2.9%	1.5%
Asian or Asian Irish	3.8%	3.3%
Other	2.8%	2.0%
Not stated	6.42%	6.2%

4.3.3 Economic Profile

The 2022 Census of Population was examined to determine trends in relation to employment including the number of persons at work, unemployment levels and the sectoral composition of the population, based upon principal economic status.

Table 4-10 shows the overall unemployment rate as measured by the responses from the 2016 and 2022 Census. The unemployment rate is calculated by dividing the number of unemployed individuals by the total labour force (i.e., total amount of unemployed persons and employed persons) and multiplying by 100 to express as a percentage.

The unemployment rate across the state and County Carlow has decreased significantly between 2016 and 2022. More recent data on employment is provided in the CSO Labour Force Survey published quarterly. This

shows that in Q4-2025 the national unemployment rate was 4.3% which was an increase of 0.5% from 3.8% in Q4-2024²¹.

Table 4-10 - Principal Economic Status (Profile) 2016-2022

	State 2016	State 2022	Carlow 2016	Carlow 2022
At work	2,006,641	2,320,297	21,973	26,792
Looking for First Regular Job	31,434	34,526	434	429
Overall Unemployed	297,396	210,802	4,507	2,799
Labour Force	2,304,037	2,531,099	26,480	29,591
Unemployment Rate (%)	12.9%	8.3%	17%	9.5%

Source: cso.ie (2022)

The Proposed Development is located within Small Area: A017010001, which has a total population of 229 and Small Area A017010005 which has a total population of 449 persons (CSO, 2022) (Figure 4-4 and Figure 4-5).

From the Small Area Population Statistics, the main occupations in the A017010001 small area are professional occupations, followed by skilled trades occupations, Associate Professional and Technical Occupations and seniors officials, and Elementary Occupations (CSO, 2022)²².

4.3.3.1 Residential and Private Property

The Study Area is located within County Carlow, ca. 0.7 km south of Carlow Town. The area surrounding the Mortarstown WwTP is residential to the north, south and east, with agricultural land holdings further south. The Proposed gravity sewer runs along the Kilkenny road which is bordered on the east by numerous housing estates.

There are no inhabited residential properties located within the Proposed Development site boundary; however, the following residential receptors have been identified within the Study Area:

- The Cluain Buí residential estate is located ca. 80m east of the Proposed Development, separated via the Green Road which borders the eastern edge of the Site boundary.
- The Glen residential estate located north of the Proposed Development site
- College Green residential estate located northeast of the Proposed Development site, separated via the Green Road bordering the eastern edge of the Site Boundary.
- Southern Gardens residential estate located bordering the Kilkenny road and Proposed Gravity sewer main route to the east.
- Carraig Abhainn residential estate located bordering the Kilkenny road and Proposed Gravity sewer main route to the east.
- Maple Court residential estate is located ca. 250m south of the Proposed Development Site.

²¹ <https://www.cso.ie/en/releasesandpublications/ep/p-lfs/labourforcesurveyquarter42025/unemployment/>

²² <https://data.cso.ie/#>

4.3.3.2 Development land and businesses

The Proposed Development will involve upgrading the existing Mortarstown WwTP and will provide for a new gravity sewer extending to the Kilkenny Road Pumping Station.

The area the Proposed Development is located is built up with numerous commercial units surrounding including:

- Tyndall College Carlow, Carlow Institute and related sports grounds located bordering the Proposed Development in the south.
- Cyril Bryne Plant Hire located ca. 80m east of the Proposed Development, separated via the Green Road
- Fanning Electrical & Solar Carlow located ca. 80 m northeast of the Proposed Development Site.
- Irish Wheelchair associated located along the Kilkenny Road bordering the Proposed Route of the gravity sewer
- GreatGas – Munnellys Service Station located along the Kilkenny Road bordering the Proposed Route of the gravity sewer.
- South East Technological University Carlow and associated building units and sports hall located within 100m of the Proposed gravity sewer and Kilkenny Pumping Station.

4.3.3.3 Community

The Proposed Development will increase the capacity of the existing WwTP from 36,000 person equivalent to 58,500 person equivalent. This will support the growing population and local economy within County Carlow.

The Proposed Development will also temporarily increase employment in the local area during the construction phase.

4.3.3.3.1 Community Amenities and Tourism

The Proposed Development runs ca. 80m east of the River Barrow. The River Barrow is classified by the EPA Water Framework Directive 2019-2024 as 'Moderate' and is 'At Risk' of failing to achieve WFD standards by 2027. The Latest River Q values were obtained from EPA (2026) from station name: BARROW – 1.5 km d/s Graigue Br, located ca. 80 m of the Proposed Development. The Q value of the River at this station is classified as 'Bad' and allocated a Q value score of 1 '*Seriously polluted – Unsatisfactory*'.

There are numerous boating clubs which use the River Barrow as a base for activities including Carlow Rowing Club, Carlow Dragon Boat Club, Phoenix Kayak Club and Carlow Heritage Boats Association. The River Barrow is also a renowned fishing location, particularly popular for coarse fishing and angling. Fish common to the River Barrow include bream, roach, dace, perch, pike, brown trout and salmon. The River Barrow is also a tourist attraction for many travelling through County Carlow due to associated walking and cycling trails, as well as the aforementioned uses.

Other community amenities in the area of the Proposed Development include

- Numerous educational facilities including: South East Technological University, Carlow National School, Tyndall College Carlow and Carlow Institute. All are within 300 m of the Proposed Development;
- The Irish Wheelchair Association;
- The South East Technological University Sports Complex
- Quinagh House Golf Course; and,
- Carlow & District Football League.



4.3.3.3.2 Employment Opportunities

Opportunities for employment exists within the surrounding area, with a range of services including:

Tourism

- Carlow Institute of Education;
- South East Technological University;
- South East Technological University (SETU) Carlow Sport Complex;
- Quinagh House Par 3 Golf Course;
- Carlow & District Football League Pitches;
- Delta Sensory Garden;
- Arboretum Garden Centre and
- Numerous hotels and B&Bs including Woodford Dolmen Hotel, Shalom B&B and 6 Riverside Lodge.

Commercial

- Sheehans Garage;
- Custom Build Scalextric Ireland;
- Almas Beauty Salon; and,
- Haggardstown Garden Centre.

Industrial

- Rawsaol Fire Pits; and
- Shaws Warehouse

Table 4-11 and Figure 4-6 shows the sensitive receptors within the 500 m Study Area. These receptors are predominantly residential in nature, however there are scattered business throughout as well as numerous educational facilities.

Table 4-11 - Sensitive receptors within the Study Area

Receptor	Within RLB (count)	Within 250 m of RLB (count)	250m – 500 m of RLB (count)
Residential Properties	0	208	370
Community Facility	0	1	3
Businesses	0	2	6
School	0	3	3



Figure 4-6 - Sensitive Receptors within the 500m Study Area. RLB = proposed red line boundary

4.3.3.4 Agriculture

The Census of Agriculture Mapping²³ shows that the Study Area intersects 3no. Electoral Divisions. The agricultural structure of the Study Area is shown in Table 4-12. The data indicates that agriculture is a key land use, and driver of the local economy in the Study Area with a mixture of livestock and arable farming.

Table 4-12 - Agricultural Structure of the Study Area

Electoral Division	Number holdings	of Average size of holding (hectares)	Livestock units	Area Farmed (hectares)	Average Age of holder
Carlow Rural	22	34.1	497	747.3	59.1
Graiguecullen Rural	28	43.8	1,413	1,225.9	61.1
Ballinacarrig	32	57.4	1,645	1,835.9	57.6
<i>Total</i>	<i>82</i>	<i>45.1</i>	<i>7,166</i>	<i>1,269.7</i>	<i>59.37</i>

²³ CSO AgriMap, 2020.

<https://visual.cso.ie/?body=entity/ima/coa&boundary=C03904V04656&guid=2AE19629183713A3E055000000000001>

4.3.3.5 Commuting / Transport

The usage rates of different methods of transportation used in both Co. Carlow and the state are shown in table 4-13. The population at State and County level are reliant on the local road network for commuting to and from work, school and college. This may result in implications during construction during hours of peak traffic including morning and evening.

Table 4-13 - Population aged 5-years and over means of travel to work, college or school

Means of Travel	State	Carlow
On Foot	456,291	4,999
Bicycle	97,212	577
Bus, minibus or coach	323,923	2,325
Train, DART, or Luas	85,316	384
Motorcycle or scooter	9,150	65
Car Driver	1,254,419	15,987
Car Passenger	691,044	9,802
Van	148,823	2,226
Other (incl. lorry)	14,092	240
Not Stated	266,412	3,174
Total	3,613,408	39,779

4.3.4 Health Baseline

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'.

Overall life expectancy and self-assessed health statistics are included below.

The Department of Health's report 'Health in Ireland Key Trends 2024'²⁴ and the previous version provides statistical analysis on health in Ireland over the last ten years. Chapters 1 and 2 of the report deal specifically with life expectancy and health. According to this report the average life expectancy trends are as follows:

- Life expectancy for women (continual upward trend since 1996): 85 years
- Life expectancy for men (continual trend since 2006): 81 years

It is also noted that the gap between male and female life expectancy has continued to narrow over the last decade. An upward trend is evident in the life expectancy of older age groups reflecting decreasing mortality rates from major diseases. Older Irish people's life expectancy (65 years of age) to be lived in good health, is higher for both men and women compared with the EU average.

²⁴ [Health in Ireland: Key Trends 2024](#)



The report also states that “Ireland has the highest self-perceived health status in the EU, with 80.0% of people rating their health as good or very good”. Overall population health at the national level shows decreasing mortality and a rise in life expectancy over the last ten years.

4.3.4.1 General Health

In relation to General Health, the State generally performs better than in the County and Electoral Division intersecting the Study Area (Table 4-14). However, the Electoral District and Carlow County have higher numbers of people describing their general health as good and fair than nationally. Compared to the State statistics, Co. Carlow and the Rural ED has reported higher numbers of people with a disability (Table 4-14).

Table 4-14 - State, County and Electoral Division General Health Ratings

	General Health - Very Good	General Health - Good	General Health - Fair	General Health - Bad	General Health - Very Bad	Population with a disability
State	53.2%	29.7%	8.6%	1.4%	0.3%	21.5%
County Carlow	51.3%	30.4%	9.9%	1.7%	0.4%	23.1%
Carlow Rural ED	50%	31.7%	9.45%	1.7%	0.3%	23.7%

Nationally, two in every five people (41%) have a long-term health condition confirmed by a medical professional, broadly unchanged since 2023 (40%). The most prevalent long-term health conditions confirmed by a medical diagnosis include high blood pressure (8%), arthritis (6%), asthma and diabetes (both 5%). At County level, based on Census data 2022, 23% of Carlows population reported experiencing at least one long lasting condition or difficulty to any extent²⁵. Of these people 9% reported experiencing at least one long-lasting condition or difficulty to a greater extent or a lot. A further 14% reported experiencing at least one long-lasting condition or difficulty to some extent or a little. This is similar to the national levels where 22% of the population report one long-lasting condition or difficulty to any extent, of these 8% experience at least one long lasting condition to a great extent and 14% to some extent.

Healthy Ireland is a national framework for improved health and wellbeing from 2013 to 2025 aimed at improving the health and wellbeing of the Irish society. Healthy Ireland has been introduced due to concerns that the current health status of people living in Ireland – including lifestyle trends and health inequalities – is leading towards a future that is dangerously unhealthy, and very likely unaffordable. The many risks to the health and wellbeing of people living in Ireland include issues such as overweight and obesity, mental health, smoking, alcohol and drugs. Healthy Ireland seeks to provide people and communities with accurate information on how to improve their health and wellbeing and seeks to empower and motivate them by making the healthy choice the easier choice.

Healthy Carlow²⁶ was established in 2017 and is delivered through County Carlow Local Community Development Committee (LCDC) through a sub-group made up of an inter-agency partnership from a cross section of key stakeholders including Carlow Sports Partnership, Carlow County Council – Community Section,

²⁵<https://www.cso.ie/en/csolatestnews/pressreleases/2023pressreleases/pressstatementcensus2022resultspro file4-disabilityhealthandcarerscarlow/>

²⁶ <https://carlow.ie/community/health-and-wellbeing/healthy-cities-and-counties-programme>

St Catherines Community Services Centre and Waterford Leader Partnership with the overall aim to ‘increase individuals level of positive mental health as per Energy and Vitality Index’.

A key factor in upkeeping an areas mental and physical health is access to thriving recreational facilities / provisions including Rivers. County Carlow has rich biodiversity and any threat to that is also a threat to the people’s health, quality of life and well-being. Water quality is a key issue that affects us all and its protection is the responsibility of all sections of society. Ensuring that our local natural water bodies are clean and well protected is critically important to our health and wellbeing. A healthy catchment provides high quality drinking water and supports local livelihoods such as agriculture, food production, tourism and water based recreational activities. As the River Barrow provides significant amenities such as listed above in Section 4.3.3.3, it is important that the quality of the River is maintained. The Proposed Development aims to increase the capacity of the existing WwTP which will subsequently limit future overflows and pollution events in local waterways.

4.3.4.2 Physical activity

There are 2no. active travel routes located within the Study Area including the Carlow Town Loop cycle and pedestrian route and a section of the Barrow Way which is a 120km long walking and cycling route stretching from Co. Kildare to Co. Carlow²⁷.

4.3.4.3 Risk Taking Behaviour

While the Proposed Development is located within a built up area of Co. Carlow, Mortarstown WwTP and Kilkenny Pumping Station have been operational for many years. Therefore risk to the local population as a result of the development is considered low. Furthermore, due to the forecasted growth in population to the local area over the next number of years – there is considered a higher risk to the local population should the development not be facilitated.

4.3.4.4 Diet and Nutrition

The Proposed Development is located in the existing Mortarstown WwTP with the gravity sewer proposed to run along the Kilkenny road to the Kilkenny Road pumping station. Agricultural fields surrounding the Proposed Site are likely to be used for light grazing and silage cutting. Baseline data in relation to agriculture in the area is included in Section 4.3.3.4.

4.3.4.5 Housing

Between April 2016 and April 2022, housing stock in the county grew by 6% from 23,274 to 24,557. The number of vacant dwellings decreased by 8% from 1,864 to 1,724 and the number of holiday homes fell by 5% from 298 to 284. Nationally, the housing stock grew by more than 5% from 2,003,645 to 2,112,121. The number of vacant dwellings fell by almost 20,000 (-11%) to 163,433 and the number of holiday homes rose by 8% from 62,148 to 66,956²⁸.

At a local level, the housing stock and vacancy rate for the relevant electoral divisions are summarised in Table 4-15.

²⁷ [Find Your Trails | Sport Ireland](#)

²⁸ [Press Statement Census 2022 Results Profile 2 - Housing in Ireland Carlow - CSO - Central Statistics Office](#)

Table 4-15 - Housing Stock and Vacancy Rate

	Carlow Rural	Graigecullen Rural	Ballinacarrig
Total housing stock	6,191	1,894	410
Occupied by - Usual resident(s) of the household	5,761	1,773	394
Occupied by - Visitors only	31	1	0
Unoccupied - Residents temporarily absent	85	26	4
Unoccupied - Vacant house & Flat	304	89	10
Unoccupied - Holiday Home	10	5	2
Vacancy rate	5	5	2

Section 4.3.4.5. contains a review of baseline conditions in respect of residential and private property.

4.3.4.6 Employment and Income

Carlow County Development Plan (2022–2028) states that ‘Labour Force participation rates in County Carlow in 2016 were recorded at 59.7% (26,480), which is below the State average of 61.4%’.

With respect to Economic Development, the development plan sets out the following objective / policy:

- *ED. P1 - Maximise the efficiency of zoned lands by advocating for and facilitating the provision, upgrade or refurbishment of necessary infrastructure to support economic development.*

The 2022 Census data was examined to determine trends in relation to employment including the number of persons at work and unemployment rate. This is summarised in Table 4-16. The unemployment rate is calculated by adding the number of persons unemployed to first time job seekers and then dividing the total by the overall labour force (i.e., total amount of unemployed persons and employed persons).

Table 4-16 - Employment Figures 2022

	State	County Carlow	Ballinacarraig ED	Carlow Rural ED	Graigecullen Rural ED
At work	2,320,297	26,792	509	6,793	2,399
Student	459,275	5,599	93	1,665	519
Looking for First Regular Job	34,526	429	6	156	45
Short term Unemployed	70,217	810	18	226	69
Long term Unemployed	106,059	1,560	17	486	106
Retired	657,790	7,549	156	1,709	390
Unable to work due to permanent sickness or disability	189,308	2,900	42	768	204



Looking after home/family	272,318	3,812	58	942	299
Labour Force (Population aged 15 years and Over)	4,136,852	49,191	902	12,793	4,069
Unemployment Rate (%)	4.26%	5.69%	4.5%	6.78%	5.4%

Please see Section 4.3.3.2 for further baseline relating to development land and businesses.

4.3.4.7 Relocation

See Section 4.3.4.5. for a review of baseline conditions in respect of residential and private property.

4.3.4.8 Deprivation

The Pobal Deprivation Index shows the level of overall affluence and deprivation at the scale of CSO Small Areas based on the number of census indicators. Carlow Rural ED under Small Area no. A017010001 and A017010005 (Figures 4-4 and 4-5) (covering Mortarstown WwTP land) was classified as 'marginally below average' and the area of Kilkenny Pumping Station as 'marginally above average'. The general area is considered 'disadvantaged'.

The Study Area is serviced by a diverse range of services and social infrastructure including health and medical centres, pharmacies, educational facilities, sports facilities and retirement homes. It is also well provided for tourism, with respect of hotels, restaurants, B&Bs and other lodgings in abundance within Carlow Town.

4.3.4.9 Open Space, leisure and play

See Section 4.3.3.3.1. for a review of baseline conditions in respect of community assets, which include any areas of open space, leisure and play.

4.3.4.10 Community identity, culture, resilience and influence

As previously noted, the Proposed Development is within 0.7 km of Carlow Town. This Project is essential to ensure that Carlow town and the surrounding area can continue to grow and that utilities and infrastructure can accommodate this growth.

4.3.4.11 Social participation, interaction and support

Please see Section 4.3.3.3 for a review of baseline conditions in respect of community assets, which will include any community assets and meeting places, for voluntary, social, cultural or spiritual participation as well as sports grounds and community uses.

4.3.4.12 Education and Training

Over a 31-year period from 1991 to 2022, the educational attainment of people aged 15 years and over improved steadily in the State. There was a decrease in the number of people who were educated to primary level only and an increase in the number of those with higher levels of education. The greatest gains were in the number

of people with a third level qualification, rising from 14% of the population aged 15 and over in 1991 to 48% in 2022.²⁹

At a local level, the 2022 Census data in relation to education for Carlow County Council, Carlow Rural ED, Ballinacarraig ED and Graiguecullen Rural ED is summarised in Table 4-17. These figures are in relation to the population aged 15 and over.

²⁹ [Level of Education - CSO - Central Statistics Office](#)



Table 4-17 - Education Figures 2022

	Carlow County Council	Carlow Rural Electoral District	Ballinacarraig Electoral District	Graigucullen Rural Electoral Division
Population who ceased education at age 15	1,631	330	26	93
Highest Level of Education Completed				
No formal education	840	166	6	66
Primary education	3,547	646	54	141
Lower secondary	6,586	1,442	95	442
Upper secondary	7,339	1,820	123	622
Technical or vocational qualification	3,746	980	60	331
Advanced certificate/Completed apprenticeship	2,720	597	50	264
Higher certificate	2,508	604	67	217
Ordinary bachelor degree or national diploma	2,749	755	74	217
Honours bachelor degree, professional qualification or both	4,536	1,251	134	382
Postgraduate diploma or degree	3,177	917	92	245
Doctorate (Ph.D.) or higher	272	95	6	21

As noted in Section 4.3.3.3 there are numerous educational resources available within the Study Area including Carlow Institute of Technology, South East Technological University, Tyndall College Carlow and Carlow National School.

4.3.4.13 Biophysical - Climate change mitigation and adaptation

Effects on climate arising from the Proposed Development will be considered in Chapter 8 (Climate) of the EIAR and has been integrated into the Population and Human health assessment. See Section 8.3 of Chapter 8 for a review of baseline conditions in respect of climate.

4.3.4.14 Air Quality and Odour

Effects on air quality and odour arising from the Proposed Development will be considered in Chapter 7 (Air Quality & Odour) of the EIAR and has been integrated into the Population and Human health assessment. See Section 7.3 of Chapter 7 for a review of baseline conditions in respect of air quality and odour.

4.3.4.15 Water Quality or Availability

Effects on surface water and / or groundwater arising from the Proposed Development are considered in Chapter 12 (Water) of the EIAR and has been integrated into the Population and Human health assessment. Please see Section 12.3 of Chapter 12 for a review of baseline conditions in respect of water.

4.3.4.16 Biophysical - Land Quality

Effects on land quality arising from the Proposed Development are considered in Chapter 11 (Land, Soils & Geology) of the EIAR and has been integrated into the Population and Human health assessment. Section 11.4 of Chapter 11 provides a review of baseline conditions in respect of land quality.

4.3.4.17 Noise and Vibration

Effects on Noise and Vibration arising from the Proposed Development are considered in Chapter 9 (Noise and Vibration) of the EIAR and has been integrated into the Population and Human Health assessment. Section 9.3 of Chapter 9 provides a review of baseline conditions in respect of Noise and Vibration.

4.3.4.18 Biophysical - Major Accidents and Disasters

Major Accidents and Disasters with respect to the Proposed Development have been considered in Chapter 15 (Major Accidents and Disasters). Section 15.3 of Chapter 15 provides a review of baseline conditions.

4.3.5 Wider Groups and Vulnerable Groups

It is well established in Ireland and internationally that the factors that influence health and well-being within the affected population vary by age, gender, ethnicity, disability, income, and social support. The most sensitive or vulnerable members in society often stand to lose the most from both the construction and operational stages, as well as demolition activities, of a project and this can lead to health inequality and health and social equity issues that must be addressed. This also reflects IEMA guidance for assessing health impacts in EIA, which recommends that specific attention should be paid to impacts on vulnerable groups within the community. These groups are noted in the guidance as likely to be more susceptible to the changes to health determinants than other social groups and are typically differentiated by their age, health status and income.

Identification of vulnerable groups was done by examining relevant plans and policies in respect of the Study Area to identify key health and wellbeing issues, but also through examining the baseline data gathered for the Study Area and consideration of the nature and initial proposed construction activities and design of the Proposed Development. As such, wider and/or vulnerable groups identified in the Study Area are given in Table 4-18 - Wider and Vulnerable Groups.

Table 4-18 - Wider and Vulnerable Groups

Wider group or vulnerable group	Location of individuals / groups	Sensitivity to Proposed Development
Wider group – adults / working people (population as a whole).	People working in the Proposed Development and nearby local businesses / farms. Residents living in houses, users of local commercial premises.	Residents of properties in the wider Study Area, employees and business owners of the commercial and industrial businesses interspersed throughout the area, users of the nearby recreational/community facilities, and public transport users are likely to be most exposed to health impacts.

Wider group or vulnerable group	Location of individuals / groups	Sensitivity to Proposed Development
	Users of local road network, travelling to / from employment, education and community facilities.	Table 4-7 and Table 4-8 give an overview of the population in the Study Area and the proportion of which are of working age.
Vulnerable Group - Families with children and adolescents, (pregnant women, babies, children and adolescents)	Residential houses.	Families with children and adolescents are present throughout the Study Area as shown by the population in each Electoral Division (Table 4-7 and Table 4-8).and it is noted that there is a slightly higher proportion of the population in the Study Area aged 0-14 than the County or State as a whole. Children and adolescents constitute a sensitive population group due partly to their need to be able to move around freely to and from school, open space, greenspace and recreational activities, whilst they lack the experience and judgement displayed by adults when moving around in traffic and public spaces ³⁰ and when using public transport and related infrastructure.
Vulnerable Group – People who are physically or mentally disadvantaged (elderly people, people with physical disabilities, people with other health problems or impairments)	Residential houses.	Elderly people are present throughout the Study Area as shown by the population in each Electoral Division. Table 4-8 and Table 4-14 shows that there are also people with a disability within both Electoral Divisions within the Study Area. Elderly people constitute a sensitive group as they are more sensitive than young and middle-aged adults and while there is a lower proportion of elderly people living in the Study Area than in the County or State as a whole, taking a precautionary approach to assessment merits their inclusion in this assessment. Generally, the older people are, the slower their movement and reactions and the poorer their hearing³¹. They can be more at risk from injury and may fear falls, steps or lack of suitable footpaths, lack of safe crossing points and short crossing times at safe crossing points and other aspects of the surrounding built environment³². As such, they are more vulnerable to disruption caused by construction / demolition activities. This can deter them from outdoor activity, especially walking, whereas walking is critical for muscle strength and reduces the risk of falls amongst other benefits.

³⁰ World Health Organisation (2018, December) Adolescents: health risks and solutions. Available at: [Adolescent and young adult health](#)

³¹ Transport for London (2013, April) Older Pedestrians and Road Safety, Research Debrief. ([content.tfl.gov.uk/older-pedestrians-research-report.pdf](#))

³² Asher. L, Aresu. M, Falaschetti. E, Minell. J (2012) Most older pedestrians are unable to cross the road in time: a cross-sectional study ([untitled](#))

Wider group or vulnerable group	Location of individuals / groups	Sensitivity to Proposed Development
		Elderly people can also feel more sensitive when using public transport³³. They also often need to seek health services. Their continuing independence at home is often dependent on having available a range of transport mode and route options. They can be more vulnerable to disruption to travel caused by construction. People who are disabled and/or with physical and/or mental illnesses or impairments constitute a sensitive group as they may not be able to access many forms of transport or need special arrangements and/or support to access these³⁴. They are more likely to find it difficult to walk or travel independently and can also be disadvantaged by the cost of transport, or disruption to transport options. Any changes in access, such as greater travel distances, diversions or replacement services during construction or demolition would have particular impacts on this group. Chronically ill persons, for example, people with impaired lung function, can be more adversely affected by air pollution³⁵. The same is true of hypersensitive individuals such as asthmatics³⁶. Noise can cause hypertension and cardio-vascular problems³⁷. Those who already have these conditions can be more troubled by noise than others. People with existing physical and mental illnesses, including sleep disturbance, anxiety and depression, are likely to be more sensitive to changes to their local environment.

³³ Shrestha.B.P, Millonig.A, Hounsell.N.B, McDonald.M (2017) Review of Public Transport Needs of Older People in European Context ([Review of Public Transport Needs of Older People in European Context - PMC](#))

³⁴ House of Commons Briefing Paper (2018, October) Access to transport for disabled people, Number CBP 601 ([SN00601.pdf](#))

³⁵ DEFRA UK AIR, Air Information Resource, Effects of air pollution ([Effects of air pollution - Defra, UK](#))

³⁶ Asthma, UK ([Air pollution | Asthma + Lung UK](#))

³⁷ Munzel T, Schmidt FP, Steven S, Herzog J, Daiber A, Sorensen M. Environmental Noise and the Cardiovascular System. J Am Coll Cardiol. 2018;71(6):688-97 (Extract from Journal of the American College of Cardiology 2018; ([Environmental Noise and the Cardiovascular System](#)))

Wider vulnerable group	group or	Location of individuals / groups	Sensitivity to Proposed Development
Sensitive People materially disadvantaged	Group who are	- Residential houses.	People who are deprived are present throughout the Study Area as shown by Section 4.3.4.8 and the levels of deprivation. It is recognised that pockets of deprivation can exist within areas (with rural areas often masking deprivation). There are also likely to be individuals who are materially disadvantaged on a personal basis and as such this group are considered in order to ensure a precautionary approach to the assessment. People on low incomes (living in deprived areas is a proxy measure for low income) and people without access to a car constitute a sensitive group as they are likely to walk further because they cannot afford public transport or to own a car, and their lack of transport options may limit life and work opportunities. Those on low incomes may be less able to adapt to changes in access, such as greater travel distance or alternative transport provision. People living in deprived areas tend to suffer the most from road traffic incidents (deaths and injuries), noise and air pollution, as they tend to be characterised by high traffic volume, as well as other environmental burdens such as industrial facilities. This group is generally more likely to already have reduced access to health and social care as well as reduced access to other services and amenities. This group may have increased stress levels due to the factors above. In addition, this group is more sensitive to food insecurity, which has an access dimension.

4.4 Potential Effects of the Proposed Development

This section examines the potential impacts of the Proposed Development on Population and Human Health during construction, operation and decommissioning. Details on specific impacts are provided in different chapters of this EIAR for example, traffic, noise, air quality & odour etc. During construction, operation and decommissioning, it is anticipated that impacts on population and human health could potentially be affected in respect of the following determinants in Table 4-19.

4.4.1 Scoping

Table 4-19 - Scoping Decision with respect to wider determinants of health

Categories	Wider determinant of health	Scoped in / out?	Rationale
Health related behaviours	Physical activity	Out	There are 2no. dedicated active travel routes in the area, however neither will be impacted during the construction phase of the Proposed Development. No other implications for physical activity have been identified.
	Risk taking behaviour	Out	While construction compounds with low security can enable criminal behaviours, it is anticipated that this construction site and operational site will have good levels of security including security fencing and CCTV during construction. Security will be provided on site during operation.
	Diet and nutrition	Out	The Proposed Development will not result in the loss of agricultural lands and therefore diet and nutrition of the wider Study Area will not be implicated by the Proposed Development. No implications for diet or nutrition have been identified.
Social environment	Housing	Out	The Proposed Development does not involve the development of residential properties or enable the development of future housing. The Proposed Development is also outside of housing zones within the Local Development Plan and is outside current settlement limits. While there are a number of housing estates with access from the Kilkenny Road, issues relating to access of housing are considered under the transport modes, access and connections wider health determinant (see below). Issues relating to Noise and Vibration or Air Quality & Odour towards residential properties in proximity to the Proposed Development are addressed in Chapters 9 and 7 respectively of this EIAR.
	Relocation	Out	The Proposed Development is located within the existing Mortarstown WwTP. The cottage within the Site is derelict and owned by UÉ. There is no requirement to relocate any residents or business at any stage of construction, operation or demolition.
	Open space, leisure and play	Out	No direct loss of open space is anticipated other than the site itself. There are a number of community assets such as the South East Technological University sports grounds, Quinagh House Par 3 Golf Course and the Irish Wheelchair Association which could have access disrupted during construction. These impacts are considered under Transport modes, access and connections, Noise and Vibration and air quality wider health determinants (see below).

Categories	Wider determinant of health	Scoped in / out?	Rationale
	Transport modes, access and connections	In	During construction, increased traffic from heavy vehicles (e.g. deliveries and construction plant) is expected but will stay within the capacity of local roads. In operation, only minimal additional traffic is generated – mainly a few maintenance vehicles (e.g. sludge trucks and staff cars), typically outside peak hours. At the end of construction, the removal of redundant facilities (e.g. certain old pump station components) will involve very limited additional traffic (around 1–2 extra truck trips per day) that is essentially absorbed within the broader construction traffic profile. Given the prevalence of residential receptors in the study area this is scoped in.
	Community safety	Out	Construction activities could give rise to activities which could present a danger, or perceived danger, to the local community. This could include ‘stranger danger’ which could be generated by a perceived threat from unknown persons in the local area. Security fencing and lighting will be provided during construction and operation which may improve local residents perception of safety surrounding the Proposed Development. Operation of the Proposed Development could also pose a perceived risk to the local community regarding the links between increased storage of wastewater, chances of overflows and recreational use of the River Barrow. However, the Proposed Development will increase the current capacity of Mortarstown WwTP, which will prevent chances of overflows. The Proposed Development will be designed and operated to the highest safety standards and will pose no risk to locals when operational. It may also have benefits by helping to provide for a more robust WwTP for the community.
	Community identity, culture, resilience and influence	Out	No communities would be displaced to construct or accommodate the Proposed Development and impacts/ effects on local communities, including from the influx of a construction, operation or demolition workforce is not expected to be significant. Refer to section above titled Transportation modes for information regarding road closures which could temporarily impacts access to community facilities along the Kilkenny Road.
	Social participation, interaction and support	Out	No impacts on Social participation, interaction and support are anticipated as a result of construction operation or decommissioning of the scheme.

Categories	Wider determinant of health	Scoped in / out?	Rationale
			Impacts relating to access to infrastructure along the Kilkenny Road will be temporary during the construction phase. Refer to section above titled Transportation modes for information regarding road closures which could temporarily impacts access to social participation along the Kilkenny Road.
Economic environment	Education and training	Out	The Development will not directly impact on Education and training however it is recognised that disruption on the local road network means there is a potential for access issues for local residents to education and training facilities including schools such as South East Technological University. It is considered that is then most appropriately addressed under the Transport modes, access and connections wider determinant of health.
	Employment and income	In	The Proposed Development may provide opportunity for employment, particularly during construction. In respect of tourism, it is noted that given localized nature of the works, no implications for tourism have been identified. The River Barrow is also a popular fishing location located west of the Proposed Development, however with the implementation of mitigation as per Chapter 12 – Water of this EIAR, no impacts on surface water are expected to occur during the construction phase of the Proposed Development – therefore fishing opportunities will remain unchanged.
Bio-physical environment	Climate mitigation and adaptation	In	There is a potential impact on climate change mitigation and adaptation from the Proposed Development. This will be addressed in Chapter 8 Climate of the EIAR.
	Air Quality and Odour	In	There is a potential impact on air quality from the Proposed Development during construction, operation and decommissioning. The construction works will likely generate particulates and dust, which will lower air quality within the area of works. The reduced air quality could affect those with respiratory conditions, in particular. There is also potential for impacts to the baseline odour of the surrounding area as a result of the Proposed Development during operation. A full Odour Impact Assessment was completed and is included within Chapter 7 – Air Quality and Odour, of this EIAR. It concluded that <i>‘There will be a net overall improvement in odour air quality in the vicinity of the facility as a result of the development and the</i>

Categories	Wider determinant of health	Scoped in / out?	Rationale
			<i>impact associated with the Proposed Development is considered Positive and Imperceptible.</i> There is asbestos on the site (Chapter 2 of this EIAR). This will be addressed in Chapter 7 – Air Quality and Odour of the EIAR. Mitigation as per Chapter 7 – Air Quality and Odour of the EIAR will be implemented in order to prevent implications on the air quality and odour.
	Surface water and Groundwater quality or availability	In	There is a potential impact on the surface water and groundwater environment from the Proposed Development during construction, operation and decommissioning. Some groundwater seepages will likely occur in excavations, and this will create additional volumes of water to be treated by the water management system. Based on the site data a shallow groundwater table is present at the Proposed Development Site, hosted within the glacial outwash sand and gravels of the Athy-Bagenalstown Gravels GWB. Inflows into these excavations will require management and treatment to reduce suspended sediments In-stream works relating to the construction of the new outfall will have the potential to result in elevated concentrations of suspended solids in the River Barrow which will have a negative effect on surface water quality and associated water dependent ecosystems. The effects would be temporary due to the short-duration of these works. Potential release of contaminated run-off during the construction phase may also impact surface water quality. Reduced quality of water sources may negatively affect the health of biodiversity and humans. This will be addressed in Chapter 12 - Water of the EIAR.
	Land quality	In	The existing site area of the WwTP is ca. 3.79 hectares. An additional ca. 1.74 hectares of agricultural land will be incorporated into the development to facilitate the expanded WwTP and pumping station. The microtunnel will be constructed within the footprint of the existing R448 and there will be no additional land take. As the land use within the

Categories	Wider determinant of health	Scoped in / out?	Rationale
			Proposed Development will change, land quality will also be impacted. This will be addressed in Chapter 11 – Land, Soil and Geology of the EIAR.
	Noise and Vibration	In	Noise effects are a direct health determinant (e.g., annoyance, sleep disturbance). There is a potential impact from Noise and Vibration due to the construction of the Proposed Development, including the ground excavations and construction vehicles. With respect to the operational phase, an assessment completed as part of Chapter 9 – Noise and Vibration of this EIAR concluded that <i>‘it is considered that the noise effects of the Proposed Development at nearby NSLs is negative, imperceptible to not significant and long-term.’</i> This will be addressed in Chapter 9 – Noise and Vibration of the EIAR.
	Radiation	Out	The Proposed Development is within an area classified as <i>‘about 1 in 10 homes in this area is likely to have high radon levels’</i> . The Proposed Development will not give rise to increased radon levels in the area and is scoped out.
Institutional and built environment	Health and social care services	Out	There will be no direct impact on local health and social care facilities. Disruption on the local road network means there is a potential for temporary access issues for local residents to such facilities in the wider area. This could include increased journey times that may present anxiety and potential for missed appointments. Increased journey times, route closure etc. could impact emergency service response times. Such issues are considered under Transport modes, access and connections.
	Wider infrastructure and resources	In	The Proposed Development is a critical piece of infrastructure and as such will have beneficial effects on wider society and resources.

For wider determinants of health which have been screened in, a sensitivity has been identified for each of the wider and vulnerable groups identified in Table 4-18. The sensitivity of a community / population shall be reported as:

- Very low
- Low
- Medium
- High (see IEMA Guidance).



The sensitivity of a population sub-group encompasses their ability to withstand exposures and the range of associated impacts or effects, and the physiological (e.g. co-morbidities or disabilities) and socio-economic factors that increase their susceptibility to the exposure.

Table 4-20 notes the wider and vulnerable groups sensitivity to health determinants (see Table 4-18) for further rationale behind the determination of sensitivity in respect of this Proposed Development).

Table 4-20 - Health receptor sensitivity to health determinants screened in during the scoping process

Community / Population within Study Area	Determinant and sensitivity	Rationale
Wider group – adults / working people	Transport modes, access and connections - Medium Employment and income - Medium Climate change mitigation and adaptation - Medium Air quality - Medium Water quality or availability - Medium Land quality - Medium Noise and Vibration - Medium Wider societal infrastructure and resources – Medium	The sensitivity for adults / working people and the population as a whole in relation to all determinants is considered to be Medium. Note that, as per IEMA guidance, while the Study Area is relatively less deprived, with a generally healthier population as a whole, this determination of medium sensitivity is based on there being likely moderate pockets of deprivation, concerns in the community / uncertain outlook and the likely presence of people with a poor health status and / or people with a limited capacity to adapt. A general sensitivity of medium is considered precautionary for this area. Where sensitivity for vulnerable groups deviates from this, the rationale is set out below.
Vulnerable Group – Families with children and adolescents, (pregnant women, babies, children and adolescents)	Transport modes, access and connections - Medium Employment and income - Low Climate change mitigation and adaptation - Medium Air quality - High Water quality or availability - High Land quality - Medium Noise and Vibration - High Wider societal infrastructure and resources – Medium	Families with children and adolescents are considered to have a low sensitivity to employment and income as this will not be a consideration for the majority of people in this group due to their age. This group are considered to have a high sensitivity to community safety as they lack the experience and judgement displayed by adults when moving around in traffic and public spaces as set out in Table 4-18. Children and adolescents are considered to have a high sensitivity to air quality as they are particularly vulnerable to air pollution because their bodies, organs and immune systems are still developing ³⁸ and high sensitivity to Noise and Vibration as there is growing evidence to suggest that children that are exposed to transport noise at school or at home

³⁸ [Air pollution and children's health — European Environment Agency](#)

Community Population within Study Area	Determinant and sensitivity	Rationale
		are more likely to suffer certain types of cognitive, learning, behavioural problems and obesity ³⁹ .
Vulnerable Group – People who are physically or mentally disadvantaged (elderly people, people with physical disabilities, people with other health problems or impairments)	Transport modes, access and connections - High Employment and income - Medium Climate change mitigation and adaptation – Medium Air quality - High Water quality or availability - Medium Land quality - Medium Noise and Vibration - High Wider societal infrastructure and resources – Medium	High sensitivity is considered in relation to transport modes, access and connections as their continuing independence at home is often dependent on having available a range of transport mode and route options and any changes in access, such as greater travel distances, diversions or replacement services during construction would have particular impacts on this group. People who are physically or mentally disadvantaged are also considered to have a high sensitivity in relation to community safety as they can be more at risk including from injury and may fear falls, steps or lack of suitable footpaths, lack of safe crossing points and short crossing times at safe crossing points and other aspects of the surrounding built environment. This group are considered to have a high sensitivity to air quality and Noise and Vibration as they be adversely affected by air pollution and may be more troubled by noise than others (Table 4-18)
Vulnerable Group – People who are materially disadvantaged	Transport modes, access and connections - High Employment and income - High Climate change mitigation and adaptation - Medium Air quality - Medium Water quality or availability - Medium Land quality - Medium Noise and Vibration - Medium Wider societal infrastructure and resources – Medium	High sensitivity is also anticipated in relation to employment and income as these aspects are important for gaining employment and generating income.

³⁹ [The effect of environmental noise on children's reading ability and behaviour in Europe | European Environment Agency's home page](#)

4.4.2 Construction Phase Effects Assessment (including demolition)

On any major infrastructure project there is a potential relationship between construction related exposures (such as traffic, noise, dust, exposure to contaminants, pollutants, increased risk of injury or death, increased demand for local services and housing accommodation etc.) and health outcomes. Furthermore, any change to the baseline position can potentially result in the widening of inequalities and impact on health priorities.

The population and human health assessment is by nature an in-combination assessment of the potential effects on population and human health (both beneficial and adverse) arising from the environmental effects of the Proposed Development. The construction phase impact assessment (which includes demolition) for the Proposed Development is set out in Table 4-21 below.

In addition to the mitigation measures in Table 4-21, the mitigation measures set out in other technical chapters of the EIAR which are linked to population and human health also apply, where relevant. The Chapters are as follows:

- Chapter 7: Air Quality and Odour Section 7.5
- Chapter 8: Climate, Section 8.6
- Chapter 9: Noise and Vibration, Section 9.7
- Chapter 10: Traffic, Section 10.13
- Chapter 11: Land, Geology and Soils, Section 11.8
- Chapter 12: Water, Section 12.8
- Chapter 15: Major Accidents and Disasters, Section 15.8

4.4.2.1 Air Quality and Odour

There is potential impact on air quality during the construction phase of the Proposed Development from excavation, demolition and construction dust emissions and the potential for nuisance dust.

To ensure that no dust nuisance occurs during the various activities, a range of dust mitigation will be implemented to ensure that dust risk is considered Low risk. When the dust mitigation measures detailed in the mitigation section of this Chapter 7 – Air Quality and Odour are implemented, fugitive emissions of dust from the site will be **insignificant** and pose no nuisance at nearby receptors.

Best practice mitigation measures are proposed for the construction phase of the Proposed Development, which will focus on the proactive control of dust and other air pollutants, to minimise generation of emissions at source. The mitigation measures that will be put in place during construction will ensure that the impact complies with all EU ambient air quality legislative limit values (set out in SI 730/2022 Ambient Air Quality Regulations 2022), which are based on the protection of human health. The residual effects of construction and operation of the Proposed Development is likely to be **temporary** and **imperceptible** with respect to human health. Full details are included in the Air Quality and Odour Chapter of this EIAR (Chapter 7).

Potential impacts on air quality during demolition/decommissioning are limited to short-term, localised emissions of dust and vehicle exhausts. These may arise from the dismantling of infrastructure and the removal of equipment. Dust suppression measures, such as water spraying, covering of stockpiles, and proper maintenance of machinery, will be implemented. An Asbestos Survey of the Kilkenny pumpstation (scheduled to be decommissioned) will be undertaken prior to commencement of the proposed decommissioning works. An asbestos survey of all existing infrastructure on site has been carried out and will be considered throughout the demolition works, with appropriate mitigation measures being taken as per Chapter 7 – Air Quality and

Odour of this EIAR to remove asbestos relating risks should asbestos containing materials not be removed prior to demolition phase.

Asbestos-containing materials will have been removed prior to this phase, eliminating any associated risk. Given the limited scale and duration of activities, the residual effects on air quality are considered not significant or adverse.

4.4.2.2 Climate change mitigation and adaptation

Whilst a detailed Climate Change Risk Assessment (CCRA) of the construction phase has been scoped out, consideration has been given to the Proposed Development's vulnerability to the following climate change hazards with best practice mitigation measures proposed:

- Flood Risk due to increased precipitation, and intense periods of rainfall. This includes fluvial and pluvial flooding;
- Increased temperatures potentially causing drought, wildfires and prolonged periods of hot weather;
- Reduced temperatures resulting in ice or snow; and
- Major Storm Damage including wind damage.

With design mitigation in place, the significance of effect of the impacts to the Proposed Development as a result of climate change are direct, long-term, negative and imperceptible, which is overall not significant in EIA terms.

The Proposed Development will result in some impacts to climate through the release of GHGs. The Proposed Development has proposed some best practice mitigation measures and is committing to reducing climate impacts where feasible. As per the TII and ISEP assessment criteria the residual effect of the Proposed Development in relation to GHG emissions is considered **direct, long-term, negative** and **slight**, which is overall **not significant** in EIA terms. Full details are included in the Climate Chapter of this EIAR (Chapter 8).

The demolition/decommissioning phase will result in a temporary, slight increase in greenhouse gas (GHG) emissions due to the use of machinery and haulage vehicles. These emissions are considered minor and short-term. Mitigation measures include the reuse and recycling of materials where feasible, and the use of fuel-efficient plant and equipment. No new vulnerabilities to climate-related hazards are introduced during this phase. Standard weather contingency measures, as outlined in Chapter 8 – Climate of this EIAR, will remain in place. The residual effect on climate is considered not significant or adverse.

4.4.2.3 Traffic and Transportation

Whilst an increase in traffic including heavy machinery, altered traffic movements and potential restrictions during the construction phase is likely, this is not expected to notably or permanently increase traffic in the area. The duration is expected to be temporary only occurring for the duration of the construction and therefore non-significant. Local route closures may temporarily impact user of the local road network which may slightly decrease their health and well-being during construction phase of the Proposed Development.

The additional construction traffic is not expected to result in any significant impact on the surrounding road network. In line with Table 3.4 of the EPA Guidelines (2022), this level of impact is classified as “**not significant**”, meaning “**an effect that causes noticeable changes in the character of the environment but without significant consequences**”.



The traffic-related residual effects during the construction phase, following the implementation of mitigation measures, are anticipated to **be imperceptible**. Refer to Chapter 10 – Traffic and transportation for additional details. Therefore, effects on health and wellbeing for those in the area are not likely anticipated.

Demolition/ decommissioning works will involve the generation of ca. 1,936m³ of demolition material, as well as the removal of redundant materials from site as a result of the decommissioning of Kilkenny Road PS. The resulting effect is considered imperceptible on the surrounding road network. Therefore there will be no impact on population and human health during the demolition/decommissioning phases as a result of traffic and transport from the Proposed Development.

With the implementation of mitigation measures as per Chapter 10 – Traffic and Transportation, no negative effects are anticipated.

4.4.2.4 Water Quality or Availability

The Proposed Development **will not result in any significant adverse impacts** to the existing hydrological regime of the area. The development will not result in any flood risk to the Proposed Development itself or surrounding lands. The Development is therefore considered to be appropriate from a flood risk perspective and not have any likely significant effects.

The primary risk to groundwater during construction would be from cementitious materials, hydrocarbon/chemical spillage and leakages. These are common potential impacts which occur at all construction sites (such as road works and industrial sites). All potential contamination sources are to be carefully managed during the construction and operational phases of the Proposed Development and mitigation measures are proposed to deal with these potential minor impacts. There is likely to be requirements to manage groundwater during the construction phase in terms of excavation dewatering. However any dewatering will only be localised and temporary and the effects will not be significant.

The proposed upgraded WwTP plant will discharge treated effluent to the River Barrow. The upgraded plant has been designed to meet both the discharge quality standards set out in Urban Wastewater Treatment Regulations (UWWTR), and to a standard which will allow the River Barrow to meet at least “Good” status as required by the WFD and the Surface Water Regulations. By adhering to the calculated emission limit values, it can be ensured that the quality of the effluent being discharged is compatible with the long-term WFD objectives of the receiving waterbody. Given the high level of treatment to be provided by the proposed upgraded WwTP, there will be no significant negative effects associated with the proposed discharge. Recreational users of the River Barrow will not be impacted by the Proposed Development so long as mitigation is adhered to.

Following the implementation of the proposed mitigation measures during both the construction and operational phases, **the residual effects on the water environment are expected to be slight, temporary, and not significant**. As such, no significant negative population or human health effects are anticipated. Full details are included in the Water Chapter of this EIAR (Chapter 12).

There is potential for water quality effects during the demolition/decommissioning phases due to increased levels of dust and sediment. Pollution prevention measures, including bunding, silt fencing, and controlled waste disposal, will remain in place. No measurable impact on surface or groundwater quality or availability is anticipated. The residual effect is considered not significant or adverse.

With the implementation of mitigation measures as per Chapter 12 – Water, no negative effects are anticipated.



4.4.2.5 Noise and Vibration

During the construction phase of the Proposed Development there will be some impact on nearby noise sensitive properties due to noise emissions from site traffic and other activities. The application of noise limits (i.e. as per Chapter 9 – Noise and Vibration), along with implementation of appropriate noise and vibration control measures (as summarised in Chapter 9 – Noise and Vibration), will ensure that noise and vibration impact is kept to a minimum. Any construction noise effects will be slight to significant (dependant on location), negative and short-term in nature. No significant negative effects on population and human health are anticipated as a result of the Proposed Development. Full details are included in the Noise and Vibration Chapter of this EIAR (Chapter 9).

Noise emissions during demolition/decommissioning will be limited to short-term, and only last the duration of the demolition phase. No significant vibration-generating activities are anticipated. Noise will be managed through restrictions on working hours, use of low-noise equipment, and advance notification to nearby receptors. Given the limited scope and duration of these activities, the residual Noise and Vibration effects are considered not significant or adverse.

With the implementation of mitigation measures as per Chapter 9 – Noise and Vibration, no negative effects are anticipated.

4.4.2.6 Land Quality

During the Construction Phase of the Proposed Development, ca. 1.74 hectares of agricultural land will be incorporated into the development to facilitate the expanded WwTP and pumping station which will result in a change of land use. Effects relating to population and human health include:

- Stripping of topsoil will result in exposure of the underlying subsoil layers to the effects of weather and construction traffic. This may result in subsoil erosion and generation of sediment laden runoff
- Dust generation can also occur during extended dry weather periods as a result of construction traffic; and,
- Soils and bedrock may be at risk of becoming contaminated through site construction activity; in particular the risk of fuel spillages and leakage.
- Given the current site use as a WwTP there is a moderate potential for contaminated soil to be encountered onsite. Hydrocarbon levels marginally in excess of the inert waste criteria has been encountered in TP13 and RC03. Soil samples from the slit trench in close proximity to the petrol station along the line of the micro tunnel indicated Dissolved Organic Carbon (DOC) marginally above the inert waste criteria. Any soils requiring removal from these areas will be removed offsite to a non-hazardous landfill.

The development is likely to have a negative, slight, permanent effect on soils and bedrock during the construction phase. With the implementation of best practice mitigation measures as per Chapter 11 – Land, Soils and Geology, no significant population or human health effects are anticipated. Full details are included in the Land Soils and Geology Chapter of this EIAR (Chapter 11).

Demolition/ decommissioning works will involve minimal ground disturbance. Any contaminated soils encountered will be excavated and disposed of in accordance with the project's waste management protocols. Following the removal of redundant infrastructure, the site will be reinstated using clean fill and topsoil, with appropriate landscaping. No long-term degradation of soil quality or land use is expected. The residual effect on land and soil is considered not significant or adverse.

With the implementation of mitigation measures as per Chapter 12 – Water, no negative effects are anticipated.

4.4.2.7 Major Accidents and Disasters

The following scenarios were identified that could impact the construction phase of the project:

- Extreme heat or cold weather resulting in structural damage and/or pollution to soils, groundwater or surface waters
- Storm events (including lightning) resulting in structural damage and/or pollution to groundwater and surface waters
- Flooding
- Flash fire, Explosion or Jet fire following compressed gas cylinder release (e.g. acetylene for welding)
- Release of Concrete paste to surrounding environment
- Release of silt laden waters, muds, drilling spoils, hydrocarbons from the drilling equipment, stripped soil, and drilled cuttings

There are no likely effects on the project to off-site receptors during the construction phase in relation to major accidents and disasters. Full details are included in the Major Accidents and Disasters Chapter of this EIAR (Chapter 15).

The demolition/decommissioning phases introduces potential for major accidents and disasters. However, all demolition activities will be carried out under the mitigation measure as per Chapter 15 – Major Accidents and Disasters of the EIAR, with adherence to safety protocols and emergency response procedures. The residual effects with respect to major accidents or disasters is considered not significant.

Table 4-21 - Construction Effects and mitigation measures

Baseline						
Receptor	Sensitivity	Effects	Mitigation	Magnitude	Residual effect	Significance
Transport modes, access and connections						
Residents (adjacent to Proposed Development and Micro tunnel Gravity Sewer)	Medium (Wider group and Families with children and adolescents)	Additional construction traffic is not expected to result in any significant operational impact on the surrounding road network. In line with Table 3.4 of the EPA Guidelines (2022), this level of impact is classified as “ not significant ”, It is estimated that there will be two abnormal loads over the entire construction period. Whilst an increase in traffic including heavy machinery, altered traffic movements and potential restrictions during the construction phases (including large volumes of materials being moved on/off-site) is likely, this is expected to be not expected to be notably or permanently increase traffic in the area. Road closures along Kilkenny Road will be limited to 100m stretches. One side of the road will remain open via ‘Stop/Go’ system with a minimum 3m	Car Parking - Parking will not be permitted along the side of any road. Proposed parking arrangements will utilise the existing WwTP site Access & Egress - The existing access will be maintained. No changes are proposed for either the construction or operational phases	Medium	Moderate Adverse <i>Temporary, direct, reversible and limited to the construction phase</i>	Moderate (Significant)
	High (People who are physically or mentally disadvantaged and People who are materially disadvantaged)		Traffic Management - Signage: All signage will comply with the Traffic Signs Manual – Chapter 8 and be agreed with Carlow County Council. Construction Route: Materials will be delivered directly to each site. HGV traffic will use National and Regional Roads. Deliveries via Kilkenny Road / Green Road junction. Material Delivery Timing: Deliveries restricted to 09:00–16:00 to minimise community impact. Speed Limits: Compliance with posted/legal speed limits will be emphasised to all staff, suppliers, and contractors. Micro Tunnel Gravity Sewer: Road closures along Kilkenny Road limited	Medium	Moderate Adverse <i>Temporary, direct, reversible and limited to the construction phase</i>	Not Significant

carriageway. The duration is expected to be temporary only occurring for the duration of the construction/decommissioning and therefore traffic related impact was considered 'slight'. Refer to Chapter 10 - Traffic and Transport of this EIAR.

to 100m stretches. One side of the road will remain open via 'Stop/Go' system with a minimum 3m carriageway. No road closure for outfall pipe crossing under the Kilkenny Road

Road Cleaning - Regular cleaning of the road network near the site will be required.

Enforcement - Inspections and spot checks will ensure compliance with the CTMP by all project staff and suppliers.

Emergency Procedures - Emergency services will be contacted immediately via 112. Full incident details will be provided

Residents (within study and wider area)	Medium (Wider group and Families with children and adolescents)	Introduction of construction traffic, increased traffic levels in surrounding areas, altered traffic movements (including large volumes of materials being moved), user conflict, restrictions, diversions and/or closures.	Car Parking - Parking will not be permitted along the side of any road. Proposed parking arrangements will utilise the existing WwTP site Access & Egress - The existing access will be maintained. No changes are proposed for either the construction or operational phases	Low	Minor Adverse	Not Significant
	High (People who are physically or mentally disadvantaged and People who are	Injuries or loss of life from construction traffic, increased traffic levels and an unawareness of altered traffic movements, particularly for sensitive road users (e.g. motorcyclists, elderly drivers,	Traffic Management - Signage: All signage will comply with the Traffic Signs Manual – Chapter 8 and be agreed with Carlow County Council. Construction Route: Materials will be delivered directly to each site. HGV	Low	Minor Adverse	Not Significant

materially disadvantaged) children, pedestrians, new drivers and cyclists). traffic will use National and Regional Roads. Deliveries via Kilkenny Road / Green Road junction.

Material Delivery Timing: Deliveries restricted to 09:00–16:00 to minimise community impact.

Speed Limits: Compliance with posted/legal speed limits will be emphasised to all staff, suppliers, and contractors.

Micro Tunnel Gravity Sewer: Road closures along Kilkenny Road limited to 100m stretches. One side of the road will remain open via ‘Stop/Go’ system with a minimum 3m carriageway. No road closure for outfall pipe crossing under the Kilkenny Road

Road Cleaning - Regular cleaning of the road network near the site will be required.

Enforcement - Inspections and spot checks will ensure compliance with the CTMP by all project staff and suppliers.

Emergency Procedures -Emergency services will be contacted immediately via 112. Full incident details will be provided.



Business owners and employees (including farm businesses and associated workforce)	Medium (Wider group and Families with children and adolescents)	A section along Kilkenny Road which is subject to closure during the construction phase micro tunnel gravity sewer, is used to access the Irish Wheelchair Association and the GreatGas – Munnelys Service Station. This may result in disturbance to access and trading conditions as a result of the route closure and traffic management during construction. Similar effects are anticipated for farm businesses located along this section of road or which use the road to access their lan	Car Parking - Parking will not be permitted along the side of any road. Proposed parking arrangements will utilise the existing WwTP site Access & Egress - The existing access will be maintained. No changes are proposed for either the construction or operational phases Traffic Management - Signage: All signage will comply with the Traffic Signs Manual – Chapter 8 and be agreed with Carlow County Council. Construction Route: Materials will be delivered directly to each site. HGV traffic will use National and Regional Roads. Deliveries via Kilkenny Road / Green Road junction. Material Delivery Timing: Deliveries restricted to 09:00–16:00 to minimise community impact. Speed Limits: Compliance with posted/legal speed limits will be emphasised to all staff, suppliers, and contractors. Micro Tunnel Gravity Sewer: Road closures along Kilkenny Road limited to 100m stretches. One side of the road will remain open via ‘Stop/Go’ system with a minimum 3m carriageway. No road closure for	Medium	Moderate Adverse	Moderate
	High (People who are physically or mentally disadvantaged and People who are materially disadvantaged)			Medium	Moderate Adverse	Moderate



				outfall pipe crossing under the Kilkenny Road			
				Road Cleaning - Regular cleaning of the road network near the site will be required.			
				Enforcement - Inspections and spot checks will ensure compliance with the CTMP by all project staff and suppliers.			
				Emergency Procedures - Emergency services will be contacted immediately via 112. Full incident details will be provided.			
Users of community assets (including schools)	Medium	(Wider group and Families with children and adolescents)	A section along Kilkenny Road which is subject to closure during the construction phase micro tunnel gravity sewer, is used to access the Irish Wheelchair Association, Tyndall College Carlow and Carlow Institute. Also in the local area and may be accessed by the affected routes are SETU Carlow Sports Complex. Community assets, including schools and churches, in the wider area may also be affected by disruption to the local road network. There may be a negative health and wellbeing outcome from disruptions,	Car Parking - Parking will not be permitted along the side of any road. Proposed parking arrangements will utilise the existing WwTP site	Medium	Moderate Adverse	Moderate
	High			Access & Egress - The existing access will be maintained. No changes are proposed for either the construction or operational phases	Medium	Moderate Adverse	Significant
	(People who are physically or mentally disadvantaged and People who are materially disadvantaged)			Traffic Management - Signage: All signage will comply with the Traffic Signs Manual – Chapter 8 and be agreed with Carlow County Council.			
				Construction Route: Materials will be delivered directly to each site. HGV traffic will use National and Regional Roads. Deliveries via Kilkenny Road / Green Road junction.			
						<i>Temporary, direct, reversible and limited to the construction phase</i>	
						<i>Temporary, direct, reversible and limited to the construction phase</i>	

amenity impacts and changes in access to these areas of public open space and community facilities.

Material Delivery Timing: Deliveries restricted to 09:00–16:00 to minimise community impact.

Speed Limits: Compliance with posted/legal speed limits will be emphasised to all staff, suppliers, and contractors.

Micro Tunnel Gravity Sewer: Road closures along Kilkenny Road limited to 100m stretches. One side of the road will remain open via 'Stop/Go' system with a minimum 3m carriageway. No road closure for outfall pipe crossing under the Kilkenny Road

Road Cleaning - Regular cleaning of the road network near the site will be required.

Enforcement - Inspections and spot checks will ensure compliance with the CTMP by all project staff and suppliers.

Emergency Procedures - Emergency services will be contacted immediately via 112. Full incident details will be provided.

Walkers, cyclists and horse riders	Medium (Wider group and Families with children)	There are 2no. cycle / pedestrian walking routes located along the River Barrow which travel along the	Car Parking - Parking will not be permitted along the side of any road. Proposed parking arrangements will utilise the existing WwTP site	Medium	Minor Adverse	Not Significant
					Temporary, direct, reversible and limited	



and adolescents)	Kilkenny road and which may be impacted during the construction phase. There may be a negative health and wellbeing outcome from temporary severance, disruptions to access, pedestrian and cyclist delays and increases in journey length as well as temporary loss of amenity as a result of temporary loss/closure of routes.	Access & Egress - The existing access will be maintained. No changes are proposed for either the construction or operational phases Traffic Management - Signage: All signage will comply with the Traffic Signs Manual – Chapter 8 and be agreed with Carlow County Council. Construction Route: Materials will be delivered directly to each site. HGV traffic will use National and Regional Roads. Deliveries via Kilkenny Road / Green Road junction. Material Delivery Timing: Deliveries restricted to 09:00–16:00 to minimise community impact. Speed Limits: Compliance with posted/legal speed limits will be emphasised to all staff, suppliers, and contractors. Micro Tunnel Gravity Sewer: Road closures along Kilkenny Road limited to 100m stretches. One side of the road will remain open via ‘Stop/Go’ system with a minimum 3m carriageway. No road closure for outfall pipe crossing under the Kilkenny Road Road Cleaning - Regular cleaning of the road network near the site will be required.	to the construction phase	
High (People who are physically or mentally disadvantaged and People who are materially disadvantaged)		Medium	Minor Adverse Temporary, direct, reversible and limited to the construction phase	Not Significant

Enforcement - Inspections and spot checks will ensure compliance with the CTMP by all project staff and suppliers.

Emergency Procedures - Emergency services will be contacted immediately via 112. Full incident details will be provided.

Employment and income

Business owners and employees	Low (Families with children and adolescents)	The Proposed Development may provide opportunity for employment, particularly during construction. Demolition/decommissioning works have potential to impact on local businesses surrounding the Proposed Development, in particular those located on the Kilkenny Road. However due to the minimal nature of demolition/decommissioning works, it is unlikely this phase will result in effects to the local study area. With the implementation of mitigation measures as per Chapter 10 – Traffic and transportation, no negative effects are anticipated	None identified	Low	Minor Beneficial <i>Temporary, direct, reversible and limited to the construction phase</i>	Not Significant
	Medium (Wider group and People who are physically or mentally disadvantaged)			Low	Minor Adverse <i>Temporary, direct, reversible and limited to the construction phase</i>	Not Significant
	High (People who are materially disadvantaged)			Low	Minor Beneficial <i>Temporary, direct, reversible and limited to the construction phase</i>	Not Significant
Low			None identified	Low	Minor Beneficial	Not Significant



Local Communities	(Families with children and adolescents)	Health and wellbeing outcomes from economic benefits of construction stimulating the local economy and local job market (including the multiplier effect) throughout the development of the Proposed Development.			Temporary, direct, reversible and limited to the construction phase		
	Medium (Wider group and People who are physically or mentally disadvantaged)		Low	Minor Beneficial	Not Significant	Temporary, direct, reversible and limited to the construction phase	
	High (People who are materially disadvantaged)		Low	Minor Beneficial	Not Significant	Temporary, direct, reversible and limited to the construction phase	
Wider societal infrastructure and resources							
Residents and users of services in the wider area	Medium (All groups)	Disruption (traffic) related effects to infrastructure and resources in the wider area including the Irish Wheelchair Association located on the Kilkenny Road may occur during this phase, however with the implementation of mitigation measures as per Chapter 10 – Traffic and transportation, it is not anticipated there will be effects.	The CTMP will implement appropriate traffic management and will focus on maintaining free traffic flow along the local road networks. Car Parking - Parking will not be permitted along the side of any road. Proposed parking arrangements will utilise the existing WwTP site Access & Egress - The existing access will be maintained. No changes are proposed for either the construction or operational phases	Low	Minor Adverse	Not Significant	Temporary, direct, reversible and limited to the construction phase



Traffic Management - Signage: All signage will comply with the Traffic Signs Manual – Chapter 8 and be agreed with Carlow County Council.

Construction Route: Materials will be delivered directly to each site. HGV traffic will use National and Regional Roads. Deliveries via Kilkenny Road / Green Road junction.

Material Delivery Timing: Deliveries restricted to 09:00–16:00 to minimise community impact.

Speed Limits: Compliance with posted/legal speed limits will be emphasised to all staff, suppliers, and contractors.

Micro Tunnel Gravity Sewer: Road closures along Kilkenny Road limited to 100m stretches. One side of the road will remain open via ‘Stop/Go’ system with a minimum 3m carriageway. No road closure for outfall pipe crossing under the Kilkenny Road

Road Cleaning - Regular cleaning of the road network near the site will be required.

Enforcement - Inspections and spot checks will ensure compliance with the CTMP by all project staff and suppliers.



Emergency Procedures -
Emergency services will be contacted immediately via 112. Full incident details will be provided.



4.4.3 Operational Phase

In addition to the mitigation measures in Table 4-22, the mitigation measures set out in other technical chapters of the EIAR which are linked to population and human health also apply, where relevant. The Chapters are as follows:

- Chapter 7: Air Quality and Odour Section 7.5
- Chapter 8: Climate, Section 8.6
- Chapter 9: Noise and Vibration, Section 9.7
- Chapter 10: Traffic, Section 10.13
- Chapter 11: Land, Geology and Soils, Section 11.8
- Chapter 12: Water, Section 12.8
- Chapter 15: Major Accidents and Disasters, Section 15.8

The operational phase impact assessment is set out in Table 4-22.

In addition to the mitigation measures set out in Table 4-22, the mitigation measures set out in the other technical chapters of the EIAR which are linked to population and human health also apply, where relevant, to each section of the assessment. Relevant Sections are noted as follows:

The WwTP will be operated within a highly regulated regime to the highest standards and subject to relevant legislative and other regulatory regimes during its operation. As such, any potential effects associated with the day to day operations of the plant are not considered within the Population and Human Health Assessment as these will be managed under the appropriate regulatory framework of consents and licensing.

4.4.3.1 Air Quality

During the Operational Phase, with regards to human health effects all parameters remain well within the Air Quality Limit values for the protection of human health and thus effects can be considered **Negligible** to both the environment and human health.

An Odour air quality Impact Assessment was completed as part of the air quality assessment considered in Chapter 7 – Air Quality and Odour of this EIAR. This concluded that with regards to the Proposed WwTP design, the maximum predicted ground level concentrations (GLCs) of Odour is well below the guideline odour air quality limit values' (refer to Table 7.1, Chapter 7 – Air Quality and Odour).

All receptors in the vicinity of the proposed facility will perceive an odour concentration less than or equal to 2.30 OuE/m³ for the 98th percentile of hourly averages for the worst case met year Oak Park 2020. The WwTP upgrade includes enhanced odour control measures (covers, biofilters) to reduce fugitive odours.

Residual odour effects on local amenity/quality of life are thus assessed as negligible. There will be a net overall improvement in odour air quality in the vicinity of the facility as a result of the development and the impact associated with the Proposed Development is considered **Positive**.

Full details are included in the Air Quality of this EIAR (Chapter 7).

4.4.3.2 Traffic and Transportation

During the operational phase, the majority of vehicle trips will be associated with screening, grit removal, dewatered sludge removal, and activities related to dry recycling and the administrative building. Overall, operational phase trips are expected to have an “**Imperceptible**” means an effect capable of measurement but

without significant consequences on the surrounding road network. Therefore, effects on health and wellbeing for those in the area are not likely anticipated.

Refer to Chapter 10 – Traffic and transportation for additional details.

4.4.3.3 Water Quality or Availability

The Proposed Development shall not result in a significant impacts to the existing hydrological regime of the area. The development will not result in any flood risk to the Proposed Development itself or surrounding lands. The Development is therefore considered to be appropriate from a flood risk perspective and not have any likely significant impacts.

Following the implementation of the proposed mitigation measures during both the construction and operational phases, no significant impacts on the hydrological regime of the area will be impacted. As such, no significant negative population or human health impacts are anticipated.

Full details are included in the Water Chapter of this EIAR (Chapter 12).

4.4.3.4 Climate

The operational phase of the Proposed Development is predicted to result in 49,532 tCO₂e over the 25-year lifespan (1,981 tCO₂e annually). The majority of GHG emissions associated with the operational phase and the overall lifespan of the Proposed Development, originate from transport to and from site to deliver chemicals and for routine maintenance (47%). Other emission sources include operational energy (31%) and operational waste (17%) which includes sludge and grit.

With design mitigation in place as per Chapter 8 - Climate, there are no significant risks to the Proposed Development as a result of climate change, i.e. only low vulnerabilities have been identified. In accordance with the EPA Guidelines (EPA, 2022), the significance of effect of the impacts to the Proposed Development as a result of climate change are **direct, long-term, negative** and **not significant** which is overall **not significant** in EIA terms. As such, no significant negative population or human health impacts are anticipated.

Full details are included in the Climate Chapter of this EIAR (Chapter 8).

4.4.3.5 Noise and Vibration

Proprietary noise and vibration control measures will be employed in order to ensure that noise emissions from plant do not exceed the adopted criterion at the façade of any nearby noise sensitive locations. In addition, noise emissions will be broadband in nature and should not contain any tonal or impulsive elements. The resultant noise impact is negative, not significant and long-term. No significant impacts relating to population and human health arising from the Proposed Development are anticipated.

In terms of the additional operational traffic on local roads that will be generated as a result of the Proposed Development, the impacts are determined to be imperceptible with no significant negative population or human health impacts anticipated.

Full details are included in the Noise and Vibration Chapter of this EIAR (Chapter 9).



4.4.3.6 Land Quality

During the operational phase of the development the following potential impacts on soils and bedrock could occur and have been assessed accordingly. Land use change of agricultural land in an area of 1.74 hectares will occur as a result of the Proposed Development

Electrical equipment and onsite chemical / oil storage could potentially be a source of contaminants to the underlying soil and bedrock. Soils and bedrock may be at risk of becoming contaminated through routine site maintenance activities. The development will have a negative, moderate, permanent effect on the surrounding area. No significant negative population or human health impacts are anticipated. Best practice mitigation measures as per Chapter 11 – Land, Soils and Geology will be implemented.

Full details are included in the Land Soils and Geology Chapter of this EIAR (Chapter 11).

4.4.3.7 Major Accidents and Disasters

The following potential risks of major accidents or disasters in connection with the Proposed Development have been assessed:

- Extreme heat or cold weather resulting in structural damage and/or pollution to soils, groundwater, or surface waters;
- Storm events resulting in structural damage and/or pollution to groundwater and surface waters;
- Flooding;
- Release of hazardous material and/or effluent leak following plant failure and/or pollution to soils, groundwater, or surface waters.

There are no likely significant effects on the proposed development or to off-site receptors during the operational phase in relation to major accidents and disasters. Full details are included in the Major Accidents and Disasters Chapter of this EIAR (Chapter 15).

Table 4-22 - Operation Effects

Baseline		Assessment				
Receptor	Sensitivity	Effects	Mitigation	Magnitude	Residual effect (Post Mitigation)	Significance (Pre-mitigation)
Transport modes, access and connections						
Residents, Business owners and employees, Users of community assets and Walkers, cyclists and horse riders	Medium (Wider group and Families with children and adolescents)	During the operational phase, the majority of vehicle trips will be associated with screening, grit removal, dewatered sludge removal, and activities related to dry recycling and the administrative building. These operations are expected to involve the transport of approximately 330 tonnes of material over a one-month period.	None identified.	Negligible	Negligible	Not Significant
	High (People who are physically or mentally disadvantaged and People who are materially disadvantaged)			Negligible	Negligible	Not Significant
		</				

Baseline		Assessment				
Receptor	Sensitivity	Effects	Mitigation	Magnitude	Residual effect (Post Mitigation)	Significance (Pre-mitigation)
		vehicle trips (6 pcu) per day. Existing access to the Mortarstown WwTP is to be retained off the Green Road and therefore no significant impact is expected during operational phase.				
Employment and income						
Local Communities	Low (Families with children and adolescents)	There may be some opportunities for employment during operation of the plant, given the capacity of the plant will be increasing.	None identified	Low	Minor Beneficial <i>Permanent</i>	Not Significant
	Medium (Wider group and People who are physically or mentally disadvantaged)			Low	Minor Beneficial <i>Permanent</i>	Not Significant
	High (People who are materially disadvantaged)			Low	Minor Beneficial <i>Permanent</i>	Not Significant
	Wider societal infrastructure and resources					



Baseline		Assessment				
Receptor	Sensitivity	Effects	Mitigation	Magnitude	Residual effect (Post Mitigation)	Significance (Pre-mitigation)
Residents and users of services in the wider area	Medium (All groups)	There are not expected to be any impacts on residents and users of services in the wider area, during operation of the Proposed Development. The Proposed Development will ensure that the local population can continue to grow with security in its WwTP process and systems.	None identified	Negligible	Negligible <i>Permanent</i>	Not Significant



4.4.4 Decommissioning Phase

The decommissioning phase impact assessment is set out in Table 4-23. In addition to the mitigation measures set out in Table 4-23, the mitigation measures set out in the other technical chapters of the EIAR which are linked to population and human health also apply. Relevant sections have been identified as part of the following summary. The Chapters are as follows:

- Chapter 7: Air Quality and Odour Section 7.5
- Chapter 8: Climate, Section 8.6
- Chapter 9: Noise and Vibration, Section 9.7
- Chapter 10: Traffic, Section 10.13
- Chapter 11: Land, Geology and Soils, Section 11.8
- Chapter 12: Water, Section 12.8
- Chapter 15: Major Accidents and Disasters, Section 15.8

4.4.4.1 Air Quality and Odour

Potential impacts on air quality and odour during decommissioning are limited to short-term, localised emissions of dust and vehicle exhaust. These may arise from the dismantling of infrastructure and the removal of equipment. Dust suppression measures, such as water spraying, covering of stockpiles, and proper maintenance of machinery, should be implemented.

Odour management would be maintained during cleaning and demolition. No significant negative impacts are anticipated.

Mitigation measures will be implemented during the decommissioning phase to avoid these potential impacts.

4.4.4.2 Climate change mitigation and adaptation

The decommissioning phase will likely result in a temporary, slight increase in greenhouse gas (GHG) emissions due to the use of machinery and haulage vehicles. These emissions are considered minor and short-term. No new vulnerabilities to climate-related hazards are introduced during this phase. Standard weather contingency measures, will remain in place.

Mitigation measures will be implemented during the decommissioning phase to avoid these potential impacts.

4.4.4.3 Noise and Vibration

Noise emissions during decommissioning will be limited to the duration of the decommissioning works and will involve activities such as structure dismantling, equipment removal and transport. No significant vibration-generating activities are anticipated. Noise will be managed through restrictions on working hours, use of low-noise equipment, and advance notification to nearby receptors.

Mitigation measures will be implemented during the decommissioning phase to avoid these potential impacts

4.4.4.4 Traffic and Transportation

Whilst an increase in traffic including heavy machinery, altered traffic movements and potential restrictions during the future decommissioning phase is likely, this is not expected to notably or permanently increase traffic in the area. The duration is expected to be temporary only occurring for the duration of the decommissioning

and therefore impacts are considered non-significant. Local route closures may temporarily impact user of the local road network which may slightly decrease their health and well-being during future decommissioning phase of the Proposed Development.

A total volume of approximately 30,000 m³ of material is expected to be hauled during the decommissioning phase. Assuming a 6-month period for uniform haulage and a material density of 2 tonnes/m³, this equates to approximately 10,000 tonnes per month.

Assuming the same working hours (168 hours per month) as those adopted for the excavation and material import phase, this results in approximately 60 tonnes of material per hour. Based on an assumed trailer capacity of 20 tonnes, this equates to approximately 3 heavy vehicle trips per hour.

This is lower than the estimated 7 heavy vehicle trips per hour during the excavation phase. Therefore, no additional analysis is required. Overall, the effect of traffic associated with the decommissioning phase is considered “**Imperceptible**”, means an effect capable of measurement but without significant consequences.

Mitigation measures will be implemented during the decommissioning phase to avoid these potential impacts.

4.4.4.5 Water quality or availability

There is potential for minor contamination from residual effluent or wash-water during the dismantling of tanks and pipelines. However, all infrastructure will be drained, flushed, and cleaned prior to decommissioning. Pollution prevention measures, including bunding, silt fencing, and controlled waste disposal, will remain in place. The decommissioning of the rising main will be carried out in situ, with appropriate capping and sealing.

Mitigation measures will be implemented during the decommissioning phase to avoid these potential impacts

4.4.4.6 Land Quality

The potential impacts on Land, Soils & Geology associated with any eventual decommissioning phase will be very similar to the impacts associated with the construction phase. The Outline CEMP provides a section relating to decommissioning phase including:

- Stripping of topsoil will result in exposure of the underlying subsoil layers to the effects of weather and construction traffic. This may result in subsoil erosion and generation of sediment laden runoff;
- Soils beneath the development may become unnecessarily compacted by machinery during construction;
- Topsoil and subsoil may become rutted and deterioration of the topsoil layer and any exposed subsoil layers, resulting in erosion and generation of sediment laden runoff;
- Dust generation can also occur during extended dry weather periods as a result of construction traffic; and,
- Soils and bedrock may be at risk of becoming contaminated through site construction activity; in particular the risk of fuel spillages and leakage.
- Subsoil and topsoil may require offsite disposal.

Given the current site use and ongoing site use as a WwTP there is a moderate potential for contaminated soil to be encountered onsite. The development is likely to have a negative, slight, permanent effect on soils and bedrock during the decommissioning stage

Mitigation measures will be implemented during the decommissioning phase to avoid these potential impacts, and to address any potential waste management issues.

4.4.4.7 Major Accidents and Disasters

Uisce Éireann and the contractors responsible for the operation of the WwTP will continue to assess the risk of major accidents and/or disasters on site on an on-going basis during operation. The maintenance programme, record or reported incidents, as well as general site operations will be monitored on a regular basis.

In the event of facility shutdown UÉ will decommission, render safe or remove for disposal/recovery, all materials, waste, ground, plant, and equipment that could result in environmental pollution.

Decommissioning would follow a staged, compliant process focused on safety, environmental protection, and traceable documentation in accordance with prevailing best practice at the time of closure.

Under Licence requirements, an Environmental Liabilities Risk Assessment (ELRA) and/or a Closure, Restoration and Aftercare Management Plan (CRAMP) will be prepared. This will include stakeholder notifications, risk assessments (covering odour, confined spaces, and residual chemicals), and a method statement for flow diversion. It is anticipated that any shutdown of all or part of the site operations would be preceded by a scaling down of activities therefore further reducing the quantities of materials, particularly chemicals to be dealt with. Wastewater would be gradually rerouted to the replacement works or temporary treatment so the plant could be safely run down.

The decommissioning process would involve the safe isolation of all infrastructure, removal of gas, and the de-energisation of equipment. All tanks and pipelines would be isolated, drained, cleaned, and made gas-safe, with residual sludge dewatered and removed to an approved facility. Above-ground equipment, such as valves, pipework, gantries, platforms, kiosks, and associated infrastructure, would be dismantled and removed from site by suitably qualified contractors. Materials would be segregated and sent for re-use, recycling, or licensed disposal in line with legislative requirements and commercial viability.

MEICA systems would be de-energized, disconnected, and either removed for reuse/recycling or disposed of per Waste Electrical and Electronic Equipment (WEEE) and hazardous waste disposal requirements.

Structural works would then proceed under a demolition plan and civil structures would be demolished using controlled methods, with concrete and steel segregated for recycling. Sub-surface foundations may be broken to a depth of 1m below ground level, with the remainder left *in-situ*.

Successful decommissioning will only be complete when all buildings, infrastructure, equipment, materials, wastes, or any other materials, which could result in environmental pollution, are removed from the site and recycled, recovered, or disposed of in accordance with all regulations in force at the time.

There are no likely impacts on the project or to off-site receptors during decommissioning in relation to major accidents and disasters. Full details are included in the Major Accidents and Disasters Chapter of this EIAR (Chapter 15).

Table 4-23 - Assessment of Decommissioning Effects

Baseline		Assessment of Effects				
Receptor	Sensitivity	Effect	Mitigation	Magnitude	Residual effect (Post Mitigation)	Significance (Pre-Mitigation)
Transport modes, access and connections						
Residents, Business owners and employees, Users of community assets and Walkers, cyclists and horse riders	Medium (Wider group and Families with children and adolescents)	Whilst there may be an increase in traffic during the decommissioning phase (including large volumes of materials being moved off-site), this is not expected to notably increase traffic in the area and therefore impacts on health and wellbeing for those in the area are not anticipated.	None identified	Negligible	Negligible <i>Permanent</i>	Not Significant
	High (People who are physically or mentally disadvantaged and People who are materially disadvantaged)			Negligible	Negligible <i>Permanent</i>	Not Significant
Employment and income						
Local Communities	Low (Families with children and adolescents)	The Proposed Development may provide opportunity for employment during decommissioning, although this is not expected to be significant.	None identified	Low	Minor Beneficial <i>Permanent</i>	Not Significant
	Medium (Wider group and People who are physically or			Low	Minor Beneficial <i>Permanent</i>	Not Significant

Baseline		Assessment of Effects				
Receptor	Sensitivity	Effect	Mitigation	Magnitude	Residual effect (Post Mitigation)	Significance (Pre-Mitigation)
	<i>mentally disadvantaged)</i>					
	High (People who are materially disadvantaged)			Low	Minor Beneficial <i>Permanent</i>	Not Significant
Wider societal infrastructure and resources						
Residents and users of services in the wider area	Medium (All groups)	There are not expected to be any impacts on residents and users of services in the wider area, during decommissioning of the Proposed Development.	None identified	Negligible	Negligible <i>Permanent</i>	Not Significant



4.5 Mitigation and Monitoring Measures

The Proposed Development will have minor adverse effects during the construction, operation, decommissioning and demolition phases on Population and Human Health as stated above in Table 4-21, Table 4-22 and Table 4-23. However, mitigation measures as presented within the relevant technical chapters (Chapter 6 – Landscape and Visual; Chapter 7 - Air Quality and Odour; Chapter 9 – Noise and Vibration; Chapter 11 – Land, Soils and Geology; and Chapter 12 – Water) and Chapter 18 - Schedule of Commitments, will be implemented as part of the Proposed Development. A Construction Environmental Management Plan and Construction Traffic Management Plan (CTMP) will be enacted during the construction phase, as is standard for projects of this scale.

In addition, a Health and Safety Plan will be prepared by the Contractor for the construction of the Proposed Development in line with Safety, Health and Welfare at Work Act 2005. Emergency systems, like fire alarms are to be checked weekly and emergency escape drills are to be carried out frequently. The construction of the Proposed Development will comply with all of the requirements of this EIAR (Volume 1 to 3) as well as the Construction Environmental Management Plan (CEMP) submitted as Appendix 2-2, Volume 3 of the EIAR. This document will be further developed and added to within the project specific Detailed CEMP which will be prepared by the Contractor in advance of the construction phase and will be fully implemented onsite for the duration of the construction phase of the project. Environmental monitoring will be carried out (including air quality and odour and noise and vibration) during the construction phase as detailed in Chapter 18 of this EIAR - Schedule of Commitments.

Operational Phase monitoring includes the final effluent being monitored in accordance with the terms of the Wastewater Discharge Licence and is detailed in all EIAR chapters (Chapter 6 – Landscape and Visual; Chapter 7 - Air Quality and Odour; Chapter 9 – Noise and Vibration; Chapter 11 – Land, Soils and Geology; and Chapter 12 – Water) and Chapter 18 - Schedule of Commitments).

4.6 Do Nothing Scenario

As shown above, the population of the State Co. Carlow and the Carlow Rural ED are all increasing significantly. In order to meet the capacity demand of the local area, the Mortarstown WwTP and Kilkenny Road Pumping Station must increase their capacity. A 'Do Nothing' scenario would adversely impact the local area, increasing the risk of pollution events via overflows and reduce the feasibility of future developments in the area. In addition to this, there would be an increased volume of untreated discharge – placing the local water network at risk of pollution events and not reaching Water Framework Targets by 2027.

It is noted that whilst the WwTP is currently treating the wastewater in order to meet future population growth and stay in compliance with the Wastewater Discharge License (D0028-01), the Urban Waste Water Treatment Regulations 2001 as amended, require relevant authorities to provide appropriate wastewater collection systems and treatment for agglomerations such as Mortarstown. The key objective is to upgrade the plant by either the optimisation of existing assets, the addition of assets, or the replacement of existing assets, to:

- Alleviate current overloading;
- Provide headroom to treat future predicted catchment growth

Furthermore, as mentioned above in Section 4.3.3.3, many community and tourist resources and amenities revolve around the use of the River Barrow. These resources and amenities could become compromised should the quality of the River Barrow be affected by capacity overloads associated with Mortarstown WwTP. The River Barrow is also designated as a Special Area of Conservation which makes the flora and fauna in the Study Area sensitive to changes in water quality in the River Barrow.



As outlined in Chapter 7 – Air Quality and Odour, odour emissions from the existing WwTP and pumping station facilities were found to exceed recommended guidance levels. Adopting a ‘Do Nothing’ scenario could negatively affect human health and settlement patterns in the area due to reduced air quality and persistent odor issues arising from excessive loading on the current infrastructure.

4.7 Residual Effects

All construction and demolition phase activities are temporary in nature. No significant adverse residual effects are likely during the construction and demolition phases, and the operational phase of the Proposed Development.

4.8 Difficulties encountered during preparation of this chapter

No difficulties were encountered during preparation of this chapter.

5. BIODIVERSITY

5.1 Introduction

AtkinsRéalis was commissioned by UÉ to prepare an Environmental Impact Assessment Report (EIAR) for the proposed Mortarstown Wastewater Treatment Plan Upgrade (“the proposed development”), which is described in detail in Chapter 2. This chapter (Chapter 5) describes the Biodiversity present within the footprint of the proposed development, evaluates the importance of ecological features on a geographic scale, assesses the likely effects of the proposed development on key ecological receptors and proposes appropriate measures to avoid or reduce those effects. Furthermore, this chapter proposes ecological enhancements to ensure No Net Loss of Biodiversity, as per UÉ’s *Biodiversity Action Plan* (UÉ, 2021).

A separate Natura Impact Statement (NIS) has been prepared in respect of the proposed development (AtkinsRéalis Report Ref. 5161805DG0457 - NIS, 2026). The NIS assesses the implications of the proposed development for Natura 2000 sites to inform the competent authority’s Appropriate Assessment (AA) under Article 6(3) of the Habitats Directive (92/43/EEC). The NIS is included as part of the planning application.

5.2 Methodology

5.2.1 Guidance

This report was prepared with due regard to the relevant guidance, including but not limited to: -

- CIEEM (2018). *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine*. Version 1.3 - Updated September 2024. Chartered Institute of Ecology and Environmental Management, Winchester.
- EPA (2022). *Guidelines on the information to be contained in Environmental Impact Assessment Reports*. May 2022. Environmental Protection Agency, Wexford.
- NRA (2009a). *Guidelines for Assessment of Ecological Impacts of National Roads Schemes*. Revision 2. National Roads Authority, Dublin.
- NRA (2009b). *Ecological Surveying Technique’s for Protected Flora and Fauna during the Planning of National Road Schemes*. National Roads Authority, Dublin.
- Smith, G.F., O’DonoghUÉ, P., O’Hora, K. and Delaney, E. (2011). *Best Practice Guidance for Habitat Survey and Mapping*. The Heritage Council, Kilkenny.
- UÉ (UÉ) (2018a). *Biodiversity Policy*. AMS-AMT-POL-013 - Rev 2.1. April 2018. UÉ, Dublin.
- UÉ (2021). *Irish Water’s Biodiversity Action Plan - Embedding Biodiversity into Water Services*. Spring 2021. UÉ, Dublin.
- UÉ (2024). *UÉ’s Biodiversity Action Plan - Progress Report*. August 2024. UÉ, Dublin.



5.2.2 Desk Study

Baseline data on the receiving environment was gathered through a thorough desk study, using both publicly available resources and data requests. The main sources of information were as follows: -

- National Parks & Wildlife Service (NPWS)
 - Designated site data (*NPWS Maps and Data*), including:
 - Boundary data and site documents for Natura 2000 sites,
 - Site-specific Conservation Objectives data,
 - Boundary data for Natural Heritage Areas (including proposed sites), and
 - Locations of statutory Nature Reserves, National Parks, and Wildfowl Sanctuaries.
 - Habitats and species datasets, including:
 - Reporting under Article 17 of the Habitats Directive (NPWS, 2025d-f; *Article 17 web tool*) and Article 12 of the Birds Directive (NPWS, 2022c; *Article 12 web tool*),
 - Records of species listed on the Flora (Protection) Order, 2022 (*NPWS Maps and Data*),
 - Woodland inventories (*NPWS Maps and Data*),
 - *Margaritifera*-sensitive Areas map (*NPWS Maps and Data*),
 - Water Framework Directive fish sampling data (*IFI Open Data*), and
 - Recent and historical records of protected and threatened species, including sensitive data (NPWS Data Request No. 2025_133).
- Environmental Protection Agency (EPA):
 - Spatial and other data regarding rivers and other waterbodies (*EPA Geoportal*)
- National Biodiversity Data Centre (NBDC) (*Biodiversity Maps*)
 - Published habitat mapping,
 - Recent and historical records of species, including:
 - Protected and threatened species, and
 - Invasive non-native species.
- Irish Wetland Bird Survey (I-WeBS)
 - Bird counts for the site 'River Barrow (Goresbridge-Maganey Bridge)' (0P301) and its subsites for the seasons 2019/20 and 2021/22.
- Satellite imagery and aerial mapping from Tailte Éireann, OpenStreetMap and Google Earth.

The geographical scope of the species data request to the NPWS and the species records retrieval from the NBDC database is illustrated in Figure 5-1 below.

The legal protections and status of species was checked against the *Checklists of protected and threatened species in Ireland (Version 4.0 - 16 June 2025)* (Nelson *et al.*, 2019).



Figure 5-1 - Geographic scope of species data requests/searches.

5.2.3 Field Surveys

As the proposed development has been in the early phases of development for several years, a number of site visits and surveys have been carried out and repeated or updated (over the period from 2018 to 2025), as appropriate, to inform the evolving design and environmental assessments. A summary of all these surveys is shown in Table 5-1 below. Full details of the methodology and results of surveys carried out directly by AtkinsRéalis are provided in the main body of this chapter. To avoid excessive repetition, only summary details of the methodology and results of surveys carried out by sub-consultants are included in the main text, while their full reports are appended, as indexed in Table 5-1.

5.2.3.1 Walkover and Habitat Surveys

As summarised in Table 5-1 below, initial multi-disciplinary walkover surveys were undertaken by AtkinsRéalis⁴⁰ ecologists during July 2018, September 2020 and November 2021. Further surveys were carried out in September 2022 and May 2023 to validate and update the previous surveys, ensure coverage of new areas within the updated red-line boundary, and achieve coverage across different times of the year.

Habitats were classified with reference to *A Guide to Habitats in Ireland* (Fossitt, 2000) and the *Interpretation Manual of European Union Habitats* (DG Env, 2013). The primary aim of these surveys was to gather baseline data relating to the potential ecological constraints on the proposed works with particular emphasis on the potential presence of qualifying interests of Natura 2000 sites. On completion of these surveys, habitats were mapped following *Best Practice Guidance for Habitat Survey and Mapping* (Smith *et al.*, 2011).

These surveys also included checks for invasive alien plant species, e.g. Japanese Knotweed (*Reynoutria japonica* syn. *Fallopia japonica*), and any evidence of protected mammals, particularly Otter (*Lutra lutra*), as well as recording of any incidental observations or evidence of presence of birds and other fauna.

During the non-volant mammal surveys carried out in March 2025 (described in Section 5.2.3.3 below), any notable changes to habitats since the earlier habitat surveys were recorded and the habitat mapping updated.

Limitations

There are not considered to be any significant limitations on the value of these surveys. They included visits which covered the full extent of the red-line boundary during both the optimal season for habitat surveys (April to September, inclusive) and times outside this season, i.e. November. They also cover multiple years.

5.2.3.2 Woodland Habitat Surveys

Dr Mary O'Connor's woodland survey in June 2023 involved a walkover of the site. An inventory of the habitat and species of conservation importance at the site was made and habitats were classified using *A Guide to Habitats in Ireland* (Fossitt, 2000) and the constituent species were recorded in these habitats. The floristic composition of riparian woodland areas was also described using the Irish Vegetation Classification (IVC). In tandem with this habitat survey, a topographical survey of the site was also carried out which showed in detail elevations at the site.

During her survey, Dr O'Connor was accompanied by AtkinsRéalis ecologist Owen O'Keefe, who also recorded incidental observations of other ecological receptors, e.g. evidence of Otter and invasive non-native species. In

⁴⁰ At the time of these surveys, AtkinsRéalis Ireland Ltd was WS Atkins Ireland Ltd, trading as "Atkins". In September 2023, Atkins and all other companies in the SNC Lavalin group rebranded as "AtkinsRéalis".

addition, any notable changes to habitats since the earlier habitat surveys were recorded and the habitat mapping updated.

5.2.3.3 Non-volant Mammal Surveys

In addition to the trail camera monitoring by Sweeney (2021), a further walkover survey to identify the presence or evidence of the presence of protected or threatened mammal species was carried out by AtkinsRéalis Senior Ecologist Owen O'Keefe and AtkinsRéalis Graduate Ecologist Alec Schmidt on 27th March 2025. This was followed by further trail camera monitoring, as described below. These surveys followed *Ecological Surveying technique's for Protected Flora and Fauna during the Planning of National Road Schemes* (NRA, 2009a).

Walkover

Starting the walkover at 11:00, the air temperature was c. 14°C, with a gentle south-westerly breeze, c. 50% cloud cover, no precipitation, and excellent visibility. These were considered optimal weather conditions for surveying and remained until the survey was completed at 16:00. There was no heavy rainfall or floods in the two weeks preceding the survey and there preceding four days were dry.

The geographic scope of the field survey, as illustrated in Figure 5-2 below, covered the footprint of the proposed development, with a particular focus on the areas highlighted in yellow, which included areas both within the red-line boundary and adjoining areas outside the red-line boundary, as the habitats in these areas were considered to be more likely to support mammals than areas such as open fields. The areas of particular focus for the mammal survey are described as follows:

- The riverbank and adjoining areas from the south-western corner of the existing Kilkenny Road pumping station north (upstream) to the property boundary, c. 100m beyond the red-line boundary of the proposed development.
- The riverbank and adjoining areas of woodland and scrub for c. 150m south (downstream) of the existing Kilkenny Road pumping station. Further downstream, the vegetation becomes very dense, preventing access.
- The edge of the woodland adjoining the western verge of the Kilkenny Road along the full length of the proposed new gravity sewer, as well as the verge itself.
- The hedgerow adjoining the eastern edge of the Kilkenny Road along the full length of the proposed new gravity sewer, and adjoining amenity grassland in the housing estate.
- The vacant cottage sitting directly between the existing WwTP and the Kilkenny Road, including its outbuildings, gardens and surrounds, which includes areas of scrub.
- The existing WwTP itself, focussing on the boundaries and the area of rough grassland and scrub on the southern side of the campus.
- The area around the proposed outfall location and the adjoining woodland as far as c. 150m north (upstream) of the outfall point, covering the full width of this area between the Kilkenny Road and the River Barrow.

The survey areas were walked at a slow pace, allowing for a thorough search for any evidence of mammal presence in the study area, e.g. prints, tracks, hairs, droppings, other markings, burrows or other resting places, feeding signs, carcasses or direct observations of live animals.



Target notes and other observations, including notes on habitat suitability, along with photos of any mammal signs or any other points of interest, were recorded using the QField app for QGIS on a Samsung Galaxy S24 Ultra and later viewed in QGIS 3.34 for Windows.



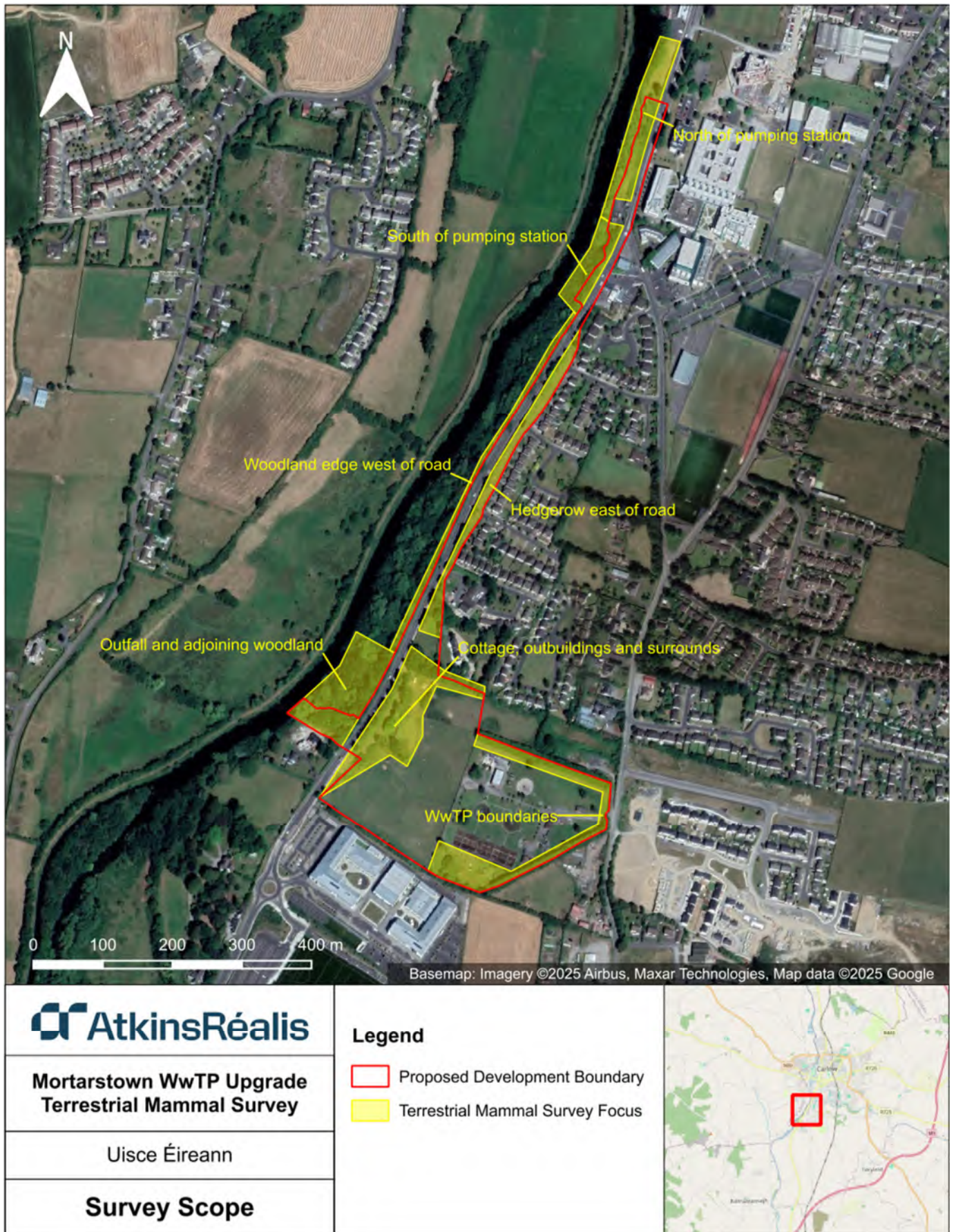


Figure 5-2 - Geographic scope of terrestrial mammal survey.

Trail camera monitoring

Once the walkover was complete, 2 no. trail cameras were deployed as follows:

- 1 no. Bushnell CORE DS-4K No Glow camera was deployed in an area of scrub behind the cottage (ITM Grid Ref. 671257, 674876). This location was selected due to the presence of two potential mammal burrows, as well as a concentration of mammal signs such as paths, prints and droppings.
- 1 no. Spypoint FLEX-M camera was deployed on the riverbank about 25m north of the existing outfall (ITM Grid Ref. 671176, 674975). This location was selected due to a concentration of signs of Otter, including spraints and scratching on the riverbank and a low branch.

Both cameras were deployed on 27th March and collected on 10th April 2025, i.e. 14 nights after they were deployed, following which the videos were reviewed.

Limitations

The scope and extent of the field surveys were appropriate to the level of assessment required at this stage and these were also carried out in spring, when mammal signs are most visible due to the lack of vegetation but also when mammals are particularly active. Weather conditions were also favourable for the survey.

Access to lands south of the proposed discharge were not available, as such only lands within the red-line boundary south of the proposed discharge could be surveyed. Given the dense riparian vegetation present along this area a boat survey was not suitable. There are two residential properties located immediately south of the red-line boundary which are separated from the River Barrow by a narrow strip of riparian vegetation. Given that there will be regular disturbance in this area due to the residential properties it is considered unlikely that otter holts are present in this area, considering the abundance of more suitable habitat in the immediate area. Therefore, this is not considered to be a significant limitation. It should be noted, however, that the field surveys were undertaken in 2025 and so the results represent a snapshot of mammal use of the site during 2025 only and, as with any survey carried out in a single year, cannot account for variations between years.

5.2.3.4 On-site Meeting with the NPWS

On 21st June 2024, AtkinsRéalis held an on-site consultation meeting with the NPWS and UÉ. The purpose of this meeting was to brief the NPWS on the current proposals, the ecological constraints identified and how these were proposed to be addressed, and to provide the NPWS with an opportunity to raise any queries or concerns directly with the project team.



Table 5-1 - Summary of ecological surveys carried out for the proposed development.

Target	Method(s)	Surveyor(s)	Date(s)	Reference (reports appended to this chapter)
Multi-disciplinary	Walkover to map habitats and invasive non-native plant species, and to record evidence of protected and threatened species	AtkinsRéalis: Niamh Sweeney and Emma Nickelsen	12 th July 2018; 15 th September 2020	n/a (described fully in this chapter)
Multi-disciplinary	As above (validation)	AtkinsRéalis: Niamh Sweeney	4 th November 2021	n/a (described fully in this chapter)
Multi-disciplinary	As above (validation and inclusion of new areas)	AtkinsRéalis: Owen O'Keefe	21 st September 2022; 2 nd May 2023	n/a (described fully in this chapter)
Aquatic ecology	Electro-fishing (focussing especially on lamprey species); Fisheries habitat appraisal; SONAR survey (for bathymetry and bottom hardness)	Triturus: Ross Macklin, Bill Brazier and Derick Bora	15 th July 2021	Triturus (2021) <i>Fisheries assessment of Mortarstown WWTP upgrade works, Co. Carlow</i> . Report by Triturus Environmental Ltd. (Appendix 5-1)
Aquatic ecology	As above (validation)	Triturus: Ross Macklin and Derick Bora	3 rd July 2025	Triturus (2025). <i>Fisheries assessment of Mortarstown WWTP upgrade works, Co. Carlow</i> . Report prepared by Triturus Environmental Ltd. (Appendix 5-2)
Woodland habitats	Vegetation and habitat survey of woodlands	Dr Mary O'Connor (independent expert)	27 th June 2023	O'Connor, M. (2023). <i>Mortarstown WwTP and Kilkenny Road WwPS - alluvial woodland survey</i> . Report by Dr Mary O'Connor (Appendix 5-3)
Bats (all species)	External inspection of buildings; Passive acoustic monitoring	Dr Caroline Shiel (independent expert)	29 th and 30 th September 2020	Shiel, C. (2020). <i>Bat Surveys Conducted at Mortarstown Waste Water Treatment Plant and Pumping Station, Carlow</i> . Report by Dr Caroline Shiel. (Appendix 5-4)
Bats (all species)	Walkover and habitat suitability assessment; Ground-based assessment of trees; Passive acoustic monitoring; Targeted acoustic and visual survey	Dr Caroline Shiel (independent expert)	6 th and 7 th May 2021	Shiel, C. (2021a). <i>Bat Surveys Conducted at Proposed Extension and Outflow Area at Mortarstown Waste Water Treatment Plant and Pumping Station, Carlow</i> . Report by Dr Caroline Shiel (Appendix 5-5)



Target	Method(s)	Surveyor(s)	Date(s)	Reference (reports appended to this chapter)
Bats (all species)	Ground-based assessment of trees; Passive acoustic monitoring; Walked activity transects	Dr Caroline Shiel (independent expert)	28 th and 29 th September 2021	Shiel, C. (2021b). <i>Bat Surveys Conducted Along Potential New Routes of Rising Main Pipe and in Green Area to North of Plant at Mortarstown Waste Water Treatment Plant in Carlow</i> . Report by Dr Caroline Shiel. (Appendix 5-6)
Bats (all species)	Desktop review; Walkover and habitat suitability assessment; Ground-based assessment of trees and external inspection of buildings; Passive acoustic monitoring; Walked activity transects	Abbott Ecology: Dr Isobel Abbott	14 th to 21 st September 2024 (inclusive)	Abbott Ecology (2024). <i>Bat Surveys for the proposed Mortarstown Wastewater Treatment Plant Upgrade, Carlow</i> . Report by Dr Isobel Abbott. (Appendix 5-7)
Bats (all species)	Walkover; Ground-based assessment of trees and external inspection of buildings	Dr Caroline Shiel (independent expert)	19 th March 2025	Shiel, C. (2025a). <i>Walk-over Survey to Assess Potential Roost Features for Bats on Site of Proposed Extension Area and Along Route of Pipeline at Mortarstown Waste Water Treatment Plant in Carlow</i> . Report by Dr Caroline Shiel. (Appendix 5-8)
Bats (all species)	Targeted acoustic and visual survey aided by thermal scopes	Dr Caroline Shiel (independent expert)	9 th and 10 th July 2025	Shiel, C. (2025b). <i>Bat Surveys of Buildings and Trees with Potential Roost Features on Site of Proposed Extension Area and Along Route of Pipeline at Mortarstown Waste Water Treatment Plant in Carlow</i> . Report by Dr Caroline Shiel. (Appendix 5-9)
Non-volant mammals	Trail camera monitoring	Sweeney Consultancy: Pascal Sweeney	13 th to 21 st September 2021 (inclusive)	Sweeney (2021). <i>Camera Trap Monitoring of Mammal Burrow at Mortarstown, Co. Carlow</i> . Report by Sweeney Consultancy. (Appendix 5-10)
Non-volant mammals	Targeted walkover; Trail camera monitoring	AtkinsRéalis: Owen O'Keefe and Alec Schmidt	27 th March to 10 th April 2025	n/a (described fully in this chapter)
Invasive non-native plants	Targeted walkover	Envirico: Julie Larkin	22 nd April 2021	Envirico (2021). <i>Invasive Alien Species Management Plan</i> . Report by Envirico Ltd. (Appendix 5-11)
Invasive non-native plants	Targeted walkover	INVAS: Tom Donovan	6 th May 2025	INVAS (2026). <i>Invasive Alien Plant Species Management & Biosecurity Plan - WwTP Mortarstown, Carlow</i> . Report by INVAS Biosecurity Ltd. (Appendix 5-12)

5.2.4 Assessment of Effects

The overall methodology followed in the preparation of this report was informed by the most recent guidelines for ecological impact assessment in the UK and Ireland, i.e. the CIEEM (2018) guidelines (as updated September 2024). In addition, the methods for specific aspects of the assessment, e.g. evaluation of receptors, assessment of impacts and effects, and development of mitigation and enhancement measures, had regard to appropriate guidelines from the National Roads Authority (now Transport Infrastructure Ireland) and the EPA, as described below.

5.2.4.1 Evaluation of Ecological Receptors

The evaluation of the importance of ecological features present within the footprint of the proposed development and its Zone of Influence followed *Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes* (NRA, 2009a). The geographic frame of reference summarised in the table below was used.

Table 5-2 - Geographic frame of reference for evaluating the importance of ecological features. Following: NRA (2009a).

Level	Examples (non-exhaustive)
International Importance	- European (Natura 2000) sites or sites which fulfil the criteria for such a designation. - Features essential to the coherence of the Natura 2000 network. - Best examples of natural habitat types listed on Annex I to the Habitats Directive ("Annex I habitats"). - Resident or regularly occurring populations of bird species listed on Annex I to the Birds Directive or animal or plant species listed on Annex II or IV to the Habitats Directive ("Annex II/IV species") (in numbers of national importance). - Wetlands of International Importance (under the Ramsar Convention). - UNESCO World Heritage Sites or Biosphere Reserves.
National Importance	- Designated or proposed Natural Heritage Areas (NHA/pNHA), statutory Nature Reserves or sites fulfilling the criteria for such a designation. - Resident or regularly occurring populations of species protected under the Wildlife Act, 1976 (as amended) or listed on the relevant national Red List (in numbers of national importance). - Viable examples of Annex I habitats.
County Importance	- Areas of Special Amenity, areas subject to a Tree Preservation Order and Areas of High Amenity. - Resident or regularly occurring populations of protected or threatened species (in numbers significant at the county level, e.g. >1% of the county population). - Examples (not of National or International Importance) of Annex I habitats. - Other features of ecological interest identified in relevant local or national biodiversity action plans. - Sites or habitats of high biodiversity value or degree of naturalness in a county context or species which are uncommon in the county. - Sites containing habitats or species which are in decline nationally.
Local Importance (Higher Value)	Ecological features identified in the relevant local biodiversity action plan.

Level	Examples (non-exhaustive)
	▪ Resident or regularly occurring populations of protected or threatened species (in numbers significant at the local level). ▪ Sites habitats of high biodiversity value or degree of naturalness in a local context or species which are uncommon locally. ▪ Sites or features containing common or lower value habitats which provide connectivity between features of higher ecological value.
Local Importance (Lower Value)	▪ Sites containing small areas of semi-natural habitat that are of some local importance for wildlife. ▪ Sites or features containing non-native species that are of some importance in maintaining habitat links.

Accordingly, factors which were considered when evaluating importance included the following:

- National or international designations on sites, or identification of sites in local plans,
- Level (if any) of statutory protection of the habitats and species concerned,
- Conservation status and trends in habitats and species in a local, national and international context,
- Quality and extent of habitats and numbers of individuals of species within the study area,
- Likely future prospects of habitats and species in the study area in the 'do-nothing' scenario, and
- Inter-relationships between habitats, species and other ecological features in the study area and wider landscape.

5.2.4.2 Assessment of Effects

Once the importance of ecological features in the study area had been evaluated, the assessment of the potential impacts focussed on key ecological receptors (KERs), i.e. ecological features of at least Local Importance (Higher Value), in accordance with *Guidelines on the information to be contained in Environmental Impact Assessment Reports* (EPA, 2022). The assessment of impacts is carried out in three stages, as follows:

3. First, potential impacts are identified by the examination of possible source-pathway-receptor chains.
4. Then, impacts and their effects are characterised in terms of the following:
 - a. Nature (type) and quality (whether positive, neutral or negative),
 - b. Probability of occurrence,
 - c. Intensity, magnitude and/or spatial extent,
 - d. Timing, duration and frequency, and
 - e. Reversibility or potential for recovery.
5. Finally, the significance of effects is evaluated by considering their characteristics in the context of the particular sensitivities of the relevant KERs.



Regarding the duration of effects, EPA (2022) specifies the following definitions for what may be considered as “temporary”, “short-term”, “long-term” etc.:

- ‘Momentary’ – Seconds to minutes.
- ‘Brief’ – Less than a day.
- ‘Temporary’ – Less than 1 year.
- ‘Short-term’ – 1 to 7 years.
- ‘Medium-term’ – 7 to 15 years.
- ‘Long-term’ – 15 to 60 years.
- ‘Permanent’ – Over 60 years.

EPA (2022) also provides definitions for other relevant terms which might otherwise be subjective.

Regarding defining levels of significance, EPA (2022) provides for the following scale:

- ‘Imperceptible’ – Capable of measurement but without significant consequences.
- ‘Not significant’ – Causes noticeable changes in the character of the environment but without significant consequences.
- ‘Slight’ – Causes noticeable changes in the character of the environment without affecting its sensitivities.
- ‘Moderate’ – Alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
- ‘Significant’ – Alters a sensitive aspect of the environment.
- ‘Very significant’ – Significantly alters most of a sensitive aspect of the environment.
- ‘Profound’ – Obliterates sensitive characteristics.

The significance of an impact or effect may also be evaluated on the same geographical scale as the importance of ecological features. However, as noted in NRA (2009a), “*significance [...] is determined empirically, on the basis of an analysis of the factors which characterise it, irrespective of the value of the receptor. [...] If impacts are not found to be significant at the highest geographical level at which the resource has been valued, they may be significant at a lower level.*”

5.2.4.3 Mitigation and Enhancement

The development of the mitigation measures followed the “mitigation hierarchy”, which prioritises avoidance over reduction, and actions at source over pathway over receptor, as follows:

6. Eliminate the source of the impact,
7. Minimise or reduce the impact at its source,



8. Block or weaken the pathway for effects, and
9. Abate effects at the receptor.

This approach assists with more complete removal of negative effects, minimises the risk of effects occurring by less obvious pathways, protects non-target receptors, and minimises the risks of unintended harm associated with measures focussed at or near receptors.

The ecological enhancements of the proposed development outlined in this report have been developed in line with UÉ's *Biodiversity Action Plan* (UÉ, 2021), the biodiversity policies and objectives of the Carlow County Development Plan 2022-2028 and the Carlow-Graigecullen Joint Urban Local Area Plan 2024-2030. In accordance with NRA (2009a), it is recognised that ecological mitigation and enhancement measures "*may have a significant beneficial impact, but at a higher or lower geographic scale than the value of the receptor to which they have been applied.*"



5.3 Baseline Ecology

5.3.1 Zone of Influence

The “Zone of Influence” of a plan or proposed development is the area which may experience ecological effects because of its implementation, including any ancillary activities. The various impacts of a plan or project will each have their own characteristics, e.g. nature, extent, magnitude, duration etc. Accordingly, the area subject to each impact (“zone of impact”) will vary depending on characteristics of the impact and the presence of pathways for its propagation. Ecological features within or connected to one or more zones of impact could, depending on their sensitivities, be affected by the plan or project under consideration. The area containing such features may be regarded as the Zone of Influence. As such, in establishing the Zone of Influence for a plan or project, regard must be had to the characteristics of its potential impacts, potential pathways for impacts and the sensitivities of ecological features in the receiving environment.

Box 10 in CIEEM (2018 - v1.3) lists useful question’s which should be asked to assist in establishing the Zone of Influence for a proposal under consideration. This is reproduced in Figure 5-3 below. Consideration must be given to all phases of the proposal under consideration e.g. ground investigations, site preparation, construction, operation and decommissioning (NRA, 2009a; CIEEM, 2018).

Box 10: Ecological considerations for establishing the zone(s) of influence

The following questions will help to determine the zone(s) of influence on ecological features:

- What ‘important’ ecological features (see Chapter 4) are known to occur within the project site and the surrounding area?
- What other ‘important’ ecological features could occur within the project site and surrounding area based on knowledge of the local distribution of relevant habitats and species?
- What activities may generate ecological impacts and which of these might have an influence on ecological features beyond the site boundaries? (see Box 9)
- Is the project likely to affect migratory species?
- Is the area used by mobile species that make regular movements to, from, or across the site?
- What are the key ecological processes or species activity periods? Are there seasonal variations in distribution, abundance and activity?
- Does peatland occur within the project site and surrounding area? If so, the extent of the hydrology associated with the habitat should be included in the zone of influence. Any assessment of impacts should include a buffer beyond the project site determined by the topography, hydrology and the project, for example the UK Peatland Code uses a 30m buffer for a ditch.
- What are the key hydrodynamic processes at the site (e.g. tidal currents, wave activity)? Are there seasonal or cyclic variations in these?
- Does the project affect any sites, directly or indirectly, that are designated or likely to be designated in the foreseeable future? What are the reasons for designation?
- What is required for the maintenance of particular ecosystems, networks, habitats or species populations? How would these be affected by project activities?
 - What are their distribution and status elsewhere for comparison?
 - What were their historical distributions, status and management compared with present?
 - Is anything known about the key factors influencing distribution and abundance of the feature(s)?
 - What are their scales of variation, vulnerability and likely exposure to the project?
- Are there any features whose disappearance would have significant consequences for other features?
- Are there any other projects planned within the same area or time-frame that may contribute to cumulative effects? (see 5.19 - 5.22)

Figure 5-3 - Factors in establishing the Zone of Influence. Source: CIEEM (2018 - v1.3).

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Following the guidance in NRA (2009a) and CIEEM (2018), and based on the nature, scale and location of the proposed development, the baseline conditions in the receiving natural environment and the potential pathways for ecological impacts, the likely zones of impact from the proposed development were defined as: -

- For direct impacts, e.g. habitat loss and fragmentation, all areas within and immediately adjoining the red-line boundary.
- For temporary disturbance to fauna (including from general construction noise and artificial lighting), as well as the spread of invasive species, all areas within a buffer of 150m from the red-line boundary. While a precautionary buffer of c. 500m would often apply, e.g. where sensitive receptors such as waterbird populations occur, a reduced buffer of 150m was selected in this case given the semi-urban setting with its inherent baseline levels of disturbance, the screening effect of existing dense vegetation (woodland and scrub) and the absence of such highly sensitive receptors, e.g. Wigeon, Greenshank or Curlew. This was still considered precautionary given that the most sensitive receptor likely to be present in the vicinity of the proposed development is Otter (*Lutra lutra*) and that National Roads Authority (NRA) guidelines⁴¹ suggest a threshold of c. 150m from an active breeding holt for disturbance from activities such as piling or blasting.
- For underwater noise and vibration, the River Barrow up to c. 700m from the proposed outfall works.
- For water quality and other hydrological impacts, e.g. hydrological regime and hydromorphology, the River Barrow adjacent to and downstream of the proposed development.
- For indirect impacts, any other areas with potential ecological connectivity to the above zones of impact, e.g. connected wetlands and waterbodies.

The Zone of influence was defined as sum of the above zones of impact.

Using QGIS, spatial data for waterbodies and catchments from *EPA Geoportal* were viewed in conjunction with aerial imagery from *Google Maps* to identify pathways and zones of impact from the proposed development, and other potential ecological connections to the wider landscape. These were then mapped in relation to designated sites, habitats, species and other ecological features using spatial data from *NPWS Maps and Data* (see Figure 5-4). The wider Zone of Influence was examined to identify any other ecological receptors with potential ecological connectivity to these zones of impact.

⁴¹ NRA (2008). *Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes*.

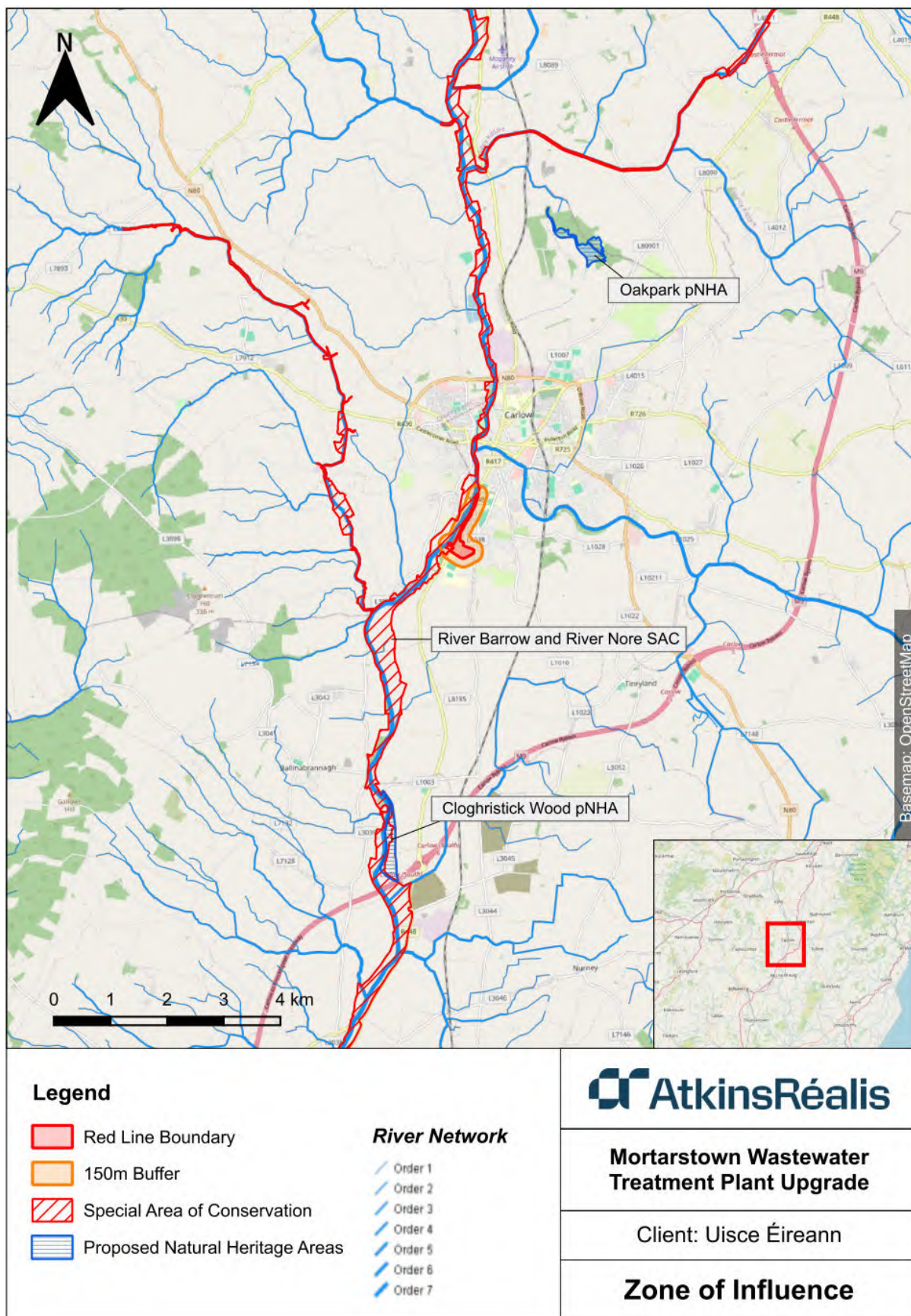


Figure 5-4 - Pathways for impacts from the proposed development in relation to designated sites (as per NPWS and EPA data accessed 09/09/2025).

5.3.2 Designated Sites

5.3.2.1 International Sites

Within the Zone of influence, there are 2 no. sites designated as Wetlands of International Importance under the Convention on Wetlands of International Importance especially as Waterfowl Habitat (“the Ramsar Convention”), namely the Slieve Bloom Mountains (site no. 335)⁴² and Pollardstown Fen (site no. 474)⁴³.

The Slieve Bloom Mountains Ramsar Site is situated c. 38km north-west of the proposed development over land. The site includes the largest and most intact known area of mountain blanket bog in Ireland and is one of Ireland’s most important sites for breeding Hen Harrier (*Circus cyaneus*). Other species of interest at this site include Peregrine (*Falco peregrinus*), Merlin (*F. columbarius*) and Red Grouse (*Lagopus lagopus*).

The Pollardstown Fen Ramsar Site is situated c. 45km north-east of the proposed development over land. The site includes Ireland’s largest spring-fed fen. Other habitats include damp grassland, woodland and open water, while species include a number of rare and threatened plants, invertebrates, birds and mammals. Birds of interest at this site include Mallard (*Anas platyrhynchos*), Snipe (*Gallinago gallinago*) and Little Grebe (*Tachybaptus ruficollis*). Rare species, e.g. Marsh Harrier (*Circus aeruginosus*) and Reed Warbler (*Acrocephalus scirpaceus*) visit occasionally.

For the following reasons, neither of these 2 no. Ramsar sites is considered to be an ecological receptor for the proposed development:

- Given the large distances between the proposed development and these sites, there is no possibility of direct impacts.
- As both sites are >65km upstream of the proposed development, there is no possibility of hydrological or hydromorphological impacts.
- As these sites are in separate ground waterbodies from the proposed development, there is no possibility of hydrogeological impacts.
- As none of the wetland habitats or bird species of interest at either of these sites are dependent on any of the habitats or species which are likely to be affected by the proposed development, there is no possibility of any ex-situ, indirect or secondary effects on either of these sites.

There are no UNESCO World Heritage Sites or UNESCO Biosphere Reserves near the proposed development or within its Zone of influence.

5.3.2.2 European Sites

The Habitats Directive (92/43/EEC) is primary legislation of the European Union which provides legal protection for habitats and species of Community interest. Article 2 requires the maintenance or restoration of such habitats and species at a favourable conservation status, while Articles 3 to 9, inclusive, provide for the establishment and conservation of a Community-wide network of special areas of conservation (SACs), known as Natura

⁴² RSIS: Slieve Bloom Mountains (<https://rsis.ramsar.org/ris/335>) [accessed 05/09/2025]. Ramsar Site Information Service.

⁴³ RSIS: Pollardstown Fen (<https://rsis.ramsar.org/ris/474>) [accessed 05/09/2025]. Ramsar Site Information Service.

2000, which also includes special protection areas (SPAs) designated under the Birds Directive (2009/147/EC). Both SACs and SPAs are commonly referred to as “European sites” or “Natura 2000 sites”.

SACs are selected for natural habitat types listed on Annex I to the Habitats Directive and the habitats of species listed on Annex II to the Habitats Directive. SPAs are selected for species listed on Annex I to the Birds Directive, other regularly occurring migratory species and other species of special conservation interest. The habitats and species for which a Natura 2000 site is selected are referred to as the “qualifying interests” of that site and each is assigned a “conservation objective” aimed at maintaining or restoring its “favourable conservation condition” at the site, which contributes to the maintenance or restoration of its “favourable conservation status” at national and European levels.

The proposed development intersects the boundaries of 1 no. Natura 2000 site, namely the River Barrow and River Nore SAC (site code: 002162). This site is designated for a range of Annex I habitat types and Annex II species, including the following that are particularly relevant with regard to the proposed development:

- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation (3260)
- Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels (6430)
- *Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) (91E0)
- Freshwater Pearl Mussel (*Margaritifera margaritifera*) (1029)
- White-clawed Crayfish (*Austropotamobius pallipes*) (1092)
- Sea Lamprey (*Petromyzon marinus*) (1095)
- Brook Lamprey (*Lampetra planeri*) (1096)
- River Lamprey (*Lampetra fluviatilis*) (1099)
- Twait Shad (*Alosa fallax fallax*) (1103)
- Salmon (*Salmo salar*) (1106)
- Otter (*Lutra lutra*) (1355)

The NIS (AtkinsRéalis Report Ref. 5161805DG0457 - NIS) presents a detailed description of this Natura 2000 site and assess the implications of the proposed development, individually and in combination with other plans and projects, for the integrity of the site, in view of its conservation objectives. The NIS also assesses the potential for ecological connectivity with other Natura 2000 sites in the Zone of influence.

5.3.2.3 National Sites

Natural Heritage Areas

Natural Heritage Areas (NHAs) are designated under the Wildlife Act, 1976 (as amended) due to their importance for the habitats present or which support species of plants and animals whose habitat requires protection. In addition, there are 630 no. proposed Natural Heritage Areas (pNHAs) nationally; these were



published on a non-statutory basis in 1995 and, although they have not yet been formally designated, their ecological value is recognised by public authorities.

There are 3 no. NHAs designated within the Zone of influence of the proposed development, as follows:

- Hodgestown Bog (site code: 001393) is >50km north of the proposed development and is designated for the protection of its raised bog habitats.⁴⁴
- Daingean Bog (site code: 002033) is >55km north-west of the proposed development and is designated for the protection of its raised bog habitats and its population of Irish Hare (*Lepus timidus hibernicus*).⁴⁵
- Clonreher Bog (site code: 002357) is >35 km north-west of the proposed development and is designated for the protection of its raised bog habitats.⁴⁶

All three of these sites are in the upper reaches of the Barrow catchment and are of conservation interest for their terrestrial habitats and species. Given the nature and scale of the proposed development and its location at large distances downstream from these areas, there are no pathways for impacts to these habitats and species.

There is a total of 37 no. pNHAs within the Zone of influence, most of which are situated at great distances from the proposed development. However, the following 7 no. (out of the 37 no. total) are within 15km of the proposed development:

- Ardristan Fen pNHA (site code: 000788)
- Ballymoon Esker pNHA (site code: 000797)
- Cloghrystick Wood pNHA (site code: 000806)
- Oakpark pNHA (site code: 000810)
- Whitehall Quarries pNHA (site code: 000855)
- Ballylynan pNHA (site code: 000857)
- Barrow Valley at Tankardstown Bridge pNHA (site code: 000858)

Oakpark pNHA and Whitehall Quarries pNHA are situated 4.5km north-east and 14.2km south-west, respectively, of the proposed development and do not have any surface water connectivity to the proposed development. All the remaining sites have some surface water connectivity to the proposed development. However, with the exception of Cloghrystick Wood pNHA, which is c. 4.8km downstream of the proposed development (on the River Barrow), all are upstream of the proposed development (the closest is the Barrow Valley at Tankardstown Bridge pNHA, c. 13.5km upstream).

⁴⁴ Natural Heritage Area (Hodgestown Bog NHA 001393) Order, 2005. *SI No. 586/2005*.

⁴⁵ Natural Heritage Area (Daingean Bog NHA 002033) Order, 2005. *SI No. 6/2005*.

⁴⁶ Natural Heritage Area (Clonreher Bog NHA 002357) Order, 2005. *SI No. 576/2005*.

Cloghrystick Wood pNHA is of interest for its woodland complex, which includes Annex I priority habitat 'alluvial forests' (which is a qualifying interest of the overlapping River Barrow and River Nore SAC) and a larger area of mixed broadleaved woodland.

There are 2 no. further pNHAs downstream of the proposed development, namely:

- Clohastia pNHA (site code: 000830) is situated on the right-hand bank of the River Barrow >36km downstream of the proposed development. No site synopsis is available for this site. However, it is clear from satellite imagery that it supports woodland, scrub, semi-natural grasslands and open water in a disused quarry. As such, this site is likely of botanical interest and may support nesting birds such as Kestrel (*Falco tinnunculus*) or Peregrine (*F. peregrinus*) as well as providing woodland connectivity along the riparian corridor.
- Barrow River Estuary pNHA (site code: 000698) is situated >52km downstream and is of interest for its estuarine eco-system and the habitats and species that that supports. These are also largely included within the River Barrow and River Nore SAC designation.

National Parks and Nature Reserves

There are no National Parks in the Zone of influence of the proposed development. The nearest National Park is Wicklow Mountains, c. 35km north-east of the proposed development, outside the Zone of influence.

There are 2 no. statutory Nature Reserves within the Zone of influence of the proposed development.

- Slieve Bloom Mountains is of scientific interest for its mountain blanket bog ecosystem.⁴⁷ This site is situated c. 38km north-west of the proposed development over land and is >65km upstream.
- Timahoe Esker Nature Reserve is of scientific interest for its woodland ecosystem.⁴⁸ This site is situated c. 24km north-west of the proposed development over land, and is >40km upstream.

For the following reasons, neither of these 2 no. Nature Reserves are considered to be an ecological receptor for the proposed development:

- Given the large distances between the proposed development and these sites, there is no possibility of direct impacts.
- As both sites are >40km upstream of the proposed development, there is no possibility of hydrological or hydromorphological impacts.
- As these sites are in separate ground waterbodies from the proposed development, there is no possibility of hydrogeological impacts.
- As none of the ecosystems for which these sites were selected is dependent on any of the habitats or species which are likely to be affected by the proposed development, there is no possibility of any ex-situ, indirect or secondary effects on either of these sites.

⁴⁷ Nature Reserve (Slieve Bloom Mountains) Establishment Order, 1985. *SI No. 382/1985*.

⁴⁸ Nature Reserve (Timahoe Esker) Establishment Order, 1985. *SI No. 383/1985*.

Wildfowl Sanctuaries

Wildfowl Sanctuaries are areas that have been excluded from the Wildlife (Wild Birds) (Open Seasons) Order, 1979-2012 so that game birds can rest and feed undisturbed from shooting. Spatial data is not yet available for Wildfowl Sanctuaries. Based on the list of Wildfowl Sanctuaries published on the NPWS website⁴⁹, 2 no. such sites were identified as having potential connectivity from the proposed development, namely the River Barrow (Muine Bheag) (site no. WFS-01) and the River Barrow (Goresbridge) (site no. WFS-31), which are situated c. 10km and >25km downstream of the proposed development, respectively. However, given the nature, scale and location of the proposed development, it does not have any potential to cause disturbance to wildfowl in either of these sites or cause any reduction in the extent or quality of the habitats on which they depend.

5.3.3 Habitats

Following the Fossitt (2000) classification, the habitats found in the vicinity of the proposed development are described in Table 5-3 below and mapped in Figure 5-7 to Figure 5-9. Where relevant, correspondence to natural habitat types listed on Annex I to the Habitats Directive⁵⁰ is also highlighted.

Table 5-3 - Fossitt (2000) habitat types in the study area.

Code	Habitat name	Description
FW2	Depositing/lowland rivers	Adjacent to the proposed development, the River Barrow is a 5 th -order watercourse (<i>EPA Maps: Water</i>), 30-35m wide and 1.2m deep in the margins to >3m in the centre (Triturus, 2025). See Appendix 5, Volume 3. The slow, smooth flow type and silted margins are typical of this habitat type. Shade from overhanging trees limits macrophyte growth in the margins to occasional Arrowhead (<i>Sagittaria sagittifolia</i>) and the invasive Nuttall's Waterweed (<i>Elodea nuttallii</i>) (Triturus, 2025). Based on the description and mapping of the Annex I habitat type 'Water courses of plain to montane levels with the <i>Ranunculon fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation' (3260) in the Article 17 Reports (NPWS, 2025d-f the River Barrow is taken to represent an example of this Annex I habitat, which is a qualifying interest of the River Barrow and River Nore SAC.
GA1	Improved agricultural grassland	This category covers highly modified or intensively managed agricultural grasslands. In the vicinity of the proposed development, areas of this habitat include the large field immediately west of the existing WwTP (grazed by sheep) and the smaller fields to the north-west (grazed by horses). The vegetation in these areas is largely that described for the Irish Vegetation Classification (IVC) community 'Perennial Ryegrass (<i>Lolium perenne</i>) – White Clover (<i>Trifolium repens</i>) grassland' (GL3B) and does not correspond to any Annex I habitat type. These areas are of little conservation value.
GA2	Amenity grassland (improved)	Small areas of amenity grassland occur in lawns and public green spaces or landscaped areas around the proposed development. The sward is kept short by regular mowing and herbs such as Daisy (<i>Bellis perennis</i>), Dandelion (<i>Taraxacum</i> spp.), clovers (<i>Trifolium</i> spp.) and plantains (<i>Plantago</i> spp.) are common. The improved amenity grassland within the existing WwTP is included under WD5 below, as trees are a prominent feature. Amenity grassland also occurs intermediate with

⁴⁹ *Wildfowl Sanctuaries* (<https://www.npws.ie/protected-sites/wildfowl-sanctuaries>) [accessed 08/09/2025]. National Parks & Wildlife Service.

⁵⁰ Annex I to the Habitats Directive lists natural habitat types which are of Community interest in the EU and require the establishment of SACs for their protection and the restoration or maintenance of their favourable conservation status. Under Article 17 of the Habitats Directive, Member States are required to monitor the status of these Annex I habitats and report on their conservation status and trends every six years. The latest Article 17 reports for Ireland were published by the NPWS in 2019.

Code	Habitat name	Description
		'Dry meadows and grassy verges' (see GS2 below) and in a mosaic with 'Buildings and artificial surfaces' (see BL3/GA2 below).
GS2	Dry meadows and grassy verges	This category covers grasslands which are rarely fertilised or grazed, but occasionally mown or treated with herbicide, such as roadside verges and abandoned gardens. Common/typical species include False Oat-grass (<i>Arrhenatherum elatius</i>), Yorkshire Fog (<i>Holcus lanatus</i>), thistles (<i>Cirsium</i> spp.), docks (<i>Rumex</i> spp.), Nettle (<i>Urtica dioica</i>), Ragwort (<i>Jacobaea vulgaris</i>), Winter Heliotrope (<i>Petasites pyrenaicus</i>), Hogweed (<i>Heracleum sphondylium</i>) and Ribwort Plantain (<i>Plantago lanceolata</i>). In the southern corner of the existing WwTP, 'Recolonising bare ground' (ED3) grades to GS2 and this then grades to 'Scrub' (WS1) towards the site boundary. A mosaic of GS2/WS1 also occurs surrounding the cottage west of the WwTP and between the road and the river north of the Kilkenny Road WwPS. On the western side of the Kilkenny Road, parts of the grassy verge are more frequently mown or otherwise more intensively managed, causing them to become intermediate with 'Amenity grassland (improved)' (GA2).
WN*	Semi-natural woodland	The area denoted WN* is a mosaic or continuum of 'Riparian woodland' (WN5), 'Wet willow-alder-ash woodland' (WN6) and 'Mixed broadleaved woodland' (WD1), as detailed in O'Connor (2023) (See Appendix 5, Volume 3). The woodland type at any given location within this area is influenced by a combination of vegetation composition, frequency of flooding, soil type and previous management and disturbance and the complex interactions between these factors. The vegetation in the areas which are more representative of WN5 and WN6 corresponds to the IVC community 'Grey Willow (<i>Salix cinerea</i>) – Common Nettle (<i>Urtica dioica</i>) woodland' (WL3D), while the vegetation composition of the areas more representative of WD1 reflects the drier conditions and less frequent flooding, with canopy species such as Horse Chestnut (<i>Aesculus hippocastanum</i>), Poplar (<i>Populus</i> sp.) and Wild Plum (<i>Prunus domestica</i>) replacing the willows (<i>Salix</i> spp.) of the wetter and more frequently flooded areas. Parts of this woodland correspond to the Annex I priority⁵¹ habitat type '*Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i>, <i>Alnion incanae</i>, <i>Salicion albae</i>)' (91E0), which is a qualifying interest of the River Barrow and River Nore SAC. The woodland zonation has been defined as follows and illustrated in Figure 5-5 and Figure 5-6: ▪ Zone A, between the river and the 1-in-10-year flood contour (precautionary), represents the priority Annex I alluvial woodland habitat. ▪ Zone B, between the 1-in-10-year and 1-in-100-year flood contours, represents a transitional area with some elements of alluvial woodland, not corresponding to the priority Annex I habitat but providing an important supporting function. ▪ Zone C, above the 1-in-100-year flood contour (i.e. only inundated in extreme events), represents a mixed broadleaved woodland with very few elements of alluvial woodland, not corresponding to the priority Annex I habitat and providing only a limited supporting function. ▪ Zone D, immediately south of the existing pumping station, represents immature scrub, not corresponding to the priority Annex I habitat and not providing any supporting function. ▪ Zone E, which is on made ground and almost never inundated, represents willow scrub, not corresponding to the priority Annex I habitat and providing only a limited supporting function, i.e. continuity of woodland canopy and a source of

⁵¹ Annex I habitat types marked with an asterisk (*) are "priority habitat types", i.e., natural habitat types in danger of disappearing and for the conservation of which the EU has a particular responsibility given the proportion of their natural ranges falling within the European territory of Member States.

Code	Habitat name	Description
		willow regeneration following damage, and much of this zone has recently been cleared.
WD5	Scattered trees and parkland	Areas of the existing WwTP site not taken up with the wastewater infrastructure, buildings and roadways/footpaths are mostly covered by regularly mown amenity grassland with scattered trees and shrubs, the larger and more mature of which include birches (<i>Betula</i> spp.), domestic apples (<i>Malus domestica</i>), Crab apple (<i>Malus sylvestris</i>) and roses (<i>Rosa</i> spp.). These areas are of some biodiversity value as a food source for birds and invertebrates, and for pollinators.
WS1	Scrub	Scrub of different types is present in a number of locations within and adjacent to the red-line boundary of the proposed development. Immediately south of the existing Kilkenny Road WwPS is an area of scrub dominated by Bramble (<i>Rubus fruticosus</i> agg.) with abundant weedy species including Common Nettle, Hedge Bindweed (<i>Calystegia sepium</i>), False Oat-grass (<i>Arrhenatherum elatius</i>), Great Willowherb (<i>Epilobium hirsutum</i>), and some immature willows (<i>Salix</i> spp.) and Sycamore (<i>Acer pseudoplatanus</i>). There is no canopy and very low woody component. On the raised ground near the outfall location, an area of scrub dominated by stunted Grey Willow (<i>Salix cinerea</i>), Elder (<i>Sambucus nigra</i>) and Hazel (<i>Corylus avellana</i>). Recent disturbance in this area has removed much of the herb layer in this area. This area is mapped as zone E in Figure 5-6. This area provides limited supporting function for the adjoining priority Annex I alluvial woodland, i.e. continuity of woodland canopy and a source of willow regeneration following damage. A large stand of the invasive Japanese Knotweed (<i>Reynoutria japonica</i> syn. <i>Fallopia japonica</i>) occurred here previously, but this has been reduced to a small number of plants occurring down-slope from the scrub. Other areas of scrub include the verges and other neglected areas around the remnants of the old Kilkenny Road (now private) which runs in front of the cottage to the west of the WwTP. These areas are dominated by weedy species such as Bramble, Traveller's-joy (<i>Clematis vitalba</i>), Winter Heliotrope and Butterfly-bush (<i>Buddleja davidii</i>). Scrub is of some biodiversity in providing cover for fauna including mammals and birds, as well as a food source for birds and invertebrates.
WL1	Hedgerows	Hedgerows occur along several field and property boundaries around the WwTP site and surrounding areas, and include as their main species Bramble, Ash (<i>Fraxinus excelsior</i>), maples (<i>Acer</i> spp.), Dog-rose (<i>Rosa canina</i>), Hawthorn (<i>Crataegus monogyna</i>), Blackthorn (<i>Prunus spinosa</i>), elm (<i>Ulmus</i> sp.) and Ivy (<i>Hedera</i> sp.), among others. The hedgerows mapped as WL1/WL2, i.e. on the eastern side of the Kilkenny Road north of the WwTP, incorporate a significant proportion of trees >5m tall within them, but their overall character remains that of a hedgerow rather than a treeline. Hedgerows are of biodiversity value as nesting habitat for birds and a food source for birds and invertebrates and also provide connectivity between other habitats in the landscape.
WL2	Treelines	North and west of the WwTP, where the new WwPS is proposed, there are mature treelines of Sycamore and Birch, as well as mature conifers. Along the northern and south-eastern boundary of the existing WwTP site, there is a treeline of mature Leyland Cypress (<i>Cupressus × leylandii</i>) with occasional ornamental maples.
ED2	Spoil and bare ground	These are areas of bare ground or unconsolidated material that are kept largely clear of vegetation (at least 50% of the area is free of vegetation) due to recent or regular disturbance.
ED3	Recolonising bare ground	This category includes areas of previously bare or disturbed ground which is being recolonised by vegetation (at least 50% of the area is vegetated). Species commonly observed in these areas in the vicinity of the proposed development included

Code	Habitat name	Description
		willowherbs (<i>Epilobium</i> spp.), Greater Plantain (<i>Plantago major</i>), Knotgrass (<i>Polygonum aviculare</i>) and Shepherd's-purse (<i>Capsella bursa-pastoris</i>).
BC3	Tilled land	During the surveys which informed the habitat mapping, a field to the south of the existing WwTP site had been tilled in preparation for planting of crops.
BL1	Stone walls and other stonework	An old stone walls occurs on the eastern boundary of the existing Kilkenny Road WwPS and continues south for c. 125m along the road. This wall is relatively well maintained and, consequently, supports only common species of this habitat, including spleenworts (<i>Asplenium</i> spp.), Herb-Robert (<i>Geranium robertianum</i>), Navelwort (<i>Umbilicus rupestris</i>), Ivy, Ivy-leaved Toadflax (<i>Cymbalaria muralis</i>) and Red Valerian (<i>Centranthus ruber</i>).
BL3	Buildings and artificial surfaces	This category includes all of the roads, footpaths, areas of hardstanding, buildings (regardless of use) and other structures within and adjoining the red-line boundary of the proposed development. Generally, these are of little to no biodiversity value. However, some buildings and other structures can provide roosting and nesting habitats for bats and certain species of birds. Where this is the case, buildings or structures in the vicinity of the proposed development of value for bats or birds are highlighted in the relevant sections below.
BL3/GA2	Buildings and gardens	Buildings such as domestic dwellings and their associated landscaped areas or gardens are mapped as a mosaic of primarily BL3 and GA2. These also frequently contain areas of 'Ornamental/non-native shrub' (WS3), 'Horticultural land' (BC2), 'Flower beds and borders' (BC4) and 'Stone walls and other stonework' (BL1). Many species, particularly shrubs, from gardens and landscaping have escaped into the surrounding area and become established.

Other than the river and alluvial woodland described above, there are no Annex I habitats within or near the proposed development footprint and most of the other habitats are of limited ecological importance, being mostly highly modified or subject to frequent disturbance. The main ecological value of the remaining areas is as habitat or connectivity for birds, mammals and invertebrates, particularly in mature trees, treelines and patches of scrub. Therefore, only the river and woodland are considered as a key ecological receptors for the proposed development.



Figure 5-5 - South of existing pumping station, Zone A representing Annex I priority alluvial woodland (91E0). Source: Figure 3 in O'Connor (2023); Note: Refer to Table 5-3 for description of Zone A to D.



Figure 5-6 - Vicinity of outfall pipe, Zone A representing Annex I priority alluvial woodland (91E0) and Zone E – willow scrub. Source: Figure 4 in O'Connor (2023);

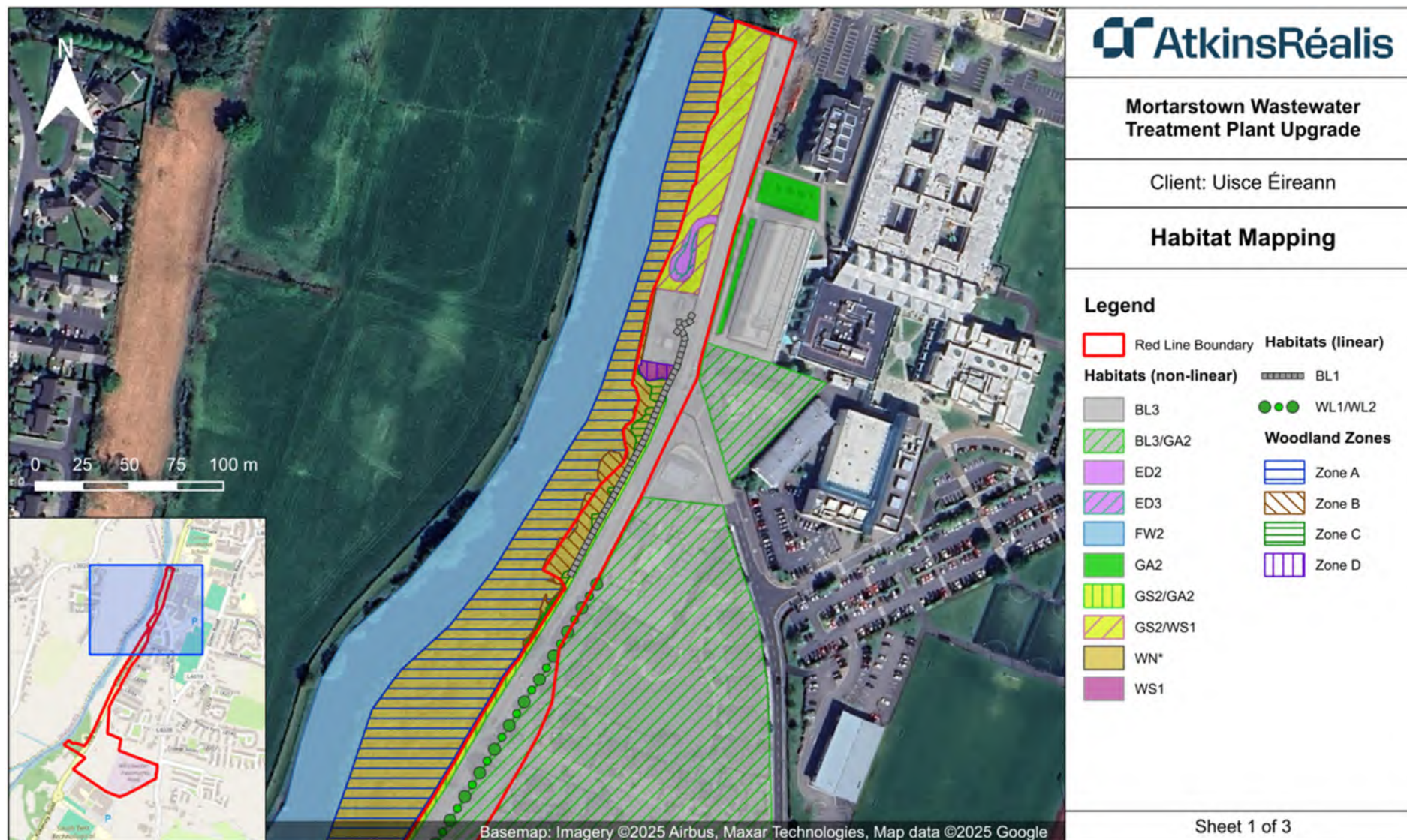


Figure 5-7 - Habitat mapping following the Fossitt (2000) classification. Sheet 1 of 3.

Mortarstown Master EIA Volume 2 -
Final



AtkinsRéalis - Baseline / Référence



Figure 5-8 - Habitat mapping following the Fossitt (2000) classification. Sheet 2 of 3.

Mortarstown Master EIA Volume 2 -
Final



AtkinsRéalis - Baseline / Référence

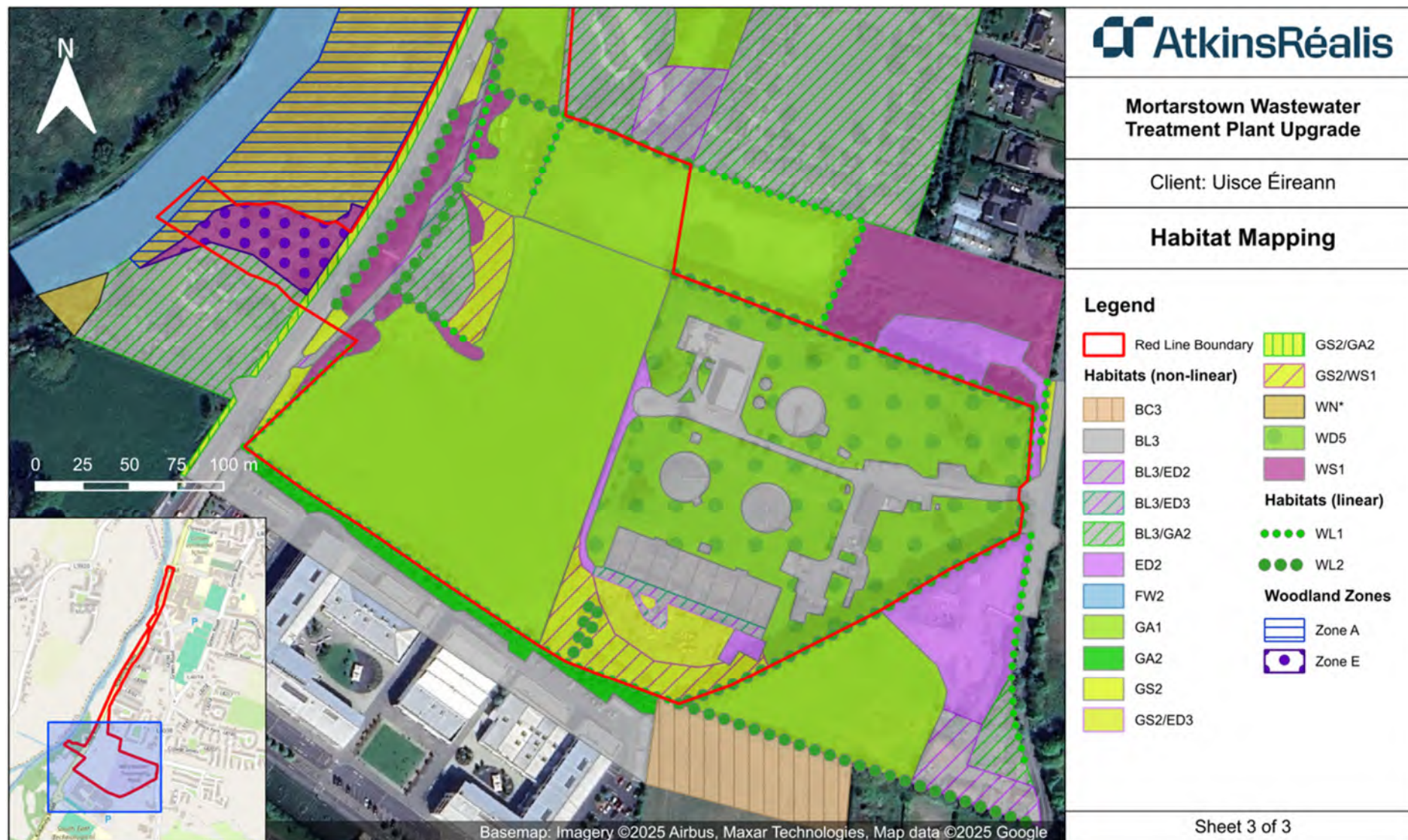


Figure 5-9 - Habitat mapping following the Fossitt (2000) classification. Sheet 3 of 3.

Mortarstown Master EIA_R_Volume 2 -
Final



AtkinsRéalis - Baseline / Référence

5.3.4 Protected and Threatened Species

5.3.4.1 Flora

The current list of plant species protected by Section 21 of the Wildlife Act⁵² is set out in the Flora Protection Order⁵³ (FPO), which gives legal protection to 89 no. vascular plant species and 65 no. bryophyte species. The conservation status of floral species are assessed at the national level in the Irish Red Lists of Vascular Plants⁵⁴ and Bryophytes⁵⁵.

Based on NPWS Data Request No. 2025_133 and the *FPO (Vascular Plants) Map Viewer*⁵⁶, the following 2 no. species listed on the FPO have been recorded in hectad S77:

- Meadow Saffron (*Colchicum autumnale*), which is listed as 'Endangered' in the Irish Red List of Vascular Plants, was recorded south of Carlow town in 1836.
- Red Hemp-nettle (*Galeopsis angustifolia*), which is listed as 'Vulnerable' in the Irish Red List of Vascular Plants, was recorded north of Carlow town in 1898.

In addition, the following 2 no. species have also been recorded in hectad S77:

- Basil Thyme (*Clinopodium acinos*), which is listed as 'Near Threatened' in the Irish Red List of Vascular Plants, was recorded south of Carlow town in 1898.
- Henbane (*Hyoscyamus niger*), which is listed as 'Near Threatened' in the Irish Red List of Vascular Plants, was recorded at Browne's Hill (east of Carlow town) in 1866.

Only the records for Meadow Saffron and Basil Thyme are potentially in close proximity to the proposed development, i.e. "south of Carlow town". It should be noted that both of these records are pre-1900. While there is potentially suitable habitat for Meadow Saffron in the vicinity of the proposed development (although not within the construction footprint), this plant is highly conspicuous and, as such, the absence of any records of it from this area for well over a century is a strong indication that it is no longer present. No evidence of this species was found during the field surveys. Suitable habitat for Basil Thyme was not encountered during the surveys.

No records of protected or threatened bryophytes were found in NPWS Data Request No. 2025_133 or on the *FPO (Bryophytes) Map Viewer*⁵⁷.

⁵² Wildlife Act, 1976. No. 39 of 1976. Updated to 16 May 2024 (<https://revisedacts.lawreform.ie/eli/1976/act/39/revised/en/html>) [accessed 01/08/2025]. Law Reform Commission.

⁵³ Flora (Protection) Order, 2022. SI No. 235/2022.

⁵⁴ Wyse Jackson *et al.* (2016). *Ireland Red List No. 10: Vascular Plants*. NPWS.

⁵⁵ Hodgetts & Lockhart (2025). *Ireland Red List No. 14: Bryophytes (Mosses, Liverworts & Hornworts)*. NPWS.

⁵⁶ Flora (Protection) Order 2022 Map Viewer (<https://heritagedata.maps.arcgis.com/apps/webappviewer/index.html?id=a41ef4e10227499d8de17a8abe42bd1e>) [accessed 10/09/2025]. NPWS

⁵⁷ FPO Bryophytes (<https://dahg.maps.arcgis.com/apps/webappviewer/index.html?id=71f8df33693f48edbb70369d7fb26b7e>) [accessed 10/09/2025]. NPWS.

The search of the NBDC database (see geographic extent in Figure 5-1 above) did not return any records of protected or threatened vascular plants or bryophytes.

None of the floral species observed during the field surveys are listed on the FPO or assessed as greater than 'Least Concern' in the relevant Irish Red List.

Based on the above results of the desk study and field surveys with regard to protected and threatened flora, such species are not considered to be a key ecological receptor for the proposed development.

5.3.4.2 Birds

All wild birds are protected under the Wildlife Act (principally Sections 19 and 22). Bird species of conservation interest include those listed on Annex I to the Birds Directive and those listed on the *Birds of Conservation Concern in Ireland 4: 2020-2026* (BoCCI4) Red and Amber Lists⁵⁸.

Desk Study

The search of the NBDC database (see geographic extent in Figure 5-1 above) found that the species listed in Table 5-4 below had been recorded recently or historically either within the search area or in the same hectad (S77). The records received in NPWS Data Request No. 2025_133 did not include any additional species.

Table 5-4 - Wild bird species of conservation interest recorded in the vicinity of the proposed development. Source: NBDC Biodiversity Maps. BD-I = Birds Directive, Annex I.

Common name	Scientific name	Designation
Golden Plover	<i>Pluvialis apricaria</i>	BD-I; BoCCI-Red
Kingfisher	<i>Alcedo atthis</i>	BD-I; BoCCI-Amber
Whooper Swan	<i>Cygnus cygnus</i>	BD-I; BoCCI-Amber
Little Egret	<i>Egretta garzetta</i>	BD-I
Meadow Pipit	<i>Anthus pratensis</i>	BoCCI-Red
Swift	<i>Apus apus</i>	BoCCI-Red
Stock Pigeon	<i>Columba oenas</i>	BoCCI-Red
Yellowhammer	<i>Emberiza citrinella</i>	BoCCI-Red
Coot	<i>Fulica atra</i>	BoCCI-Red
Snipe	<i>Gallinago gallinago</i>	BoCCI-Red
Grey Wagtail	<i>Motacilla cinerea</i>	BoCCI-Red
Curlew	<i>Numenius arquata</i>	BoCCI-Red
Redwing	<i>Turdus iliacus</i>	BoCCI-Red
Barn Owl	<i>Tyto alba</i>	BoCCI-Red
Lapwing	<i>Vanellus vanellus</i>	BoCCI-Red
Sky Lark	<i>Alauda arvensis</i>	BoCCI-Amber

⁵⁸ Gilbert, G., Stanbury, A. and Lewis, L. (2021). Birds of Conservation Concern in Ireland 4: 2020-2026. *Irish Birds* 43:1-22.

Common name	Scientific name	Designation
Teal	<i>Anas crecca</i>	BoCCI-Amber
Mallard	<i>Anas platyrhynchos</i>	BoCCI-Amber
Gadwall	<i>Anas strepera</i>	BoCCI-Amber
Tufted Duck	<i>Aythya fuligula</i>	BoCCI-Amber
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	BoCCI-Amber
Mute Swan	<i>Cygnus olor</i>	BoCCI-Amber
House Martin	<i>Delichon urbicum</i>	BoCCI-Amber
Kestrel	<i>Falco tinnunculus</i>	BoCCI-Amber
Brambling	<i>Fringilla montifringilla</i>	BoCCI-Amber
Barn Swallow	<i>Hirundo rustica</i>	BoCCI-Amber
Lesser Black-backed Gull	<i>Larus fuscus</i>	BoCCI-Amber
Spotted Flycatcher	<i>Muscicapa striata</i>	BoCCI-Amber
House Sparrow	<i>Passer domesticus</i>	BoCCI-Amber
Tree Sparrow	<i>Passer montanus</i>	BoCCI-Amber
Cormorant	<i>Phalacrocorax carbo</i>	BoCCI-Amber
Willow Warbler	<i>Phylloscopus trochilus</i>	BoCCI-Amber
Goldcrest	<i>Regulus regulus</i>	BoCCI-Amber
Sand Martin	<i>Riparia riparia</i>	BoCCI-Amber
Starling	<i>Sturnus vulgaris</i>	BoCCI-Amber

While many of these species may be associated with habitat types in S77 which do not occur within the study area, several of these bird species are likely to occur regularly (at least on a seasonal basis) along the River Barrow in the vicinity of the proposed development, especially Kingfisher, Little Egret, Coot, Grey Wagtail, Mallard, Black-headed Gull, Mute Swan, Lesser Black-backed Gull, Cormorant and Sand Martin. While there is no suitable nesting habitat for Kingfisher in the vicinity of the proposed development, there is suitable foraging habitat around the outfall location. Species such as Little Egret, Coot and Mallard may breed in the woodland between the outfall and the existing WwPS. Grey Wagtail may forage along the riverbank in this area, though there are limited; in the absence of stone bridges or buildings, nesting opportunities would include crevices along the riverbank, or in tree roots etc. Cormorant breeds colonially on trees (inland colonies) or on offshore islands – there are no records of large breeding colonies from this area. There are no records of either Black-headed Gull or Lesser Black-backed Gull nesting colonies from the study area or environs; these mostly occur during the winter months foraging in the river. Cormorant may also roost in the riparian trees along the River Barrow. There is limited potential nesting habitat for Mute Swan in the vicinity of the proposed development, but this species likely commutes along the river. There is no suitable nesting habitat for Sand Martin, but this species may forage over the river.

Other species of conservation interest which may occur in the vicinity of the proposed development include Yellowhammer, Barn Owl, House Martin, Kestrel, Barn Swallow and House Sparrow. Yellowhammer may nest in higher-quality hedgerows near the proposed development and feed in areas under cereal crops in the surrounding landscape. There are limited nesting opportunities for Barn Owl or Kestrel in the vicinity of the proposed development, but hunting opportunities do exist, including on the WwTP site. House Martin, Barn

Swallow and House Sparrow could all potentially nest in or on the existing and proposed buildings on the WwTP site.

Field Surveys

Wild bird species observed during the field surveys included Collared Dove (*Streptopelia decaocto*), Jackdaw (*Corvus monedula*), Rook (*C. frugilegus*), Magpie (*Pica pica*), Blackbird (*Turdus merula*), Robin (*Erithacus rubecula*), Wren (*Troglodytes troglodytes*), Chaffinch (*Fringilla coelebs*), Woodpigeon (*Columba palumbus*), Dunnock (*Prunella modularis*), Grey Heron (*Ardea cinerea*) and Blue Tit (*Cyanistes caeruleus*), all of which are on the BoCCI4 Green List and none of which are on Annex I to the Birds Directive.

Possible evidence of Buzzard (*Buteo buteo*) was also noted around the WwTP site, including partial remains of prey species such as corvids and rabbits. This species is also on the BoCCI4 Green List and is not on Annex I to the Birds Directive.

A local resident met during the surveys mentioned that they had previously seen 2 no. Great Spotted Woodpecker (*Dendrocopos major*) near the cottage to the west of the WwTP site. This species is currently increasing its population and expanding its range in Ireland. It is on the BoCCI4 Green List and is not on Annex I to the Birds Directive.

Pheasant (*Phasianus colchicus*) was also recorded during the surveys. This is a game bird native to Asia and was introduced to Ireland for recreational hunting. As such, it is not a species of conservation importance.

Based on the results of the desk study and the bird species observed during the walkover and other surveys (all of which are common and widespread), further targeted surveys for birds were not deemed necessary.

Evaluation

Based on all the above and the nature and scale of the proposed development, the only species of specific interest in terms of impacts to its habitats is Kingfisher. Disturbance and habitat loss from the proposed development are of concern for birds in general (rather than any species in particular). There are also opportunities for enhancements for birds to be incorporated as part of the proposed development. Therefore, birds are considered a key ecological receptor.

5.3.4.3 Bats

Desk Study

Abbott Ecology (2024) undertook a desktop review regarding bats. This included a review of recent and historic records of bats covering the same area as Figure 5-1 above, landscape-scale bat Habitat Suitability Index (HSI) scores (Lundy *et al.*, 2011) and caves or other underground sites, as well as the three previous bat survey reports for the proposed development (Shiel, 2020, 2021a,b) and available bat reports for other projects in the vicinity.

No records for bat species were returned in NPWS Data Request No. 2025_133.

Field Surveys

The most recent annual cycle of bat surveys for the proposed development were undertaken by Abbott Ecology (2024) and Shiel (2025a,b), which are presented in Appendix 5-7 to 5-9, Volume 3 of this EIAR.

Abbott Ecology (2024) found that bat activity levels in the vicinity of the proposed development were low, but species diversity was high, with 7 no. of the 9 no. resident bat species known to Ireland detected during the surveys, albeit in low numbers. All of the bat species recorded during survey are:



- listed on Annex IV to the Habitat Directive, affording them strict protection under Article 12, as transposed into Irish law by Regulation 51 of the Habitats Regulations⁵⁹,
- protected under the Wildlife Act,
- assessed as having 'Favourable' conservation status in Ireland⁶⁰ and
- assessed as 'Least Concern' in the Irish Red List⁶¹.

3 no. species accounted for >90% of the overall passively detected acoustic bat activity, namely Soprano Pipistrelle (*Pipistrellus pygmaeus*), Common Pipistrelle (*Pipistrellus pipistrellus*), and Leisler's Bat (*Nyctalus leisleri*). These are the three most common bat species in Ireland and are also more tolerant of artificial lighting and urbanisation than other Irish bat species.

Daubenton's Bat (*Myotis daubentonii*) was recorded in its typical foraging habitat along the River Barrow at the WwPS, but also in low numbers at a non-typical habitat at the north-west corner of the WwTP on 5 out of 6 nights. The rarer *Myotis* sp., Natterer's Bat (*M. nattereri*) and Whiskered Bat (*M. mystacinus*) were also confirmed once each at this location. Brown Long-eared Bat (*Plecotus auritus*) was also recorded here on 5 out of 6 nights, and at 4 no. other locations near the WwTP.

Overall, habitats were assessed as having 'Low' to 'Moderate' suitability to foraging and commuting bats, following Collins (2023)⁶². Little foraging activity was observed at Mortarstown WwTP during the surveys. The river corridor supports foraging of Common Pipistrelle, Soprano Pipistrelle, and Daubenton's Bat, and potentially other bat species.

Structures and trees assessed by Abbott Ecology (2024) in terms of their bat roost potential are shown in Figure 5-10 below. Of these, only Structure No. 2 and No 3 were assessed as having 'Moderate' potential. All other buildings were assessed as having 'Low' potential. The Ash tree was assessed as 'PRF-M', meaning that it has potential roost features suitable for multiple bats.

⁵⁹ European Communities (Birds and Natural Habitats) Regulations, 2011. S.I. No. 477/2011 (as amended).

⁶⁰ NPWS (2019c). *The Status of EU Protected Habitats and Species in Ireland. Volume 3: Species Assessments*. NPWS.

⁶¹ Marnell et al. (2019). *Ireland Red List No. 12: Terrestrial Mammals*. NPWS.

⁶² Collins (2023). *Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edition)*. Updated 27/03/2024. BCT.

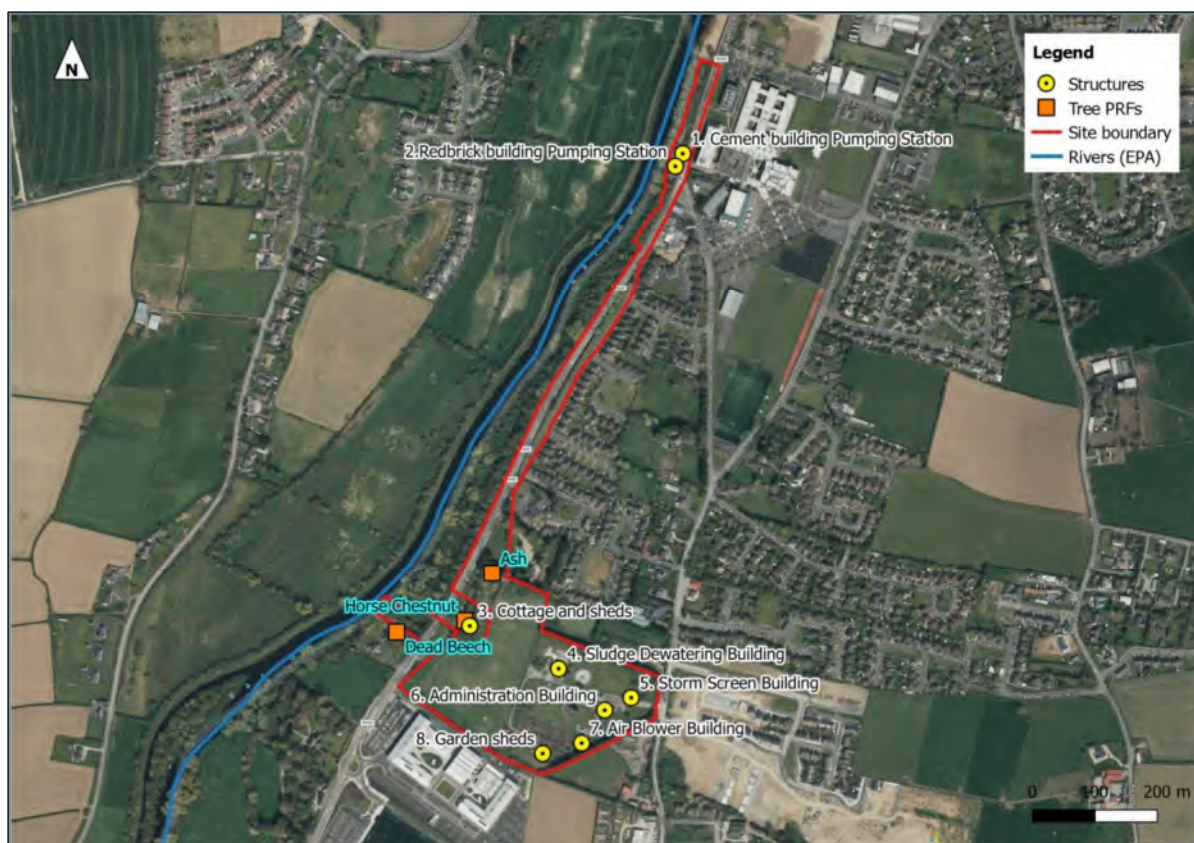


Figure 5-10 - Trees and structures assessed in Abbott Ecology (2024). Taken from Figure 4 of that report.

Shiel (2025a) identified 5 no. areas as having high potential for roosting bats, as shown in Figure 5-11 below.



Figure 5-11 - Areas of potential importance for bats. Taken from Figure 2 in Shiel (2025a).

Area 1 includes the cottage, outbuildings and Horse Chestnut trees between the WwTP site and the Kilkenny Road. The cottage and outbuildings have 'High' potential for roosting bats and the trees have obvious cavities.⁶³ Shiel (2021) confirmed the cottage and adjoining shed as a roost sites for at least 2 no. Soprano Pipistrelle (1 no. bat in each). At least one of the mature Horse Chestnut trees is highly likely to be a roost site for 2 no. Brown Long-eared Bat.

⁶³ The cottage and outbuildings were assessed as having 'Moderate' bat roost potential based on a survey in September 2024 (Abbott Ecology, 2024). Six months later, in March 2025, they were assessed as having 'High' potential. During these six months, the buildings were unoccupied and unused and there were several storms. The lack of occupancy, maintenance and repairs to these buildings over the winter of 2024/25 is likely the main factor in the increase in bat roost potential over this period.

Area 2 is a mature treeline forming the southern property boundary of the large house “Carrig Rua”. This treeline consists of mature Ash, Scots Pine (*Pinus sylvestris*), with a row of mature cypress (Cupressaceae) on the northern side of the treeline. Several of the deciduous species, especially the mature Ash, contain obvious cavities suitable for roosting bats. Shiel (2025b) recorded no bats emerging from any of the trees in the treeline. However, between 6 no. and 8 no. Soprano Pipistrelle were recorded foraging over the paddock to the front of the house shortly after sunset. A smaller number of Soprano Pipistrelle were also recorded foraging in this area at dawn. These bats may have emerged from Carrig Rua house.

Area 3 is a single very mature Beech (*Fagus sylvatica*) with numerous cavities suitable for roosting bats. This tree is situated just north of the red-line boundary and will not be affected by the proposed development.

Area 4 is the existing Kilkenny Road WwPS site, where Structures No. 1 and No. 2 from Abbott Ecology (2024) are located. Shiel (2025b) recorded no bats returning to either of the buildings during the dawn survey.

Area 5 is the woodland between the Kilkenny Road and the River Barrow, with numerous trees with obvious bat roost potential. These trees are outside the red-line boundary and will not be affected by the proposed development.

Area 6 is the area around the existing and proposed outfall locations. When this area was surveyed in May 2021 a dead standing beech tree was identified as having ‘High’ potential for roosting bats. This tree is no longer standing. Other trees have ‘Moderate’ potential for roosting bats. The two large mature willow trees on the riverbank here had no visible bat roost features. Shiel (2025b) recorded a total of 126 no. bat calls here, mostly Soprano Pipistrelle and Common Pipistrelle, but also some Leisler’s Bat, Daubenton’s Bat and Whiskered Bat. This floodplain is an important foraging area for bats.

Evaluation

While the habitats within the footprint of the proposed development and surrounding areas or not generally of ‘High’ importance for bats, particularly in terms of roosting, care is still required during the implementation of the proposed development to avoid any harm to bats or their roosts. There are also opportunities for an enhancements for bats to be incorporated as part of the proposed development. Therefore, bats are considered a key ecological receptor.

5.3.4.4 Non-volant Mammals

Table 5-5 below lists the non-volant mammal species for which records were retrieved from NBDC *Biodiversity Maps* and NPWS Data Request No. 2025_133. In this table, WA = Wildlife Act; IRL = Irish Red List, LC = Least Concern, NA = Not Assessed; HD = Habitats Directive, II/IV/V = Annex II/IV/V.

Table 5-5 - Non-volant mammals recorded overlapping the proposed development (excluding invasive non-native species). Source: NBDC *Biodiversity Maps* and NPWS Data Request No. 2025_133.

Common name	Scientific name	Designation
Otter	<i>Lutra lutra</i>	WA; HD-II,IV; IRL-LC
Irish Hare	<i>Lepus timidus</i> subsp. <i>hibernicus</i>	WA; HD-V; IRL-LC
Pine Marten	<i>Martes martes</i>	WA; HD-V; IRL-LC
Red Deer	<i>Cervus elaphus</i>	WA; IRL-LC
Hedgehog	<i>Erinaceus europaeus</i>	WA; IRL-LC
Badger	<i>Meles meles</i>	WA; IRL-LC
Irish Stoat	<i>Mustela erminea</i> subsp. <i>hibernica</i>	WA; IRL-LC

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A mammal burrow in the vicinity of the outfall was investigated by Sweeney (2021) as a potential Otterholt. No otters were recorded entering or exiting the burrow, while a Pine Marten and a Red Fox (*Vulpes vulpes*) were seen outside it (Red Fox is not a protected species). During field surveys by AtkinsRéalis in 2025, the burrow identified in 2021 was no longer present (it was likely lost to reprofiling of the slope of the made ground at this location).

The field surveys by AtkinsRéalis in 2025 did, however, confirm the presence of Otter in the vicinity of the proposed development. Otter is also listed on Annex IV to the Habitats Directive, affording strict protection to this species and its breeding and resting places. In the latest Article 17 species assessment reports (NPWS, 2025d-f), the conservation status of Otter is assessed as 'Favourable' and 'improving'. While Otter commuting and regular sprainting sites were identified, a thorough search found no potential holts.

The results of the 2025 non-volant mammal surveys are as follows and as illustrated in Figure 5-12 and Figure 5-13 below:

- Other than along the riverbank and around the uninhabited cottage between the WwTP and the Kilkenny Road, there was no evidence of breeding or resting places of non-volant mammals.
- Behind the cottage and outbuildings, there was evidence of burrows of Rabbit and likely Red Fox. One entrance appeared more like that of Badger, but there was no evidence of recent use. This area may be a former annex Badger sett which has been taken over by Rabbits and possibly Fox. The trail camera monitoring at this location recorded Red Fox on 6 no. of the 14 no. nights from 27th March to 10th April. No other mammals were recorded on this camera. On at least one occasion, the same individual was identifiable on both cameras.
- There was much evidence of mammal activity along the riverbank at and upstream of the outfall location, including Otter spraints and slides. Prints in the mud also show evidence of foxes, rats and potentially other mammals. The trail camera monitoring at this location recorded Otter on 8 no. of the 14 no. nights from 27th March to 10th April, confirming regular use of this area by this species. On a number of occasions, 2 no. individuals were seen in the same recording. Other species recorded on this camera included Red Fox, Brown Rat, a domestic cat and several bird species, including Grey Heron.
- The sloped ground around the existing and proposed outfall locations was thoroughly searched. There was very little evidence of mammals using this area and there were no holes/burrows large enough to be used by Otter or even Rabbit. This area is highly disturbed and the ground is full of refuse and rubble, making it very difficult for Otter or other mammals to burrow here.
- Around the existing WwPS, there was some evidence of Otter activity (small number of prints and spraints), but not as intensive as observed along the riverbank in the southern part of the woodland, and there were no signs of any holts.

Other non-volant mammals protected under the Wildlife Act which may use the habitats found in the vicinity of the proposed development include: Hedgehog (*Erinaceus europaeus*), Irish Hare (*Lepus timidus* subsp. *hibernicus*), Badger (*Meles meles*), Irish Stoat (*Mustela erminea* subsp. *hibernica*), Red Squirrel (*Sciurus vulgaris*) and Pygmy Shrew (*Sorex minutus*). However, limited evidence of these mobile species was observed during field surveys.

Given that Otter, a strictly protected species, regularly occurs in close proximity to the proposed development and is sensitive to disturbance and other impacts, this species is considered to be a key ecological receptor. Given the lack of evidence of the presence of other protected or threatened non-volant mammals, these are not considered to be key ecological receptors for the proposed development.



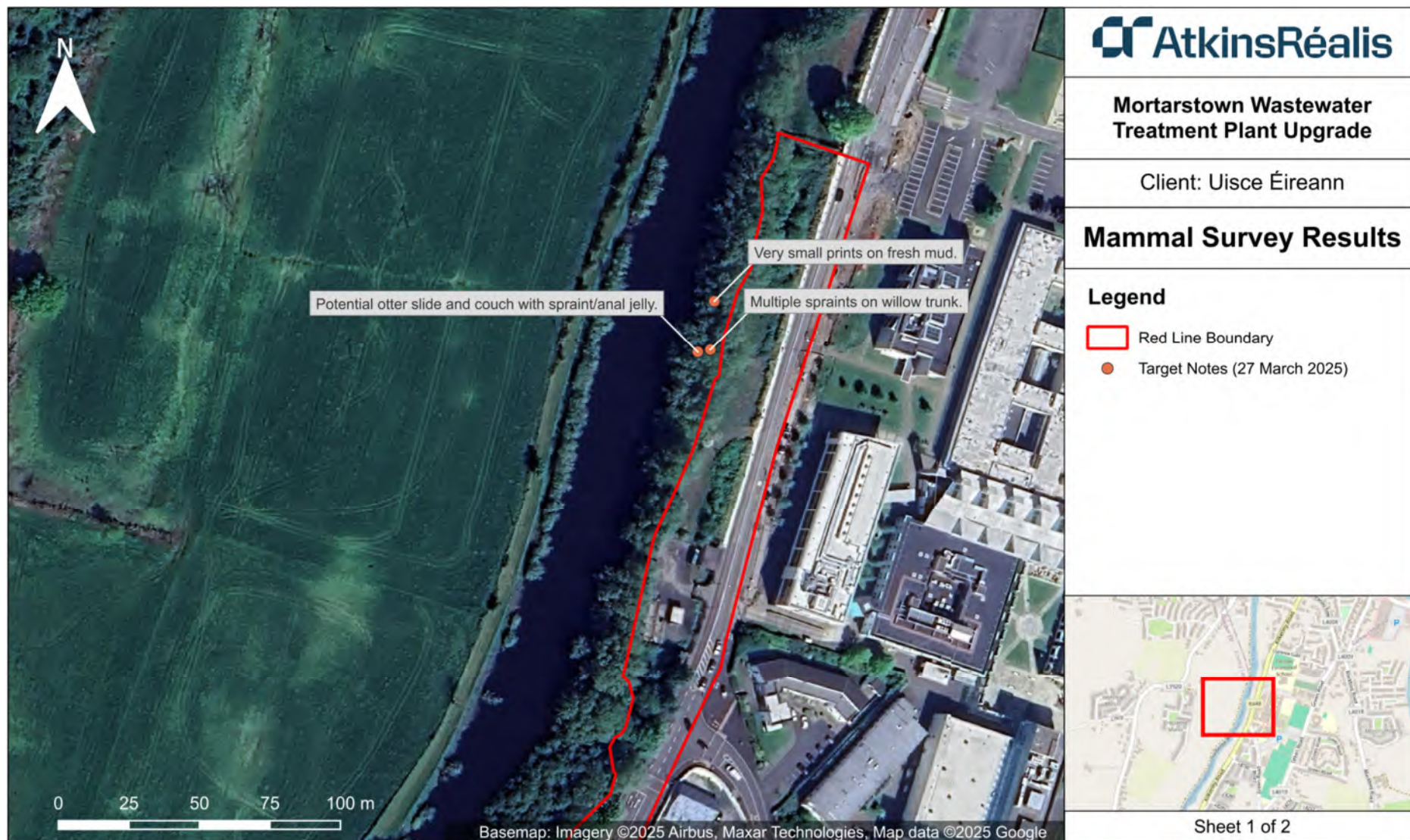


Figure 5-12 - Target notes from non-volant mammal walkover in the vicinity of the existing pumping station.



Figure 5-13 - Target notes from non-volant mammal walkover in the vicinity of the existing cottage and proposed outfall.

5.3.4.5 Reptiles and Amphibians

NPWS Data Request No. 2025_133 returned records for Common Frog (*Rana temporaria*), which is listed on Annex V to the Habitats Directive, protected under the Wildlife Act and assessed as 'Least Concern' in the relevant Irish Red List⁶⁴. These records do not overlap with the red-line boundary of the proposed development. This data request did not return records for any other reptile or amphibian species. The NBDC *Biodiversity Maps* search did not return any records of any reptile or amphibian species.

No reptiles or amphibians, or any evidence of reptiles or amphibians, were observed during the field surveys. There is very limited suitable habitat for species such as Common Frog, Smooth Newt (*Lissotriton vulgaris*) and Viviparous Lizard (*Zootoca vivipara*) in the vicinity of the proposed development. The only notable areas being pools and backwaters in the woodland between the Kilkenny Road and the River Barrow, which are suitable for frogs. However, these areas will not be affected by the proposed development.

Given the lack of evidence of reptiles and amphibians and any important habitats for these species in the areas that will be affected by the proposed development, they are not considered to be key ecological receptors.

5.3.4.6 Fish and Other Aquatic Fauna

Fish Species

No fish records were returned from either the NBDC or NPWS databases. However, IFI has recently made Water Framework Directive (WFD) fish sampling records available via an online GIS platform⁶⁵ and this was reviewed to gather the fish data shown in Table 5-6 below.

Most of the species recorded are non-native and some are considered to be invasive, e.g. Dace (*Leuciscus leuciscus*) and Roach (*Rutilus rutilus*).⁶⁶ The status of Pike (*Esox lucius*) as a native or non-native species is debated. European Eel (*Anguilla anguilla*) is assessed as 'Critically Endangered' both in Ireland and globally.

Table 5-6 - Records from WFD Fish Sampling. Location is relative to the proposed development. Source: IFI Open Data.

Location	Year	WFD Fish Status	Species
c. 2.8km upstream	2015	'Poor'	Dace, Gudgeon (<i>Gobio gobio</i>), Minnow (<i>Phoxinus phoxinus</i>), Perch (<i>Perca fluviatilis</i>), Pike and Roach
c. 2.5km upstream	2015	'Poor'	Dace, Perch, Roach
c. 2.5km upstream	2021	'Moderate'	Dace, Gudgeon, Minnow, Perch, Pike, Roach and Roach-Bream hybrid (<i>Rutilus rutilus</i> × <i>Abramis brama</i>)
c. 2.3km downstream	2015	'Moderate'	Dace, Gudgeon, Minnow, Perch, Pike, Roach and Stone Loach (<i>Barbatula barbatula</i>)
c. 2.6km downstream	2015	'Moderate'	Dace, Gudgeon, Minnow, Perch, Roach and Stone Loach

⁶⁴ King et al. (2011). *Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish*. NPWS.

⁶⁵ IFI Open Data: *Water Framework Directive Rivers Fish Ecological Status 2008 to recent* (https://opendata-ifi.geo.hub.arcgis.com/datasets/649f3be078b04317896547bd517bfda0_0/explore) [accessed 12/09/2025]. IFI.

⁶⁶ King et al. (2011). *Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish*. NPWS.

Location	Year	WFD Fish Status	Species
c. 2.6km downstream	2021	'Poor'	Dace, European Eel, Perch and Roach

Fisheries surveys by Triturus (2021) recorded 11 no. Minnow, 3 no. Brook/River Lamprey (*Lampetra* sp.) ammocoetes and 1 no. stickleback (*Gasterosteus* sp.) in the sample sites near the outfall. In the same locations, Triturus (2025) recorded 21 no. Minnow, 12 no. Dace and 5 no. Three-spined Stickleback (*G. aculeatus*). No lampreys were recorded in 2025. The increase in the numbers of cyprinid fish from 2021 to 2025 is likely associated with the reduced flows and increase in cover of the invasive Nuttall's Waterweed (*Elodea nuttallii*).

Sea Lamprey (*Petromyzon marinus*), Brook Lamprey (*Lampetra planeri*) and River Lamprey (*L. fluviatilis*) have all been recorded in the River Barrow historically. However, as explained in Triturus (2025) (see Appendix 5-2, Volume 3 of this EIAR), the main channel of the river is generally poor in terms of spawning and nursery habitat. While no suitable spawning or nursery habitat occurs in the vicinity of the proposed development, lamprey are likely to move past this location on their migrations.

Salmon (*Salmo salar*) also occurs throughout the River Barrow catchment. While the aquatic habitat in the vicinity of the proposed development is of poor quality for adult and juvenile salmon, salmon are likely to move past this location when on migration or otherwise moving between areas of more suitable habitat.

Given all of the above, fish are considered to be a key ecological receptor for the proposed development.

Crayfish

White-clawed Crayfish (*Austropotamobius pallipes*) is known to occur throughout the River Barrow and several of its tributaries, the nearest record being c. 200m downstream of the proposed development (NPWS Data Request No. 2025_133). This species is protected under the Wildlife Act and listed on Annex II to the Habitats Directive. It is a qualifying interest of the River Barrow and River Nore SAC. The Article 17 assessment of the conservation status of White-clawed Crayfish in 2025 was 'Bad' and 'deteriorating'.

An outbreak of aphanomycosis or "crayfish plague" occurred in the River Barrow in 2017. This disease is caused by the oomycete or "water mould" pathogen *Aphanomyces astaci* and leads to 100% mortality in the infected populations of White-clawed Crayfish. No crayfish were encountered during the Triturus (2025) aquatic surveys.

While it is unlikely that White-clawed Crayfish occurs in the vicinity of the proposed works, its presence cannot be ruled out entirely. Given the previous likely presence of this species (pre-2017), its conservation importance and the need for in-stream works for the construction of the proposed development, it is considered prudent to include it as a key ecological receptor.

5.3.4.7 Terrestrial Invertebrates

NPWS Data Request No. 2025_133 did not return any records of terrestrial invertebrate species. The search of NBDC Biodiversity Maps returned records for a large number of terrestrial species, including Sprawler (*Asteroscopus sphinx*), Moss Carder-bee (*Bombus muscorum*) and Large Red Tailed Bumble Bee (*Bombus lapidarius*), all of which are assessed as 'Near Threatened' in the relevant Irish Red Lists^{67,68}, and Comma (*Polygonia c-album*), which is not assessed in the Irish Red Lists.

⁶⁷ Allen *et al.* (2016). *Ireland Red List No. 9: Macro-moths (Lepidoptera)*. NPWS.

⁶⁸ Regan *et al.* (2010). *Ireland Red List No. 4: Butterflies*. NPWS.

Comma and Red Admiral (*Vanessa atalanta*) butterflies were both observed incidentally during the field surveys. Red Admiral is assessed as 'Least Concern' in the Irish Red List for Butterflies. No habitats were identified during the field surveys which would be of particular importance for terrestrial invertebrates. Therefore, this group is not considered to be a key ecological receptor for the proposed development.

5.3.5 Invasive Non-native Species

Invasive non-native species are species which are caused to spread outside their natural range due to human activities and become problematic in their new habitats. Such species can have significant negative effects on biodiversity and related ecosystem services, human health and safety, and the economy. *Ireland's invasive and non-native species – trends in introductions* (O'Flynn *et al.*, 2014) presented a risk assessment of 377 no. recorded non-native species and 342 no. non-native potential invaders and categorised them as 'High-impact', 'Medium-impact' and 'Low-impact' species, according to their environmental, social and economic impacts.

The Third Schedule to the Habitats Regulations lists invasive non-native species requiring legal restrictions to prevent their spread. Regulation 49(2) and (3) of the Habitats Regulations make it an offence to cause or allow the spread of any of these species (or their hybrids, cultivars etc.), except where all reasonable steps have been taken and due diligence exercised to avoid committing the offence. As such, these species are of particular concern with regard to site development and construction works.

In addition, the EU Invasive Alien Species Regulation⁶⁹ establishes rules to prevent, minimise and mitigate the negative effects of IAS within the EU. The species to which this Regulation applies are included in the official *List of Invasive Alien Species of Union concern*⁷⁰. Given the environmental, social and economic effects of these species and the legal restrictions on them at an EU level, they are also of concern for planning and development.

Four legally restricted invasive non-native plant species were recorded in the vicinity of the proposed development during the field surveys:

- A small stand of Japanese Knotweed (*Reynoutria japonica* syn. *Fallopia japonica*) is present in the vicinity of the existing and proposed outfalls to the River Barrow. This stand is located where an area of disturbed ground meets the riparian woodland and is subject to ongoing monitoring and control (INVAS, 2025, 2026). This is a 'High-impact' invasive species and is listed on the Third Schedule to the Habitats Regulations.
- Himalayan Balsam (*Impatiens glandulifera*) is more widespread in the riparian zone and in frequent ly flooded areas, including near the outfall location and the existing WwPS. The balsam stands in the study area likely form part of a much larger population extending along the banks of the River Barrow and its tributaries (INVAS, 2026). This is a 'High-impact' invasive species and is listed on both the Third Schedule to the Habitats Regulations and the *List of Invasive Alien Species of Union concern*.
- Three-cornered Leek (*Allium triquetrum*) occurs along the eastern edge of the Kilkenny Road and adjoining hedgerow/treeline in the vicinity of the proposed development (INVAS, 2026). This is a 'Medium-impact' invasive species and is listed on the Third Schedule to the Habitats Regulations.

⁶⁹ Regulation (EU) No 1143/2014 of the European Parliament and of the Council of 22 October 2014 on the prevention and management of the introduction and spread of invasive alien species. *Official Journal of the European Union* L 317/35-55.

⁷⁰ *List of Invasive Alien Species of Union concern* (unofficial consolidation) (<https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:02016R1141-20250807>) [accessed 11/09/2025]. DG Env.

- Nuttall's Waterweed (*Elodea nuttallii*) occurs within the River Barrow in the vicinity of the existing and proposed outfall (Triturus, 2025). This is a 'High-impact' invasive species and is listed on both the Third Schedule to the Habitats Regulations and the *List of Invasive Alien Species of Union concern*.

Other non-native and invasive plant species found in the vicinity of the proposed development during the field surveys, but which are not subject to legal restrictions, include Traveller's-joy (*Clematis vitalba*), Snowberry (*Symphoricarpos albus*), Winter Heliotrope (*Petasites pyrenaicus*), Butterfly-bush (*Buddleja davidii*), Sycamore (*Acer pseudoplatanus*) and Cherry Laurel (*Prunus laurocerasus*). These are predominantly 'Medium-impact' species.

A number of additional invasive non-native species were identified in the desk study but not recorded during the field surveys. These are listed in Table 5-7 below.

Table 5-7 - Additional invasive non-native species identified in the desk study but not recorded during the field surveys. Source: NBDC Biodiversity Maps and NPWS Data Request No. 2025_133.

Common name	Scientific name	Designation
Giant Hogweed	<i>Heracleum mantegazzianum</i>	High-impact; HR-3; EU-IAS
Water Fern	<i>Azolla filiculoides</i>	Medium-impact; HR-3
Canadian Waterweed	<i>Elodea canadensis</i>	High-impact
Freshwater shrimp	<i>Gammarus pulex</i>	Medium-impact
Jenkins' Spire Snail	<i>Potamopyrgus antipodarum</i>	Medium-impact
Canada Goose	<i>Branta canadensis</i>	High-impact; HR-3
Sika Deer	<i>Cervus nippon</i>	WA; High-impact; HR-3
American Mink	<i>Neovison vison</i>	High-impact; HR-3
Greater White-toothed Shrew	<i>Crocidura russula</i>	Medium-impact

Given the presence of legally restricted invasive non-native species within the footprint of the proposed development and the ecological and legal risks associated with working in close proximity to these species, they are considered to be a key ecological receptor for the proposed development.

5.4 Key Ecological Receptors

The key ecological receptors identified in Section 5.3 are catalogued in Table 5-8 below. They are described in detail and their ecological importance is evaluated following the criteria set out in Table 5-2.

Table 5-8 - Key Ecological Receptors for the proposed development.

Key Ecological Receptor	Description	Evaluation
KER 1 - River Barrow and River Nore SAC	The NIS (AtkinsRéalis Report Ref. 5161805DG0457 - NIS) presents a description of this Natura 2000 site, including an overview of the site in its entirety and a detailed description of the parts of the site in the Zone of Influence of the proposed development.	International Importance on the basis that it is a Natura 2000 site, i.e. a site designated at the European level.
KER 2 - River Barrow	The River Barrow flows immediately adjacent to the proposed development. The river is a defining feature of the River Barrow and River Nore SAC and, as such, is structurally integral to the site. It is also an example of the Annex I habitat type 'Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation' (3260), which is a qualifying interest of the SAC. Other qualifying interests of the SAC, such as lamprey species, Salmon and Otter, are wholly dependent on the river. The river is also crucial to the functioning of other ecosystems, including the Annex I priority habitat type "Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>)' (91E0), which is also a qualifying interest of the SAC. The river corridor also supports species not covered by the SAC designated, including birds and bats.	International Importance given that it is the river and the habitats and species which supports are the fundamental reasons for the designation of the River Barrow and River Nore SAC.
KER 3 - Woodland	The woodland between the Kilkenny Road and the River Barrow adjacent to the proposed development contains examples of the Annex I priority habitat type "Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>)' (91E0), which is a qualifying interest of the SAC. Areas of the woodland that do not represent the Annex I type include areas which provide supporting functions for areas that do, as well as other areas that, while not of particular importance to the Annex I areas, are nevertheless of value to biodiversity locally. The woodland supports protected species such as Otter, which is a qualifying interest of the River Barrow and River Nore SAC, and bats.	International Importance on the basis that the woodland includes a small but viable example of an Annex I priority habitat for which the River Barrow and River Nore SAC was selected, supports protected species and, due to its linear nature and position along the river, is considered to be a feature essential to maintaining the coherence of the Natura 2000 network, in line with Articles 3 and 10 of the Habitats Directive.
KER 4 - Birds	The only wild bird species of specific interest in relation to the proposed development Kingfisher. This species, which is listed on Annex I to the Birds Directive, may utilise the riverbank in the vicinity of the proposed development for foraging (not nesting). Hedgerows, treelines, gardens, trees and scrub in the vicinity of the proposed development are of interest for birds in general. There are	Local Importance (Higher Value) on the basis that this includes species such as Kingfisher, which is an Annex I bird species, as well as habitats such as hedgerows which provide connectivity between features of higher ecological value in the wider landscape.



Key Ecological Receptor	Description	Evaluation
	also opportunities for a enhancements for birds to be incorporated as part of the proposed development.	
KER 5 - Bats	While the habitats within the footprint of the proposed development and surrounding areas or not generally of 'High' importance for bats, particularly in terms of roosting, at least 4 no. bats were confirmed roosting in the cottage and shed west of the WwTP and the trees beside them, and several other trees and structures in the vicinity of the proposed development were assessed as having 'Medium' bat roost potential. In addition, the area around the outfall was identified as being important for foraging bats. Care will be required during the implementation of the proposed development to avoid any harm to bats or their roosts. There are also opportunities for a enhancements for bats to be incorporated as part of the proposed development.	Local Importance (Higher Value) on the basis that bats and bat roosts, which are strictly protected, are present in the vicinity of the proposed development, albeit in small numbers. Furthermore, this KER includes habitats such as treelines which provide connectivity between features of higher ecological value in the wider landscape.
KER 6 - Otter	Walkover surveys and trail camera monitoring confirmed that at least 2 no. Otter regularly use the River Barrow and its banks around the outfall area. This species is a qualifying interest of the River Barrow and River Nore SAC and is also strictly protected under the Habitats Directive. While no potential holts or couches were recorded during the surveys, the presences of such features becoming established between the date of surveys and commencement of works cannot be ruled out. As resting places of an Annex IV species, these features also benefit from the strict protections of Article 12 of the Habitats Directive.	Local Importance (Higher Value) on the basis that this strictly protected species, which is a qualifying interest of the River Barrow and River Nore SAC, occurs in close proximity to the proposed development. This KER also includes the riparian corridor, which is also of importance for other species.
KER 7 - Fish species	This KER includes 4 no. qualifying interests of the River Barrow and River Nore SAC, namely Sea Lamprey, Brook Lamprey, River Lamprey and Salmon. While suitable spawning and nursery habitat for these species does not occur in the vicinity of the proposed development, these species likely migrate though the river past the proposed development location. This KER also includes the critically endangered European Eel, which is likely present both upstream and downstream and likely migrates past the proposed development. Other species such as Minnow, Dace and sticklebacks, while not of conservation interest and currently increasing in numbers in the vicinity of the propose development, likely provide additional prey for species such as Otter, which is strictly protected and a qualifying interest of the River Barrow and River Nore SAC.	Local Importance (Higher Value) on the basis that this KER includes protected and threatened species, 4 no. of which are qualifying interests of the River Barrow and River Nore SAC and likely migrate through the River Barrow adjacent to the proposed development, as well as other species which, although not of conservation interests in themselves, likely form part of the diet of species such as Otter (KER 6).



Key Ecological Receptor	Description	Evaluation
KER 8 - White-clawed Crayfish	This species is protected under the Wildlife Act and is a qualifying interest of the River Barrow and River Nore SAC. Where White-clawed Crayfish is present, it often forms an considerable part of the diet of Otter. While it is unlikely that White-clawed Crayfish occurs in the vicinity of the proposed works since the crayfish plague outbreak that occurred in the Barrow catchment in 2017, its presence cannot be ruled out entirely. As this species was likely present in the vicinity of the proposed development prior to the crayfish plague outbreak, it is considered prudent to include it as a key ecological receptor.	Local Importance (Higher Value) on the basis that this species, whose presence cannot be entirely ruled out, is a qualifying interest of the River Barrow and River Nore SAC, protected and supports other protected species, e.g. Otter.
KER 9 - Invasive Non-native Species	Invasive non-native species of particular concern recorded in the vicinity of the proposed development included several plant species which are listed on the Third Schedule to the Habitats Regulations, namely 3 no. terrestrial species Japanese Knotweed, Himalayan Balsam and Three-cornered Leek, and 1 no. aquatic species Nuttall's Waterweed. Of these, Three-cornered Leek is 'Medium-impact' and the rest are 'High-impact'. Other invasive and non-native species occurring in the vicinity of the proposed development are not legally restricted or 'High-impact' species.	N/A as these species are not of conservation importance. Rather, they represent a risk of negative ecological impacts or project liability if not managed correctly during construction and operation of the proposed development.



5.5 Assessment of Effects

5.5.1 Potential Effects from the Proposed Development

This section describes the types of impacts expected to arise during the construction and operation of the proposed development. More detailed analysis specific to each KER is provided in the subsequent section.

5.5.1.1 Habitat Loss and Fragmentation

The expansion of the footprint of the wastewater and ancillary infrastructure necessitates the permanent removal of areas of semi-natural habitats, while construction activities will require the temporary use of additional areas.

The effects of these impacts can include reductions in the area and distribution of the habitats themselves, as well as reduced habitat connectivity and quality in the wider area. Habitat loss can also lead to changes in adjoining habitats via edge effects. These impacts can also lead to negative impacts on fauna, such as loss of forage, cover or breeding and resting places at a local level, restriction of feeding ranges, and reduced gene flow at the population level.

The significance of these effects depends on their extent, the availability of alternative habitats (with connectivity) and the capacity of the habitats for recovery or regeneration (in the case of areas required temporarily).

5.5.1.2 Disturbance to Fauna

Disturbance can stimulate different responses from fauna, from heightened vigilance (refocussing energy from feeding or breeding-related activities to active awareness of threats) to avoidance (physically moving away from the stimulus). These responses can cause physiological stress, which affects the energy budgets of the species concerned. At the upper end of the scale, avoidance can lead to the displacement of species from the area, which reduces their access to feeding, breeding or resting habitats. This can also represent an effective barrier to connectivity where the affected area crosses a commuting corridor, e.g. a hedgerow. When the impacts persist over a critical timeframe, survival and breeding success can fall. As such, the degree to which a receptor is affected depends on the intensity of the disturbance at its source, the duration of the disturbance, the sensitivities of the receptors and availability of suitable alternative habitats and commuting corridors.

Construction Phase

During the construction phase, the physical presence, movement, sound and vibration from vehicles, machinery and personnel will give rise to disturbance to fauna, particularly mammals and birds. Given the nature of the construction activities, the impacts are likely to be moderate-intensity but very localised, with any noise and vibration unlikely to affect fauna beyond c. 100m from active works given the noise / disturbance environment in which the site is located. The affected area for visual disturbance to fauna is very variable depending on the sensitivities of the species concerned and presence of existing screening in the form of vegetation or structures to be retained during construction.

The overall duration of the construction phase is expected to be c. 30 months and the duration of high-intensity works at any one location will likely be significantly less than this. Works relating to construction of the new outfall are expected to take 2-3 weeks to complete (Cofferdam installation/removal, formation/foundation works, headwall installation and backfilling). As works will be undertaken during normal working hours, disturbance will be focussed outside of the hours of greatest sensitivities of mammals in the study area, which are predominantly nocturnal or crepuscular.



Operational Phase

Disturbance during the operational phase will be limited to the typical operational activities of a WwTP within the main campus, and periodic maintenance at the outfall and other chamber/manhole locations. Disturbance from these activities is considered to be low-intensity and frequency, and would also be very localised (within c. 50m). Any disturbance from the operation of the proposed development is likely to be imperceptible above baseline levels.

5.5.1.3 Artificial Lighting

As natural systems, from single cells to whole ecosystems, rely on day/night length as cues for their time-based (daily, monthly and annual) cycles, artificial lighting at night is recognised as a major disruptor of these cycles, with negative effects for the species and ecosystems concerned. Nocturnal and crepuscular mammals such as bats and Otter are particularly sensitive to such impacts, both directly (due to shifts in their hours of activity and avoidance of lit areas) and indirectly (due to changes in the behaviour of their prey). The significance of the effects of artificial lighting depends on factors such as the proximity to sensitive receptors, the type, intensity and wavelength of light emitted, and the hours during which the lights are on. Artificial lighting will be required for both the construction and operation of the proposed development. As such, the impact assessment in Section 5.5.2 considers the effects of both construction- and operational-phase lighting on the Key Ecological Receptors.

5.5.1.4 Solar Panels

Solar panels can attract birds due to their shiny nature (birds can mistake a reflective solar facility for a waterbody) (Kagan *et al.*, 2014). Reflective surfaces can also attract insects which further attracts foraging birds (Horváth *et al.*, 2009) and thus causes an increased collision risk.

Several studies, literature reviews and guidance documents, such as a review for Natural England of the impact of solar farms on birds, bats and general ecology (Harrison *et al.*, 2016), have highlighted a concerning lack of scientific evidence relating to the ecological effects of solar energy infrastructure. This lack of understanding of the impacts of solar arrays on ecological receptors was also highlighted during wildlife sensitivity mapping for renewable energy planning for the European Commission (Allinson *et al.*, 2020).

A further in-depth review of existing studies was carried out by BSG Ecology (Taylor *et al.*, 2019), focussing on birds, bats and habitats for biodiversity. This review found numerous studies which highlighted that both birds and bats can mistake the flat, reflective surfaces of PV panels for water, which could lead to collisions, particularly for bird species which feed in flight (e.g. swallows, swifts and sand martins). This is most likely in the case of horizontally mounted panels. Polarised reflected light also has the potential to disrupt flight paths of birds and other fauna. It is also possible that bats may mistake vertical panels for clear flight paths, which is possibly the cause of occasional bat collisions with glass windows. In addition, the reflective properties of PV panels may cause changes in the microclimate in their vicinity (particularly air temperature and humidity), which may alter the abundance and behaviour of insects, which in turn may increase feeding behaviour of birds around the panels. However, there is little empirical evidence published relating to these effects, and some studies, such as DeVault *et al.* (2014), who investigated the effects on birds of PV infrastructure at airports in the USA, found little evidence that birds responded either directly to reflected light from the panels or to changes in insect abundance associated with the panels, nor did they observe any collisions.

Studies on the ecological impacts of PV infrastructure have focussed to a large degree on ground-mounted panels, as is the case for the proposed development. Consequently, the land-use change and associated impacts on habitats has been afforded more attention. In the case of the proposed development, the existing land use where the panels are proposed is intensively grazed improved agricultural grassland of low ecological value. Therefore, the addition of the panels does not present a significant negative impact.

5.5.1.5 Underwater Noise and Vibration

The installation of the new outfall to the River Barrow will require a temporary cofferdam to enable the works area to be isolated from the river and carried out in the dry. The cofferdam will be formed by sheet piles installed by a piling rig or excavator with piling attachment on a jack-up barge in the river. Piling is the only construction activity that will give rise to any significant underwater noise or vibration. Species at risk include fish and otters.

Wave Dynamics (2026)⁷¹ modelled the underwater noise predicted to arise from piling for the cofferdam and evaluated it against recognised impact thresholds for the most sensitive receptors (juvenile fish of species with specialised acoustic organs). This assessment found that, even in the worst-case scenario (impact/percussive pile driving), these receptors would only experience temporary hearing injury if they remain within 12m of active piling for at least 10 minutes, while behavioural responses could be induced up to 700m from the activity.

Therefore, the significance of effects of underwater construction noise will depend on the timing (seasonal) and pattern of repetition of the impact. No such impacts will occur during the operational phase.

5.5.1.6 Impacts on Water Quality

Construction Phase

Water quality impacts that can arise from construction activities include pollution from the following sources, which can affect both surface waters and groundwater:

- sediment from excavations, earthworks and dewatering,
- hydrocarbons (e.g. diesel, hydraulic oils and lubricating oils) from vehicles, plant and equipment, including the jack-up barge to be used for installation of the temporary cofferdam at the outfall location,
- cementitious materials (e.g. concrete) from batching of wet concrete and washing out of concrete transport and placement machinery,
- effluent from on-site temporary wastewater treatment systems, e.g. welfare units, and
- drilling fluid and/or other deleterious matter from fracture blow-out during tunnelling works.

Such impacts can have negative effects on aquatic habitats and species, the significance of which depends on the nature, magnitude, extent and timing of the pollution event. Chapter 12 Water provides a detailed assessment of the likely effects of the construction and operation of the proposed development on the River Barrow and groundwater. In general, negative effects are likely to be “moderate” and “temporary”, but the outfall works and any accidental spills of hydrocarbons pose a risk of “significant” effects.

Operational Phase

The proposed development will provide additional wastewater treatment capacity at the Mortarstown WwTP. The current collected load at the WwTP is population equivalent (p.e.) 39,270, which is above the existing design p.e. of 36,000. The proposed design capacity is p.e. 58,500 (for design year 2052). The operation of the proposed development does not involve any permanent loss or alteration of riparian habitat, and is expected to

⁷¹ Wave Dynamics (2026). *Mortarstown WWTP Underwater Noise Impact Assessment*. WDA240906 RP_B_01. February 2026. Wave Dynamics Ltd for Uisce Éireann. [included as Appendix 5, Volume 3 of this EIAR]

lead to an improvement in water quality, including fewer and smaller overflow events, until at least the design year.

A Wastewater Assimilative Capacity (WAC) Assessment Report (AtkinsRéalis Report Ref. 5161805DG0434, 2026) has been prepared for the proposed development to inform the setting of emission limit values (ELVs) for the upgraded WwTP. Compliance with these ELVs will ensure that the discharge from the WwTP will not lead to exceedance of the environmental quality standards (EQSs) for the River Barrow.⁷²

Based on an assessment of the environmental sensitivity of the receiving waterbody, i.e. the River Barrow, including the River Barrow and River Nore SAC, and an examination of a the various water quality parameters of the existing effluent, it was found that ammonia, biological oxygen demand (BOD) and orthophosphates were of concern, as their concentrations in the WwTP effluent exceeded both the EQS and ambient concentrations.

River water quality is monitored at sampling points RS14B012310, at Graiguecullen Bridge, c. 1.8km upstream of the primary outfall and RS14B012460, at Dolmen Mews, c. 1.0km downstream of this outfall, as illustrated in Figure 12-4 (in Chapter 12 Water). The following is noted with respect to the differences between upstream and downstream ambient concentrations for ammonia, BOD and orthophosphates (with reference to Table 5-9 below):

- Both the mean and 95%ile concentrations of ammonia are in the upper 25% of the 'Good' status EQS band at the upstream monitoring point and exceed the 'Good' status EQS thresholds at the downstream point.
- Both mean and 95%ile BOD exceed the 'Good' status EQS thresholds at both the upstream and downstream monitoring points. The increases in BOD between the upstream to downstream sampling points is 0.022mg/l (mean), which is 1.2% of the upstream concentration or 1.5% of the 'Good' status EQS, and 0.179mg/l (95%ile), which is 4.4% of the upstream concentration or 6.9% of the 'Good' status EQS, i.e. no significant increase.
- Mean ambient concentrations of orthophosphates are within the 'High' status EQS threshold both upstream and downstream, while the 95%ile concentrations (both upstream and downstream) are within the 'Good' status EQS band.
- The WAC Assessment Report established that the exceedances of the 'Good' status EQS thresholds for ammonia and BOD are due to upstream catchment pressures on water quality.

Table 5-9 - Existing concentrations of pollutants of concern at Mortarstown (Table 4-2 of the WAC report). Green shading indicates concentrations within the EQS for 'Good' status, while orange indicates exceedance; blue indicates 'High' status.

	RS14B012310 (Upstream)		RS14B012460 (Downstream)	
Substance	Mean	95%ile	Mean	95%ile
Ammonia (mg/l)	0.063	0.139	0.069	0.202
BOD (mg/l)	1.805	4.100	1.827	4.279
Orthophosphate (mg/l)	0.020	0.049	0.021	0.058

⁷² The EQSs have been set as a basis for the achievement of the Water Framework Directive (WFD) objectives for the waterbody in question. The objective for the River Barrow is to achieve 'Good' status, which in turn supports the conservation of the aquatic habitats and species that depend on the river, including the qualifying interests of the River Barrow and River Nore SAC.

The available WAC of the receiving waterbody is the difference between the upstream ambient concentrations of a given substance and the EQS for that substance, assuming that the latter is greater. At Mortarstown, the upstream ambient concentrations of ammonia are in the upper 25% of the 'Good' status EQS bands (and exceed the 'Good' status EQS thresholds downstream) and the upstream and downstream ambient BOD exceed the 'Good' status EQS threshold. As such, ELVs cannot be set for effluent from the upgraded WwTP which would secure compliance with 'Good' status at the downstream point. Therefore, following UÉ's standard methodology (see Figure 2-1 of the WAC Assessment Report), the assessment and setting of ELVs is carried out on the basis of a "notionally clean" condition for ammonia and BOD, i.e. ambient value simulated as 20% of EQS for 'High' status.

The ELVs represent the concentrations of each substance in WwTP effluent (for the design flow at p.e. 58,500) that will take up no more than 30% of the available WAC, i.e. effluent concentrations that will not lead to exceedance of the relevant EQS.

The WAC Assessment Report recommended that the ELVs for the Discharge Licence for the upgraded WwTP be set as follows, with comparison to the current Discharge Licence for the existing WwTP:

- Ammonia: 2.0mg/l, no change.⁷³
- BOD: 25mg/l, increased from current 15mg/l.⁷⁴
- Orthophosphates: 1.0mg/l, no change.

The proposed development has been designed to operate within these ELVs and will be required to do so under the terms and conditions of its new Discharge Licence. As such, any impacts on water quality will be imperceptible and limited to the locality of the discharge, with no impacts on the downstream estuarine and coastal waters.

A standalone assessment of the implications of the proposed development for the Water Framework Directive (WFD) quality status and objectives for the receiving waterbodies was carried out by Hydro Environmental Services Ltd and is included in Appendix 12-6 to this EIAR. This assessment concluded that the proposed development:

- *"will not cause a deterioration in the status of all surface and groundwater bodies assessed;*
- *will not jeopardise the objectives to achieve 'Good' surface water/groundwater status;*
- *does not jeopardise the attainment of 'Good' surface water/groundwater chemical status;*
- *does not jeopardise the attainment of 'Good' surface water/groundwater quantity status;*
- *does not permanently exclude or compromise the achievement of the objectives of the WFD in other waterbodies within the same river basin district;*

⁷³ The ELV calculated based on the "notionally clean" condition was 2.4mg/l. However, the ELV will be set at 2.0mg/l to align with the existing Discharge Licence. This will allow for sustainable future operation of the wastewater infrastructure in line with the "polluter-pays" principle under the WFD, while still ensuring that there will be no deterioration in ambient water quality in terms of ammonia.

⁷⁴ The ELV calculated based on the "notionally clean" condition was 42.5mg/l. However, the maximum permitted ELV for BOD under the Urban Wastewater Treatment Directive is 25mg/l. As such, the ELV will be set at 25mg/l. This will allow for sustainable future operation of the wastewater infrastructure in line with the "polluter-pays" principle, while still ensuring that the discharge does not contribute significantly to the baseline exceedance of the EQS for BOD.

- *is compliant with the requirements of the Water Framework Directive (2000/60/EC); and,*
- *is consistent with other Community Environmental Legislation including the EIA Directive (2014/52/EU), the Habitats Directive (92/43/EEC) and the Birds Directive (2009/147/EC)."*

In addition to the above, the increased capacity of the new gravity sewer and WwPS that will replace the existing Kilkenny Road WwTP, and the increased storm water storage and treatment capacity at the upgraded WwTP, there will be a decrease in the frequency and volume of overflows of untreated wastewater and surface water to the River Barrow during high rainfall events. This positive effect will be significant in the short term, but will decrease over time as more of the unused capacity is taken up by urban development in the wastewater agglomeration and the intensity of rainfall events likely increases due to the effects of climate change.

On the basis of the above assessments and from the perspective of Biodiversity, the overall effect of the operation of the proposed development on water quality in the River Barrow is likely to be positive and slight in the short term to imperceptible in the long term.

Chapter 12 Water also identifies a risk of water quality impacts in the event of a leak or other failure of the wastewater infrastructure. However, it has assessed such impacts as "imperceptible" and "unlikely".

5.5.1.7 Changes to Hydrological Regime and Hydromorphology

The presence of structures within a river channel displaces flows, leading to changes in water levels and flow velocities elsewhere in the channel, which can in turn lead to changes in patterns of erosion, transport and deposition of river substrate or bank material. In the case of the proposed development, the new headwall at the outfall point is an in-channel structure, and the cofferdam that will be in place during construction represents a more significant one.

Modelling by IE Consulting (2026)⁷⁵ (see Appendix 12-2 to this EIAR) predicted the effects of the presence of the headwall and cofferdam on water levels and flow velocities in the River Barrow under different scenarios of flow conditions and climate change. For the operational phase (headwall only), modelling predicted no perceptible change to water levels or flow velocities under any scenario. For the construction phase, however, there were some changes likely due to the presence of the temporary cofferdam.

In the very worst-case scenario (cofferdam in place, 5%ile flow + climate change), the modelling predicted maximum increases in flow velocity of 0.14-0.16m/s on the right bank of the river, while in parts of the channel velocities are unaffected or reduced, as illustrated in Figure 5-14 below. The mean change over this cross-section is +0.03m/s, as shown in Table 23 in IE Consulting (2026). All changes in flow velocities are limited to within 40m upstream and 70m downstream of the outfall works. In the same scenario, the upstream water level was predicted to increase by c. 1cm and the downstream water was predicted to decrease by c. 1cm (changes restricted to within c. 100m of the outfall works).

In the case of the 50%ile flow, with or without consideration of climate change, no change was predicted to water levels or flow velocities due to the presence of the cofferdam.

Based on the modelling in IE Consulting (2026), it is considered that there will be:

- no changes to water levels that would affect the hydrological regime in any habitat, and

⁷⁵ IE Consulting (2026). *Mortarstown WWTP Upgrade. Proposed Outfall Pipe & Headwall. Hydrodynamic Technical Report.* March 2026. IE Consulting Ltd for Uisce Éireann.

- no changes to flow velocities that would
 - affect patterns of erosion, transport and deposition of the river substrate or bank material, or
 - impede the upstream movement of fish, otters, crayfish or other aquatic fauna.

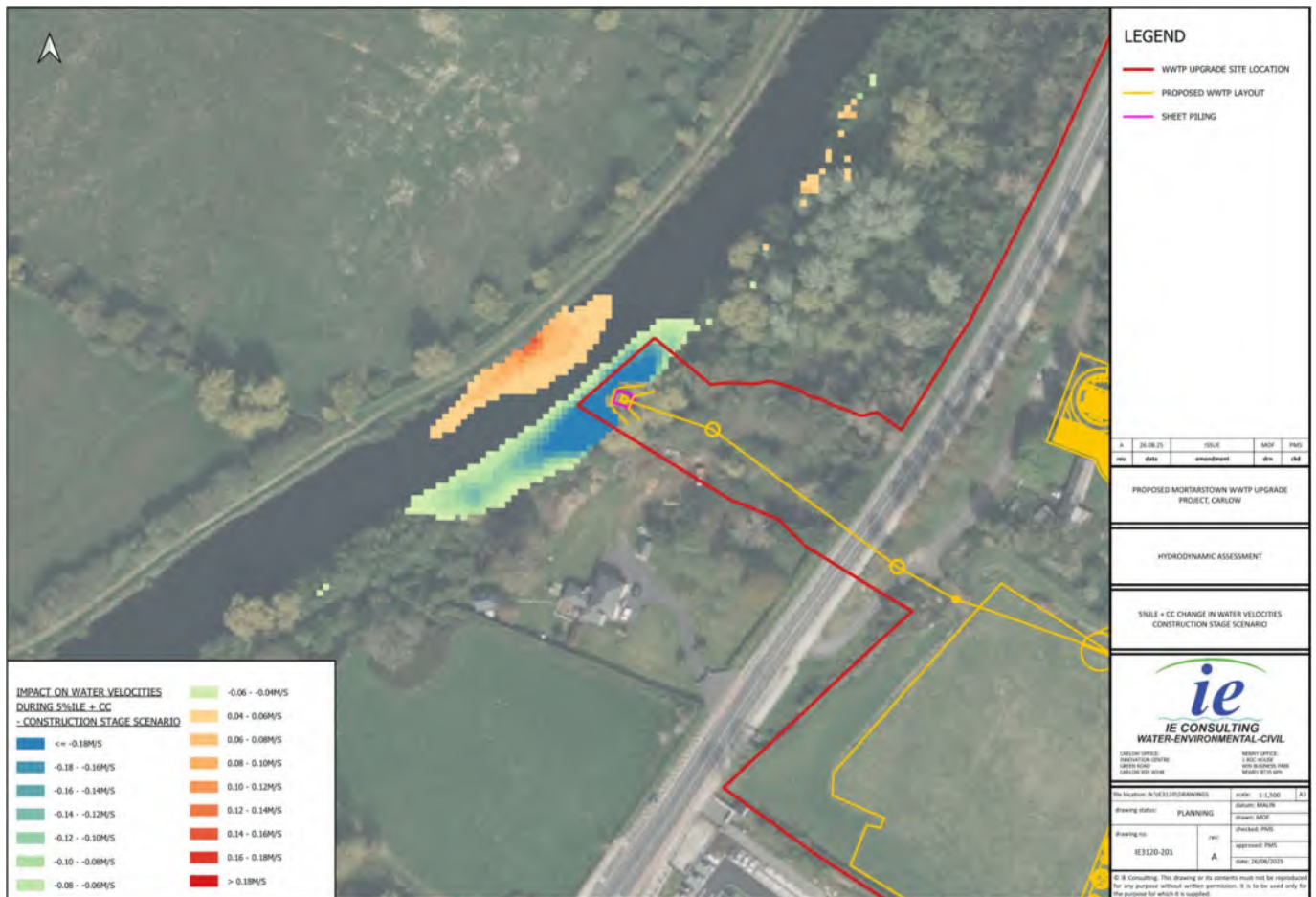


Figure 5-14 - Modelled changes in flow velocities for the construction stage, 5%ile flow + climate change.
Source: IE Consulting (2026).

5.5.1.8 Spread of Invasive Non-native Species

Activities associated with the construction of the proposed development, particularly the excavation, storage and movement of soil, stone and other materials, as well as the movement of vehicles and equipment (including the jack-up barge), pose a risk of importing invasive non-native species to the site, spreading such species already present locally, or exporting them from the site.

The species of particular concern in this case are Japanese Knotweed, Himalayan Balsam and Three-cornered Leek and Nuttall's Waterweed. These can have negative impacts on native habitats and species, most notably through competition with and displacement of native species, as well as by altering the physical and chemical properties of the soil. Furthermore, they also represent a project risk as negligence with regard to biosecurity could constitute an offence under Regulation 49 of the Habitats Regulations.

Overall, the ecological effects of any spread of invasive non-native species associated with the construction of the proposed development would likely be moderate to significant, localised in extent and persist long-term.

As there are no invasive species on or adjoining the WwTP site and given the nature of the activities associated with the activity of a wastewater facility, there is not considered to be any significant risk of the introduction or spread of invasive species arising from the operational activities associated with the proposed development.

5.5.1.9 Impacts from Decommissioning and Demolitions

As described in Section 2.2 and 2.3 and illustrated in Figure 2-12, existing plant/items to be demolished as part of the proposed development is as follows:

- Storm tank (area 616m²),
- Inlet works (area 166m²),
- Various small chambers within the site (2 no. chambers, area 3m² and 14m²), and
- Existing sludge cake transfer facility (area 100m²).

Given the scale of these works and their location on the existing WwTP site, as well as the fact that the structures in question all have 'Low' or no bat roost suitability and low suitability for nesting birds, the only impacts associated with their demolition that could negatively affect sensitive ecological receptors are noise and visual disturbance, primarily to birds, during the works themselves. The nature, magnitude/intensity and timing of this disturbance will not differ from those of the general construction activities and so the assessment and mitigation of these impacts and effects is included within the assessment of noise and visual disturbance from construction generally.

As described in Section 2.3 above and illustrated in Figure 2-9, existing plant/items to be decommissioned as part of the proposed development are listed as follows:

- Kilkenny Road WwPS,
- Existing rising main, and
- Existing settlement tanks (2no.).

The decommissioning of any of these plant/items will not give rise to any impacts which could negatively affect any of the Key Ecological Receptors. In particular, it should be noted that the decommissioning of the existing Kilkenny Road WwPS does not include the demolition of the above-ground structure.

Future Decommissioning of Mortarstown WwTP

As stated in Section 2.4 above, UÉ will be responsible for any future decisions on continued operation or decommissioning of the WwTP. The design lifespan of the upgraded WwTP is 25 years, but it is anticipated that it will be maintained, and periodic upgrading undertaken over a longer lifetime. In the event of a decision to decommission the WwTP, UÉ will carry this out as described in Section 2.4 to ensure full compliance with all relevant regulations at that time and that there are no significant effects to the environment, including the Key Ecological Receptors.

5.5.2 Impacts on Key Ecological Receptors

Table 5-10 below analyses the likely impacts of the construction and operation of the proposed development (in the absence of any mitigation or enhancement measures) on each of the KERs and evaluates the significance of their effects. In accordance with NRA (2009a), the significance of effects is assessed empirically, without reference to the importance of the KERs in question.

Table 5-10 - Assessment of impacts on Key Ecological Receptors (pre-mitigation).

Key Ecological Receptor	Analysis of Impacts	Evaluation
KER 1 - River Barrow and River Nore SAC	The NIS (AtkinsRéalis Report Ref. 5161805DG0457 - NIS, 2026) presents a detailed examination, analysis and evaluation of the implications of the proposed development, individually and in combination with other plans and projects, for the integrity of the River Barrow and River Nore SAC. The NIS found that, in the absence of appropriate mitigation, there is a possibility of adverse effects on several qualifying interests of the site, in view of their conservation objectives.	Construction: Temporary moderate to significant negative effects at the local level on in-stream and marginal habitats of the River Barrow; medium-term slight negative effects at the local level on priority alluvial woodland; for White-clawed Crayfish, temporary or short-term slight to moderate negative effects at the local level from disturbance and pollution from works, and biosecurity risks, namely crayfish plague; for Sea Lamprey, Brook Lamprey, River Lamprey, and Salmon, temporary slight to moderate negative effects from disturbance, risk of short-term moderate negative effects in the event of pollution on, and biosecurity risk; and, for Otter, slight to moderate short-term effects due to disturbance. Operation: Short-term slight and long-term imperceptible positive effects in terms of water quality; imperceptible long-term effects on aquatic habitat area and hydromorphology; not significant in view of the site-specific conservation objectives.
KER 2 - River Barrow	The installation of the new outfall will lead to a direct loss of a very small area of habitat from within the river channel (c. 130m² within the cofferdam during construction, thereafter reducing to 5m² occupied by the headwall). This area has very slow flows and the substrate is steeply-sloping, deep, largely anoxic silt. This area is not important for species of conservation importance. Construction works for the proposed development are likely to include artificial lighting of the works areas. As explained in Section 5.5.1.3 above, artificial lighting at night can negatively affect ecosystem functioning, with aquatic habitats being particularly vulnerable. As in-stream works and works on the riverbank, i.e. works for the construction of the new outfall, are limited to the months of July, August and September, the normal working hours of 08:00 to 18:00 will not require any artificial lighting. However, in the very unlikely event that such works must be undertaken outside of this period, it is considered prudent to provide mitigation to explicitly restrict all such works to daylight hours. There will be no artificial lighting of river habitats during the operational phase. The effects on aquatic species of underwater noise from sheet piling for the temporary cofferdam are assessed under KERs 6, 7 and 8 below. Given the scale	Construction: Temporary moderate to significant negative effects at the local level. Operation: Short-term slight and long-term imperceptible positive effects in terms of water quality; imperceptible long-term effects on habitat area and hydromorphology.

Key Ecological Receptor	Analysis of Impacts	Evaluation
	of piling activity, and the nature of the river substrate and almost imperceptible flow at this location, any re-suspension of fine sediment due to vibration from piling will be brief, very localised and not give rise to any negative effects on aquatic habitats or species. Chapter 12 Water found that, in the absence of mitigation, there is potential for negative effects on water quality in the River Barrow due to pollution relating to construction activities, as summarised in Section 5.5.1.6 above. Overall, these effects are temporary and moderate to significant at the local level. As the proposed development facilitates greater wastewater treatment and storm water storage capacity, its operation will lead to overall positive effects in terms of water quality. As summarised in Section 5.5.1.7 above, the proposed development will not have any perceptible effects on hydrological regime or hydromorphology in the operational phase, while such effects during construction are slight to imperceptible and limited to within c. 100m of the outfall works. The impacts and risks associated with invasive non-native species, including the aquatic plant Nuttall's Waterweed, are dealt with under KER 9 below.	
KER 3 - Woodland	Immediately south of the existing WwPS, a corner of the woodland and adjoining scrub (area c. 520m², of which c. 370m² is woodland) will need to be cleared to accommodate the reception shafts for the new gravity sewer as well as the temporary works (see Figure 5-15 below). The c. 370m² represents <1% of the total c. 42,133m² covered by this woodland block and includes vegetation from zones B and C, but not zone A (zones are described in Table 5-3 above). Furthermore, the permanent infrastructure is entirely within zone D (scrub), so the areas within zones B and C will be left to regenerate post-construction, as such edge effect will reduce over time as the area regenerates. The affected area does not split the woodland and, as such, there is no fragmentation. Therefore, the loss of woodland habitat is a medium-term, slight negative impact, reducing to imperceptible thereafter, and there is no habitat fragmentation.	Construction: Medium-term slight negative effects at the local level due to minor habitat loss and damage to ground flora and individual trees. Operation: Reduction to imperceptible negative effects over the medium term as habitats recover following completion of works.



Key Ecological Receptor	Analysis of Impacts	Evaluation
	At the downstream end of the woodland, Independent Tree Surveys (2025)⁷⁶ states: “The two mature Willow trees (T59 and T60) on the bank of the River Barrow will suffer damage from the trenching associated with the installation of the new outfall pipe. The full extent of the damage (to the roots and above ground parts of the trees) will only be apparent as the works progress, the intention being to try and retain the trees whilst laying the new pipe through the only viable route to the river channel. The trees may require pruning to reduce their size or coppicing if they sustain significant damage during the works.” This is illustrated in Figure 5-16 and Figure 5-17 below. As these trees will be retained, the only impacts to the woodland here are temporary disturbance to the ground layer and potentially some damage to these trees (minor roots during excavation as works approximately 5m from either tree and pruning of tree limbs for access). This does not represent significant habitat loss or fragmentation. The ‘Woodland W3’ in Figure 5-16 below is considered scrub (zone E described in Table 5-3 above) for the Biodiversity assessment. Much of this area has already been cleared. Indicative footprints of the temporary works in this area are shown in Figure 5-17. Any impacts on this area will not significantly affect the adjoining high-canopy woodland. There will be no additional habitat loss or other impacts to woodland from utility diversions or other ancillary works. During construction, there is likely to be artificial lighting of works areas. The impacts of this include avoidance of the affected area by nocturnal species such as bats and small mammals; however, the extent is extremely small relative to the woodland and does not sever ecological corridors, and the duration is very short (effects being brief or temporary and fully reversible). Although the project is estimated to take 30 months to complete individual works will be much shorter and be carried out during normal working hours. As such, any effects would be slight to imperceptible at the local level. There will be no new artificial lighting of woodland during the operational phase.	

⁷⁶ Independent Tree Surveys (2025). *Tree Survey Report. Mortarstown WWTP Upgrade. Kilkenny Road, Carlow*. September 2025. Independent Tree Surveys Ltd for Uisce Éireann.

Key Ecological Receptor	Analysis of Impacts	Evaluation
	Two legally restricted invasive non-native species are present in the woodland, namely Japanese Knotweed and Himalayan Balsam. These are dealt with under KER 9 below.	
KER 4 - Birds	Habitat loss and fragmentation and fragmentation for birds arising from the proposed development comprises removal of the following: ▪ c. 520m² of woodland and scrub immediately south of the existing WwPS (see Tree Protection Plan Drawing No. 25025_TPP Sheet 5, NIS Appendix H), ▪ a maximum of c. 470m² of open scrub in the temporary works area along the outfall pipeline and possible pruning or coppicing of the 2 no. mature willows on the riverbank (see Tree Protection Plan Drawing No. 25025_TPP Sheet 2, Figure 5-16 below), ▪ 2 no. sections (c. 50m each) of the hedgerow/treeline and single trees/small tree groups along the Kilkenny Road where temporary works are required for the intermediate tunnel shafts (see Tree Protection Plan Drawing No. 25025_TPP Sheets 3 and 4, NIS Appendix H), ▪ four of the trees north of the cottage were to be removed, the tree survey assessed these trees as having low value and are non native species (see Tree Protection Plan Drawing No. 25025_TPP Sheet 2, Figure 5-18 below), however, these works have since been rearranged to retain at least the 2 no. mature trees (T675 and T676), ▪ approx. 20 no. mostly low value single trees and shrubs on the existing WwTP campus, and, ▪ a short section (c. 20m) of the WwTP site boundary treeline near the south-eastern corner. All trees, shrubs and hedges to be removed are catalogued in the Tree Survey Report (Independent Tree Surveys, 2025, NIS Appendix H) and Tree Protection Plan drawings which accompany it. In view of the quality of the habitats affected, the scale and distribution of losses, and the nature of adjoining habitats, the impacts on the area and connectivity of habitat are considered to represent medium-term slight to moderate negative effects on birds at the local level. None of the buildings or other structures to be demolished provide good nesting opportunities for birds. Therefore, no perceptible effect on birds is expected owing	Construction: Slight to moderate negative effects at the local level due to minor loss and fragmentation of habitats, as well as disturbance. Operation: Negative impacts from habitat loss reducing to slight or imperceptible over time as habitats are either reinstated or replaced.

Key Ecological Receptor	Analysis of Impacts	Evaluation
	to their demolition. There will be no loss of Kingfisher perches along the River Barrow. Possible pruning or coppicing of the 2 no. mature willows on the riverbank at the outfall location may lead to a loss of roosting perches for species such as Cormorant, but there is abundant alternative habitat in the locality and, therefore, no perceptible negative effect. Construction activities will likely give rise to noise and visual disturbance to birds, which may affect their usage of certain areas in close proximity to the works. As the total duration of construction is >12 months, disturbance will coincide with at least one breeding season. This represents a short-term slight to moderate negative effect on birds at the local level. During sheet piling (approximately 10 days) for the temporary cofferdam, there will be significant but brief disturbance to birds, which may exclude them from the immediate vicinity of the active works. During the operation of the project, any increases over baseline levels of disturbance from the proposed development will likely be imperceptible. Artificial lighting can affect activity cycles and prey availability for birds. While it is not practical to quantify this effect due to its complexity, based on the information available, it is not considered that the minor increase in lighting associated with the proposed development has any potential cause significant effects in this regard. Nevertheless, mitigation has been provided based on the precautionary principle in Section 5.6.1.2 below. Water quality impacts can indirectly affect certain bird species, e.g. Kingfisher, by reducing the availability of prey species. As per KER 2 above, there is a risk of negative water quality impacts requiring mitigation.	
KER 5 - Bats	Loss and fragmentation of commuting and feeding habitats for bats is as described for birds under KER 4 above. This represents a medium-term slight negative effect in terms of habitat area and connectivity. In terms of roosting habitat, the 2 no. Horse Chestnut trees adjoining the cottage west of the WwTP are of concern (T675 and T676 in Tree Protection Plan Drawing No. 25025_TPP Sheet 2, Figure 5-18 below). These have 'High' bat roost potential and at least one of them supports at least 2 no. roosting Brown Long-eared Bat. The removal of these trees (if they were to be removed, as originally proposed) would represent a significant negative impact at the site level and a moderate impact at the local level, and would require a derogation licence under Regulation	Construction: Temporary slight negative effects from construction-stage lighting. Operation: Slight negative permanent effects due to artificial lighting.

Key Ecological Receptor	Analysis of Impacts	Evaluation
	54 of the Habitats Regulations. Therefore, the works have been rearranged to avoid removal of these trees. No other trees were confirmed as having roosting bats during the surveys. Other trees with potential roost features (as per surveys to date) will not be affected. The buildings proposed for demolished have negligible bat roost suitability. The existing Kilkenny road WwPS has moderate bat roost suitability, however, it will decommissioned and not demolished as part of this project. The main source of disturbance to bats is artificial lighting during construction and operation. During construction, artificial lighting will be required for some works areas. The impacts of this include avoidance of the affected area and delayed emergence at dusk if near roosts, as well as changes in prey abundance, distribution and behaviour. As it is not practical to quantify this effect based on the information available, mitigation has been provided based on the precautionary principle in Section 5.6.1.2 below. In the worst-case scenario, given the locations, scale and duration of the construction works, the effects of works lighting on bats are likely to be negative, temporary and slight at the local level. As the river corridor has been identified as being of particular importance for commuting and foraging bats, it should be noted that works in this area (i.e. works for the construction of the new outfall) are limited to the months of July, August and September and, as such, the normal working hours of 08:00 to 18:00 will not require any artificial lighting. However, in the very unlikely event that such works must be undertaken outside of this period, it is considered prudent to provide mitigation to explicitly restrict all such works to daylight hours. Section 5.6.1.2 below also sets out principles to be followed and specific measures to be included in the design of the operational-phase lighting design, which is to be done at the detailed design phase. There will be no artificial lighting of river or riparian habitats during the operational phase.	
KER 6 - Otter	There will be no loss or fragmentation of Otter habitats as a result of the proposed development. No breeding or resting places for this species (holts or couches) were identified in the immediate vicinity of the outfall or existing WwTP. Thus, based on the current baseline, there will be no loss of any holt or couch. However, given the confirmed presence of otters in the vicinity and the significant time likely to elapse between the surveys which informed this EIAR and the commencement of works,	Construction: Slight to moderate short-term effects at the local level due to noise and visual disturbance from construction activities, most notably noise from piling activities during the installation of the temporary cofferdam for outfall works. Operation: No perceptible effect.



Key Ecological Receptor	Analysis of Impacts	Evaluation
	the possibility that Otters may establish new holts or couches in the affected area cannot be entirely excluded. Loss or disturbance of an Otter holt or couch would be a significant effect at the local level and require a derogation licence under Regulation 54 of the Habitats Regulation. During the construction phase, works near the riverbank are a potential source of noise and visual disturbance to Otter. Apart from piling and artificial lighting, construction activities will be of generally low intensity, limited extent (focussed on the existing WwPS and the outfall works), relatively short duration (3 weeks) and occur during daylight hours (outside of the main activity period of Otter). The dense woodland vegetation along the riverbanks also provides a degree of inherent screening/attenuation of noise and visual impacts. Therefore, any effects on Otter would likely be moderate (at the local level) and temporary or short-term. As explained in Section 5.5.1.5, it is extremely unlikely that any Otters would be exposed to underwater noise which could cause even temporary hearing injury. However, intense noise from sheet piling to install the temporary cofferdam for the outfall works could cause significant disturbance to Otters, causing individuals to leave the area and/or deter them from moving along the river corridor past the active works (an effective barrier to connectivity). However, this impact is highly localised (c. 150m radius from active piling) and limited to periods when piling is actively taking place, i.e. between the hours of 08:00 and 18:00 over a period of c. 10 days, which itself is restricted to the permitted season for in-stream works (1st July to 30th September), and even on days when piling is taking place it will not be continuous as there will be pauses for set-up, alignment and checking of piles. As such, there will be no impact during dusk, dawn or at night, when otters are most active, or during pauses in piling activity. Thus, the probability of otters being exposed to this impact is very low. Furthermore, given the localised extent and timing of the impact, it is extremely unlikely that more than one or a small number of otters would be exposed. The effective exclusion of otters from the affected area will be fully reversed on cessation of active piling. Given the short duration, restricted timing, and localised extent of the impact, as well as the full reversal of the impact on completion of the works concerned, the likely effect on Otter is evaluated as being temporary and moderate at the local level. During construction, there is likely to be artificial lighting of works areas, including the outfall area. The impacts of this include avoidance of the lit area, as well as	

Key Ecological Receptor	Analysis of Impacts	Evaluation
	changes in prey (fish) distribution and behaviour if the river channel is lit. As it is not practical to quantify this effect based on the information available, mitigation has been provided based on the precautionary principle in Section 5.6.1.2 below. It should be noted that works on and near the riverbank (i.e. works for the construction of the new outfall) are limited to the months of July, August and September and, as such, the normal working hours of 08:00 to 18:00 will not require any artificial lighting. However, in the very unlikely event that such works must be undertaken outside of this period, it is considered prudent to provide mitigation to explicitly restrict all such works to daylight hours. In the worst-case scenario, given the location, scale and duration of these works, the effects of works lighting on otters are likely to be negative, temporary and slight at the local level. There will be no artificial lighting of the river channel or riverbanks or riparian zone as part of the operation of the proposed development. Water quality impacts can indirectly affect Otter, by reducing the availability of prey species. As per KER 2 above, there is a risk of negative water quality impacts requiring mitigation. In the long term, the expected improvement in water quality due to greater capacity and improved wastewater treatment has the potential to increase prey availability. As summarised in 5.5.1.7 above, the proposed development will not have any impacts in terms of hydrological regime or hydromorphology that could affect Otter.	
KER 7 - Fish species	The proposed development will not lead to any direct or indirect loss or fragmentation of habitat for fish species of conservation interest. There is potential for direct mortality of small numbers of fish not of conservation interest during temporary dewatering of the outfall works area, requiring fish salvage and release outside the cofferdam. Disturbance to fish is limited to light spill onto the river channel and underwater noise from piling. During construction, there is likely to be artificial lighting of works areas, including the outfall area. The impacts of this include avoidance of the lit area, i.e. changes in fish distribution and behaviour if the river channel is lit. As it is not practical to quantify this effect based on the information available, mitigation has been provided on a precautionary basis in Section 5.6.1.2 below. It should be noted that works on and near the riverbank (i.e. works for the construction of the new outfall) are limited	Construction: Temporary slight to moderate negative effects due to underwater noise from piling. Temporary imperceptible negative effects from construction-stage lighting. Risk of short-term moderate negative effects in the event of pollution. Operation: Imperceptible positive effects at the local level in terms of water quality.

Key Ecological Receptor	Analysis of Impacts	Evaluation
	to the months of July, August and September and, as such, the normal working hours of 08:00 to 18:00 will not require any artificial lighting. However, in the very unlikely event that such works must be undertaken outside of this period, it is considered prudent to provide mitigation to explicitly restrict all such works to daylight hours. In the worst-case scenario, given the location, scale and duration of these works, the effects of works lighting on fish are likely to be negative, temporary and imperceptible at the local level. There will be no artificial lighting of the river channel as part of the operation of the proposed development. As explained in Section 5.5.1.5 above, modelling by Wave Dynamics (2026) found that, in the worst-case scenario (impact/percussive pile driving), even the most sensitive receptors (juvenile hearing-specialist fish such as Twaite Shad) would only experience temporary hearing injury if they remain within 12m of active piling for at least 10 minutes, while behavioural responses could be induced up to 700m from the activity. Juvenile Twaite Shad are only found in the tidal sections of the river and adults are also unlikely to be found as far upstream as the proposed development. No other hearing specialist species is known from the River Barrow. As such, only hearing generalist species are likely to occur and, given the lack of suitable spawning and juvenile habitat in the vicinity, will likely to be limited to larger fish moving through the area. In addition, piling is limited to between the hours of 08:00 and 18:00 for a period of c. 10 days. Therefore, even temporary hearing injury is extremely unlikely, with effects on fish limited to temporary avoidance of the area during active piling. This is considered to be a temporary slight to moderate negative impact at the local level. As per KER 2 above, there is a risk of negative water quality impacts from the construction works. Given the potential nature, magnitude, extent and duration of these impacts, they are considered to represent moderate short-term negative effects on fish. In the long term, the expected improvement in water quality due to greater capacity and improved wastewater treatment has the potential to reduce the pressures on fish populations associated with water quality impacts from wastewater discharge. As summarised in Section 5.5.1.7 above, the proposed development will not have any impacts in terms of water levels or flow velocities that could negatively affect	



Key Ecological Receptor	Analysis of Impacts	Evaluation
	fish by preventing their movement past the works or by altering substrate conditions. As stated in Triturus (2025), the increase in numbers of cyprinid fish from 2021 to 2025 is likely associated with the increase in cover of the invasive Nuttall's Waterweed. As per KER 9 below, the proposed development does not pose a risk of exacerbating the existing Nuttall's Waterweed infestation (and thereby risk further increasing the numbers of non-native fish). The proposed development also does not pose a risk of introduction of additional non-native fish species. However, proper site hygiene and biosecurity should be observed to control the risk of introducing diseases that could affect fish populations.	
KER 8 - White-clawed Crayfish	As noted in Section 5.3.4.6 and Table 5-8, White-clawed Crayfish is known historically from the River Barrow near the proposed development, but no evidence of its presence was recorded during the aquatic surveys and its status is uncertain following an outbreak of crayfish plague in the Barrow catchment in 2017. This assessment has been undertaken on the precautionary assumption that this species is present near the proposed development or could recolonise this section of the river in the future. The installation of the new outfall will lead to a direct loss of a very small area of potentially suitable habitat for crayfish from within the river channel (c. 130m² within the cofferdam during construction, thereafter reducing to 5m² occupied by the headwall). This represents a miniscule portion of this habitat type in the locality and the presence of the headwall would also not prevent the movement of crayfish. Therefore, the effects on the area and connectivity of crayfish habitat are long-term but imperceptible at the local level. The assessment of hydromorphological impacts summarised in in Section 5.5.1.7 above shows that there will be no indirect loss or alteration of crayfish habitat. Disturbance to crayfish is limited to light spill onto the river channel (construction stage) and underwater noise and vibration from piling. As per KER 7 regarding artificial lighting. Unlike fish, which have swim bladders, crayfish lack air-filled cavities and so are primarily sensitive to the particle motion component of sound rather than the pressure component. Only crayfish in the immediate vicinity of active piling are at risk of lethal effects. Crayfish at greater distances may suffer sub-lethal injuries.	Construction: Temporary or short-term slight to moderate negative effects at the local level due to disturbance from piling and pollution from works. Temporary imperceptible negative effects from construction-stage lighting. Operation: Long-term negligible effects at the local level due to habitat loss and fragmentation at the headwall. Imperceptible positive effects at the local level in terms of water quality.

Key Ecological Receptor	Analysis of Impacts	Evaluation
	However, the beginning of piling will likely induce an escape response, allowing them to move further away and avoid injury. Any mortality would be extremely localised. Given that piling is limited to between the hours of 08:00 and 18:00 for a period of c. 6 days, displacement and barrier effects would be temporary and slight to moderate at the local level. As per KER 2 above, there is a risk of negative water quality impacts from the construction works. Given the potential nature, magnitude, extent and duration of these impacts, and this species' relative tolerance of these types of water quality impacts, they are considered to represent slight to imperceptible short-term negative effects on crayfish. In the long term, the expected improvement in water quality due to greater capacity and improved wastewater treatment has the potential to reduce the pressures on water quality from wastewater discharge. However, this would not likely have a perceptible benefit for crayfish. The proposed development is extremely unlikely to facilitate the introduction of invasive non-native crayfish species to the River Barrow. However, as with any in-stream works, there is a risk of spreading aphanomycosis ("crayfish plague") or other diseases that affect crayfish. If crayfish are present and crayfish plague were re-introduced, this would be a profound negative effect on the local population, which would likely be significant at the national level.	
KER 9 - Invasive Non-native Species	The 'High-impact' aquatic invasive Nuttall's Waterweed occurs in the River Barrow near the in-stream works for the outfall. Given the limited nature, extent and duration of these works, they do not pose a risk of exacerbating the existing infestation. However, appropriate biosecurity protocols will need to be followed to prevent its export to other sites via the jack-up barge or on materials such as removed sheet piles. Spread of this species to new waterbodies could have moderate to significant negative effects on the aquatic ecosystem in newly-infested areas. There is also a risk of importing aquatic invasive species or diseases via the jack-up barge, requiring biosecurity measures. The 'High-impact' terrestrial invasives Japanese Knotweed and Himalayan Balsam are both present in the vicinity of the outfall works. Himalayan Balsam is also present in the woodland immediately south of the existing WwPS. Works in these areas pose a significant risk of both exacerbating the existing infestations and	Construction: Risk of long-term significant impacts at the local level. Operation: No appreciable risk of spreading invasive non-native species.

Key Ecological Receptor	Analysis of Impacts	Evaluation
	spread to other areas of the proposed development or further afield. This could have significant long-term negative effects in the affected areas. The 'Medium-impact' terrestrial invasive Three-cornered Leek is present along the eastern side of the Kilkenny Road. This area was adjacent to a previously proposed location for the southernmost intermediate tunnel shaft. However, the proposed location for this intermediate shaft and its associated temporary works area have been moved away from the location of the Three-cornered Leek. As such, there is no risk associated with this species in the context of the design and construction as now proposed.	



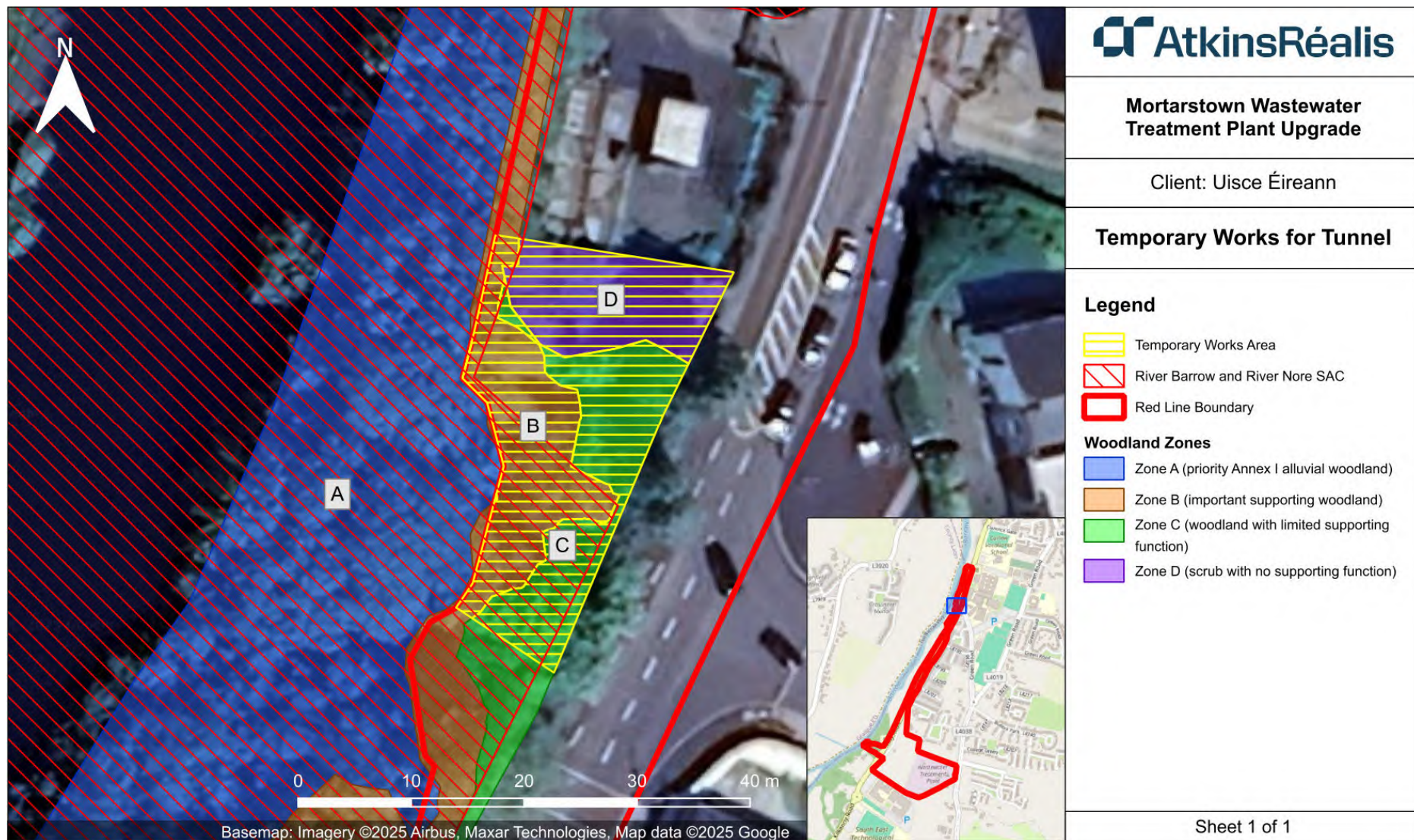


Figure 5-15 - Maximum extent of temporary works area south of the existing Kilkenny Road WwPS (permanent works are confined to zone D).

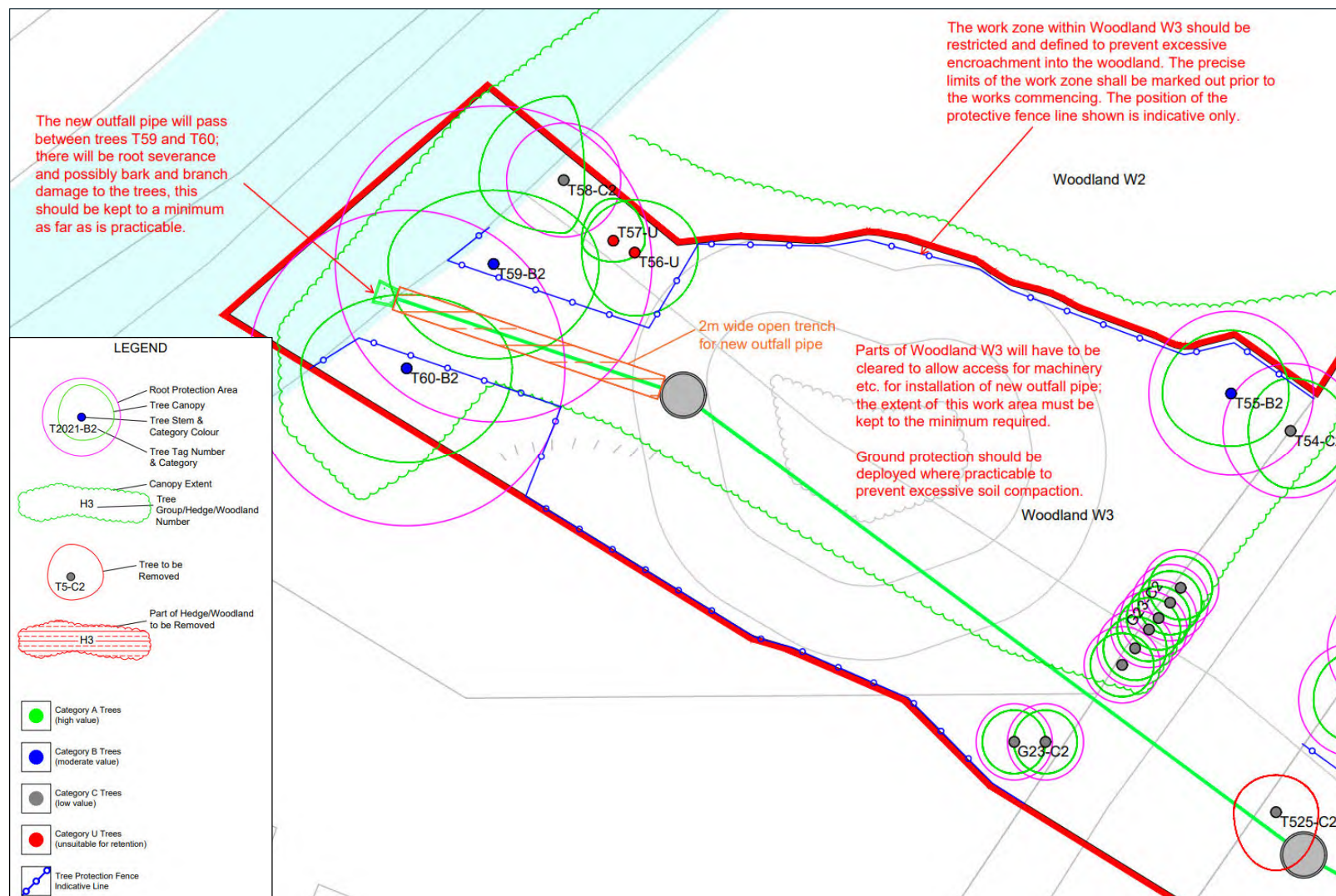


Figure 5-16 - Impacts to woodland and riparian trees near the outfall works (from Tree Protection Plan Drawing No. 25025_TPP Sheet 2, full scale version in NIS Appendix H).

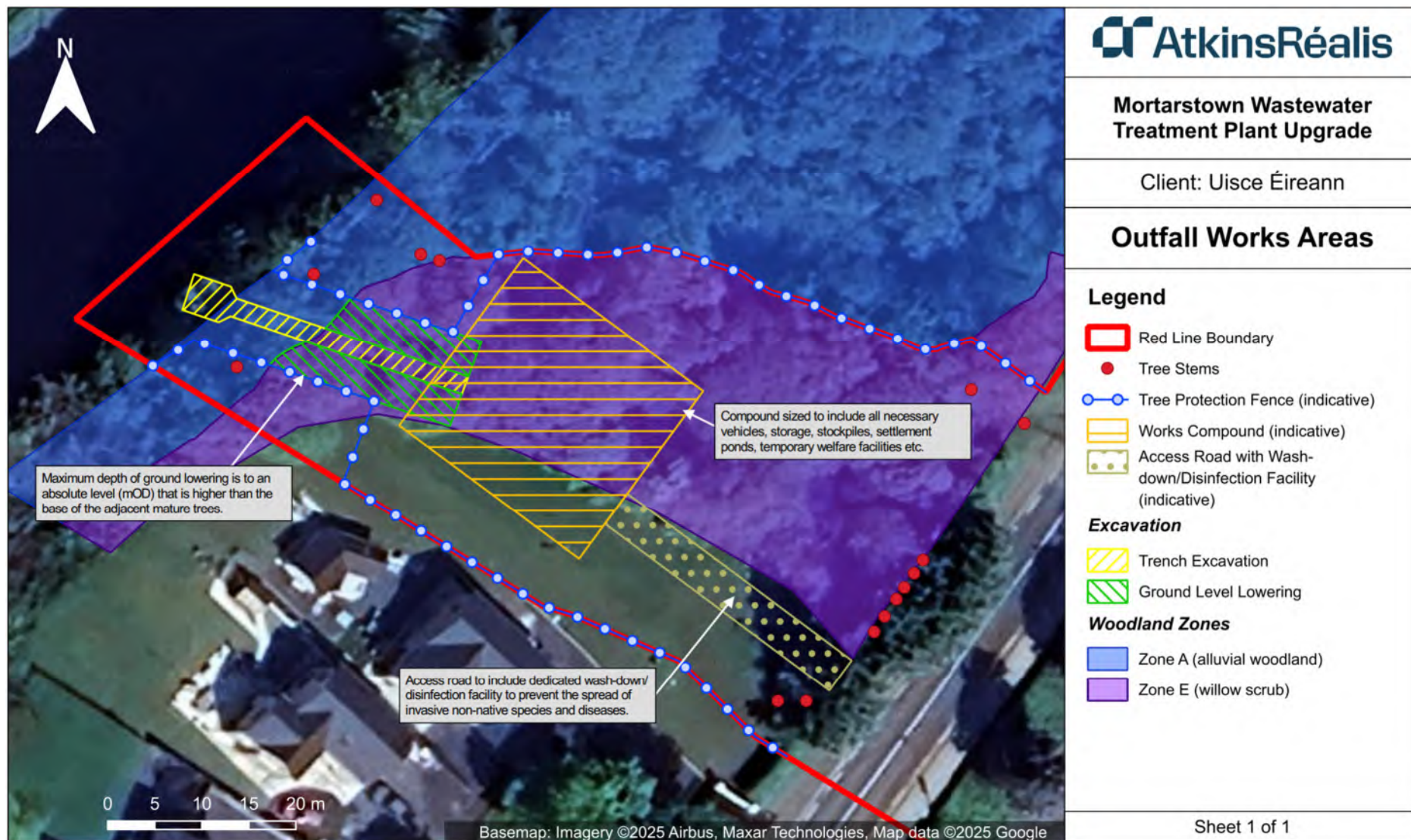


Figure 5-17 - Indicative extents of temporary works areas for the proposed new outfall.

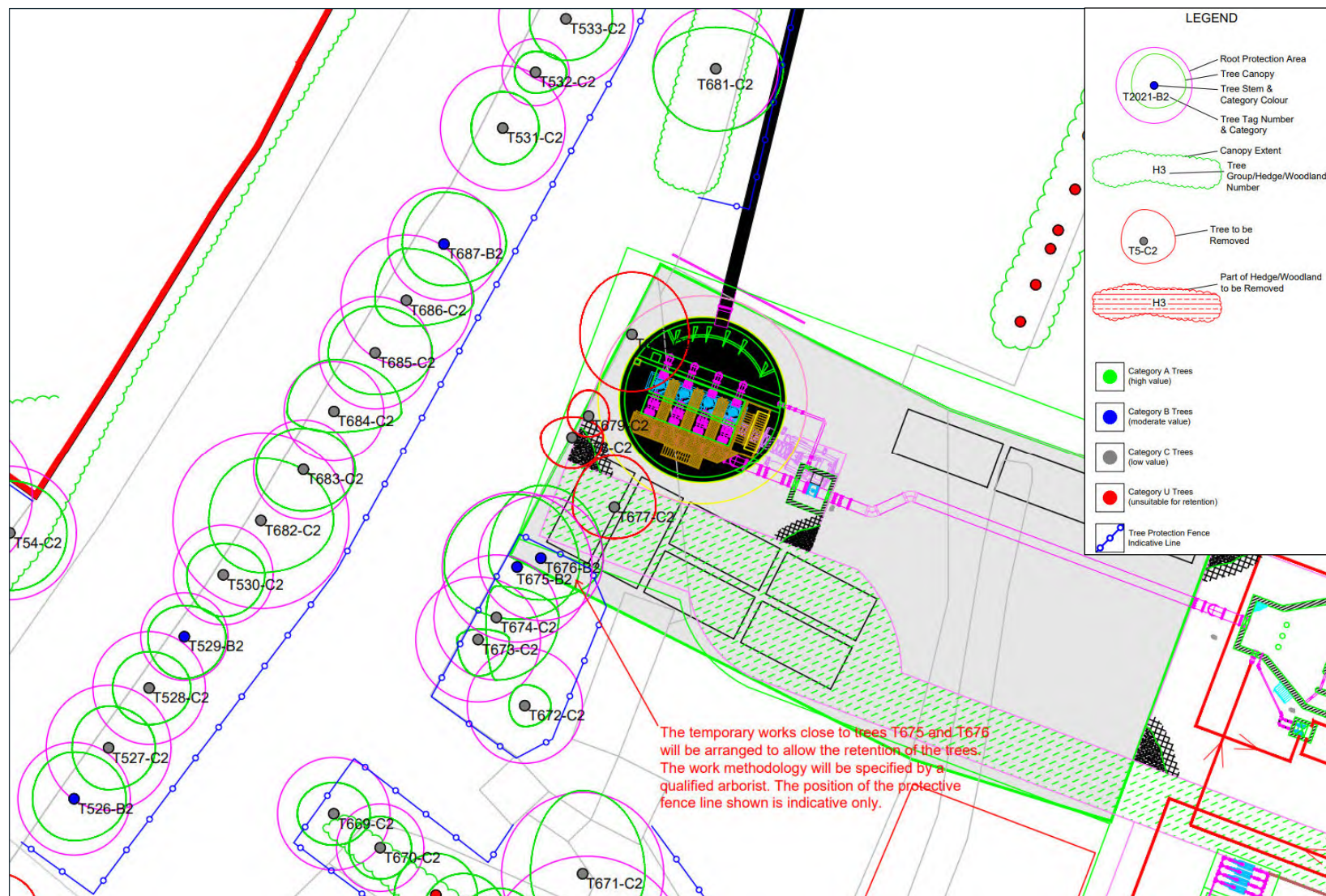


Figure 5-18 - Loss of trees in the vicinity of the cottage west of the WwTP (from Tree Protection Plan Drawing No. 25025_TPP Sheet 2, full scale version in NIS Appendix H).



5.6 Mitigation and Enhancement

5.6.1 Mitigation of Effects

This section has been prepared in accordance with the mitigation hierarchy set out in Section 5.2.4.3 above.

The measures described here cover all the perceptible negative impacts assessed in the previous section. These include:

- Adverse effects on the integrity of the River Barrow and River Nore SAC,
- Possible artificial lighting of the river channel, particularly affecting aquatic habitats, fish, crayfish and otter,
- Excessive artificial lighting on other habitats, particularly affecting bats, but also birds,
- Risk of water quality impacts associated with construction activities, affecting most KERs either directly or indirectly,
- Reduced area and quality of woodland habitats,
- Loss of habitat area and connectivity for birds and bats,
- Noise and visual disturbance to birds, bats and otter,
- Potential loss of bat roosts,
- Potential loss or disturbance of Otter holts or couches,
- Intense noise and vibration from sheet piling for the temporary cofferdam,
- Trapping of fish and other aquatic fauna within the temporary cofferdam, and
- Risks associated with invasive non-native species and diseases of aquatic species.

The following sub-sections address all of these impacts. The most general or over-arching measures are presented first, followed by additional more specific or targeted measures, as required.

With regard to construction-related mitigation measures, indicative locations, extents and layouts of construction compounds are illustrated in Drawings No. 5161805_EWE_DR_MOR_5600 to 5161805_EWE_DR_MOR_5604. As can be seen from these drawings, there are large areas within the Red Line Boundary that are unused for the permanent infrastructure but will be available to the Contractor for use during construction. As such, there is ample suitable space for all of the measures prescribed in this section, even when certain restrictions (e.g. minimum distances from watercourses, or tree protection zones) are taken into account. Therefore, it has not been necessary to prescribe the exact location, extents or layouts of these measures.



5.6.1.1 Protection of Water Quality

Chapter 12 Water, specifically Section 12.8, presents a suite of mitigation measures to address all water quality impacts associated with the proposed development. The authors of this Biodiversity chapter have reviewed the mitigation measures set out in Chapter 12 and consider that they are adequate to address the effects of water quality impacts on the relevant KERs.

The mitigation measures for water quality impacts associated with each impact source are set out in Chapter 12 Water as follows:

- Sediment (from earthworks and dewatering) - Section 12.8.1.1 and 12.8.1.2.
- Hydrocarbons - Section 12.8.1.3.
- Cement-based materials - Section 12.8.1.4.
- Wastewater - Section 12.5.5.
- Outfall works - Section 12.8.1.7.
- Micro-tunnelling - Section 12.5.8.

Section 12.9 re-evaluated the significance of the predicted impacts following incorporation of the mitigation measures. For construction works at the new outfall, the residual effects on water quality in the River Barrow are assessed as negative, temporary and moderate. Residual effects on water quality from all other impacts are imperceptible.

Section 8.2.1.3 of the NIS (AtkinsRéalis Report Ref. 5161805DG0457 - NIS, 2026) submitted alongside this EIAR also sets out the water quality protection measures required to avoid adverse effects on the integrity of the River Barrow and River Nore SAC.

Given the nature of the proposed development, the increased capacity and improved wastewater treatment will likely lead to an improvement in water quality in the River Barrow during the operation of the upgraded WwTP, which is subject to compliance with emission limit values (ELVs) and a Discharge Licence. No additional mitigation is required in respect of the operational phase.

5.6.1.2 Artificial Lighting

Construction works during hours of darkness will be kept to a minimum. Works should be limited to normal working hours (08:00 to 18:00), with the site being secured and lighting being switched off outside of these hours, subject to safety and security requirements (This does not apply to areas within the existing WwTP which are subject to existing operational lighting).

Any works lighting shall be directed away from the River Barrow and all trees and vegetation to be retained, following the principles set out below in relation to the permanent lighting design.

All in-stream works and works near the riverbank shall be restricted to daylight hours. Therefore, there shall be no artificial lighting of the river channel or riverbanks.

The proposed operational lighting is restricted to the access roads within the WwTP site itself (see Figure 5-19 below). No lighting is proposed west of Kilkenny Road. A lighting plan has been prepared for the WwTP site, which follows the below principles:

- Lighting design will be flexible and fully take into account the presence of protected species. Appropriate lighting will be used, with more sensitive lighting regimes (in terms of both the type, extent and timing of light) deployed in wildlife-sensitive areas.



- Dark zones will be used to separate habitats or features such as waterbodies, hedgerows, treelines and scrub from lighting by forming a dark perimeter around them.
- Buffers will be used to protect dark zones and rely on ensuring light levels within a certain distance of a feature do not exceed defined limits.

The following, which is taken from Institute of Lighting Professionals *Guidance Note GN08/23*⁷⁷, should be considered if choosing new luminaires: -

- All luminaires should lack UV elements when manufactured. Metal halide, compact fluorescent sources should not be used.
- LED luminaires should be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability.
- A warm white light source (2700 Kelvin or lower) should be adopted to reduce blue light component.
- Luminaires should feature peak wavelengths higher than 550nm.
- Column heights should be carefully considered to minimise light spill and glare visibility. This should be balanced with the potential for increased numbers of columns and upward light reflectance as with bollards.
- The use of bollard or low-level downward-directional luminaires is strongly discouraged. This is due to Issues such as unacceptable glare, poor illumination efficiency, unacceptable upward light output, increased upward light scatter from surfaces and poor facial recognition which makes them unsuitable for most sites. Therefore, they should only be considered in specific cases where the lighting professional and project manager are able to resolve these issues.
- Only luminaires with an upward light ratio of 0% and with good optical control will be used.
- Luminaires must always be mounted on horizontally with no light output above 90° and/or no upward tilt.
- As a last resort, accessories such as baffles, hoods or louvres may be used to reduce light spill and direct it only to where it is needed.

With regard to artificial lighting in the vicinity of the proposed pumping station, i.e. lighting columns 24A and 26A as shown in Figure 5-19 below, the default setting for these lights shall be that they are switched off unless activated by a security sensor, or required for emergency maintenance during hours of darkness. Thus, there will be no slight spill from these lights towards the nearby bat habitats except in exceptional circumstances and even then only for a very brief duration.

The timing of all other lighting around the site being switched on shall also be limited to that necessary for operational, safety and security reasons.

⁷⁷ ILP (2023). *Guidance Note GN08/23 - Bats and Artificial Lighting at Night*. Institute of Lighting Professionals.



Figure 5-19 - Operational lighting plan, see full scale drawing 5161805_EWE_DR_MOR_1300 included in the planning pack.

5.6.1.3 Installation of Temporary Cofferdam

As these are in-stream works, they are limited to the period beginning on 1st July and ending on 30th September. Were it to be impossible to schedule these works to take place entirely within this period, Carlow County Council (on behalf of UÉ) would need to apply for a derogation under the Local Authorities (Works) Act, 1949 (as amended) from the Inland Fisheries Section of the Department of Climate, Energy and the Environment. However, as construction of the new outfall will take approximately 3 weeks to complete (including installation and removal of the cofferdam), timing these works to take place between 1st July and ending on 30th September is very feasible.

Following the precautionary principle, the assessment of the impact of piling noise in Section 5.5.1.5 above, Table 5-10 and in Wave Dynamics (2026) (see Appendix 5-13, Volume 3 of this EIAR) was based on the worst-case scenario in terms of the piling method to be employed, i.e. percussive pile driving using an hydraulic hammer. This method of piling generates intense pulses of sound energy and, thus, is considered to be the most environmentally damaging method. Alternative methods such as hydraulic pushing/pressing or vibratory piling produce much lower peak outputs of sound and so are less damaging to the auditory organs of animals and less likely to induce behavioural responses (i.e. cause less disturbance). Other relatively quiet piling methods such as rotary driving are not applicable to sheet piles. On that basis, the following shall apply to piling for the temporary cofferdam:

- Wherever possible, piles shall be driven by hydraulic pressing.
- Where this is not feasible, vibratory piling will be deemed acceptable.
- Any percussive piling shall be limited to a small number (between 1 no. and 10 no.) strikes with an impact hammer to drive piles to refusal, where necessary.

These measures will further reduce the effects of piling noise on sensitive ecological receptors.

During dewatering, the pump intake shall be fitted with a screen or mesh to prevent intake of any fish or other aquatic life. Any fish (and crayfish, if present) within the isolated area shall be rescued (prior to dewatering) and released into the river outside the cofferdam. The dewatering from the cofferdam will be to a settlement pond to be installed at a minimum of 20m from the river bank.

5.6.1.4 Habitat Loss and Fragmentation

For the construction phase, the Tree Survey Report (Independent Tree Surveys, 2025) and the Tree Protection Plan drawings which accompany it detail which areas of woodland, tree groups, treelines, hedgerows, scrub and individual trees and shrubs are to be protected and how. For the purposes of this Biodiversity chapter, the Tree Protection Plan measures are emphasised and reinforced as follows:

- Tree felling and vegetation clearance shall be limited to the areas required for the construction of the proposed development. These areas shall be clearly delineated and marked out prior to commencement of tree felling and vegetation clearance. No tree felling or vegetation clearance will be permitted outside of these areas.
- The Tree Protection Plan shall be followed to ensure that there is no direct or indirect loss or damage to trees or other vegetation that is not within areas required to be cleared.
- Clearance of woodland and scrub immediately south of the existing WwPS shall not exceed a total area 520m² and shall under no circumstances encroach on the priority Annex I 'alluvial woodland' (zone A).



- Clearance for the temporary works area along the outfall pipeline shall not encroach into the adjoining zone A woodland outside the Red-Line Boundary.
- Vegetation clearance in zone A at the outfall location shall be strictly limited to that required to construct the new outfall. Protection of the 2 no. mature willow trees on the riverbank shall be of paramount importance and the measures in the Tree Protection Plan shall be strictly followed in this regard.
- Replacement and additional planting in each area shall be established at the earliest opportunity, subject to any seasonal recommendations set out in the Landscape Plan and Specification (EBLA, 2025), landscape rationale set out in Section 5.6.2.2 below.

With regard to the tree group west and north of the cottage (see Tree Protection Plan Drawing No. 25025_TPP Sheet 2), the temporary works for the new WwPS have been rearranged to minimise habitat loss and fragmentation in this area, most especially to allow for the retention of the 2 no. mature Horse Chestnut trees (T675 and T676) and maintenance of a dark buffer zone around these trees to avoid negative impacts on the bat roosts identified.

5.6.1.5 Biosecurity

General

To prevent the import of invasive non-native species to the proposed development site, all vehicles, plant, equipment, and PPE shall be thoroughly checked for any signs of invasive species or their propagules, e.g. seeds or fragments of rhizomes, before being allowed on site, paying particular attention to wheels and tracks.

If there is any doubt as to the absence of invasive species materials, the vehicle/plant/equipment/PPE concerned shall be taken to one of the dedicated wash-down disinfection facilities described below and thoroughly cleaned and re-checked before being allowed on site.

The Biosecurity Standard Operating Procedure (SOP) set out in Section 3.1 of INVAS (2026), which is presented in Appendix 5-12, Volume 3 of this EIAR, shall be implemented for all works, including surveys, site investigations or any other activities on site.

Terrestrial Environment

During construction, works between the Kilkenny Road and the riverbank to construct the new outfall are assumed to interact with Japanese Knotweed and Himalayan Balsam. Therefore, the following shall be implemented:

- The Contractor shall set up dedicated wash-down/disinfection facilities for use on entry to/exit from the two works areas west of the Kilkenny Road, i.e. the outfall area and the area south of the existing pumping station.
- All personnel, visitors, materials and equipment shall be thoroughly cleaned in this facility and be checked to ensure that they are free of any signs of invasive species or their propagules, e.g. seeds or fragments of rhizomes, before being allowed to leave the area.
- Washings built up in the wash-down/disinfection facility shall be periodically removed and stockpiled for removal as detailed in the first bullet point.
- All personnel and visitors shall be made aware of the presence of invasive species, the importance of preventing their spread, and the measures/protocol being implemented by the Contractor to that end.



- Appropriate signage shall be erected at entry and exit points from this area to alert all personnel and visitors to the presence of this species.
- All arisings from excavations in this area shall be treated as contaminated with invasive species material and shall be stockpiled accordingly, in a bunded area at least 20m from the riverbank, and then removed to an appropriately licensed waste facility.

Works west of the Kilkenny Road in the vicinity of the existing WwPS shall be assumed to interact with Himalayan Balsam. The same arrangement as described above in relation to the outfall area is required here.

As noted in Table 5-10 above, the proposed location for the southernmost intermediate tunnel shaft and its associated temporary works area have been moved away from the location of the Three-cornered Leek along the Kilkenny Road. The new location is further south along the western side of the road. While there are no legally restricted species in this area, the 'Medium-impact' Traveller's-joy is present, smothering the adjoining hedgerow and trees. Although this species is not legally restricted, its spread to new areas would constitute a negative impact on Biodiversity. Therefore, should works encroach into the infested area, any arisings shall be removed off-site to an appropriately licensed waste facility and any vehicles, plant, equipment or PPE in contact with the same shall be thoroughly cleaned and checked before being permitted to leave the area.

Any Ash (*Fraxinus excelsior*) trees or material encountered during necessary tree felling and vegetation clearance shall be assumed to be infected with *Hymenoscyphus fraxineus*, the causal agent of 'Ash dieback disease'. Any Ash material arising from necessary tree felling or vegetation clearance works shall be dealt with in line with published best practice, e.g. Scottish Environmental Protection Agency (SEPA) advice on *Disposal of trees and plants infected with specific plant diseases*.⁷⁸

Aquatic Environment

During construction, all in-stream works shall be assumed to interact with Nuttall's Waterweed and aphanomycosis ("crayfish plague"). The following shall be implemented to control the risk of spread:

- The Contractor shall set up a wash-down/disinfection facility for use on entry to/exit from the outfall works area, i.e. the works area west of the Kilkenny Road. Contaminated water from the biosecurity station will be tankered off site to a licenced waste facility.
- All personnel, visitors, materials and equipment which have been in contact with the riverbed material shall be thoroughly cleaned in this facility and be checked to ensure that they are free of invasive species material before being allowed to leave the area.
- Washings built up in the wash-down/disinfection facility shall be periodically removed and stockpiled for removal as detailed in the first bullet point.
- All personnel and visitors to site shall be made aware of the presence of aquatic invasive non-native species and diseases in the in-stream works area, the importance of preventing their spread, and the measures/protocol being implemented by the Contractor to that end.
- Appropriate signage shall be erected on approach to the in-stream works area to alert all personnel and visitors to the presence of this species.⁷⁹

⁷⁸ https://www.sepa.org.uk/media/154389/wst-q-037-disposal_of_trees_plants_with_specific_diseases.pdf

⁷⁹ Templates for invasive non-native species and biosecurity signage are available on *Invasives.ie* (<https://invasives.ie/resources/check-clean-dry-resources/>).

- The Check-Clean-Dry/Disinfect protocol shown in Figure 5-20 below will apply to any vehicles, plant, equipment or PPE in contact with the water, including sheet piles/cofferdam units.
- All arisings from the in-stream works area shall be treated as contaminated with Nuttall's Waterweed and crayfish plague and shall be stockpiled accordingly in a bunded area at least 20m from the riverbank. This material shall then be removed off-site to an appropriately licensed waste facility.
- On their removal from the river following completion of the outfall works, the sheet piles shall be treated as per other materials or equipment used for in-stream works before leaving site.

To control the risk of the introduction or spread of aquatic invasive non-native species or diseases associated with the use of a barge for the temporary cofferdam works, the owner or operator of the barge shall submit the following to the Employer or Employer's Representative:

- Documentary evidence in the form of a completed and signed Marine Institute '*Cleaning and Disinfection Declaration Form*' (Form No. C-038) or appropriate alternative, e.g. from Waterways Ireland, that the barge was fully cleaned and disinfected within 6 months immediately preceding its arrival on site; and,
- Records of the barge's movements during the 6 months immediately preceding its arrival on site.

If the above cannot be provided, the barge shall be fully cleaned and disinfected, e.g. at the Waterways Ireland dry dock at Athy, c. 20km north of the works area via the Barrow Navigation, or at another suitable location. This shall be done, under the supervision of the Contractor's ecologist, who shall make a record of the cleaning and disinfection of the barge and include this in their monitoring file.

The barge shall only be permitted to move to site once the Contractor's ecologist is satisfied that it does not pose a significant risk of importing aquatic invasive non-native species or diseases to the works area.

ATTENTION WATER USERS - Help stop the Invasion!

Invasive aquatic plants and animals harm our wildlife and block waterways.
Protect and enjoy your natural environment by remembering to:

CHECK

Check your equipment, boat, and clothing after leaving the water for mud, aquatic animals, or plant material. Remove anything you find and leave it at the site.

CLEAN

Clean everything thoroughly as soon as you can paying attention to areas that are damp and hard to inspect. Use hot water (at least 45°C) or a high-pressure spray.

DRY

Dry everything until it is dry for at least 48 hours before using elsewhere as some invasive plants and animals can survive for weeks in damp conditions.

Disinfect everything if complete drying is not possible.

STOP THE SPREAD

invasives.ie/biosecurity/check-clean-dry



An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreacht
Department of Housing,
Local Government and Heritage



Figure 5-20 - Check-Clean-Dry/Disinfect Protocol. Source: *Invasives.ie*.

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AtkinsRéalis - Baseline / Référence

5.6.1.6 Protection of Birds

Section 22(4) of the Wildlife Act makes it an offence to hunt or deliberately injure a wild bird, to take or remove eggs or nests, to destroy, injure or mutilate eggs or nests, or to disturb a wild bird on or near a nest containing eggs or unflown young. However, Section 22(5) states that it is not an offence to unintentionally kill or to injure a wild bird or unintentionally destroy, injure or mutilate eggs or nests while carrying out construction works. Notwithstanding this, every effort shall be made to avoid killing or injuring birds, destroying nests or eggs or disturbing birds near nests.

To further protect nesting birds and other wildlife, Section 40 of the Wildlife Act makes it an offence to “*cut, grub, burn or otherwise destroy, during the period beginning on the 1st day of March and ending on the 31st day of August in any year, any vegetation growing on any land not then cultivated*”. However, this does not apply to “*the clearance of vegetation in the course of road or other construction works or in the development or preparation of sites on which any building or other structure is intended to be provided*”. Notwithstanding this, every effort shall be made to avoid cutting/felling trees or clearing vegetation during this period.

Where tree felling or vegetation clearance is necessary between 1st March and 31st August, a suitably qualified and experienced ecologist will inspect the trees/vegetation and identify any active bird nests present. Any active nests will be protected and any surrounding cover (extent to be determined by suitably qualified ecologist) not cleared until such time as the nest is no longer active, as advised by the Contractor's ecologist.

5.6.1.7 Protection of Bats

Mitigation for construction- and operational-phase artificial lighting is provided in Section 5.6.1.2 above and provides effective measures to avoid and minimise the negative effects on bats associated with those impacts.

The 2 no. Horse Chestnut trees (T675 and T676) in the garden of the cottage west of the WwTP were previously marked for removal to facilitate the construction of the new WwPS in this area. Bat surveys indicate the presence of at least 1 no. roost for 2 no. Brown Long-eared Bat in these trees. As per Section 5.6.1.4, the temporary works for the new WwPS have been rearranged to allow for the retention of these trees and maintenance of a dark buffer zone around them to avoid the bat roost(s).

The existing WwPS building is proposed to be decommissioned and not demolished. This building has been assessed as having ‘Moderate’ bat roost potential. No evidence of current use by bats was found during the surveys. As this building is not being demolished the potential bat roost habitat will remain.

5.6.1.8 Protection of Otter

All open excavations shall be securely fenced off and include ramps/ladders outside of active working hours to prevent Otters of other species from becoming trapped within them.

No Otter holts or couches were identified in the immediate vicinity of the proposed works. Thus, based on the current baseline, there is no requirement for a Regulation 54 derogation licence. However, given the confirmed presence of otters in the vicinity and the significant time likely to elapse between the surveys and the commencement of works, the possibility that Otters may establish new holts or couches in the vicinity cannot be entirely excluded. Therefore, pre-construction surveys to identify any new Otter holts or couches (should they occur) will be undertaken in advance of works (including any investigatory or preparatory works).

These surveys will be undertaken by a suitably qualified and experienced ecologist (appointed by the Contractor) and in the appropriate survey seasons.



The results of these pre-construction surveys will determine the need or otherwise for any derogation licence (due to any changes in Otter use in the area in the intervening time between the planning application and start of works). The terms and conditions of any licence granted will be strictly observed. The Contractor will be responsible for applying for and executing any licences required, and will be assisted by their own suitably qualified and experienced ecologist.

5.6.1.9 River Barrow and River Nore SAC

All specific mitigation required to address potential adverse effects on the integrity of the River Barrow and River Nore SAC is prescribed in the NIS (AtkinsRéalis Report Ref. 5161805DG0457 - NIS, 2026) submitted alongside this EIAR.

5.6.2 Ecological Enhancement

5.6.2.1 Background

The main documents which informed the recommendations in this section were the Carlow County Development Plan the Carlow-Graiguecullen Joint Urban Local Area Plan, UÉ's *Biodiversity Action Plan* and the All-Ireland Pollinator Plan. The policies, objectives and actions from these plans which are most applicable to the proposed development are set out below. As well as the planned enhancement measures discussed in this section, additional measures which could be enacted in the future to further improve ecology on the site have been included. Only the planned measures have been used to assess the residual effects in Section 5.6.4.

Carlow County Development Plan 2022-2028

Chapter 9: Landscape and Green Infrastructure contains the following green infrastructure policies which are relevant in terms of ecological enhancement:

- **GI. P2:** *Protect and enhance the biodiversity and ecological function of the County's green infrastructure network.*
- **GI. P4:** *Require all new development to contribute to the protection and enhancement of existing green infrastructure and the delivery of new green infrastructure, as appropriate.*
- **GI. P12:** *Encourage and support the incorporation of elements of green infrastructure and biodiversity into all new developments in urban areas, including the design of buildings and their surroundings (e.g. tree planting, green spaces and verges, planters, green roofs, living walls, bird boxes, bat roost sites etc.), and that contributes to and links with the wider green infrastructure network, in particular where similar features exist on adjoining sites.*

Chapter 10: Natural and Built Heritage also contains a general policy that includes the enhancement of the natural heritage and biodiversity of the county.

Carlow-Graiguecullen Joint Urban Local Area Plan 2024-2030

Chapter 10: Natural Heritage, Green Infrastructure and Landscape contains the following policies which are relevant in terms of ecological enhancement:

- **NH. P9:** *Identify, protect, conserve, and enhance wherever possible, wildlife habitats and species of local importance in Carlow-Graiguecullen, not otherwise protected by legislation. Such habitats can include woodland, river, wetlands, and grassland areas along with field boundaries (hedgerows, stone walls and ditches). These features form part of a network of habitats and corridors, which allow wildlife to exist and flourish and contribute to compliance with Article 10 of the Habitats Directive.*

- **GI. P1:** *Protect and enhance the biodiversity and ecological function of the green infrastructure network in Carlow-Graiguecullen.*
- **GI. P4:** *Require the protection and integration of new and existing green infrastructure as an essential component of all new developments in Carlow-Graiguecullen, and to ensure future development does not fragment, damage, or prejudice the integrity of the green infrastructure network in the joint urban area.*
- **GI. P10:** *Promote appropriate tree planting and pollinator friendly planting, in accordance with the recommendations of the All-Ireland Pollinator Plan 2021-2025 throughout Carlow-Graiguecullen and in open spaces within new developments, in order to enhance local biodiversity, visual amenity and surface water management.*
- **GI. P14:** *Seek to protect trees and hedgerows in the joint urban area with a particular local amenity or conservation value and encourage the planting of native tree and hedgerow species.*

County Carlow Biodiversity Action Plan 2023-2025

The Biodiversity Action Plan for County Carlow covering the period 2023-2025 aims to realise the following Vision:

“To further improve our understanding of County Carlow’s biodiversity and take actions for its conservation and restoration.”

This is supported by Objectives and Actions, which include the following that are considered relevant in the context of the proposed development:

Objective 3: To Restore Where Possible

Action 3.1 *To support initiatives under the Water Framework Directive that contribute to the restoration of ecology in water bodies, and the Blue Dot Catchments Programme.*

3.1.2 *To support or lead initiatives, including litter clean-ups, invasive species management, and riparian habitat management.*

Action 3.3 *To control Invasive Species across Carlow.*

Objective 4: To Enhance Where Possible

Action 4.1 *To identify opportunities for habitat creation in areas of low biodiversity across Carlow.*

4.1.1 *Identify potential sites, and initiate proposals, within Carlow County Council managed lands.*

4.1.2 *Identify potential sites, and initiate proposals, within institutional lands in Carlow.*

4.1.3 *To encourage habitat creation as a primary function of SUDS, as opposed to a by-product of water management.*

Objective 5: To Adopt Biodiversity Friendly Policies

Action 5.1 *To roll out low mow/ no mow areas in all town centres in County Carlow.*



Action 5.2 To implement the ‘right tree, right place’ approach to tree planting by Carlow County Council.

Action 5.3 To implement a pesticide reduction strategy within Carlow County Council.

5.3.1 Identify and trial alternatives to pesticides

5.3.2 Develop and implement a communications campaign for the public that encourages a higher level of tolerance for “weeds” in a pesticide-free environment.

Action 5.4 To replace all public lighting in Carlow with bat/wildlife friendly lighting.

Where possible, enhancement measures aligning with these Objectives and Actions have been incorporated into the recommendations for the proposed development. Some of the survey results in this chapter may also inform Carlow County Council in some of their actions, e.g. “**4.1.1** Identify potential sites, and initiate proposals, within Carlow County Council managed lands” (as some of the survey results relate to Council-owned lands).

At the time of preparation of this EIAR, the Carlow Biodiversity Action Plan 2026-2031 pre-draft discussion paper was out for public consultation. It is recommended that the new plan be reviewed as part of the Detailed Design process for the proposed development, to ensure that the final design and construction methods are in line with current local biodiversity policies and objectives at that time.

Carlow Town Biodiversity Strategy & Action Plan 2021-2025

This Strategy and Action Plan is intended as “A framework for partnership between Carlow Town Development Forum, Carlow County Council, and the community of Carlow Town” and was prepared by Scott Cawley Ltd for Carlow Town Development Forum in partnership with Carlow County Council.

The Plan proposes several possible “flagship projects” that could be undertaken in Carlow town, as follows:

10. Biodiversity Education and Awareness
11. Become a town partner of the All-Ireland Pollinator Plan
12. Save our Swifts
13. Bat-Friendly Town
14. River Clean-Up
15. Biodiversity Loop Walk

Many of the recommendations in this Biodiversity align with these proposed flagship projects. As such, if and when any such projects are progressed, there is potential for UÉ to partner with them and, in doing so, contribute to the achievement of their aims.

In additions, the Plan outlines actions under the following headings which would be generally applicable throughout Carlow town:

BA1 Incorporate biodiversity friendly planting schemes

BA2 Incorporating biodiversity friendly grassland management



BA3 *Incorporating biodiversity friendly roadside grass verge management*

BA4 *Reducing chemical use (herbicides, pesticides, fertilisers)*

BA5 *Planting new hedgerows*

BA6 *Installing bat boxes and bird boxes/towers*

BA7 *Invasive species management*

BA8 *Installing sensitive bat lighting*

Where possible, enhancement measures aligning with these local biodiversity actions have been incorporated into the recommendations for the proposed development.

UÉ's Biodiversity Action Plan

Key objectives in UÉ (2021) that are applicable to the proposed development include the following:

- *"Issue all Irish Water sites with a clear set of measures that will enhance and protect biodiversity."*
- *"Ensure 'no net loss' of biodiversity when carrying out activities, or delivering plans or projects."*
- *"Implement actions arising from the All-Ireland Pollinator Plan across all Irish Water sites, to support and increase our pollinator population."*
- *"Promote the use of nature-based solutions for water protection and wastewater treatment."*
- *"Manage invasive alien species at Irish Water sites."*

The main actions in UÉ (2021) that are applicable to the proposed development are in relation to the management of grasslands, hedgerows and trees on UÉ sites. These have been integrated into the recommendations in this section. UÉ (2021) also states that UÉ will monitor actions for pollinators and their outcomes as part of its participation in the All-Ireland Pollinator Plan.

The policies and actions in UÉ's Biodiversity Action Plan are also reflected in the company's *Landscape Treatment Guidelines* (IW-AMT-GL-009) and *Tree Protection Guidance* (UÉ-AMT-GL-026), which were followed in the preparation of the Landscape Plan (EBLA, 2025) and Specification and the Tree Protection Plan (Independent Tree Surveys, 2025).

All-Ireland Pollinator Plan 2021-2025

UÉ is a partner in the All-Ireland Pollinator Plan. Under Objective 2: "Making public land pollinator friendly", Target 2.4: "Organisations with site networks on public land to manage these in a pollinator-friendly way" includes Action 54: "Irish Water to adopt pollinator-friendly management across site network, where appropriate" (measure: Number of participating sites). From a review of the Actions for Pollinators map viewer⁸⁰, it is understood that the Mortarstown WwTP site is not currently a participating site. As such, it is recommended that UÉ register the Mortarstown WwTP site as an All-Ireland Pollinator Plan participating site.

⁸⁰ *Actions for Pollinators* (<https://pollinators.biodiversityireland.ie/>) [accessed 22/09/2025]. NBDC.

There are several sector-specific guidance documents that complement the All-Ireland Pollinator Plan. The document *Councils: actions to help pollinators*⁸¹ is the most appropriate to the proposed development. Although this document is related to the previous iteration of the All-Ireland Pollinator Plan, it still contains useful guidance that is appropriate for the Mortarstown site and is specified in UÉ's *General Civil Engineering Specification Notes for Guidance* (IW-TEC-300-02).

The main actions that are applicable to the proposed development are summarised as follows:

- Mow appropriate area under a pollinator-friendly regime (5 cut-and-lifts annually),
- Create meadows (1 cut-and-lift annually),
- Plant and manage native hedgerows for pollinators,
- Protect/create bare earth/sand banks for nesting pollinators,
- Create holes in wood or concrete for nesting pollinators,
- Where possible, eliminate the use of pesticides and, where not possible, ensure best practice, and
- Monitor and record actions and outcomes.

These actions have been incorporated into the recommendations in the following sub-sections.

At the time of preparation of this EIAR, the All-Ireland Pollinator Plan 2026-2030 has not yet been published. It is recommended that the new plan be reviewed as part of the Detailed Design process for the proposed development, to ensure that the final design and construction methods are in line with the current Plan at that time.

5.6.2.2 Habitat Creation and Improvement

Landscape Plan

The Landscape Plan for the proposed development is included in Drawings No. 5161805_EWE_DR_MOR_5180 to 5161805_EWE_DR_MOR_5184, inclusive, which accompany this EIAR.

The proposed planting strategy for Mortarstown WwTP is designed to integrate the site sensitively into the surrounding landscape, enhance visual screening, and support biodiversity. Retention of existing vegetation, supplemented with additional native hedgerows, grassland management, ponds and tree planting, will mitigate the visual and ecological impacts of the works while contributing to the overall landscape character of the area.

All planting proposed within the Mortarstown WwTP site will comprise native species of Irish provenance.

Existing screen planting along the northern, eastern, and southern boundaries of the site will be largely retained. Additional native species hedgerows will be planted along the entire boundary to the extension to the site to increase biodiversity, these hedgerows as they mature will also provide screening.

⁸¹ Councils: actions to help pollinators. AIPP Guidelines 4. *National Biodiversity Data Centre Series 12*.

Grassland areas within the site will be managed to enhance biodiversity. Short grassland areas will be managed through a mowing regime of five cuts per year at approximately six-week intervals, with all arisings removed. Long grassland areas will be managed through a single annual cut, with all arisings removed.

Two wildlife ponds, incorporating marginal planting and pondside trees to provide partial shading, will be provided within the Mortarstown WwTP site. Additional orchard tree planting will be provided within the rear garden of the derelict cottage located to the west of the site.

Replacement tree and hedgerow planting will be provided where sections of existing trees and hedgerows are removed along Kilkenny Road (in the vicinity of Southern Gardens and Carraig Abhainn) to facilitate shafts for micro-tunnelling works.

The small area of woodland removed south of the Kilkenny Road pumping station will be allowed to naturally regenerate following completion of the works. In addition, a native hedgerow will be planted adjacent to the existing stone boundary wall near the Kilkenny Road pumping station.

Grassland Management

Most of the grassed areas within the WwTP site can be managed as a short-sward species-rich grassland by changing the mowing regime to 5 no. 6-weekly cut-and-lifts annually, as follows:

- First cut-and-lift on or shortly after 15th April,
- Second cut-and-lift at the end of May,
- Third cut-and-lift in mid-late July;
- Fourth cut-and-lift in late August, and
- Fifth cut-and-lift after mid-October.

If necessary, e.g. where spring-flowering bulbs have been planted, an earlier cut can also be done in late February.

The mowing height should be set to 3 inches.

- The benefits of this regime are as follows:
- The sward is kept at a manageable height while increasing the growth of wildflowers.
- Not cutting until mid-April allows Dandelion (*Taraxacum officinale* agg.) to flower but not set seed. Dandelions are a vital food source for pollinators in spring.
- Cutting at the end of May and not again until mid-late July increases the growth of important plants like clovers (*Trifolium* spp.), Self-heal (*Prunella vulgaris*), Cuckooflower (*Cardamine pratensis*) and Common Bird's-foot Trefoil (*Lotus corniculatus*).

Areas along the southern and eastern boundaries of the WwTP site can be managed as a long-flowering wildflower meadow, similar to a hay meadow, by changing to 1 no. annual cut-and-lift in late August or early September.

In the early years, the following additional measures may assist in the establishment of this meadow type:



- Pulling problematic weeds such as Ragwort (*Jacobaea vulgaris*) to prevent them from becoming too dominant, and/or
- Sowing Yellow-rattle (*Rhinanthus minor*) and other appropriate wildflower species, locally sourced following All-Ireland Pollinator Plan guidelines⁸².

Long-flowering meadows provide important for feeding and undisturbed nesting areas for pollinators.

For all meadow areas, whether short-flowering or long-flowering, all cuttings should be removed, ideally to an on-site compost area, to continually reduce the fertility of the soil, thereby increasing wild species diversity.

Paths can be mowed through the meadows where more frequent access is required.

The indicative areas for meadows are illustrated in Figure 5-21 below, which also states the indicative extents of each of these. This has considered all of the above, maximising connectivity of meadow habitats and connectivity with other habitats, especially hedgerows, as well as land ownership constraints and other future or potential future projects (as described in Chapter 16).

In addition, the All-Ireland Pollinator plan guidelines for solar farms⁸³ (or any updates to these) will be followed for the area under the proposed solar array.

⁸² Collecting and using pollinator friendly wildflower seed. All-Ireland Pollinator Plan, How-to-guide 2. *National Biodiversity Data Centre Series 6*.

⁸³ Pollinator-friendly management of: Solar Farms. All-Ireland Pollinator Plan, *Guidelines 13. National Biodiversity Data Centre Series 31*.

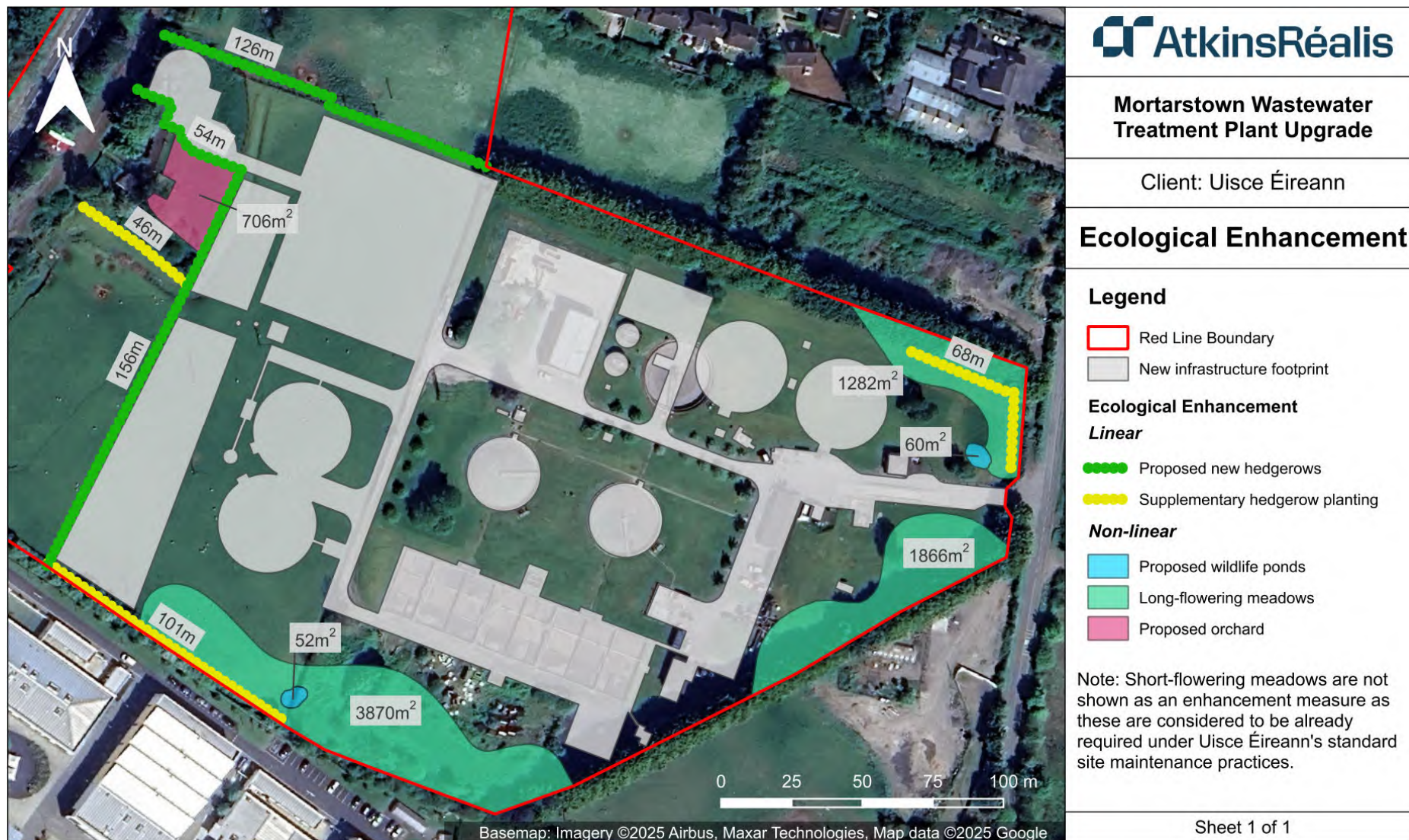


Figure 5-21 - Indicative areas for ecological enhancement within the WwTP site.

Hedgerows

The indicative lengths of new and supplementary native hedgerows are illustrated in Figure 5-21 above. This has considered the recommendations in Abbott (2024), as well as maximising connectivity of hedgerows and connectivity with other habitats, especially treelines and species-rich grasslands.

The All-Ireland Pollinator Plan guidelines for Councils advises that native hedgerows should contain 75% Hawthorn (*Crataegus monogyna*) and 25% of at least 4 no. other native species, e.g. willow, Blackthorn (*Prunus spinosa*), Hazel (*Corylus avellana*), Holly (*Ilex aquifolium*), Dog-rose (*Rosa canina*), Gorse (*Ulex europaeus*) and Guelder-rose (*Viburnum opulus*), and should be at least 30m in length. Species such as willows (*Salix* spp.), Blackthorn and Hawthorn flower in spring, providing an important food source for pollinators emerging from hibernation, while species such as Bramble (*Rubus fruticosus* agg.) flower in summer, and Ivy (*Hedera helix*) flowers in autumn, providing a vital food source for late-flying pollinators. This guidance also emphasises the importance of sourcing locally grown specimens of local provenance when planting. Specific All-Ireland Pollinator Plan guidelines for hedgerows⁸⁴ provide further useful guidance on the establishment of new hedgerows and management of existing ones. In addition, the All-Ireland Pollinator Plan guidelines for nocturnal pollinators⁸⁵ lists hedgerow species such as Honeysuckle (*Lonicera periclymenum*), Ivy and willows as being particularly important for these species, which are of particular importance as prey for bats.

Sourcing of young plants for the establishment of new or supplementary hedgerow planting should focus on native species of local provenance, locally grown, where possible. The establishment and ongoing maintenance of new and supplemental native hedgerows shall adhere to the Landscape Plan and Specification and follow UÉ's Landscape Treatment Guidelines (IW-AMT-GL-009) and Tree Protection Guidance (UÉ-AMT-GL-026), as well as the relevant All-Ireland Pollinator Plan guidelines.

Following the All-Ireland Pollinator Plan, and subject to safety/access requirements, hedgerows should be trimmed every 3 years (rather than every year) to encourage flowering. Ideally, this should be done on a rotation so that no more than half of the hedgerows on the site are cut in any given year, ensuring that flowering occurs on at least half of the hedgerows every year. Hedgerows should be trimmed to give an "A" profile rather than a box profile. After trimming, trimmings/deadwood should be left underneath the hedgerow to provide microhabitat for invertebrates and other fauna.

Consideration of the All-Ireland Pollinator Plan guidelines for transport corridors⁸⁶ in the reinstatement post-construction of the landscaping along the Kilkenny Road corridor.

Trees and Treelines

The proposed planting will include nectar- and pollen-rich trees and shrubs: suitable native species are Willows (*Salix* spp.), Hazel (*Corylus avellana*), Hawthorn (*Crataegus monogyna*) and Blackthorn (*Prunus spinosa*). UÉ's Biodiversity Action Plan also recommends the following considerations when planting/establishing new trees on UÉ sites:

- Young trees may need protection from grazers, e.g. rabbits, hares and deer.
- Specially designed tree supports should be used (not cable ties).
- Care must be taken when strimming around trees as strimmers can damage and even kill trees.

⁸⁴ Hedgerows for Pollinators. All-Ireland Pollinator Plan, How-to-guide 3. *National Biodiversity Data Centre Series 7*.

⁸⁵ Protecting nocturnal pollinators. All-Ireland Pollinator Plan, How-to Guide 13. *National Biodiversity Data Centre Series 33*.

⁸⁶ Pollinator-friendly management of: Transport Corridors. All-Ireland Pollinator Plan, Guidelines 9. *National Biodiversity Data Centre Series 20*.

Consideration should be given to replacing the non-native Leyland Cypress (*Cupressus × leylandii*) in the treeline around the main WwTP site with native species, including oaks (*Quercus* spp.), as recommended by Abbott (2024). Given the existing maturity and continuity of this treeline, any such replacement should be carried out gradually, over to maintain the continuity of the mature treeline. This is a long-term recommendation and, as such, it has not been taken into account when calculating the post-development biodiversity score of this treeline.

Orchard to be established to the rear of the uninhabited cottage to the west of the WwTP, as indicated in Figure 5-21. The All-Ireland Pollinator Plan guidelines for orchards⁸⁷ provides useful information on how fruit trees may be used to provide additional habitat diversity and food for pollinators, and indirectly species that prey on them, including bats which roosting in the cottage and nearby mature trees. As noted above, the All-Ireland Pollinator Plan guidelines for nocturnal pollinators lists trees and shrubs that are of particular importance for nocturnal insects, which are in turn important as prey for bats, and these should be incorporated into the species mix for the orchard.

As above, the All-Ireland Pollinator Plan guidelines for transport corridors 'Action 12' should be followed in the selection, siting and establishment of new street trees along the Kilkenny Road, which will be required.

Other Features for Pollinators

Bare earth scrapes or sand banks can provide nesting habitat for solitary bees. Although the WwTP site is generally flat, there are some small but marked changes in elevation in the proposed layout. These ridges or banks can be cut or scraped into to create a bare surface, and maintained annually by manual scraping with a shovel/spade (herbicides or pesticides of any kind must not be used around these areas).

Holes in untreated wood/timber or concrete can also provide nest cavities for solitary bees. South or east faces raised at least 1.5m above ground level are particularly suitable. During detailed design, appropriate locations for these features should be identified and included in the specification. These can be bought (e.g. "bee bricks") or hand-made following All-Ireland Pollinator Plan guidelines. Holes should be c. 10cm deep and include a range of diameters from 4mm to 8mm diameter. No pesticides or other harmful chemicals should be used near these.

These nesting habitats will be most effective when sited as close as possible to feeding areas (ideally within 100m).

Additional Surface Water Features

Surface water drainage features and ponds can provide additional feeding habitat for pollinators and provide breeding habitat for a greater diversity of pollinators and other invertebrates, e.g. damselflies and dragonflies, aquatic beetles etc., as well as providing a source of water for a large range of fauna, and breeding habitat for amphibians. As such, the addition of ponds, however small in scale, would be a significant enhancement for the biodiversity of the site.

The 2 no. ponds that have been included in the Landscape Plan will incorporate several different levels/depths to accommodate a variety of marginal, emergent, floating and submerged plant species. It is essential that any pond provide safe and easy access and egress for fauna, including species that are aquatic during all or part of their life cycle, e.g. Common Frog (*Rana temporaria*), and non-aquatic species that would access the pond to drink, e.g. birds, small mammals and invertebrates such as bees.

⁸⁷ Traditional Orchards and Fruit Trees for Pollinators on the Farm. All-Ireland Pollinator Plan, How-to Guide 12. *National Biodiversity Data Centre Series* 32. Waterford, July 2023.

Other surface water features such as swales or filter drains can also be enhanced for ecological gain. The All-Ireland Pollinator Plan leaflet *Make a Pollinator-friendly Rainwater Planter*⁸⁸ includes a list of suitable native plant species for such features, as well as acceptable non-native ornamental plants which could supplement the native planting.

Pesticide Use

In addition to implementing UÉ's own *Pesticide Policy* (AMS-AMT-POL-025), it is recommended that the Mortarstown WwTP site adopt the best practice code for pesticide use (which is provided as an appendix to "*Councils: actions to help pollinators*") and provide the necessary training to staff, as well as monitor and record the use of pesticides on the Mortarstown site to ensure compliance.

Fencing

In order to minimise the effects of habitat fragmentation on non-volant mammals, mammal-proof fencing will not be specified for the proposed development. During the detailed design stage, a suitably qualified and experienced ecologist will be consulted with regard to the specification of an appropriate fence which shall provide permeability for movement of mammals. Fencing relates to the main compound, no fencing is required west of Kilkenny Road for the outfall.

5.6.2.3 Bat Roost Features

Bat Conservation Ireland leaflets on gardening⁸⁹ and hedgerow management⁹⁰ for bats provide further guidance on the management of landscaped areas, hedgerows, treelines etc. for the benefit of bats. These guidelines should be considered during detailed design and the ongoing maintenance of the site.

Where appropriate, artificial roost features for bats should be incorporated into the design. The types, numbers and positions of such features will be determined during the detailed design process, on the advice of a suitably qualified ecologist, having regard to the site-specific bat fauna and existing bat roosts as described in this EIAR and the following guidelines :

- Marnell, F., Kelleher, C. and Mullen, E. (2022) Bat mitigation guidelines for Ireland – V2. *Irish Wildlife Manuals* 134. National Parks & Wildlife Service, Department of Housing, Local Government and Heritage, Dublin.
- Reason, P.F. and Wray, S. (2025). *UK Bat Mitigation Guidelines: a guide to impact assessment, mitigation and compensation for developments affecting bats. Version 1.2*. Chartered Institute of Ecology and Environmental Management, Ampfield.

Roosts in Trees

The installation of bat boxes should be considered to increase available roosting sites for bats in the area. Specifically, these should be tree hollow-type bat boxes. The exact model, number and placement should be determined by a suitably qualified ecologist. Bat boxes may require periodic maintenance and/or renewal to ensure their continued suitability; this will be done on the advice of a suitably qualified bat ecologist.

⁸⁸ *Make a Pollinator-friendly Rainwater Planter* (https://pollinators.ie/wp-content/uploads/2025/01/Rainwater-Planter_WEB.pdf) [accessed 06/10/2025]. NBDC.

⁸⁹ *Gardening for Bats* (<https://www.batconservationireland.org/wp-content/uploads/2022/07/Gardening-For-Bats.pdf>) [accessed 23/09/2025]. BCI.

⁹⁰ *Managing Hedgerows for Bats* (<https://www.batconservationireland.org/wp-content/uploads/2022/07/Managing-Hedgerows-for-Bats.pdf>) [accessed 23/09/2025]. BCI.

However, veteranisation of suitable nearby trees should be considered in addition to bat boxes, as this creates natural features that are more likely to be used by bats, last longer and be renewed naturally without a need for maintenance as is the case with artificial roost features. Establishment of newly planted trees, particularly oaks (*Quercus* spp.), will also provide additional roost features in the longer term. While veteranisation is a useful technique for creating natural or naturalistic roost features in trees in a short timeframe, it must be noted that trees naturally develop these features over their lifetimes (due to storm damage, disease and other injuries) and that these features are the most likely to be used by bats (and other wildlife). However, management of trees often results in the removal of these features, e.g. due to over-emphasis on “tidiness”, or for Health & Safety reasons which may not actually apply in all situations. Therefore, all trees retained as part of the proposed development should be allowed to age as naturally as possible, and before any dead, damaged or diseased trees or parts of trees are removed, a balanced, site-specific assessment of biodiversity value, Health & Safety (and other considerations) should be undertaken.

Roosts in Buildings

The cottage and outbuildings have ‘Moderate-High’ potential for roosting bats and the cottage and adjoining shed have confirmed roost sites for at least 2 no. Soprano Pipistrelle (*Pipistrellus pygmaeus*). The status of these roosts, i.e. the number of bats present and the level of use during different seasons, is not currently known (this would require further survey). However, it is noted that Marnell *et al.* (2022) rates roosts in buildings as having a strong association with both maternity and hibernation for both Soprano Pipistrelle and Common Pipistrelle (*Pipistrellus pipistrellus*), as well as Brown Long-eared Bat (2 no. bats of this species are confirmed roosting in the mature trees adjoining the cottage). Based on the survey data, the numbers of bats using the roosts identified on site is likely to be small (at present) and it is unlikely that the cottage or its adjoining outbuildings or mature trees are used as maternity roosts. However, it is possible that they are used as hibernacula for small numbers of bats. As the cottage is now in UÉ’s ownership, there is potential to enhance its bat roost potential to benefit the local bat populations.

This would be in addition to the other measures that this chapter has already recommended to further enhance the value/potential of the Mortarstown site for bats, including:

- Planting of new and supplementary native hedgerows and treelines, which serve as commuting corridors for bats and also provide habitat and a food source for invertebrates on which bats feed,
- Other general enhancements for wildlife, including improved grassland management, minimising pesticide use, nesting habitat features for invertebrates, and a pond and appropriate planting of other surface water features (including site drainage), all of which indirectly benefit bats in terms of prey availability and diversity,
- Establishment of an orchard in the curtilage to the rear of the cottage, following All-Ireland Pollinator Plan guidelines for traditional orchards and nocturnal pollinators to maximise its value for feeding bats close to the known roosts, and
- Provision of new bat roost features by veteranisation of existing trees and provision of artificial features such as bat boxes.

The delivery of these measures is of greater value due to their location near existing bat roosts and could be even greater if the cottage and outbuildings could be secured, enhanced and maintained for roosting bats into the future. Taken together, this delivery of a coherent suite of enhancements for roosting, commuting and foraging habitats for bats and other wildlife would be a significant positive impact for Biodiversity.

There are several examples of buildings such as former dwellings or other buildings, e.g. schoolhouses, which have been renovated or converted as bat roosts. The resources listed below contain case studies showing how this has been achieved and the benefits for bats.

- *Bat mitigation guidelines for Ireland - V2* (Marnell et al., 2022).
- *UK Bat Mitigation Guidelines* (Reason & Wray, 2025).
- Mitchell-Jones, A.J. and McLeish, A.P. (eds) (2004). *Bat Workers' Manual*. 3rd Edition. Joint Nature Conservation Committee, Peterborough.
- Bat Conservation Ireland (2010) *Bats in Buildings: Guidance notes for planners, engineers, architects and developers*. Updated September 2014. Bat Conservation Ireland, Dublin.

The detailed design of interventions to improve the cottage for roosting bats would need account for the particular requirements of the target species, primarily Soprano Pipistrelle, but also Common Pipistrelle and Long-eared Bat, as there is significant overlap in the kinds of buildings used by these species during both summer/maternity and hibernation. The main aim would be to provide suitable access to the desired roost features for their respective target species and ensuring that the building can self-regulate the climate (primarily temperature and humidity) to maintain their suitability for bats. Examples include:

- Securing the roof to ensure that it remains watertight and there are no holes for daylight to enter,
- Ensuring that the roof materials and colour are such that they result in the correct temperatures for the target species,
- Adjusting the humidity in the buildings to maximise its suitability for bats, and
- Creating suitable access points for bats, e.g. opening under the soffit allowing bats to access the eaves, modified slates, ridge tiles, fascia/soffit or flashing.

Modifications to buildings that currently support roosting bats would require a Regulation 54 derogation licence (such works are not proposed as part of the current planning application for the proposed development). Given that the works in question would be specifically to enhance the buildings/trees to provide enhanced bat roost potential, the authors of this report do not foresee any difficulty in obtaining such a licence.

5.6.2.4 Nest Boxes for Birds

There is ample scope for the erection of bird nest boxes around the WwTP site. A variety of types of bird boxes should be used in suitable locations to provide nesting opportunities for a variety of bird species.

On buildings that are suitably tall (>4.5m), special bricks can be installed to provide nesting habitat for Swift (*Apus apus*). Swift bricks should be installed as high as possible, in groups (as swifts are colonial breeders) and facing east, north-east, north or north-west (avoiding exposure to hot sun). Guidelines on the selection, positioning and fixing of swift bricks can be found in BirdWatch Ireland leaflet *Saving Swifts*⁹¹ and additional resources are available on the Swift Conservation Ireland website (<https://www.swiftconservation.ie>).

Bird boxes for other species can be either purchased or hand-made, e.g. by local site staff using templates such as those provided by BirdWatch Ireland, which would encourage ownership of these and other enhancement measures. Remote video monitoring of nest boxes, e.g. to a live feed in the site staff canteen or common area, can help to engage staff in the success of these and other ecological enhancement efforts on the site.

⁹¹ BirdWatch Ireland (2019). *Saving Swifts* (<https://www.swiftconservation.ie/wp-content/uploads/2019/06/Saving-Swifts-Guide-by-BWI-2019.pdf>) [accessed 06/10/2025]. BirdWatch Ireland, Kilcoole.

Swift bricks and bird best boxes may require periodic maintenance and/or renewal to ensure their continued suitability; this will be done on the advice of a suitably qualified ecologist or ornithologist.

5.6.2.5 Invasive Non-native Species

For a minimum of 2 years following completion of construction, UÉ will continue to manage the Himalayan Balsam infestation in the vicinity of the outfall, following the *Irish Water Guidance on the Management of Himalayan Balsam* (IW-AMT-GL-002) and observing the Biosecurity SOP set out in Section 3.1 of INVAS (2026). Ongoing monitoring and treatment of this infestation will be recorded, as per the commitment in UÉ's *Biodiversity Action Plan* to record and monitor infestations of invasive species at its sites.

Operational-phase monitoring will also follow UÉ's guidelines for Japanese Knotweed (UÉ-AMT-SOP-009) and biosecurity during aquatic sampling (UÉ-AMT-GL-007).

5.6.3 Monitoring

5.6.3.1 Construction Phase

The Contractor shall retain the services of a suitably qualified and experienced ecologist for the duration of the works.

The qualifications and experience of the Contractor's ecologist shall include, as a minimum: -

- BSc (Hons) or above in Ecology or a related environmental discipline,
- Full membership of the CIEEM or equivalent membership of a similar professional body,
- Demonstrable experience in providing ecological/environmental supervision on construction sites, including where there are in-stream works.

The main duties of the Contractor's ecologist shall include the following: -

1. Assist the Contractor in ensuring that the measures in this Biodiversity chapter and the NIS, any conditions of consents/licences and relevant guidelines are fully and properly implemented during construction.
2. Undertake pre-construction surveys for breeding or resting places of species listed on Annex IV to the Habitats Directive, most notably Otter and bats, as well as nesting birds and invasive non-native plant species.
3. Oversee the continued implementation of the biosecurity measures described above.
4. Advise the Contractor on any requirement for a derogation licence under Regulation 54 of the Habitats Regulations due to the presence of breeding or resting places of species listed on Annex IV to the Habitats Directive, if identified during the pre-construction surveys.⁹²
5. Directly supervise key activities on site, particularly works near sensitive ecological receptors such as the River Barrow, woodlands and potential bat roost features.

⁹² The Contractor, with the assistance of the Contractor's ecologist, shall be responsible for applying for any such licence and observing its conditions.

6. Carry out weekly inspections of the site and document the implementation of the measures in this NIS, any conditions of consents/licences and relevant guidelines. The Contractor's ecologist's inspection records shall be available to UÉ or the Employer's Representative, An Coimisiún Pleanála, the NPWS and IFI, on request.
7. Provide monthly updates to UÉ or the Employer's Representative on the implementation of the mitigation measures detailed in this chapter and in the accompanying NIS, and any ecological/environmental incidents on site.

5.6.3.2 Post-construction

For a period of 4 years following completion of construction, UÉ shall maintain monitoring and treatment of invasive non-native species management measures, as well as the establishment of the landscaping and ecological enhancement measures described in this chapter.

5.6.3.3 Operational

Water Quality

Mitigation has been provided by design and as such no further mitigation is required, other than appropriate monitoring and maintenance of the operation of the WwTP.

The upgraded WwTP will operate under Discharge Licence conditions, which will include:

8. Complying with the ELVs and ensuring that no discharge from the wastewater works exceed these ELVs.
9. Ongoing maintenance of all plant and equipment to ensure that no unauthorised wastewater discharge takes place.
10. Continued sampling and analysis of key water quality parameters in the discharge effluent and in the ambient environment, i.e. River Barrow upstream and downstream of the discharge point.
11. Continued monitoring of the influent stream in order to measure mass loadings to the WwTP.
12. Ongoing maintenance and calibration of all instrumentation.
13. Maintenance corrective action procedures and undertaking corrective action to address any non-compliances.
14. Notifying the EPA as soon as practicable if an incident occurs and, if the incident relates to discharge to water, notifying IFI as well.
15. Recording of all complaints of an environmental nature.

No additional mitigation measures beyond those set out in the Discharge Licence are necessary.

Ecological Enhancement

During the operational phase, UÉ shall maintain ongoing monitoring of the management of landscaping and implementation of ecological enhancement described above. Appropriate data from this monitoring should be made public as part of reporting on progress under UÉ's own Biodiversity Action Plan as well as through All-Ireland Pollinator Plan public mapping.



The results of this ongoing monitoring should be used to inform the adaptive/dynamic implementation of ecological enhancement on the Mortarstown WwTP site and other UÉ sites.

5.6.4 Residual Effects

A comparison of the pre-mitigation effects and the residual effects following the inclusion of the above mitigation and enhancement measures is presented in Table 5-11 below.



Table 5-11 - Evaluation of ecological effects post-mitigation and enhancement.

Key Ecological Receptor	Effects pre-mitigation	Effects post-mitigation and enhancement
KER 1 - River Barrow and River Nore SAC	Construction: Temporary moderate to significant negative effects at the local level on in-stream and marginal habitats of the River Barrow; medium-term slight negative effects at the local level on priority alluvial woodland; for White-clawed Crayfish, temporary or short-term slight to moderate negative effects at the local level from disturbance and pollution from works, and biosecurity risks, namely crayfish plague; for Sea Lamprey, Brook Lamprey, River Lamprey, and Salmon, temporary slight to moderate negative effects from disturbance, risk of short-term moderate negative effects in the event of pollution on, and biosecurity risk; and, for Otter, slight to moderate short-term effects due to disturbance. Operation: Short-term slight and long-term imperceptible positive effects in terms of water quality; imperceptible long-term effects on aquatic habitat area and hydromorphology; not significant in view of the site-specific conservation objectives.	Construction: Temporary moderate to imperceptible negative effects at the local level on in-stream and marginal habitats of the River Barrow; medium-term slight negative effects at the local level (worst-case scenario) on priority alluvial woodland; for White-clawed Crayfish, temporary slight to imperceptible negative effects at the local level from disturbance and pollution from works, and biosecurity risk under control; for Sea Lamprey, Brook Lamprey, River Lamprey, and Salmon, temporary slight to imperceptible negative effects from disturbance, risk of short-term slight negative effects in the event of pollution on, and biosecurity risk under control; and, for Otter, slight short-term effects from disturbance during construction. Operation: Short-term slight and long-term imperceptible positive effects in terms of water quality; imperceptible long-term effects on aquatic habitat area and hydromorphology; not significant in view of the site-specific conservation objectives.
KER 2 - River Barrow	Construction: Temporary moderate to significant negative effects at the local level. Operation: Short-term slight and long-term imperceptible positive effects in terms of water quality; imperceptible long-term effects on habitat area and hydromorphology.	Construction: Outfall works temporary moderate negative effects at the local level. All other sources have imperceptible effects. Operation: Short-term slight and long-term imperceptible positive effects in terms of water quality; imperceptible long-term effects on habitat area and hydromorphology.
KER 3 - Woodland	Construction: Temporary slight negative effects at the local level due to minor habitat loss and damage to ground flora and individual trees. Operation: Reduction to imperceptible negative effects over the medium term as habitats recover following completion of works.	Construction: Temporary slight negative effects at the local level due to minor habitat loss and damage to ground flora and individual trees. Operation: Imperceptible negative effects over the medium term as habitats recover following completion of works. Locally positive effect from the eradication of Japanese Knotweed and management of Himalayan Balsam.
KER 4 - Birds	Construction: Slight to moderate negative effects at the local level due to minor loss and fragmentation of habitats, as well as disturbance. Operation: Negative impacts from habitat loss reducing to slight or imperceptible over time as habitats are either reinstated or replaced.	Construction: Slight to imperceptible negative effects at the local level due to minor loss and fragmentation of habitats, as well as disturbance. Operation: Negative impacts from habitat loss reducing to slight or imperceptible over time, and eventually to a net positive effect, as habitats are either reinstated or replaced.

Key Ecological Receptor	Effects pre-mitigation	Effects post-mitigation and enhancement
KER 5 - Bats	Construction: Long-term moderate negative impact due to the loss of the Brown Long-eared Bat roost in the Horse Chestnut trees adjoining the cottage. Temporary slight negative effects from construction-stage lighting. Operation: Slight long-term effects due to artificial lighting.	Construction: No loss of any bat roosts. Short-term slight to moderate negative impact due to removal of foraging and commuting treelines near small roosts. Operation: Imperceptible long-term effects due to artificial lighting (no such impacts along the river corridor). Slight positive effect at the local level due to enhancement of foraging and commuting habitat quality and connectivity, and provision of additional potential roost features.
KER 6 - Otter	Construction: Slight to moderate short-term effects at the local level due to noise and visual disturbance from construction activities, most notably noise from piling activities during the installation of the temporary cofferdam for outfall works. Operation: No perceptible effect.	Construction: Slight short-term effects at the local level due to noise and visual disturbance from outfall works. No negative effects from construction-stage lighting. Operation: No perceptible effect.
KER 7 - Fish species	Construction: Temporary slight to moderate negative effects due to underwater noise from piling. Temporary imperceptible negative effects from construction-stage lighting. Risk of short-term moderate negative effects in the event of pollution. Operation: Imperceptible positive effects at the local level in terms of water quality.	Construction: Temporary slight to imperceptible negative effects due to underwater noise from piling. No negative effects from construction-stage lighting. Risk of short-term slight to imperceptible negative effects in the event of pollution. Operation: Imperceptible positive effects at the local level in terms of water quality.
KER 8 - White-clawed Crayfish	Construction: Temporary or short-term slight to moderate negative effects at the local level due to disturbance from piling and pollution from works. Temporary imperceptible negative effects from construction-stage lighting. Operation: Long-term negligible effects at the local level due to habitat loss and fragmentation at the headwall. Imperceptible positive effects at the local level in terms of water quality.	Construction: Temporary slight to imperceptible negative effects at the local level due to disturbance from piling and pollution from works. Operation: Long-term negligible effects at the local level due to habitat loss and fragmentation at the headwall. Imperceptible positive effects at the local level in terms of water quality.
KER 9 - Invasive Non-native Species	Construction: Risk of long-term significant impacts at the local level. Operation: No appreciable risk of spreading invasive non-native species.	Construction: Risk of spreading invasive non-native species effectively controlled. Operation: No appreciable risk of spreading invasive non-native species and local infestations under control.



5.7 Conclusion

This chapter has examined the biodiversity and baseline ecological conditions of the receiving environment within the site of the proposed development and its Zone of Influence, assessed the likely effects, individually and in combination with other plans and projects, on its key ecological receptors. This chapter has also proposed suitable measures to avoid or reduce the likely effects on those features and evaluated any residual effects.

Based on that assessment, it is concluded that the proposed Mortarstown WwTP Upgrade, provided that it is implemented in accordance with the measures proposed in this chapter, will not give rise to any significant negative effects on the biodiversity or ecology of the receiving environment.



6. LANDSCAPE AND VISUAL

6.1 Introduction

This chapter describes the existing landscape and visual environment of the study area and assesses the likely landscape and visual effects of the proposed development.

6.2 Methodology

LVIA is used to identify and assess the likely significance of the effects of change resulting from a development. The two components of LVIA are:

- Assessment of landscape effects: assessing effects on the landscape as a resource in its own right; and,
- Assessment of visual effects: assessing effects on specific views and on the general visual amenity experienced by people.

The assessment was carried out with reference to the following:

- Guidelines for Landscape and Visual Impact Assessment (3rd Edition, 2013),
- Carlow County Development Plan 2022-2028,
- Carlow County Landscape Character Assessment and Schedule of Protected Views (Appendix VII of the Carlow County Development Plan 2022-2028),
- Laois County Development Plan 2021-2027,
- Laois Landscape Character Assessment (Appendix 6 of the Laois County Development Plan 2021-2027).

6.2.1 Study Constraints

There were no study constraints. The field survey was undertaken in November 2024 when deciduous vegetation was not in leaf, hence providing a good indication of maximum visibility.

6.2.2 Proposed Development description/ specification

The proposals are summarised in terms of their physical appearance at Chapter 2. Please also refer to the drawing pack for drawings. The proposed development description sets out the essential aspects of the development considered in this landscape and visual impact assessment, which include:

- Upgrade of Mortarstown Wastewater Treatment Plant (WwTP) including new structures and ground mounted solar panels.
- Construction of a new pumping station at the Mortarstown Wastewater Treatment Plant site which will replace the existing Kilkenny Road Pump Station at Mortarstown, Co. Carlow.
- Construction of a new outfall pipe from WwTP and new micro tunnel gravity sewer from the previous Kilkenny Road Pump Station location to the new pumping station.
- Provision of planting to the boundaries of the WwTP site. Provision of ecological enhancements within the WwTP site including ponds and grassland,



6.2.3 Study Area

The Study Area for the assessment was devised as an area sufficient to enable the potential significant effects of the proposed development on landscape character and views/ visual amenity to be analysed.

The Study Area includes areas of land within a .5km radius of the site. Refer also to Section 6.5 Zone of Theoretical Visibility.

6.2.4 Baseline studies

The baseline landscape and visual conditions were established through a combination of desk-based study and field surveys conducted between November 2024 and September 2025.

6.2.4.1 Landscape baseline

The aim of the landscape baseline is 'to provide an understanding of the landscape in the area that may be affected, its constituent elements, its character and way it varies spatially, its geographic extent, its history, its condition and the way the landscape is experienced, and the value attached to it' (Landscape Institute and Institute of Environmental Management and Assessment, 2013). The baseline study was undertaken by a mix of desktop study and fieldwork to identify and record the character of the landscape and the elements, features and aesthetic and perceptual factors which contribute to it. The baseline study also considered the landscape condition and the value attached to landscape. Sources of information for the desktop study included; ordnance survey maps, aerial maps of the site and surrounding area, existing landscape character assessments and relevant planning policy.

6.2.4.2 Visual baseline

The aim of the visual baseline is 'to establish the area in which the development may be visible, the different groups of people who may experience views of the development, the places where they will be affected and the nature of the views and visual amenity at those points' (Landscape Institute and Institute of Environmental Management and Assessment, 2013). The baseline study was undertaken by desktop study followed by a field survey to establish the Zone of Theoretical Visibility of the proposals and to identify a number of viewpoints representative of views experienced by people, or 'visual receptors'. The Zone of Theoretical Visibility was estimated using a manual approach using map interpretation, and visual envelope mapping on site to establish the outer limit of land that may be visually connected with the proposal. There are areas within the Zone of Theoretical Visibility which do not have views of the scheme due to local variations in vegetation, topography and built development. The Zone of Theoretical Visibility is not always precise and is an indication only of the area within which the most significant visual effects may be expected.

6.2.5 Landscape Assessment Criteria

The overall significance of effects is established by combining the separate judgements about sensitivity and magnitude of effects.

Sensitivity includes an assessment of landscape receptors' susceptibility to change and value.

Factors considered in assigning landscape value include:

- the presence of international, national or local designations
- the quality or condition of the attributes and features contributing to character



- scenic quality (including all sensory aspects)
- the presence of rare elements, features or overall landscape type
- the degree to which the landscape is representative of important defining characteristics
- the presence of features of ecological, historical or geological conservation interest
- the recreational value of the landscape
- the likely perception of the landscape in connection with its wildness and/or tranquillity
- cultural associations such as with notable people or historical events.

The criteria in combination with professional judgment for assessing value to landscape receptors is set out in Table 6.1 below.

With regard to susceptibility, an attribute would be judged as very susceptible to change if it is very likely to be substantively affected by change of the nature proposed. Conversely, an attribute would not be susceptible to change if the nature of change proposed could not in any way affect the attribute. The criteria for assessing susceptibility of landscape in combination with professional judgement are described at Table 6.2.

The separate assessments of value and susceptibility are then combined to determine the sensitivity of each receptor against the criteria in Table 6.3 which in combination with professional judgement guides the assessment of sensitivity.

Magnitude includes an assessment of the impact on landscape receptors in terms of size or scale, geographical extent of the area influenced.

The criteria in combination with professional judgment for assessing the magnitude of impact are described in Table 6.4 below.

The separate assessments of sensitivity and magnitude are then combined with professional judgement to determine the significance of effect on each receptor. These levels of significance can either be beneficial or adverse and are described in Table 6.5.

6.2.6 Visual Assessment Criteria

The overall significance of effects is established by combining the separate judgements about sensitivity and magnitude of effects. Sensitivity includes an assessment of the visual receptors susceptibility to change and the value attached to views.

Value was attributed to visual amenity within the Study Area incorporating the site according to the criteria in combination with professional judgment set out in Table 6.1 below. Factors influencing the judgement of value included:

- recognition of the value attached to particular views, for example in relation to heritage assets, or through planning designations;
- indicators of the value attached to views by visitors, for example through appearances in guidebooks or on tourist maps, provision of facilities for their enjoyment or convenience, and references to them in literature or art.

Next, the susceptibility of visual receptors to changes in their view of the nature proposed was considered. As set out in the Guidelines for Landscape and Visual Impact Assessment (GLVIA), this depends upon the occupation or activity of people experiencing the view and the extent to which their attention or interest may be focused upon visual amenity as a result. The criteria for assessing visual receptor susceptibility in combination with professional judgement are described at Table 6.2.

The separate assessments of value and susceptibility are then combined to determine the sensitivity of each receptor against the criteria in Table 6.3 which in combination with professional judgement guides the assessment of sensitivity.

Magnitude includes an evaluation of the visual impact identified in terms of size or scale and geographical extent of the area influenced. The criteria in combination with professional judgment for assessing the magnitude of impact are described in Table 6.4 below.

The separate assessments of sensitivity and magnitude are then combined with professional judgement to determine the significance of effect on each receptor. These levels of significance can either be beneficial or adverse and are described in Table 6.5.

Table 6-1 - Criteria for landscape value and value of views

Value	Landscape value typical criteria	Value of Views typical criteria
Very High	International or National importance. Highly distinctive landscape characteristics Distinctive/rare/unique features worthy of conservation Strong sense of place No detracting features	Highly distinctive view including nationally or internationally significant features or scenery. Evidence of popular use including access routes facilities and specific viewing infrastructure. No detracting features.
High	National, Regional or Local importance. Highly distinctive landscape characteristics Distinctive/rare/unique features worthy of conservation Strong sense of place Occasional detracting features	Highly distinctive although not necessarily widely publicised view of unique or rare features or scenery. Evidence of popular use including frequented access routes. Occasional or no detracting features.
Medium	Regional or Local importance. Recognised landscape characteristics Some features worthy of conservation Sense of place Some detracting features	Highly or moderately distinctive view not widely publicised and likely to be experienced mainly in passing and by smaller numbers of people living nearby. Some access infrastructure with little evidence of heavy use. Some or occasional detracting features.
Low	Local importance. Distinguishable landscape characteristics Few features worthy of conservation No particular sense of place Frequent detracting features	Moderately distinctive or undistinguished view not widely known or frequented. Some access routes, e.g. Public Rights of Way. Frequent detracting features may be present.
Very Low	Local importance. Degraded/damaged landscape characteristics No features worthy of conservation Extensive detracting features	View with few or no distinctive features. Areas accessed mainly for transitory purposes. Frequent detracting features.

Table 6-2 - Criteria for landscape and visual receptor susceptibility

Susceptibility	Landscape Susceptibility Criteria	Visual Receptor Susceptibility to Change Criteria
Very High	The landscape receptor has <i>no or very limited</i> ability to accommodate the proposed development without undue consequence's for the maintenance of the baseline situation and/or the achievement of landscape planning polices and strategies.	People engaged in outdoor recreation within very important national/ international landscape, cultural/ historic sites (e.g. National Parks, UNESCO World Heritage sites), including users of pubic rights of way, whose attention is likely to be focussed on the landscape and particular views.
High	The landscape receptor has <i>limited</i> ability to accommodate the proposed development without undue Consequences for the maintenance of the baseline situation and/or the achievement of landscape planning polices and strategies.	Residents People engaged in outdoor recreation, including user of pubic rights of way, whose attention is likely to be focussed on the landscape and particular views. Visitors to heritage assets or other attractions where views of the surroundings are an important part of the experience. Communities where views contribute to the landscape setting and are enjoyed by residents. Travellers on scenic routes where awareness of views is likely to be high.
Medium	The landscape receptor has <i>some</i> ability to accommodate the proposed development without undue Consequences for the maintenance of the baseline situation and/or the achievement of landscape planning polices and strategies.	Travellers on road, rail or other transport routes.
Low	The landscape receptor has the ability to accommodate the proposed development without undue Consequences for the maintenance of the baseline situation and/or the achievement of landscape planning polices and strategies.	People engaged in outdoor recreation, which does not involve appreciation of views. People at their place of work, whose attention may be focussed on their work and where the setting not important to the quality of working life.
Very Low	The landscape receptor has the ability to accommodate the proposed development without undue consequences for the maintenance of the baseline situation and/or the achievement of landscape planning polices and strategies.	Travellers on road, rail or other transport routes within degraded landscape.

Table 6-3 - Criteria for assessing landscape and visual receptor sensitivity

Sensitivity (susceptibility and value)	Landscape criteria	Visual criteria
Very High	Landscapes of very high international/ national importance and rarity or value with no or very limited ability to accommodate change without substantial loss/ gain (i.e. national parks, internationally acclaimed landscapes - UNESCO World Heritage Sites).	1) Static views from and of major tourist attractions; 2) Views from and of very important national/ international landscapes, cultural/ historical sites (e.g. National Parks, UNESCO World Heritage sites); 3) Receptors engaged in specific activities for enjoyment of dark skies.
High	Landscapes of high national importance containing distinctive features/ elements with limited ability to accommodate change without incurring substantial loss/ gain (i.e. designated areas, areas of strong sense of place - registered parks and gardens, country parks).	1) Views by users of nationally important PRoW / recreational trails (e.g. national trails, long distance footpaths); 2) Views by users of public open spaces for enjoyment of the countryside (e.g. country parks); 3) Static views from dense residential areas, longer transient views from designated public open space, recreational areas; 4) Views from and of rare designated landscapes of national importance.
Medium	Landscapes of local or regional recognition of importance able to accommodate some change (i.e. features worthy of conservation, some sense of place or value through use/ perception).	1) Static views from less populated residential areas, schools and other institutional buildings and their outdoor areas; 2) Views by outdoor workers; 3) Transient views from local/regional areas such as public open space, scenic roads, railways or waterways, users of local/ regional designated tourist routes of moderate importance; 4) Views from and of landscapes of regional importance.
Low	Local landscape areas or receptors of low to medium importance with ability to accommodate change (i.e. non-designated or designated areas of local recognition or areas of little sense of place).	1) Views by users of main roads or passengers in public transport on main arterial routes; 2) Views by indoor workers; 3) Views by users of recreational/formal sports facilities where the landscape is secondary to enjoyment of the sport; 4) Views by users of local public open spaces of limited importance with limited variety or distinctiveness.
Negligible	Landscapes of very low importance and rarity able to accommodate change.	1) Quick transient views such as from fast moving vehicles; 1) Views from industrial area, land awaiting re-development; 2) Views from landscapes of no importance with no variety or distinctiveness.

Table 6-4 - Magnitude of Impact Criteria

Magnitude (change) of effect	Landscape criteria	Visual criteria
Major	Total loss or large-scale damage to existing landscape character or distinctive features or elements; and/or addition of new uncharacteristic, conspicuous features or elements. Large scale improvement of landscape character to features and elements; and/or addition of new distinctive features or elements, or removal of conspicuous infrastructure elements.	The project, or a part of it, would become the dominant feature or focal point of the view.
Moderate	Partial loss or noticeable damage to existing landscape character or distinctive features or elements; and/ or addition of new uncharacteristic, noticeable features or elements. Partial or noticeable improvement of landscape character by restoration of existing features or elements; or addition of new characteristic features or elements or removal of noticeable features or elements.	The project, or a part of it, would form a noticeable feature or element of the view which is readily apparent to the receptor.
Minor	Slight loss or damage to existing landscape character of one (maybe more) key features and elements; Slight improvement of landscape character by the restoration of one (maybe more) key existing features and elements; and/or the addition of new characteristic features.	The project, or a part of it, would be perceptible but not alter the overall balance of features and elements that comprise the existing view.
Negligible	Very minor loss, damage or alteration to existing landscape character of one or more features and elements. Very minor noticeable improvement of character by the restoration of one or more existing features and elements.	Only a very small part of the proposed development work or activity would be discernible or being at such a distance it would form a barely noticeable feature or element of the view.
No Change	No noticeable alteration or improvement, temporary or permanent, of landscape character of existing features and elements.	No part of the proposed development work or activity would be discernible.

Table 6-5 - Significance categories of landscape and visual effects

Category	Landscape	Visual
Very Large Beneficial Effect	The proposed development would greatly enhance the character (including quality and value) of the landscape; create an iconic high-quality feature and/or series of elements; enable a sense of place to be created or greatly enhanced.	The proposed development would create an iconic new feature that would greatly enhance the view.
Large Beneficial Effect	The proposed development would enhance the character (including quality and value) of the landscape; enable the restoration of characteristic features and elements lost as a result of changes from inappropriate management or development; enable a sense of place to be enhanced.	The proposed development would lead to a major improvement in a view from a highly sensitive receptor.
Moderate Beneficial Effect	The proposed development would improve the character (including quality and value) of the landscape; enable the restoration of characteristic features and elements partially lost or diminished as a result of changes from inappropriate management or development; enable a sense of place to be restored.	The proposed development would cause obvious improvement to a view from a moderately sensitive receptor, or perceptible improvement to a view from a more sensitive receptor.
Slight Beneficial Effect	The proposed development would complement the character (including quality and value) of the landscape; maintain or enhance characteristic features and elements; enable some sense of place to be restored.	The proposed development would cause limited improvement to a view from a receptor of medium sensitivity or would cause greater improvement to a view from a receptor of low sensitivity.
Neutral Effect	The proposed development would maintain the character (including quality and value) of the landscape; blend in with characteristic features and elements; enable a sense of place to be retained.	Difficult to distinguish, barely perceptible change in view. No perceptible change in view
Slight Adverse Effect	The proposed development would not quite fit the character (including quality and value) of the landscape; be at variance with characteristic features and elements; detract from a sense of place.	The proposed development would cause limited deterioration to a view from a receptor of medium sensitivity or cause greater deterioration to a view from a receptor of high sensitivity

Moderate Adverse Effect	The proposed development would conflict with the character (including quality and value) of the landscape; have an adverse impact on characteristic features or elements; diminish a sense of place	The proposed development would cause obvious deterioration to a view from a moderately sensitive receptor, perceptible damage to a view from a more sensitive receptor.
Large Adverse Effect	The proposed development would be at considerable variance with the character (including quality and value) of the landscape; degrade or diminish the integrity of a range of characteristic features and elements; damage a sense of place.	The proposed development would cause major deterioration to a view from a highly sensitive receptor and would constitute a major discordant element in the view.
Very Large Adverse Effect	The proposed development would be at complete variance with the character (including quality and value) of the landscape; cause the integrity of characteristic features, elements and sense of place to be lost.	The proposed development would cause the loss of views from a highly sensitive receptor and would constitute a dominant discordant feature in the view.

6.3 Planning Context

This section summarises relevant local landscape planning policy. Information on landscape character and landscape designations is described under the landscape baseline at Section 6.4 below.

The following policies and objectives from the Carlow County Development Plan 2022-2028 relevant to the application site are as follows;

Landscape Policy LA.P1

Includes reference the following: *‘Protect and maintain the overall integrity of the County’s landscape, by recognising its capacity to sustainably integrate and absorb appropriate development, and by ensuring that development protects, retains and, where necessary, enhances the appearance and character of the landscape, and does not unduly damage or detract from those features which contribute to its value, character, distinctiveness and sensitivity e.g. landform, habitats, scenic quality, settlement pattern, historic heritage, amenity, land use and tranquillity.’*

Landscape Policy LA P5

Includes reference to the following: *‘Protect and maintain the landscape quality and visual integrity of river valleys and river corridors, and to ensure development in these sensitive landscape areas does not adversely affect or detract from scenic views, including views from bridges, or from distinct linear sections such as open floodplains...’*

Landscape Policy LA P6

Includes reference to the following: *‘Require all developments, having regard to their landscape setting, to be appropriate in siting, layout, design and scale, in order to ensure any potential adverse or landscape and visual impacts are minimised and/or removed where necessary, and that natural site features and characteristics are retained and maintained.’*

Landscape Policy LA P10

Includes reference to the following: *‘Ensure that features which contribute to local landscape character, including historic features and buildings, trees, hedgerows, shelter belts and stone walls, are retained, protected, and enhanced where appropriate, so as to preserve the appearance and local landscape character of an area, whilst supporting sustainable landscape change and development. Development proposals necessitating the removal of such features will be discouraged...’*

Landscape Policy LA P11

Includes reference to the following: *‘Protect and preserve the established appearance and aesthetic attributes of views and prospects that contribute to the inherent quality of the County’s landscape, including views, prospects and scenic routes listed in Tables 6-3 and 6-4 , and particularly views to and from mountains, hills, river valleys and river corridors, and views of historical or cultural value (including buildings and townscapes) and views of natural beauty.’* There are no views, prospects and scenic routes listed in Tables 6-3 and 6-4 within the study area.

Green Infrastructure Policy GI P3

Includes reference to the following: *‘Protect and preserve landscape features which contribute to green infrastructure in the County, including trees, hedgerows, woodlands, wetlands, watercourses and other habitats.’*

Green Infrastructure Policy GI P4

Includes reference to the following: *‘Require all new development to contribute to the protection and enhancement of existing green infrastructure and the delivery of new green infrastructure, as appropriate.’*

Green Infrastructure Policy GI P11

Includes reference to the following: *‘Ensure that green infrastructure informs the development management process, and that all new developments in urban areas contribute towards the protection, maintenance, and enhancement of existing green infrastructure in terms of siting, layout, design, and landscaping.’*

Green Infrastructure Policy GI P12

Includes reference to the following: *‘Encourage and support the incorporation of elements of green infrastructure and biodiversity into all new developments in urban areas, including the design of buildings and their surroundings (e.g. tree planting, green spaces and verges, planters, green roofs, living walls, bird boxes, bat roost sites etc.), and that contributes to and links with the wider green infrastructure network, in particular where similar features exist on adjoining sites.’*

6.4 Receiving Environment-Landscape

The aim of the landscape baseline is ‘to provide an understanding of the landscape in the area that may be affected, its constituent elements, it’s character and way it varies spatially, its geographic extent, its history, its condition and the way the landscape is experienced, and the value attached it’ (Landscape Institute and Institute of Environmental Management and Assessment, 2013).

The study area is within County Carlow and County Laois. The relevant local landscape character assessments include The Carlow County Landscape Character Assessment and Laois County Landscape Character Assessment.



6.4.1 Carlow County Landscape Character Assessment

The Carlow County Landscape Character Assessment and Schedule of Protected Views (Appendix VII of the Carlow County Development Plan 2022-2028), this county and local level character assessment provides detail on the type of landscape that occurs within the part of the study area within County Carlow. The part of the study area east of the River Barrow includes land within the **Central Lowlands Character Area**.

The key characteristics described and also apparent in the study area are as follows:

- Most of the County lies within this character area,
- Landscape is level to gently rolling,
- Predominantly fertile agricultural lands with medium to large fields defined by low trimmed hedgerows and occasional to frequent mature hedgerow trees,
- Views within and from the Character Area are generally open and expansive except where restricted by buildings, plantations or ridges,
- Extensive road network penetrating the character area,
- The County's major settlements are also located in the Character Area. This includes Carlow town,
- Patterns of settlements and one-off houses in the rural areas are visible along roads leading out of Carlow and notably to the east and the south of Carlow Town.

The site itself and land immediately surrounding the site within this character area is categorised as a Built-Up Area landscape type that is assigned a sensitivity rating of 1, which is defined as least sensitive to development in the landscape sensitivity mapping within Carlow County Landscape Character Assessment.

Table 6-6 below sets out the attributes contributing to character observed within the part of the Central Lowlands Character Area within Study Area, together with their likely condition.

Table 6-6 - Landscape Character Area Baseline Attributes (Central Lowlands)

Natural Attributes		
Attribute	Description	Condition
Landform	Flat to rolling lowland along the River Barrow Valley	NA
Hydrology	The River Barrow flows to the west of the area.	Good
Land cover/ flora and fauna	Woodland along the River Barrow corridor. Woodland and tree planting along main roads and within suburban and residential development areas. Hedgerows and trees to agricultural field boundaries.	Good
Cultural Attributes		
Attribute	Description	Condition
Land Use	Settlement to suburban areas to Carlow including residential, commercial, industrial and educational land use including Carlow Institute and South East Technological University. Improved grassland farmland.	Good

Settlement	Suburban development and ribbon development along local roads.	Good
Enclosure	Small sized irregular shaped fields bounded by hedgerows. Residential development enclosed by boundary walls, hedges, fencing and ornamental planting.	Good
Heritage	Historic field pattern. River Barrow navigation.	Good
Aesthetic and Perceptual Attributes		
Attribute	Description	Condition
Scale	Intimate/ small scale	Good
Openness / Enclosure	Generally enclosed by a combination of buildings and tree planting. Some expansive views from more open areas to distant higher ground to the west in County Laois.	Good
Unity / Coherence	Mostly a consistent suburban area including a balance between built development and natural vegetation. Ribbon development detracts from rural approaches to Carlow.	Good
Diversity / Complexity	Combination of suburban and rural areas and woodland along the River Barrow.	Good
Tranquillity / Peacefulness	Busy trafficked suburban areas including regional/ local roads and street lighting.	Poor
Naturalness / Wildness	The areas along the River Barrow corridor appear natural with woodland. Otherwise the area is mostly suburban.	NA
Legibility / Sense of Place	Typical suburban area, little sense of place.	Poor
Memorability / Visual Impact	Few distinctive features. Some distant views to higher upland areas to the west.	Poor
Light & Colour	Grassland, woodland and tree planting give green colour to the landscape with seasonal change from deciduous trees in autumn and winter	Good
Seasonality / Temporal Change	Seasonal change from deciduous trees in autumn and winter	Good

Condition

The rural landscape in the area is generally in good condition, with intact characteristics such as grassland, hedgerows, woodland, and views along the river Barrow contributing to character. The suburban areas are typical suburban areas and generally in good condition.

Value

This landscape is judged to be of local importance and low value due to the influence of suburban development.

Laois County Landscape Character Assessment

The Laois County Landscape Character Assessment (Appendix 6 of the Laois County Development Plan 2021-2027) provides county and local level character assessment detail on the type of landscape that occurs within the part of the study area within County Laois. The part of the study area west of the River Barrow includes land within; Urban Fringe and Lowland Agricultural Areas. Lowland Agricultural Areas and Urban Fringe Landscape Character Areas are categorised as Low Sensitivity in the Laois County Development Plan 2021-2027.

The key characteristics described and also apparent in the study area are as follows:

Urban Fringe

- The majority of the centres of the county population are located in this landscape type including the urban settlement of Graiguecullen,
- In terms of urban fringe, the defining characteristics include the radiating road routes on which development has taken place in a ribbon-type physical form,
- Individual sites are often suburban in design, and their more formal and sculptured character does not usually integrate sympathetically with the overall landscape context.

Table 6-7 below sets out the attributes contributing to character observed within the part of the Urban Fringe Character Area within Study Area, together with their likely condition and is summarised below.

Table 6-7 - Landscape Character Area Baseline Attributes (Urban Fringe)

Natural Attributes		
Attribute	Description	Condition
Landform	Flat to rolling lowland along the River Barrow Valley	NA
Hydrology	The River Barrow defines the eastern boundary to this character area.	Good
Land cover/ flora and fauna	Tree planting along main roads and within suburban and residential development areas. Hedgerows and trees to agricultural field boundaries. Wetland vegetation along the banks of the River Barrow.	Good
Cultural Attributes		
Attribute	Description	Condition
Land Use	Settlement to Graiguecullen and suburban areas. Improved grassland farmland to rural areas.	Good
Settlement	Suburban development and ribbon development along local roads.	Good



Enclosure	Small sized irregular shaped fields bounded by hedgerows. Residential development enclosed by boundary walls, hedges, fencing and ornamental planting.	Good
Heritage	Historic field patterns. River Barrow navigation.	Good

Aesthetic and Perceptual Attributes

Attribute	Description	Condition
Scale	Intimate/ small scale	Good
Openness / Enclosure	Generally enclosed by a combination buildings and planting in suburban areas. Some expansive views from more open areas to distant higher ground to the west.	Good
Unity / Coherence	Mostly a consistent urban/ suburban area including a balance between built development and natural vegetation. Suburban style ribbon development detracts from rural approaches to Carlow.	Good
Diversity / Complexity	Combination of suburban and rural areas with some attractive riverside and countryside views.	Good
Tranquillity / Peacefulness	Busy trafficked suburban areas including local roads and street lighting. Rural areas and along the River Barrow are more peaceful.	Poor
Naturalness / Wildness	The areas along the River Barrow corridor appear natural with woodland. Otherwise the areas is mostly suburban.	NA
Legibility / Sense of Place	Areas adjacent to the River Barrow have a strong sense of place.	Good
Memorability / Visual Impact	Views along the River Barrow.	Poor
Light & Colour	Grassland, woodland and tree planting give green colour to the landscape with seasonal change from deciduous trees in autumn and winter.	Good
Seasonality / Temporal Change	Seasonal change from deciduous trees in autumn and winter.	Good

Condition

The rural landscape in the area is generally in good condition, with intact characteristics such as grassland, hedgerows, woodland, and views along the river Barrow contributing to character. The suburban areas are typical suburban areas and generally in good condition.

Value

This landscape is judged to be of local importance and low value due to the influence of suburban development.



Lowland Agricultural

- The Lowland Landscape Character Type (LCT) covers the largest proportion of County Laois. In terms of land use, it is comprised primarily of pastoral and tillage agriculture,
- It is generally a flat open landscape (around Ballylynan, Barrowhouse and the environs of Graiguecullen especially) with long range views towards the upland areas. Field patterns tend to be of large scale and are generally bounded by deciduous hedgerows containing mature trees. Farm sizes are larger than average,
- The Lowland LCT has been developed more extensively than the other the Landscape Character Types, particularly in the north and east where there is development pressure from the large towns as well as the Dublin metropolitan area. This has resulted in significant changes to the landscape character and it is crucial that future development of this LCT is carried out sensitively and with particular reference to the rural nature of the landscape.
- Much of the lowlands have an enclosed character with well-treed road corridors, dense hedgerows, parkland and areas of woodland. Views of landmarks within the landscape and of the surrounding upland areas are a characteristic of this area and must be retained because the interaction between the lowlands and hills/uplands is an important feature of this LCT.

Table 6-8 below sets out the attributes contributing to character observed within the part of the Urban Fringe Character Area within Study Area, together with their likely condition.

Table 6-8 - Landscape Character Area Baseline Attributes (Lowland Agricultural)

Natural Attributes		
Attribute	Description	Condition
Landform	Flat to rolling lowland along the River Barrow Valley	NA
Hydrology	The River Barrow defines the eastern boundary to this character area.	Good
Land cover/ flora and fauna	Hedgerows and trees to agricultural field boundaries. Wetland vegetation along the banks of the River Barrow.	Good
Cultural Attributes		
Attribute	Description	Condition
Land Use	Improved grassland and arable farmland rural area.	Good
Settlement	One off residential dwellings in the countryside and ribbon development along local roads.	Good
Enclosure	Small to large sized irregular shaped fields bounded by hedgerows.	Good
Heritage	Historic field patterns. River Barrow navigation.	Good
Aesthetic and Perceptual Attributes		
Attribute	Description	Condition

Scale	Intimate where enclosed by vegetation, and large scale views to distant upland areas from open areas.	Good
Openness / Enclosure	Generally enclosed by hedgerows. Some expansive views from more open areas to distant higher ground to the west.	Good
Unity / Coherence	Mostly a consistent rural area.	Good
Diversity / Complexity	Rural areas with some attractive riverside and long distant countryside views.	Good
Tranquillity / Peacefulness	Generally a tranquil rural area.	Poor
Naturalness / Wildness	The areas along the River Barrow corridor appear natural with woodland. Otherwise the areas is mostly rural farmland.	NA
Legibility / Sense of Place	Areas with long distant views of distant uplands and adjacent to the River Barrow have a strong sense of place.	Poor
Memorability / Visual Impact	Views along the River Barrow and countryside views to distant upland areas.	Poor
Light & Colour	Grassland, woodland and tree planting give green colour to the landscape with seasonal change from deciduous trees in autumn and winter	Good
Seasonality / Temporal Change	Seasonal change from deciduous trees in autumn and winter	Good

Condition

The rural landscape in the area is generally in good condition, with intact characteristics such as grassland, hedgerows, woodland, and views to distant upland areas and along the river Barrow contributing to character.

Value

This landscape is judged to be of local importance and medium value and includes some sense of place and distinctive features.

Landscape Designations

There are no landscape designations within the study area.

Ecological designations include, the River Barrow and River Nore Special Area of Conservation (SAC).

The WwTP and Pumping Station sites and land immediately surrounding the sites (in County Carlow) is categorised as a Built-Up Area landscape type that is assigned a sensitivity rating of 1 (least sensitive to development) in the landscape sensitivity mapping within Carlow County Landscape Character Assessment.

There are no protected views within the study area.



Site Description

The WwTP site consists of the existing wastewater treatment plant and associated buildings, structures, access road and adjacent agricultural land to the west. Dense screen planting bounds the existing WwTP site to the northern and south eastern boundaries. The western boundary is mostly open. There are mown grass areas within the site, with occasional ornamental trees. The agricultural land west of the existing WwTP site includes grassland, groups of trees and a fragmented hedgerow near Kilkenny Road.

The Kilkenny Road Pumping Station site consists of the pump house, steel hoist and inlet work. The boundaries to the site are a combination of stone walls and steel palisade fencing. The pump station is screened from the south and west by vegetation along the River Barrow, there is no screen planting to the existing pumping station site along Kilkenny Road to the east.

The route for new outfall to the River Barrow consists of agricultural land west of the WwTP site, the R448 Kilkenny Road and woodland next to the River Barrow.

The route of the microtunnel gravity sewer from the previous Kilkenny Road Pump Station to the new pumping station at the WwTP includes agricultural land west of the WwTP site and the R448 Kilkenny Road corridor up to the Kilkenny Road Pumping Station site.

6.5 Receiving Environment-Visual

The aim of the visual baseline is 'to establish the area in which the development may be visible, the different groups of people who may experience views of the development, the places where they will be affected and the nature of the views and visual amenity at those points' (Landscape Institute and Institute of Environmental Management and Assessment, 2013).

6.5.1 Zone of Theoretical Visibility

The Zone of Theoretical Visibility (ZTV) or areas of land from which the development may be potentially visible was estimated using a manual approach using map interpretation, and visual envelope mapping on site to establish the outer limit of land that may be visually connected with the proposal.

The areas identified are generally within 500m from the WwTP site and 150m from the Kilkenny Road Pumping Station and include; the area of the R448 Kilkenny Road corridor immediately west of the WwTP site and up to the Kilkenny Road Pumping station, the area of Green Road immediately east of the WwTP site, the residential areas at The Glen, College Green, Cluain Bui, Maple Court, Tyndall College/Carlow Institute of Further Education. The area of the R448 Kilkenny Road corridor immediately adjacent to the Kilkenny Road Pumping Station site.

Views to the WwTP site from the north and east are limited by intervening built development (including the residential areas at The Glen, College Green and Cluain Bui) and vegetation. Views from the south are limited by intervening built development (including Tyndall College and Maple Court) and vegetation. Views from the west are limited by intervening woodland and vegetation along the River Barrow. Further to the west there is a ridge of high ground at Rossmore (Co. Laois) up to 4.5km from the site, however visibility to the site from here would be limited due to the effect of distance and intervening vegetation.

Views to the Kilkenny Road Pumping Station site/ route of the underground sewer from the west are limited by dense intervening vegetation along the River Barrow. Views to the Kilkenny Road Pumping Station site/ route of the underground sewer from the east are limited by built development along the R448 Kilkenny Road and Green Road.



6.5.2 Visual Receptors

The following groups of people are potential visual receptors to changes within the site:

6.5.2.1 Tracks/ Waymarked Walks

The Barrow Way travels along the River Barrow west of the WwTP site and Kilkenny Road. The site is not visible from here due to the effect of the intervening dense woodland along the River Barrow.

6.5.2.2 Roads

Green Road travels immediately adjacent and to the east of the WwTP site. The site is not visible (except where there are glimpsed views through the main entrance gate to the WwTP) from Green Road due to the site's dense perimeter screen planting. Residential access roads at the Southern Relief Road, Cluain Bui, The Glen, College Green and Maple Court are located to the north, east and south of the WwTP site; the site is not visible from these roads due to intervening vegetation and buildings. The R448 Kilkenny Road travels west of the WwTP site. There are glimpsed distant views towards the WwTP site from the section of the R448 Kilkenny Road immediately west of the site. Leighlin Road travels further west of the site and the River Barrow, the combination of distance and intervening vegetation screens the site from here. The Kilkenny Road Pumping Station site is visible from the area of the R448 Kilkenny Road corridor immediately adjacent to the Kilkenny Road Pumping Station site and the area of Green Road south east of the Kilkenny Road Pumping Station site.

6.5.2.3 Settlements

The site is located within the southern suburbs of Carlow. The closest residential property includes one-off dwellings located west and north west of the WwTP site along the R448 Kilkenny Road, north of the site at The Glen, Southern Gardens, Carraig Abhainn, north east at College Green and east of the site at Cluain Bui.

There are also some dwellings located to the south east of the site along Green Road and to the south of the site at Maple Court. There may be some distant views to the western area of the WwTP site from one-off dwellings located west of the site along the R448 Kilkenny Road. There may some distant views to the western extension area of the site from first floor windows from dwellings at The Glen, (the existing site is screened by dense boundary planting from here). The WwTP site is not visible from residential dwellings at The Glen, Southern Gardens, Carraig Abhainn, College Green, Cluain Bui and along Green Road due to existing dense screen planting around the site. The WwTP site is not visible from residential dwellings at Maple Court due to existing dense screen planting around the site and intervening built development.

6.5.2.4 Commercial Property

There are various commercial properties located south of the WwTP site along Green Road. The site is generally not visible due to the effect of the intervening planting and built development.

There is a filling station and shop located south of the Kilkenny Road Pumping Station along the R448 Kilkenny Road. The Kilkenny Road Pumping Station area of the site would be visible in distant views from here.

6.5.2.5 Education Buildings

Tyndall College and part of Carlow Institute of Technology are located to the south west of the WwTP site.

There are numerous Carlow Institute of Technology buildings located east of the Kilkenny Road Pumping Station. The Kilkenny Road Pumping Station area of the site is visible from windows on these buildings facing onto Kilkenny Road and Green Road.



6.5.2.6 Representative Viewpoints

Seventeen viewpoint locations were selected based on professional judgement to represent the experience of visual receptors. The viewpoints chosen, do not cover every view but have been selected to represent the different users from a range of directions and distances from the site. The viewpoint locations are illustrated on the Viewpoint Locations drawing, in Appendix 6-1, Volume 3 of the EIAR. The viewpoint images are illustrated in Appendix 6-2, Volume 3 of the EIAR. The following describes the nature and characteristics of existing views from the selected viewpoints.

Table 6-9 - Representative viewpoints-nature and characteristic of the baseline view

Viewpoint	Nature and Characteristics of the Baseline View
1	From Green Road, circa. 50m from the WwTP site. There are views along Green Road including roadside vegetation. The subject WwTP site is not visible, as it is screened by planting to the site itself. The receptors at and close to this viewpoint would include users of the Green Road and residents in dwellings along Green Road and at Cluain Bui and College Green.
2	From Green Road, circa. 16m from the WwTP site. There are views from a short section of Green Road (immediately opposite the main WwTP site entrance) through the main entrance gate including views to existing buildings and structures. The receptors at and close to this viewpoint would include users of the Green Road and residents in some dwellings at Cluain Bui.
3	From Green Road, circa. 45m from the WwTP site. There are views along Green Road including roadside vegetation. The subject WwTP site is not visible, as it is screened by screen planting to the site itself. The receptors at and close to this viewpoint would include users of the Green Road.
4	From Green Road, circa. 215m from the WwTP site. There are views along Green Road including roadside vegetation and a commercial business. The subject WwTP site is not visible, as it is screened by intervening vegetation and screen planting to the site itself. The receptors at and close to this viewpoint would include users of the Green Road and residents in dwellings along Green Road.
5	From Maple Court, circa. 275m from the WwTP site. There are views of residential dwellings and garden vegetation. The subject WwTP site is not visible, as it is screened by intervening vegetation and screen planting to the site itself. The receptors at and close to this viewpoint would include residents in dwellings at Maple Court.
6	From the Southern Relief Road at Cluain Bui, circa. 230m from the WwTP site. There are views along an access road and to residential dwellings. There are distant views to a ridge of high ground in Co. Laois. The subject WwTP site is not visible, as it is screened by intervening vegetation and screen planting to the site itself. The receptors at and close to this viewpoint would include residents in dwellings at Cluain Bui and College Green.
7	From a residential road at The Glen, circa. 150m from the WwTP site. There are views to residential dwellings, street trees and screen planting to the back gardens to some dwellings. The subject WwTP site is not visible, as it is screened by intervening vegetation and screen planting to the site itself. The receptors at and close to this viewpoint would include residents in dwellings at The Glen.
8	From the R448 Kilkenny Road, circa. 135m from the new pumping station and WwTP site. There are views along Kilkenny Road including dense roadside screen planting. The subject WwTP

	site is not visible, as it is screened by intervening vegetation and screen planting to the site itself. The receptors at and close to this viewpoint would include residents in a one-off dwelling opposite this viewpoint and users of the R448 Kilkenny Road.
9	From the R448 Kilkenny Road, circa. 100m from the western extension to the WwTP. There are views to roadside vegetation, the WwTP site and land to the west of the site are noticeable. The existing WwTP site is partially visible, as the western boundary to the site is open and not screened with planting. The receptors at and close to this viewpoint would include residents in one-off dwellings near this viewpoint and users of the R448 Kilkenny Road.
10	Looking south east from Leighlin Road, circa. 500m from the WwTP site. There are views of grassland, scrub and woodland. Tyndall College/ Carlow Institute of Technology is partially visible in the background of this view. The subject WwTP site is not visible, as it is screened by intervening dense vegetation and the effect of distance. The receptors at and close to this viewpoint would include users of the Leighlin Road and residents in dwellings along Leighlin Road.
11	From the R448 Kilkenny Road, circa. 25m from the existing Kilkenny Road pumping station site. There are views along Kilkenny Road including roadside vegetation and open views to the pumping station site. The receptors at and close to this viewpoint would include users of the R448 Kilkenny Road and nearby Institute of Technology Carlow buildings.
12	From the R448 Kilkenny Road, circa. 60m from the existing Kilkenny Road pumping station site. There are views along Kilkenny Road including roadside vegetation and open views to the pumping station site. The receptors at and close to this viewpoint would include users of the R448 Kilkenny Road and nearby Institute of Technology Carlow buildings.
13	From the Barrow Way, circa. 50m from the existing Kilkenny Road pumping station site. There are views across the River Barrow including dense riverside vegetation located to the west of the pumping station site. The pumping station site itself is not visible. The receptors at and close to this viewpoint would include users of the Barrow Way and River Barrow for boating.
14	From the R448 Kilkenny Road looking north west towards the outfall pipeline route. There are views along Kilkenny Road including roadside vegetation. The receptors at and close to this viewpoint would include users of the R448 Kilkenny Road.
15	From the R448 Kilkenny Road looking north east towards the proposed microtunnel gravity sewer route. There are views along Kilkenny Road including roadside vegetation. The receptors at and close to this viewpoint would include users of the R448 Kilkenny Road.
16	From the Green Road, circa. 65m from the existing Kilkenny Road pumping station site. There are views to the junction with Kilkenny Road including roadside vegetation and views to the pumping station site. The receptors at and close to this viewpoint would include users of the R448 Kilkenny Road/ Green Road and nearby Institute of Technology Carlow buildings.
17	From the R448 Kilkenny Road, circa. 75m from the site. There are views to roadside vegetation, the WwTP site is mostly screened by intervening vegetation and a boundary wall. The receptors at and close to this viewpoint would include users of the R448 Kilkenny Road.

6.6 Likely Significant Landscape Effects during Construction Phase

This section describes the effects of the proposed development on landscape receptors during the construction phase and assesses the significance of the effects identified.

6.6.1 Landscape Sensitivity

The proposed development site and Study Area do not coincide with any landscape designations. Ecological designations include the River Barrow and Nore SAC.

6.6.1.1 Central Lowlands Character Area (Co. Carlow)

The part of the Central Lowlands Character Area within the study area is judged to have low value refer to Section 6.4 above. This landscape is judged to have low susceptibility to change as a result of the proposed development. The combination of low susceptibility and low value mean that the sensitivity of overall local landscape character is judged to be **low**.

6.6.1.2 Urban Fringe Character Area (Co. Laois)

The part of the Central Lowlands Character Area within the study area is judged to have low value refer to Section 6.4 above. The site is not located within this character area so there will be no direct physical effects; intervisibility from this area to the proposed development will also be limited by intervening vegetation/ built development. This landscape is judged to have low susceptibility to change as a result of the proposed development. The combination of low susceptibility and low value mean that the sensitivity of overall local landscape character is judged to be **low**.

6.6.1.3 Lowland Character Area (Co. Laois)

The part of the Lowland Character Area within the study area is judged to have medium value refer to Section 6.4 above. The site is not located within this character area so there will be no direct physical effects; intervisibility from this area to the proposed development will also be limited by intervening vegetation/ built development. This landscape is judged to have low susceptibility to change as a result of the proposed development. The combination of low susceptibility and medium value mean that the sensitivity of overall local landscape character is judged to be **low**.

6.6.2 Landscape Effects

The effects of construction upon the attributes of each landscape character area previously identified is detailed below.

6.6.2.1 Central Lowlands Character Area (Co. Carlow)

Tables 6-10 below lists the effects of construction upon the attributes of character previously identified.

Table 6-10 - Effects upon attributes of landscape character during construction: Landscape Character Area (Central Lowlands)

Natural Attributes		
Attribute	Effect	Magnitude
Landform	Localised temporary excavations/ regrading/ micro tunnelling within the site.	Minor
Hydrology	Construction of outfall to the River Barrow.	Negligible
Land cover/ flora and fauna	Removal of some trees/ woodland to facilitate the outfall route to the River Barrow. Removal of some trees within the existing WwTP site. Removal of some trees to facilitate the construction of the inlet pumping station at the WwTP site. Removal of sections of hedge and trees at Kilkenny Road (near Southern Gardens and Carraig Abhainn) to facilitate shafts for micro tunnelling works. Removal of area of woodland to the south of the Kilkenny Road Pumping Station.	Moderate
Cultural Attributes		
Attribute	Effect	Magnitude
Land Use	Partial temporary change of proposed development site to construction use.	Negligible
Settlement	No effect	No Change
Enclosure	Removal of sections of boundary vegetation/ hedges. Removal of sections of boundary hedge at Kilkenny Road (near Southern Gardens and Carraig Abhainn) to facilitate shafts for micro tunnelling works. Potential removal of section stone wall near Kilkenny Road Pumping Station. Construction of new site fencing boundaries.	Minor
Heritage	No effect	No Change
Aesthetic and Perceptual Attributes		

Attribute	Effect	Magnitude
Scale	No effect	No Change
Openness / Enclosure	Localised removal of vegetation will open up temporary views to construction activities.	Minor
Unity / Coherence	Temporary introduction of construction machinery, stockpiles, part finished structures, bare earth etc. reducing unity.	Minor
Diversity / Complexity	No effect	No Change
Tranquillity / Peacefulness	Temporary introduction of construction machinery, lighting and noise etc. reducing tranquillity.	Minor
Naturalness / Wildness	No effect	No Change
Legibility / Sense of Place	No effect	No Change
Memorability / Visual Impact	No effect	No Change
Light & Colour	Temporary introduction of construction machinery, stockpiles, part finished structures, bare earth etc.	Minor
Seasonality / Temporal Change	Temporary introduction of construction machinery, stockpiles, part finished structures, bare earth etc.	Minor

Overall magnitude of change (Construction): Minor adverse and of temporary to short term duration.

Significance (Construction): The combination of the overall minor adverse magnitude and low sensitivity, suggest that the overall significance of the effect on Central Lowlands landscape character in the study area during construction would be **slight adverse effect**.

Urban Fringe Character Area (Co. Laois)

Tables 6-11 below lists the effects of construction upon the attributes of character previously identified.

Table 6-11 - Effects upon attributes of landscape character during construction: Landscape Character Area (Urban Fringe)

Natural Attributes		
Attribute	Effect	Magnitude
Landform	No effect	No Change
Hydrology	No effect	No Change
Land cover/ flora and fauna	No effect	No Change
Cultural Attributes		
Attribute	Effect	Magnitude
Land Use	No effect	No Change
Settlement	No effect	No Change
Enclosure	No effect	No Change
Heritage	No effect	No Change
Aesthetic and Perceptual Attributes		
Attribute	Effect	Magnitude
Scale	No effect	No Change
Openness / Enclosure	No effect	No Change
Unity / Coherence	Temporary perception of construction machinery in the distance reducing unity.	Negligible
Diversity / Complexity	No effect	No Change
Tranquillity / Peacefulness	Temporary perception of construction machinery in the distance reducing tranquillity.	Negligible
Naturalness / Wildness	No effect	No Change
Legibility / Sense of Place	No effect	No Change
Memorability / Visual Impact	No effect	No Change

Light & Colour	No effect	No Change
Seasonality / Temporal Change	No effect	No Change

Overall magnitude of change (Construction): Negligible adverse and of temporary to short term duration.

Significance (Construction): The combination of the overall negligible adverse magnitude and low sensitivity, suggest that the overall significance of the effect on Urban Fringe landscape character in the study area during construction would be **neutral effect**.

6.6.2.2 Lowland Character Area (Co. Laois)

Tables 6-12 below lists the effects of construction upon the attributes of character previously identified.

Table 6-12 - Effects upon attributes of landscape character during construction: Landscape Character Area (Lowland Character Area)

Natural Attributes		
Attribute	Effect	Magnitude
Landform	No effect	No Change
Hydrology	Construction of outfall to River Barrow.	Negligible
Land cover/ flora and fauna	No effect	No Change
Cultural Attributes		
Attribute	Effect	Magnitude
Land Use	No effect	No Change
Settlement	No effect	No Change
Enclosure	No effect	No Change
Heritage	No effect	No Change
Aesthetic and Perceptual Attributes		
Attribute	Effect	Magnitude
Scale	No effect	No Change
Openness / Enclosure	No effect	No Change
Unity / Coherence	Temporary perception of construction machinery in the distance reducing unity.	Negligible

Diversity / Complexity	No effect	No Change
Tranquillity / Peacefulness	Temporary perception of construction machinery in the distance reducing tranquillity.	Negligible
Naturalness / Wildness	No effect	No Change
Legibility / Sense of Place	No effect	No Change
Memorability / Visual Impact	No effect	No Change
Light & Colour	No effect	No Change
Seasonality / Temporal Change	No effect	No Change

Overall magnitude of change (Construction): Negligible adverse and of temporary to short term duration.

Significance (Construction): The combination of the overall negligible adverse magnitude and low sensitivity, suggest that the overall significance of the effect on Lowland landscape character in the study area during construction would be **neutral effect**.

6.7 Likely Significant Landscape Effects during Operational Phase

This section describes the effects of the proposed development on landscape receptors and assesses the significance of the effects identified.

6.7.1 Sensitivity of landscape receptors

This has already been discussed at Section 6.4 above.

6.7.1.1 Landscape Effects

The effects of the project during operation upon the attributes of each landscape character area previously identified is detailed below.

6.7.1.2 Central Lowlands Character Area (Co. Carlow)

Tables 6-13 below lists the effects of during operation upon the attributes of character previously identified.

Table 6-13 - Effects upon attributes of landscape character during operation: Landscape Character Area (Central Lowlands)

Natural Attributes		
Attribute	Effect	Magnitude
Landform	Finished levels to the site will remain similar to the existing ground levels. Temporary spoil heaps will have been removed.	Negligible
Hydrology	Completed outfall to River Barrow.	Negligible
Land cover/ flora and fauna	Permanent removal of some trees/ woodland to facilitate the outfall route to the River Barrow. Permanent removal of some trees within the existing WwTP site. Permanent removal of some trees to facilitate the construction of the inlet pumping station at the WwTP site. Permanent removal of sections of hedge and trees at Kilkenny Road (near Southern Gardens and Carraig Abhainn) to facilitate shafts for micro tunnelling works. Permanent removal of area of woodland to the south of the Kilkenny Road Pumping Station. Proposed planting to WwTP site boundary would partially mitigate loss of vegetation.	Moderate Adverse
Cultural Attributes		
Attribute	Effect	Magnitude
Land Use	Extension of WwTP site within the local area.	Negligible
Settlement	No effect	No Change
Enclosure	Permanent removal of sections of boundary vegetation/ hedges. Permanent removal of sections of boundary hedge at Kilkenny Road (near	Minor

	Southern Gardens and Carraig Abhainn) to facilitate shafts for micro tunnelling works. Proposed replacement hedge planting would mitigate loss. Potential removal of section stone wall near Kilkenny Road Pumping Station. Completion of new site fencing boundaries.	
Heritage	No effect	No Change
Aesthetic and Perceptual Attributes		
Attribute	Effect	Magnitude
Scale	No effect	No Change
Openness / Enclosure	Localised removal of vegetation will open up views to Kilkenny Road from adjacent residential areas near Southern Gardens and Carraig Abhainn. Localised removal of vegetation will open up views to Kilkenny Road Pumping Station from Kilkenny Road.	Minor Adverse
Unity / Coherence	Completed development will include structures/ materials similar in appearance to existing WwTP. Proposed screen planting and existing vegetation along Kilkenny Road will partially screen the extension to the WwTP.	Minor Adverse
Diversity / Complexity	No effect	No Change
Tranquillity / Peacefulness	No noticeable change to tranquillity once the development is completed. Negligible change for lighting as the site is located within an area which already includes street/ urban lighting.	Negligible
Naturalness / Wildness	No effect	No Change
Legibility / Sense of Place	No effect	No Change
Memorability / Visual Impact	No effect	No Change

Light & Colour	Completed development will include structures/ materials similar in appearance to existing WwTP.	Negligible
Seasonality / Temporal Change	No effect	No Change

Overall magnitude of change (Operation): Minor Adverse and long term duration.

Significance (Operation): The combination of the overall minor adverse magnitude and low sensitivity, suggest that the overall significance of the effect on Central Lowlands landscape character in the study area during operation would be **slight adverse effect**.

6.7.1.3 Urban Fringe Character Area (Co. Laois)

Tables 6-14 below lists the effects of during operation upon the attributes of character previously identified.

Table 6-14 - Effects upon attributes of landscape character during operation: Landscape Character Area (Urban Fringe)

Natural Attributes		
Attribute	Effect	Magnitude
Landform	No effect	No Change
Hydrology	No effect	No Change
Land cover/ flora and fauna	No effect	No Change
Cultural Attributes		
Attribute	Effect	Magnitude
Land Use	No effect	No Change
Settlement	No effect	No Change
Enclosure	No effect	No Change
Heritage	No effect	No Change
Aesthetic and Perceptual Attributes		
Attribute	Effect	Magnitude
Scale	No effect	No Change
Openness / Enclosure	No effect	No Change



Unity / Coherence	No effect	No Change
Diversity / Complexity	No effect	No Change
Tranquillity / Peacefulness	No effect	No Change
Naturalness / Wildness	No effect	No Change
Legibility / Sense of Place	No effect	No Change
Memorability / Visual Impact	No effect	No Change
Light & Colour	No effect	No Change
Seasonality / Temporal Change	No effect	No Change

Overall magnitude of change (Operation): No change

Significance (Operation): The combination of the overall no change magnitude and low sensitivity, suggest that the overall significance of the effect on Urban Fringe landscape character in the study area during operation would be **neutral effect**.

6.7.1.4 Lowland Character Area (Co. Laois)

Tables 6-15 below lists the effects during operation upon the attributes of character previously identified.

Table 6-15 - Effects upon attributes of landscape character during operation: Landscape Character Area (Lowland Character Area)

Natural Attributes		
Attribute	Effect	Magnitude
Landform	No effect	No Change
Hydrology	Completed outfall to River Barrow.	Negligible
Land cover/ flora and fauna	No effect	No Change
Cultural Attributes		
Attribute	Effect	Magnitude
Land Use	No effect	No Change
Settlement	No effect	No Change



Enclosure	No effect	No Change
Heritage	No effect	No Change
Aesthetic and Perceptual Attributes		
Attribute	Effect	Magnitude
Scale	No effect	No Change
Openness / Enclosure	No effect	No Change
Unity / Coherence	No effect	No Change
Diversity / Complexity	No effect	No Change
Tranquillity / Peacefulness	No effect	No Change
Naturalness / Wildness	No effect	No Change
Legibility / Sense of Place	No effect	No Change
Memorability / Visual Impact	No effect	No Change
Light & Colour	No effect	No Change
Seasonality / Temporal Change	No effect	No Change

Overall magnitude of change (Operation): No change.

Significance (Operation): The combination of the overall no change magnitude and low sensitivity, suggest that the overall significance of the effect on Lowland landscape character in the study area during operation would be **neutral effect**.

6.8 Likely Significant Visual Effects during Construction Phase

6.8.1 Sensitivity of visual receptors

Tracks/ Waymarked Walks

Users of the Barrow Way would use the track for enjoyment of the countryside and riverside views and are judged to have high susceptibility. The value of the riverside views is judged to be high. The combination of high susceptibility and high value the sensitivity of these receptors would be **high**.



Roads

There are no designated viewpoints from roads within the study area. The views within the suburban areas of Carlow would have low value, whilst the views from roads within open countryside would include some long distance views to upland areas and are judged to have medium value. As road users would generally be travelling at speed their susceptibility is judged to be medium. The combination of medium susceptibility and low/medium value the sensitivity of these receptors would be **medium**.

Settlement

The value of views from settlement areas within the suburbs of Carlow is judged to be low, whilst value of views from rural areas would be medium due to the longer distance rural views available. The susceptibility of residents in local residential areas is judged to be high. The combination of high susceptibility and low/medium value the sensitivity of these receptors would be **high**.

Commercial Property

The value of views from commercial areas within the suburbs of Carlow is judged to be low. The susceptibility of people at their place of work is judged to be low. The combination of low susceptibility and low value the sensitivity of these receptors would be **low**.

Educational Buildings

The value of views from educational buildings and their outdoor areas within the suburbs of Carlow is judged to be low. The susceptibility of people at institutional buildings is judged to be medium. The combination of medium susceptibility and low value the sensitivity of these receptors would be **medium**.

Table 6-16 below lists the visual effects of construction upon receptors represented by viewpoints 1-17. These effects would be at most be moderate in magnitude.

Table 6-16 - Visual Effects during Construction Phase

Viewpoint	Effects	Sensitivity	Magnitude	Significance
1	No part of the works would be discernible.	Medium/ High	No Change	Neutral
2	Partial glimpsed views of construction activities through WwTP main entrance. Temporary to short term duration.	Medium/ High	Negligible	Neutral
3	No part of the works would be discernible.	Medium	No Change	Neutral
4	No part of the works would be discernible.	Medium/ High	No Change	Neutral
5	No part of the works would be discernible.	High	No Change	Neutral
6	The works would be screened by intervening vegetation and the effect of distance. At most there may be temporary/ short term distant views of taller cranes during construction.	Medium/ High	Negligible	Neutral

7	Removal of part of the line of mature cypress trees which bound the WwTP site trees from the view. The proposals would mostly be screened by dense intervening vegetation. Only a small part of the construction activities may be discernible through gaps in vegetation/ buildings. Temporary to short term duration views of construction activities.	High	Minor	Slight Adverse
8	Proposed micro tunnelling works would not be visible as they would be underground. The proposals would mostly be screened by dense intervening vegetation. Only a small part of the construction activities associated with the new pumping station and WwTP may be partially discernible through gaps in vegetation. Temporary to short term duration views of construction activities.	High/ Medium	Minor	Slight Adverse
9	Removal of part of the line of mature cypress trees which bound the WwTP site trees from the view. Open views to construction activities in the west of the WwTP site area in particular.	High/ Medium	Moderate	Moderate Adverse
10	The works would be screened by intervening vegetation and the effect of distance. At most there may be temporary/ short term distant views of taller cranes during construction.	Medium/ High	Negligible	Neutral
11	Construction works to Kilkenny Road Pumping Station would be noticeable. Removal of part of the woodland to the south of the pumping station. Proposed micro tunnelling works would not be visible as they would be underground.	Medium	Moderate	Moderate Adverse
12	Construction works to Kilkenny Road Pumping Station would be noticeable. Removal of part of the woodland to the south of the pumping station. Possible removal of section of existing stone wall along Kilkenny Road.	Medium	Moderate	Moderate Adverse

	Proposed micro tunnelling works would not be visible as they would be underground.			
13	Construction activities at/ near the Kilkenny Road pumping station development would barely noticeable in the view due to dense intervening vegetation along the River Barrow. Barely noticeable temporary to short term views of construction activities.	High	Negligible	Neutral
14	The clearance of some trees to accommodate the outfall route would be noticeable from this location. There would be distant views to tunnelling shaft site compound in the distant of the view further along Kilkenny Road. Temporary to short term views of construction activities.	Medium	Moderate	Moderate Adverse
15	Temporary/ short term views of construction activities associated with proposed micro tunnel gravity sewer works including shaft compound area.	Medium	Moderate	Moderate Adverse
16	Construction works to Kilkenny Road Pumping Station would be noticeable. Removal of part of the woodland to the south of the pumping station. Possible removal of section of existing stone wall along Kilkenny Road. Proposed micro tunnelling works would not be visible as they would be underground.	Medium	Moderate	Moderate Adverse
17	Construction activities associated with outfall route crossing Kilkenny Road would be visible in the distance. Construction works to the WwTP site would be mostly screened by intervening vegetation. There may be temporary/ short term distant views of taller cranes during construction.	Medium	Minor	Slight Adverse

The significance of the visual effect of the proposed development during construction was judged neutral from 8 viewpoints. This means the proposed development would be difficult to distinguish and/ or there would be barely perceptible change in view. The significance of the visual effect of the development during construction was judged as slight adverse from 3 viewpoints. This means the proposed development would cause limited deterioration to the view. The significance of the visual effect of the development during construction was judged as moderate adverse from 6 viewpoints. This means the proposed development would cause obvious deterioration to a view. The duration of effects during construction would be temporary to short term.



6.9 Likely Significant Visual Effects during Operational Phase

This section describes the effects of the proposed development on visual receptors during the operational phase and assesses the significance of the effects identified.

6.9.1 Sensitivity of visual receptors

This has already been discussed at Section 6.8 above.

6.9.2 Effects on Visual Receptors

6.9.2.1 Tracks/ Waymarked Walks

The upgrade works to the main WwTP site and along Kilkenny Road and to the Kilkenny Road Pumping Station would not be visible/ barely perceptible to users of the Barrow Way due to dense intervening vegetation and the effect of distance, the significance of visual effect is judged to be Neutral (refer to Viewpoint 13). During operation there would be neutral effects to users the section of the Barrow Way directly opposite the outfall into the River Barrow and as natural vegetation starts to regrow.

6.9.2.2 Roads

The proposed development generally would not be visible to users of the Southern Relief Road and the L4019 Green Road due to dense intervening vegetation (refer to Viewpoints 1, 2, 3, 4 & 6). Users of the junction of the L4028 Green Road and R448 Kilkenny Road near the Kilkenny Road Pumping Station would experience moderate adverse effects due to the removal of woodland (refer to Viewpoints 11, 12 & 16).

Users of the remainder of Kilkenny Road would experience neutral effects (refer to Viewpoints 14 & 15) except from opposite areas of roadside hedgerow removed to facilitate the tunnelling shafts where there will be moderate adverse effects. And from a very small section of the road directly opposite the WwTP site (refer to Viewpoint 9) where there will be some moderate adverse effects on opening year reducing to slight adverse (as screen planting matures) due to glimpsed views to the development through gaps in vegetation.

The proposed development site would not be visible from the L3920 Leighlin Road (refer to Viewpoint 10) due to the effect of distance and intervening vegetation.

6.9.2.3 Settlement

One-off dwellings directly opposite the WwTP site at Kilkenny Road would experience some moderate adverse effects on opening year reducing to slight adverse (as screen planting matures) due to glimpsed views to the development through gaps in vegetation (refer to Viewpoint 9).

The one off dwelling located to the north west of the WwTP site along the R448 Kilkenny Road (refer to Viewpoint 8) would experience neutral effects of the development due to intervening vegetation and proposed screen planting.

The proposed development would not be visible from residential areas at Cluain Bui, College Green and Maple Court (refer to Viewpoints 5 & 6).



Users of The Glen residential area (refer to Viewpoint 7) would experience neutral effects due to intervening vegetation and screen planting which screen the site.

Users of the Southern Gardens and Carraig Abhainn residential areas would experience moderate adverse effects due to the removal of roadside hedgerows and trees to facilitate the tunnel shafts.

The proposed development site would not be visible from residential dwellings along the L3920 Leighlin Road (refer to Viewpoint 10) due to the effect of distance and intervening vegetation.

6.9.2.4 Commercial Property

The proposed development would not be visible from commercial development areas south of the WwTP site due intervening vegetation (refer to Viewpoints 3 & 4).

Users of the filling station and shop located south of the Kilkenny Road Pumping Station along the R448 Kilkenny Road would experience slight adverse effects due to the removal of woodland south of Kilkenny Road Pumping Station (refer to Viewpoint 12).

6.9.2.5 Education Buildings

Users of Tyndall College and part of Carlow Institute of Technology located to the south west of the WwTP site would experience neutral effects from ground floor views (refer to Viewpoint 17).

Users of the Carlow Institute of Technology buildings located east of the Kilkenny Road Pumping Station site would experience slight adverse effects due to the removal of woodland south of Kilkenny Road Pumping Station (refer to Viewpoint 11).

6.9.2.6 Glint and Glare

A separate Glint and Glare Assessment was undertaken by Macro Works Ltd to determine the potential for solar reflectance effects upon dwelling and transport route receptors in respect of a proposed ground mounted solar element of the development at Mortarstown WwTP (refer to Appendix 6-3). The assessment concludes that *'from the analysis and discussions contained herein, it is considered that there will be no reflectance effects experienced at any of the dwelling receptors in this assessment as a result of the proposed solar development at Mortarstown, Co. Carlow. It is also considered that there will not be any reflectance effects experienced at any road receptors assessed in this study as a result of the proposed development.'*

Table 6-17 below lists the visual effects of the completed proposals upon receptors represented by Viewpoints 1-17.



Table 6-17 - Visual Effects during Operational Phase

Viewpoint	Effects	Sensitivity	Magnitude	Significance
1	Users of Green Road would have medium sensitivity. Residents in dwellings along Green Road, Cluain Bui and College Green already have views to the WwTP obstructed by vegetation and would have high sensitivity. The WwTP development would not be visible from this location; intervening vegetation and screen planting to the perimeter of the WwTP screens the site. There would be no change in view. The numbers of receptors affected would be none. The combination of no change in view and no people affected the magnitude of the effect is judged to be no change. The combination of medium/ high sensitivity and no change magnitude, the significance of the visual effect is judged to be neutral effect.	Medium/ High	No Change	Neutral
2	Users of Green Road would have medium sensitivity. Residents in dwellings at Cluain Bui already have views to the WwTP obstructed by vegetation and would have high sensitivity. The WwTP development would be visible from this location, however there will only be some minor change in the composition of elements in the view. The numbers of receptors affected would be few. The combination of minor change in view and few people affected; the magnitude of the effect is judged to be negligible. The combination of medium/ high sensitivity and negligible magnitude, the significance of the visual effect is judged to be neutral effect.	Medium/ High	Negligible	Neutral
3	Users of Green Road would have medium sensitivity. The WwTP development would not be visible from this location; intervening vegetation and screen planting to the perimeter of the WwTP screen the site. There would be no change in view. The numbers of receptors affected would be none. The combination of no change in view and no people affected the magnitude of the effect is judged to be no change. The combination of medium sensitivity and no change magnitude, the	Medium	No Change	Neutral

	significance of the visual effect is judged to be neutral effect.			
4	Users of Green Road would have medium sensitivity. Residents in dwellings along Green Road, already have views to the WwTP obstructed by vegetation and would have high sensitivity. The WwTP development would not be visible from this location; intervening vegetation and screen planting to the perimeter of the WwTP screen the site. There would be no change in view. The numbers of receptors affected would be none. The combination of no change in view and no people affected, the magnitude of the effect is judged to be no change. The combination of medium/high sensitivity and no change magnitude, the significance of the visual effect is judged to be neutral effect.	Medium/ High	No Change	Neutral
5	Residents in dwellings at Maple Court, already have views to the WwTP obstructed by vegetation and would have high sensitivity. The WwTP development would not be visible from this location; intervening vegetation and screen planting to the perimeter of the WwTP screen the site. There would be no change in view. The numbers of receptors affected would be none. The combination of no change in view and no people affected, the magnitude of the effect is judged to be no change. The combination of high sensitivity and no change magnitude, the significance of the visual effect is judged to be neutral effect.	High	No Change	Neutral
6	Residents in dwellings at Cluain Bui and College Green, already have views to the WwTP obstructed by vegetation and would have high sensitivity. The WwTP development would not be visible from this location, the removal of a small section of cypress trees would be barely noticeable; intervening vegetation and screen planting to the perimeter of the WwTP screen the site. There would be negligible change in view. The numbers of receptors affected would be few. The combination of barely noticeable change in view and few people affected; the magnitude of the effect is	High	Negligible	Neutral

	judged to be negligible. The combination of high sensitivity and negligible magnitude, the significance of the visual effect is judged to be neutral effect.			
7	Residents in dwellings at The Glen, already have views to the WwTP obstructed by vegetation and would have high sensitivity. The WwTP development would be barely perceptible from this location; intervening vegetation and screen planting to the perimeter of the WwTP screen the site. The removal of a small section of cypress tree planting would be barely perceptible. The numbers of receptors affected would be few. The combination of barely perceptible change in view and few people affected the magnitude of the effect is judged to be negligible. The combination of high sensitivity and negligible magnitude, the significance of the visual effect is judged to be neutral effect.	High	Negligible	Neutral
8	Users of Kilkenny Road would have moderate sensitivity. Residents in the nearby one-off dwelling, already have views to the WwTP obstructed by vegetation and would have high sensitivity. The WwTP development would be barely perceptible from this location; intervening vegetation and screen planting to the perimeter of the WwTP would mostly screen the site. At most there may be some faint outline of structures perceptible through gaps in existing intervening vegetation. As proposed screen planting to the site matures, screening would improve. The numbers of receptors affected would be few. The combination of barely perceptible change in view and few people affected, the magnitude of the effect is judged to be negligible. The combination of medium/ high sensitivity and negligible magnitude, the significance of the visual effect is judged to be neutral effect.	Medium/ High	No Change	Neutral
9	Users of the Kilkenny Road would have medium sensitivity. Residents in the one-off dwellings, already have views to the WwTP partially obstructed by vegetation	High/ Medium	Moderate	Slight Adverse

and would have high sensitivity. The WwTP development would be partially visible from this location, there will be a partial alternation to the baseline view with additional built elements also noticeable in the western extension area of the site. The proposed hedge planting will include the full extent of the western boundary to the WwTP site, but would not screen taller structures, so not all project elements will be screened. The numbers of receptors affected would be few. The combination of partial change in view and some people affected, the magnitude of the effect is judged to be moderate on opening year and minor long term as screen planting matures. The combination of Medium/ High sensitivity and moderate magnitude, the significance of the visual effect is judged to be moderate adverse effect on opening year. As screen planting to the site matures the effect would reduce to slight adverse.

10	Users of Leighlin Road would have medium sensitivity. Residents in dwellings along Leighlin Road, already have views to the WwTP obstructed by vegetation and would have high sensitivity. The WwTP development would not be visible from this location; intervening vegetation and the effect of distance screen the site. There would be no change in view. The numbers of receptors affected would be none. The combination of no change in view and no people affected the magnitude of the effect is judged to be no change. The combination of medium/ high sensitivity and no change magnitude, the significance of the visual effect is judged to be neutral effect.	High/ Medium	No Change	Neutral
11	Users of Kilkenny Road and the Institute of Technology Carlow buildings would have medium sensitivity. The removal of some woodland south of the Kilkenny Road pumping station site would be visible from this location, there will be a partial alternation to the baseline view. The magnitude of the effect is judged to be minor and long term. The combination of moderate sensitivity and minor magnitude,	Medium	Minor	Slight Adverse

	the significance of the visual effect is judged to be slight adverse effect.			
12	Users of the Kilkenny Road and Institute of Technology Carlow buildings would have medium sensitivity. Users of the filling station would have low sensitivity. Removal of part of the woodland to the south of the pumping station. Possible removal of section of existing stone wall along Kilkenny Road. The numbers of receptors affected would be many. The combination of partial change in view and many people affected the magnitude of the effect is judged to be moderate and long term. The combination of moderate sensitivity and moderate magnitude, the significance of the visual effect is judged to be moderate adverse effect.	Medium	Moderate	Moderate Adverse
13	Users of the Barrow Way and River Barrow would have high sensitivity. The removal of woodland near the Kilkenny Road pumping station would not be visible from this location when deciduous vegetation is in leaf, in winter months the removal of woodland would be barely noticeable in the view. The numbers of receptors affected would be few. The combination of barely noticeable change in view in winter months only and few people affected, the magnitude of the effect is judged to be negligible to no change. The combination of high sensitivity and negligible to no change magnitude, the significance of the visual effect is judged to be neutral effect.	High	Negligible	Neutral
14	Users of Kilkenny Road would have medium sensitivity. The clearance of some vegetation to accommodate the outfall route would be perceptible but change the overall balance of features comprising the view. The magnitude of the effect is judged to be minor on opening year. The combination of moderate sensitivity and minor magnitude, the significance of the visual effect is judged to be slight adverse effect on opening year, reducing to neutral as disturbed vegetation starts to regrow.	Medium	Minor	Neutral

15	Users of Kilkenny Road would have medium sensitivity. Once completed the gravity sewer would not be visible. The numbers of receptors affected would be none. The combination of no change in view and no people affected the magnitude of the effect is judged to be no change. The combination of moderate sensitivity and no change magnitude, the significance of the visual effect is judged to be neutral.	Medium	No Change	Neutral
16	Users of Green Road and Institute of Technology Carlow buildings would have medium sensitivity. Removal of part of the woodland to the south of the pumping station. Possible removal of section of existing stone wall along Kilkenny Road. The numbers of receptors affected would be many. The combination of partial change in view and many people affected the magnitude of the effect is judged to be moderate and long term. The combination of moderate sensitivity and moderate magnitude, the significance of the visual effect is judged to be moderate adverse effect.	Medium	Moderate	Moderate Adverse
17	Users of Kilkenny Road would have medium sensitivity. The WwTP development would be barely noticeable from this location; intervening vegetation and screen planting to the perimeter of the WwTP would screen the site. There would be barely noticeable change in view. The numbers of receptors affected would be few. The combination of barely noticeable change in view and few people affected the magnitude of the effect is judged to be negligible. The combination of medium sensitivity and negligible magnitude, the significance of the visual effect is judged to be neutral effect.	Medium	No Change	Neutral

The significance of the visual effect of the development during operation was judged as neutral from 13 viewpoints. This means the proposed development would be difficult to distinguish and/ or there would be barely perceptible change in view.

The significance of the visual effect of the development during operation was judged as slight adverse from 2 viewpoints. This means the proposed development would cause limited deterioration to the view.

The significance of the visual effect of the development during operation was judged as moderate adverse from 2 viewpoints. This means the proposed development would cause obvious deterioration to a view. The duration of effects during operation would be long term.

6.10 Do Nothing Scenario

In the absence of the proposed development the landscape of the area would likely change with additional suburban development over time.

Views and visual amenity would also likely change due to the likelihood of other suburban development proceeding over time.

6.11 Mitigation Measures

This section identifies mitigation measures to reduce any potential adverse effects, refer also to the landscape plan in Appendix 6-4.

- Hedge planting and natural recolonisation of woodland will be provided to replace the woodland removed south of Kilkenny Road Pumping Station.
- Any damage to existing stone walls at the Kilkenny Road Pumping Station will be made good.
- A comprehensive landscape scheme will be implemented at the WwTP site and to provide biodiversity enhancements.
- Tree and hedge planting will be provided to replace tree and hedges lost on Kilkenny Road due to the provision of shafts for the micro tunnelling works.

6.12 Residual Effects

Following the implementation of additional mitigation measures outlined in Section 6.11 above, there would be no significant adverse residual landscape and visual effects.

6.13 Monitoring Measures

The proposed landscape planting for the site should include an initial 3 year post completion establishment maintenance period. The success of planting establishment and landscape management on the site should be checked and reviewed on a regular basis to ensure successful long term establishment. For this reason a landscape management plan for the site should be undertaken.

6.14 Difficulties encountered during the preparation of this chapter

There were no difficulties encountered during the preparation of this chapter.



7. AIR QUALITY AND ODOUR

7.1 Introduction

This chapter evaluates the impact which the Proposed Development may have on Air Quality and Odour as defined in the Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022).

The chapter describes the potential impacts to ambient air quality and odour from the proposed upgrade to the Mortarstown Waste water Treatment Plant (WwTP) located in Mortarstown, Co. Carlow. Particular attention is given to the potential exposure of receptors to airborne pollutants resulting from the development and operation of the subject site. Sensitive receptors, including local business units and residential dwellings in the vicinity of the subject site have been included within the assessment. The proposed development is to upgrade and existing WwTP.

A full description of the existing and proposed facility upgrade is detailed in Chapter 2 of this EIAR.

The scope of the study consists of the following components:

- Review of background ambient air quality in the vicinity of the application area using available reference data generated by the EPA, site specific data and other referenced sources;
- Appraisal of site-specific baseline air quality monitoring data in the vicinity of the proposed plant;
- Identification of the significant substances likely to be released from the proposed plant during construction and when operational;
- Review of maximum emission levels of Odours and other relevant information needed to inform the dispersion modelling study for Odours;
- Detailed air dispersion modelling of Odours expected to be released during the existing and proposed operational phase;
- Identification of predicted ground level concentrations (GLC's) of Odours at the site boundary and at identified sensitive receptors in the local environment;
- Evaluation of the significance of these predicted concentrations of Air Pollutants and Odour, including consideration of whether these ground level concentrations are likely to exceed the ambient air quality standards and guidelines;
- Assessment of other potential air quality impacts such as construction dust and emissions from construction, operational phase traffic and operational process emissions associated with the proposed facility.

7.2 Policy, Guidelines and Legislation

7.2.1 Methodology

This chapter has been prepared in accordance with the Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022). Potential impacts have been described with regard to Table 3.3 of the guidelines.

The following legislation and policy guidance was used to inform the air quality and odour assessment and included:

- SI 739 of 2022, Air Quality Standards Regulations 2022,



- Air Guidance Note 4 (2020). Air dispersion modelling from Industrial Installations Guidance Note (AG4), EPA.
- TaLuft 2002 - First General Administrative Regulation Pertaining the Federal Immission Control Act (Technical Instructions on Air Quality Control, 2006),
- Guidance on the assessment of dust from demolition and construction,(2014), Institute of Air Quality Management (IAQM).

7.2.2 Criteria for Rating of Impacts

7.2.2.1 Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, National and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values for “Air Quality Standards” are health or environmental based levels for which additional factors may be considered. For example natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set (see Table 7.1).

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards, guideline and or limit values. The applicable standards in Ireland include the Air Quality Standards Regulations 2011, which incorporates European Commission Directive 2008/50/EC which has set limit values for the pollutants such as Oxides of nitrogen, Particulate matter (PM10), Carbon monoxide, Benzene and Sulphur dioxide relevant to the assessment. Council Directive 2008/50/EC combines the previous Air Quality Framework Directive (96/62/EC) and its subsequent daughter directives (including 1999/30/EC and 2000/69/EC) and also includes ambient limit values relative to PM2.5

The European Union (EU) has introduced several measures to address the issue of air quality management. In 1996, Environmental Ministers agreed a Framework Directive on ambient air quality assessment and management (Council Directive 96/62/EC). As part of the measures to improve air quality, the European Commission has adopted proposals for daughter legislation under Directive 96/62/EC.

The first of these directives to be enacted, 1999/30/EC, set limit values in April 2001 that replaced previous limit values that were set by Directives 80/779/EEC, 82/884/EEC and 85/203/EEC. This was again updated through the implementation of the Ambient Air Quality and Cleaner Air for Europe (CAFE) Directive 2008/50/EC. New limit values for sulphur dioxide, PM10, PM2.5 and nitrogen dioxide set by the CAFÉ Directive are detailed in Table 7.1.

The National Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002) transpose those parts of the “Framework” Directive 96/62/EC on ambient air quality assessment and management not transposed by the EPA Act 1992 (Ambient Air Quality Assessment and Management) Regulations 1999 (S.I. No. 33 of 1999). The 2002 Regulations also transpose, in full, the 1st two “Daughter” Directives 1999/30/EC relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air, and 2000/69/EC relating to limit values for benzene and carbon monoxide in ambient air.

Council Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe has revised and combined several existing Ambient Air Quality Standards including Council Directives 96/62/EC, 1999/30/EC and 00/69/EC. With regard to existing ambient air quality standards, it will not modify the standards but will strengthen existing provisions to ensure that non-compliances are removed. It does however set a new ambient standard for PM2.5. With regard to PM2.5, the proposed approach is to establish a limit value of 25 µg/m³, as an annual average (to be attained by 2015), coupled with a non-binding target to reduce human exposure generally to PM2.5 between 2010 and 2020. This exposure reduction target is currently proposed at 20% of the



average exposure indicator (AEI). The AEI is based on measurements taken in urban background locations averaged over a three-year period.

In 2011, SI 271 of 2002, Air Quality Standards Regulations 2002 was replaced with SI 180 of 2011, Air Quality Standards Regulations 2011 which transposes 2008/50/EC into Irish law.

In 2022, SI 180 of 2011, Air Quality Standards Regulations 2011 was replaced with SI 739 of 2022, Air Quality Standards Regulations 2022.

Table 7-1 - Ambient Air Quality Standards and guideline limit values for Air pollutants considered in this assessment

Parameter	Directive Regulation	/ Limit Type	Value
Nitrogen Dioxide	2008/50/EC and SI 180 of 2011	Hourly limit for protection of human health – not to be exceeded more than 18 times/year-1 hour average	200 µg/m³ NO2
		Annual limit for protection of human health- Annual	40 µg/m³ NO2
		Annual limit for protection of vegetation-Annual	30 µg/m³ NO + NO2
Particulate Matter as PM ₁₀	2008/50/EC and SI 180 of 2011	24-hour limit for protection of human health – not to be exceeded more than 35 times/year-24 hour average	50 µg/m³ PM ₁₀
		Annual limit for protection of human health- Annual	40 µg/m³ PM ₁₀
Particulate matter as PM _{2.5}	2008/50/EC and SI 180 of 2011	Annual limit for protection of human health- Annual	25µg/m³ PM _{2.5}
Benzene	2008/50/EC and SI 180 of 2011	Annual limit for protection of human health	5 µg/m³
Odours	EPA AG4 Guidance and Uisce Eireann Standards	1 hr limit for the prevention of odour impact	Less than 3.0 OUE/m³ worst case met year
Total depositional dust (TDD)	TaLuft / EPA Guidelines	Daily limit averaged over 1 month to minimise nuisance dust at receptor	350 mg/m²/day

7.2.2.2 Dust Deposition Guidelines

The concern from a health perspective is focused on particles of dust which are less than 10µm in size and the EU ambient air quality standards outlined in Section 7.2.2 have set ambient air quality limit values for PM10 and PM2.5.

With regard to larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction and operational phase of a development in Ireland.

However, guideline for dust deposition, the German TA-Luft standard for dust deposition (non-hazardous dust) (German VDI, 2002) sets a maximum permissible emission levels for dust deposition of 350 mg/m²/day averaged over a one-month monitoring period at any receptor outside the site boundary. Recommendations from the Department of the Environment, Health and Local Government (DOEHLG, 2004) apply the Bergerhoff limit of 350 mg/m²/day to the site boundary for quarries. This limit value can be implemented with regard to dust impacts from construction and operational phase of the Proposed Development.

This limit value of 350 mg/m²/day has also been incorporated into Environmental Management in the Extractive Industry (Non-Scheduled Minerals) (EPA, 2006) and the Irish Concrete Federation Environment Code (ICF, 2005).

7.2.3 Construction phase

7.2.3.1 Air Quality

There is the potential for a number of emissions to the atmosphere during the construction phase of the proposed development. In particular, the construction and demolition activities may generate quantities of dust and classical air pollutants in the immediate region of the construction activities and along the route of the haulage trucks. Potential impacts are assessed in Section 7.6 using the relevant assessment criteria outlined in Section 7.3.1

7.2.4 Operational Phase

7.2.4.1 Air Quality

The assessment methodology as a result of impacts associated with traffic involves air dispersion modelling using the UK Design Manual for Roads and Bridges Screening Model (UK Highways Agency, DEFRA, 2007) (Version 1.03c, July 2007), the NOX to NO2 Conversion Spreadsheet (UK DEFRA, 2016) (Version 6.1), and following guidance issued by Transport Infrastructure Ireland (TII, 2011), UK Highways Agency (2007), UK Department for Environment, Food and Rural Affairs (2018) and the EPA (2017 Draft; 2015 Draft).

Transport Infrastructure Ireland guidance states that the assessment must progress to detailed modelling if:

- Concentrations exceed 90% of the air quality limit values when assessed by the screening method; or
- Sensitive receptors exist within 50m of a complex road layout (e.g. grade separated junctions, hills, etc.).

In order to determine which road links need inclusion in the local air quality assessment, they must meet one or more of the following criteria. This criterion is stipulated in the UK Design Manual for Roads and Bridges guidance (UK Highways Agency, 2007), on which Transport Infrastructure Ireland guidance (2011) was based on Proposed Development.

- Road alignment change of 5 m or more,



- Daily traffic flow changes by 1,000 AADT or more,
- HGV flows change by 200 vehicles per day or more,
- Daily average speed changes by 10 km/h or more, or
- Peak hour speed changes by 20 km/h or more.

None of the road links impacted by the Proposed Development satisfy any of the criteria outlined above; therefore no assessment using the DMRB model was required for the Proposed Development. For completeness, this was completed and included in the overall impact assessment on Air quality for both Construction and Operational phase traffic.

With regards to process-based emissions namely Odours during the operational phase, detailed dispersion modelling in accordance with EPA Guidance AG4 was utilised in conjunction with specified emission limit value for the existing and proposed facility design. This was utilised to assess the potential air quality impacts associated with process operation for Odours at the facility.

7.3 Characteristics of the Proposed Development

A detailed description of the proposed development is presented in Chapter 2 of the EIAR.

7.4 Receiving Environment

7.4.1 Sensitive receptors

With regards to the sensitive receptors utilised within the Air quality and Odour chapter. Any houses and commercial developments within a 1.0 km of the site is considered in the assessment for air quality pollutants and odours outlined in Section 7.2.2 of the EIAR. Residents living in proximity to the development can potentially be affected by outlined pollutants especially odours. With regards to the Air dispersion modelling for odours only, computations of odour concentration were carried out at each Cartesian grid receptor location that is predicted to be exceeded for 2% (175 hours of exceedance) over 5 years of screened hourly Sequential meteorological data (Oak Park 2016 to 2020).

The Cartesian receptor grid was 20 and 200m spaced given a total receptor number of 589 over an area of 4 km².

Other Chapter studies or elements of the other chapters (e.g. climate) can consider a wider study area as appropriate and sensitive receptors as outlined within.

In order to comply with the requirements of EPA Guidance AG4, 27 nearby flagpole receptors are also identified in the assessment in order to present worst case impact associated with odours in close proximity to the site boundary, These receptor location are presented in Figure 7 -1 and Table 7-2.



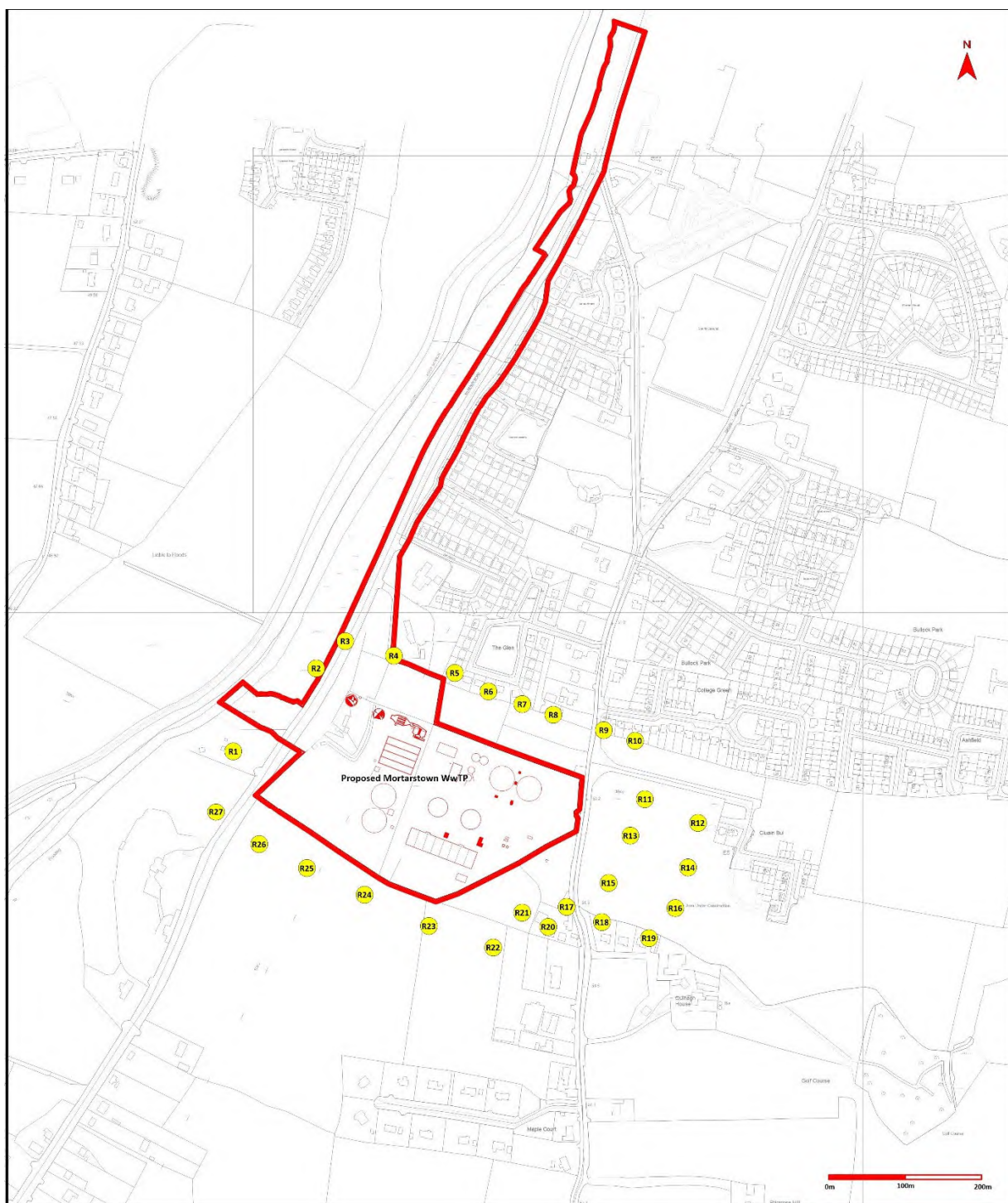


Figure 7 -1 - Proposed Mortarstown Waste water treatment facility layout, relative location of sensitive receptors (Note: receptors in a cartesian grid at 20 m and 200m spacing were included over 4 km2) and odour sources located within the boundary of the facility

Table 7-2 - Residential sensitive receptors in the vicinity of subject site

Receptor Identity	X Coordinate (m)	Y Coordinate (m)
R1	671109	674858
R2	671218	674967
R3	671256	675002
R4	671320	674983
R5	671400	674961
R6	671444	674936
R7	671488	674920
R8	671529	674906
R9	671595	674886
R10	671636	674872
R11	671649	674795
R12	671719	674763
R13	671630	674747
R14	671706	674705
R15	671601	674685
R16	671689	674652
R17	671546	674654
R18	671593	674634
R19	671654	674613
R20	671522	674628
R21	671488	674646
R22	671450	674601
R23	671366	674628
R24	671281	674669
R25	671206	674704
R26	671143	674735
R27	671087	674778



7.4.2 Meteorological Data / Climate

A key factor in assessing temporal and spatial variations in air quality is the prevailing meteorological conditions. Depending on wind speed and direction, individual receptors may experience very significant variations in pollutant levels under the same source strength (i.e. traffic levels) (WHO, 2006). Wind is of key importance in dispersing air pollutants and for ground level sources, such as traffic emissions and stationary sources, pollutant concentrations are generally inversely related to wind speed. Thus, concentrations of pollutants derived from traffic and stationary based sources will generally be greatest under very calm conditions and low wind speeds when the movement of air is restricted. In relation to PM₁₀, the situation is more complex due to the range of sources of this pollutant. Smaller particles (less than PM_{2.5}) from traffic sources will be dispersed more rapidly at higher wind speeds. However, fugitive emissions of coarse particles (PM_{2.5} to PM₁₀) will actually increase at higher wind speeds. Thus, measured levels of PM₁₀ will be a non-linear function of wind speed.

The nearest representative synoptic weather station collating detailed weather records is Oak Park meteorological station, which is located approximately 7 km north north-east of the site. Oak Park met data has been examined to identify the prevailing wind direction and average wind speed over a five-year period (see Figure 7-2). For data collated during the five representative years (2016 to 2020) (Met Eireann, 2021), the predominant wind direction is westerly, south westerly and southerly, with general moderate wind speeds averaging 4 to 5 m/s for the period 2016 to 2020 (source, www.met.ie).

Long term 30-year averages can be obtained from Kilkenny Met station which is located circa 35 Km south west of the subject site. Mean monthly wind speed over the 30-year average ranged from 3.0 to 4.2 m/s. Mean monthly temperatures over the 30-year period ranges from 8.2 Deg C in winter to 20.3 Deg C in Summer. Mean monthly rainfall across the 30-year averages range from 54.6 to 90.4 mm/month.

Poor dispersion can occur under certain weather characteristics known as inversions that form in very light or calm wind and stable atmospheric conditions. The wind roses presented in Figure 7-2 identifies that such wind conditions are very infrequent (<0.10% of hours in the years 2016 to 2020, inclusive).

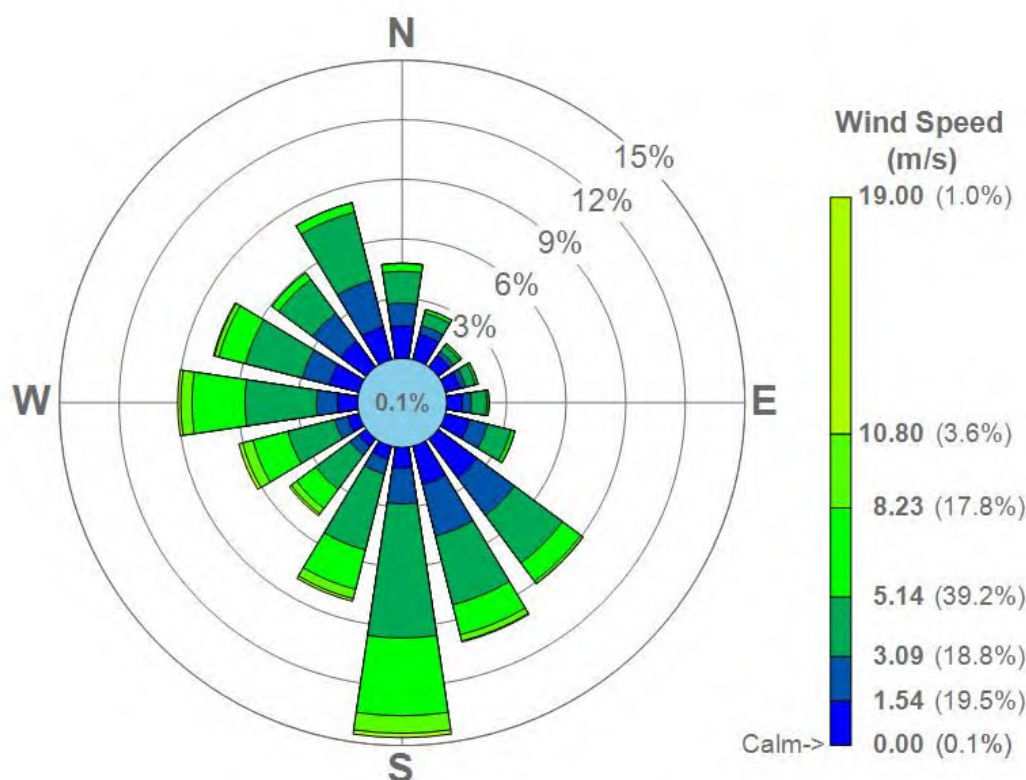


Figure 7-2 - Graphical representation of hourly meteorological data Oak Park 2016 to 2020 (www.met.ie)

7.4.3 Baseline Air Quality

The EU Air Framework Directive deals with each EU Member State in terms of 'Zones' and 'Agglomerations' for air quality. For Ireland, four zones, A, B, C and D have been defined and are included in the Air Quality Standards (AQS) Regulations (SI No 180 of 2011).

- Zone A – Dublin conurbation
- Zone B – Cork conurbation
- Zone C – 21 towns in Ireland with population > 15,000
- Zone D – remaining area of Ireland

Mortarstown and its environs are classified for the purposes of this assessment as falling within Zone C. While there is some availability of recent and historic data for air quality in major urban and rural areas, there is no data available from the national air quality monitoring database for air quality specific to Mortarstown. As such, available data from the EPA Monitoring Site located in a Zone C area has been referenced for Nitrogen Oxides, Benzene and PM10 and PM2.5 levels (see Table 7-3) and is considered representative of background air quality in the study area.

In addition, site specific baseline data was collected at 4 monitoring locations for Oxides of nitrogen, Sulphur dioxide, Particulate matter 10 μm and 2.5 μm between May and June 2025 (see Table 7-3 & Figure 7-3). In addition, baseline Total depositional dust and Odour monitoring was performed within the boundary of the site from 2022 to 2025 (see Table 7-13). The results of data collation are presented on Table 7-3. The baseline odour monitoring data is contained in Table 7-3.

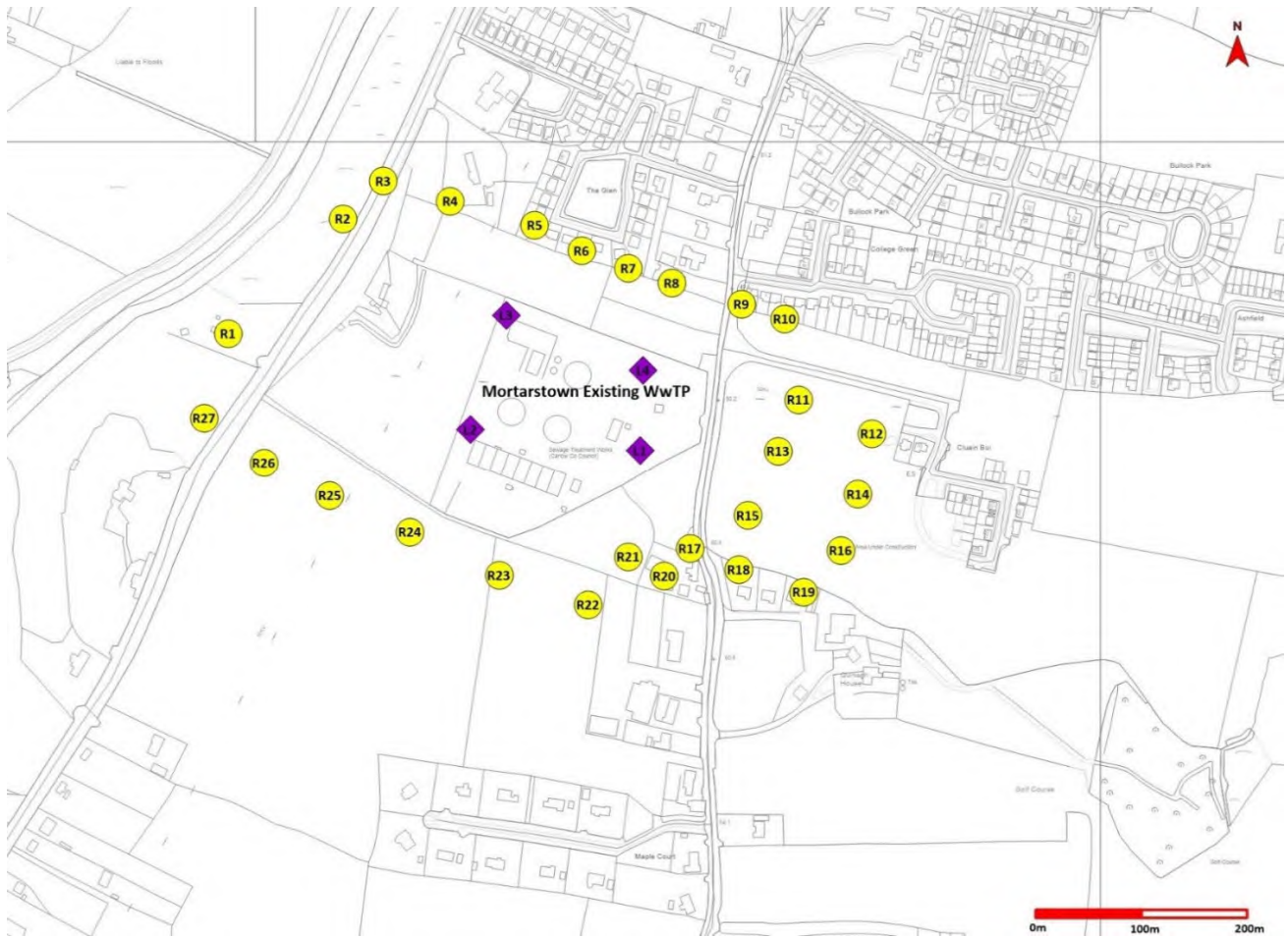


Figure 7-3 Location map of ambient air quality monitoring locations within the existing facility site boundary.

Table 7-3 - EPA and reference site specific air quality data for Years 2022, 2023, 2024 and 2025

			Yr. 2022		Yr. 2023		Yr. 2024		Site specific data – Yr. 2025		
Parameter unless stated	Zone otherwise	C	Average conc	Maximum conc	Average conc	Maximum conc	Average conc	Maximum conc	Average conc	Maximum conc	Notes
Oxides of nitrogen Annual average (µg/m³)			12	21	12	22	12.6	21.3	-	-	Air quality in Ireland Reports 2022, 2023, 2024
Sulphur dioxide Annual average (µg/m³)			3.80	4.70	3.53	4.50	6.5	11.7	-	-	
Carbon monoxide 8 hr average (µg/m³)			200	200	300	300	200	200	-	-	
Particulate matter 10µm (µg/m³)			13.27	20.00	12.00	16.40	11.9	16	-	-	
Particulate matter 2.5µm (µg/m³)			9.47	19.80	7.75	12.30	8.0	12.2	-	-	
Benzene Annual average (µg/m³)			0.46	0.46	0.60	0.60	0.3	0.3	-	-	
Oxides of nitrogen (µg/m³)			-	-	-	-	-	-	3.11	3.42	Monitoring locations L1 to L4 15/05/2025 to 12/06/2025
Sulphur dioxide (µg/m³)			-	-	-	-	-	-	<1.58	1.58	
Particulate matter 10µm (µg/m³)			-	-	-	-	-	-	18.4	20.2	
Particulate matter 2.5µm (µg/m³)			-	-	-	-	-	-	8.4	9.6	
Benzene (Zone A) (µg/m³)			-	-	-	-	-	-	0.25	0.27	
Total depositional dust (mg/m²/day)			-	-	-	-	-	-	141	198	

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AtkinsRéalis - Baseline / Référence

7.4.3.1 Oxides of nitrogen

Nitrogen is a constituent of both the natural atmosphere and of the biosphere. When industrial metabolism releases nitrogen to the environment it is considered a "pollutant" because of its chemical form: NO, NO₂, and N₂O. In the transportation sector, NO_x emissions result from internal combustion engines. In power plants and industrial sources, NO_x is produced in boilers. The overwhelming fraction of nitrogen oxide emissions arises from the high temperature combustion of fossil fuels; emissions from metal-processing plants and open-air burning of biomass. Nitrogen dioxide is classed as both a primary pollutant and a secondary pollutant. As a primary pollutant NO₂ is emitted from all combustion processes (such as a gas/oil fired boiler or a car engine). Potentially, the main source of primary NO₂ for the proposed development will be from process emissions from the proposed stacks and vehicle/machinery exhausts.

Continuous monitoring carried out at rural background and site-specific stations indicate an average annual mean concentrations ranging from 12 and 22 µg/m³ in 2022, 2023 and 2024 (see Table 7-3) (EPA, 2022, 2023, 2024). Site specific data measured on site between May and June 2025 ranged between 3.11 and 3.42 µg/m³. Sufficient data is available for all stations to observe trends over the periods 2022 to 2025. An analysis of the data suggests upper max average concentrations of no more than 12 µg/m³. Based on these results, a conservative estimate of the background annual average NO₂ concentration in the region of the proposed development is 12 µg/m³.

7.4.3.2 Sulphur dioxide

Sulphur dioxide is a colourless gas, about 2.5 times as heavy as air, with a suffocating faint sweet odour. It occurs in volcanic gases and thus traces of sulphur dioxide are present in the atmosphere. Other sources of SO₂ include smelters and utilities, electricity generation, iron and steel mills, petroleum refineries, pulp and paper mills, metallurgical processes, chemical processes and the combustion of iron pyrites, which is often present in coal. Small sources include residential, commercial and industrial space heating.

Continuous monitoring carried out at rural background and site-specific stations indicate an average annual mean concentrations ranging from 3.8 and 11.7 µg/m³ in 2022, 2023 and 2024 (see Table 7-3) (EPA, 2022, 2023, 2024). Site specific data measured on site between May and June 2025 ranged between <1.58 to 1.58 µg/m³. Sufficient data is available for all stations to observe trends over the periods 2022 to 2025. An analysis of the data suggests upper max average concentrations of no more than 6.5 µg/m³. Based on these results, a conservative estimate of the background annual average SO₂ concentration in the region of the proposed development is 6.5 µg/m³.

7.4.3.3 Carbon monoxide

Carbon monoxide is produced as a result of incomplete burning of carbon-containing fuels including coal, wood, charcoal, natural gas, and fuel oil. It can be emitted by combustion sources such as un-vented kerosene and gas heaters, furnaces, woodstoves, gas stoves, fireplaces and water heaters, automobile exhausts, etc.

Carbon monoxide interferes with the distribution of oxygen in the blood to the rest of the body. If large amounts are inhaled, this gas can impede coordination, worsen cardiovascular conditions, and produce fatigue, headache, weakness, confusion, disorientation, nausea, and dizziness. Very high levels can cause death. The symptoms are sometimes confused with the flu or food poisoning. Foetuses, infants, elderly, and people with heart and respiratory illnesses are particularly at high risk for the adverse health effects of carbon monoxide.

Continuous monitoring carried out at rural background stations indicate an average annual mean concentrations ranging from 200 to 300 µg/m³ in 2022, 2023 and 2024 (see Table 7-3) (EPA, 2022, 2023, 2024). Sufficient data is available for all stations to observe trends over the periods 2022 to 2024. An analysis of the data suggests upper max average concentrations of no more than 300 µg/m³. Based on these results, a conservative estimate of the background annual average CO concentration in the region of the proposed development is 300 µg/m³.

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7.4.3.4 PM10 and PM2.5

Major sources of particulates include industrial/residential combustion and processing, energy generation, vehicular emissions and construction projects. The particulate matter created by these processes is responsible for many adverse environmental conditions including reduced visibility, contamination and soiling, but also recognised as a contributory factor to many respiratory medical conditions such as asthma, bronchitis and lung cancer. PM₁₀ and PM_{2.5} refers to particulate matter with an aerodynamic diameter of 10 and 2.50 µm, respectively. Generally, such particulate matter remains in the air due to low deposition rates. Particulate matter is of concern in Europe and air quality limits have been set for both PM₁₀ and PM_{2.5}.

Continuous monitoring carried out at rural background and site-specific stations indicate an average annual mean PM₁₀ concentrations ranging from 11.9 and 20 µg/m³ in 2022, 2023 and 2024 (see Table 7-3) and average annual mean PM_{2.5} concentrations ranging from 7.75 and 19.8 µg/m³ in 2022, 2023 and 2024 (EPA, 2022, 2023, 2024). Sufficient data is available for all stations to observe trends over the periods 2022 to 2024. An analysis of the data suggests upper max average concentrations of no more than 13.27 µg/m³ and 9.47 µg/m³ for PM₁₀ and PM_{2.5}, respectively. Based on these results, a conservative estimate of the background annual average SO₂ concentration in the region of the proposed development is 13.27 µg/m³ and 9.47 µg/m³ for PM₁₀ and PM_{2.5}, respectively.

7.4.3.5 Benzene

The sources associated with individual volatile organic compounds (VOCs) tend to be dependent on the nature of industries in a region. Methane is a naturally occurring VOC derived from plants and animals; it is also generated as a by-product of certain industries. Benzene and other aromatic/alkanes are most often derived from petrol driven vehicle exhausts. Heavier semi-volatile organic compounds are frequently derived from diesel-powered engines.

Continuous monitoring carried out at rural background and site-specific stations indicate an average annual mean concentrations ranging from 0.30 and 0.60 µg/m³ in 2022, 2023 and 2024 (see Table 7-3) (EPA, 2022, 2023, 2024). Site specific data measured on site between May and June 2025 ranged between 0.25 and 0.27 µg/m³. Sufficient data is available for all stations to observe trends over the periods 2022 to 2025. An analysis of the data suggests upper max average concentrations of no more than 0.60 µg/m³. Based on these results, a conservative estimate of the background annual average NO₂ concentration in the region of the proposed development is 0.60 µg/m³.

7.4.3.6 Total depositional dust

Total dust deposition was measured at the site using Bergerhoff gauges specified in the German Engineering Institute VDI 2119 entitled "Measurement of Dustfall Using the Bergerhoff Instrument (Standard Method)." Samples were collected at four locations (i.e. L1 to L4) over a 30-day period, as shown in Figure 7.3 The purpose of these monitors is to assess the baseline total depositional dust impact within the existing site boundary. The results are presented in Table 7.3.

Currently in Ireland there are no statutory limits for dust deposition, however, EPA guidance suggest, "a soiling of 10mg/m²/hour is generally considered to pose a soiling nuisance" (TA Luft 2002). This equates to 240mg/m²/day of Total Depositional Dust. The EPA recommend a maximum level of 350mg/m²/day of dust deposition when measured according to TA Luft standard, which includes both soluble and insoluble matter (i.e. EPA compliance monitoring is based on the TA Luft Method). This value was not exceeded at any of the sample locations with all measured values at least 43% lower than the maximum recommended limit value.



7.4.4 Sensitivity of the Receiving Environment

In line with the UK Institute of Air Quality Management (IAQM) guidance documents “Significance in air quality Nov 2009 and Guidance on the Assessment of Mineral Dust Impact for Planning” (2016) prior to assessing the impacts of air pollutants from a Proposed Development, the sensitivity of the area must first be assessed as outlined below.

With regards to dust nuisance both receptors sensitivity and proximity to proposed works area are taken into consideration. For the purposes of this assessment, high sensitivity receptors are regarded as residential properties and areas of amenity where people are likely to spend the majority of their time.

In terms of receptor sensitivity to dust spoiling, there are a number of sensitive receptors located less than 100 m from the proposed facility (see Figure 7.1). Based on the IAQM criteria outlined in Table 7.4, the worst-case sensitivity of the area to dust spoiling is considered to be **Medium**.

Table 7-4 - Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor sensitivity	Number of receptors	Distance from source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

In addition to sensitivity to dust spoiling, the IAQM guidelines also outline the assessment criteria for determining the sensitivity of the area to human health impacts. The criteria take into consideration the current annual mean PM₁₀ concentration, receptors sensitivity based on type (residential receptor are classified as sensitive) and the number of receptors affected within various distance bands from the works. A conservative estimate of the current annual mean PM₁₀ concentration in the vicinity of the Proposed Development is estimated to be 13.27 µg/m³ and there are between 10-100 sensitive receptors located less than 50 m from the proposed development works. Based on the IAQM criteria outlined in Table 7.5, the worst-case sensitivity of the area to human health is considered **Low**.

Table 7-5 - Sensitivity of the Area to Human Health Impacts

Receptor sensitivity	Annual Mean PM ₁₀ Concentration	Number of receptors	Distance from source (m)			
			<20	<50	<100	<200
High	<24 µg/m ³	>100	Medium	Low	Low	Low
		10-100	Low	Low	Low	Low
		1-10	Low	Low	Low	Low



Medium	<24 µg/m ³	>10	Low	Low	Low	Low
		1-10	Low	Low	Low	Low
Low	<24 µg/m ³	>1	Low	Low	Low	Low

With regards to describing the impact magnitude for change in ambient air pollutant concentrations as a percentage of Objective / Limit value / Environmental Assessment Level, this can be described depending on the magnitude of change. Table 7.6 presents the different categories associated with this description (IAQM, 2009).

Table 7-6 - Generic Basis of Definition of Impact Magnitude for Changes in Ambient Pollutant Concentrations as Percentage of Objective/Limit Value/Environmental Assessment Level

Magnitude of change	Annual Mean
Large	Increase / Decrease >10%
Medium	Increase / Decrease 5 - 10%
Small	Increase / Decrease 1 - 5%
Imperceptible	Increase / Decrease <1%

7.5 Potential Effects of the Development

7.5.1 'Do Nothing'

The baseline survey undertaken as part of this assessment suggests that air quality associated with Oxides of nitrogen, Sulphur dioxide, Carbon monoxide, Particulate matter 10µm and 2.5µm, Benzene, and Total depositional dust in the vicinity of the application area is expected to be good with typical levels of pollutants for the study area. All classical air pollutant levels are within the relevant Irish and EU limits.

With regards to Odours, the impact associated with the existing facility is in excess of the guideline limit value of less than or equal to 3.0 OUE/m³ for the 98th percentile of hourly averages for the worst case meteorological year. In the event that the development does not proceed it is likely that air quality will remain the same and/or slightly disimprove in years to come as a result of increased loading on the existing WwTP (i.e. especially with regards to Odours).

7.5.2 Construction Phase

7.5.2.1 Direct

The following sections describe the potential impacts to air quality resulting from the construction phase of the proposed plant. The impacts have been assessed on a local scale to determine impacts on human health and ecological receptors. The aspects considered include:

- Dust as a result of Demolition works. The total estimated volume of demolition material is 876 m³;



- Dust as a result of excavation material. The total estimated volume of excavation will be 88,500 m³;
- Dust as a result of haulage of excavated material from the site;
- Dust as a result of Construction activities on the site and its potential to impact on sensitive receptors and to cause an environmental nuisance;

The impacts are assessed in the following sections with respect to the relevant assessment criteria where appropriate.

7.5.2.2 Construction Dust

There is potential impact on air quality during the construction phase of the Proposed Development from excavation, demolition and construction dust emissions and the potential for nuisance dust.

In order to determine the level of dust mitigation required during the proposed works, the potential dust emission magnitude for each dust generating activity needs to be taken into account, in conjunction with the previously established sensitivity of the area (see Section 7.5.4).

The major dust generating activities are divided into four types within the IAQM guidance to reflect their different potential impacts. These are:

- Site preparation / restoration (including soil and overburden handling);
- Material extraction/excavation;
- On-site transportation (haul roads);
- Material processing (e.g. crushing and screening);
- Stockpiling / exposed surface; and
- Off-site transportation (e.g. leading to track out onto external road network).

While construction dust tends to be deposited within 200m of a construction site, the majority of the deposition occurs within the first 50 m. The extent of any dust generation depends on the nature of the dust (soils, peat, sands, gravels, silts, etc.) and the nature of the construction activity. In addition, the potential for dust dispersion and deposition depends on local meteorological factors such as rainfall, wind speed and wind direction and the relative location of receptor to the site activities.

It is important to note that the potential impacts associated with the construction phase of the Proposed Development are short-term in nature (associated with excavation and construction within the development). When the dust minimisation measures detailed in the mitigation section (see Section 7.5) of this chapter are implemented, fugitive emissions of dust from the site will not be significant and will pose no nuisance at nearby receptors.

Table 7.7 presents the distances within which dust could be expected to result in a nuisance from construction sites for impacts such as soiling (dust nuisance), PM₁₀ deposition and vegetation effects. This data has been taken from the National Roads Authority (NRA) *Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes* and is considered a worst-case assessment. These distances present the potential for dust impact with standard mitigation in place.

Details of proposed mitigation measures to be implemented as part of the construction phase of the proposed development will also be presented in the CEMP.

Table 7-7 - Assessment criteria for the impact of dust from construction, with standard mitigation in place

Source		Potential distance for significant effects (distance from source)		
Scale	Description	Soiling	PM ₁₀	Vegetation effects
Major	Large construction sites with high use of haul roads	100m	25m	25m
Moderate	Moderate sized construction sites with moderate use of haul roads	50m	15m	15m
Minor	Minor construction sites with minor use of haul roads	25m	10m	10m

Source: National Roads Authority, 2006.

The construction phase of this proposal is deemed for the purposes of this assessment to be of a minor scale. Using this screening assessment tool, at a minor construction site there is a risk that dust may cause an impact at sensitive receptors within 25m of the source of the dust generated. The nearest residential sensitive receptor to the centre of the subject sites is located at a distance of over 80m from the activity area, therefore, the impact from construction activities can be considered to be imperceptible.

All sensitive habitats are located at a distance greater than 50m from the emission source as a result the impact on habitats will be imperceptible.

Site preparation, Stockpiling and Material extraction/excavation

Site preparation and extraction primarily involves excavating materials, loading and unloading of materials, tipping and stockpiling activities. Activities such as levelling the site and landscaping works are also considered under this category. The dust emission magnitude can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

Large: Total site area >10,000 m², potentially dusty soil type (e.g. clay which will be prone to suspension when dry due to small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds > 8 m in height, total material moved > 100,000 tonnes;

Medium: Total site area 2,500 – 10,000 m², moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4-8 m high, total material moved 20,000 – 100,000 tonnes;

Small: Total site area <2,500 m², soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds < 4 m high, total material moved <20,000 tonnes, earthworks during the wetter months.

The dust emission magnitude for the proposed activities can be classified as Medium and this is considered a conservative estimate given the works to be completed on the site and the site will not involve any blasting of materials.

The sensitivity of the area, as determined in Section 7.4.4 is combined with the dust emission magnitude for each dust generating activity to define the risk of dust impacts in the absence of mitigation. As outlined in Table 7.8, this results in an overall **Medium risk** of temporary dust soiling impacts and an overall **Medium risk** of temporary human health impacts as results of the proposed works.



Table 7-8 - Risk of Dust Impacts - Earthworks

Sensitivity of area	Dust emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Low Risk

Onsite and Offsite transportation

Factors which determine the dust emission magnitude are vehicle size, vehicle speed, number of vehicles, road surface materials and duration of movement. Dust emission magnitude from track-out can be classified as small, medium or large based on the definitions from the IAQM guidance as transcribed below:

Large: > 50 HGV (>3.5t) outward movement in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length > 100m;

Medium: 10-50 HGV (>3.5 t) outwards movement in any one day, moderately dusty surface materials (e.g. high clay content), unpaved road length 50 – 100m;

Low: <10 HGV (>3.5 t) outwards movements in any one day, surface material with low potential for dust release, unpaved road length <50 m.

The dust emission magnitude for the proposed track out can be classified as Medium.

The sensitivity of the area is combined with the dust emission magnitude for each dust generating activity to define the risk of dust impacts in the absence of mitigation. As outlined in Table 7.9, this results in an overall **Medium Risk** of dust soiling impacts and an overall **Medium Risk** of human health impacts as a result of the proposed site transportation activities.

Table 7-9 - Risk of Dust Impacts – Onsite / Off site transportation

Sensitivity of area	Dust emission Magnitude		
	Large	Medium	Small
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible Risk



7.5.3 Summary of Dust Emission Risk

The risk of dust impacts as a result of the Proposed Development are summarised in Table 7.10 for each activity. The magnitude of risk determined is used to prescribe the level of site-specific mitigation required for each activity in order to prevent significant impacts occurring.

Overall, in order to ensure that no dust nuisance occurs during the various activities, a range of dust mitigation will be implemented to ensure the dust risk matrix is considered Low risk. When the dust mitigation measures detailed in the mitigation section of this chapter (see Section 7.5) are implemented, fugitive emissions of dust from the site will be **insignificant** and pose no nuisance at nearby receptors.

Table 7-10 - Summary of Dust Impact Risk used to Define Site Specific Mitigation

Potential Impact	Dust Emission Magnitude				
	Site preparation	Stockpiling	Material extraction / excavation / Demolition	Onsite / Offsite transportation	Material Processing
Dust Soiling	Medium Risk	Medium Risk	Medium Risk	Medium Risk	Low Risk
Human health	Medium Risk	Medium Risk	Medium Risk	Medium Risk	Low risk

High level mitigation is discussed in Section 7.5 with regards to Dust. The effects of these mitigation strategies will be closely monitored and maintained to obtained the stated dust deposition limit value of less than 350 mg/m²/day stated in Table 7-1.



7.5.4 Air Quality – Classical Air Pollutants

Emissions associated with construction traffic can impact on local air quality. In particular, the proposed routes used for operation of the facility and any sensitive receptors that line these routes may experience impacts to local air quality. The potential impact of construction / operational traffic associated with this proposal was estimated as a worst case Annual Average Daily Traffic (AADT) scenario of 250 (which is in excess of the expected peak AADT so as to assume worst case potential impact and air quality risk) with a mean traffic speed of 20km/hr (which again is worst case scenario as typical speed would be 50 km/hr). The detailed results of the modelling exercise are presented in Table 7.11.

Table 7-11 - Predicted contribution of air pollutants to baseline air quality as a result of construction traffic

Link location	Carbon monoxide Annual mean (µg/m³)	Benzene Annual mean (µg/m³)	Oxides of nitrogen Annual mean (µg/m³)	Particulate matter 10µm	
				Annual mean (µg/m³)	Days > 50 (µg/m³)
Worst case receptor 5m from road centreline on any roadway	<0.06	<0.05	<0.38	<0.14	0

The IAQM (2009) provided a generic basis of definition of impact magnitude for changes in ambient pollutant concentrations as a percentage of Objective/Limit value. Within this table (see Table 7.6) they defined the magnitude of change versus the increase/decrease in annual mean percentage.

When considering the increase in the annual mean and comparison of the % contribution to the ambient air quality limit value for each classical air pollutant, the magnitude of change can be considered **Imperceptible** and **Negligible**.

7.5.4.1 Indirect

There are no indirect emissions to air associated with construction.

7.5.5 Operational Phase

Air quality impacts may arise from process-based emissions and traffic movements associated with the operational phase of the proposed plant. Traffic based air quality emissions will result from traffic making deliveries and collections to and from the proposed plant and employee traffic movements.

7.5.5.1 Direct

7.5.5.1.1 Traffic

The detailed information provided in the Traffic and Transport assessment (see Chapter 10 of the EIAR) has been used to identify whether any significant impact on sensitive receptors will occur. The traffic information has been inputted into the Design Manual for Roads and Bridges (DMRB), Volume 11 (ver. 1.03c) model. This model was prepared by the United Kingdom Department of Transport, the Scottish Office of Industrial

Development, the Welsh Office and the Department of Environment for Northern Ireland as a screening tool to assess worst-case air quality impact associated with traffic movements.

The screening model uses a worst-case scenario in calculating emissions. The emission factors used for each pollutant are intentionally set to be biased and to overestimate the actual emission rate. In addition, wind speeds are assumed to be 2 ms^{-1} (approximately 3.90 knots compared to a mean wind speed of between 4 to 5 ms^{-1} at the nearest Met station (Oak Park Met Station)). Emission rates predicted as a result of traffic are added to the cumulative emissions generated by the proposed plant's scheduled emission points and baseline data. This is considered a worst-case assessment of likely impact. It can therefore be assumed with confidence that traffic related air pollution will not arise if the model does not identify any issues.

Traffic figures have been assessed using Annual Average Daily Traffic (AADT) figures. The Heavy Goods Vehicle (HGV) percentage was taken from the traffic assessment. As the average speed of vehicles has a significant effect on the generation of pollutants, calculations are carried out at a worst-case traffic speed scenario. The speed used is 20 km hr^{-1} , to represent gridlock conditions so as to assess the worst-case scenario. In addition, it was assumed within the model that the sensitive receptor was located within 5m of the road centreline, again to represent worst case conditions.

7.5.5.1.2 Output Data from Traffic Air Quality Model

Table 7.12 presents the results of the worst-case conservative traffic air quality modelling data, performed in order to ascertain the likely air quality impact as a result of a change to traffic patterns generated during the operational phase of the subject site.

As can be observed, there is no significant increase in the air quality impact of named pollutants as a result of increased traffic numbers in 2029 as a result of the development with only a slight increase occurring in pollutant concentration predicted 5m from the road centreline.

Based on the IAQM (2009) guidance document, impacts of air quality can be considered **Negligible** and **Imperceptible** (see Table 7.6). With regards to human health impacts, all parameters remain well within the Air Quality Limit values contained in Table 7.1 for the protection of human health and thus impacts can be considered **Negligible** to both the environment and human health.

Table 7-12 - Predicted contribution of air pollutants as a result of operation traffic, do-nothing (2023) and do-something scenario (2023)

Year	Worst case Assessment location	
	Worst case junction	
Emissions as a result of operational phase traffic 2029 Opening Year – Do something	Carbon monoxide Annual mean ($\mu\text{g}/\text{m}^3$)	0.02
	Benzene Annual mean ($\mu\text{g}/\text{m}^3$)	0.02
	Oxides of nitrogen Annual mean ($\mu\text{g}/\text{m}^3$)	0.44
	Particulate matter 10um – Annual mean ($\mu\text{g}/\text{m}^3$)	0.03
	Particulate matter 10um – Days > 50 ($\mu\text{g}/\text{m}^3$)	0

As can be observed, there is no significant increase in the air quality impact of named pollutants as a result of increased traffic numbers when the development occurs with only a slight increase occurring in pollutant concentration predicted 5m from the road centreline.

In terms of the 'do nothing' versus 'do something' there is a slight increase in some pollutant concentration in the order of less than 1% of the impact criterion (see Table 7-6) which is considered to be imperceptible. When this increase is added to baseline data presented in Table 7-3 for each named pollutant, emissions will remain well within the air quality limits presented in Table 7-1 for the protection of human health.

7.5.5.2 Scheduled emission points and Input Source Characteristics for Dispersion Model

The impacts associated with Odour emissions for the existing and proposed facility design are discussed within this section of the report.

The location of the proposed and existing facility relative to nearby receptors is presented in Figures 7.1 and 7.3 respectively.

Baseline odour emissions were measured on the WwTP using standard techniques in accordance with EN13725:2022. Sampling was performed on the WwTP in June 2025.

The emissions associated with the existing facility are presented in Table 7.13. As can be observed, the overall calculated odour emission rate associated from the existing facility will be 26,944 OUE/s.

The overall odour air quality emission data from the identified processes is presented in Tables 7.13 and Table 7.14. The relative location of each emission point is presented in Figure 7.4 and 7.5.

This data was inputted into the dispersion model AERMOD Prime 24142 along with meteorological data (i.e. Oak Park 2016 to 2020 inclusive), terrain, building and source characteristics as described within to allow for the examination of predicted odour air pollutant levels for maximum predicted regime at each of the identified sensitive receptors presented in Table 7.2.

Table 7-13 - Calculated odour emissions from the existing Mortarstown WwTP facility

Source ID	Exposed area (m ²)	Volumetric air flow rate (Nm ³ /hr.)	Odour threshold conc (OUÉ/m ³)	Odour flux (OUÉ/m ² /s)	Odour emission rate (OUÉ/s)
Inlet works	39.31	-	-	26.3	1,034
Sludge return sump	0.1	0.012	5,790	-	69
Oxic tank 1 to 4	1324	-	-	8.4	11,122
Anoxic tank 1 - 4	660	-	-	9.4	6,204
Flow distribution chamber 2	24	-	-	9.2	221
Flow distribution chamber 3	21	-	-	8.6	181
Clarifier 1	452	-	-	1.6	723
Clarifier 2	452	-	-	1.6	723
Sludge building Vent 1	-	1,800	2,448	-	1,224
Sludge building Vent 2	-	1,800	2,448	-	1,224
Sludge trailer	30	-	-	31.2	936
Picket fence thickener 1	28.27	-	-	29.4	831
Picket fence thickener 2	28.27	-	-	29.4	831
Storm tank	515	-	-	2.9	1,494
Storm screen OCU	-	635	724	-	128
Total odour emission rate (OUÉ/s)	-	-	-	-	26,944



With regards to the proposed Mortarstown WwTP facility, calculated emissions based on proposed facility design are presented in Table 7.14.



Table 7-14 - Calculated odour emissions from the proposed Mortarstown WwTP facility

Source Identity	State whether	Covered / Uncovered	Dimensions (m)	Surface area	Volume (Nm ³ /hr)	flow	State if process	Odour conc limit	Odour emission	Odour emission	Notes
New Pumping Station	New	Covered	15	0	-		Abated	-	-	0	see OCU 1
New Inlet Works	New	Covered	50m x 20 m	0	-		Abated	-	-	0	see OCU 2
New Stormwater holding tanks	New	Uncovered	30	1,400	-		Unabated	-	0.10	140	Washdown facilities will be installed on the stormwater tanks and these will be see OCU 3
New Primary Settlement Tank	New	Covered	45m x 36 m	0	-		Abated	-	-	0	
Aeration Tanks	Existing	Uncovered	92m x 23m	1,361	-		Unabated	-	1.50	2,042	Implementation of PST lowers load to Aeration tanks and lowers odour emission rate
Anoxic / Anaerobic tank	Proposed	Covered	92 m by 7.16m	659			Abated		0	0	see OCU 6
New Final Clarifiers	New	Uncovered	32	1,600	-		Unabated	-	0.15	240	- 2 tanks
Sludge Blending Tank	Existing	Covered	6	0	-		Abated	-	-	0	see OCU 4
Picket Fence Thickener - 1	Existing	Covered	6	0	-		Abated	-	-	0	See OCU 4
Picket Fence Thickener - 2	New	Covered	7.5	0	-		Abated	-	-	0	See OCU 4
Sludge Dewatering Building	Existing	Covered	21.9m x 12.7m	-	-		Abated	-	-	0	See OCU 4
Foul Pump Station	New	Covered	2.5m x 2.5m	0	-		Abated	-	-	0	see OCU 5
Centrate Pump	New	Covered	1.6m x 1.6m	0	-		Abated	-	-	0	see OCU 5
OCU 1 - New WWPS	New	Covered	6.00m high x 300mm dia.	N/A	9,109		-	500	-	1,265	Vented through 8 m stack
OCU 2 - New Inlet Works	New	Covered	4.00m high x 300mm dia.	N/A	2,911		-	500	-	404	Vented through 8 m stack
OCU 3 - New Primary Settlement Tank	New	Covered	4.00m high x 300mm dia.	N/A	9,558		-	500	-	1,328	Vented through 8 m stack
OCU 4 - Sludge Dewatering Building	New	Covered	6.00m high x 300mm dia.	N/A	15,100		-	500	-	2,097	Vented through 8 m stack
OCU 5 - New Local WWPS	New	Covered	2.00m high x 150mm dia.	N/A	400		-	500	-	56	Vented through 2 m stack
OCU 6 - Anoxic / Anaerobic / Flow distribution chambers	New	Covered	-	-	1318		-	500	-	183	Vented through 8 m stack
Total Odour emission rate (OUÉ/s)	-	-	-	-	-		-	-	-	7,754	-



The emissions associated with the proposed facility are presented in Table 7.14. As can be observed, the overall calculated odour emission rate associated from the existing facility will be 7,754 OUE/s.

The existing and proposed emission point characteristics and odour emission rates were utilised within a dispersion modelling odour air quality assessment. The predicted impacts as a result of operation of the existing and proposed scheduled emission points at the existing and proposed WwTP facility for odour air quality were examined utilising odour air quality emission rate data as presented in Tables 7.13 and 7.14, in accordance with procedures and methods contained in the following publications:

- H4 Odour Management, Guidance Parts 1 and 2, Environment agency, UK, 2011.
- Air Dispersion Modelling from Industrial Installations Guidance Note (AG4), EPA 2010, updated 2020).
- TaLuft 2002 - First General Administrative Regulation Pertaining the Federal Immission Control Act (Technical Instructions on Air Quality Control, 2006)

This data was inputted into a dispersion model in order to predict the impacts of odour emissions from identified emissions points located within the facility boundary. AERMOD Prime (24142) and 5 years of hourly sequential meteorological data (Oak Park 2016 to 2020) representative of the study area were utilised within the dispersion model with the worst-case year Oak Park 2020 used for data presentation.

7.5.5.3 Dispersion Model AERMOD Prime

The AERMOD model was developed through a formal collaboration between the American Meteorological Society (AMS) and U.S. Environmental Protection Agency (U.S. EPA). AERMOD is a Gaussian plume model and replaced the ISC3 model in demonstrating compliance with the National Ambient Air Quality Standards (Porter et al., 2003). AERMIC (USEPA and AMS working group) is emphasising development of a platform that includes air turbulence structure, scaling, and concepts; treatment of both surface and elevated sources; and simple and complex terrain. The modelling platform system has three main components: AERMOD, which is the air dispersion model; AERMET, a meteorological data pre-processor; and AERMAP, a terrain data pre-processor (Cora and Hung, 2003).

7.5.5.4 Model Assumptions

The approach adopted in this assessment is considered a worst-case investigation in respect of emissions to the atmosphere from the existing and proposed emission points to be located within the operational plant. These predictions are therefore most likely to overestimate the GLC's that may actually occur for each modelled scenario. The assumptions are summarised and include:

- All emissions were assumed to occur at maximum potential emission concentration and mass emission rates for each scenario and were assumed to occur for 100% of an operating year, simultaneously (when the existing and proposed plant is in operation);
- Five years of hourly sequential meteorological data from Oak Park 2016 to 2020 inclusive was used in the modelling screen which will provide statistically significant results in terms of the short and long term assessment. The worst-case year 2020 was used for data analysis, this is in keeping with guidance presented in AG4. In addition, AERMOD incorporates a meteorological pre-processor AERMET PRO. The AERMET PRO meteorological pre-processor requires the input of surface characteristics, including surface roughness (z_0), Bowen Ratio and Albedo by sector and season, as well as hourly observations of wind speed, wind direction, cloud cover, and temperature. The values of Albedo, Bowen Ratio and surface roughness depend on land-use type (e.g., urban, cultivated land etc.) and vary with seasons and wind direction. The assessment of appropriate land-use type was carried out to a distance of 10km from the meteorological station for Bowen Ratio and Albedo and to a distance of 1km for surface roughness in line with USEPA recommendations.



- AERMOD Prime (24142) dispersion modelling was utilised throughout the assessment in order to provide the most conservative dispersion estimates;
- All building wake effects were assessed within the dispersion model;
- Normal breathing height was established at 1.80m within the dispersion model;
- Twenty-seven individual sensitive receptors were also included within the model in order to provide specific predicted ground level concentrations at these locations.
- 5 m spaced specific for the site and 10 m spaced Topographical data from OSI was inputted into the model in order to take account of terrain changes in the vicinity of the site. A total grid area of 4 square Km was utilised within the model. 20m and 200 m spacing was used within the Cartesian grid providing a total receptor number of 589.
- In order to comply with the requirements of EPA Guidance AG4, 27 nearby flagpole receptors are also identified in the assessment in order to present worst case impact associated with odours in close proximity to the site boundary, These receptor location are presented in Figure 7 -1 and Table 7-2.

7.5.5.5 Meteorological Data

Five years of hourly sequential meteorological data was chosen for the modelling exercise (i.e. Oak Park 2016 to 2020 inclusive). A schematic wind rose and tabular cumulative wind speed and directions of all five years are presented in Figure 7.1. All five years of meteorological data was screened to provide statistically significant output results from the dispersion model. The worst-case year 2020 was used for data presentation. This is in keeping with national and international recommendations on quality assurance in operating dispersion models and will provide a worst-case assessment of predicted ground level concentrations based on the input emission rate data. Surface roughness, Albedo and Bowen ratio were assessed and characterised around Dublin Airport Met Station for AERMET Pro processing.

7.5.5.6 Terrain Data

Topography effects were accounted for within the dispersion modelling assessment as terrain was considered complex in the vicinity of the site. 10m spaced XYZ column format topographical data as gathered from Ordnance Survey Ireland was pre-processed using AERMAP (22112) for the dispersion modelling area in order to allow for the characteristics of terrain to be accounted for in the model. A total fine grid area of 4.0 km sq was examined within the dispersion modelling assessment giving a total receptor grid number of 589 receptor points in the assessment area.

7.5.5.7 Building Wake Effects

Building wake effects are accounted for in modelling scenarios through the use of the Prime algorithm (i.e. all building features located within the plant) as this can have a significant effect on the compound plume dispersion at short distances from the source and can significantly increase GLC's in close proximity to the proposed plant. All adjacent building structures, stack heights and orientations were inputted into the dispersion model in order to allow for wake effects to be taken in to account in the calculations. The latest Building Profile Input Programme (BPIP) version (04274) was utilised in the analysis.

7.5.5.8 Air quality impact criterion

Table 7.1 outlines the air quality impact criterion utilised to assess the Odour impacts associated with the operation of the facility scheduled emission points.

The 98th percentile analysis of the 1-hour average analysis was performed on the dispersion model output file to allow comparison with these assessment criteria.



7.5.5.9 Odour air quality impact assessment

Table 7.15 presents the maximum predicted odour air pollutant ground level concentration values in the vicinity of the existing and proposed plant when in operation. The predicted ground level concentration at each of the specified receptors is presented to include residential/commercial receptors. The worst case predicted value at any of the sensitive receptors is compared against the prescribed environmental assessment level as presented in Table 7.1.

As can be observed in Table 7.15, for the existing WwTP plant design, the maximum predicted Ground Level Concentration (GLC) of Odour is above the guideline odour air quality limit value presented in Table 7.1 (see Figure 7.4).

With regards to the Proposed WwTP design, the maximum predicted GLC of Odour is well below the guideline odour air quality limit value presented in Table 7.1 (see Figure 7.5).

All receptors in the vicinity of the proposed facility will perceive an odour concentration less than or equal to 2.30 OU_E/m³ for the 98th percentile of hourly averages for the worst case met year Oak Park 2020 (see Table 7-15).

There will be a net overall improvement in odour air quality in the vicinity of the facility as a result of the development and the impact associated with the proposed development is considered **Positive and imperceptible**.

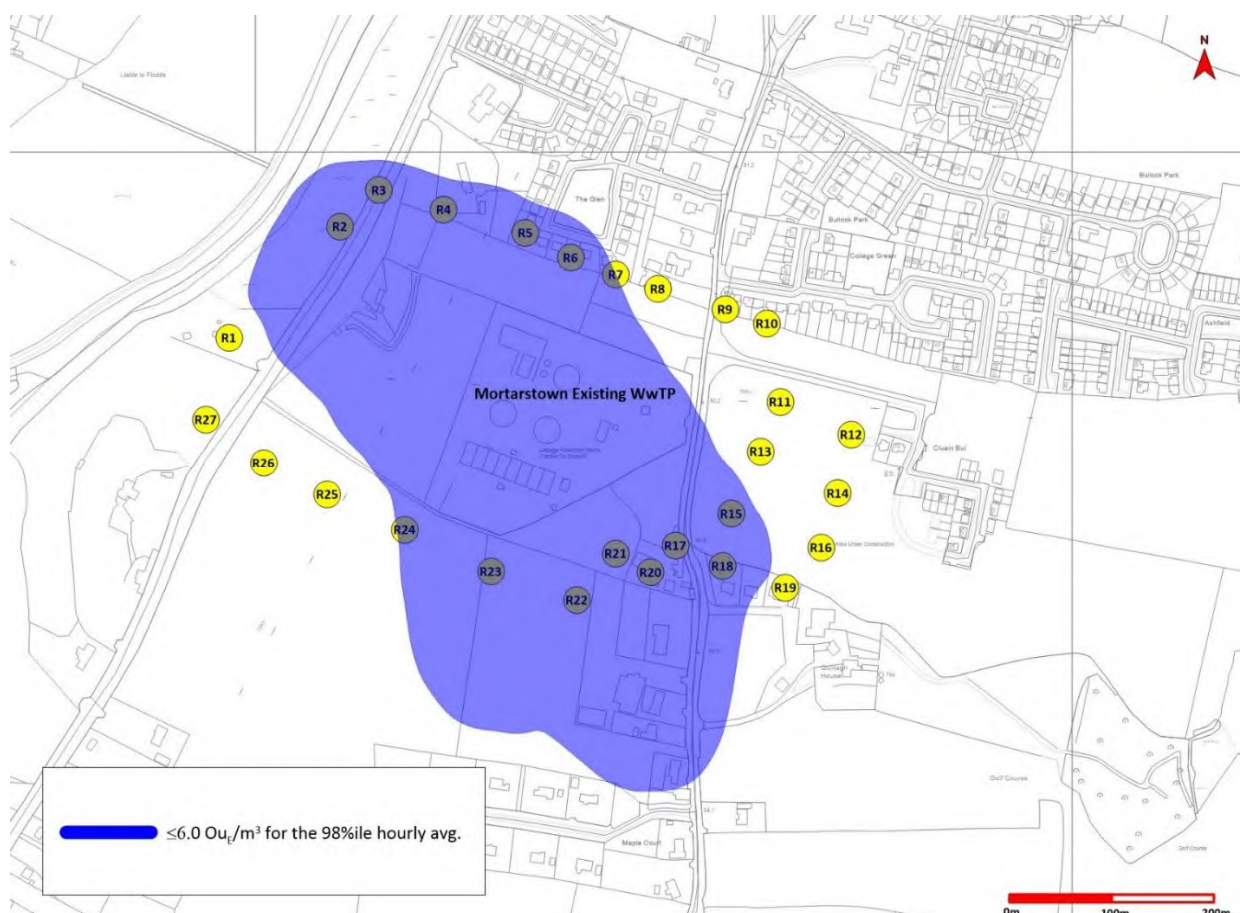


Figure 7-4 Predicted Odour emission contribution of existing facility operation to Odour plume dispersal for an Odour concentration of less than or equal to 6.0 OU_E/m³ (■■■) for the 98th percentile of hourly averages for worst case meteorological year Oak Park 2020.

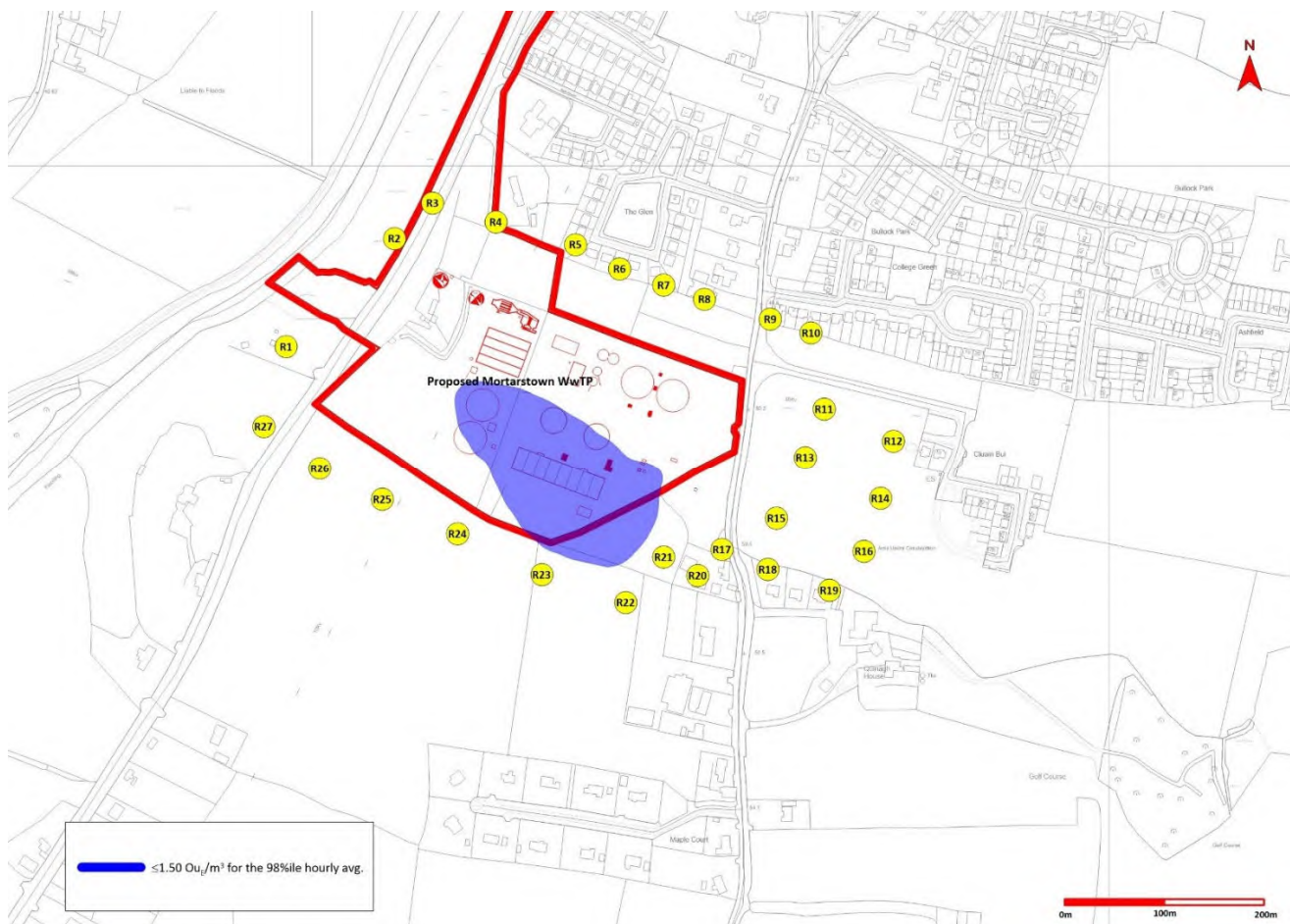


Figure 7-5 - Predicted Odour emission contribution of proposed facility operation to Odour plume dispersal for an Odour concentration of less than or equal to 1.50 OuE/m³ (■) for the 98th percentile of hourly averages for worst case meteorological year Oak Park 2020.

Table 7-15 - Predicted ground level concentrations (GLC's) of Odours at each identified sensitive receptor for the Existing and Proposed facility design

Receptor ID	X coordinates (m)	Y coordinates (m)	Existing proposed GL 98%ile odour	Predicted proposed GL
R1	671109	674858	3.5	0.58
R2	671218	674967	7.9	0.99
R3	671256	675002	6.8	0.93
R4	671320	674983	7.1	0.81
R5	671400	674961	7.3	0.75
R6	671444	674936	7.9	0.74
R7	671488	674920	5.8	0.64
R8	671529	674906	4.1	0.62
R9	671595	674886	2.8	0.57
R10	671636	674872	2.5	0.52
R11	671649	674795	3.2	0.64
R12	671719	674763	2.5	0.51
R13	671630	674747	4.4	0.74
R14	671706	674705	3.5	0.62
R15	671601	674685	7.4	0.94
R16	671689	674652	4.3	0.67
R17	671546	674654	12.2	1.35
R18	671593	674634	8.2	0.99
R19	671654	674613	5.4	0.77
R20	671522	674628	13.8	1.56
R21	671488	674646	21.0	2.20
R22	671450	674601	20.9	2.05
R23	671366	674628	29.5	2.28
R24	671281	674669	5.2	0.90
R25	671206	674704	2.2	0.48
R26	671143	674735	1.4	0.42
R27	671087	674778	1.2	0.35
Maximum 98%ile GLC (OUÉ/m³)	-	-	29.5	2.3
Limit values @ 98%ile (OUÉ/m³)	-	-	<3.0	<3.0

7.5.6 Unplanned events (Accidents or major disasters)

With regards to unplanned events (Accidental / Major disasters) such as a fire, the risk would be considered low. The impacts to Air Quality would be considered Negligible.

7.5.7 “Worst Case” Scenario

A worst case of assessment was utilised throughout the air quality impact study in order to assess any risk associated with the proposed operation of the plant.

Worst case volume flow and odour pollutant concentration emission values were analysed within the impact assessment. It was assumed that the operational facility will operate 24 hrs per day, 7 days per week, 365 days per year. In addition, all data analysis was performed utilising the worst-case meteorological year. Given these facts, it is considered that the worst-case scenario is analysed as part of the assessment.

Emission limit volume flow and concentration values for all pollutants where applicable will be regulated through the Planning process, where necessary.



7.5.8 Table of Effects

Table 7-16 - Table of Effects

Scenarios where Effects may arise	Potential Effects					Quality of Effect	Significance of Effect	Extent/Context of Effect	Probability	Duration	Type of Effect (as per Table 3.3)
	Activity	Attribute/receiving environment	Importance of attribute/sensitivity of receiving environment	Nature of Effect (description)							
Construction phase	Construction of proposed development (construction traffic, excavation, demolition, track out)	Number of Residential dwellings within 0.5km	Medium Sensitivity	Direct: Air emissions arising from construction traffic, excavation and track out		Negative	Imperceptible	Number of Residential dwellings within 0.5km	Likely	Temporary	Imperceptible
	Traffic	Number of Residential dwellings within 0.5km	Low Sensitivity	Direct: Air emissions and dust as a result of traffic		Negative	Imperceptible	Number of Residential dwellings within 0.5km	Likely	Temporary	Imperceptible
Operational phase	Dust	Number of Residential dwellings within 0.5km	Medium Sensitivity	Direct: Dust emissions as a result of Site preparation, Excavation, Demolition, Construction, Track out, Off site transportation		Negative	Insignificant	Number of Residential dwellings within 0.5km	Likely	Temporary	Imperceptible
	Odours from process	Number of Residential dwellings within 0.5km and Natura receptors up to 15 km from site	Medium sensitivity	Direct: Emission of various pollutants from process operations		Negative	Small	Number of Residential dwellings within 0.5km and Natura receptors up to 15 km from site	Likely	Continuous	Imperceptible
Unplanned Events	Fire / Explosion / Dust blow	Residential dwellings within 0.5km	Medium	Direct/Indirect		Negative	Major	Within 0.5km of the site, low number of receptors	Unlikely	Temporary	Imperceptible



7.6 Remedial and Mitigation measures

7.6.1 Construction phase

The objective of dust control at site is to ensure that no significant nuisance occurs at nearby sensitive receptors. The construction phase is limited and considered Temporary.

In order to develop a workable and transparent dust control strategy, the following high level mitigation plan has been formulated by drawing on best practice guidance from Ireland, the UK (IAQM (2014), The Scottish Office (1996), UK Office of Deputy Prime Minister (2002) and BRE (2003)) and the USA (USEPA (1997)). All mitigation measures are presented in Chapter 18 – Schedule of Commitments, of this EIAR, and will also be incorporated into the Outline CEMP submitted as part of this planning application.

7.6.1.1 Site management

The aim is to ensure good site management by avoiding dust becoming airborne at sources. This will be done through good design and effective control strategies. A Dust Management Plan (DMP) should be prepared and agreed with the stakeholders for implementation on-site. A DMP is a documented site-specific operational plan to prevent or minimise the release of dust from the site. It should describe the management and operational actions the site will use to deal with both anticipated (e.g. forecast) and actual high-risk conditions (e.g. dry days with measured winds above moderate breeze). The DMP should describe the conditions under which dust is most likely to pose a risk of disamenity at sensitive receptors close to the site and set trigger levels which, when exceeded, would require further dust control measures to be implemented (i.e. over and above the routine measures)

At the construction planning stage, the siting of activities and storage of materials will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance (see Figure 7-2 for the wind rose for Oak Park met station). As the prevailing wind is predominately south westerly, locating materials downwind (to the north west) of sensitive receptors will minimise the potential for dust nuisance to occur at the majority of sensitive receptors.

Good site management will include the ability to respond to adverse weather conditions by either restricting operations on site or quickly implementing effective control measures before the potential for nuisance occurs. When rainfall is greater than 0.20 mm/day, dust generation is generally suppressed (UK Office of Deputy Prime Minister (2002), BRE (2003)). The potential for significant dust generation is also reliant on threshold wind speeds of greater than 10 m/s (19.4 Knots) (at 7m above ground) to release loose material from storage materials and other exposed surfaces (USEPA, 1986). Particular care should be taken during periods of high winds (gales) as these are periods where the potential for significant dust emissions is highest. The prevailing meteorological conditions in the vicinity of the site are favourable in general for the suppression of dust for a significant period of the year. Nevertheless, there will be infrequent periods where care will be needed to ensure that dust nuisance does not occur. The following measures shall be taken in order to avoid dust nuisance occurring under unfavourable meteorological conditions:

- The operator must monitor performance to ensure that the proposed mitigation measures are implemented and that dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions;
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out;
- All dust control conditions contained within shall be achieved.



- At all times, the procedures put in place will be strictly monitored and assessed.

The dust minimisation measures shall be reviewed at regular intervals during the works to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practices and procedures. In the event of dust nuisance occurring outside the site boundary, site activities will be reviewed and satisfactory procedures implemented to rectify the problem. Specific dust control measures to be employed are described below.

7.6.1.2 Site Roads and Routes

Movement of transportation trucks and plant trucks along haul roads (in particular unpaved roads) can be a significant source of fugitive dust if control measures are not in place. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25 to 80% (UK Office of Deputy Prime Minister, 2002).

- Browsers or suitable watering equipment will be available during periods of dry weather through the construction period. Research has found that watering can reduce dust emissions by 50% (USEPA, 1997). Watering shall be conducted during sustained periods to ensure that unpaved areas are kept moist. The required application rate frequency will vary according to soil type, weather conditions and vehicular use;
- Any hard surface roads will be swept to remove mud and aggregate materials from their surface.

7.6.1.3 Site traffic on Public roads

Spillage and blow off of debris, aggregates and fine material onto public roads will be reduced to a minimum by employing the following measures:

- Vehicles delivering or collecting material with potential for dust emissions shall be enclosed, covered or wetted at all times to restrict the escape of dust;
- Public roads directly outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary.

7.6.1.4 Summary of Dust Mitigation Measures

The proactive control of fugitive dust will ensure that the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released, will contribute towards the satisfactory performance of the operator.

A full traffic management plan and dust management plan will be incorporated into the Environmental Management System in order to minimise such emissions as a result of the operational phase of the development. This will be generated specifically for the proposed development when detailed design is completed.

In order to ensure that no dust nuisance occurs at sensitive receptors, a series of measures will be implemented through the CEMP:

- On site roads shall be regularly cleaned and maintained as appropriate.
- Hard surface roads shall be swept to remove mud and aggregate materials from their surface as a result of the development.
- Any un-surfaced roads shall be restricted to essential site traffic only.
- Furthermore, any on site road that has the potential to give rise to fugitive dust will be regularly watered, as appropriate, during extended dry and/or windy conditions.
- Vehicles using site roads shall have their speed restricted, and this speed restriction will be enforced rigidly. On any un-surfaced site road and on hard surfaced roads speed shall be restricted to 20 km per hour.

- Vehicles delivering material with dust potential (soil, aggregates) will be enclosed or covered with tarpaulin at all times to restrict the escape of dust.
- Material handling systems and site stockpiling of materials shall be designed and laid out to minimise exposure to wind. Water misting or sprays shall be used as required if particularly dusty activities are necessary during dry or windy periods.
- At all times, these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the subject site boundary, movements of materials likely to raise dust will be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.
- In relation to the completion of the proposed development, the hard standing surface, and all roads will be tarmacadamed/concreted where applicable. In periods of dry weather when dust emission would be greatest, a road sweeper, which would also dampen the road, will be employed as required to prevent the generation of dust.
- In terms of good practice construction vehicles and equipment will receive regular maintenance. Technical inspection will be performed of vehicles to ensure they will perform most efficiently. A Traffic Management Plan will be implemented to minimise congestion.

7.6.2 Operational Phase

7.6.2.1 Scheduled emission points

Scheduled emission points operated within the facility will be regulated through the Planning process and emission limit values utilised in this assessment are typical of emission limit levels used for this specific process.

This assessment demonstrates that emission levels as a result of the operation of the proposed plant will not result in any air/odour quality impact in line with Irish and European assessment criteria limits and guidelines including SI 787 of 2005. There will be a net overall improvement in odour air quality in the vicinity of the facility as a result of the development and the impact associated with the proposed development is considered **Negligible**.



Table 7-17 - Table of Mitigation Measures

Scenarios where Impacts may arise	Potential Effect			Mitigation measure		Residual effect (following mitigation)
	Activity	Attribute/receiving environment	Nature of Effect (description)	Description	Significance or quality of Effect	Probability
Construction phase	Construction of proposed development	Residential dwellings within 0.5km	Dust arising from construction traffic, Demolition, Excavation	Construction traffic will be restricted to standard working hours and exclude Sundays. Construction works will be carried out in accordance with guidance set out in Section 7.5.1	Neutral	Unlikely
	Site management	Residential dwellings within 0.5km	Poor site management will lead to increased emissions and poor control	The operator must monitor performance to ensure that the proposed mitigation measures are implemented and that dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions; A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out; All dust control conditions contained within shall be achieved. At all times, the procedures put in place will be strictly monitored and assessed.	Neutral	Unlikely
Operational phase						



Scenarios where Impacts may arise	Potential Effect			Mitigation measure		Residual effect (following mitigation)
	Activity	Attribute/receiving environment	Nature of Effect (description)	Description	Significance or quality of Effect	Probability
				See Section 7.5.2		
	Site roads and routes	Residential dwellings within 0.5km	Dust arising from site roads and route location	Speed restrictions to 20 km/hr. Minimise unpaved sections and located away from sensitive receptors. Browsers wetting to minimise dust formation during dry conditions See Section 7.5.2	Neutral	Unlikely
	Site traffic on public road	Residential dwellings within 0.5km	Dust from transport vehicles and dirty roads	Controlled via covering, wetted or enclosed load transport Road sweeper to clean roads, Wheel wash to minimise tracking on to roads See Section 7.5.2	Neutral	Unlikely
	Equipment vehicles	Residential dwellings within 0.5km	Air emissions as a result of poorly	Service and maintain site vehicles regularly to minimise air emissions associated with the equipment.	Neutral	Unlikely



Scenarios where Impacts may arise	Potential Effect		Mitigation measure		Residual effect (following mitigation)	
	Activity	Attribute/receiving environment	Nature of Effect (description)	Description	Significance or quality of Effect	Probability
			maintained site vehicles			
	Scheduled emission points	Residential dwellings within 0.5km	Air emissions as a result of odour air pollution control plant failure	Service and maintain regularly to minimise air emissions associated with the equipment. Performed regular air monitoring of performance of air pollution control plant in accordance with Planning conditions.	Negative	Unlikely
Unplanned Events	None	Residential dwellings within 0.5km	None	None	None	None



7.7 Residual Effects of the Proposed Development

7.7.1 Construction Phase

There will be no residual effects on air quality as a result of the limited construction phase.

7.7.2 Operational Phase

7.7.2.1 Air Quality and Odours

When dust mitigation measures detailed in the mitigation section of this report are implemented, fugitive emissions of dust and particulate matter from the site will be **minor** and **not significant** in nature posing no nuisance at nearby receptors.

The facility will operate a number of emissions points namely up to six Odour control units. These will be licenced to operate by the Planning process. This will stipulate specific emission limit values for Odours from these processes. The operator will be required to be compliant with these emission limit values. This will ensure that the facility will operate well in compliance with guideline odour air quality limit values. When compared against the guideline odour air quality limit values, the operational facility will remain well within these odour air quality limit value with typical worst-case impact been 77% of the impact criteria.

7.7.2.2 Human Health

Best practice mitigation measures are proposed for the operational phase of the Proposed Development which will focus on the pro-active control of dust and odour air pollutants to minimise generation and release of emissions at source. The mitigation measures that will be put in place during the operation of the Proposed Development will ensure that the impact of the development complies with all EU ambient and guideline odour air quality limit values which are based on the protection of human health. Therefore, the impact of construction and operation of the Proposed Development is likely to be **Temporary** and **imperceptible** with result to human health.

7.8 Monitoring Measures

With respect to monitoring measures temporary dust deposition monitoring will be carried out at the facility during construction phase of the proposed development in order to ensure the boundary levels of deposition and nuisance dust are within recommended limit which are typically less than 350 mg/m²/day. These locations and frequency of monitoring will be confirmed prior to the start of construction.

With regards to the operational phase of the project, the facility will be required to monitor odours to ensure compliance with the proposed limit values for the proposed facility (see Table 7-1).

Specific limit values will most likely form part of the requirements of the planning decision. The specific monitoring techniques will determine:

- That the development is not impacting on the environment and or,
- That the mitigation measures implemented at the facility are effective.

8. CLIMATE

8.1 Introduction

This chapter assesses the likely climate impacts and the impact of climate change risks on the proposed development located in, Co. Carlow. A full description of the development is available in Chapter 2 – Project Description.

The climate assessment is divided into two distinct sections – a greenhouse gas assessment (GHGA) and a climate change risk assessment (CCRA).

- Greenhouse Gas Emissions Assessment (GHGA) – Quantifies the GHG emissions from a project over its lifetime. The assessment compares these emissions to relevant carbon budgets, targets and policy to contextualise magnitude.
- Climate Change Risk Assessment (CCRA) – Identifies the impact of a changing climate on a project and receiving environment. The assessment considers a projects vulnerability to climate change and identifies adaptation measures to increase project resilience.

8.2 Methodology

8.2.1 Relevant Guidance, Legislation and Policy

8.2.1.1 Guidance

The principal guidance and best practice documents used to inform the assessment of potential impacts on climate are summarised below. In addition to specific climate guidance documents, the following EIA guidelines were considered and consulted in the preparation of this chapter:

- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (hereafter referred to as the Environmental Protection Agency (EPA) Guidelines) (EPA, 2022); and
- Environmental Impact Assessment of Projects – Guidance on the Preparation of the Environmental Impact Assessment Report (European Commission, 2017).

The assessment has made reference to national guidelines where available, in addition to international standards and guidelines relating to the assessment of climate impacts. These are summarised below:

- Environmental Protection Agency (2024) National Climate Change Risk Assessment. Technical Guidance for Sectoral assessment.
- Transport Infrastructure Ireland (TII) PE-ENV-01104: Climate Guidance for National Roads, Light Rail and Rural Cycleways (Offline & Greenways) – Overarching Technical Document (TII, 2022);
- Transport Infrastructure Ireland (TII) GE-ENV-01106: TII Carbon Assessment Tool for Road and Light Rail Projects and User Guidance Document (TII, 2024a);
- Intergovernmental Panel on Climate Change (IPCC) (2023) 6th Synthesis report.
- International Organization for Standardization (ISO) (2021) ISO 14091:2021. Adaptation to climate change — Guidelines on vulnerability, impacts and risk assessment
- Institute of Sustainability & Environmental Professionals (ISEP) (formerly known as IEMA) Environmental

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Impact Assessment Guide to: Assessing GHG Emissions and Evaluating their Significance (hereafter referred to as the ISEP GHG guidance) (ISEP, 2022);

- ISEP Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (hereafter referred to as the ISEP Climate Change guidance) (ISEP, 2020a);
- ISEP GHG Management Hierarchy (hereafter referred to as the ISEP GHG Management Hierarchy) (ISEP, 2020b);
- ISEP Principles Series: Climate Change Mitigation & EIA (ISEP, 2010);
- Publicly Available Specification (PAS) 2080:2016 on Carbon Management in Infrastructure (BSI, 2016); and
- Technical Guidance on the Climate Proofing of Infrastructure in the Period 2021-2027 (European Commission, 2021a).

8.2.1.2 Legislation

8.2.1.2.1 International Legislation & Policy

The Paris Agreement (UNFCCC, 2015), which entered into force in 2016, is an important milestone in terms of international climate change agreements and includes an aim of limiting global temperature increases to no more than 2°C (degrees Celsius) above pre-industrial levels with efforts to limit this rise to 1.5°C. Nationally determined contributions (NDCs) are at the heart of the Paris Agreement and the achievement of these long-term goals. NDCs comprise the efforts and actions by each country to reduce national emissions and adapt to the impacts of climate change. The Paris Agreement requires each country to prepare the NDCs that it intends to achieve, updating and enhancing the NDCs every 5 years. Countries are required to implement mitigation measures, with the aim of achieving the objectives of such contributions. Each of the EU Member States submit their own NDCs, which contribute to the overall EU NDC.

The European Green Deal, published by the European Commission in December 2019, provides an action plan which aims for the EU to be climate neutral by 2050. The EU Green Deal highlights that further decarbonisation of the energy sector is critical to reach climate objectives in 2030 and 2050. The European Green Deal has increased the GHG emissions reduction 2030 target to at least 55% in comparison to 1990 levels.

On 14 July 2021, the European Commission adopted a series of legislative proposals setting out how it intends to achieve climate neutrality in the EU by 2050, including the intermediate target of at least a 55% net reduction in greenhouse gas emissions by 2030. The package of proposals is known as the 'Fit for 55' package.

The package includes revisions to the legislation put forward as part of the Climate and Energy Framework 2021-2030, including the EU Emissions Trading System (ETS), Effort Sharing Regulation, transport and land use legislation, setting out in real terms the ways in which the Commission intends to reach EU climate targets under the European Green Deal.

The EU ETS was launched in 2005 as the world's first international company- level 'cap-and trade' system for reducing emissions of greenhouse gases cost-effectively. The EU ETS regulates the GHG emissions of larger industrial emitters including electricity generation, cement manufacturing and heavy industry.

Under this new package of legislative proposals, the sectors of the Irish economy covered by the current ETS must reduce emissions by 42% by 2030 compared to 2005 levels by increasing annual emissions reduction to 4.2% per annum.

The non-ETS sector includes all domestic GHG emitters which do not fall under the ETS scheme and thus includes GHG emissions from transport, residential and commercial buildings and agriculture. These sectors must reduce emissions by 42% by 2030 compared to 2005 levels.

Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law') writes into law the goal set out in the European Green Deal for Europe's economy and society to become climate-neutral by 2050. The law also sets the intermediate target of reducing net greenhouse gas (GHG) emissions by at least 55% by 2030, compared to 1990 levels.

The 2021 EU Strategy on Adaptation to Climate Change sets out the pathway to prepare for the unavoidable impacts of climate change. The aim is that *"by 2050, when we aim to have reached climate neutrality, we will have reinforced adaptive capacity and minimised vulnerability to climate impacts..."*

Adaptation refers to measures that can reduce the negative impact of climate change by, for example, ensuring a project is resilient to future increases in storm frequency and rainfall levels.

The EU has adopted integrated monitoring and reporting rules to ensure progress towards its 2030 climate and energy targets and its international commitments under the 2015 Paris Agreement.

Climate is also addressed specifically in Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment. Recital (7) of Directive 2014/52/EU states that:

"Over the last decade, environmental issues, such as resource efficiency and sustainability, biodiversity protection, climate change, and risks of accidents and disasters, have become more important in policy making. They should therefore also constitute important elements in assessment and decision-making processes".

Recital (13) of Directive 2014/52/EU states that:

"Climate change will continue to cause damage to the environment and compromise economic development. In this regard, it is appropriate to assess the impact of projects on climate (for example greenhouse gas emissions) and their vulnerability to climate change".

Additionally Annex IV requires the following to be considered within Environmental Impact Assessment:

- Paragraph 4: *"A description of the factors specified in Article 3(1) likely to be significantly affected by the project: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape".*
- Paragraph 5 (f): *"A description of the likely significant effects of the project on the environment resulting from, inter alia: the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change".*

8.2.1.2.2 National Legislation

In 2015, the Climate Action and Low Carbon Development Act 2015 (No. 46 of 2015) (as amended) (the 2015 Act) (Government of Ireland, 2015) was enacted. The purpose of the 2015 Act was to enable Ireland *'to pursue, and achieve, the transition to a low carbon, climate resilient and environmentally sustainable economy by the end of the year 2050'* (3.(1) of No. 46 of 2015). This is referred to in the 2015 Act as the *'national transition objective'*. The 2015 Act made provision for a national mitigation plan, and a national adaptation framework. In addition, the 2015 Act (as amended) provided for the establishment of the Climate Change Advisory Council with the function to advise and make recommendations on the preparation of the national mitigation and adaptation plans and compliance with existing climate obligations.

The first Climate Action Plan (CAP) was published by the Irish Government in June 2019 (Government of Ireland, 2019). The Climate Action Plan 2019 outlined the current status across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture and outlined the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. The 2019 CAP also detailed the required governance arrangements for implementation including carbon-proofing of policies, establishment of carbon budgets, a strengthened Climate Change Advisory Council and greater accountability to the Oireachtas. The fifth and most recent climate action plan, CAP25, was published in April 2025 (Government of Ireland, 2025).

Following on from Ireland declaring a climate and biodiversity emergency in May 2019, and the European Parliament approving a resolution declaring a climate and environment emergency in Europe in November 2019, the Government approved the publication of the General Scheme in December 2019, followed by the publication of the Climate Action and Low Carbon Development (Amendment) Act 2021 (hereafter referred to as the 2021 Climate Act), in March 2021, which amended the 2015 Act. The 2021 Climate Act was signed into Law on the 23rd July 2021, giving statutory effect to the core objectives stated within the CAP.

The purpose of the 2021 Climate Act (Government of Ireland, 2021) is to provide for the approval of plans “*for the purpose of pursuing the transition to a climate resilient, biodiversity rich and climate neutral economy by no later than the end of the year 2050*”. The 2021 Climate Act also provides for “carbon budgets and a decarbonisation target range for certain sectors of the economy”. The 2021 Climate Act defines the carbon budget as “*the total amount of greenhouse gas emissions that are permitted during the budget period*”.

In relation to carbon budgets, the 2015 Act states “*A carbon budget, consistent with furthering the achievement of the national climate objective, shall be proposed by the Climate Change Advisory Council, finalised by the Minister and approved by the Government for the period of 5 years commencing on the 1 January 2021 and ending on 31 December 2025 and for each subsequent period of 5 years (in this Act referred to as a ‘budget period’)*”. The carbon budget is to be produced for 3 sequential budget periods, as shown in Table 8-1. The carbon budget can be revised where new obligations are imposed under the law of the European Union or international agreements or where there are significant developments in scientific knowledge in relation to climate change. In relation to the sectoral emissions ceiling, the Minister for Climate, Environment and Energy (the Minister for the Environment) shall prepare and submit to government the maximum amount of GHG emissions that are permitted in different sectors of the economy during a budget period and different ceilings may apply to different sectors. The sectoral emission ceilings for 2030 are published in CAP25 and are shown in Table 8-2.

Table 8-1 5-Year Carbon Budgets 2021 to 2035

Budget Period	Carbon Budget	Reduction Required
2021-2025	295 Mt CO ₂ e	Reduction in emissions of 4.8% per annum for the first budget period.
2026-2030	200 Mt CO ₂ e	Reduction in emissions of 8.3% per annum for the second budget period.
2031-2035	151 Mt CO ₂ e	Reduction in emissions of 3.5% per annum for the third provisional budget.

Table 8-2 Sectoral Emissions Ceilings 2030

Sector	Baseline (MtCO ₂ e)	Carbon (MtCO ₂ e)	Budgets	2030 Emissions (MtCO ₂ e)	Indicative Emissions % Reduction in Final Year of 2025 – 2030 Period (Compared to 2018)
	2018	2021-2025	2026-2030		
Electricity	10	40	20	3	75
Transport	12	54	37	6	50
Built Environment – Residential	7	29	23	4	40
Built Environment – Commercial	2	7	5	1	45
Industry	7	30	24	4	35
Agriculture	23	106	96	17.25	25
Other (F-gases, waste, petroleum refining)	2	9	8	1	50
Land Use, Land-use Change and Forestry (LULUCF)	5	Reflecting the continued volatility for LULUCF baseline emissions to 2030 and beyond, CAP25 puts in place ambitious activity targets for the sector reflecting an EU-type approach.			
Total	68				
Unallocated Savings	-	-	26	-5.25	-
Legally Binding Carbon Budgets and 2030 Emission Reduction Targets	-	295	200	-	51

8.2.1.3 Policy

8.2.1.3.1 Greenhouse Gas Policy

National Policy

In December 2023, CAP24 was published, establishing key actions to deliver a 51% reduction in GHG emissions by 2030 (compared to 2018 levels) and achieve climate neutrality by 2050 (Government of Ireland, 2023). The updated and current CAP25, published in April 2025 (Government of Ireland, 2025), builds on the progress of the previous four iterations of the CAP, with CAP23 first publishing carbon budgets and sectoral emission ceilings, and reaffirms Ireland's climate ambition, with a focus on delivery, implementation and measurable outcomes, particularly ahead of the second carbon budget period (2026–2030). 2025 is the last year in the first 5-year carbon budget period. During the initial 5-year budget period the average annual reduction required was 4.8%, this increases to 8.3% in the second budget period (2026-2030). CAP25 retains the high-impact sectors where the biggest savings can be achieved, while emphasising public sector leadership and green procurement. These sectors include renewable energy; energy efficiency of buildings; transport; sustainable farming; sustainable business; and land-use change.

Public sector leadership is strengthened through a new *Buying Greener: Green Public Procurement Strategy and Action Plan* (2024–2027) (Government of Ireland, 2024a) the development of mandatory Climate Action

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Roadmaps, and enhanced emissions monitoring and reporting across government operations. The government has reinforced the public sector's responsibility to lead by example, particularly through climate-proofing operations and sustainable procurement initiatives.

CAP25 also reinforces targets first outlined in CAP24 to reduce the embodied carbon of construction materials, with a 10% reduction by 2025 and 30% reduction by 2030 for materials produced and used in Ireland. Cement and high embodied carbon construction materials can be reduced through product substitution, reduced clinker content in cement and uptake of low-carbon construction methods, including those outlined in the Construction Industry Federation 2021 report *Modern Methods of Construction* (Construction Industry Federation, 2021). Public bodies are now required under the Public Sector Mandate to use best practice project design to reduce embodied carbon; procure concretes with clinker replacements (lower carbon); and require that large construction projects produce a whole life cycle GHG emissions assessment. Further guidance on how the built environment can contribute to a circular, low-carbon economy is detailed in the recently published *A Roadmap for a Resource Efficient Circular Built Environment*. This supports the Circular Economy And Miscellaneous Provisions Act 2022 (No. 26 of 2022), which allows for waste material to be safely and sustainably re-used as secondary raw materials and is particularly important for the construction sector.

In April 2023, the Government published its *Long-Term Strategy on Greenhouse Gas Emissions Reductions* (Government of Ireland, 2024b). This strategy provides a long-term plan on how Ireland will transition towards net carbon zero by 2050, achieving the interim targets set out in the Climate Action Plan.

Local Authority Policy

The *Carlow Local Authority Climate Action Plan 2024–2029* (Carlow County Council, 2024) outlines Carlow County Council's objectives to mitigate greenhouse gas emissions and strategies to prepare for and adapt to climate change. The plan outlines the sectors with the highest GHG emissions in Carlow, which are agriculture; transport; manufacturing & commercial; and residential. All actions to reduce GHG emissions will be measured with Key Performance Indicators (KPIs). The plan encompasses actions across several thematic areas, including Governance & Leadership; Built Environment & Transport; Natural Environment & Green Infrastructure; Communities: Resilience & Transition; and Sustainability & Resource Management. The Plan aligns with the Government's National Climate Objective, which aims to achieve, by no later than 2050, a transition to a climate-resilient, biodiversity-rich, environmentally sustainable, and climate-neutral economy. The Carlow Local Authority Climate Action Plan sets ambitious targets, including a 51% reduction in the Council's GHG emissions by 2030.

8.2.1.3.2 Climate Change Vulnerability Policy

National Policy

The Second National Adaptation Framework (NAF) (Government of Ireland, 2024c), published in June 2024 under the 2015 Climate Act, sets out a whole-of-government and society approach to climate adaptation. It aims to reduce Ireland's vulnerability to climate risks such as extreme weather, flooding, drought, biodiversity loss, sea level rise, and rising temperatures.

Echoing the principles of a "Just Transition," the NAF promotes "Just Resilience", envisioning a climate-resilient Ireland with reduced fossil fuel dependence, accessible electrified public transport, and sustainable agriculture practices like agroforestry and organic farming.

The framework warns of possible increased drought frequency and higher evapotranspiration, which may reduce river flows, groundwater recharge, and reservoir capacity posing risks to long-term water supply. It stresses the need for strategic investment in national water infrastructure to ensure resilience by 2050.



For the water sector the NAF identifies key climate risks:

- More frequent droughts and higher evapotranspiration may reduce river flows, groundwater recharge, and reservoir capacity—threatening water supply.
- Extreme rainfall could overwhelm drainage systems, affecting water quality and aquatic ecosystems.
- Rising temperatures may degrade water quality through increased lake stratification and reduced oxygen levels.
- Sea level rise risks salinity intrusion and damage to coastal water infrastructure.

The *National Climate Change Risk Assessment* (NCCRA) was published in June 2025 (EPA, 2025). The NCCRA was required to be developed under Action 457 from the 2021 CAP (Government of Ireland, 2021). Action 457 seeks to “Further develop Ireland’s national climate change risk assessment capacity to identify the priority physical risks of climate change to Ireland”. The NCCRA uses definitions of the risk determinants from the Intergovernmental Panel on Climate Change (IPCC) Risk Framework (IPCC, 2023):

- **Hazard** - the potential occurrence of a natural or human-induced physical event or trend or physical impact that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources
- **Exposure** - the presence of people, livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected
- **Sensitivity** - refers to the degree to which a system or asset is affected by climate hazards. It reflects how vulnerable something is to changes such as temperature extremes, flooding, or drought, based on its physical, functional, or ecological characteristics.
- **Vulnerability** - the propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts including sensitivity
- **Risk** - the potential for adverse consequences for human or ecological systems.

When considering risk, the NCCRA assess exposure and vulnerability for two future climate change scenarios or Representative Concentration Pathways (RCPs):

- RCP4.5 was selected as it represents a scenario aligned with the global temperature trajectory
- RCP8.5 was selected as it represents a high-emissions scenario and achieves the highest level of modelled temperature increases by the end of the century. Consequently, this scenario will result in the highest level of physical risk for Ireland, and therefore the greatest requirement for adaptation.

These scenarios align with a conservative approach to assess climate change risks to Ireland and aligns with the principle of precaution as stated in the NAF (Government of Ireland, 2024c). In addition to the future climate scenarios, the NCCRA assesses the risk from the future climate during the following timeframes:

- Present (~2030)
- Medium term (2040-2070) (~ 2050)
- Long term (2070-2100) (~2100)

Local Authority Policy

The Carlow Local Authority Climate Action Plan 2024–2029 (Carlow County Council, 2024) outlines the growing risks that climate change poses to the county’s infrastructure, communities, and economy. The most significant threats identified for County Carlow include river flooding, extreme precipitation, and drought, with extreme windstorms also emerging as a future concern.



The plan sets out a vision to make Carlow a climate-resilient region by mitigating the impacts of climate-related hazards and fostering active community engagement in climate action. A key priority is the protection of the built environment, including public infrastructure, through strategic planning, robust asset management, and enhanced preparedness. This will involve close collaboration with key stakeholders such as the Office of Public Works (OPW) especially in relation to flood risk management.

8.2.2 Greenhouse Gas Assessment Methodology

As per the EU guidance document *Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment* (European Commission, 2013) the climate baseline is first established with reference to EPA data on annual GHG emissions (see Section 8.3.1).

8.2.2.1 Construction Phase

The GHG assessment has been conducted following the TII PE-ENV-01104 guidance (TII, 2022). PE-ENV-01104 (TII, 2022) recommends the calculation of the construction stage GHG emissions, including embodied carbon, using the TII Online Carbon Tool (TII, 2025). Embodied carbon refers to the sum of the carbon needed to produce a good or service. It incorporates the energy needed in the mining or processing of raw materials, the manufacturing of products and the delivery of these products to site. The TII Online Carbon Tool (TII, 2025) has been commissioned by TII to assess GHG emissions associated with road or rail projects using Ireland-specific emission factors and data. However, the tool can be used to estimate the GHG emissions from other development types such as the proposed development as a number of the material types and activities are somewhat similar. The tool uses emission factors from recognised sources including the Civil Engineering Standard Method of Measurement (CESSM) Carbon and Price Book database (CESSM, 2013), which can be applied to a variety of developments, not just road or rail. The tool aligns with PAS 2080.

The purpose of the embodied carbon assessment is to engage the design team in the consideration of embodied carbon at an early stage in the development and mitigate embodied carbon. This engagement aims to ensure carbon savings are made and to assist in aligning the project to Ireland's CAP21 goal of Net Carbon Zero by 2050.

The TII Carbon Tool has been used to assess the GHG emissions associated with site clearance works, excavation works, construction materials, material transport, energy usage during construction, construction worker travel and construction waste. Reasonable conservative estimates have been used in this assessment where necessary to provide an estimate of the GHGs associated with the proposed development.

8.2.2.2 Operational Phase

Operational phase emissions are linked with the ongoing energy requirements of the site such as the electricity needed to operate the pumping station and associated infrastructure. Solar panels are being installed at the site and are expected to generate 350,000kWh/ year which will reduce operational electricity demand.

It also includes transport for maintenance activities, inspections, service visits, chemical deliveries and waste disposal, although these are expected to be minimal.

GHG emissions from chemical use at the site will also be accounted for within this section. Ferric sulphate (which facilitates the chemical precipitation of phosphorus from the wastewater) and polyelectrolyte (used to dewater sludge) are both utilised on-site. The GHG assessment has been carried out using emissions factors from UK Water Industry Research (UKWIR) Carbon Accounting Workbook V19.

8.2.2.3 Significance Criteria for GHGA

The Transport Infrastructure Ireland (TII) guidance document entitled *PE-ENV-01104 Climate Guidance for National Roads, Light Rail and Rural Cycleways (Offline & Greenways) – Overarching Technical Document* (TII, 2022) outlines a recommended approach for determining the significance of both the construction and operational phases of a development.

The significance of GHG effects set out in PE-ENV-01104 (TII, 2022) is based on ISEP GHG Guidance (ISEP, 2022) which is consistent with the terminology contained within Figure 3.4 of the EPA's (2022) '*Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*'.

The ISEP GHG Guidance (ISEP, 2022) sets out the following principles for significance:

- When evaluating significance, all new GHG emissions contribute to a negative environmental impact; however, some projects will replace existing development or baseline activity that has a higher GHG profile. The significance of a project's emissions should therefore be based on its net impact over its lifetime, which may be positive, negative or negligible;
- Where GHG emissions cannot be avoided, the goal of the EIA process should be to reduce the project's residual emissions at all stages; and
- Where GHG emissions remain significant, but cannot be further reduced, approaches to compensate the project's remaining emissions should be considered.

The criteria for determining the significance of effects are a two-stage process that involves defining the magnitude of the impacts and the sensitivity of the receptors (i.e. Ireland's National GHG targets). In relation to climate, there is no project specific assessment criteria, but the proposed development will be assessed against the recommended TII significance determination. This takes account of any embedded or committed mitigation measures that form part of the design which should be considered.

TII (TII, 2022) states that professional judgement must be taken into account when contextualising and assessing the significance of a project's GHG impact. In line with ISEP GHG Guidance (ISEP, 2022), TII state that the crux of assessing significance is "*not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050*".

The impact to climate as a result of a proposed development must be assessed as a whole for all phases. Significance is determined using the criteria outlined in Table 8-3 (derived from Table 6.7 of PE-ENV-01104 (TII 2022)) along with consideration of the following two factors:

- The extent to which the trajectory of GHG emissions from the proposed development aligns with Ireland's GHG trajectory to net zero by 2050; and
- The level of mitigation taking place.

Table 8-3 – Significance Criteria for GHGA

Effects	Significance Level	Description
Significant adverse	Major adverse	The project's GHG impacts are not mitigated. The proposed development has not complied with do-minimum standards set through regulation, nor provided reductions required by local or national policies; and No meaningful absolute contribution to Ireland's trajectory towards net zero.
	Moderate adverse	The project's GHG impacts are partially mitigated.

Effects	Significance Level	Description
		The proposed development has partially complied with do-minimum standards set through regulation, and have not fully complied with local or national policies; and Falls short of full contribution to Ireland's trajectory towards net zero.
Not significant	Minor adverse	The project's GHG impacts are mitigated through 'good practice' measures. The proposed development has complied with existing and emerging policy requirements; and Fully in line to achieve Ireland's trajectory towards net zero.
	Negligible	The project's GHG impacts are mitigated beyond design standards. The proposed development has gone well beyond existing and emerging policy requirements; and Well 'ahead of the curve' for Ireland's trajectory towards net zero.
Beneficial	Beneficial	The project's net GHG impacts are below zero and it causes a reduction in atmosphere GHG concentration. The proposed development has gone well beyond existing and emerging policy requirements; and Well 'ahead of the curve' for Ireland's trajectory towards net zero, provides a positive climate impact.

Ireland's carbon budgets can also be used to contextualise the magnitude of GHG emissions from the proposed development (TII, 2022). The approach is based on comparing the net proposed development GHG emissions to the relevant carbon budgets (Government of Ireland, 2025a). With the publication of the Climate Action Act in 2021, CAP23 and later, CAP25, sectoral carbon budgets have been published for comparison with the net GHG emissions from the proposed development over its lifespan.

8.2.3 Climate Change Risk Assessment Methodology

This assessment will not assess the climate change risk of the proposed design during the construction phase as this is considered short term and not specifically relevant to assessing climate vulnerability and risk over the long-term exposure of the site. However, Section 8.4.2.1 does provide a qualitative review of such. This assessment instead focuses on the operational phase of the development. This approach is taken with reference to guidance from TII PE-ENV-01104 (TII, 2022) and ISEP (2020).

The assessment involves determining the vulnerability of the proposed development to climate change. This involves an analysis of the sensitivity and exposure of the development to climate hazards which together provide a measure of vulnerability. This assessment was produced by aligning to the most recent best practice and guidance issued by:

- National Climate Change Risk Assessment. Technical Guidance for Sectoral assessment. (EPA, 2024)
- ISO 14091:2021. Adaptation to climate change — Guidelines on vulnerability, impacts and risk assessment (International Organization for Standardization (ISO), 2021)
- TII PE-ENV-01104: Climate Guidance for National Roads, Light Rail and Rural Cycleways (Offline & Greenways) – Overarching Technical Document (TII, 2022);



- Technical Guidance on the Climate Proofing of Infrastructure in the Period 2021-2027 (European Commission, 2021a); and
- The Institute of Environmental Management and Assessment, Environmental Impact Assessment Guide to: Climate Change Resilience and Adaptation (2nd Edition) (ISEP, 2020).

Section 8.3 presents the receiving environment which details the baseline (1991-2020) and future climatology. Two scenarios have been chosen to assess and compare future climate change (RCP4.5 and RCP8.5).

8.2.3.1 Climate Risk Assessment

An initial screening of risk during the operational phase is conducted, according to the TII guidance PE-ENV-01104. This is carried out by determining the sensitivity of proposed development assets (i.e. receptors) and their exposure to climate change hazards.

The proposed development asset categories must be assigned a level of sensitivity to climate hazards. PE-ENV-01104 (TII, 2022) provides the list of asset categories and climate hazards to be considered. The asset categories will vary for development type and need to be determined on a development-by-development basis.

- **Asset Categories:** Pavements; drainage; structures; utilities; landscaping; signs, light posts, buildings, and fences.
- **Climate Hazards:** Flooding (coastal, pluvial, fluvial); extreme heat; extreme cold; wildfire; drought; extreme wind; lightning and hail; landslides; fog.

First an initial screening of physical hazards is carried out based on the proposed site location (Table 8-9). This is a qualitative screening which intends to only proceed with relevant hazards (e.g., sea level rise is not an applicable hazard to inland areas or wildfire is not considered a hazard due to the site location). Following this relevant hazard will continue to be assessed on their exposure under future climate change.

The sensitivity is based on a High, Medium or Low rating with a score of 1 to 3 assigned as per the criteria below.

- **High Sensitivity** - The climate hazard will or is likely to have a major impact on the asset category. This is a sensitivity score of 3.
- **Medium Sensitivity** - It is possible or likely the climate hazard will have a moderate impact on the asset category. This is a sensitivity score of 2.
- **Low Sensitivity** - It is possible the climate hazard will have a low or negligible impact on the asset category. This is a sensitivity score of 1.

Once the sensitivities have been identified the exposure analysis is undertaken. The exposure analysis involves determining the level of exposure of each climate hazard at the proposed development location irrespective of the proposed development type. For example, flooding could be a risk if the proposed development location is next to a river in a floodplain. Exposure is assigned a level of High, Medium or Low as per the below criteria.

- **High Exposure:** It is almost certain or likely this climate hazard will occur at the proposed development location, i.e. might arise once to several times per year. This is an exposure score of 3.
- **Medium Exposure:** It is possible this climate hazard will occur at the proposed development location, i.e. might arise a number of times in a decade. This is an exposure score of 2.
- **Low Exposure:** It is unlikely or rare this climate hazard will occur at the proposed development location, i.e. might arise a number of times in a generation or in a lifetime. This is an exposure score of 1.

Once the sensitivity and exposure are categorised, a vulnerability analysis is conducted by multiplying the sensitivity and exposure to calculate the vulnerability.

8.2.3.2 Significance Criteria for CCRA

The CCRA involves an initial screening assessment to determine the vulnerability of the proposed development to various climate hazards. The vulnerability is determined by combining the sensitivity and the exposure of the proposed development to various climate hazards.

$$\text{Vulnerability} = \text{Sensitivity} \times \text{Exposure}$$

The vulnerability assessment takes any proposed mitigation into account. Table 8-4 details the vulnerability matrix; vulnerabilities are scored on a high, medium and low scale.

TII guidance (TII, 2022) and the EU technical guidance (European Commission, 2021a) note that if all vulnerabilities are ranked as low in a justified manner, no detailed climate risk assessment may be needed. Therefore, the impact from climate change on the proposed development can be considered to be not significant.

However, where residual medium or high vulnerabilities exist the assessment may need to be progressed to a detailed climate change risk assessment and further mitigation implemented to reduce risks. An assessment of construction phase CCRA impacts is only required according to the TII guidance (TII, 2022) if a detailed CCRA is required.

Table 8-4 Vulnerability Matrix

		Exposure		
		High (3)	Medium (2)	Low (1)
Sensitivity	High (3)	9 - High	6 – High	3 - Medium
	Medium (2)	6 - High	4 - Medium	2 - Low
	Low (1)	3 - Medium	2 – Low	1 - Low

The screening CCRA, detailed in Section 8.4.2.2, did not identify any residual medium or high risks to the proposed development as a result of climate change. Therefore, a detailed CCRA for the construction and operational phase were scoped out.

While a CCRA for the construction phase was not required, best practice mitigation against climate hazards is still recommended in Section 8.6.1.

8.3 Receiving Environment

PE-ENV-01104 (TII, 2022) states that a baseline climate scenario should identify, consistent with the study area for the project, GHG emissions without the proposed development for both the current and future baseline.

Ireland declared a climate and biodiversity emergency in May 2019 and in November 2019 there was European Parliament approval of a resolution declaring a climate and environment emergency in Europe. This, in addition to Ireland's current failure to meet its EU binding targets under Regulation 2018/842 (European Union, 2018) results in changes in GHG emissions either beneficial or adverse being of more significance than previously considered prior to these declarations.

8.3.1 Current GHG Baseline

Data published in July 2025 (EPA, 2025a), indicates that Ireland exceeded, without the use of flexibilities, its 2024 annual limit set under EU's Effort Sharing Decision (ESD) (406/2009/EC) by 1.03 Mt CO₂e. However, the 2024 emissions represent the second consecutive year in which Ireland's emission were below (-4.2%) 1990 levels. ETS (Emissions Trading Scheme) emissions decreased (-1.1%) and ESR (Effort Sharing Regulation) emissions decreased (-2.2%). Ireland's target is an emission reduction of 626 kt of CO₂e by 2030 on an average baseline of 2016 to 2018.

The EPA estimate that 2024 total national GHG emissions, excluding LULUCF, have decreased by 2.0% on 2023 levels to 53.82 Mt CO₂e, with a 0.7 Mt CO₂e (-8.9%) reduction in electricity industries alone. This was driven by a 39.7% share of energy from renewables in 2024 and the complete phase-out of peat for electricity generation. Manufacturing combustion and industrial processes decreased by 4.6% to 6.0 Mt CO₂e in 2024 due to declines in fossil fuel usage. The sector with the highest emissions in 2024 was agriculture at 37.9% of the total, followed by transport at 20.8%. For 2024, total national emissions (including LULUCF) were 57.53 Mt CO₂e (EPA, 2025a) Table 8-5.

The current estimates of national greenhouse gas emissions (including LULUCF) in 2024 are 12.0% below 2018, well off the national climate ambition of a 51% reduction by 2030. The data indicate that from 2021- 2024 Ireland has used 79% (186 Mt CO₂e) of the 295 Mt CO₂e carbon budget for the five-year period 2021-2025. This leaves 21% of the budget available for 2025, requiring a substantial 17.5% annual emissions reduction for 2025 to stay within budget.

Table 8-5 Trends in Total National GHG Emissions 2022 – 2024

Sector <i>Note 1</i>	2022	2023	2024	Total Budget (Mt CO₂e) (2021-2025)	% Budget 2021-2025 Used	Annual Change 2023 to 2024
Electricity	9.69	7.57	6.95	40	85.25%	-8.19%
Transport	11.76	11.8	11.65	54	85.74%	-1.27%
Buildings (Residential)	5.75	5.35	5.61	29	81.31%	4.86%
Buildings (Commercial and Public)	1.45	1.39	1.49	7	82.43%	7.19%
Industry	6.62	6.31	6.01	30	86.77%	-4.75%
Agriculture	21.78	20.72	20.41	106	80.05%	-1.50%
Other <i>Note 2</i>	1.93	1.81	1.63	9	80.33%	-9.94%
LULUCF	3.98	3.89	3.89	–	–	0
Total including LULUCF	62.99	58.83	57.64	295	82.81%	-2.04%

Note 1 Reproduced from latest emissions data on the EPA website (EPA, 2025a).

Note 2 Other includes Petroleum refining, F-Gases and Waste (emissions from solid waste disposal on land, solid waste treatment (composting and anaerobic digestion), wastewater treatment, waste incineration and open burning of waste).

8.3.2 Future GHG Baseline

The future baseline with respect to the GHGA can be considered in relation to the future climate targets which the assessment results will be compared against. In line with TII (TII, 2022) and ISEP GHG guidance (ISEP,

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2022) the future baseline is a trajectory towards net zero by 2050, “whether it [the project] contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050”.

The future baseline will be determined by Ireland meeting its targets set out in the CAP25, and future CAPs, alongside binding 2030 and net zero by 2050 EU targets. In order to meet the commitments under the Paris Agreement, the European Union (EU) enacted ‘Regulation (EU) 2018/842 on binding annual GHG 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’ (hereafter referred to as the Regulation) (European Union, 2018). The Regulation aims to deliver, collectively by the EU in the most cost-effective manner possible, reductions in GHG emissions from the Emission Trading Scheme (ETS) and non-ETS sectors amounting to 43% and 30%, respectively, by 2030 compared to 2005. The Regulation was amended in April 2023 and Ireland must now limit its greenhouse gas emissions by at least 42% by 2030. The ETS is an EU-wide scheme which regulates the GHG emissions of larger industrial emitters including electricity generation, cement manufacturing and heavy industry. The non-ETS sector includes all domestic GHG emitters which do not fall under the ETS scheme and thus includes GHG emissions from transport, residential and commercial buildings and agriculture.

In May 2025, the EPA released the report *Ireland’s Greenhouse Gas Emissions Projections 2024-2055* (EPA, 2025b), which includes total projected emissions and a breakdown of projected emissions per sector under the ‘With Existing Measures’ and ‘With Additional Measures’ scenarios. The EPA projections indicate that currently implemented measures (With Existing Measures) will achieve a reduction of 10% on 2005 levels by 2030, significantly short of the 42% reduction target. If measures in the higher ambition (With Additional Measures) scenario are implemented, EPA projections show that Ireland can achieve a reduction of 22% by 2030, still short of the 42% reduction target.

8.3.3 Current CCRA Baseline

The region of the proposed development has a temperate, oceanic climate, resulting in mild winters and cool summers. This baseline data is derived from the European Centre for Medium-Range Weather Forecasts (ECMWF) ERA5 data reanalysis and includes observed data from meteorological weather stations in Ireland and recorded data from 1950-2020. This method has been chosen to ensure data can be analysed at the daily level and harmoniously compared with future scenarios. The baseline time-period referred to in this assessment was from 1991-2020 and is specific to the county of Carlow.



Figure 8-1 shows the climatology for the 30-year period from 1991 to 2020 indicating the wettest months are from October through to January with October (87mm) being the wettest. August is also notably wet (81mm) on average. The driest month on average was February (64mm), with March and September also experiencing lower than average rainfall. Precipitation in Ireland is largely aligned to its oceanic climate, and it is no surprise that the wettest months align to the periods where low pressure Atlantic storms are most frequent.

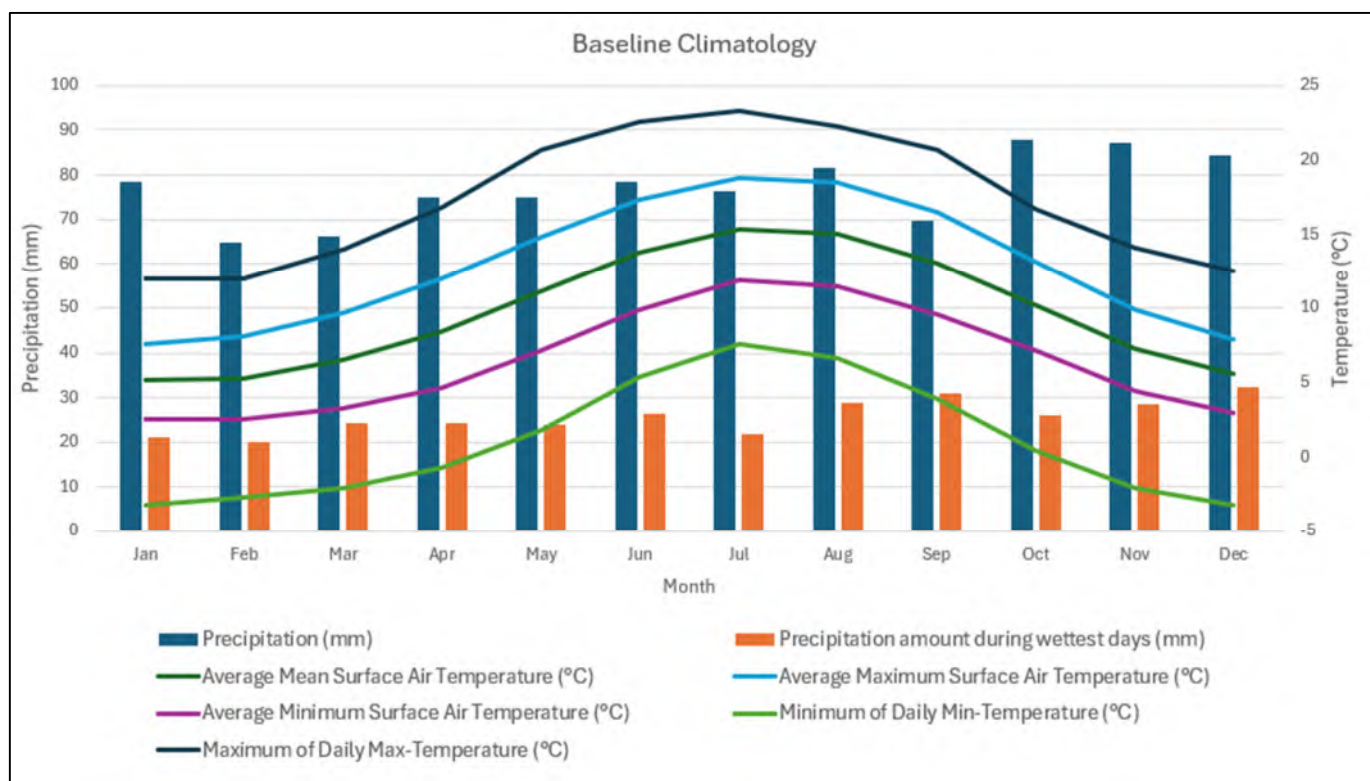


Figure 8-1 - Baseline Climatology for Carlow (1991-2020)

July was the warmest month with a mean temperature of 15.3°C with average mean surface temperatures across the summer months (July – August) >13°C. July is also the warmest month for maximum daily temperatures which showcases the higher value ranges recorded during a particular month. Across the summer months daily maximums >20°C with 23°C on average for July.

January is the coldest month with average mean surface air temperatures of 5.1°C and average minimum of <2°C. For daily minimum temperatures which references the lowest range values (10th percentile range), January remains the coldest -3°C with several other winter and early spring months (February- April) also experiencing minimums of below 0°C.

8.3.4 Future CCRA Baseline

8.3.4.1 Climate Change Impacts and Projections for Ireland

Ireland is already experiencing increased annual rainfall in the north and west, with more variable patterns in the south and east including the area of the proposed development (EPA, 2021b). Key risks identified by the EPA relevant to the proposed development include:

- Increased likelihood of more frequent and intense North Atlantic low-pressure systems bringing high rainfall and storms.
- Greater risk of river and coastal flooding.

- Summer water shortages in the east.
- Impact to water quality.

8.3.4.2 Climate Modelling and Planning

International best practice and national policy such as the NCCRA (2024) and PE-ENV-01104 (TII, 2022) recommends using two emission scenarios to project future climate change. This includes a moderate and high emission scenarios (RCP4.5 and RCP8.5) for future planning. These Representative Concentration Pathways (RCPs) reflect varying levels of global climate mitigation explained below.

- RCP 4.5 (a 'moderate' scenario) represents an approximate 2.4°C increase in global average temperatures (1.7-3.2°C). It assumes moderate mitigation efforts leading to stabilisation of emissions by mid-century and is generally aligned with current policies for emission reduction.
- RCP 8.5 (a 'worst case' / high emissions scenario) represents an approximate 4.3°C increase in global average temperatures (3.2-5.4°C) and assumes continued high emissions with minimal mitigation. This high-end scenario is useful for understanding potential impacts of current emission trends continue. Consequently, this scenario will result in the highest level of physical risk for Ireland, and therefore the greatest requirement for adaptation.

This climate change assessment uses the latest climate change projections, standardised and bias corrected, for Ireland available through the EPA and the TRANSLATE project (Met Éireann, 2023b).

8.3.4.3 Key Findings from Climate Projections

Projected changes include:

- Summer temperatures rising by over 2°C and overall mean temperatures increasing >1°C
- Fewer cold winter nights and more frequent short heatwaves (≥5 days >25°C).
- Rainfall may increase by 4–38%, though summer months could see declines beyond the 2°C warming threshold.

Table 8-6 Future Climate Change Summary of Projections under both RCP scenarios for 2050 period (2040-2070) taken from the EPA climate Ireland Translate Projections.

Climate Hazard	Indicator	Baseline	RCP4.5 (2040-2070)	RCP8.5 (2040-2070)
Temperature	<i>Mean temp (°C)</i>	9.7	11 (+1.3°C)	12.7(+2°C)
	<i>Mean Max temp (°C)</i>	12.8	14.8 (+2°C)	16.4(+3.4°C)
	<i>Mean Min temp (°C)</i>	6.5	7.2 (+0.7°C)	8.9 (+2.4°C)
Precipitation and Flooding	<i>Annual precipitation (mm)</i>	924	968 (+44)	995 (+71)
	<i>Max 1-day (mm)</i>	32	39 (+7)	40 (+8)
Storms and high winds	<i>Winter - Average 10m wind speed (knots)</i>	5	Projected to increase in winter and decrease in summer	
Drought	<i>Absolute Drought</i>	Rare	Marginal increase	Increased Likelihood

Recent weather patterns and records of extreme weather events recorded by Met Éireann have been reviewed.



Considering the 2025 data, Met Éireann states that the latest Irish climate change projections indicate further warming in the future, including warmer winters and reduction in cold spells and subzero temperatures. This will result in longer dry periods and heavy rainfall events. Met Éireann has high confidence in maximum rainfall rates increasing but not in how the frequency or intensity of storms will change with climate change.

Impacts resulting from climate change hazards will evolve and have the potential to include increases in global temperatures and increases in the intensity and frequency of rainfall days per year combined with increases in the intensity and frequency of low-pressure systems in the north Atlantic during the winter storm period. Therefore, it is expected that the climate over the proposed site in Carlow will evolve over time and consideration is needed with respect to this within the design of the proposed development.

8.4 Potential Effects of the Proposed Development

8.4.1 Greenhouse Gas Assessment

8.4.1.1 Construction Phase

The most significant proportion of GHG emissions tend to occur during the construction phase as a result of embodied carbon in construction materials and GHG emissions from construction activities (see Figure 8-2 - Greenhouse Gas Emissions by Activity

Table 8-7 for details). However, once annualised across the 25-year lifespan of the project, operational emissions exceed construction emissions.

The construction phase of the proposed development is predicted to result in 9,513 tCO₂e (381 tCO₂e annualised). Of this, construction materials (backfill material, concrete, steel, plastic) make up 60%. Material transport (import and export of materials for groundworks) account for 15% and fuel usage by construction plant and generators contributes 14%. A small proportion of excavated material will be re-used on the site rather than sending it to landfill. This equates to 43 tCO₂e of avoided GHG emissions.

The embodied carbon emissions associated with the solar panels was not quantified as no Life Cycle Assessment was available. However, the GHG emissions generated during the manufacture of the panels will typically be paid back within 1-4 years (Renewable Energy Hub, 2026).

8.4.1.2 Operational Phase

The operational phase of the proposed development is predicted to result in 49,532 tCO₂e over the 25-year lifespan (1,981 tCO₂e annually). The majority of GHG emissions associated with the operational phase and the overall lifespan of the proposed development, originate from transport to and from site to deliver chemicals and for routine maintenance (47%). Other emission sources include operational energy (31%) and operational waste (17%) which includes sludge and grit.

The process emissions from the chemical usage at the site have minor emissions associated with them, totalling 291 tCO₂e across the 25-year life of the project.

By installing solar panels which generate 325,000kWh of electricity annually, the site is avoiding approximately 84 tCO₂e per year from grid electricity, based on an emissions factor which reflects current carbon intensity. Solar panels will provide 15% of the energy demand of Mortarstown WwTP.



8.4.1.3 Total GHG Emissions Over Construction and Operational Phases

Figure 8-2 and Table 8-7 show the GHG emissions for the proposed development per life-cycle stage based on the output from the TII Carbon Tool. Tonnes of CO₂e emitted during the construction phase are one-off GHG emissions whereas those emitted during the operational phase will be ongoing across the 25-year lifespan of the development.

The total GHG emissions for the proposed development across the 25-year life span are predicted to be 59,045 tCO₂e. Annual GHG emissions equate to 2,362 tCO₂e.

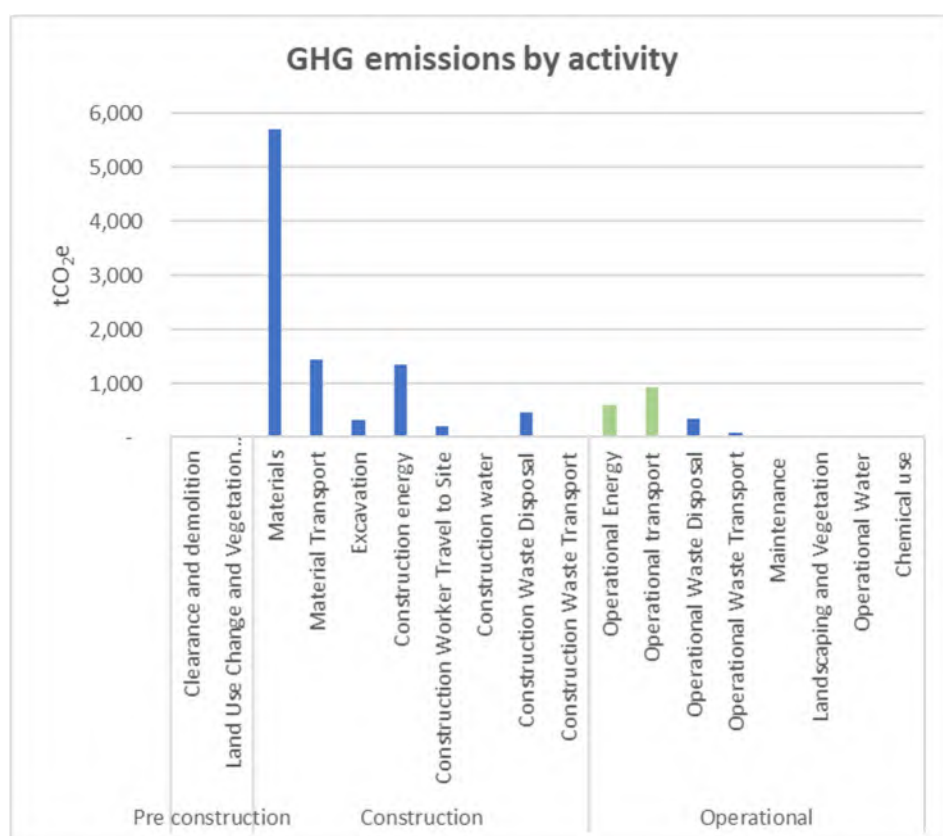


Figure 8-2 - Greenhouse Gas Emissions by Activity

Table 8-7 GHG Assessment Results

GHG Category	Assessment	Elements Considered/ Assumptions	Predicted GHG Emissions (tCO ₂ e)	Relevant Sector for Carbon Budget Comparison
Construction Phase Emissions				
Materials		Aggregates and fill, plastic pipework, concrete, steel	5,697	Industry
Material Transport		Data sought from traffic chapter. Includes vehicle movements from delivery of materials for earthworks and removal of excavated material from site.	1,451	Transport
Clearance and demolition		Site preparation	1	Industry



Excavation	Excavation of topsoil and general excavation	338	Industry
Construction Water Use	Water use	1	Industry
Construction energy use	Construction energy use is based on a conservative estimate of 1000 days construction period.	616	Electricity
Construction Worker Travel	Data from traffic chapter. Includes total car movements across the construction period.	213	Transport
Construction Waste Disposal	Mixed C&D, office waste, wood, metals, paper and aggregate. All waste is assumed to have been sent to landfill, in line with the conservative approach taken. Data provided by design team.	465	Waste
Construction Waste Transport	Transport of waste offsite, assumes 20t HGV and 50km distance to waste site. This excludes transport of excavated material as it has been included under material transport above in line with the Traffic Chapter.	4	Transport
Total Construction Phase Emissions		9,513 tCO₂e (381 tCO₂e annualised)	
Avoided GHG emissions	Reuse of excavated material onsite	-42.6	Industry
Operational Phase Emissions			
Operational Energy	Electricity consumption is likely higher than reported due to the new odour control system however no data was available at the time of the report.	616	Electricity
Operational Water	No data available, assumed low impact	ND	Industry
Operational Waste Disposal	Grit and sludge removed from site as stated in OWMP.	347	Waste
Operational Waste Transport	Transport associated with the removal of grit and sludge calculated within TII tool based on waste disposal volume	68	Transport
Operational Transport	Car trips for routine maintenance and chemical deliveries as set out in the Traffic Chapter.	939	Transport
Chemicals	Process emissions	12	Industry
Total Operational Phase Emissions (annually)		1,981 tCO₂e (annually)	
Avoided GHG emissions (annually)	Solar generation	84 tCO ₂ e	Electricity
Total Construction and Operational Phase Emissions Annualised		2,362 tCO₂e (Annually)	
Total GHG Emissions across project lifespan		59,045 tCO₂e	



The GHG emissions from the development as a total cannot be compared against one specific sector 2030 carbon budget. The emissions are broken down into different assessment categories and these must be compared separately to the relevant sectoral emissions budget. The predicted GHG emissions (as shown in Figure 8-2 and Table 8-7) have been averaged over the full lifespan of the proposed development to give the predicted annual emissions to allow for direct comparison with national annual emissions and targets.

In Table 8-8, GHG emissions have been compared against the carbon budget for the industry, transport and waste sectors in 2030 (Government of Ireland, 2025), against Ireland's total GHG emissions in 2024, against Ireland's EU 2030 target of a 42% reduction in non-ETS sector emissions based on 2005 levels (27.7 Mt CO₂e) (set out in Regulation EU 2018/842 of the European Parliament and of the Council).

The estimated total GHG emissions, when annualised over the 25-year proposed development lifespan, are equivalent to 0.0045% of Ireland's total GHG emissions in 2024. The total annualised energy use emissions are 0.02% of the Electricity sector budget. Total annualised industry-related emissions are 0.006% of Ireland's non-ETS 2030 emissions target and 0.0009% of the 2030 Industry budget. The estimated annualised GHG emissions associated with transport-related activities are 0.018% of the 2030 Transport budget, while annualised waste GHG emissions are 0.04% of the Waste budget.

Table 8-8 Estimated GHG Emissions Relative to Sectoral Budgets and GHG Baseline

Target/Sectoral Budget (tCO ₂ e)		Annualised Development GHG Emissions (tCO ₂ e)		% of Relevant Target/Budget
Ireland's 2024 Total GHG Emissions (existing baseline)	57,640,000	Total GHG Emissions	2,362	0.0041%
2030 Sectoral Budget (Industry Sector)	4,000,000	Total Industry Emissions	253	0.0009%
Non ETS 2030 Target (42% of 2005 ETS Level)	27,722,000			0.006%
2030 Sectoral Budget (Transport Sector)	6,000,000	Total Transport Emissions	1,073	0.018%
2030 Sectoral Budget (Waste Sector)	1,000,000	Total Waste Emissions	365	0.04%
2030 Sectoral Budget (Electricity Sector)	3,000,000	Total Electricity Emissions	670	0.02%

8.4.1.4 GHGA Significance of Effects

The TII and ISEP guidance states that the following two factors should be considered when determining significance:

- The extent to which the trajectory of GHG emissions from the project aligns with Ireland's GHG trajectory to net zero by 2050; and
- The level of mitigation taking place.

Therefore, prior to mitigation, any impact to climate as a result of GHG emissions arising from the construction and operation of the Proposed Development is considered **significant**.

8.4.2 Climate Change Risk Assessment

8.4.2.1 Construction Phase

A detailed CCRA of the construction phase has been scoped out, as discussed in Section 8.2.3. However, consideration has been given to the proposed development's vulnerability to the following climate change hazards with best practice mitigation measures proposed in Section 8.6.1.

- Flood Risk due to increased precipitation, and intense periods of rainfall. This includes fluvial and pluvial flooding.
- Increased temperatures potentially causing water scarcity and prolonged periods of hot weather.
- Reduced temperatures resulting in ice or snow and [possible hazard to working conditions.
- Major Storm Damage, including wind damage.

8.4.2.2 Operational Phase

To determine the vulnerability of the proposed development to climate change, the sensitivity and exposure of the development to various climate hazards must first be determined. Table 8-9 presents the initial qualitative climate hazards screening which are relevant to the proposed development due to the proposed development location and which have been screened out of the assessment.

Table 8-9 Climate Hazard Screening

Climate-related Hazard		Hazard Screening Rationale	Screening
Extreme temperatures	Heat	High temperatures are a key consideration for both construction and long-term operation of the proposed development . Historical data shows rising temperatures in Ireland. Heat and thermal expansion can damage buildings, materials, and road surfaces, and affect the lifecycle of assets.	Screen in
Extreme Temperature	Cold	Snow and ice events pose significant risks to health, safety, and site operations. Road access may be disrupted, and low temperatures can affect assets such as fuel tankers, workers, and infrastructure. Freeze-thaw cycles may cause cracking in concrete and road surfaces, requiring snow clearance and ice management.	Screen in
High precipitation and pluvial flooding		Surface water remains a key vulnerability for any proposed development during both construction and operational phases due to the sensitivity of construction materials and site assets to water exposure.	Screen in
Fluvial flooding		The proposed development site is approximately 200m from the River Barrow. Its impact is considered substantial to the site's security during both operational and construction. The Site Specific Flood Risk Assessment (SSFRA) determines river flooding as a risk.	Screen in

Climate-related Hazard	Hazard Screening Rationale	Screening
Drought	Droughts have occurred across Ireland, previously impacting water supply. Future reductions in availability could directly affect the proposed development 's operations and resilience.	Screen in
Wildfire	The area surrounding the site is largely residential and urban. The proposed site is located at a reasonable distance for this assessment to not view wildfire as a risk for the proposed development or design.	Screen out
High winds and storms	While the site itself is not significantly elevated, existing and proposed assets and design components may be exposed to high winds. Historically, Ireland has experienced several notable storm events including Storm Éowyn and Storm Darragh (2024), which caused widespread damage across Ireland. These storms often bring heavy rainfall and flood warnings, increasing overall risk.	Screen in
Fog	Fog is not considered a significant hazard for this development, as it does not involve transport, aviation, or activities requiring high visibility.	Screen out
Lightning & Hail	The proposed design is not considered at significant risk from electrical storms or severe hail. Severe hail events are rare in Ireland and are not regarded as a major hazard.	Screen out
Landslides and Subsidence	The Geological Society of Ireland (GSI) landslide susceptibility mapping database (GSI, 2025) was reviewed to determine the risk from landslides at the proposed development. Consideration has been given to fluvial erosion however, adequate protective measures are in place to mitigate risks of erosion and landslip from the river.	Screen out
Sea level rise and coastal flooding	Not a coastal location	Screen out

8.4.2.2.1 Climate Vulnerability Assessment

The sensitivity and exposure of the development to the screened in climate hazards must first be established, to then determine the vulnerability of the proposed development to climate change. Flooding (pluvial, fluvial), extreme heat, extreme cold, drought, and extreme wind, have been considered as climate hazards in the context of the proposed development.

The sensitivity of the proposed development to the climate hazards is assessed irrespective of the project location. Table 8-10 details the sensitivity of the proposed development on a scale of high (3), medium (2) and low (1). Once the sensitivity has been established the exposure of the proposed development to each of the climate hazards is determined, this reflects on the possible likelihood of the climate hazard occurring at the project location and is also scored on a scale of high (3), medium (2) and low (1). The product of the sensitivity and exposure is then used to determine the overall vulnerability of the proposed development to each of the climate hazards. The results of the vulnerability assessment are detailed in Table 8-10.

Table 8-10 Climate Change Vulnerability Assessment

Climate Hazard	Sensitivity	Exposure	Vulnerability
Flooding (Pluvial, Fluvial)	1 (Low)	2 (Medium)	2 (Low)
Extreme Heat	1 (Low)	2 (Medium)	2 (Low)



Extreme Cold	1 (Low)	1 (Low)	1 (Low)
Drought	2 (Medium)	1 (Low)	1 (Low)
Extreme Wind	1 (Low)	2 (Medium)	2 (Low)

The sensitivity and exposure of the area was determined with reference to a number of online tools as per the methodology section and with input from the various discipline specialists on the project team. It was concluded that the proposed development does not have any significant vulnerabilities to the identified climate hazards as described in the below sections. All vulnerabilities are classified as low.

Flooding

Future increases in rainfall due to climate change may elevate the risk of both pluvial and fluvial flooding. A SSFRA was undertaken by IE Consulting and indicated there was no risk of pluvial flooding at the site of the Proposed Development. In terms of fluvial flooding, the assessment found that the majority of the site lies within Flood Zone C, indicating a low risk of flooding. However, a small section (proposed outfall pipe and associated headwall) adjacent to the river falls within Flood Zone A and Flood Zone B, where fluvial flooding is possible. However, the potential flood risk to and from the proposed outfall pipe and headwall is considered to be low based on the results of hydraulic modelling. The development as proposed is not predicted to result in an adverse impact to the existing hydrological regime of the area or increase flood risk elsewhere and is therefore considered to be appropriate from a flood risk perspective.

Extreme Wind

In relation to extreme winds, the buildings shall be designed to the appropriate standards to account for the relevant wind loadings events for RCP4.5 and RCP8.5. If required as part of the building design, lightning protection shall be provided but this assessment concludes that lightning is not considered a risk to the site.

Extreme Temperatures (Heat & Cold)

In relation to extreme temperatures, both extreme heat and extreme cold, these have the potential to impact the building materials and some related infrastructure. However, building materials will be selected which meet the relevant design standards and which account for extreme temperatures. The likelihood of extreme cold events in the future is projected to decrease reducing their overall exposure and risk. Therefore, both extreme temperatures (cold and heat) are not considered a significant risk.

Drought

As set out in the Water Chapter (Chapter 12) of this EIAR, the changes in rainfall patterns associated with future climate change will result in reduced low flows associated with an increased frequency of summer droughts and increased evaporation rates. According to the modelling undertaken within Chapter 9, the Q95 flow in the Barrow Catchment would be reduced by 11% by 2080 for a RCP4.5. However, the upgraded WwTP has been designed to ensure that the proposed discharge of treated effluent from the upgraded WwTP does not prevent the River Barrow from achieving 'Good' Water Framework Directive status. Adaptations in the future are possible, should emission limit values exceed set targets.

Summary

Overall, the proposed development has at most low vulnerabilities to the identified climate hazards. Therefore, no detailed risk assessment is required.



8.4.2.3 CCRA Significance of Effects

With design mitigation in place as set out in Section 8.4.2.2.1, there are no significant risks to the proposed development as a result of climate change, i.e. only low vulnerabilities have been identified. In accordance with the EPA Guidelines (EPA, 2022), the significance of effect of the impacts to the proposed development as a result of climate change are **direct, long-term, negative** and **not significant** which is overall **not significant** in EIA terms.

8.5 Do Nothing Scenario

In the Do-Nothing scenario, the site will remain as per the baseline and will change in accordance with trends within the wider area. The Do-Nothing scenario is considered neutral in terms of the climate assessment.

As set out in Chapter 12- Water, increase in precipitation rates, and intense rainfall events, will increase the occurrence of stormwater overflows and the existing Mortarstown WwTP operations would not have the capacity to cope with the increasing flow volumes. The increase in summer droughts will result in a reduction in low river flows. This will have a negative effect on water quality in the River Barrow.

8.6 Mitigation Measures

8.6.1 Construction Phase

Embodied carbon of materials and construction activities will be the primary source of climate impacts during the construction phase. During the construction phase the following best practice measures shall be implemented on site to prevent significant GHG emissions and reduce impacts to climate:

- Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site. A construction waste management plan will be implemented to minimise construction waste sent to landfills. Recycling of materials will be promoted to and reduce the environmental footprint of the site.
- Sourcing materials locally will be prioritised. This will help to reduce transport related GHG emissions and helps support local suppliers, further promoting economic sustainability.
- Material choices and quantities will be reviewed during detailed design, to identify and implement any lower embodied carbon options, where feasible.

These measures will contribute towards UÉ Sustainability Framework which sets out an ambition to Reduce the carbon intensity of capital investment.

As set out in the OWMP opportunities will be taken to:

- Maximise the use of low carbon concrete
- Maximise the use of recycled steel
- Installation of low energy equipment in buildings
- Maximise reuse of materials on site and minimise waste generated
- Maximise the use of local supplier and minimise materials transport to site
- Utilise and implement renewable energy sources for powering the plan



An OTMP (Outline Traffic Management Plan) and CTMP (Construction Traffic Management Plan) are in place for the construction phase of the proposed development. A summary of the CTMP mitigation measures such as information on delivery timing, construction route and car parking can be found in the Traffic assessment (Chapter 10 of this EIAR). In addition the following actions can be taken to reduce impacts to climate:

- Prevention of on-site or delivery vehicles from leaving engines idling, even over short periods.
- Ensure all plant and machinery are well maintained and inspected regularly.

In terms of impact on the proposed development due to climate change, during construction the Contractor will be required to mitigate against the effects of extreme wind/storms, temperature extremes through site risk assessments and method statements. All materials used during construction will be accompanied by certified datasheets which will set out the limiting operating temperatures. Temperatures can affect the performance of some materials, and this will require consideration during construction. During construction, the Contractor will be required to mitigate against the effects of fog, lighting and hail through site risk assessments and method statements.

8.6.2 Operational Phase

The majority of the operational GHG emissions associated with the proposed development are from vehicle use to carry out routine maintenance, deliver chemicals and collect sludge cake. Emissions from these visits will be reduced by using local businesses to carry out required works and ensuring visits are multi-functional where possible to negate the need for additional trips. Electricity consumption also contributes to operational emissions. The installation of solar panels will reduce GHG emissions associated with electricity consumption from the grid which is often generated using fossil fuels. Solar panels will provide 15% of the energy demand of Mortarstown WwTP.

UÉ Sustainability Framework sets out additional measures to reduce impacts to climate including:

- 40% energy demand met from installed renewables and Power Purchase Agreements (PPAs) by 2035
- Half energy intensity by 2030
- Process emissions strategy: Monitoring of process emissions by 2027

8.7 Residual Effects

8.1.1 GHG Residual Effects

TII reference the ISEP guidance (2022) which states that the crux of assessing significance is:

“not whether a project emits GHG emissions, nor even the magnitude of GHG emissions alone, but whether it contributes to reducing GHG emissions relative to a comparable baseline consistent with a trajectory towards net zero by 2050”.

As set out in Table 8-8, the Proposed Development will negatively impeded Irelands trajectory to achieving net zero by 2050 as GHG emissions produced during the construction and operational phases will contribute a small fraction towards the national and sectoral budgets. However, the Proposed Development will minimise its impacts through design and management measures (see Section 8.6). The level of mitigation described in Section 8.6 has therefore been taken into account when determining the residual significance of the proposed development's GHG emissions. Based on the above reasoning, according to the TII significance criteria, the residual significance of the GHG emissions during the construction and operational phase is minor adverse. The ISEP GHG guidance (ISEP, 2022) (which has been embraced by the updated TII Guidance (TII, 2022) in

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Section 6.7.2) describes minor adverse as follows:

“A minor adverse not significant impact is described with: A project that is compatible with the budgeted, science based 1.5°C trajectory (in terms of rate of emissions reduction) and which complies with up-to-date policy and ‘good practice’ reduction measures to achieve that has a minor adverse effect that is not significant. The project may have residual impacts but is doing enough to align with and contribute to the relevant transition scenario. A ‘minor adverse’ or ‘negligible’ non-significant effect conclusion does not necessarily refer to the magnitude of GHG emissions being carbon neutral (i.e. zero on balance) but refers to the likelihood of avoiding severe climate change and achieving net zero by 2050. A ‘minor adverse’ effect or better is a high bar and indicates exemplary performance where a project meets or exceeds measures to achieve net zero earlier than 2050.”

In addition, the TII guidance (2022) describes minor adverse as:

- The proposed developments GHG impacts are mitigated through ‘good practice’ measures.
- The proposed development has complied with existing and emerging policy requirements; and
- Fully in line to achieve Ireland’s trajectory towards net zero.

In accordance with the EPA Guidelines (EPA, 2022), the above criteria equates to an impact of GHG emissions during the construction phase of a **direct** impact due to its presence, that is **long-term** as a result of the atmospheric lifetime of GHG emissions, **negative** due to the emission of GHGs and **slight** based on the reduced contribution of GHG emissions to Irelands national trajectory to net zero, due to the outlined mitigation measures. Overall, the impact on the climate is considered to be **not significant** in EIA terms.

In accordance with the EPA Guidelines (EPA, 2022), the above criteria equates to an impact of GHG emissions during the operational phase of a **direct** impact due to its presence, that is **long-term** as a result of the estimated lifetime of the infrastructure and atmospheric lifetime of GHG emissions, **negative** due to the emission of GHGs and **slight** based on the reduced contribution of GHG emissions to Irelands national trajectory to net zero, due to the outlined mitigation measures. Overall, the impact on the climate is considered to be **not significant** in EIA terms.

CCRA Residual Effects

With design mitigation in place, there are no residual risks to the Proposed Development as a result of climate change. In accordance with the EPA Guidelines (EPA, 2022), the significance of effect of the impacts to the Proposed Development as a result of climate change are **direct** as climate extremes have a direct physical effect on buildings and infrastructure, **long-term** due to the response times of the climate in relation to changes in anthropogenic emissions, **negative** as climate extremes have been shown to damage or adversely affect infrastructure, and **not significant** due to the low vulnerability of the Proposed Development to the effects of climate change once mitigation measures have been embedded, which is overall **not significant** in EIA terms.

8.8 Monitoring Measures

There are no monitoring requirements in relation to climate.

8.9 Difficulties encountered during preparation of this chapter

There were no difficulties encountered when completing the climate assessment.



9. NOISE AND VIBRATION

9.1 Introduction

The development will consist of the upgrade the existing Mortarstown WwTP, construction of a new pumping station at the treatment plant site, construction of a new microtunnel gravity sewer between the existing and the new pumping station along Kilkenny Road, landscaping, boundary treatments, and all ancillary site works. This includes the associated internal roads, lighting, security fencing and landscaping. Please see Chapter 2 for a description of the proposed development.

This report includes a description of the receiving ambient noise climate in the vicinity of the subject site and an assessment of the potential noise and vibration impact associated with the proposed development, during both the short-term construction phase and the long-term operational phase, on its surrounding environment. The assessment of direct, indirect and cumulative noise and vibration impacts on the surrounding environment have been considered.

Mitigation measures are included, where relevant, to ensure the proposed development is constructed and operated in an environmentally sustainable manner in order to ensure minimal impact on the receiving environment.

9.2 Methodology

The following methodology has been prepared based on the requirements of the Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA 2022) and on AWN's experience of preparing the noise and vibration assessments for similar developments. The following approach has been used for this assessment:

- An environmental noise survey has been undertaken in the vicinity of the subject site in order to characterise the existing baseline noise environment;
- A review of applicable standards and guidelines has been conducted in order to set a range of acceptable noise and vibration criteria for the construction and operational phases of the proposed development;
- Predictive calculations have been performed during the construction phase of the proposed development at the nearest sensitive locations to the development site;
- Predictive calculations have been performed to assess the potential impacts associated with the operational of the development at the most sensitive locations surrounding the development site; and
- A schedule of mitigation measures has been proposed to reduce, where necessary, the identified potential outward impacts relating to noise and vibration from the proposed development.

9.2.1 Relevant Legislation and Guidance

The following guidance documents have been complied with when preparing this chapter of the EIAR:

- EPA Guidelines on the Information to be contained in Environmental Impact Statements, Environmental Protection Agency, 2022 (Hereafter EPA 2022);
- British Standard BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise (Hereafter BS5228-1)
- British Standard BS 5228-2:2009+A1:2014 Code of practice for vibration control on construction and open sites – Vibration (Hereafter BS5228-2);



- British Standard BS 7385 – Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from groundborne vibration BSI, 1993 (Hereafter BS7385);
- Design Manual for Roads and Bridges Sustainability & Environment Appraisal LA 111 Noise and Vibration Revision 2 (National England (now National Highways)) 2020 (Hereafter DMRB);
- Guidelines for the Treatment of Noise and Vibration in National Road Schemes, Transport Infrastructure Ireland (TII) (formerly National Roads Authority 2004 (Hereafter TII 2004).
- Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes, Transport Infrastructure Ireland (TII) (formerly National Roads Authority (NRA) 2014 (Hereafter TII 2014);
- ISO 1996: 2017: Acoustics – Description, measurement, and assessment of environmental noise (Hereafter ISO-1996:2017);
- EPA document 'Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities NG4 EPA, 2016 (Hereafter NG4);
- BS 4142:2014: Methods for rating and assessing industrial and commercial sound (Hereafter BS4142);
- Department of Education and Skills (DoES) SDG 02-05-03 Acoustic Performance in New Primary & Post Primary School Buildings (DoES, 2020);
- ISO 9613-2:2024: Acoustics — Attenuation of sound during propagation outdoors Part 2: Engineering method for the prediction of sound pressure levels outdoors (Hereafter ISO-9613-2:2024).

9.2.2 Construction Phase Guidance

9.2.2.1 Criteria for Rating Noise Impacts

There is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. Local authorities normally control construction activities by imposing limits on the hours of operation and may consider noise limits at their discretion.

In the absence of specific noise limits, appropriate criteria relating to permissible construction noise levels for a development of this scale may be found in the British Standard BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Noise.

The approach adopted here calls for the designation of an NSL into a specific category (A, B or C) based on existing ambient noise levels in the absence of construction noise. A threshold noise value is applied to each category. Exceedances (construction noise only) of the threshold value, at the facade of a sensitive receptor during construction, indicates a potential significant noise impact associated with the construction activities. The threshold values recommended by BS5228-1 are set out in Table 9-1 .

Table 9-1 - Example Threshold of Significant Effect at Dwellings

Assessment category and threshold value period (L_{Aeq})	Threshold value, in decibels (dB)		
	Category A ^{Note A}	Category B ^{Note B}	Category C ^{Note C}
Night-time (23:00 to 07:00hrs)	45	50	55
Evenings and weekends ^{Note D}	55	60	65
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75

Note A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.



Note B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.

Note C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.

Note D) 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays

It should be noted that this assessment method is only valid for residential properties.

The approach is as follows: for each period (i.e. daytime, evening and night time) the ambient noise level is determined and rounded to the nearest 5 dB. Baseline monitoring carried out as part of this assessment (Refer to Section 9.3) indicates that the threshold values for Category A are appropriate in terms of the nearest noise sensitive locations being considered in this instance.

9.2.2.2 Fixed Limits

When considering non-residential receptors, such as Carlow Institute of Technology, a boundary with the proposed development, BS 5228-1 gives several examples of acceptable limits for construction noise, the most simplistic being based upon the exceedance of fixed noise limits. For example, paragraph E.2 states:

“Noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut.”

Paragraph E.2 goes on to state: -

“Noise levels, between say 07.00 and 19.00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed:

70 decibels (dBA) in rural, suburban areas away from main road traffic and industrial noise;

75 decibels (dBA) in urban areas near main roads in heavy industrial areas”.

9.2.2.3 Proposed Construction Threshold Noise Levels

Taking into account the proposed documents outlined above and making reference to the baseline noise environment monitored around the development site (see Section 12.3), BS 5228-1 has been used to inform the assessment approach for construction noise.

The following Construction Noise Threshold (CNT) levels are proposed for the construction stage of this development:

- For residential NSLs it is considered appropriate to adopt 65 dB(A) CNT for daytime periods and Saturday mornings.
- For non-residential NSLs it is considered appropriate to adopt the 70 dB(A) CNT, given the urban/industrial environment in which the proposed development is set, in line with BS5228-1 Annex E2.

9.2.2.4 Interpretation of the CNT

In order to assist with interpretation of CNTs,

Table 9-2 - **Description of the magnitude of impacts**

Construction Level	Noise	Magnitude of Impact (DMRB)	EPA Significance of Effect	Determination
Below or equal Noise Level	Baseline	Negligible	Not Significant	Depending on range of CNL and baseline noise level
Above Baseline and below or equal to threshold		Minor	Slight – Moderate	
Above threshold and below or equal to threshold + 5dB		Moderate	Moderate – Significant	
Above threshold + 5dB		Major	Significant – Very Significant	

The adapted DMRB guidance outlined will be used to assess the predicted construction noise levels at NSLs and comment on the likely effects during the construction stages.

9.2.2.5 Consideration of Duration of Effects

Section 3.19 of DMRB states that construction noise shall constitute a significant effect where it is found that a major or moderate magnitude of impact will occur for a duration exceeding:

- 10 or more days or nights in any 15 consecutive days or nights; or
- A total number of days exceeding 40 in any 6 consecutive months (DMRB).

includes guidance as to the likely magnitude of impact associated with construction activities, relative to the CNT. This guidance is derived from Table 3.16 of DMRB: Noise and Vibration and adapted to include the relevant significance effects from the EPA Guidelines (EPA 2022).

Table 9-2 - Description of the magnitude of impacts

Construction Level	Noise	Magnitude of Impact (DMRB)	EPA Effect	Significance of Determination
Below or equal Noise Level	Baseline	Negligible	Not Significant	
Above Baseline and below or equal to threshold		Minor	Slight – Moderate	Depending on range of CNL and baseline noise level
Above threshold and below or equal to threshold + 5dB		Moderate	Moderate – Significant	
Above threshold + 5dB		Major	Significant Significant	– Very

The adapted DMRB guidance outlined will be used to assess the predicted construction noise levels at NSLs and comment on the likely effects during the construction stages.

9.2.2.6 Consideration of Duration of Effects

Section 3.19 of DMRB states that construction noise shall constitute a significant effect where it is found that a major or moderate magnitude of impact will occur for a duration exceeding:

- 10 or more days or nights in any 15 consecutive days or nights; or
- A total number of days exceeding 40 in any 6 consecutive months (DMRB).

9.2.2.7 Criteria for Construction Traffic

Vehicular movement to and from the onshore infrastructure works will make use of the existing road network. To assess the potential impact of additional traffic on the human perception of noise, the following two guidelines are referenced: DMRB Noise and Vibration and the EPA Guidelines.

For construction traffic, due to the short-term period over which this impact occurs, the magnitude of impacts is assessed against the 'short term' period in accordance with the DMRB Noise and Vibration document.

Table 9-3 relates changes in traffic noise levels to impact on human perception based on the guidance contained in these documents.

Table 9-3 - Classification of Magnitude of Noise Impacts in the Short Term

Changes in Sound Level (dB)	Subjective Reaction	DMRB Magnitude of Impact (Short-term)	EPA Significance of Effect
Less than 1	Inaudible	Negligible	Imperceptible
1 – 2.9	Barely Perceptible	Minor	Not Significant
3 – 4.9	Perceptible	Moderate	Slight, Moderate
≥5	Up to a doubling of loudness	Major	Significant

9.2.2.8 Criteria for Vibration Impacts

Vibration standards come in two varieties: those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. In both instances, it is appropriate to consider the magnitude of vibration in terms of Peak Particle Velocity (PPV).

It is acknowledged that humans are particularly sensitive to vibration stimuli and that any perception of vibration may lead to concern. In the case of road traffic, vibration is perceptible at around 0.5 mm/s and may become disturbing or annoying at higher magnitudes. However, higher levels of vibration are typically tolerated for single events or events of short duration. For example, rock breaking and piling, two of the primary sources of vibration during construction, are typically tolerated at vibration levels up to 12 mm/s and 5 mm/s respectively. This guidance is applicable to the daytime only; it is unreasonable to expect people to be tolerant of such activities during the night.

BS 7385 states that there should typically be no cosmetic damage if transient vibration does not exceed 15 mm/s at low frequencies rising to 20 mm/s at 15 Hz and 50 mm/s at 40 Hz and above. These guidelines relate to relatively modern buildings and should be reduced to 50% or less for more critical buildings.

BS 5228-2 recommends that, for soundly constructed residential property and similar structures that are generally in good repair, a threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a peak component particle velocity (in frequency range of predominant pulse) of 15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz and 50 mm/s at 40 Hz and above. Below these values minor damage is unlikely. Where continuous vibration is such as to give rise to dynamic magnification due to resonance, the guide values may need to be reduced by up to 50%. BS 5288-2 also comments that important buildings which are difficult to repair might require special consideration on a case by case basis.



The TII document Guidelines for the Treatment of Noise and Vibration in National Road Schemes (TII 2004) also contains information on the permissible construction vibration levels as follows:

Table 9-4 - Allowable Vibration during Construction Phase

Allowable vibration (in terms of peak particle) at the velocity closest part of sensitive property to the source of vibration, at a frequency of		
Less than 10 Hz	10 to 50 Hz	50 to 100 Hz (and above)
8 mm/s	12.5 mm/s	20 mm/s

9.2.3 Operational Phase Guidance

9.2.3.1.1 BS4142

British Standard 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound describes methods for rating and assessing the impact of sound from an industrial and/or commercial development to a residential receptor. The methods described in this Standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident. The results of baseline surveys of the prevailing background sound level (LA90) allow for the noise impact associated with the development to be assessed. With reference to BS 4142:2014, it is noted that, depending on context, adverse impacts are likely to occur when the rated specific sound level exceeds the prevailing background sound level by +5 dB, with a significant adverse impact occurring at +10 dB or more. Where the rating level does not exceed the background sound level, BS 4142 comments that this is an indication of the specific sound source having a low impact, again depending on the context.

Where sound emissions are found to be tonal, impulsive, intermittent or to have other sound characteristics that are readily distinctive against the residual acoustic environment, BS 4142:2014+A1:2019 advises that penalties be applied to the specific level to arrive at the rating level.

The subjective method for applying a penalty for tonal sound characteristics outlined in BS 4142:2014+A1:2019 recommends the application of a 2 dB penalty for a tone which is just perceptible at the receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible. In relation to intermittency, BS 4142:2014+A1:2019 recommends that if the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied where it is just perceptible at the receptor location to 9 dB where it is highly perceptible. In this assessment, it is understood that the plant items will be designed and selected so that noise emissions do not attract these penalties.

In terms of this development, in accordance with the guidance provided in BS4142:2014+A1:2019, if the noise from the developed facility alone does not exceed the existing background noise level then this is an indication of the noise emissions from the facility having a low impact. Adverse impacts are predicted to occur when the background noise level is exceeded by more than 5 dB.

9.2.3.1.2 Acoustic Performance in New Primary & Post Primary School Buildings (SDG 02-05-03)

In respect of the Carlow Institute for Further Education and Training, appropriate guidance is provided in the document Acoustic Performance in New Primary & Post Primary School Buildings (SDG 02-05-03), published by the Department of Education and Skills in October 2020. The document recommends upper limits for internal ambient noise levels in terms of $L_{Aeq, 30min}$, which is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the 30-minute sample period.



Table 1.0 in SDG 02-05-03 specifies various values for the upper limits of ambient noise ranging from 35dB $L_{Aeq,30min}$ for study areas and classrooms to 50dB $L_{Aeq,30min}$ for kitchens.

In this assessment, a value of 35 dB $L_{Aeq,30min}$ is adopted as the upper limit value for the interior noise level. Allowing for a reduction of 15dB(A) through an open window, this corresponds to a limit of 50dB $L_{Aeq,30min}$ for noise levels at the façade of the school.

9.2.3.1.3 EPA Noise Guidance NG4

Although not directly applicable, reference is also made here to the Environmental Protection Agency document Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4). From Section 4.3 of the document:

All reasonably practicable measures should be adopted at licensed facilities to minimise the noise impact of the activity, and BAT should be used in the selection and implementation of appropriate noise mitigation measures and controls. While BAT must be applied on a case by case basis, the noise attributable solely to on-site activities, expressed as a free field value at any NSL, should not generally exceed the values given below.:

Typical Limit Values for Noise from Licensed Sites:

Daytime (07:00 to 19:00hrs) – 55dB $L_{Ar,T}$;

Evening (19:00 to 23:00hrs) – 50dB $L_{Ar,T}$;

Night-time (23:00 to 07:00hrs) – 45dB $L_{Aeq,T}$.

However, the guidance adds “In particularly quiet areas, such as remote or rural settings, where the background noise levels are very low, lower noise limits may be more appropriate and this may be reflected in more stringent licence limits being set.”

In Section 4.4 of NG4 an Area of Low Background Noise satisfies all three of the following criteria:

- Average Daytime Background Noise Level ≤ 40 dB L_{AF90} , and;
- Average Evening Background Noise Level ≤ 35 dB L_{AF90} , and;
- Average Night-time Background Noise Level ≤ 30 dB L_{AF90} .

In instances where a site is in an area of low background noise the EPA recommends the following stricter noise criteria:

- Daytime (07:00 to 19:00hrs) – 45dB $L_{Ar,T}$;
- Evening (19:00 to 23:00hrs) – 40dB $L_{Ar,T}$;
- Night-time (23:00 to 07:00hrs) – 35dB $L_{Aeq,T}$.

9.2.3.1.4 Criteria for Operational Traffic

In order to assist with the interpretation of the noise associated with vehicular traffic on public roads, Table 9-5 offers guidance as to the likely impact associated with any particular change in traffic noise level based on the DMRB LA 111 Noise and Vibration (UKHE 2020) and the EPA Guidelines (EPA, 2022).



Table 9-5 - Classification of Magnitude of Noise Impacts in the Long Term

Changes in Sound Level (dB)	Subjective Reaction	DMRB Magnitude of Impact (Short-term)	EPA Significance of Effect
0.0 – 0.9	Inaudible	Negligible	Imperceptible
1 – 2.9	Barely Perceptible		Not Significant
3 – 4.9	Perceptible	Minor	Slight, Moderate
5 – 9.9	Up to a doubling of loudness	Moderate	Moderate to Significant
≥10	Doubling of loudness and above	Major	Significant to Very Significant

9.2.3.2 Vibration

The proposed development does not generate significant levels of vibration in the operational phase; operational vibration is therefore scoped out of this assessment.

9.3 Receiving Environment

9.3.1 Noise-sensitive Locations

In the first instance it is considered appropriate to define a noise sensitive location. In this context, it is considered prudent to give consideration to adopt the definition supplied by the Environmental Protection Agency (EPA) which states the following in NG4 Appendix I:

NSL – any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or other area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels.

The nearest noise sensitive locations to the site are highlighted on Figure 9-1, all of which are residential houses except for R22 thru R24, which are educational buildings within Carlow Institute of Technology. Once effects are assessed and mitigated at these locations, there is no significant impact any location at greater distances.

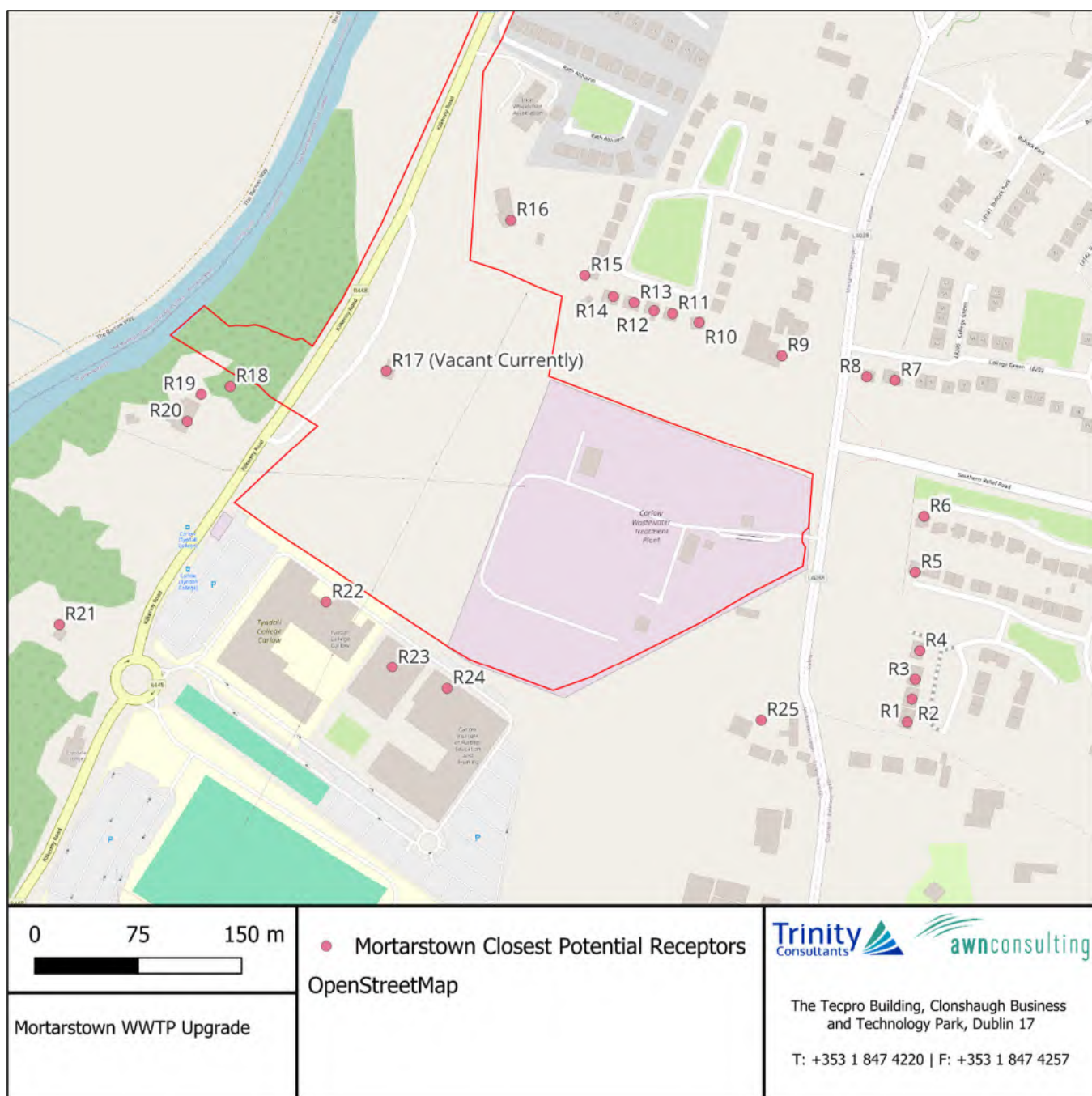


Figure 9-1 – Noise-sensitive Locations

9.3.2 Noise Survey Locations

An environmental noise survey has been conducted at the site in order to quantify the existing noise environment. The survey was conducted in general accordance with ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise.

Figure 9-2 illustrates the noise measurement locations in the vicinity of the site at which noise monitoring was undertaken as part of the current assessment.



Figure 9-2 Baseline Noise Measurement Locations

The locations are described as follows:

- AN1 in line with houses at College Green to the northeast of the WwTP site
- AN2 in The Glen housing area to the north of the main site
- AN3 along a side road / lay-by to the west of the site, near where the proposed pipe crosses under the R448 road
- AN4 at the boundary of the existing site near the educational buildings to the south of the main site, and
- AN5 by a set of houses near the existing pumping station.

9.3.3 Survey Periods

Attended noise measurements were conducted between 13:26hrs on 18th June 2025 and 00:24 19th June 2025. Measurement of noise sources on site were carried out between 11:58 – 13:17 on the 18th June 2025.

The weather during the survey period was dry with varying cloud cover. Wind speeds were low in the range of 3-4m/s and a temperature ranging 15 degrees Celsius (night-time) and 23 degrees Celsius (day-time).

9.3.4 Personnel and Instrumentation

AWN carried out the noise survey. Measurements were performed using a Rion NL-53 sound level meter, serial number 251904, last calibrated on 16 April 2025. Field calibrations were completed at the beginning and end of the survey using a Rion NC-75 calibrator, serial number 34724227, last calibrated on the 10th September 2024.

9.3.5 Measurement Parameters

The noise survey results are presented in terms of the following parameters.

L_{Aeq} is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.

L_{A90} is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

9.3.6 Survey Results

AN1: The noise environment at location AN1 was dominated by intermittent Green Road traffic noise and distant road traffic noise. Birdsong and occasional dog barks were also audible occasionally at this monitoring location. During the day-time measurements the WwTP was not audible. During the evening-time and night-time measurements the WwTP became barely audible at AN1.

AN2: The noise environment at location AN2 was dominated by distant Green Road traffic noise and other traffic noise. Birdsong and leaf rustling were also audible occasionally at this monitoring location. During the day-time measurements the WwTP was not audible. During the evening-time and night-time measurements the WwTP became barely audible at AN2.

AN3: The noise environment at location AN3 was dominated by Kilkenny Road traffic noise and distant road traffic noise during Kilkenny Road traffic lulls. Birdsong and occasional pedestrian noise were also audible occasionally at this monitoring location. The WwTP was not audible at this location during the day, evening or night time surveys.

AN4: The noise environment at location AN4 was dominated by the WwTPs aeration basins and air blower house operational noise. Birdsong, distant voices from Carlow Institute and livestock in adjacent field were also audible at the monitoring location. Only day-time measurement were taken at AN4 and the WwTP was audible during these measurements.

AN5: The noise environment at location AN5 was dominated by Kilkenny Road traffic noise and distant road traffic noise during Kilkenny Road traffic lulls. Pedestrian's walking by the sound level meter were also audible occasionally at this monitoring location. The WwTPs pump house was not audible during the measurements.



Table 9-6 reviews the typical existing noise levels at the sample locations discussed above.

Table 9-6 - Measured Noise Levels

Location	Period	Start Time	Sound Pressure Level (dB)	
			L _{Aeq,15min}	L _{AF90,15min}
AN1	Day	13:26	49	37
		15:00	54	40
		16:34	59	39
		Average	56	39
	Evening	21:25	51	39
	Night	23:04	49	31
		23:48	40	31
		Average	47	31
AN2	Day	13:45	43	37
		15:19	45	40
		16:52	57	39
		Average	53	39
	Evening	21:44	42	35
	Night	23:27	41	28
		00:09	32	28
		Average	39	28
AN3	Day	14:39	68	47
		16:13	68	47
		17:30	71	54
		Average	70	49
	Evening	22:23	44	43
	Night	22:25	60	35
		00:03	59	33
		Average	60	34
AN4	Day	13:15	45	43
		14:29	47	44
		15:29	47	45
		Average	46	44
AN5	Day	14:16	67	48
		15:54	75	47
		17:12	68	49

Location	Period	Start Time	Sound Pressure Level (dB)	
			L _{Aeq,15min}	L _{AF90,15min}
		Average	72	48
	Evening	22:04	63	42
	Night	23:06	64	35
		23:44	65	34
		Average	65	34

9.4 Likely Significant Effects on Noise & Vibration during Construction Phase

The largest noise and vibration impact of the proposed development will occur during the construction phase due to the operation of various plant machinery and HGV movement to, from and around the site. However, the construction phase can be classed as a short-term phase; it is proposed that the construction activities for the proposed development are anticipated to run for 18-20 months between Quarter 4 2027 and Quarter 2 2029.

The nearest noise-sensitive locations to the site are:

- Carlow Institute of Technology at a distance of 50 m from the proposed works to the building façade;
- the dwellings at The Glen at a distance of approximately 65 m from the northern boundary of the proposed development, and
- the dwellings at Cluain Buí at a distance of approximately 75 m from the eastern boundary of the proposed development.

Thresholds for significant noise from construction can be determined by referring to Table 9-1 (BS 5228-1) and the baseline ambient noise levels, as outlined in the assessment criteria section. The daytime significance threshold for construction noise at the site is set at 65 dB L_{Aeq,T}. A night-time threshold is not included as construction work will not be taking place at night.

9.4.1 Construction at Main WwTP Site

This section addresses the likely noise and vibration effects of the following phases of the proposed development:

- Demolition Phase (refer to Section 2.2 in Chapter 2 Project Description);
- Decommissioning Phase (refer to Section 2.3 and 2.4), and
- Construction Phase (refer to Section 2.5 and 2.6).

BS 5228-1 contains noise level data for various construction plant items. The noise levels relating to site clearance, ground excavation and loading lorries (dozers, tracked excavators and wheeled loaders) reach a maximum of 81 dB L_{Aeq,T} at a distance of 10 m. For this assessment, a worst-case scenario is assumed of 3 no. such items with a sound pressure level (SPL) of 81 dB at 10 m operating simultaneously along the closest works boundary. This would result in a total noise level of 86 dB at 10 m and an equivalent combined sound power level of 114 dB L_{WA}. This conservative assumption is made for developments of this size, on the basis that it is unlikely that more than 3 no. items of such plant/equipment would be operating simultaneously in such close proximity to each other.

Table 9-7 shows the potential noise levels calculated at various distances based on the assumed sound power level and attenuation provided by the barrier of 10 dB.

Table 9-7 – Typical Noise Levels associated with Construction Plant Items (BS5228-1)

Description of Noise Source	Sound Power Level (dB L _{WA})	Calculated noise levels (dB L _{Aeq,T}) at varying distances (m)			
		50	65	75	100
3 no. items each with SPL of 81 dB at 10 m operating simultaneously	114	69	65	63	67

The predicted noise level at 50 m from the works, representing the Carlow Institute of Technology is 69 dB L_{Aeq,T}, which is within the fixed limit of 70 dB L_{Aeq,T} as discussed in Section 9.2.2.2.

The predicted noise levels at 65 m at greater distances, representing the residential dwellings to the east and north of the site are within the criterion of 65 dB L_{Aeq,T}.

The construction noise impact of works at the main site are considered negative, not significant and short-term.

9.4.2 Pumping Station Decommissioning

Works are also proposed at the Pumping Station. Distances to noise-sensitive locations are of the order of 15 m; assuming the same plant items as on the main site, and that the works will be surrounded by solid hoarding the predicted noise level is 70 dB L_{Aeq,T}. The construction noise impact of works at the main site are considered negative, significant and short-term, and therefore mitigation measures will be required.

9.4.3 Outfall Pipe Construction

An outfall pipe is to be constructed from the west side of the site to the River Barrow. The nearest NSL to this part of the works is a house labelled R18 in Figure 9-1, at a distance of 18 m from the proposed pipe. Assuming again the same construction plant noise sources, the predicted construction noise level at R18 is 79 dB L_{Aeq,T}. This is in excess of the construction noise threshold of 65 dB L_{Aeq,T}. However, considering the short duration of the noise-generating works for the pipe, and the time frames described in Section, 9.2.2.6, the noise impact of the construction of the outfall pipe is negative, not significant, and temporary.

In order to construct the head wall on the riverbank, a temporary cofferdam installation will be carried out from a barge operating on River Barrow. The nearest NSL to this head wall is R19 at a distance of 40 m.

In respect of noise from the sheet piling activity, reference is made to BS5228-1 Table C.3 Reference 8, which states a noise level of 88 dB(A) at 10 m. Using the same methodology as in Section 9.4.1, the predicted noise level is 71 dB L_{Aeq,T}, at a distance of 40 m, which is above the threshold of 65 dB L_{Aeq,T}. Similarly, considering the short duration of the piling activity, and the time frames described in Section, 9.2.2.6, the noise impact of the construction of the head wall is negative, not significant, and temporary.

9.4.4 Construction Vibration

In respect of vibration during the sheet pile driving, expected vibration levels during piling have been determined through reference to published empirical data. British Standard BS 5228 – Part 2: Vibration publishes the measured magnitude of vibration (in terms of Peak Particle Velocity) for sheet piling into soft clay as:

- 2.5 to 4.3 mm/s at a distance of 4.8 m and;
- <0.5 mm/s at a distance of 24 m.

Taking into account the distance of 40 m to R19, the closest NSL, vibration levels due to piling will be significantly reduced. Vibration levels at the closest neighbouring buildings will be orders of magnitude below the limits set out in Table 9-4 to avoid any cosmetic damage to buildings. The impacts are predicted to be negative, not significant and temporary.

9.4.5 Construction Traffic

Forecast construction traffic volumes to and from the construction site are set out in Chapter 10 –Traffic. Traffic flows along the surrounding road network in terms of Annual Average Daily Traffic (AADT) for the Do Nothing and Do Something scenarios have been reviewed to calculate the change in traffic noise during the construction phase of the Proposed Development.

The calculated changes in noise levels during the year of construction of the development (2027) are summarised in Table 9-8 and confirm that the increases in traffic noise levels due to construction traffic are neutral, imperceptible and short-term.

Table 9-8 - Change in traffic noise level (Year of Construction 2027)

Road	AADT Do Nothing	AADT Do Something	AADT Increase (%)	Change in Noise Level (±dB)
Kilkenny Road North	11,501	11,531	0.26	+0.01
Kilkenny Road South	11,009	11,325	2.87	+0.12
Green Road	2,185	2,533	15.93	+0.64
M9	19,000	19,316	1.66	+0.07

9.5 Likely Significant Effects on Noise and Vibration during Operational Phase

The primary sources of outward noise in the operational context are deemed long term and will involve:

- plant noise from the waste water treatment plant;
- additional vehicular traffic on public roads.

These topics are discussed in the following sections.



9.5.1 Noise from Waste Water Treatment Plant

In order to calculate the noise levels at the neighbouring houses due to the additional plant items, a computer-based noise model has been developed.

Proprietary noise calculation software has been used for the purposes of this modelling exercise. DGMR iNoise is a proprietary noise calculation package for computing noise levels in the vicinity of noise sources. iNoise calculates noise levels in different ways depending on the selected prediction standard. In general, however, the resultant noise level is calculated taking into account a range of factors affecting the propagation of sound, including:

- the magnitude of the noise source in terms of A-weighted sound power levels (LWA);
- the distance between the source and receiver;
- the presence of obstacles such as screens or barriers in the propagation path;
- the presence of reflecting surfaces;
- the hardness of the ground between the source and receiver, and
- attenuation due to atmospheric absorption.

ISO9613-2:2024 calculates the noise level based on each of the factors discussed previously. However, the effect of meteorological conditions is significantly simplified by calculating the average downwind sound pressure level, $L_{AT(DW)}$, for the following conditions:

- wind direction at an angle of $\pm 45^\circ$ to the direction connecting the centre of the dominant sound source and the centre of the specified receiver region with the wind blowing from source to receiver, and;
 - wind speed between approximately 1 m/s and 5 m/s, measured at a height of 3 m to 11 m above the ground.
- The equations and calculations also hold for average propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs on clear calm nights. See Appendix 9.2 for details of the noise modelling parameters used for this assessment.

9.5.1.1 Source Sound Power Levels

Sound power levels for the new items of plant were obtained by measuring noise levels at reference distances from the existing noise sources on site. For each item, a noise spectrum in octave bands was also measured. The resulting sound power levels are summarised in Table 9-9. The reference numbers correspond with those on drawing 5161805_EWE_DR_MOR_4103 submitted with the planning application, shows locations of the noise sources within the site.

Table 9-9 – Sound Power Levels utilised in Noise Model

Ref.	Sound Source	Sound Power Level dB(A)									
		63	125	250	500	1k	2k	4k	8k	dB(A)	
1	Inlet Wet Well From Kilkenny Road P.S.	45	55	65	65	64	60	50	54	70	
4	New Inlet Works	42	45	55	65	65	64	60	50	70	
7	Stormwater Holding Tanks Back Pump Station	61	62	64	64	67	64	60	54	72	

9.5.2 Noise Model Results

Using the noise model described above, the noise predicted levels at the locations shown in Figure 9-1 are presented for daytime, evening time and night-time periods in Table 9-10, Table 9-11, Table 9-12 below.

For daytime and evening time periods, no adverse impact at any location is indicated by the assessment method. For night-time periods, the +3 dB increases at R11 to R14 are rated in BS4142 as “Adverse Impact ‘Possible’” but it is important to note that the predicted noise level is 31 dB $L_{Aeq,T}$, which remains a low level of environmental noise. This low level of predicted noise can be compared against the EPA night-time noise criterion for an area of low background noise, would be slightly higher than this predicted level, at 35 dB L_{Aeq} .

Table 9-10 – Noise Assessment for Daytime Periods

NSL Ref.	Predicted Noise Level, dB $L_{Aeq,T}$	Background Noise Level, dB L_{A90}	Noise Increase	BS4142 Assessment
R01	22	39	--	No Adverse Impact
R02	21	39	--	No Adverse Impact
R03	23	39	--	No Adverse Impact
R04	25	39	--	No Adverse Impact
R05	25	39	--	No Adverse Impact
R06	25	39	--	No Adverse Impact
R07	25	39	--	No Adverse Impact
R08	26	39	--	No Adverse Impact
R09	27	39	--	No Adverse Impact
R10	30	39	--	No Adverse Impact
R11	31	39	--	No Adverse Impact
R12	31	39	--	No Adverse Impact
R13	31	39	--	No Adverse Impact
R14	31	39	--	No Adverse Impact
R15	30	39	--	No Adverse Impact
R16	28	39	--	No Adverse Impact
R17 (Vacant)	34	--	--	--
R18	25	47	--	No Adverse Impact

NSL Ref.	Predicted Level, dB LAeq,T	Noise	Background Level, dB LA90	Noise	Increase	BS4142 Assessment
R19	24		47		--	No Adverse Impact
R20	24		47		--	No Adverse Impact
R21	21		47		--	No Adverse Impact
R22	27		48		--	No Adverse Impact
R23	28		48		--	No Adverse Impact
R24	29		48		--	No Adverse Impact
R25	26		48		--	No Adverse Impact
R26	22		48		--	No Adverse Impact

Table 9-11 – Noise Assessment for Evening Periods

NSL Ref.	Predicted Level, dB LAeq,T	Noise	Background Level, dB LA90	Noise	Increase	BS4142 Assessment
R01	22		39		--	No Adverse Impact
R02	21		39		--	No Adverse Impact
R03	23		39		--	No Adverse Impact
R04	25		39		--	No Adverse Impact
R05	25		39		--	No Adverse Impact
R06	25		39		--	No Adverse Impact
R07	25		39		--	No Adverse Impact
R08	26		39		--	No Adverse Impact
R09	27		35		--	No Adverse Impact
R10	30		35		--	No Adverse Impact
R11	31		35		--	No Adverse Impact
R12	31		35		--	No Adverse Impact
R13	31		35		--	No Adverse Impact



NSL Ref.	Predicted Noise Level, dB LAeq,T	Noise Background Level, dB LA90	Noise Increase	BS4142 Assessment
R14	31	35	--	No Adverse Impact
R15	30	35	--	No Adverse Impact
R16	28	35	--	No Adverse Impact
R17 (Vacant)	34	--	--	--
R18	25	43	--	No Adverse Impact
R19	24	43	--	No Adverse Impact
R20	24	43	--	No Adverse Impact
R21	21	43	--	No Adverse Impact
R22	27	42	--	No Adverse Impact
R23	28	42	--	No Adverse Impact
R24	29	42	--	No Adverse Impact
R25	26	42	--	No Adverse Impact
R26	22	42	--	No Adverse Impact

Table 9-12 – Noise Assessment for Night-time periods

NSL Ref.	Predicted Noise Level, dB LAeq,T	Noise Background Level, dB LA90	Noise Increase	BS4142 Assessment
R01	22	31	--	No Adverse Impact
R02	21	31	--	No Adverse Impact
R03	23	31	--	No Adverse Impact
R04	25	31	--	No Adverse Impact
R05	25	31	--	No Adverse Impact
R06	25	31	--	No Adverse Impact
R07	25	31	--	No Adverse Impact
R08	26	31	--	No Adverse Impact



NSL Ref.	Predicted Level, dB LAeq,T	Noise Background Level, dB LA90	Noise Increase	BS4142 Assessment	
R09	27	28	--	No Adverse Impact	
R10	30	28	+2	Adverse Unlikely	Impact
R11	31	28	+3	Adverse 'Possible'	Impact
R12	31	28	+3	Adverse 'Possible'	Impact
R13	31	28	+3	Adverse 'Possible'	Impact
R14	31	28	+3	Adverse 'Possible'	Impact
R15	30	28	+2	Adverse Unlikely	Impact
R16	28	28	--	No Adverse Impact	
R17 (Vacant)	34	--	--	--	
R18	25	34	--	No Adverse Impact	
R19	24	34	--	No Adverse Impact	
R20	24	34	--	No Adverse Impact	
R21	21	34	--	No Adverse Impact	
R22	27	34	--	No Adverse Impact	
R23	28	34	--	No Adverse Impact	
R24	29	34	--	No Adverse Impact	
R25	26	34	--	No Adverse Impact	
R26	22	34	--	No Adverse Impact	

9.5.2.1 Assessment of Significance

Taking the BS4142 assessment of the predicted noise levels into account, it is considered that the noise effects of the proposed development at nearby NSLs is neutral to negative, imperceptible to not significant and long-term. No mitigation measures are required in respect of noise.

9.5.3 Additional vehicle movements on surrounding roads

For the purposes of assessing the potential noise impact, it is appropriate to consider the relative change in noise level associated with additional vehicle movements on surrounding roads with and without the Proposed Development. A traffic impact assessment relating to the Proposed Development has been presented in Chapter 10 –Traffic. Traffic flows along the surrounding road network in terms of Annual Average Daily Traffic (AADT) for the Do Nothing and Do Something scenarios have been reviewed to calculate the change in traffic noise.

The calculated changes in noise levels during the year of opening of the development (2029) are summarised in Table 9-13 and confirm that the increases in traffic noise levels are neutral, imperceptible and short-term.

Table 9-13 - Change in traffic noise level (Year of Opening 2029)

Road	AADT Do Nothing	AADT Do Something	AADT Increase (%)	Change in Noise Level (±dB)
Kilkenny Road North	11,779	11,791	0.10	+0.00
Kilkenny Road South	11,280	11,308	0.25	+0.01
Green Road	2,238	2,278	1.79	+0.08
M9	19,517	19,545	0.14	+0.01

Table 9-14 summarises the calculated change in noise levels during Year of Opening + 5 (2034) and confirms that increases in traffic noise levels are neutral, imperceptible and long-term.

Table 9-14 - Change in traffic noise level (Year of Opening +5 2034)

Road	AADT Do Nothing	AADT Do Something	AADT Increase (%)	Change in Noise Level (±dB)
Kilkenny Road North	12,166	12,178	0.10	+0.00
Kilkenny Road South	11,654	11,682	0.24	+0.01
Green Road	2,316	2,356	1.73	+0.07
M9	20,246	20,274	0.14	+0.01

Table 9-15 summarises the calculated change in noise levels during Year of Opening + 15 (2044) and confirms that increases in traffic noise levels are neutral, imperceptible and long-term.



Table 9-15 - Change in traffic noise level (Year of Opening +15 2044)

Road		AADT Do Nothing	AADT Do Something	AADT Increase (%)	Change in Noise Level (±dB)
Kilkenny North	Road	13,063	13,075	0.09	+0.00
Kilkenny South	Road	12,525	12,553	0.22	+0.01
Green Road		2,497	2,537	1.60	+0.07
M9		21,996	22,024	0.13	+0.01

9.5.4 Vibration

There is no source of vibration associated with the operation of the development that will give rise to impacts at nearby sensitive locations. In terms of these the operational phase of the development the associated effect is stated to be neutral, imperceptible and long-term.

9.6 Do Nothing Scenario

In the absence of the proposed development being constructed, the noise environment at the nearest noise sensitive locations and within the development site will remain largely unchanged resulting in a neutral and local impact in the long-term

9.7 Mitigation Measures

In order to sufficiently ameliorate the likely noise and vibration impacts, a schedule of noise control measures has been formulated for both construction and operational phases associated with the Proposed Development.

9.7.1 Construction Phase

With regard to construction activities, including demolition and decommissioning, best practice operational and control measures for noise and vibration from construction sites are found within BS 5228 (2009 +A1 2014) Code of Practice for Noise and Vibration Control on Construction and Open Sites Parts 1 and 2.

BS5228 includes guidance on several aspects of construction site practices, including, but not limited to:

- selection of quiet plant;
- control of noise sources;
- screening (boundary, and or localised plant screening);
- hours of work;
- liaison with the public, and;
- monitoring.



Detailed comment is offered on these items in the following paragraphs. Noise control measures that will be considered include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work and noise monitoring.

9.7.1.1 Selection of Quiet Plant

This practice is recommended in relation to sites with static plant such as compressors and generators. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures where possible. The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item should be selected wherever possible.

9.7.1.2 Noise Control at Source

If replacing a noisy item of plant is not a viable or a practical option, consideration should be given to noise control "at source". This refers to the modification of an item of plant or the application of improved sound reduction methods in consultation with the supplier. For example, resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can often be controlled by fixing resilient materials in between the surfaces in contact.

BS5228 states that "as far as reasonably practicable sources of significant noise should be enclosed". In applying this guidance, constraints such as mobility, ventilation, access and safety must be taken into account. Items suitable for enclosure include pumps and generators.

BS5228 makes a number of recommendations in relation to "use and siting of equipment". These are all directly relevant and hence are reproduced below. These recommendations will be adopted on site.

"Plant should always be used in accordance with manufacturers' instructions. Care should be taken to place site equipment away from noise-sensitive areas. Where possible, loading and unloading should also be carried out away from such areas.

Machines such as cranes that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum. Machines should not be left running unnecessarily, as this can be noisy and waste energy.

Plant known to emit noise strongly in one direction should, when possible, be orientated so that the noise is directed away from noise-sensitive areas. Attendant operators of the plant can also benefit from this acoustical phenomenon by sheltering, when possible, in the area with reduced noise levels.

*Acoustic covers to engines should be kept closed when the engines are in use and idling. The use of compressors that have effective acoustic enclosures and are designed to operate when their access panels are closed is recommended.**

Materials should be lowered whenever practicable and should not be dropped. The surfaces on to which the materials are being moved could be covered by resilient material."

Other forms of noise control at source relevant to the development works are set out below:

- For mobile plant items such as cranes, dump trucks, excavators and loaders, the installation of an acoustic exhaust and or maintaining enclosure panels closed during operation can reduce noise levels by up to 10dB. Mobile plant should be switched off when not in use and not left idling.
- For percussive tools such as pneumatic concrete breakers and tools a number of noise control measures include fitting muffler or sound reducing equipment to the breaker 'tool' and ensure any leaks in the air lines

are sealed. Erect localised screens around breaker or drill bit when in operation in close proximity to noise sensitive boundaries.

- For concrete mixers, control measures should be employed during cleaning to ensure no impulsive hammering is undertaken at the mixer drum.
- For all materials handling ensure that materials are not dropped from excessive heights, lining drops chutes and dump trucks with resilient materials.
- Demountable enclosures can also be used to screen operatives using hand tools/breakers and will be moved around site as necessary.
- All items of plant should be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

9.7.1.3 Screening

Typically screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to all other forms of noise control. The effectiveness of a noise screen will depend on the height and length of the screen and its position relative to both the source and receiver.

Screening may be a useful form of noise control when works are taking place at basement and ground level to screen noise levels at ground floor adjacent buildings.

In addition, careful planning of the site layout should also be considered. The placement of site buildings such as offices and stores and in some instances materials such as aggregate can provide a degree of noise screening if placed between the source and the receiver. The use of localised mobile (mobile hoarding screens and / or acoustic quilts) to items of plant with the potential to generate high levels of noise are an effective noise control measure. These options should be considered when percussive works are taking place in close proximity to the nearest sensitive perimeter buildings.

9.7.1.4 Liaison with the Public

A designated noise liaison should be appointed to site during construction works. All noise complaints should be logged and followed up in a prompt fashion by the liaison officer. In addition, prior to particularly noisy construction activity, e.g. demolition, breaking, piling, etc., the liaison officer should inform the nearest noise sensitive locations of the time and expected duration of the noisy works.

9.7.1.5 Hours of Work

Construction works will be undertaken within the times below, taken from the Construction Management Plan:

- Monday to Friday 07:00 to 19:00hrs
- Saturday 07:00 to 14:00hrs
- Sunday and Public Holidays No noisy work on site.

9.7.1.6 Monitoring

During the construction phase consideration may be given to noise and vibration monitoring at the nearest sensitive locations, where high level of noise and or vibration are expected. Specifically, noise monitoring will be carried out at the nearest noise-sensitive locations to the pumping station decommissioning works, to ensure that noise levels are controlled to within criteria. Similarly, during the construction of the head wall for the outfall pipe, vibration monitoring will be carried out at the nearest noise-sensitive location.



9.7.2 Operational Phase

Predicted operational due to the proposed development noise levels are below the levels at which significant effects would be expected. No mitigation measures are required.

9.8 Residual Effects

9.8.1 Construction Phase

During the construction phase (including demolition and decommissioning phases) of the proposed development there will be some impact on nearby noise sensitive properties due to noise emissions from site traffic and other activities. The application of noise limits (i.e. as per 9.2.2.1), along with implementation of appropriate noise and vibration control measures (as summarised in Section 9.7.1), will ensure that noise and vibration impact is kept to a minimum. Also, it is reiterated that any construction noise effects will be slight to significant (dependant on location), negative and short-term in nature.

9.8.2 Operational Phase

Proprietary noise and vibration control measures will be employed in order to ensure that noise emissions from plant do not exceed the adopted criterion at the façade of any nearby noise sensitive locations. In addition, noise emissions will be broadband in nature and should not contain any tonal or impulsive elements. The resultant noise effect is negative, not significant and long-term.

9.9 Monitoring Measures

As discussed in Section 9.7.1.6, construction noise monitoring will be carried out to monitor construction noise levels at the nearest noise-sensitive locations to the pumping station commissioning works.

In respect of the operational phase, given that the operational noise emissions will not exceed the adopted criterion noise monitoring is not applicable to the proposed development.

9.10 Difficulties encountered during the preparation of this chapter

No difficulties were encountered during the preparation of this chapter.

10. TRAFFIC

This chapter of the EIAR reviews the existing receiving environment in relation to current road traffic characteristics and establishes the associated baseline scenario. It also assesses the proposed development to identify its likely effects on the traffic environment.

10.1 Proposed Development Background

10.1.1 Site Context

The proposed site on which the upgrades of the WwTP are proposed are zoned 'Utilities & Strategic Infrastructure' under the Carlow County Development Plan 2022-2028 (CDP)⁹³ with the objective '*to provide for the needs of all transport users and other utility providers*'. The area to the north of the WwTP is not zoned. The area where the new outfall pipe is proposed is zoned as '*Amenity & Open Space*' zoning with the objective to '*To preserve, provide for and improve active and passive recreational public and private open space*' and a small portion zoned for '*Residential 1. Established*' zoning with the objective '*to protect and enhance the amenity of developed residential communities*'. The outfall pipe will be installed by a combination of micro tunnelling and open cut trench excavation methods.

The following infrastructure will be laid along the existing R448/Kilkenny Road:

- New Rising Main
- New Microtunnel Gravity Sewer

Lands within the wider vicinity of the site are also used for residential, commercial and industrial uses. There are no built heritage features of note. The site is in proximity to the River Barrow and River Nore, Special Area of Conservation (SAC)(Site Code: 002162). There is no known history of flooding associated with the site.

10.2 Proposed Development Description and Site Location

The development will consist of the upgrade the existing Mortarstown WwTP, construction of a new inlet pump station at the treatment plant site, construction of a new microtunnel gravity sewer along Kilkenny Road, between the existing Kilkenny Road Pumping Station and the new inlet pump station, landscaping, boundary treatments, and all ancillary site works. This includes the associated internal roads, lighting, security fencing and landscaping.

The current WwTP access from Green Road will be retained. A new internal vehicle access point will be provided to facilitate entry to the rear of the UÉ-owned property situated to the west of the WwTP boundary. The current Kilkenny Road Pumping Station access will also be retained.

The proposed WwTP upgrade works will be developed to the west of the existing plant footprint, taking in areas of agricultural land and part of the adjoining UÉ property.

The proposal also includes the demolition of the inlet works, the stormwater holding tank, the sludge cake transfer facility, and 2 no. small chambers as well as decommissioning of the Kilkenny Road WwPS, final

⁹³ Carlow County Council Development Plan 2022 – 2028 [Layout](#)

clarifiers (2 no.) and 2 no. rising mains. In addition, the existing outfall pipe will be replaced with a new outfall pipeline.

The existing WwTP site is ca. 3.79 hectares (ha) and after completion of the upgrade works the Site will expand to ca. 5.53ha. The total Proposed Development site area (Red line boundary) is ca. 10.766 ha in size, as presented below.



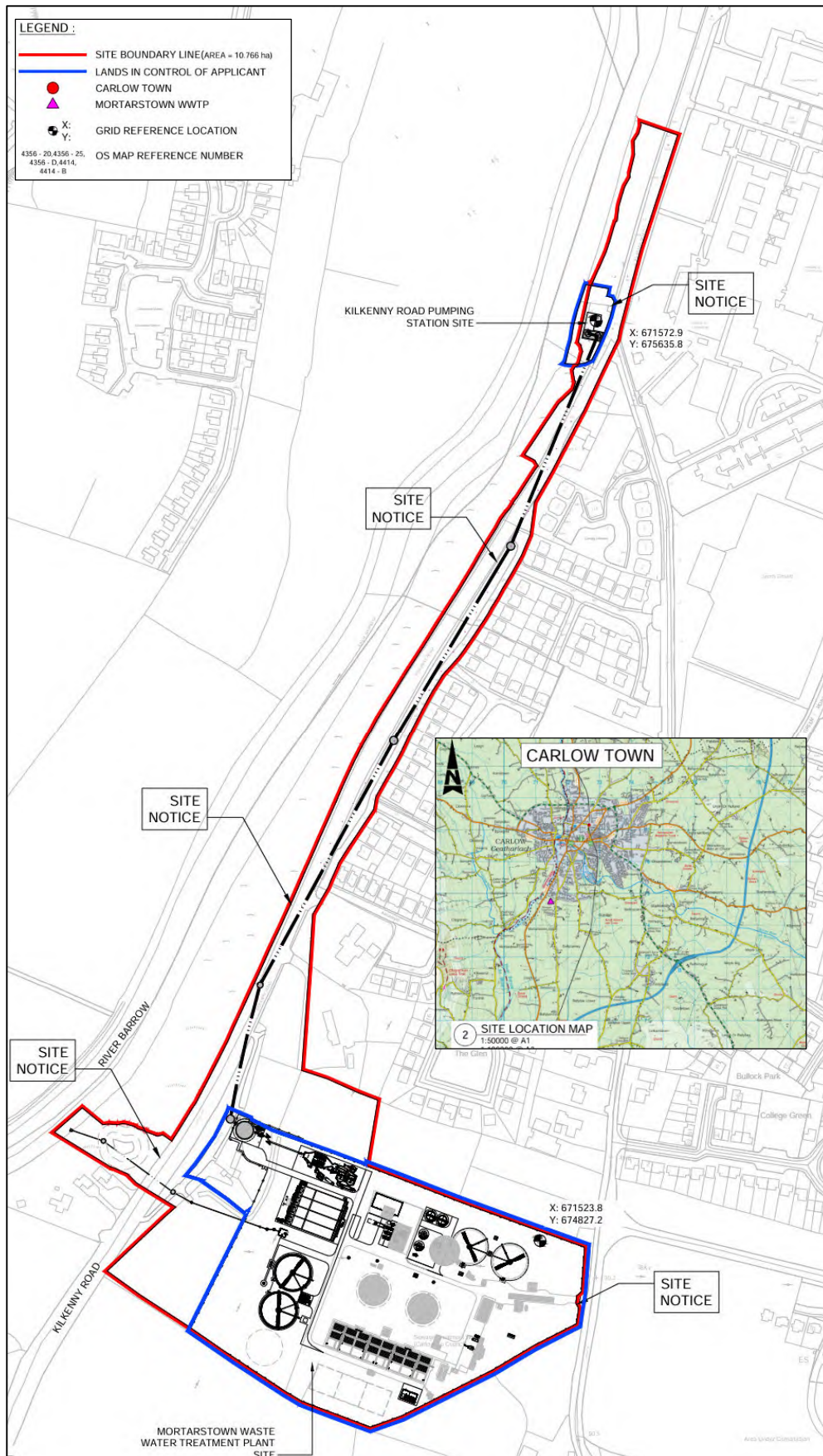


Figure 10-1 - Layout of Proposed Works (including redline boundary)

Further details are provided in Chapter 1 and 2 of the report.

10.3 Assessment Methodology

Engagement with key stakeholders was carried out during the preparation of the project design and subsequent assessment. SETU, Tyndall College and Carlow Institute of Further Education were invited to the public consultation event. Refer to Section 1.9, Chapter 1 for further details on the public consultation and comprehensive pre-application consultation undertaken to date.

The TII Traffic and Transport Assessment Guidelines (PE-PDV-02045) provide a framework that supports an integrated approach to development, ensuring more efficient use of existing transport infrastructure, reduced travel demand, and improved road safety. The Guidelines specify that a Traffic and Transport Assessment (TTA) should include an analysis of road network traffic flows for the base year, opening year, and future forecast scenarios.

Table 2.2 of the Guidelines sets out the Advisory Thresholds for Traffic and Transport Assessment Where National Roads Are Affected. A TTA is generally required where a proposed development is expected to generate more than 100 two-way vehicle trips during the AM or PM peak hours.

In this instance, the proposed WwTP upgrade is a very low-trip-intensity development. During the operational phase, it is expected to generate approximately 16 Passenger Car Unit (PCU⁹⁴) trips per day, with the majority occurring outside the peak periods (08:00–09:00 and 17:00–18:00). During the construction phase, traffic is expected to peak at approximately 42 PCU trips in the busiest hour, again largely outside the network peak hours. Traffic during peak periods is expected to be approximately 4 PCUs.

On this basis, the development traffic is substantially below the advisory thresholds, and a full Traffic and Transport Assessment is therefore not required.

However, adopting a precautionary approach, a capacity assessment of the key road links along the most likely construction haulage route has been undertaken. While the final contractor methodology will determine the exact routing, it is anticipated that the majority of HGV movements will route to/from the M9 via M9 Junction 6, and through the Kilkenny Road / Green Road junction, as illustrated in **Figure 10-2** below. This route is considered the most logical and has been used to assess impacts on the local road network.

10.3.1 Consultation with nearby Educational Campus

UÉ held a non-statutory public consultation on the proposed Carlow (Mortarstown) Wastewater Treatment Plant (WwTP) Upgrade between Monday 22 September and Sunday 19 October 2025. The non-statutory public consultation sought feedback from the local community and stakeholders including South East Technological University (SETU), Tyndall College and Carlow Institute of Further Education. Further details on the public consultation can be found in Carlow (Mortarstown) Wastewater Treatment Plant Upgrade Consultation Report.

⁹⁴ Vehicle to PCU conversion as per TfL ValUÉs; Motor Cycle – 0.4, Passenger Car/LGV – 1.0, Medium Goods Vehicle (MGV/OGV1) – 1.5, Buses and Coaches – 2.0 and Heavy Goods Vehicle (HGV/OGV2) – 2.3
Source - <https://cdn.tii.ie/publications/PE-PAG-02016-02.pdf>

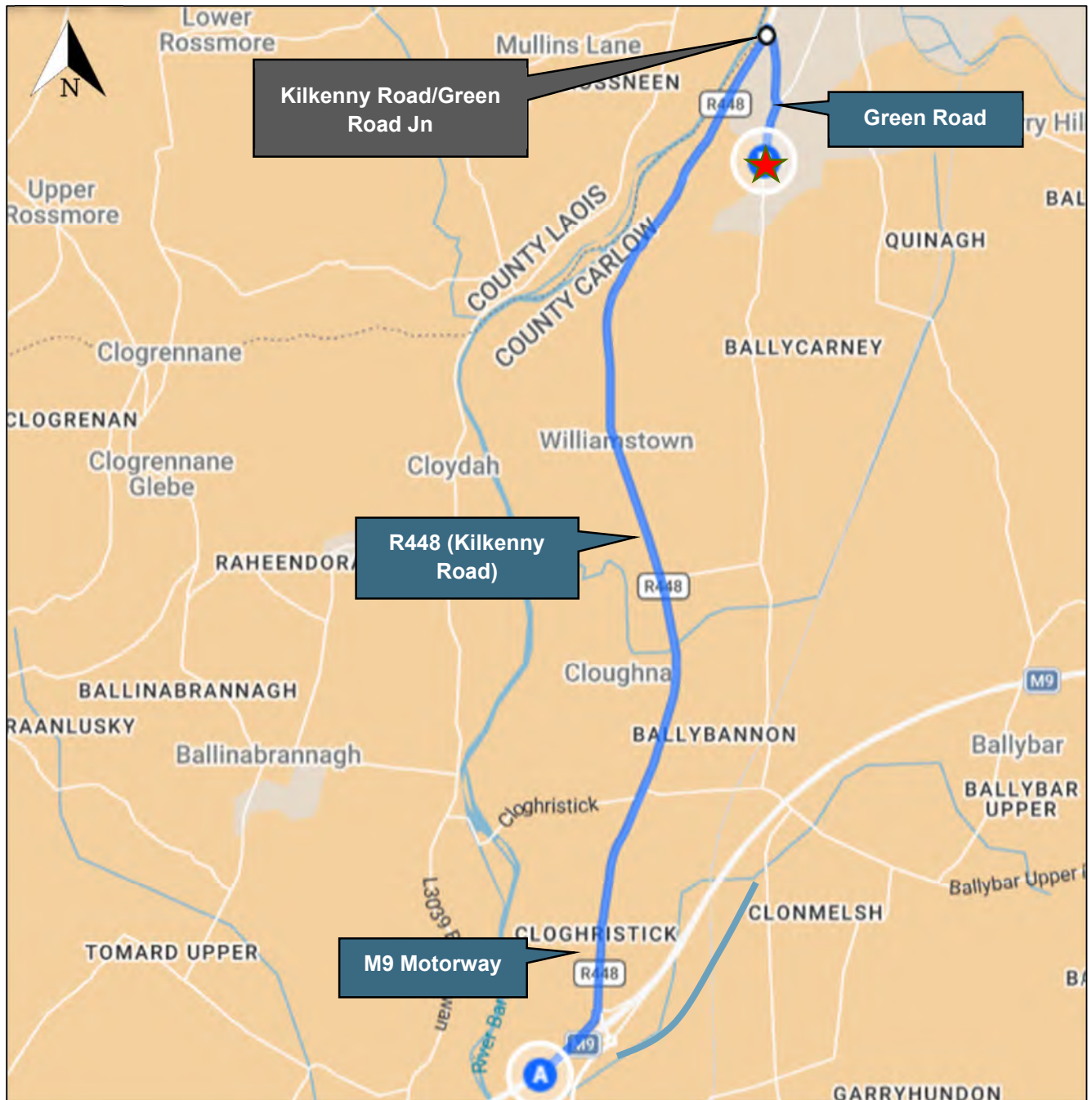


Figure 10-2 - Haulage Route

Given this routing, the **Kilkenny Road / Green Road junction** is the key junction for assessment. Traffic surveys were undertaken at this junction to establish baseline flows on Kilkenny Road and Green Road. M9 traffic volumes were obtained using TII Traffic Monitoring Units. Details of all traffic data sources are provided in Section 10.5.

The assessment has been undertaken in accordance with the TII Guidelines and comprises the following components:

- **Baseline Transportation Review:** Undertake a review of current planning policies and objectives, existing public transport services, walking and cycling network and existing and roads infrastructure.

- **Baseline Traffic Flow Review:** Undertake site visits to review current traffic conditions and to make observations on same. Identify key junctions where traffic count survey information is required.
- **Future Transport Infrastructure Review:** Undertake a review of current transport policies, plans and strategy to identify future short, medium and long term transport proposals which may have a material effect on the travel behaviour associated with the proposed development.
- **Development Proposals Review:** Review the proposed development in terms of provision for access by walking, cycling, public transport and car.
- **Transport Characteristics Review:** Undertake an assessment of the likely modal share, trip generation, assignment and distribution having regard to existing and potential future traffic patterns on the local road network.
- **Identification of Local Road Network Proposals:** Identify proposed junction works on the local road network in terms of new junctions, improvements for pedestrians, cyclists and traffic at existing junctions.
- **Assessment of Road Effect – Construction Phase:** Undertake an assessment of the potential traffic generation during the construction phase and assess the percentage traffic effect likely to occur and to identify any appropriate mitigation.
- **Assessment of Road Effect – Operational Phase:** Undertake an assessment of the key junctions during the operational base year, opening year, opening year plus five and opening year plus fifteen assessment years for both 'without development' and 'with development' scenarios in order to determine future operation and any necessary mitigation measures required.

10.4 Policy Review

This traffic chapter has been prepared in accordance with European Union (Environmental Impact Assessment Directive (2011/92/EU as amended by 2014/52/EU) and European Union (Planning and Development) (Environmental Impact Assessment) Regulations and with due regard to the following EIAR guidance:

- Environmental Protection Agency (EPA) 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports' published in 2022;
- EPA Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)' published in September 2003;
- European Commission (EC) 'Environmental Impact Assessment of Projects Guidance on Scoping (Directive 2011/92/EU as amended by 2014/52/EU)', published in 2017;
- EC '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)', published in 2017;
- Department of Housing, Local Government and Heritage (DoHPLG) 'Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment' published in August 2018;
- TII Traffic and Transport Assessment Guidelines (PE-PDV-02045, published in May 2024);
- TII Project Appraisal Guidelines – Travel Demand Projections (PE-PAG-02017, published in October 2021);
- Carlow County Development Plan (2022-2028);
- Transport Infrastructure Ireland: Traffic and Transport Assessment Guidelines (PE-PDV-02045, published in May 2014);
- Department of Transport Tourism and Sport: Design Manual for Urban Roads and Streets (DMURS); and,
- Traffic Capacity of Urban Road, TA79/99 by DMRB, UK.

10.5 Receiving Environment

A summary of the receiving environment is provided below.

10.5.1 Site Access

The existing treatment plant has two access points, and it is intended that both access points will be retained.

- The first access is located via Green Road, approximately 900 m south of the Green Road / Kilkenny Road junction, as illustrated in Figure 10-3.
- The second existing residential access is located to the west of the site and forms part of the current site access arrangement, as shown in Figure 10-4.

The existing access to PS along Kilkenny Road (shown in Figure 10-5) is also intended to be retained.



Figure 10-3 - Existing Site Access along Green Road



Figure 10-4 - Existing Site Access Route from Adjacent Residential Area



Figure 10-5 – Existing Kilkenny PS Access along Kilkenny Road (R448)

10.5.2 Surrounding Road Network

The surrounding road network and associated speed limits are summarised below:

- **Kilkenny Road (R448):** It is a regional road provides an important connection between Carlow, Waterford, and intermediate settlements. In the vicinity of the site, the speed limit for the road is 50 km/h.
- **Green Road:** It is a local access road linking Ballycarney Road with the wider Carlow urban area, including the Granby Row / Hanover Road / Blackbog Road junction. Speed limit in the vicinity of the site is 80 km/h.

10.5.3 Existing Baseline Traffic

As outlined earlier in Section 10.3, Table 2-2 of the TII *Traffic and Transport Assessment Guidelines* (PE-PDV-02045) indicates that a Transport Assessment is generally required where a development is expected to generate more than **100 vehicle trips per hour during peak periods**. The Proposed Development is expected to generate significantly fewer vehicle movements than this threshold, particularly during peak hours. Therefore, a full network-wide assessment is not warranted.

Accordingly, only the **key links** likely to be used for construction haulage have been included in the capacity analysis. Baseline traffic volumes for these links were derived from (i) traffic surveys undertaken by specialist sub-contractors, and (ii) TII Traffic Monitoring Unit (TMU) data for the M9 near Junction 6.

10.1.1.1 Traffic Volume for Kilkenny Road and Green Road

As noted previously in Section 10.3, the proposed development is expected to generate very low traffic volumes, well below the thresholds set out in Table 2-2 of the TII Traffic and Transport Assessment Guidelines. Accordingly, a full Transport Assessment is not required, and the analysis focuses solely on a capacity assessment of the key links likely to be used by construction and operational traffic.

Given that all trips during both the construction and operational phases will route through the Kilkenny Road / Green Road junction to access the site via the existing entrance on Green Road, traffic surveys at multiple junctions were not necessary. The R448 / Green Road junction was identified as the optimal survey location because it:

- provides traffic volumes for both Green Road and Kilkenny Road, in both the town-centre and motorway directions,
- lies between two access points serving the SETU campuses, thereby capturing educational-related traffic, and
- represents the primary access point for construction-related trips.

In accordance with TII guidance, traffic surveys should be undertaken on a **neutral weekday**, i.e., outside school holiday periods and not during a week containing a public holiday. In addition, Mondays and Fridays are not considered to represent typical weekday travel patterns; therefore, surveys should be undertaken on a **Tuesday, Wednesday, or Thursday**. The guidelines also require a **minimum 12-hour count (07:00–19:00)** to capture the full AM and PM peak periods.

In line with these requirements, a **12-hour fully classified Junction Turning Count (JTC)** survey was undertaken by **IDASO** on **Thursday, 22 May 2025**. The survey recorded all vehicle types, including pedal cycles, cars, LGVs and HGVs. As the survey was conducted during a period of normal academic activity, the resulting turning movements represent typical weekday conditions, including peak educational traffic generated by the SETU campuses. The data therefore provides robust and representative link volumes for use in this assessment.

The location of the surveyed junction is shown in Figure 10-6.

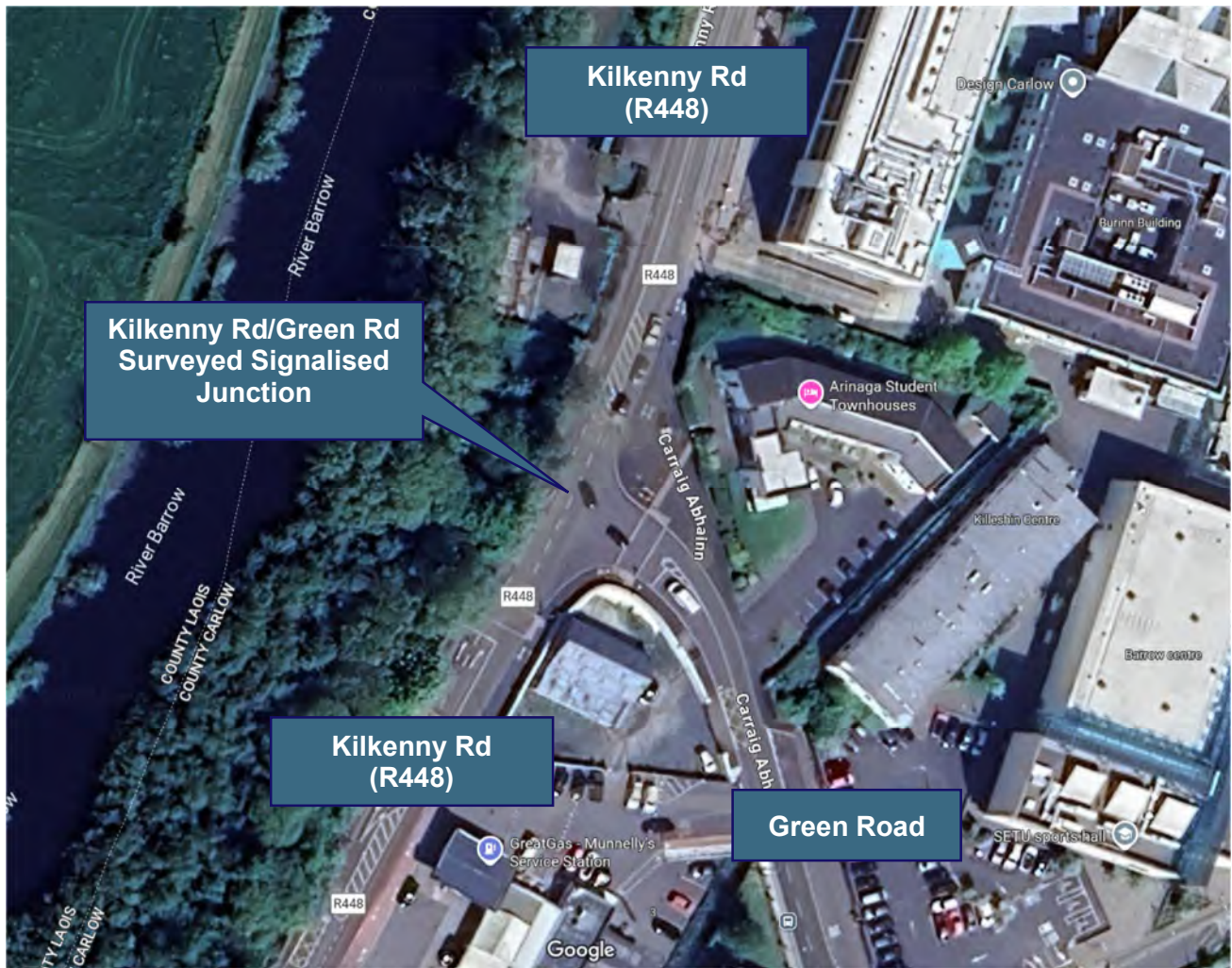


Figure 10-6 - Location of traffic survey

10.1.1.2 M9 Motorway Traffic Volume

In addition to the above survey, traffic data from the TII Traffic Monitoring Unit **TMU M09 054.0 N**, located on the M9 between **Junction 6 Carlow (South)** and **Junction 7 Paulstown, Powerstown, Co. Carlow**, was used to establish baseline motorway traffic conditions. This TMU provides a representative indication of typical traffic flows on the M9 in the vicinity of the Proposed Development.

For the purpose of this assessment, **average weekday traffic data for the full year 2025** was extracted. The dataset excludes weekends, public holidays, and any days on which abnormal events or incidents were recorded near M9 Junction 6, ensuring the use of reliable baseline conditions.

The TMU location is illustrated in **Figure 10-7** below.

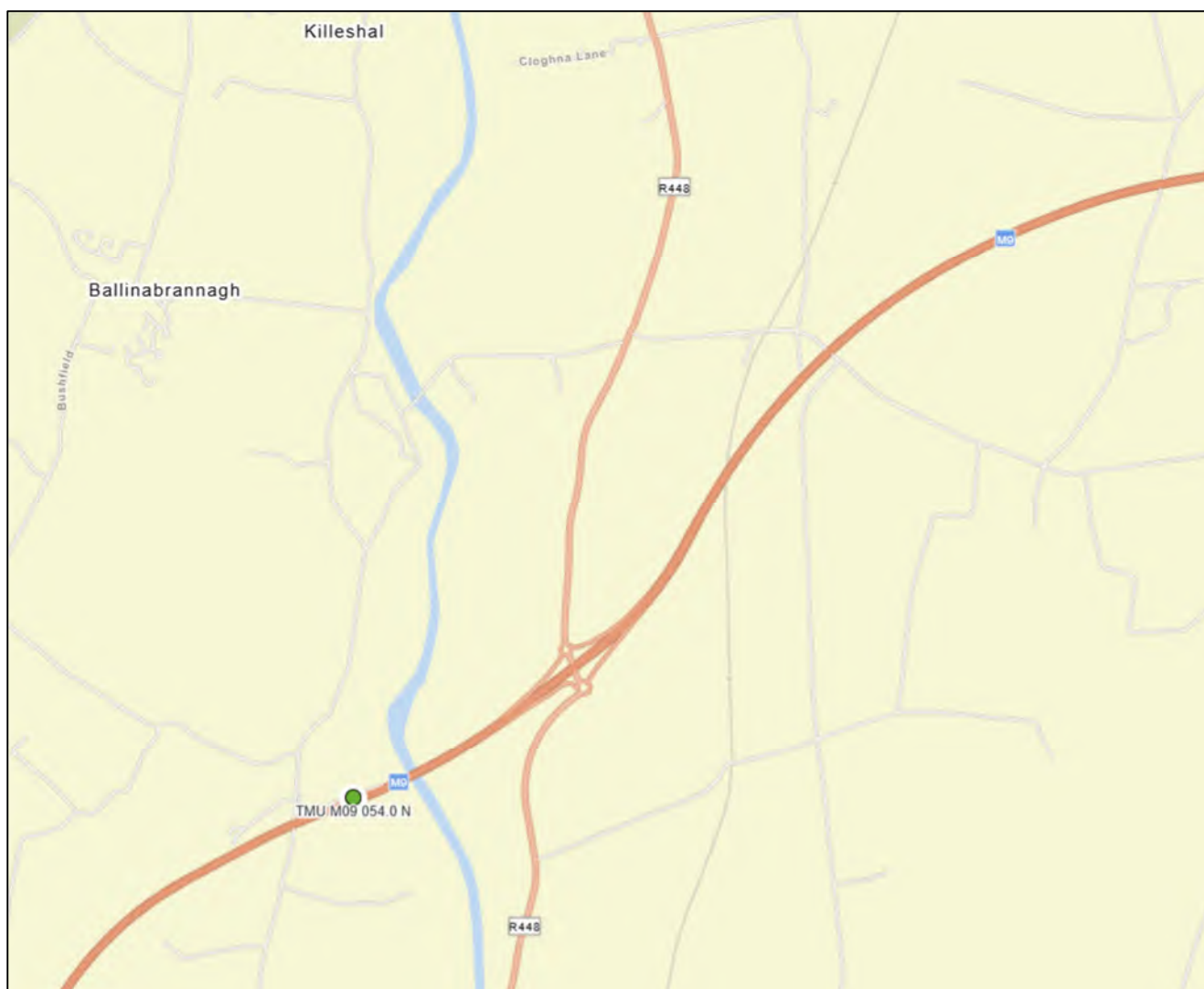


Figure 10-7 - Location of TII TMU (M9)

Based on the above, the two-way traffic volumes for each link, showing how they vary by hour, are summarised in the graphs below.

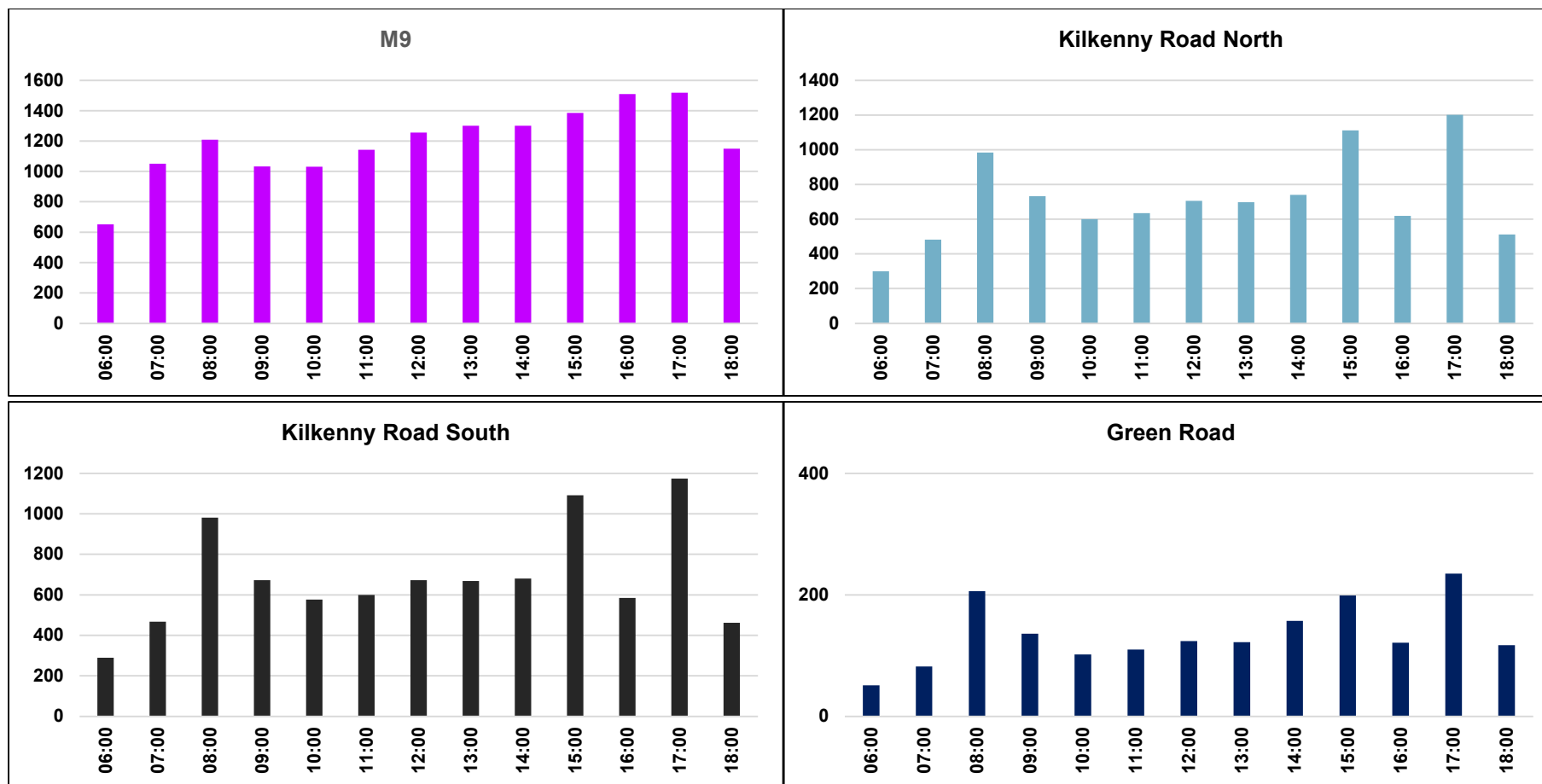


Figure 10-8 - Existing Traffic Volume on key links (2-way)



Based on the graphs presented above, the peak two-way flow along the M9 in the vicinity of the Junction 6 interchange is less than 1,600 vehicles per hour. Along Kilkenny Road, the two-way flow was observed to be less than 1,400 vehicles per hour, while on Green Road, the two-way flow was less than 400 vehicles per hour. Overall, traffic volumes on the surrounding road network are relatively low, with peak flows occurring between 8:00–9:00 a.m. and 5:00–6:00 p.m. The turning volumes for the Kilkenny Road / Green Road junction for both peak periods are summarised in Appendix 10-1, Volume 3.

10.6 Potential Significant Effects: Construction Stage

10.6.1 Assessment Methodology for Construction Phase Effects

The potential impact of construction activities on the nearby road network was assessed using the following steps:

- Estimating the number of trips expected during the construction phase;
- Identifying the primary road links likely to be used for material deliveries; and,
- Evaluating the potential impact of construction-related traffic.

10.6.2 Trip Generation: Construction Period

This section provides an estimate of the number of daily construction trips likely to be generated during the construction period. It also outlines the proposed site access arrangements, construction parking provisions, anticipated working hours, distribution of construction-related traffic, and the capacity analysis undertaken for the relevant road network.

10.6.3 Site Access

The construction vehicles to the waste water treatment plant access the site using the existing entrance located along Green Road as shown in Figure 10-3. The construction vehicles to Pumping Station will use the existing access along Kilkenny Road as shown in Figure 10-5.

10.6.3.1 Parking

Parking for construction workers and associated vehicles will not be permitted on Green Road or Kilkenny Road. Parking will be accommodated within the existing wastewater treatment plant campus or Pumping Station.

10.6.3.2 Working Period and Hours

Construction of the proposed development is expected to commence in 2027 and last approximately two years. The tentative working hours during construction period are:

- Monday to Friday: 8:00 am to 6:00 pm
- Saturday: 8:00 am to 1:00 pm
- Sunday/Bank holiday: No work

Any changes to these hours will be made in consultation with local authorities. If any amendments are made, the contractor will update them in the Detailed Construction Environmental Management Plan (CEMP).

10.6.3.2.1 Staff Trips

At peak construction, up to 40 workers are expected to be on-site. Assuming a car ownership rate of 1.5 and a 100% car mode share, approximately 27 car trips are anticipated. This represents a worst-case assessment; actual construction-phase traffic is likely to be lower than expected. All trips are assumed to be car-based (Passenger Car Unit, PCU factor = 1).

It is further assumed that 85% of staff will arrive before 8:00 AM, while the remaining 15% will be arriving between 8:00 AM and 9:00 AM. Similarly, for departures, 70% of staff are expected to leave after the end of the working day at 6:00 PM, with the remaining 30% distributed evenly across each hour leading up to 6:00 PM.

Based on these assumptions, the number of car-based staff trips during the construction period is summarised in the Table 10-1 below.

Table 10-1 - Staff Trips By hour

7 to 8 am	Arrivals	15%	23
8 to 9 am	Arrivals	15%	4
4 to 5 pm	Departures	15%	4
5 to 6 pm	Departures	15%	4
6 to 7 pm	Departures	70%	19

10.6.3.3 Staff trips Distribution

The staff trips arriving to the construction site will be using Kilkenny Road/Green Road junction (Figure 10-6). The relevant road links and routes for the staff trips are highlighted in Figure 10-9 and summarised below:

- **Link 1 (Red Colour)** – Kilkenny Road (North): to be used for staffs originating from Carlow and areas north of the WwTP
- **Link 2 (Blue Colour)** – Kilkenny Road (South): to be used for staffs coming from the south of the WwTP via the M9 motorway
- **Link 3 (Green colour)** – Green Road to be used by all staff for final access to the WwTP site, regardless of whether they arrive from Kilkenny Road North or South.

Based on baseline traffic volumes, it was assumed that approximately 60% of staff trips will originate from Carlow, and approach the site via Link 1 (Kilkenny Road-North), while the remaining 40% will arrive from the M9 motorway using Link 2.

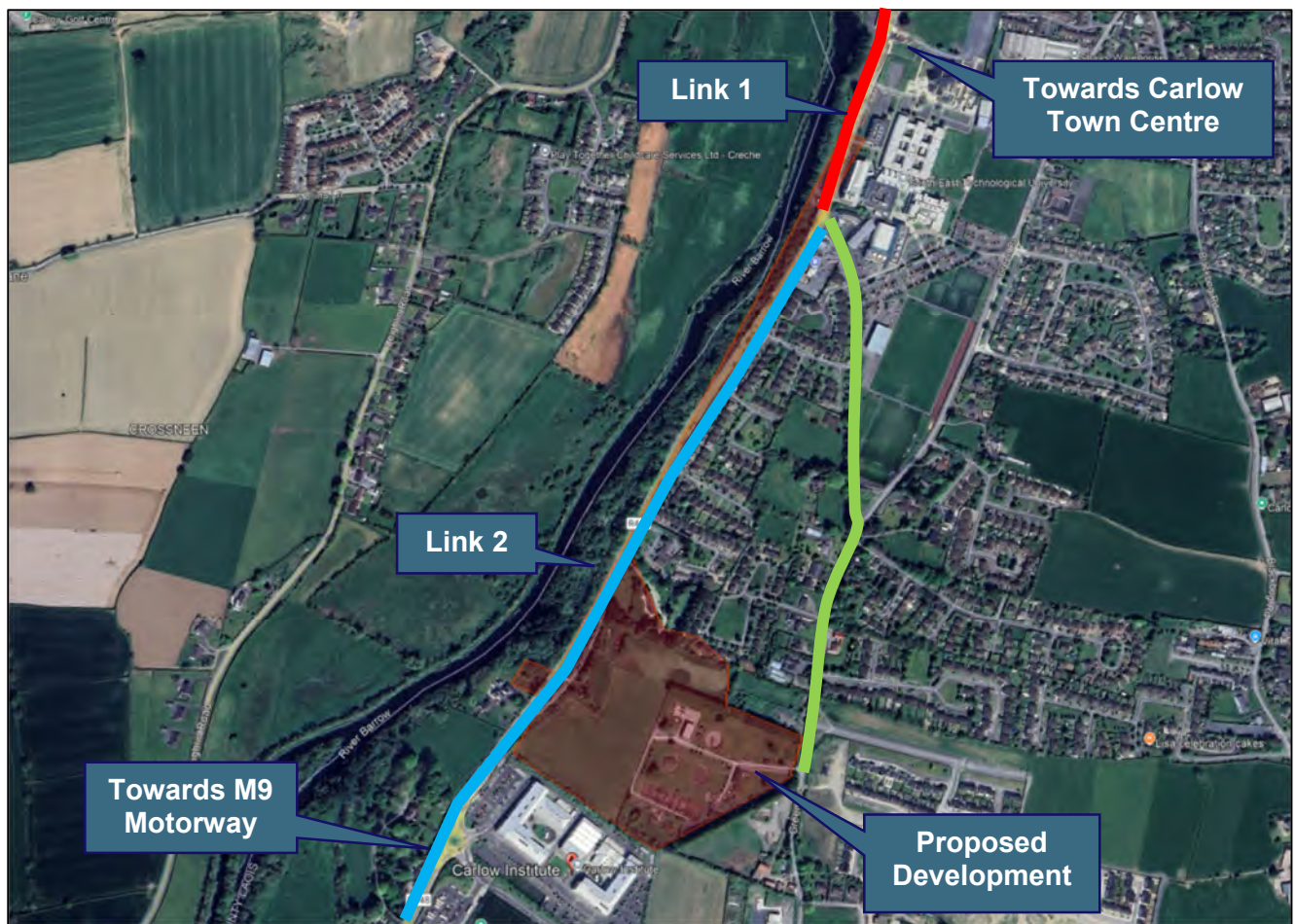


Figure 10-9 - Relevant Links and Route for Haulage and Material Delivery

10.6.3.4 Material Delivery Trips

10.6.3.4.1 Earthwork

The majority of material delivery trips during construction will be associated with earthworks and the import of materials. Therefore, heavy vehicle trip estimates were calculated specifically for earthworks and material import, based on the following methodology:

- It is estimated that approximately **45,000 m³** of material will be imported to the site, while around **86,000 m³** of material will be hauled from the site. In total, this equates to **131,000 m³** of material.
- Assuming a material density of **2 tonnes/m³**, the total weight equates to approximately **262,000 tonnes**.
- Based on an assumed trailer capacity of **20 tonnes**, this will result in an estimated total of **13,100 heavy vehicle trips** over the entire earthworks period.
- It is expected that the haulage of earthworks and import of materials will take place over a **12-month period**. Heavy vehicle operations will be restricted to **09:00–16:00 (7 hours/day) from Monday to Friday and between 8 am to 1pm on Saturday**.
 - This equates to 40 hours/week.
 - Assuming 4 weeks per month, this results in 160 hours per month and 1,920 hours over the 12-month period.
- Assuming uniform haulage over **1,920 hours**, this equates to approximately **7 vehicles/hour (one-way)** ($13,100 \div 1,920$).

- Assuming return trips occur within the same hour, this results in approximately **14 two-way heavy vehicle movements per hour**.
- Applying a **PCU factor of 3** for heavy vehicles, this corresponds to **42 PCU/hour (two-way)**, comprising **21 PCU/hour arrivals** and **21 PCU/hour departures**.

10.6.3.4.2 Abnormal Loads

- It is estimated that there will be **two abnormal loads** over the entire construction period.
- However, it is unlikely that these loads will coincide with earthworks or material import activities.
- Therefore, abnormal load movements are **not included in the analysis**.

10.6.3.4.3 Demolition Works During Construction

During the construction phase, an estimated 1,936 m³ of material will be generated from on-site demolition activities. Haulage of this material will occur as part of the overall construction works. These volumes are significantly lower than those associated with the earthworks and material import phase. Therefore, no additional analysis has been undertaken.

Overall, construction and demolition phase trips are expected to have an “Imperceptible” effect on the surrounding road network.

10.6.3.4.4 Decommissioning of Kilkenny Road PS

During the construction phase, the Kilkenny Road PS will be decommissioned. This will involve the removal of redundant materials from the site and the provision of the required benching for the pumping station. The haulage associated with these works is already accounted for within the overall construction traffic assessment. Traffic generated during the decommissioning activities is expected to be limited to approximately 1–2 HGV movements per day.

As the decommissioned materials have been included in the construction traffic calculations, no additional impact on the local road network is anticipated. The resulting effect is considered imperceptible, and no further assessment is required.

10.6.3.4.5 Material Delivery Trip Distribution

As mentioned in Section 10.3, material delivery trips associated with the construction phase will approach the site via the M9 motorway using Kilkenny Road/Green Road junction which is represented again in Figure 10-10 below.

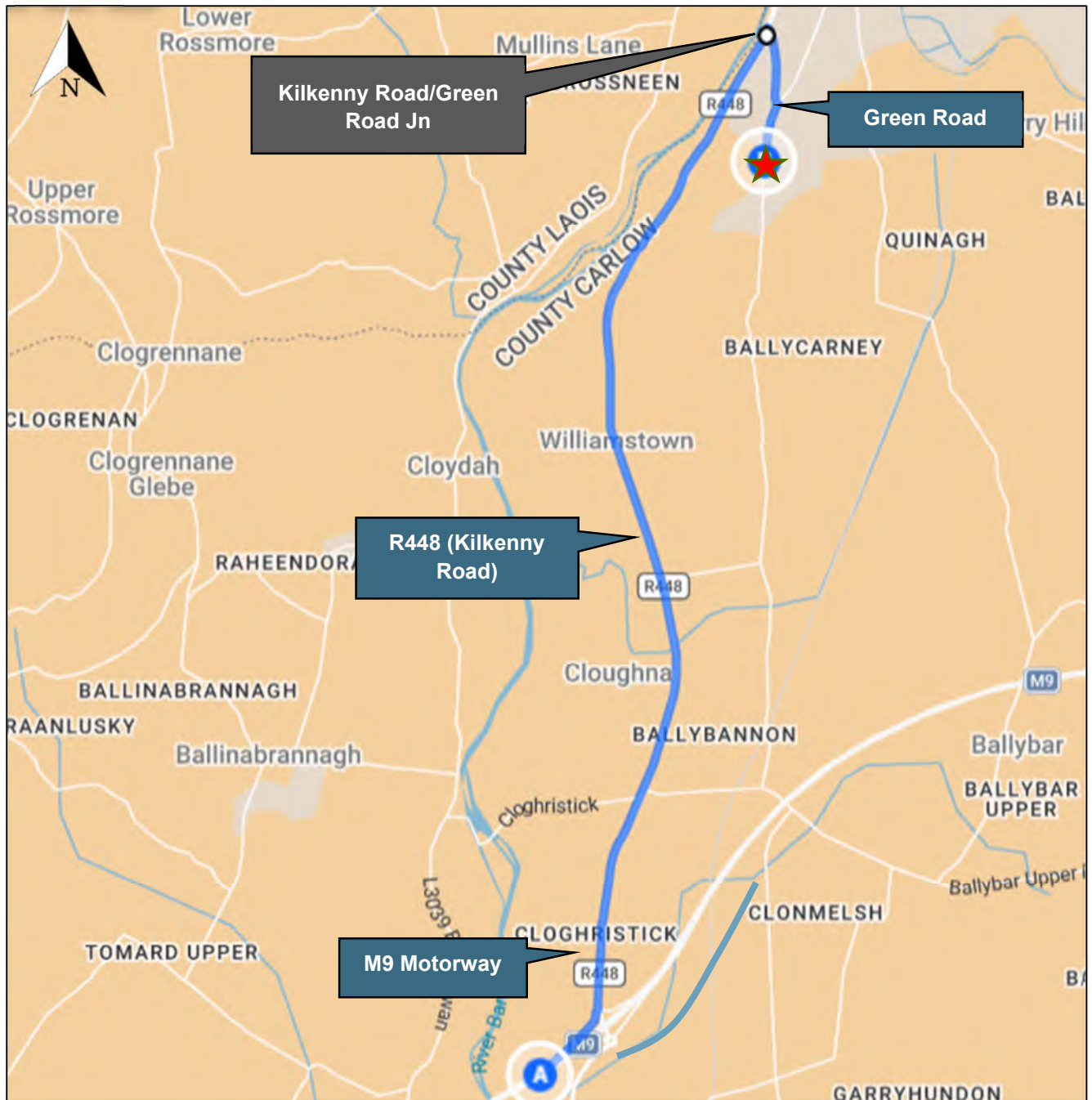


Figure 10-10 - Material Haulage Route

10.7 Effects of construction trips

10.7.1 Total Number of Construction Trips

The total number of trips are summarised in Table 10-2 below:

Table 10-2 - Two-Way Construction Trips on Weekdays (in PCU)

Time	Staff (in PCU)		HV (in PCU)		Total Trips in PCU (Two-Way)
	Arrival	Departure	Arrival	Departure	
07:00	23	0	0	0	23
08:00	4	0	0	0	4
09:00	0	0	21	21	42
10:00	0	0	21	21	42
11:00	0	0	21	21	42
12:00	0	0	21	21	42
13:00	0	0	21	21	42
14:00	0	0	21	21	42
15:00	0	0	21	21	42
16:00	0	4	0	0	4
17:00	0	4	0	0	4
18:00	0	19	0	0	19
Total	27	27	147	147	347

10.7.2 Capacity of the nearby link

The capacity of each arm was determined in accordance with the Design Manual for Roads and Bridges, Volume 5, Section 1, Part 3: Traffic Capacity of Urban Roads (May 1999). The capacity of each arm depends on the carriageway width and the classification of the road as shown below.

- According to the manual, Kilkenny Road falls under the UAP2 category. The estimated capacity is 2,040 vehicles/hour.
- According to the manual, Green Road falls under UAP3 category. The estimated capacity is 1,800 vehicles/hour.
- The estimated capacity of M9 motorway is 8000 vehicles/hour.

10.7.3 Likely Effect of Construction Trips

The likelihood of the construction trips are determined based on following methodology:

- Based on the trip distribution discussed earlier, Staff and Material Delivery Trips were distributed along key links including the M9 Motorway, R448 (Kilkenny Road) and Green Road
- Then these trips were add onto the existing flow to get cumulative flow
- The cumulative trips were compared with the capacity of each link.

These are summarised in Table 10-3.



Table 10-3 - Capacity Analysis

Time Period	Existing Trip	Construction Trips	% of existing flow	Cumulative Trip	Cumm Flow Capacity /
M9 Motorway (2-way Capacity = 8,000 vehicles/hour)					
07:00	1050	9	1%	1059	13%
08:00	1209	2	0%	1211	15%
09:00	1033	42	4%	1075	13%
10:00	1031	42	4%	1073	13%
11:00	1142	42	4%	1184	15%
12:00	1256	42	3%	1298	16%
13:00	1301	42	3%	1343	17%
14:00	1301	42	3%	1343	17%
15:00	1385	42	3%	1427	18%
16:00	1509	2	0%	1511	19%
17:00	1518	2	0%	1520	19%
18:00	1149	7	1%	1156	14%
Kilkenny Road (North) – Two way capacity = 2,040 vehicles/hour					
07:00	482	14	3%	496	24%
08:00	983	2	0%	985	48%
09:00	732	0	0%	732	36%
10:00	600	0	0%	600	29%
11:00	635	0	0%	635	31%
12:00	705	0	0%	705	35%
13:00	698	0	0%	698	34%
14:00	740	0	0%	740	36%
15:00	1111	0	0%	1111	54%
16:00	618	2	0%	620	30%
17:00	1201	2	0%	1203	59%
18:00	511	11	2%	522	26%
Kilkenny Road (South) – Two way capacity = 2,040 vehicles/hour					
07:00	468	9	2%	477	23%
08:00	981	2	0%	983	48%
09:00	672	42	6%	714	35%
10:00	576	42	7%	618	30%
11:00	599	42	7%	641	31%

Time Period	Existing Trip	Construction Trips	% of existing flow	Cumulative Trip	Cumm Flow Capacity /
12:00	673	42	6%	715	35%
13:00	668	42	6%	710	35%
14:00	681	42	6%	723	35%
15:00	1092	42	4%	1134	56%
16:00	585	2	0%	587	29%
17:00	1174	2	0%	1176	58%
18:00	462	7	2%	469	23%

Green Road – Two way capacity = 1,800 vehicles/hour

07:00	82	23	28%	105	6%
08:00	206	4	2%	210	12%
09:00	136	42	31%	178	10%
10:00	102	42	41%	144	8%
11:00	110	42	38%	152	8%
12:00	124	42	34%	166	9%
13:00	122	42	34%	164	9%
14:00	157	42	27%	199	11%
15:00	199	42	21%	241	13%
16:00	121	4	3%	125	7%
17:00	235	4	2%	239	13%
18:00	117	19	16%	136	8%

The above results are presented graphically in Figure 10-11. The graphs present a comparison of cumulative traffic volumes (existing + construction trips) against the estimated capacity.



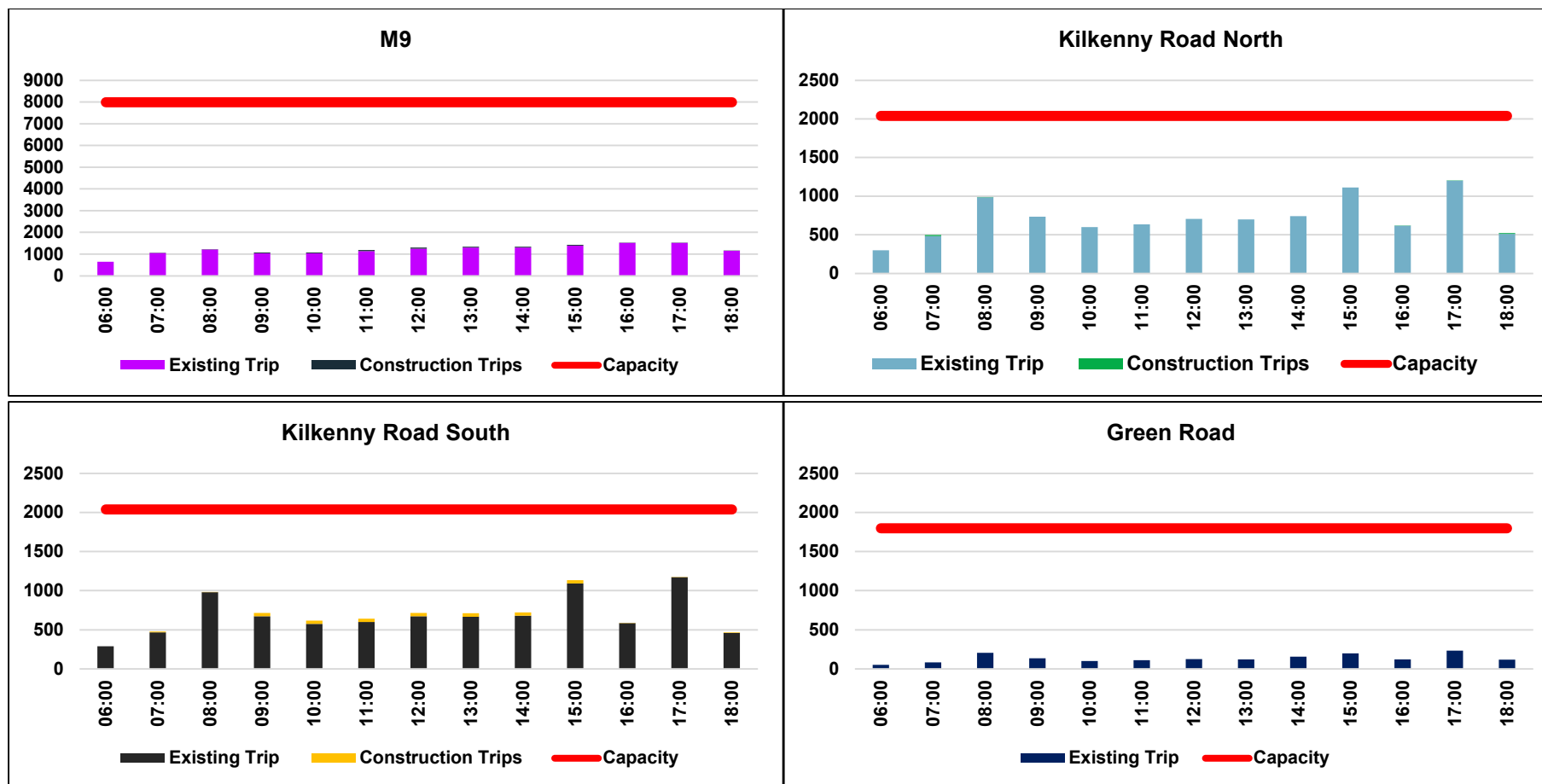


Figure 10-11 - Construction Traffic Impact



As shown in the graphs (Figure 10-11) and Table 10-3 construction-related trips represent less than 10% of total traffic for the majority of links across the full construction period. For Green Road, construction trips exceed 10% during off-peak hours (between 09:00 and 16:00). However, cumulative flows remain well below the maximum operational capacity of the road during all hours assessed.

Accordingly, the additional construction traffic is not expected to result in any significant operational impact on the surrounding road network. In line with Table 3.4 of the EPA Guidelines (2022), this level of impact is classified as “**not significant**”, meaning “**an effect that causes noticeable changes in the character of the environment but without significant Consequences**”.

10.8 Potential Significant Effects: Operational Phase

During the operational phase, the majority of vehicle trips will be associated with screening, grit removal, dewatered sludge removal, and activities related to dry recycling and the administrative building. These operations are expected to involve the transport of approximately 326 tonnes (round up to 330 tonnes) of material over a one-month period.

Assuming 5 working days per week (Monday to Friday) and 4 weeks per month, this equates to 20 working days per month. Assuming uniform material removal, approximately 14 tonnes of material would be removed per day, typically requiring 2 heavy vehicle trips (6 pcu) per day.

In addition, 10 light vehicle trips (10 PCU) per day are assumed for the staff, resulting in a total of maximum of 16 PCU trips per day.

These trip volumes are lower than those generated during the construction phase. In addition, most of these trips are expected to occur outside the typical network peak hours (7:00–9:00 a.m. and 4:00–6:00 p.m.). Therefore, no further analysis is required.

Overall, operational phase trips are expected to have an “**Imperceptible**” means an effect capable of measurement but without significant Consequences on the surrounding road network.

10.9 Potential Significant Effects: WwTP Decommissioning Phase

10.9.1 Existing WwTP

Existing plant/items to be decommissioned as part of the Proposed Development is as follows:

- Kilkenny Road pumping station;
- Existing rising main; and,
- Existing settlement tanks.

The decommissioning of the existing WwTP is expected to generate a maximum of less than 5 vehicles per day which is less than that during the earthwork period. Therefore, no separate analysis is required.

Overall, the effect of traffic associated with the decommissioning of existing WwTP is considered “**Imperceptible**”, means an effect capable of measurement but without significant consequence’s.



10.9.2 Future Decommissioning of WWTP

Mortarstown WwTP is owned and operated by UÉ. They will be responsible for the future intentions of this facility if the plant were decommissioned. The design lifespan of the upgraded plant is 25 years but it is anticipated that it will be maintained, and periodic upgrading undertaken over a longer lifetime to meet future demand and upgrades in technology.

The future decommissioning of the Mortarstown WwTP is expected to occur at a future stage and does not form part of the current construction or operational phases. If decommissioning is undertaken in the future, the following traffic movements would be generated during that phase.

A total volume of approximately 30,000 m³ of material is expected to be hauled during the decommissioning phase. Assuming a 6-month period for uniform haulage and a material density of 2 tonnes/m³, this equates to approximately 10,000 tonnes per month.

Assuming the same working hours (168 hours per month) as those adopted for the excavation and material import phase, this results in approximately 60 tonnes of material per hour. Based on an assumed trailer capacity of 20 tonnes, this equates to approximately 3 heavy vehicle trips per hour.

This is lower than the estimated 7 heavy vehicle trips per hour during the excavation phase. Therefore, no additional analysis is required.

Overall, the effect of traffic associated with the decommissioning phase is considered “**Imperceptible**”, means an effect capable of measurement but without significant consequences.

10.10 Do Nothing Scenario

In the event that the proposed development does not proceed, there would be no additional traffic-related activity associated with the wastewater treatment plant. As this scenario represents a continuation of the existing baseline conditions, no immediate or direct change to traffic patterns or operational performance on the surrounding road network is anticipated.

Accordingly, the resulting traffic effect is considered to be “**Imperceptible**” means an effect capable of measurement but without significant consequences on the surrounding road network.

10.11 Residual Effects

10.11.1 Construction Phase

The residual traffic-related residual effects during the construction phase, following the implementation of mitigation measures, are anticipated to be “imperceptible”.

10.11.2 Operational Phase

The residual traffic-related effects during the operational phase are similarly expected to be “imperceptible”.

10.12 Difficulties encountered during preparation of this chapter

No difficulties were encountered during preparation of this chapter.

10.13 Mitigation Measures

10.13.1 Construction Phase: Outline Traffic Management

An initial outline of the future Construction Traffic Management Plan (CTMP) is provided in the Outline Traffic Management Plan (OTMP), detailed in Appendix 10-2, with a summary presented in Table 10-4 below.

The OTMP is a separate document from the CTMP and serves solely as guidance for the contractor in preparing the final CTMP.

The appointed contractor shall liaise with the relevant authorities including Transport Infrastructure Ireland, Carlow County Council, and Emergency Services to develop a CTMP in accordance with Chapter 8: Temporary Traffic Management.

The CTMP shall be treated as a live document, allowing for updates to reflect changes in the construction programme, operations, or unforeseen circumstances, as required by the Employer, their agents, or relevant authorities.

The contractor shall ensure that the key elements of the OTMP are incorporated into the final CTMP. The principal contractor(s) must also agree upon and implement monitoring measures to assess the effectiveness of the CTMP. Upon finalisation, the contractor shall adopt the CTMP and its associated monitoring protocols.

The CTMP shall address the following key issues:

- Car Parking;
- Site Access & Egress;
- Traffic Management;
- Routing of Construction Traffic;
- Timing of Material Deliveries;
- Traffic Management Speed Limits;
- Road Cleaning; and,
- Enforcement of the Traffic Management Plan.

Table 10-4 - Summary of Mitigation Measures

Category	Mitigation Measure
Car Parking	Parking will not be permitted along the side of any road. Proposed parking arrangements will utilise the existing WwTP site.
Access & Egress	The existing access will be maintained. No changes are proposed for either the construction or operational phases.
Traffic Management	Signage: All signage will comply with the Traffic Signs Manual – Chapter 8 and be agreed with Carlow County Council. Construction Route: Materials will be delivered directly to each site. HGV traffic will use National and Regional Roads. Deliveries via Kilkenny Road / Green Road junction. Material Delivery Timing: Deliveries restricted to 09:00–16:00 to minimise community impact. Speed Limits: Compliance with posted/legal speed limits will be emphasised to all staff, suppliers, and contractors. Micro Tunnel Gravity Sewer: Road closures along Kilkenny Road limited to 100m stretches. One side of the road will remain open via 'Stop/Go' system with a minimum 3m carriageway. No road closure for outfall pipe crossing under the Kilkenny Road.
Road Cleaning	Regular cleaning of the road network near the site will be required.
Enforcement	Inspections and spot checks will ensure compliance with the CTMP by all project staff and suppliers.
Emergency Procedures	Emergency services will be contacted immediately via 112. Full incident details will be provided.

10.13.2 Operational Phase

As stated in Section 10.8, the proposed development is expected to generate approximately 10 staff trips and 2 material-related trips per day (equivalent to 16 PCU trips per day). These operational-phase trips are primarily associated with screening, grit removal, dewatered sludge handling, and the administration building.

The volume of operational traffic is significantly lower than the levels anticipated during the construction phase and represents only a very minor addition to existing background flows on the surrounding road network. As a result, no operational traffic issues are predicted, and no specific mitigation measures are considered necessary for the Operational Phase.

10.14 Monitoring Measures

No monitoring requirements are necessary for the Proposed Development.

10.15 Conclusion

The majority of traffic associated with the proposed development is expected during the construction phase, particularly during excavation works, with a maximum of 347 PCU two-way trips anticipated throughout the day.

Analysis indicates that cumulative construction traffic volumes will remain significantly below the capacity of key road links, including Kilkenny Road and Green Road, suggesting that the traffic-related effect during construction can be considered **not significant**.



During the operational phase, a maximum of 16 trips per day is anticipated, primarily related to routine maintenance, inspections, and occasional service visits. This level of activity is expected to have an **imperceptible** impact on the surrounding road network.

The proposed development is also not expected to have any significant impact on the future Carlow Southern Relief Road, and the cumulative traffic effect remains **imperceptible**.

An Outline Traffic Management Plan (OTMP) has been provided to guide the preparation of the final Construction Traffic Management Plan (CTMP), which will be developed by the appointed contractor prior to the commencement of construction.



11. LAND, SOIL AND GEOLOGY

11.1 Introduction

A detailed project description is included in Chapter 2- Proposed Development. The principal objective of the works associated with Mortarstown WwTP is to ensure that the treatment process can produce a treated effluent which satisfies the conditions of the Wastewater Discharge Licence (D0028-01).

This chapter describes the type of soils and geology likely to be encountered beneath and in the general area of the Mortarstown wastewater treatment plant (WwTP) micro tunnels and associated Kilkenny Road pumping station site (PS). The existing WwTP and PS and micro tunnels which will be upgraded are located south of Carlow Town. The WwTP is located to the east of the R448-Kilkenny Road. The discharge pipe which will be upgraded, passes under the R448 and discharges to the River Barrow. The existing PS is located ca. 750m north of Mortarstown WwTP and is located between the R448 and the River Barrow. The micro tunnel will be constructed within the existing footprint of the R448. The chapter also addresses the potential impact of the development on land, soils and geology together with the mitigation measures that will be employed to eliminate or reduce any potential impacts.

11.2 Methodology

The following scope of works were undertaken by Kieran Lynch in order to complete the land, soils and geology assessment presented in this chapter;

- Review and analysis of Ground Investigation;
- Desk-based study including review of available historical information; and,
- Site walkover survey by an experienced Geologist.

The desk-based study involved reviewing information from the following sources: -

- Geological Survey Ireland (GSI) Datasets Public Viewer and Groundwater web mapping (consulted 12th of Mar 2026);
- Ordnance Survey web mapping to assess the surface topography (consulted 12th of May 2026);
- Environmental Protection Agency (EPA), (consulted 12th of May 2026); and,
- Carlow County Council County Development Plan (2022-2028) (consulted 12th of May 2026);

A ground investigation was carried out by Priority Geotechnical on both the Mortarstown WwTP site and the Kilkenny Road PS site between 23rd February and 25th March, 2021 under the supervision of PGL's, Engineering Geologist in accordance with Eurocode 7- Geotechnical Design Part 2, ground investigation and testing (BS EN 1997-2: 2007) and the relevant British Standards (BS 5930 (2015) Code of Practice for Site Investigation and BS 1377, Method of Tests for Soil for Civil Engineering Purposes, in situ Tests Parts 1 to 9).

An additional ground Investigation was carried out by Priority Geotechnical between 4th March 2022 and 16th June 2022.

A copy of the factual reports for the ground investigation dated 16th August 2022 and 31st August 2022 are included in Appendix 11-1 and Appendix 11-2, Volume 3 of the EIAR.

Metroscan, working on behalf of PGL, carried out a non-intrusive ground penetrating radar (GPR) survey to locate and identify existing utilities at the site.

A copy of the ground penetrating radar (GPR) survey is included in Appendix 11-3, Volume 3 of the EIAR.

11.3 Relevant Legislation and Guidance

The key legislation and guidance referenced in the preparation of the EIAR is outlined in Chapter 1.

Specific to Land Soils and Geology, the following legislation, guidance and planning framework relevant to the consideration of land and soils has informed the assessment as outlined below.

11.3.1 Legislation

Specifically in relation to Land & Soils, the following principal legislation relevant to the assessment is set out in the following primary European legislation:

- Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration (daughter to 2000/60/EC) (Groundwater Daughter Directive).

A brief summary of the relevant legislation is provided in this section.

11.3.1.1 Groundwater Directives (80/68/EEC) and (2006/118/EC)

Directive (80/68/EEC) on the protection of groundwater against pollution caused by certain dangerous substances provided a groundwater protection framework before the Groundwater Directive 2006/118/EC (commonly referred to as the 'Groundwater Daughter Directive'). The Groundwater Directive (80/68/EC) aimed to protect groundwater from pollution by controlling discharges and disposal of certain dangerous substances to groundwater. The Directive was transposed into Irish Law by the Protection of Groundwater Regulations, 1999 (SI No. 41 of 1999). It was repealed by the Water Framework Directive 2006/60/EC (WFD) in 2013.

In Ireland the original Groundwater Directive (80/68/EEC) was primarily transposed into National legislation through:

- The Local Government (Water Pollution) Act, 1977 to 1990;
- The Local Government (Water Pollution) Regulations, 1978 (SI No 108 of 1978);
- The Protection of Groundwater Regulations, 1999 (SI No 41 of 1999). This was repealed and replaced by the Wastewater Discharge (Authorisation) Regulations, 2007 (SI 684 of 2007) in 2013; and
- The Local Government (Water Pollution) (Amendment) Regulations, 1999 (SI No 42 of 1999). This was repealed and replaced by the European Communities Environmental Objectives (Groundwater) Regulations 2010 (S.I. No 9 of 2010) in 2013.

11.3.1.2 European Communities Environmental Objectives (Groundwater) Regulations 2009 (S.I. No. 9 of 2010)

The purpose of the European Communities Environmental Objectives (Groundwater) Regulations is to transpose the requirements of the Water Framework Directive and the Groundwater Daughter Directive into national legislation and provide for transitional arrangements from the old Groundwater Directive (80/68/EEC). These regulations have been transposed into National legislation through the Environmental Objectives

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(Groundwater) Regulations 2010 (S.I. No. 9 of 2010) and Environmental Objectives (Groundwater) Amendment Regulations 2016 (S.I. No. 366 of 2016). These Regulations aim to:

- Establish a new strengthened regime for the protection of groundwater in line with the requirements of the Water Framework Directive (2000/60/EC) and by the Groundwater Directive (2006/118/EC);
- Establish clear Environmental Objectives, Groundwater Quality Standards and Threshold Values for the classification of groundwater and the protection against pollution and deterioration; and
- The Regulations also introduce the legal basis for a more flexible, proportionate and risk-based approach to implementing the legal obligation to prevent or limit inputs of pollutants into groundwater which already exist under the old Groundwater Directive (80/69/EEC).

11.3.2 Guidance

This assessment has been completed in accordance with relevant best practice guidance from the Institute of Geologists of Ireland (IGI), 'Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements' (IGI, 2013). The IGI guidance document is an updated version of the 2002 IGI guidelines, 'Geology in Environmental Impact Statements, A Guide' (IGI, 2002), which was revised to take account of legislative changes and the operational experience developed by geoscientists in the production of relevant environmental assessments. Further this assessment has been prepared in line with the EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports (2022).

11.4 Receiving Environment

11.4.1 Site Development

The 1837-1842 6-inch maps indicate that the site was used for agriculture as shown in Figure 11-1 (OSI, 2026). There are a number of buildings noted within the footprint of the discharge pipe for the WwTP. The area adjacent to the River Barrow appears to be wooded or overgrown. The R448 along which the micro tunnels will be constructed is visible.



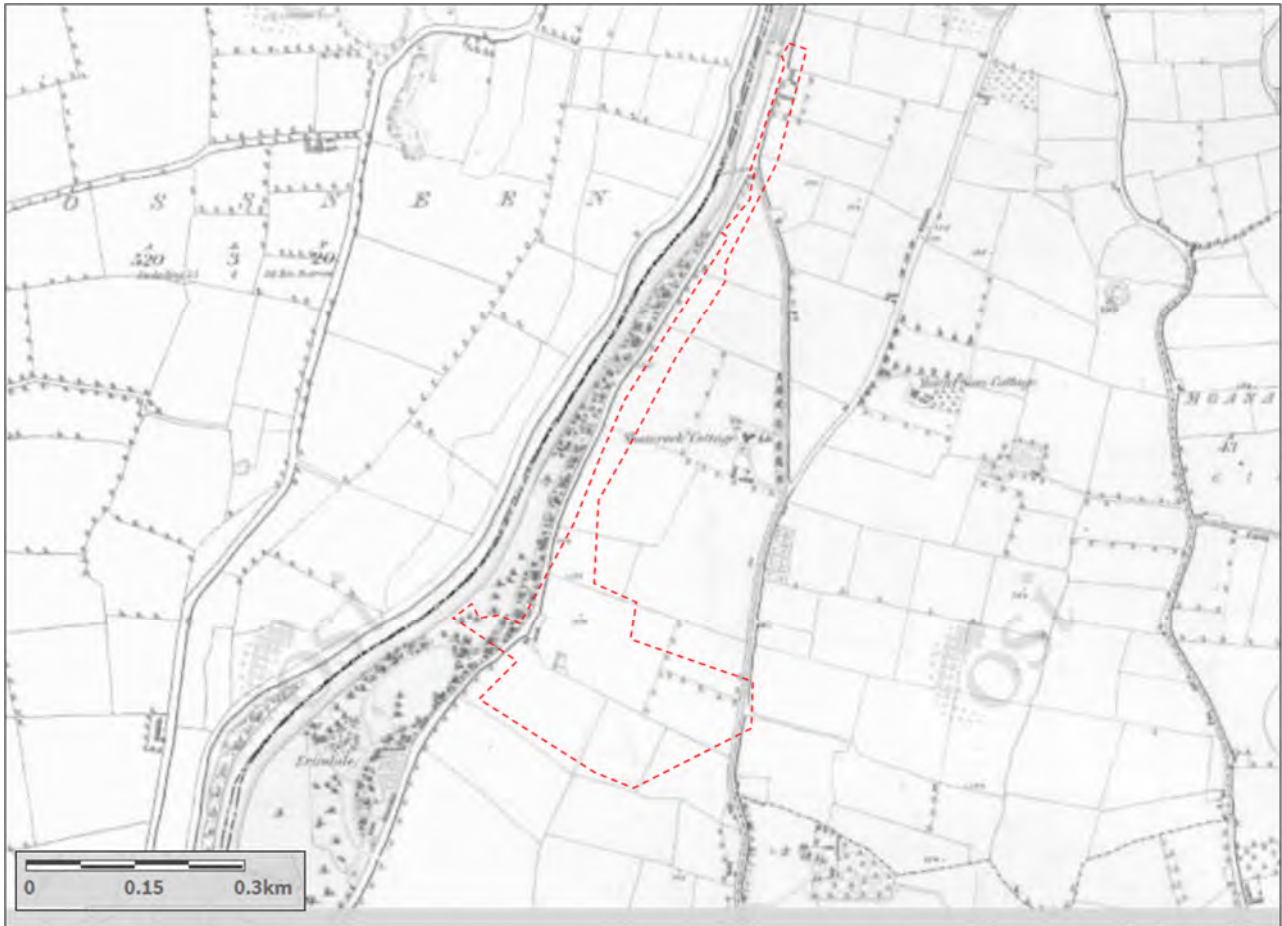


Figure 11-1 1837-1842 6 Inch Map (OSI 2026)

No significant changes are identifiable from the 1888-1913 25-inch maps as shown on Figure 11-2 below (OSI, 2021).

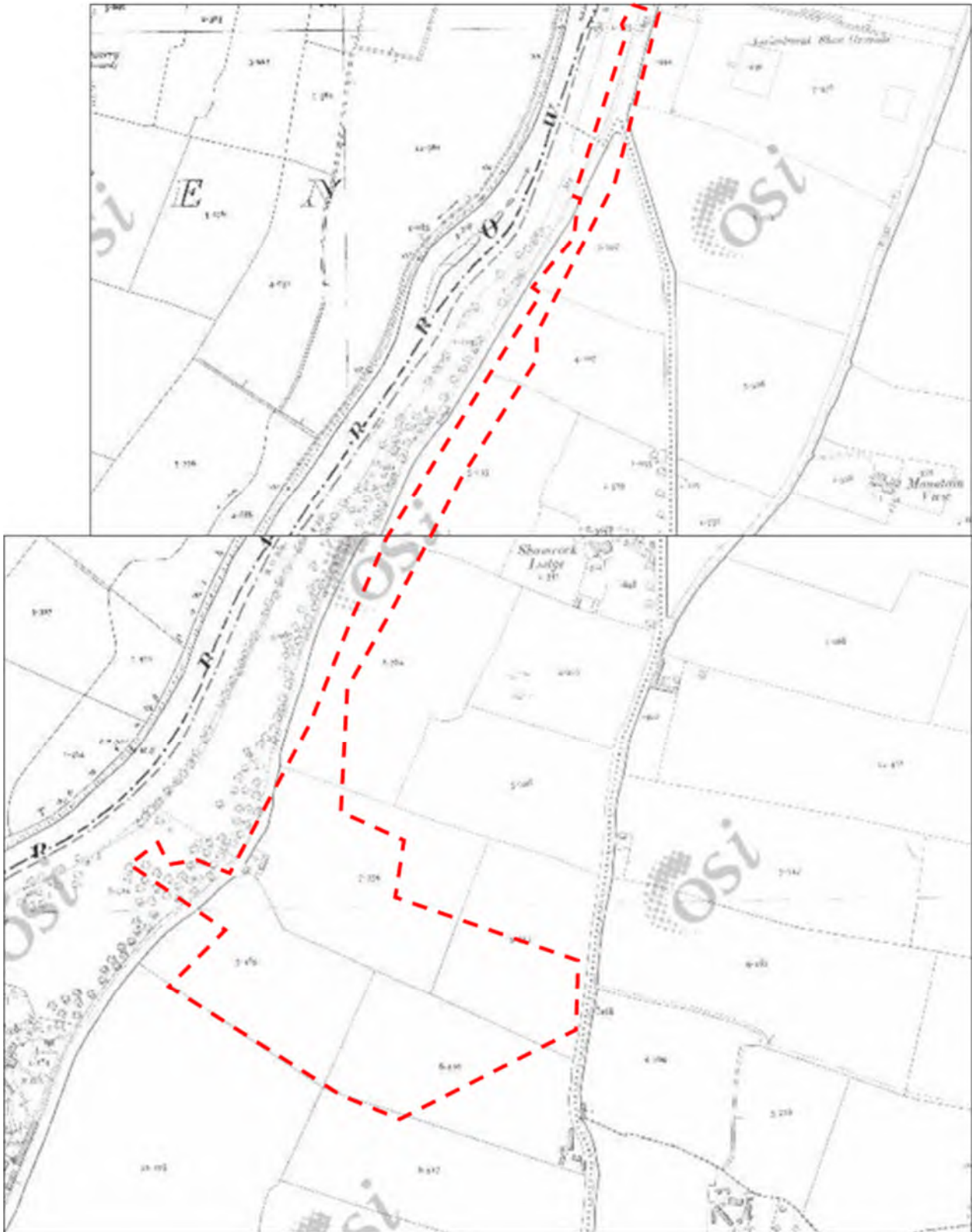


Figure 11-2 1888-1913 25 Inch Maps (OSI 2026)

The 6-inch Cassini map (1930) indicate the agricultural nature of the site and the surrounding areas as shown on Figure 11-3 below (OSI, 2025). There are a number of new agricultural or residential premises noted in the surrounding area. An area to the north east of the PS is identified as an agricultural showground. A disused burial ground is shown to the north of the agricultural showgrounds.

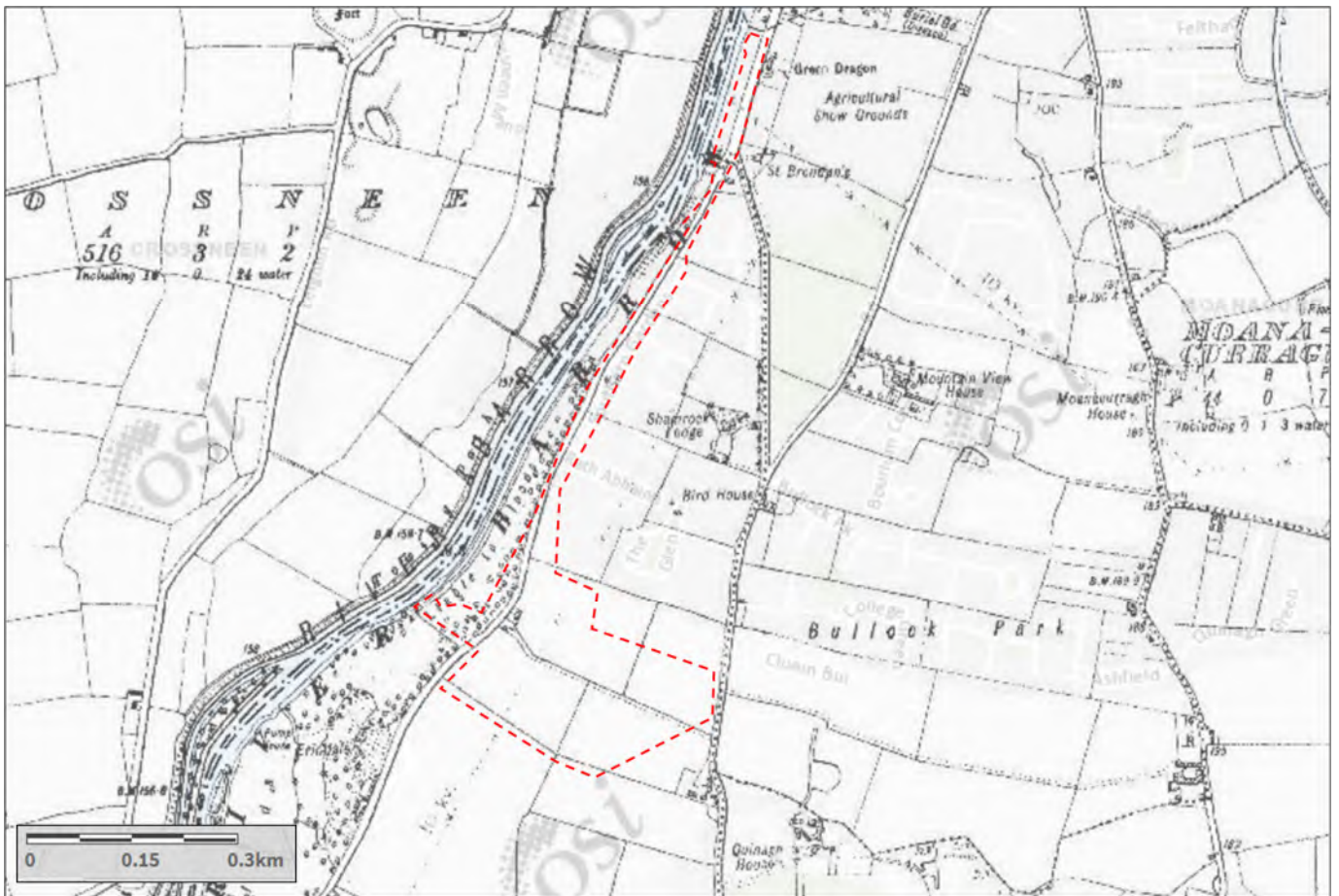


Figure 11-3 6 Inch Cassini Map (1930) (OSI 2026)

The 1995 aerial maps shows the existing WwTP and PS within the existing site footprints as shown on Figure 11-4 below. A number of housing estates and residential premises have been developed north-east of the WwTP site and what appears to be commercial premises developed to the south-east. The Institute of Technology Carlow is identified as having been developed to the north-east of the PS site.



Figure 11-4 1995 Aerial Map (OSI 2026)

The 2000 aerial maps shows the extension of the housing estates to the north east of the WwTP site as shown on Figure 11-5 below. A number of housing estates have been constructed between the WwTP and the PS along the R448.



Figure 11-5 Aerial Map 2000 (OSI 2026)

Further development is noted on the 2005 aerial maps to the south of the PS as shown on Figure 11-6 below.

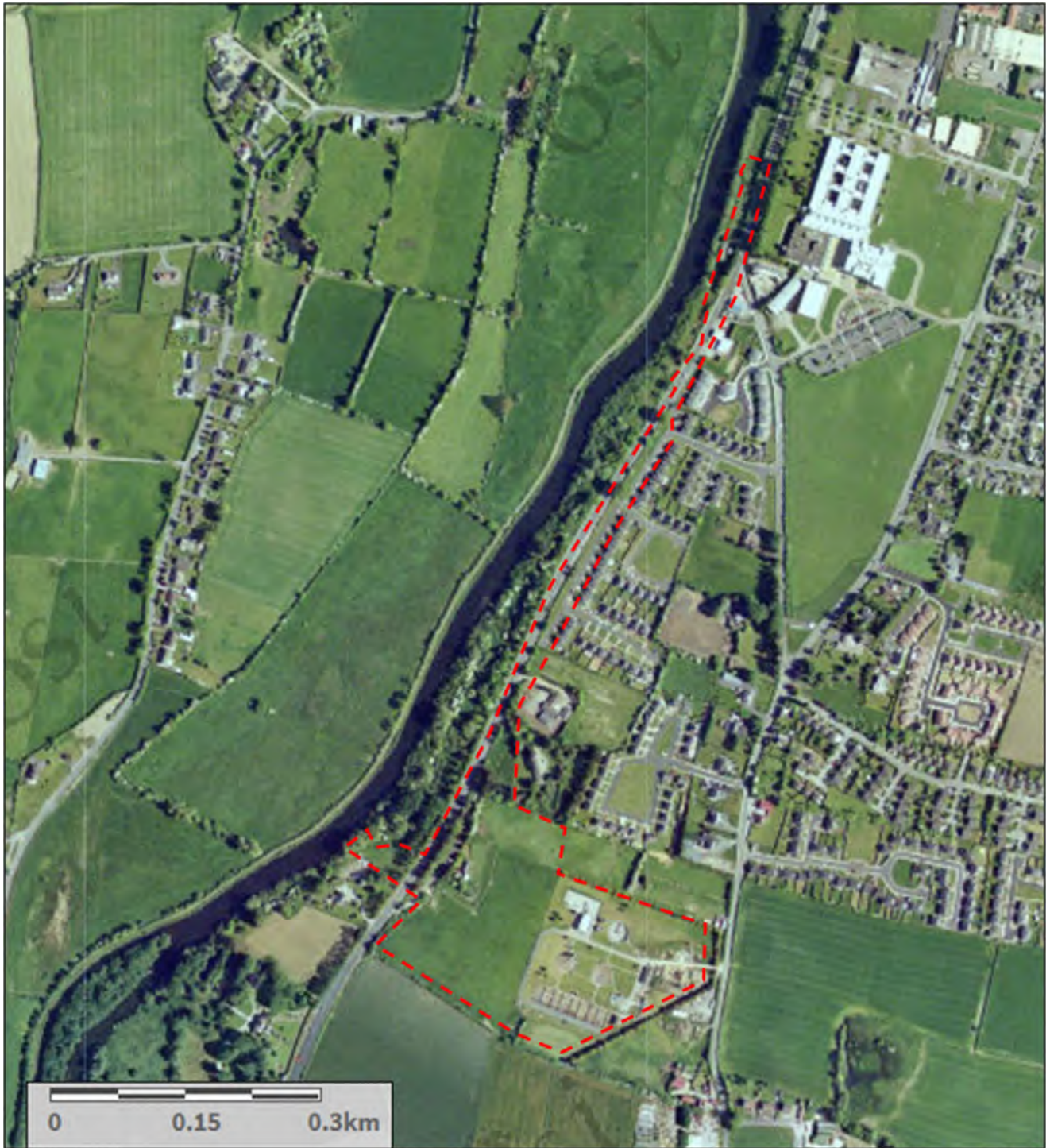


Figure 11-6 Aerial Map 2005 (OSI 2026)

No significant changes are noted from the 2012 aerial maps as shown on Figure 11-7 below.

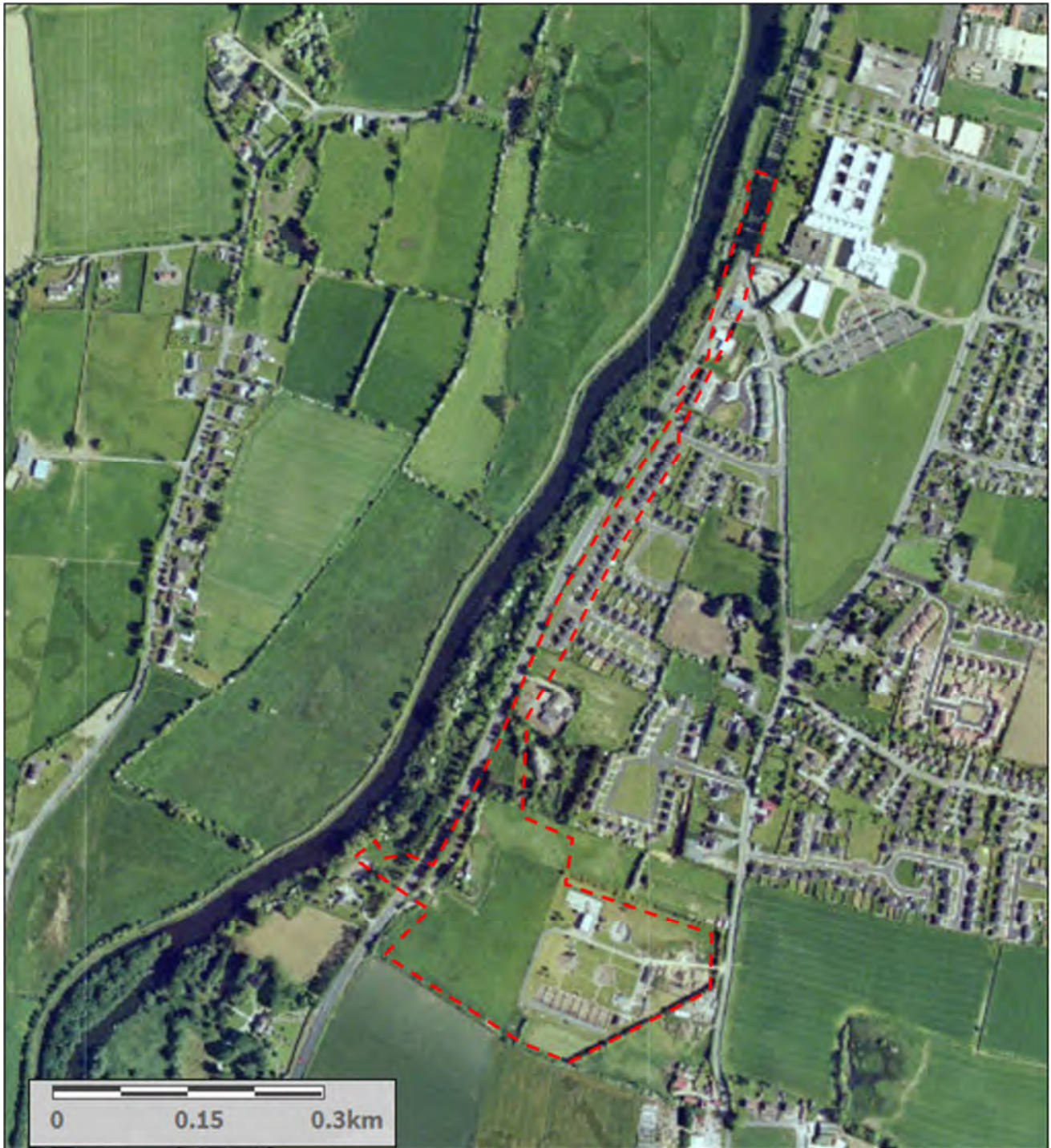


Figure 11-7 Aerial Map 2005-2012 (OSI 2026)

Latest aerial maps available from google show the development of a campus of the Institute of Technology Carlow immediately to the south of the WwTP site as shown on Figure 11-8 below. A petrol station is shown ca. 75m south of the PS site along the R448.



Figure 11-8 Aerial Map (Google 2022)

11.4.2 Site Topography

A site walkover was carried 30th April 2025 by Cormac Dunne an experienced Geo-Environmental Engineer.

The WwTP site is generally flat at ca.50m AOD. Residential Housing developments were located to the East and North, an educational institute to the South, field with livestock (sheep) to the West. A strip just Northeast of WwTP has some C&D waste and a strip North West has horses and trailers containing equine equipment. A vacant house (currently being purchased by UÉ) is also situated to the west of field with livestock. The existing site comprises infrastructure and equipment associated with the existing WwTP and a mixture of grassed, concreted, hardcore and paved areas throughout. No soft ground conditions were observed, no poor or low lying areas, there is some undulation across the site but nothing significant, with low lying ground around settlement tanks and the highest point NW of site near inlet works. Areas of made ground was observed throughout the site but no obvious areas of contamination observed. Plate 11-1 to Plate 11-3 show views of the WWTP.

The Kilkenny Road PS site is generally level at ca. 47m AOD. Immediately beyond the western boundary of the site there is a steep drop to the River Barrow. There is various infrastructure and equipment associated with the existing PS site. The site is mainly under concrete. There is a narrow strip of unused ground to the north of the

site between the Kilkenny Road and the river Barrow. There is a service station to the south of the Kilkenny Road PS site. Ground disturbance is associated with road works to the east of the site. Some C&D waste was recorded on the unused ground to the north of the site. Plate 11-4 shows a view of the existing PS site. Plate 11-5 to Plate 11-6 shows views of the Outfall location.

The outfall location is in close proximity to three residential houses. The area is grassed with some thick vegetation. A towpath runs along the river. Along the route of the discharge pipe the ground is generally level at ca. 48.7m AOD adjacent to the WwTP and ca. 48.3 m AOD at the top of an embankment close to the point of discharge to the River Barrow. The embankment falls via a steep slope to ca. 43.8m AOD down to the River Barrow. There was no evidence of instability noted along this embankment.

The route of the micro tunnel between the existing Kilkenny Road PS and the WwTP rises from ca. 47.2 mAOD at the PS end to 50.6m AOD at the WwTP end with localised areas towards the centre of the micro tunnel rising to 51.3m AOD. The micro tunnel will be located within the existing Kilkenny Road. There is a service station located just off the Kilkenny Road.



Plate 11-1 Overview of Waste Water Treatment Plant



Plate 11-2 Waste Water Treatment Plant



Plate 11-3 View of Waste Water Treatment Plant



Plate 11-4 Existing Pumping Station



Plate 11-5 Outfall Location



Plate 11-6 Towpath at Outfall Location

11.4.3 Ground Investigation

A ground investigation was carried out by Priority Geotechnical on both the Mortarstown WwTP site and the Kilkenny Road PS site between 23rd February and 25th March, 2021 and the 04th March and 16th June, 2022 under the supervision of PGL's Engineering Geologist in accordance with Eurocode 7- Geotechnical Design Part 2, ground investigation and testing (BS EN 1997-2: 2007) and the relevant British Standards (BS 5930 (2015) Code of Practice for Site Investigation and BS 1377, Method of Tests for Soil for Civil Engineering Purposes, in situ Tests Parts 1 to 9). A copy of the factual reports for the ground investigation dated 16th August 2022 and 31st August 2022 are included in Appendix 11-1 and Appendix 11-2, Volume 3 of the EIAR.

Metroscan, working on behalf of PGL, carried out a non-intrusive ground penetrating radar (GPR) survey to locate and identify existing utilities at the site.

The following works were carried out as part of this investigation:

- 11no. cable percussion boreholes were advanced to depths of between 1.2m below existing ground level (bgl) and 11.8m bgl using a Dando 2000 light cable percussion rig and 200mm diameter casing.
- 10no. rotary boreholes were drilled to depths 8.0m bgl to 25.0m bgl using EMCI-450 rotary rig using 131mm dia. symmetrex casing and T6H.
- 8no. trial pits were excavated to depths of between 1.2m bgl and 2.8m bgl using a 3t tracked excavator.
- 16no. slit trenches were carried out to depths of between 1.2 and 2.3m bgl.

In situ geotechnical testing was carried out as follows:

- Standard Penetration Tests N tests were carried out in all boreholes.



- Dynamic Cone Penetrometer
- California Bearing Ratio

Associated geotechnical and geochemical testing was carried out on samples of soil, rock and groundwater as follows:

- Natural Moisture Content
- Atterberg Limits
- Particle Size Distribution
- Dry density/ Moisture content relationship
- Unconsolidated undrained triaxial
- pH
- Sulphate (2:1 Water Soluble) as SO₄
- Total sulphur
- Sulphate (Acid soluble)
- Organic matter
- Environmental
- Waste Acceptance Criteria
- Point Loads
- Unconfined compressive strength

11.4.4 Soils

The Teagasc soil maps (GSI, 2025) as shown on Figure 11-9 below, indicate that the WwTP site is generally underlain by shallow well drained mineral soils. The pumping station site is shown to be underlain by shallow well drained mineral soils and made ground discharge pipe will encounter alluvium associated with the River Barrow.

The GSI quaternary mapping (GSI, 2025) as shown on Figure 11-10 below indicates that the natural soils beneath the WwTP consist of gravels derived from limestones with alluvium beneath the discharge pipe adjacent to the River Barrow. The PS site is shown to be underlain by made ground, gravels and alluvium. It is likely that the micro tunnels will mainly encounter engineering fill associated with the road formation.

No landslide susceptibility issues have been noted in the vicinity of the site. This is shown on Figure 11-11 below (GSI 2025). The closest landslide event reported is located ca. 10km north west of the site at Maidenhead/Arless.



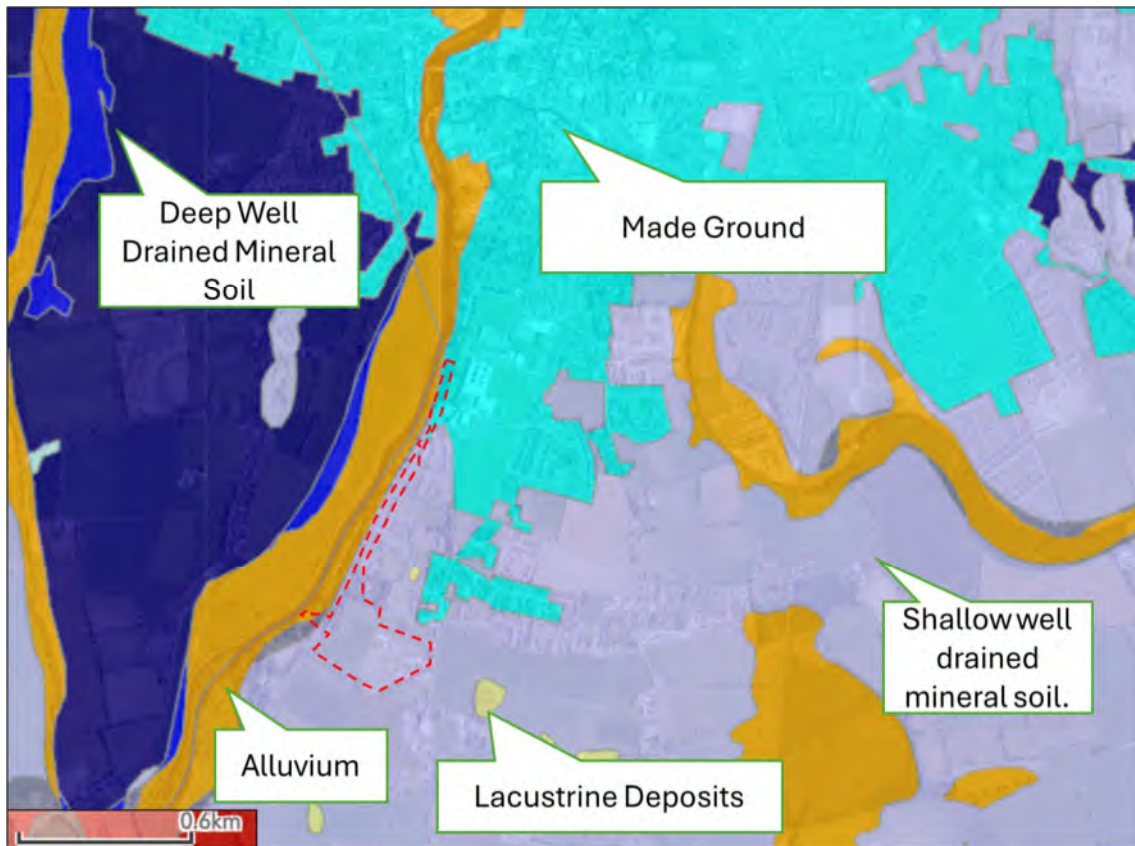


Figure 11-9 Teagasc Soil Maps (GSI 2026)

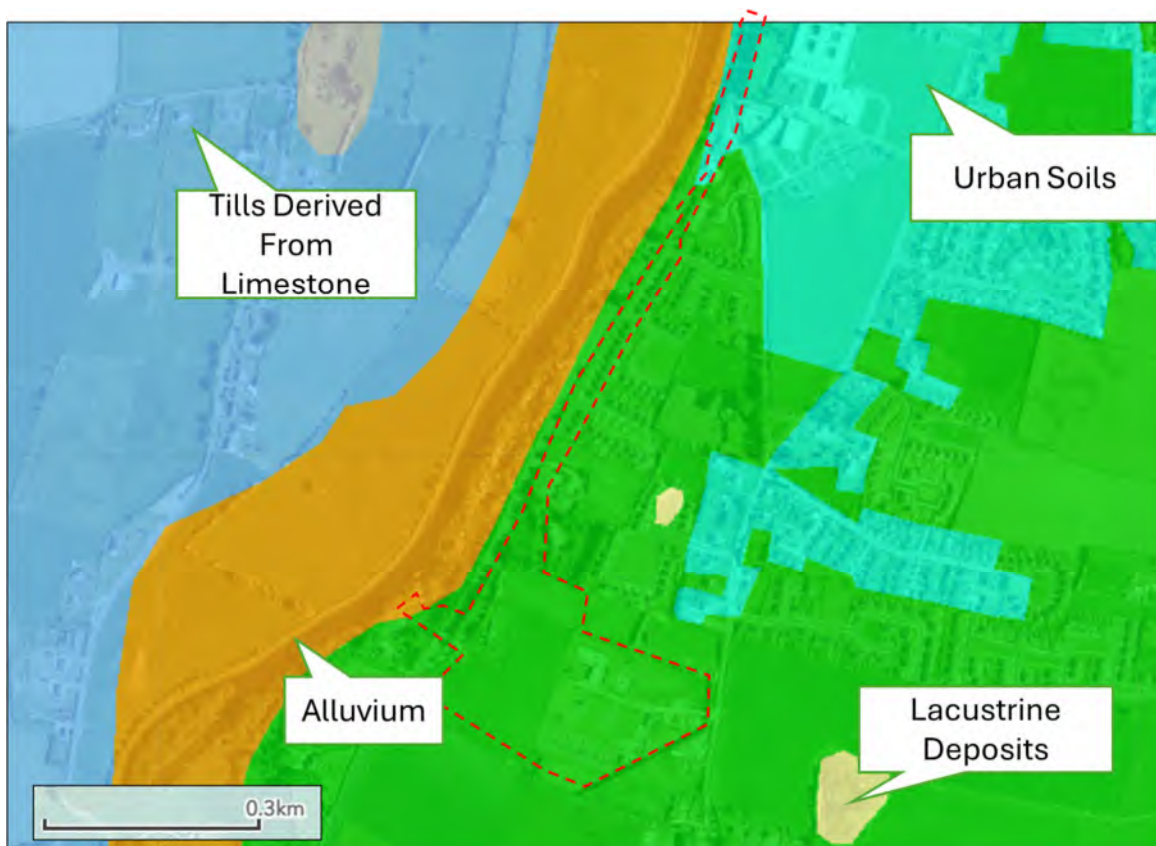


Figure 11-10 GSI Quaternary Mapping (GSI 2026)



Figure 11-11 Landslide Susceptibility (GSI 2026)

Ground conditions at the site, as observed during the ground investigations are summarised as follows.

11.4.4.1 Mortarstown WwTP and New PS Site

- Made ground was encountered at locally at TP08 to a depth 1.3m bgl described as a brown clayey very gravelly sand. Made ground was encountered overlying the cables in the slit trenches.
- Topsoil encountered across the site to depths of 200mm to 500mm bgl
- Silt encountered generally up to ca. 1m (and locally in BH08 up to 2.5m) bgl described as soft to firm slightly gravelly silt.
- Clay encountered generally across the site between 1.3-5.5m bgl described as soft to firm slightly sandy gravelly clay
- Gravels were encountered to depths 0.4m to >25m bgl and described as loose to dense sandy silty gravels with boulders
- Rockhead was encountered at depths from 14.7m bgl and not encountered in other boreholes at depths >25bgl. Bedrock was described as medium strong limestone.

A generalised geological profile for the Mortarstown WwTP is provided in Figure 11-12 below.

11.4.4.2 Kilkenny Road PS

- Made ground was encountered to a depth of 3.6m bgl and described as oft, brown, organic slightly sandy gravelly clay.
- Gravels were encountered to depths up to 12.5m bgl and described as medium dense clayey sandy gravels.
- Rockhead was encountered at 12.5m bgl. Bedrock beneath the site consisted of limestone.

A generalised geological profile for the Mortarstown WwTP is provided in Figure 11-13 below.

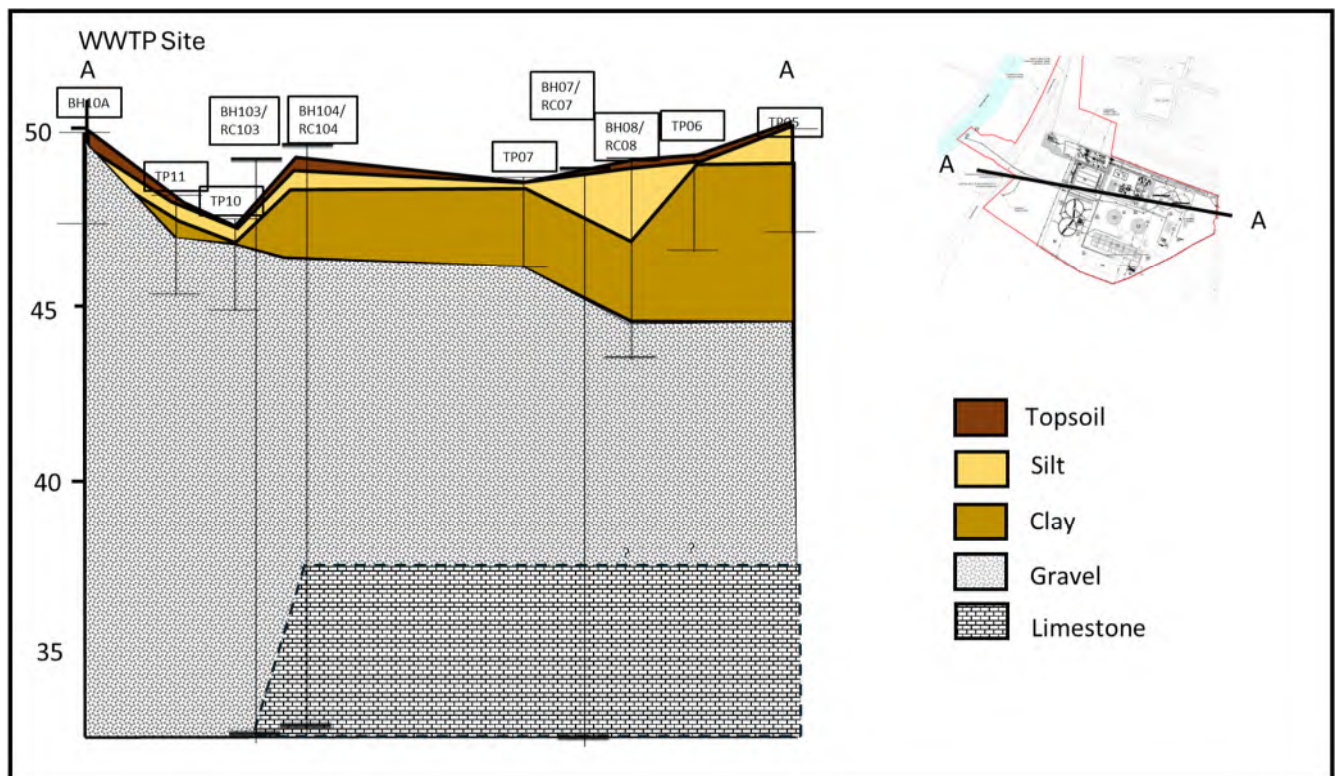


Figure 11-12 Geological Profile A-A' (Mortarstown WwTP and New PS Site)

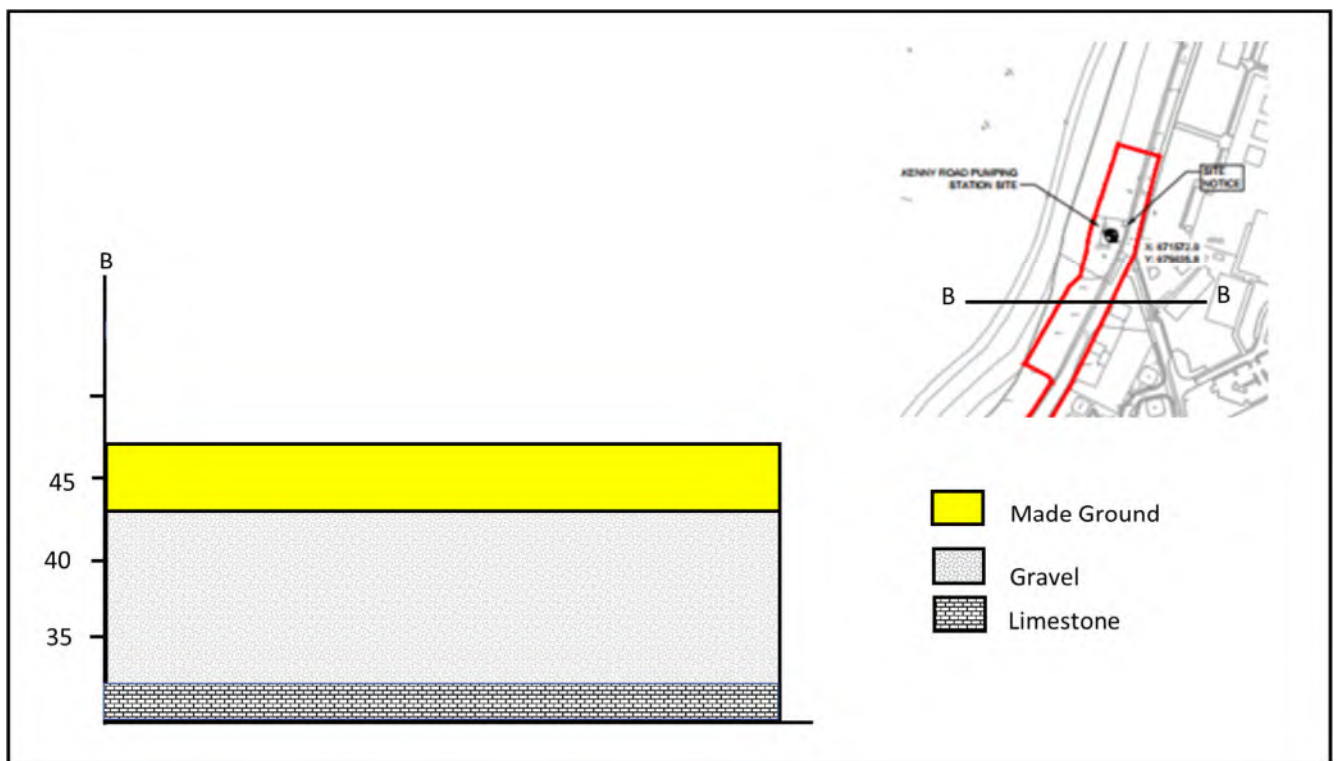


Figure 11-13 Geological Profile B-B' (Kilkenny Road PS)

11.4.5 Soil Contamination/ Quality

The sites are currently the location of Mortarstown WwTP and Kilkenny Road PS. Some commercial premises are located to the south east of the WwTP site and the Institute of Carlow have developed a campus immediately to the south of the WwTP site. The main campus of the Institute of Technology is located directly opposite the PS site and a petrol station is located ca. 75m south of the PS.

There are no EPA Industrial Pollution control (IPC), Industrial Emissions (IE) licenced sites in the area surrounding the site as shown on Figure 11-14 below.

11.4.5.1 Kilkenny Road PS

Made ground was encountered underlying the pumping station site to a depth of 3.6m bgl.

2no. environmental test results on this material indicates that this material is within the Soil Guideline Values (Contaminated Land Exposure Assessment, CLEA Model UK) generic assessment criteria (GAC) for commercial usage (CIP Lot 5 – Mortarstown, Site Investigation– Factual Report Priority Geotechnical 16th August 2022- See Appendix 11-1) and therefore does not likely pose a significant risk to users of a commercial site.

Waste Acceptance Criteria (WAC) analysis was carried out on the made ground. The results indicate that the material is inert according to this criteria. Any soils requiring disposal offsite should likely be acceptable for deposition at an inert soil recovery/ disposal facility subject to the waste acceptance criteria of the receiving facility subject to hazardous waste screening.

11.4.5.2 Mortarstown WwTP

Made ground was encountered locally within TP08 and overlying cables within the slit trenches

10no. environmental test samples were analysed from the WwTP site. Results indicated that this material is within the Soil Guideline Values (Contaminated Land Exposure Assessment, CLEA Model UK) generic assessment criteria (GAC) for commercial usage (CIP Lot 5 – Mortarstown, Site Investigation– Factual Report Priority Geotechnical 16th August 2022- See Appendix 11-1) and therefore does not likely pose a significant risk to users of a commercial site.

Waste Acceptance Criteria (WAC) analysis was carried out on 9no. samples within the proposed WwTP site.

Within the existing WwTP site all WAC analysis with the exception of TP13 at 2.0m met the WAC criteria for inert material. The level of Total Petroleum Hydrocarbons (TPH) or mineral oil was 540mg/ kg as against the inert WAC criteria of 500mg/ kg. Any soils requiring disposal from the majority of the existing WwTP with the exception of the area of TP13 should be acceptable for disposal at an inert soil facility subject to the waste acceptance criteria of the receiving facility. Soil requiring disposal in the vicinity of TP13 will require disposal to a non-hazardous facility subject to the waste acceptance criteria of the receiving facility and hazardous waste screening.

9no. WAC samples were taken in the field to the west of the existing WwTP into which it is proposed to extend the WwTP. A WAC sample from RC06 at 3.0m exceeded the WAC for TPH for inert soil at 580mg/kg compared to the inert limit of 500. Other samples from this field indicated the presence of TPH but within the inert WAC limits. The material from this field if required to be disposed offsite will likely require disposal at a non-hazardous soil recovery facility.

Microtunnel



5no. environmental test samples were analysed from the proposed route of the microtunnel. Results indicated that this material is within the Soil Guideline Values (Contaminated Land Exposure Assessment, CLEA Model UK) generic assessment criteria (GAC) for commercial usage (Mortarstown Waste Water Treatment Plant (WWTP), Additional Site Investigation– Factual Report Priority Geotechnical 31st August 2022- See Appendix 11-2), and therefore does not likely pose a significant risk to users of a commercial site.

The microtunnel runs alongside an existing petrol station. 3no. WAC samples were taken from slit trenches excavated along the route of the microtunnel. A WAC sample from ST110 located to the south of the Petrol Station exceeded the WAC for Dissolved Organic Carbon (DOC) for inert soil at 580mg/kg compared to the inert limit of 500mg/kg. Any material requiring offsite disposal from this location will likely require disposal at a non-hazardous soil recovery facility.

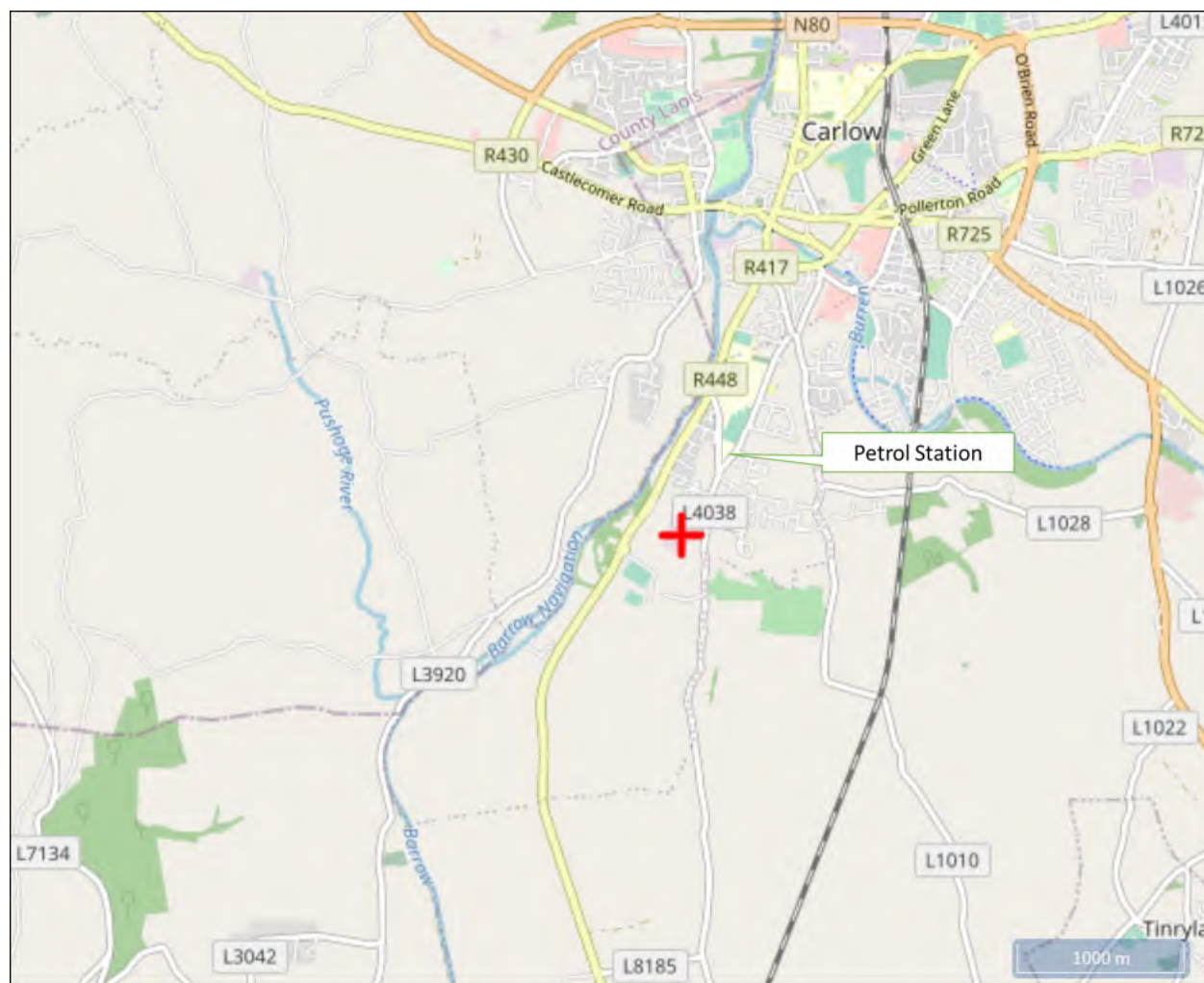


Figure 11-14 EPA Licenced/Waste Facility Sites & Petrol Stations (EPA 2026)

11.4.5.3 Bedrock

The WwTP site PS and microtunnel are underlain by limestone of the Ballyadams formation and limestone of the Milford formation as shown on Figure 11-15 below (GSI 2025). The PS site is underlain by limestone of the Ballyadams formation.

There is 1no. Geological Heritage Area located within 4km of the site. Clogrenan Quarry is located ca. 3.5km south west of the WwTP site, as shown on Figure 11-16 below (GSI, 2025).

There are no Karst features within 2km of the site as shown on Figure 11-17 below (GSI, 2025).

There are no mineral locations or active quarries within the immediate area surrounding the site as shown on Figure 11-18 below.



Figure 11-15 Bedrock Geology (GSI 2026)



Figure 11-16 Geological Heritage Areas (GSI 2026)



Figure 11-17 Karst Features (GSI 2026)

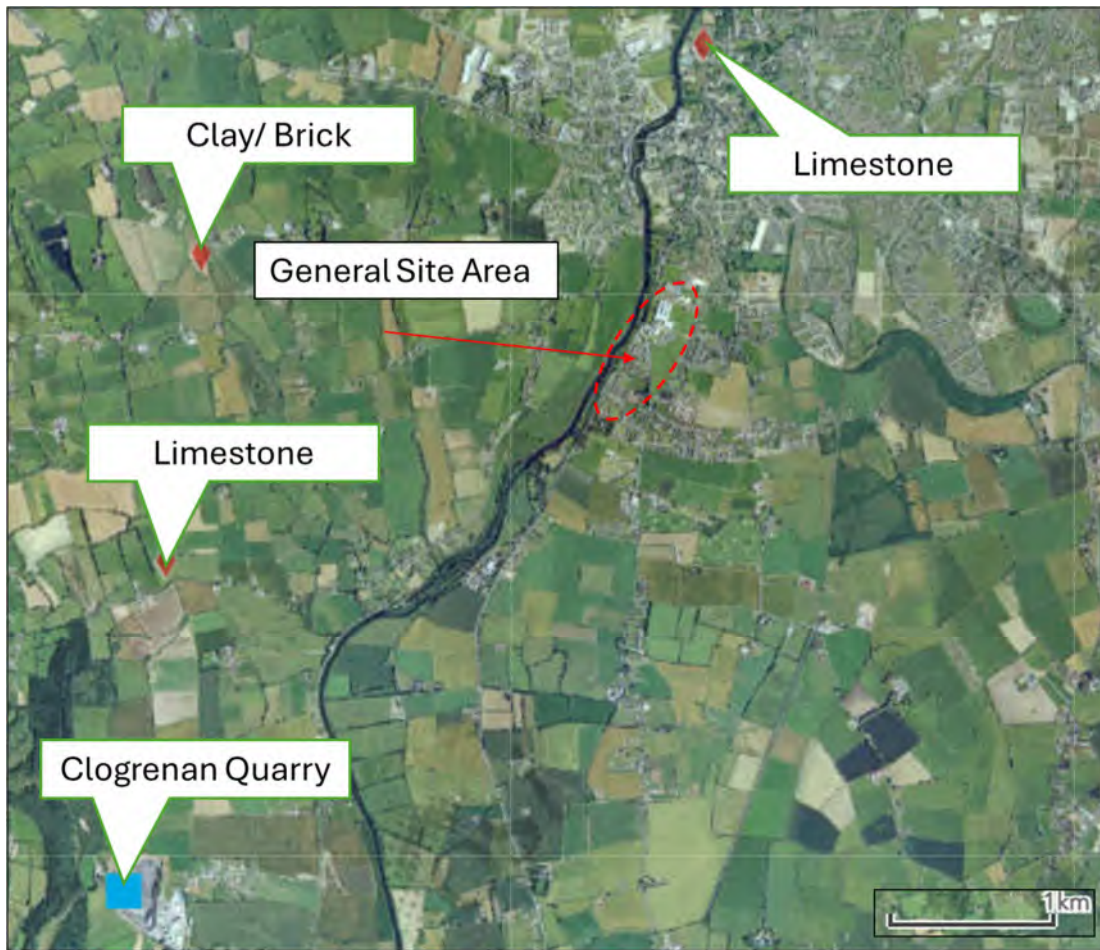


Figure 11-18 Quarries and Mineral Localities (GSI 2026)

11.4.5.4 Groundwater Abstraction

Identified historic groundwater abstraction points are shown on Figure 11-19 below (GSI 2025).

A search of private well locations (accuracy of 1 – 50m) was undertaken using the GSI well database (www.gsi.ie). The GSI does not record the presence of any wells with an accuracy of <50m in the immediate vicinity of the Proposed Development Site. There are several wells in the local area with locational accuracies of 1km reported as having poor to good yields. It is noted that the GSI well database is not exhaustive. However, the Proposed Development Site is located in an urban area with water supply served to houses in the surrounding area by the mains supply.

The GSI also map a public water supply well (GSI Name: 2617SWW407) ~1.1km to the southeast of Mortarstown WwTP. This well is reported to have a moderate yield class and the source is within the granular subsoils. There is no potential for this PWS to be impacted by the Proposed Development due to the local hydrogeological regime, whereby groundwater at the site will flow towards the River Barrow.

Ballinabranna Group Water Scheme (GWS) is located ca. 3km south west of the WwTP site.



Figure 11-19 Groundwater Abstraction Points (GSI 2026)

11.4.5.5 Land (Including Land Take and Zoning)

The existing site area of the WwTP is ca. 3.79 hectares.

The microtunnel will be constructed within the footprint of the existing R448 and there will be no additional land take.

The zoning for the sites is shown on Figure 11-20 below as per the Carlow -Graiguecullen Joint Urban Local Area Plan 2024-2030

The WwTP site is zoned “*Transport and Utilities*” with the objective:

“To provide for transport infrastructure and public utilities.”

The PS site is zoned as “*Existing / Infill Residential*” with an objective

“To protect and improve existing residential amenity; to provide for appropriate infill residential development; to provide for new and improved ancillary services.”

Part of the upgraded discharge pipe from the WwTP and the microtunnel crosses the area zoned as “*Existing / Infill Residential*”

The upgraded discharge pipe will follow the route and footprint of the existing discharge pipe and the microtunnel will be within the footprint of the road and therefore will not significantly negatively impact on the objectives of this zoning criteria.

Part of the upgraded discharge pipe from the WwTP crosses an area zoned as “*Open Space and Amenity*” with the objective:

“To protect, provide for and enhance open space, amenity facilities, and recreational uses”

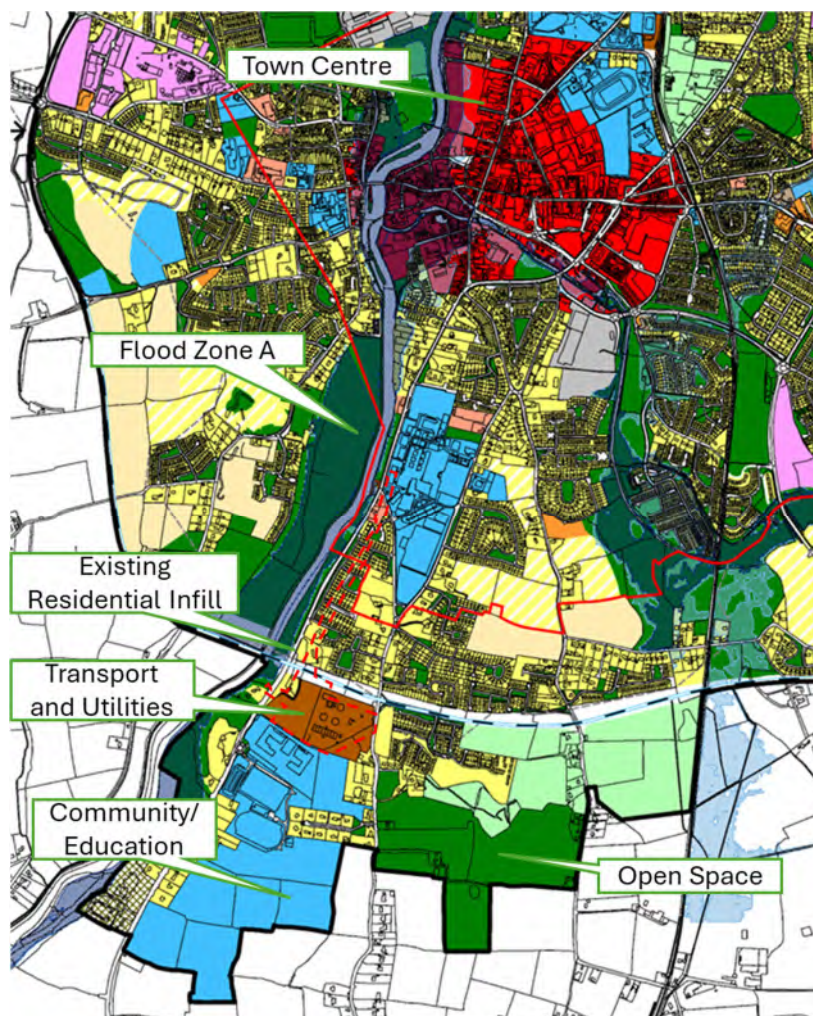


Figure 11-20 Carlow -Graiguecullen Joint Urban Local Area Plan 2024-2030

11.5 Characteristics of the Proposed Development

A detailed project description is provided in Chapter 2- Proposed Development. It is proposed to upgrade the existing Mortarstown WwTP and replace the Kilkenny Road PS with a new wastewater pumping station on the upgraded WwTP site. The existing Kilkenny Road PS will be retained as an emergency overflow. A 775m microtunnel gravity sewer will be installed at a maximum depth of 11m bgl, between the new PS and the existing Kilkenny Road PS.

The proposed Stage 1 horizon (2037) hydraulic loading for the agglomeration are presented in Table 11-1. To enable ease of future expansion, some elements of the works (primarily civil works) are being sized to cater for additional future loading from Stage 2.

Table 11-1 Proposed Hydraulic Loading Rates

Parameter	Unit	Hydraulic Loads
Design population served	capita	58,500
Dry Weather Flow Rate QDWF	m3/hr	370
Full Flow to Treatment QFFT	m3/hr	1,110
Peak Flow (Formula A)	) m3/hr	3,800

The following elements will be included in the design of this project.

11.5.1 Microtunnel Gravity Trunk Sewer

A Technical Note has been prepared for the microtunnel works associated with the Kilkenny Road Pumping Station to Mortarstown Wastewater Treatment Works. This included in Appendix (11-4) and provides a detailed description of the proposed works associated with the microtunnel element of the project.

A 785m long microtunnel gravity sewer (Ø1650mm internal diameter) will be constructed from the south side of Kilkenny Road Pumping Station to the wet well of the new inlet pump station adjacent to the new inlet works of the existing WwTP which is proposed to be upgraded. The microtunnel will be routed under the R448 Kilkenny Road before it traverses under a treelined verge and local access road (to UÉ owned property) to connect to the WwTP.

Due to a confluence on site constraints along the proposed alignment, the pipe is proposed for installation using trenchless construction. An assessment of construction method suitability and horizontal alignment constraints has proposed micro-tunnelling as a suitable method for construction of a tunnel to accommodate a 1.65 m I.D product pipe. Construction is proposed in three pipe jack drives, facilitated by a trench excavation at KRPS, a 15 m I.D shaft at the WWTP, and four intermediate shaft sites. At each site, permanent manholes will be required for maintenance access. To confirm the tunnel and shaft construction method suitability and determine the extent of any necessary mitigations, detailed ground investigation alongside the proposed tunnel alignment has been proposed.

The tunnel specimen design has been produced to account for the ground investigations that have taken place at the Mortarstown WwTP and Kilkenny Road PS sites. Where ground investigation has not yet been completed along the remainder of the tunnel route, the horizontal alignment of the tunnel has been set to mitigate the impact of any subsidence by entirely avoiding tunnelling within the zone of influence of properties alongside the road (horizontal distance between the tunnel and the houses will be at least twice the tunnel depth below ground level). The proposed pipe-jack construction, in which immediate earth retention is provided by the jacking pipes upon excavation of the tunnel, further mitigates subsidence risk



11.5.2 New Inlet Pump Station (PS)

- Provision of 1 no. terminal pump station.
- Provision of 4 no. raw sewerage pumps inclusive of MEICA works.
- Provision of 1 No. standby generator and associated fuel storage.
- Provision of 1 no. odour control unit.
- Provision of 1 no. flow meter chamber

The new pump station will be designed for 4 no. pumps configured on a duty/assist/assist/standby basis to deliver a future 2037 design horizon Formula A flow of 1,055 l/s (3,800 m³/h). Each pump will be rated to deliver 389 l/s (1,400m³/hr) so that 3 no. pumps configured on a duty/assist/standby basis will service the current Formula A flow of 695 l/s (2,503m³/hr).

The size of the pumps dictate that the proposed pump station will be configured as a wet well/dry type pump station. Given that the new pump station at Mortarstown WwTP will also be utilised as the main launch shaft of the microtunnel gravity sewer, a circular structure is proposed.

11.5.3 Mortarstown WwTP

- Provision of a new foul pumping station for local agglomeration adjacent to existing inlet works (supplemented by the WwTP standby generator).
- Provision of new fuel storage tank (5000l) and standby diesel generator to service the WwTP (roofed).
- Provision of new inlet works to include fine screening, mechanically raked by-pass screen, screening compaction and conveyance to skips, grit removal, grit classification and conveyance to skips. The new inlet works will be provided with an odour treatment unit.
- Provision of 2 no. new stormwater storage tanks and 2 no. new stormwater return pumps.
- Existing final settlement tanks and associated Return Activated Sludge (RAS)/ Waste Activated Sludge (WAS) to be retained, cleaned and decommissioned.
- Provision of 4 no. new primary settlement tanks and scraper systems.
- Provision of 4 no. new primary sludge pumps.
- Provision of a new scum pump.
- Provision of 4 no. new air blowers and modifications to existing air delivery pipework
- Provision of a new air blower building (roofed).
- Provision of new fine bubble diffused air system in existing aeration tanks.
- Provision of 2 no. new final settlement tanks with half-bridge scrapers.
- Provision of a new RAS/WAS pumping station and station fitted with 2 no. RAS pumps and 2 no. WAS pumps.
- Structural refurbishment of the existing picket fence tanks.
- Mechanical and electrical refurbishment of existing picket fence thickener and conversion of second existing tank to a sludge blending tank.
- Provision of 2 no. additional picket fence thickener tanks.
- Provision of 1 no. belt press, polymer prep unit and polymer dosing pumps in the existing sludge dewatering building.



- Provision of a new pumped sludge transfer system.
- Provision of upgrades to the existing sludge import facility.
- Provision of minimum 6 no. new odour control units
- Provision of upgrade to existing chemical storage tank and dosing facility
- Provision of 1 no. new outfall chamber and outfall pipe.
- Modifications to existing administration building.
- Provision of MEICA and SCADA upgrades.
- New storage shed and associated gantry (roofed).
- Demolition of existing inlet works structure.
- Existing service relocations.
- General civil site works.
- Future storm tank (not part of this planning consent).
- Future aeration tank (not part of this planning consent).
- Future final settlement tank (not part of this planning consent).
- Provision for PV solar panels,
- Diversion of existing ESB 38kv HV overhead lines and 10kV/20kV MV line on site (carried out by ESB).

11.5.4 Existing Kilkenny Road Pumping Station (PS)

The existing Kilkenny Road pumping station will be decommissioned. The existing building structure will remain. The existing above ground steel gantry structure, access stairs and pumps will be removed from site and repurposed. Incoming flows will be diverted via the existing below-ground holding tank to a newly constructed manhole positioned south of the existing PS, conveying flows to the new gravity microtunnel. Existing overflows at the Kilkenny Road PS will be retained in accordance with the current Wastewater Discharge Licence (EPA WwDL Ref: D0028-01) and utilised in extreme events where the new gravity microtunnel may be at maximum capacity.

The selected and derived parameters to support the design of proposed process are presented within the design calculations. All critical process, hydraulic and electric design parameters are listed within same.

11.6 Do Nothing Scenario

11.6.1 Do Nothing

Uisce Eireann currently operate the Mortarstown WwTP and the PS at the respective sites connected by an existing microtunnel. The WwTP currently has a capacity of 36,000 P.E and discharges treated waste water to the River Barrow under discharge authorisation D0028-01.

Under the “Do Nothing” scenario the WwTP and PS will continue to operate as a WwTP and PS. All waste waters entering the plant will continue to be stored and treated in existing sealed concrete and bunded metal storage tanks. All chemicals and fuels used during the operational phase will continue to be stored in bunded tanks.

The do-nothing scenario will have a neutral and imperceptible effect on Land Soils and Geology as per Table 3.4 ‘Description of Effects’ of the EPA guidance document ‘Guidelines on the information to be contained in environmental impact assessment reports’ (EPA 2002).



11.7 Potential Effects of the Proposed Development

11.7.1 Construction Phase

The key civil engineering works at the WwTP (Including new PS) with potential impacts on soils and geology during construction will involve the demolition and removal of the primary treatment works and stormwater storage tank and the excavation of material for foundations for infrastructure works including the settlement tanks, stormwater tanks, clarifier and picket fence thicker and the micro-tunnelling. The maximum excavation depth is anticipated to be ca. 15m. Works will involve disturbance of topsoil and subsoil within the existing WwTP site and the agricultural land to be incorporated into the development. Bedrock may be encountered during the excavations for the deeper tanks and sumps. Below ground construction works will be required to facilitate the construction of the tanks, clarifier and thickener. Works will also involve deliveries of imported engineering fill, crushed stone, concrete, reinforcement and other construction materials. Other construction activities will include site storage of cement and concrete materials, oils and fuels.

The maximum depth of the microtunnel along the R448 will be ca. 11m bgl.

11.7.1.1 Land (including Land take)

The existing site area of the WwTP is ca. 3.79 hectares. An additional ca. 1.74 hectares of agricultural land will be incorporated into the development to facilitate the expanded WwTP and pumping station.

The microtunnel will be constructed within the footprint of the existing R448 and there will be no additional land take.

The zoning for the sites is shown on Figure 11-20 above as per the Carlow -Graiguecullen Joint Urban Local Area Plan 2024-2030

The WwTP site is zoned “*Transport and Utilities*” with the objective:

“To provide for transport infrastructure and public utilities.”

The WwTP complies with this objective

The PS site is zoned as “*Existing / Infill Residential*” with an objective

“To protect and improve existing residential amenity; to provide for appropriate infill residential development; to provide for new and improved ancillary services.”

The PS is an ancillary service to residential areas.

Part of the upgraded discharge pipe from the WwTP and the micro tunnel crosses the area zoned as “*Existing / Infill Residential*”

The upgraded discharge pipe will follow the route and footprint of the existing discharge pipe and the microtunnel will be within the footprint of the road and therefore will not significantly negatively impact on the objectives of this zoning criteria.

Part of the upgraded discharge pipe from the WwTP crosses an area zoned as “*Open Space and Amenity*” with the objective:



“To protect, provide for and enhance open space, amenity facilities, and recreational uses”

The upgraded discharge pipe will follow the route and footprint of the existing discharge pipe. Part of the public open space along this route may be temporarily closed off to facilitate the upgrade works during construction. Following the upgrade of the discharge pipe the ground surface will be reinstated and the area returned to public open space. There will be an imperceptible impact on the objective for this area.

As per Table 3.4 ‘Descriptions of Effects’ of the EPA guidance document ‘*EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*’, the impact on the land take for the WwTP is unlikely to have a significant impact on the environment of the area as the majority of the land is currently a WwTP with 1.74 hectares currently in agricultural use. It is likely to have a minimal impact in that it alters the character of the environment in a manner consistent with existing and emerging trends. Any impacts will be permanent.

The main portion of the upgrade WwTP development is in an area zoned for “*Transport and Utilities*”. It is the site of the existing Mortarstown WwTP. The development is consistent with the zone objectives for the area. It will be a permanent impact.

The overall effect on the land take for the project is likely to negative/ adverse, not significant and permanent.

11.7.1.2 Soils & Geology

11.7.1.2.1 WwTP

Stripping of topsoil will be required across the site particularly the area of the proposed WwTP and new PS site currently in agricultural use. It is expected that all stripped topsoil will be removed offsite to a suitable facility.

Excavation of existing subsoil layers will be required in order to allow installation of the various tanks foundation excavation and drainage and utility installation. Where feasible, excavated material will be reused as part of the site development works (e.g. use as fill material around the various tanks and levelling out of the site).

Bedrock may be encountered onsite during the construction of the various deeper tanks. Bedrock was encountered at 14.7m bgl. In the event that bedrock is encountered it should be suitable to be used beneath foundations, for backfilling of tanks and reprofiling the site.

There will be a direct, permanent effect on the soils and geology, however, it is not considered to be a significant adverse effect as the removal will have a negligible influence on the overall landform morphology.

Tracked excavators will likely be sufficient to excavate soils and rock breakers may be required to excavate the top of the bedrock. The maximum depth of excavation is anticipated to be ca. 15m bgl to facilitate the construction of the tanks. The extent of excavation for the cable and pipe trenches will vary depending on the cable and pipe size, however the general depth will be in the region of ca. 1m.

11.7.1.2.2 PS

Only minor excavation works will be required at the existing Kilkenny Road PS suite to facilitate connection to the microtunnel

11.7.1.2.3 Micro tunnel

The maximum depth of excavation for the microtunnel is 11m bgl. A tunnel boring machine (TBM) will be used to excavate the micro tunnel. It is anticipated that the micro tunnel will be constructed within the existing road engineering fill material. Any excavated material will be backfilled around the proposed micro tunnel with any excess material disposed offsite.

The total volume of material requiring excavation is expected to be ca. 89,000m³ for the development including topsoil subsoil and weathered rock. It is anticipated that the 2,500m³ subsoil will be used as fill on the site while the topsoil will be removed to an appropriate facility. An application may be made to the EPA under Article 27 of the European Communities (Waste Directive) Regulations 2011 for the use of excess soil as a by-product if a definite use and need for this material can be determined. Suitable soil subject to further testing will also be removed to appropriate inert soil recovery/ disposal facilities. Approximately 86,000m³ clean topsoil, subsoil and weathered rock will be removed offsite.

Soil required to be excavated in the vicinity of RC06 and TP13 will be disposed of at a non-hazardous soil disposal/ recovery facility. The volume of contaminated material to be removed offsite is estimated to be 334m³.

11.7.1.2.4 Ground Stability

There is no evidence of significant historic landslides and there are no known karst features within the development boundary. During the micro-tunnelling works loose cohesionless ground at the tunnel face extending to the ground surface represents a risk for uncontrolled face collapse and a sink hole developing. The application of standard procedures during tunnelling works will reduce the likely risks including maintaining vigilance during construction and maintaining slurry pressure and continuously monitoring excavation volumes passing through the machine. Further Horizontal alignment of the micro-tunnel has been set to avoid property boundaries.

11.7.1.2.5 Potential Impacts

Potential Soil/ Bedrock Impacts

During the construction / decommissioning phase of the development, the following potential impacts on soils and bedrock could occur and have been assessed accordingly:

- Stripping of topsoil will result in exposure of the underlying subsoil layers to the effects of weather and construction traffic. This may result in subsoil erosion and generation of sediment laden runoff;
- Soils beneath the development may become unnecessarily compacted by machinery during construction;
- Topsoil and subsoil may become rutted and deterioration of the topsoil layer and any exposed subsoil layers, resulting in erosion and generation of sediment laden runoff;
- Dust generation can also occur during extended dry weather periods as a result of construction traffic;
- Soils and bedrock may be at risk of becoming contaminated through site construction activity; in particular the risk of fuel spillages and leakage.
- Subsoil and topsoil will require offsite disposal.
- Ground instability during micro-tunnelling works including defects to road network.
- Given the current site use as a WwTP there is a moderate potential for contaminated soil to be encountered onsite. Hydrocarbon levels marginally in excess of the inert waste criteria has been encountered in TP13 and RC03. Soil samples from the slit trench in close proximity to the petrol station along the line of the micro tunnel indicated Dissolved Organic Carbon (DOC) marginally above the inert waste criteria. Any soils requiring removal from these areas will be removed offsite to a non-hazardous landfill.

The development is likely to have a negative, slight, permanent effect on soils and bedrock during the construction stage as per Table 3.4 'Descriptions of Effects' of the EPA guidance document 'EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA 2022).

Mitigation measures will be implemented during the construction /decommissioning phase to avoid these potential impacts, and to address any potential waste management issue's; these are listed below in Section 11.8.



11.7.2 Operational Phase

During the operational phase of the development the following potential impacts on soils and bedrock could occur and have been assessed accordingly.

Electrical equipment and onsite chemical / oil storage could potentially be a source of contaminants to the underlying soil and bedrock.

Soils and bedrock may be at risk of becoming contaminated through routine site maintenance activities

The development will have a negative, moderate, permanent effect on the surrounding area.

Mitigation measures will be implemented during the construction /operational phase to avoid these potential impacts, and these are listed below in Section 11.8. These effects are unlikely to occur if the mitigation measures are implemented.

11.7.3 Decommissioning Phase

As outlined in Section 2.4 in the Proposed Development Chapter, Mortarstown WwTP is owned and operated by UÉ. They will be responsible for the future intentions of this facility if the plant were decommissioned. The design lifespan of the upgraded plant is 25 years but it is anticipated that it will be maintained, and periodic upgrading undertaken over a longer lifetime to meet future demand and upgrades in technology.

In the event of facility shutdown UÉ will decommission, render safe or remove for disposal/recovery, all materials, waste, ground, plant and equipment that could result in environmental pollution.

The potential impacts on Land, Soils & Geology associated with any eventual decommissioning phase will be very similar to the impacts associated with the construction phase as outlined above. The CEMP provides a section relating to decommissioning phase.

- Stripping of topsoil will result in exposure of the underlying subsoil layers to the effects of weather and construction traffic. This may result in subsoil erosion and generation of sediment laden runoff;
- Soils beneath the development may become unnecessarily compacted by machinery during construction;
- Topsoil and subsoil may become rutted and deterioration of the topsoil layer and any exposed subsoil layers, resulting in erosion and generation of sediment laden runoff;
- Dust generation can also occur during extended dry weather periods as a result of construction traffic; and,
- Soils and bedrock may be at risk of becoming contaminated through site construction activity; in particular the risk of fuel spillages and leakage.
- Subsoil and topsoil may require offsite disposal.

Given the current site use and ongoing site use as a WwTP there is a moderate potential for contaminated soil to be encountered onsite.

The development is likely to have a negative, slight, permanent effect on soils and bedrock during the decommissioning stage as per Table 3.4 'Descriptions of Effects' of the EPA guidance document 'EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA 2022).

Mitigation measures will be implemented during the decommissioning phase to avoid these potential impacts, and to address any potential waste management issue's; these are listed below in Section 11.8.

11.8 Mitigation Measures

11.8.1 Construction Phase

11.8.1.1 Soil and Waste Removal

- Stripping of topsoil will be carried out in a controlled and carefully managed way and coordinated with the staging for the development. At any given time, the extent of topsoil strip (and consequent exposure of subsoil) will be limited to the immediate vicinity of active work areas. Topsoil stockpiles will be protected for the duration of the works and not located in areas where sediment laden runoff may enter existing surface water drains. Topsoil stockpiles will also be located so as not to necessitate double handling. Mitigation measures as outlined in Chapter 14 – Material Assets, are also applicable to soil and waste removal.
- The design of road levels and finished levels has been carried out in such a way as to minimize cut/fill type earthworks operations. The duration that subsoil layers are exposed to the effects of weather will be minimised. Disturbed subsoil layers will be stabilised as soon as practicable (e.g. backfill of service trenches, construction of road capping layers, construction of building foundations and completion of landscaping). Similar to comments regarding stripped topsoil, stockpiles of excavated subsoil material will be protected for the duration of the works. Stockpiles of subsoil material will be located separately from topsoil stockpiles. Measures will be implemented to capture and treat sediment laden surface water runoff (e.g. surface water inlet protection and earth bunding adjacent to open drainage ditches).
- The overall excavation of material will be ca. 89,000m³ for the development, will be minimised as much as possible to reduce the impact on soils and geology. Subsoil where suitable will be reused onsite as fill material. Topsoil that can be used for amenity purposes will be stockpiled on the development area for use as required in the final landscaping of the development.
- Any surplus material, or materials which are deemed not suitable for onsite reuse (including any potentially contaminated materials), will be managed, transported and disposed of in accordance with the requirements of the Waste Management Act 1996, as amended, and the Waste Framework Directive 2008/98/EC of the European Parliament and Council on waste. A project specific Resource and Waste Management Plan (RWMP) will be fully implemented onsite for the duration of the project.

11.8.1.2 Potential Soil / Geology Impact Mitigation

- The mitigation measures for prevention of soil / bedrock contamination during construction are proposed below. Mitigation measures outlined in Chapter 12 - Water (Hydrology and Hydrogeology), are also applicable to the protection of soils and geology during the construction phase. Earthworks plant and vehicles delivering construction materials to site will be confined to predetermined haul routes around the site;
- Shoring of all deep excavations will be carried out to ensure sides do not collapse during the excavation of the tanks.
- Vehicle wheel wash facilities will be installed in the vicinity of any site entrances and road sweeping implemented as necessary in order to maintain the road network in the immediate vicinity of the site.
- Dust suppression measures (e.g. dampening down) will be implemented as necessary during dry periods;
- The employment of good construction management practices will serve to minimise the risk of pollution from construction activities at the development in line with the Construction Industry Research and Information Association (CIRIA) publication entitled, Control of Water Pollution from Construction Sites,

Guidance for Consultants and Contractors, CIRIA - C532 (2001) which are also detailed in Chapter 12 – Water (Hydrology and Hydrogeology). Specifically, with regard to soils and geology, the following will be adhered to;

- Fuels, lubricants and hydraulic fluids for equipment used on the construction site, as well as any solvents, oils, and paints will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice; Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the development for disposal or recycling;
- Any spillage of fuels, lubricants or hydraulic oils will be immediately contained, and the contaminated soil removed from the development and properly disposed of;
- All site vehicles used will be refuelled in bunded and adequately sealed and covered areas in the construction compound area.
- All plant and machinery will be serviced before being mobilised to site;
- No plant maintenance will be completed on site, any broken-down plant will be removed from site to be fixed;
- Refuelling will be completed in a controlled manner using drip trays at all times;
- Mobile bowsers, tanks and drums will be stored in secure, impermeable storage areas away from open water;
- Fuel containers will be stored within a secondary containment system, e.g. bunds for static tanks or a drip tray for mobile stores;
- Containers and bunding for storage of hydrocarbons and other chemicals will have a holding capacity of 110% of the volume to be stored;
- Ancillary equipment such as hoses and pipes will be contained within the bund;
- Taps, nozzles or valves will be fitted with a lock system;
- Fuel and chemical stores including tanks and drums will be regularly inspected for leaks and signs of damage;
- Drip-trays will be used for fixed or mobile plant such as pumps and generators in order to retain oil leaks and spills;
- Only designated trained operators will be authorised to refuel plant on site;
- Procedures and contingency plans will be set up to deal with emergency accidents or spills;
- An emergency spill kit with oil boom, absorbers etc. will be kept on-site for use in the event of an accidental spill. A specific team of staff will be trained in the use of spill containment;
- Strict supervision of contractors will be adhered to in order to ensure that all plant and equipment utilised on-site is in good working condition. Any equipment not meeting the required standard will not be permitted for use within the Site. This will minimise the risk of soils and bedrock becoming contaminated through site activity; and,
- Highest standards of site management will be maintained, and utmost care and vigilance followed to prevent accidental contamination or unnecessary disturbance to the site and surrounding environment during construction. A named person will be given the task of overseeing the pollution prevention measures agreed for the site to ensure that they are operating safely and effectively.
- Soils on the development may become unnecessarily compacted by machinery during construction. In order to protect against unnecessary compaction of soil by machinery, construction limits, accesses, and haulage roads will be clearly defined:
- In the event that contaminated ground is encountered during the construction works the following specific environmental management procedures will be adhered to;



- The contaminated material will be fully characterised in terms of lateral and vertical extent, and a detailed assessment of the potential environmental and human health impacts will be undertaken in accordance with industry standard best practice;
- Soil Excavated onsite during construction will be reused as 'Other granular 6F1/2 type' fill below the pavements and in landscaping to reduce the quantity of soil requiring disposal offsite.
- Any soil or topsoil required to be removed offsite to an appropriately licenced/ permitted soil disposal or recovery facility will be characterised in advance in accordance with the Waste Classification List of Waste & Determining if Waste is Hazardous or Non-hazardous (EPA, 2015) and the waste acceptance criteria for the relevant facility.
- Any waste generated during the works will be managed in accordance with the relevant waste legislation. Any contaminated material requiring offsite disposal will be transported and disposed of to a suitably licenced waste facility;
- Monitoring and protection measures (inclinometers, extensometers, piezometers, monitoring targets) will be implemented during the micro-tunnel construction.
- Continuous monitoring during construction of micro tunnel, maintaining slurry pressure and continuously monitoring excavation volumes passing through the machine.
- Surface watch when TBM is passing critical locations (e.g. under roads) will reduce severity of impact by enable fast mitigative reaction (e.g. stop traffic).
- At excavations proximal to the River Barrow, the excavation temporary support will exclude water ingress with immediate excavation support and water exclusion provided by sheet pile cut-off walls on all sides.

11.8.1.3 General

The standard following precautionary measures will be implemented.

- All excavated materials will be stored away from the excavations, in an appropriate manner at a safe and stable location. The maximum height of temporary stockpiles will be 3m.
- A comprehensive monitoring and supervisory regime including monitoring of all excavations and stability assessments as required will be put in place to ensure that the proposed construction works do not constitute a risk to the stability of the site.

All of the above mitigation measures will form part of a site-specific Construction Environmental Management Plan (CEMP) which will be in operation during the construction phase.

11.8.2 Operational Phase

Mitigation measures for prevention of soil and bedrock contamination, are proposed below during the operational phase. Mitigation measures outlined in Chapter 12 – Water (Hydrology and Hydrogeology) are also applicable to the protection of soils and bedrock during the operational phase.

Specifically, with regard to soils and bedrock, the following will be adhered to:

- Fuels, lubricants and hydraulic fluids for equipment used or stored at the development, as well as any solvents, oils, and paints will be carefully handled to avoid spillage, properly stored in bunded areas and secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice;
- All chemicals used within the waste water treatment process will only be used within concreted or bunded areas and will be properly stored in bunded areas and secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice;
- All onsite equipment will be maintained according to best codes of practice;

- Any spillage of fuels, lubricants or hydraulic oils will be immediately contained, and the contaminated soil / bedrock removed from the development and properly disposed of;
- Refuelling of site vehicles should be carried out only at specially bunded facilities or at offsite locations;
- Strict supervision of contractors during routine maintenance as required will be adhered to in order to ensure that all plant and equipment utilised onsite is in good working condition. Any equipment not meeting the required standard will not be permitted for use within the Site. This will minimise the risk of soils and bedrock becoming contaminated through operational site activity.
- These mitigation measures should form part of a site-specific Construction Environmental Management Plan (CEMP) during the operational phase.

11.8.3 Decommissioning Phase

The mitigation measures outlined in Section 11.8.1 Construction Phase will apply to the decommissioning phase. Further environmental soil testing will be carried out in advance of the decommissioning works to identify any potentially contaminated soils to determine any offsite suitable soil recovery/ disposal facilities as required.

11.9 Residual Effects

With the implementation of the proposed mitigation measures and monitoring, the effect of the proposed development on land and soils is considered to be negative minor in magnitude and permanent during construction and operation and decommissioning phase.

11.10 Monitoring Requirements

Proposed monitoring requirements during the construction phase in relation to the soil and geological environment are as follows:

- Adherence to the site-specific Construction Environmental Management Plan (CEMP);
- Construction monitoring of the works (e.g. inspection of existing ground conditions on completion of excavation for tanks, foundations and services).
- Inspection of fuel / oil storage areas;
- Monitoring cleanliness of adjacent road network, implementation of dust suppression and provision of vehicle wheel wash facilities;
- Monitoring of contractor's stockpile management (e.g. protection of excavated material to be reused as fill, protection of soils for removal from site from contamination); and,
- Monitoring sediment control measures (surface water inlet protection etc.).
- Ongoing monitoring proposed as part of the surface water and groundwater monitoring on completion of the construction phase as outlined in Chapter 12 Water (Hydrology and Hydrogeology) will also monitor the potential impact on soils beneath the site.
- Further soil characterisation will be required before the soil is transported for offsite recovery/ disposal.
- Monitoring and protection measures (inclinometers, extensometers, piezometers, monitoring targets) will be carried out during the construction of the micro-tunnel.



11.11 Difficulties encountered during the preparation of this chapter

No significant difficulties were encountered during the preparation of this chapter



12. WATER

12.1 Introduction

12.1.1 Background and Objectives

was engaged by AtkinsRéalis on behalf of UÉ to carry out an assessment of the potential likely and significant effects of the proposed upgrade of the Mortarstown Wastewater Treatment Plant (WwTP) on Water aspects (hydrology and hydrogeology) of the receiving environment.

The Proposed Development Site is located to the south of Carlow town centre. The Proposed Development site includes the existing location of Mortarstown WwTP, located off Green Road, Mortarstown Upper, and the existing location of the Kilkenny Road Pumping Station, adjacent the River Barrow. The proposed wastewater treatment plant upgrade includes additional treatment infrastructure, alterations to existing wastewater treatment infrastructure, the change of use of existing wastewater treatment infrastructure and the removal of wastewater treatment infrastructure. The development description is provided in Chapter 2 and summarised in Section 12.4 below.

Where the 'Proposed Development' is referred to, this relates to all the project components described in detail in Chapter 2 of this EIAR. The majority of the work will be carried out inside the existing site boundary.

Where 'Proposed Development Site' or the 'site' is referred to, this relates to the primary study area for the development, as delineated by the EIAR Site Boundary. The EIAR Site Boundary mirrors that of the application site boundary.

The objectives of the assessment are:

- Produce a baseline study of the existing water environment (surface water and groundwater) in the area of the Proposed Development ;
- Identify likely impacts of the Proposed Development on surface water and groundwater during construction and operational phases of the development;
- Identify mitigation measures to avoid, remediate or reduce significant negative impacts; and,
- Assess significant residual effects and cumulative effects of the Proposed Development.

12.1.2 Relevant Legislation

The EIAR is prepared in accordance with the requirements of European Union Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive') as amended by Directive 2014/52/EU.

The following legislation has been complied with:

- Planning and Development Acts, 2000 (as amended);
- Planning and Development Regulations, 2001 (as amended);
- S.I. No. 477/2011 – European Communities (Birds and Natural Habitats) Regulations 2011 which give effect to EU Directives 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive) and 79/409/EEC on the conservation of wild birds (the Birds Directive);



- S.I. No. 293/1988: Quality of Salmon Water Regulations;
- Water Framework Directive (2000/60/EC) (as amended by Decision No. 2455/2011/EC; Directive 2008/32/EC; Directive 2008/105/EC; Directive 2009/31/EC; Directive 2013/39/EU; Council Directive 2013/64/EU; and Commission Directive 2014/101/EU (“WFD”);
- S.I. No. 272/2009: European Communities Environmental Objectives (Surface Waters) Regulations 2009, as amended, and S.I. No. 722/2003 European Communities (Water Policy) Regulations, as amended, which implement EU Water Framework Directive (2000/60/EC) and provide for the implementation of ‘daughter’ Groundwater Directive (2006/118/EC);
- S.I. No. 684/2007: Waste Water Discharge (Authorisation) Regulations;
- S.I. No. 296/2009: European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009, as amended;
- S.I. No. 9/2010: European Communities Environmental Objectives (Groundwater) Regulations 2010, as amended;
- S.I. No. 296/2018: European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 which transposes the provisions of the EIA Directive as amended by the Directive 2014/52/EU into Irish Law;
- S.I. No. 99/2023: European Union (Drinking Water) Regulations; and,
- S.I. 403/2025: Urban Wastewater (Nutrient – Sensitive Areas) Regulations 2025.

12.1.3 Relevant Guidance

The Hydrology and Hydrogeology chapter of the EIAR is carried out in accordance with guidance contained in the following:

- Environmental Protection Agency (2022): Guidelines on the Information to be contained in Environmental Impact Assessment Reports;
- Institute of Geologists Ireland (2013): Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements;
- National Roads Authority (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;
- Inland Fisheries Ireland (2016): Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters;
- PPG1 - General Guide to Prevention of Pollution (UK Guidance Note);
- PPG5 – Works or Maintenance in or Near Watercourses (UK Guidance Note);
- OPW (2009): The Planning System and Flood Risk Management;
- CIRIA (Construction Industry Research and Information Association) (2006): Guidance on ‘Control of Water Pollution from Linear Construction Projects’ (CIRIA Report No. C648, 2006);
- CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors (CIRIA C532, 2006);
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoHPLG, 2018);
- Guidance on the preparation of the EIA Report (Directive 2011/92/EU as amended by 2014/52/EU), (European Union, 2017); and,
- Carlow County Council (2022). Carlow County Development Plan (2022-2028).
- ICARUS, 2020. Identification of climate sensitive catchments: Water Resources and Climate Change Adaption



12.2 Methodology

12.2.1 Desk Study

A desk study of the Proposed Development Site was completed in the Summer of 2022 to collect all relevant hydrological, hydrogeological and meteorological data for the Proposed Development Site and the surrounding area. The desk study was completed to supplement site walkover surveys completed by HES and site investigations completed by Priority Geotechnical. The desk study information has been checked and updated, where necessary, in December 2025.

The desk study involved consultation with the following sources:

- Environmental Protection Agency database (www.epa.ie);
- Geological Survey of Ireland - Groundwater Database (www.gsi.ie);
- Met Eireann Meteorological Databases (www.met.ie);
- National Parks & Wildlife Services Public Map Viewer (www.npws.ie);
- EPA/Water Framework Directive Map Viewer (www.catchments.ie);
- WFD 3rd Cycle Barrow Catchment Report (EPA, 2024);
- Bedrock Geology 1:100,000 Scale Map Series, Sheet 19 (Bedrock Geology of Carlow - Wexford); Geological Survey of Ireland (GSI, 1999);
- Geological Survey of Ireland - Groundwater Body Characterisation Reports;
- OPW Flood Mapping Databases (www.floodmaps.ie); and,
- Environmental Protection Agency – “Hydrotool” Map Viewer (www.epa.ie).

12.2.2 Baseline Monitoring and Site Investigations

Site investigations to address the Water Section of the EIAR included the following:

A hydrological walkover survey and detailed drainage mapping was completed by HES at the Proposed Development Site on 19th July 2022. During the walkover survey notes were made on ground conditions, local drainage patterns and potential surface water flowpaths.

Baseline surface water monitoring/sampling was undertaken by Atkins at 2 no. locations (SW1 and SW2) on the River Barrow on 28th June and 22nd September 2021. Laboratory analysis of these water samples were completed to determine the baseline water quality of the primary surface waters upstream and downstream of the Proposed Development Site. HES completed additional surface water sampling at the same locations previously sampled by Atkins on 29th April 2025. This EIAR specific water quality data was supplemented with recent and historic ambient water quality monitoring (2010 – 2023) completed by UÉ in accordance with existing discharge licence conditions.

Intrusive site investigations were completed at the Proposed Development Site by Priority Geotechnical (PGL, 2021) to characterise the local geology. These site investigations were conducted on several dates in March and April 2021, and included:

- Drilling of 9 no. cable percussion boreholes and 5 no. rotary boreholes;
- Excavation of 8 no. trial pits;
- Laboratory testing of soils obtained from site investigations including 30 no. PSD analyses;
- Installation of 4 no. standpipes to facilitate groundwater monitoring; and,
- Ground Penetrating Radar (GPR) survey of the WwTP.



PGL completed a 2nd round of site investigations between March and May 2022 which comprised of:

- 5 no. cable percussion boreholes;
- 5 no. rotary coreholes; and,
- GPR survey of Kilkenny Road.

Groundwater monitoring within the installed standpipes was completed by PGL on 16th April 2021 with HES completing manual groundwater level monitoring during subsequent site visits.

IE Consulting have also completed a Site Specific Flood Risk Assessment for the Proposed Development (2025) which is included as Appendix 12-1 and a Hydrodynamic Technical Report for the proposed outfall pipe and headwall (Appendix 12-2). Atkins have prepared a WAC Assessment which is included as Appendix 12-3. These assessments have been incorporated into this EIAR chapter and inform the impact assessment on the water environment.

12.2.3 Impact Assessment Methodology

The guideline criteria (EPA, 2022) for the assessment of likely significant effects require that likely effects are described with respect to their extent, magnitude, type (i.e. negative, positive or neutral) probability, duration, frequency, reversibility, and transfrontier nature (if applicable). The descriptors used in this environmental impact assessment are those set out in the EPA (2022) Glossary of effects as shown in Chapter 1 of this EIAR.

In addition to the above methodology, the importance of the water environment receptors was assessed on completion of the desk study and site investigations. Levels of importance which are defined in Table 12-1 and

Table 12-2 for the hydrological and hydrogeological environments are used to assess the effects that the Proposed Development may have on them.

Table 12-1: Estimation of Importance of Hydrology Criteria (NRA, 2008)

Importance	Criteria	Typical Example
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
Medium	Attribute has a medium quality or value on a local scale	Coarse fishery.

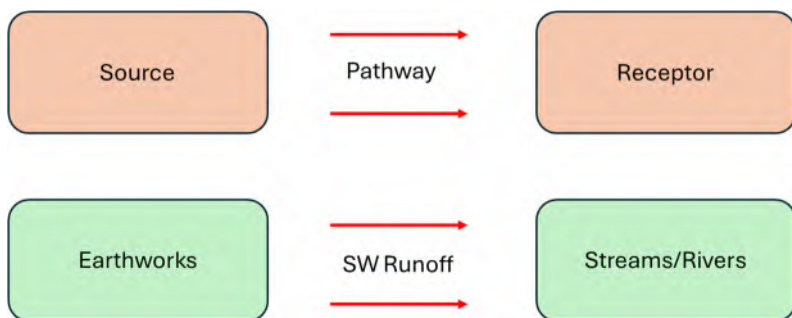
		Local potable water source supplying >50 homes Quality Class C (Biotic Index Q3, Q2-3). Flood plain protecting between 1 and 5 residential or commercial properties from flooding.
Low	Attribute has a low quality or value on a local scale	Locally important amenity site for small range of leisure activities. 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

Table 12-2: Estimation of Importance of Hydrogeology Criteria (NRA, 2008)

Importance	Criteria	Typical Example
Extremely High	Attribute has a high quality or value on an international scale	Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation, e.g. SAC or SPA status
Very High	Attribute has a high quality or value on a regional or national scale	Regionally Important Aquifer with multiple wellfields. Groundwater supports river, wetland or surface water body ecosystem protected by national legislation - NHA status Regionally important potable water source supplying >2500 homes Inner source protection area for regionally important water source.
High	Attribute has a high quality or value on a local scale	Regionally Important Aquifer Groundwater provides large proportion of baseflow to local rivers. Locally important potable water source supplying >1000 homes. Outer source protection area for regionally important water source. Inner source protection area for locally important water source.
Medium	Attribute has a medium quality or value on a local scale	Locally Important Aquifer. Potable water source supplying >50 homes. Outer source protection area for locally important water source.
Low	Attribute has a low quality or value on a local scale	Poor Bedrock Aquifer Potable water source supplying <50 homes

12.2.4 Overview of Impact Assessment Process

The conventional source-pathway-receptor model (see below, top) was applied to assess potential effects on downstream environmental receptors (see below, bottom as an example) as a result of the Proposed Development.



Where potential effects are identified, the classification of impacts in the assessment follows the descriptors provided in the Glossary of Impacts contained in the following guidance documents produced by the Environmental Protection Agency (EPA):

- Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2022)

The description process clearly and consistently identifies the key aspects of any potential impact source, namely its character, magnitude, duration, likelihood and whether it is of a direct or indirect nature.

In order to provide an understanding of the stepwise impact assessment process applied below, a summary guide is presented below, which defines the steps (1 to 7) taken in each element of the impact assessment process. The guide also provides definitions and descriptions of the assessment process and shows how the source-pathway-target model and the EPA impact descriptors are combined.

Using this defined approach, this impact assessment process is then applied to all construction and operation activities which have the potential to generate a source of significant adverse impact on the geological and hydrological/ hydrogeological (including water quality) environments.

Table 12-3: Impact Assessment Process Steps

Step 1	Identification and Description of Potential Impact Source	
	This section presents and describes the activity that brings about the potential impact or the potential source of pollution. The significance of effects is briefly described.	
Step 2	Pathway/Mechanism	The route by which a potential source of impact can transfer or migrate to an identified receptor. In terms of this type of development, surface water and groundwater flows are the primary pathways, or for example, excavation or soil erosion are physical

		mechanisms by which potential impacts are generated.
Step 3	Receptor	A receptor is a part of the natural environment which could potentially be impacted upon, e.g. human health, plant / animal species, aquatic habitats, soils/geology, water resources, water sources. The potential impact can only arise as a result of a source and pathway being present.
Step 4	Pre-Mitigation Impact	Impact descriptors which describe the magnitude, likelihood, duration and direct or indirect nature of the potential impact before mitigation is put in place.
Step 5	Proposed Mitigation Measures	Control measures that will be put in place to prevent or reduce all identified significant adverse impacts. In relation to this type of development, these measures are generally provided in two types: (1) mitigation by avoidance, and (2) mitigation by (engineering) design.
Step 6	Post-Mitigation Residual Effects	Impact descriptors which describe the magnitude, likelihood, duration and direct or indirect nature of the potential impacts after mitigation is put in place.
Step 7	Significance of Effects	Describes the likely significant post-mitigation effects of the identified potential impact source on the receiving environment.

12.2.5 Limitations and Difficulties Encountered

No limitations or difficulties were encountered during the preparation of the Hydrology and Hydrogeology Chapter of the EIAR.

12.2.6 Water Study Area

The Water Study Area for the hydrological and hydrogeological impact assessment is defined by the regional surface water catchment and groundwater bodies within which the Proposed Development Site is located.

A regional hydrology map showing the WFD surface water catchment and sub-catchment is included as Figure 12-1 with details of these receiving waterbodies provided in Section 12.3.3. In addition, the bedrock aquifer and groundwater body which underlie the Proposed Development Site are detailed in Section 12.3.7, with the bedrock aquifers presented in Figure 12-9.



12.3 Receiving Environment

12.3.1 Site Description and Topography

The Proposed Development Site extends from the existing Kilkenny Road Pumping Station in the north, along the R448 to the existing location of the Mortarstown Wastewater Treatment Plant (WwTP) in the south.

The Kilkenny Road Pumping Station is located in the north of the Proposed Development Site, to the south of Carlow Town centre and on the eastern banks of the River Barrow. The existing pumping station compound lies immediately to the west of the R448, which extends to the southeast from Carlow town. Here the Proposed Development Site is located in an urban area, with Carlow IT situated to the east of the R448. The western boundary of this section of the Proposed Development Site is marked by the River Barrow. The existing Kilkenny Road compound comprises of a pumping station, an ESB substation, a control building, a hardstand area and existing overflow pipes to the River Barrow. The existing compound is enclosed by palisade fencing and can be accessed via a locked gate from the R448. It is proposed to decommission the existing pumping station. Elevations in this area of the Proposed Development Site range from ~46 to 49mOD (metres above Ordnance Datum) with land sloping to the southwest, towards the River Barrow.

The Proposed Development Site extends southwards from the Kilkenny Road Pumping station along the R448 for ~750m until it reaches Mortarstown WwTP. A dual rising main is proposed along this section of the Proposed Development Site, connecting the Kilkenny Road Pumping Station in the north to the Mortarstown WwTP in the south. Topography ranges from 47 to 52mOD, rising gently to the south. This area of the Proposed Development Site is bounded by residential developments to the east and vegetated areas to the west along the River Barrow.

The existing Mortarstown WwTP is located in the south of the Proposed Development Site. The existing WwTP is located ~2.2km south of Carlow town on the eastern banks of the River Barrow. This WwTP serves Carlow town and its environs. Mortarstown WwTP is bounded by Carlow Institute of Further Education to the south; the River Barrow to the west and residential developments to the north. The existing WwTP is accessible from the L4038 in the east via a remotely operated security gate. The existing works are enclosed with palisade fencing. The existing WwTP compound comprises administration buildings, air blowers, settlement tanks, stormwater storage tanks, sludge tanks, dewatering buildings and secondary treatment tanks. An area of poor agricultural land lies within the Proposed Development Site to the west of the existing treatment works and is currently being used for sheep grazing. The Proposed Development Site extends to the west of the R448, where the existing WwTP outfalls to the River Barrow. Ground elevations in this area of the Proposed Development Site range from ~48 to 53mOD (metres above Ordnance Datum) with land sloping to the west, towards the River Barrow.

12.3.2 Water Balance

Long term rainfall and evaporation data were sourced from Met Éireann. The nearest rainfall station is Carlow (Oak Park), located ~4km northeast of the Proposed Development Site and has an Average Annual rainfall (AAR) of 840.2mm.

Met Éireann also provide a grid of AAR for the entire country for the period of 1991 to 2020. Based on these modelled rainfall values, the rainfall data at the point (E271000, N17500) located ~200m west of the Proposed Development Site is presented in Table 12-4 (this is considered to be the most accurate estimate of AAR from the available sources). AAR at this location is modelled to be 939mm/yr.



Table 12-4: Local Average long term Rainfall Data(mm)

Station: ~200m west of the Proposed Development Site						X-Coord – 271000				Y-Coord - 175000		
Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Total
93	72	68	63	62	66	61	72	76	103	101	102	939

The closest synoptic station where the average Potential Evapotranspiration (PE) is recorded is at Kilkenny, ~28km southwest of the Proposed Development Site. The long-term average PE for this station is ~459mm/yr. This value is used as a best estimate of the site PE. Actual Evaporation (AE) at the Proposed Development Site is estimated as 436mm/yr (which is $0.95 \times PE$).

The Effective Rainfall (ER) represents the water available for runoff and groundwater recharge. The ER for the site is calculated as follows:

Effective rainfall (ER) = Annual Average Rainfall (AAR) – Actual Evaporation (AE)

= 939mm/yr – 436mm/yr

ER = 503mm/yr

Groundwater recharge coefficient estimates from the GSI (www.gsi.ie) show variable groundwater recharge rates across the Proposed Development Site, dependent on the local ground conditions.

For example, in the north of the Proposed Development Site, at the existing Kilkenny Road Pumping Station, the groundwater recharge coefficient varies from 20% to 85% depending on the presence of made ground. Further south, at Mortarstown WwTP, the groundwater recharge coefficient ranges from 42.5% to 85% (sand and gravel aquifer) depending on the nature of the overlying soils/subsoils (*i.e.* well drained or poorly drained).

An estimate of ~415mm/year average annual recharge is calculated for the Proposed Development Site. This estimate is based on a recharge coefficient of ~85% which was taken to represent the site due to the high permeability of the subsoils underlying the local area. This means that the local hydrology is characterised by high rates of groundwater recharge and low rates of surface water runoff. This was supported by site walkover surveys whereby there was a lack of surface water drainage features (*i.e.* surface water drains) recorded at the existing WwTP. Therefore, conservative annual recharge and runoff rates for the Proposed Development Site are estimated to be ~428mm/year and ~75mm/yr respectively.

Met Éireann's Translate Project provides projections for a range of future climate change scenarios, as Ireland's future climate will depend on global greenhouse gas emissions reductions. The severity of any future climate change will depend on the degree of future warming. In a 1.5°C world, average winter and summer precipitation rates in County Carlow are projected to be 3.39mm/day and 2.07mm/day respectively. Meanwhile, in a 4°C world, the average winter and summer precipitation rates in County Carlow are projected to be 3.70mm/day and 1.85mm/day respectively. Such changes in rainfall patterns will result in a reduction in low river flows as a result of more frequent summer droughts and increased evaporation rates.

In addition to average rainfall data, extreme value rainfall depths are available from Met Éireann. Table 12-5 below presents return period rainfall depths for the area of the Proposed Development Site. These data are taken from <https://www.met.ie/climate/services/rainfall-return-periods> and they provide rainfall depths for various storm durations and sample return periods (1-year, 5-year, 30-year, 100-year).

Table 12-5: Mortarstown WwTP – Return Period Rainfall Depths (mm)

Duration	Return Period (Years)			
	1	5	30	100
5 mins	3.5	5.7	9.5	12.9
15 mins	5.7	9.4	15.5	21.2
30 mins	7.5	11.9	19.1	25.6
1 hours	9.8	15.1	23.4	30.8
6 hours	19.7	27.9	40.0	49.9
12 hours	25.7	35.4	49.1	60.2
24 hours	33.7	44.9	60.4	72.5
2 days	41.2	53.9	71.1	84.4

12.3.3 Regional Hydrology

Regionally the Proposed Development Site is located in the River Barrow surface water catchment and Hydrometric Area No. 14 of the South-Eastern River Basin District.

As per EPA's 3rd Cycle Barrow Catchment Report (EPA, 2024), the Barrow Catchment includes the area drained by the River Barrow upstream of its confluence with the River Nore confluence, and all streams entering tidal water between the Barrow railway bridge at Great Island and Ringwood, Co. Kilkenny. The catchment has a total area of 3,025km². The largest urban centre in the catchment is Carlow town. The other main urban centres in the catchment include New Ross, Graiguenamanagh, Athy, Portlaoise, Mountmellick, Portarlinton, Monasterevin and Kildare. The Barrow Catchment is divided into a total of 20 no. sub-catchments with 149 no. WFD river sub-basins, 6 no. transitional waterbodies (i.e. estuarine) and 50 no. groundwater bodies.

On a more local scale the Proposed Development Site is located in the River Barrow sub-catchment (Barrow_SC_090) and the Barrow_160 WFD River Sub-Basin. The River Barrow (EPA Code: 14B01) is located immediately to the west of the Proposed Development Site. The EPA blueline database of surface water

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features does not record the presence of any additional surface waterbodies in the surrounding area. Furthermore, no additional streams or watercourses were identified during site walkover surveys or from inspection of local 6" and 25" historic base mapping. The lack of local surface water features is a direct consequence of the permeable nature of the local soils/subsoils in the area of the Proposed Development Site which result in high rates of groundwater recharge in the valley of the River Barrow.

A regional hydrology map is attached as Figure 12-1.

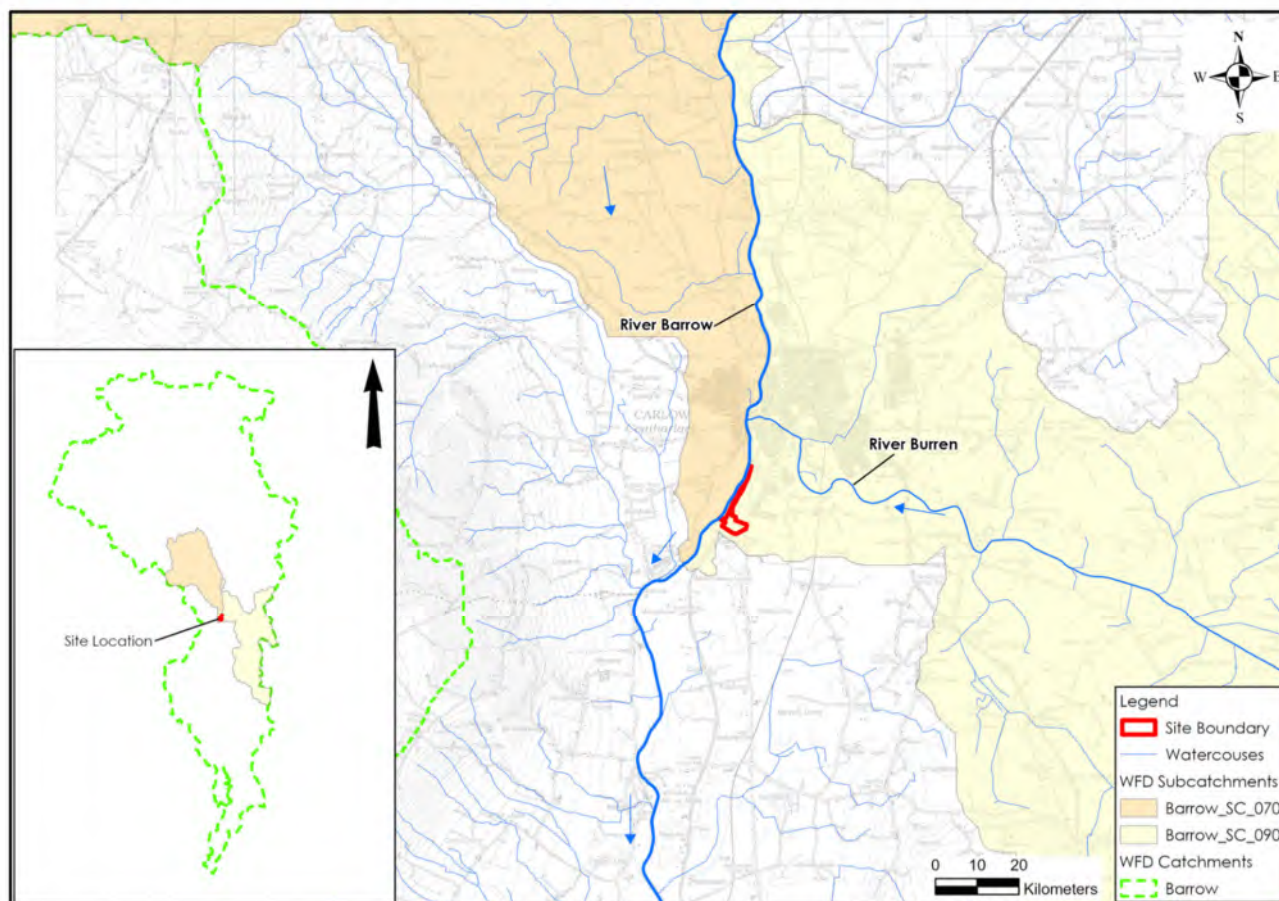


Figure 12-1: Regional Hydrology Map

12.3.3.1 Surface Water Flows

The closest OPW gauging station which records flow in the River Barrow is located at Barrow New Bridge (Station Code: 14022), ~2.1km upstream of the Proposed Development Site. The data from this OPW gauging station includes observed flows and are displayed as exceedance flows. For example, a 95%tile flow relates to the flow in the river which will be exceeded 95% of the time. The 95%tile flow at this gauging station is 8.885m³/s which means that the flow in the River Barrow at this location exceeds 8.885m³/s 95% of the time (refer to Figure 12-2).

The catchment area of the River Barrow at the Barrow New Bridge gauging station is 2,069km². According to the EPA's Hydrotool dataset, available on www.catchments.ie, the closest downstream Hydrotool Node to the Proposed Development Site is Node: 14_184 (E270140 N173880) and the catchment area at Node 14_184 is 2,255.7km². The catchment at the Barrow New Bridge gauging station therefore accounts for 92% of the catchment area at the development site. In order to estimate flows downstream of the Proposed Development Site, it is appropriate to scale the flows from the OPW gauge at the New Bridge based on the difference in

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catchment area. The catchment hydrology is unlikely to change significantly between the gauge and the Proposed Development Site. The scaled 95%tile flow at the Proposed Development Site is 9.513m³/s.

The recorded (OPW Gauge) flow volumes in the River Barrow are typical of flows in a regional river which has a significant upstream catchment. The catchment of the River Barrow near the Proposed Development Site is significant and reflect the large flow volumes in this river.

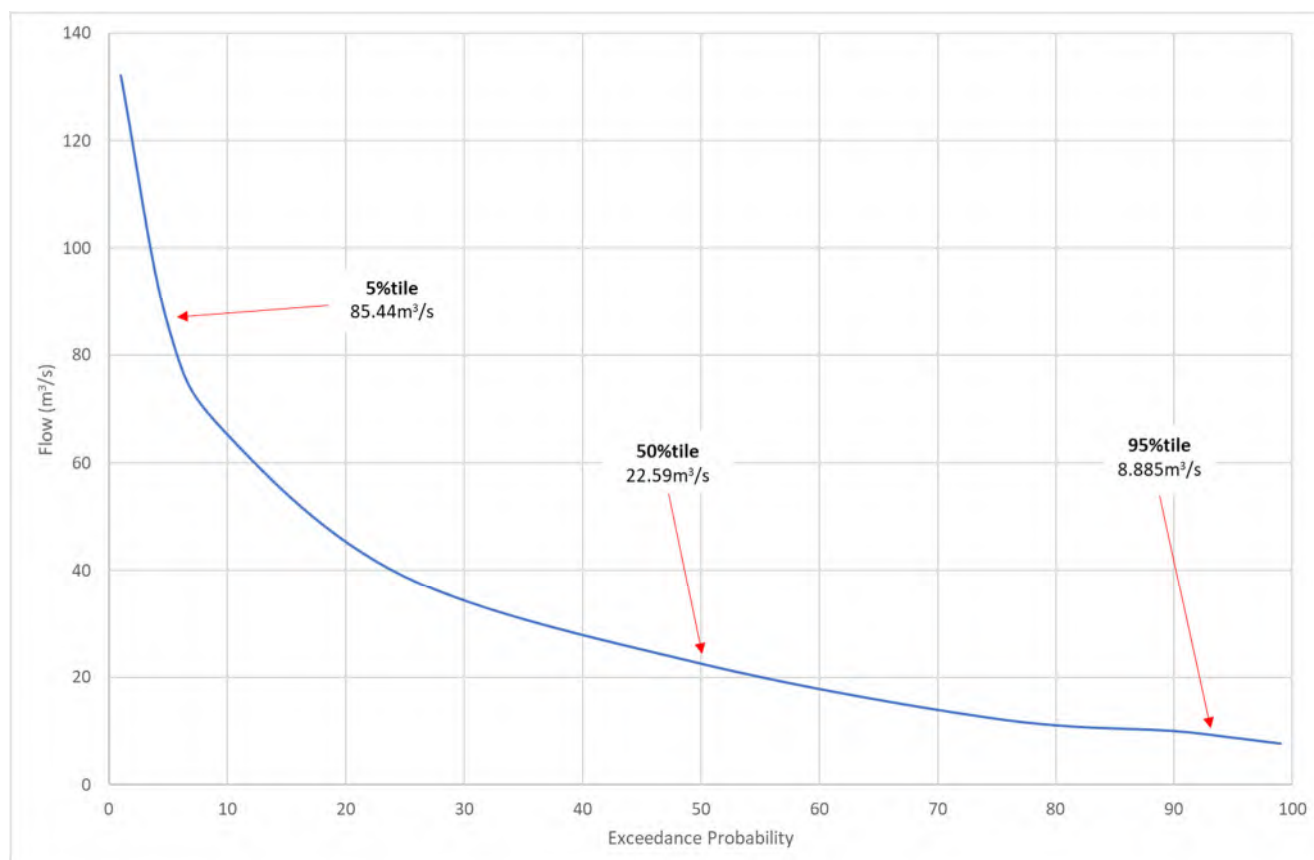


Figure 12-2: Flow Duration Curve for the River Barrow at the OPW Gauging Station (14022) upstream of the Proposed Development Site

12.3.4 Site Drainage

During the site walkover survey completed by HES, the site of the existing Mortarstown WwTP was noted to be well drained with no areas of surface water ponding. No surface water drains were recorded within or in the vicinity of the existing WwTP. The topography of the existing WwTP compound fluctuates but has a basin effect whereby the topography slopes towards the centre of the compound and the existing treatment infrastructure. The agricultural land to the west of the existing sewage works slopes gently towards the R448. The ground here was noted to be well drained with little evidence of any surface water ponding. A manmade surface water drain was noted to exist along the north-western boundary of the field however this was dry during site visits.

The north of the Proposed Development Site, at the Kilkenny Road Pumping Station, was noted to be well drained with topography sloping to the west towards the River Barrow. No additional surface water features or drains were noted in the vicinity of the Kilkenny Road Pumping Station.

The existing drainage regime is characterised by a lack of surface water features. This is due to the permeable nature of the underlying subsoils, which comprise of sands and gravels. Therefore, the hydrogeological regime of the Proposed Development Site is characterised by low rates of surface water runoff and high rates of groundwater recharge.

To the west of the R448, where the topographic gradient increases higher rates of surface water runoff are likely to occur, with this runoff discharging into the River Barrow.

12.3.5 Flood Risk Assessment

To identify those areas as being at risk of flooding, OPW's indicative river and coastal flood map, CFRAM Flood Risk Assessment maps (www.floodinfo.ie), historical mapping (i.e. 6" and 25" base maps) and the Geological Survey of Ireland Groundwater Flood Maps (www.floodinfo.ie) were consulted.

Several recurring flood incidents and historic flood events are recorded in the vicinity of the Proposed Development Site. A recurring flood event is mapped by the OPW on the western bank of the River Barrow to the southwest of the existing Kilkenny Road Pumping Station (Flood ID: 2741). Here the River Barrow is reported to overflow its banks at Crossneen every year following heavy rainfall. Further downstream, a recurring fluvial flood event (Flood ID: 2960) is mapped at Milford, Co. Carlow, ~4km southwest of Mortarstown WwTP. Recurring fluvial flood events on the River Barrow are also reported further downstream at Leighlinbridge (Flood ID: 255) and Bagenalstown (Flood ID: 2952) Co. Carlow and Graiguenamanagh, Co. Kilkenny. Meanwhile, upstream of the Proposed Development Site, several historic fluvial flood events dating from 2008 and 2009 are reported in Carlow town centre.

The GSI Winter 2015/2016 Surface Water Flood Map (www.floodinfo.ie) shows surface water flood extents during the 2015/2016 flood event. This flood event is recognised as being the largest event on record in many areas. This flood map records some areas of fluvial flooding along the River Barrow in the vicinity of the existing Kilkenny Road Pumping Station. However, this flood zone does not extend any significant distance from the river. No additional flood zones are recorded in the Proposed Development Site. This historic flood map indicates that River Barrow preferentially flooded its western bank during this historic flood event.

The CFRAM fluvial flood maps are available for the area of the Proposed Development Site. The CFRAM also shows that in this area the River Barrow preferentially floods its western bank. CFRAM maps records the presence of an embankment along the River Barrow's eastern bank, to the west of the Proposed Development Site. The western section of the existing Kilkenny Road Pumping Station is mapped within the 10-year fluvial flood zone (i.e. Fluvial Flood Zone A). Further south, in the vicinity of Mortarstown WwTP, fluvial flood zones do not extend to the east of the R448. This area of the Proposed Development Site is located in Fluvial Flood Zone C (i.e. low risk of fluvial flooding). A map showing the modelled CFRAM fluvial flood zones is included as Figure 12-3 below.

Flood risk assessments must also consider increased rainfall rates associated with climate change. The Mid-Range Future Scenario (increase in rainfall of 20%) and High-End Future Scenario (increase in rainfall of 30%) fluvial flood maps show an increased area of fluvial flooding along the River Barrow for both scenarios. In both scenarios the north of the Proposed Development Site is mapped in the 1 in 100-year fluvial flood zone (Fluvial Flood Zone A) at the location of the existing Kilkenny Road Pumping Station. Further south, the low probability fluvial flood zones (1 in 1,000-year flood event) do not extend to the east of the R448.

Furthermore, the Proposed Development Site is not mapped within any historic or modelled groundwater flood zone (www.floodinfo.ie).

Therefore, the primary risk of flooding at the Proposed Development Site is associated with fluvial flooding due to the sites close proximity to the River Barrow. While the majority of the Proposed Development Site is located

in Fluvial Flood Zone C with a low risk of flooding, some sections in the east, adjacent to the River Barrow, are located in Fluvial Flood Zone A.

IE Consulting completed a Site-Specific Flood Risk Assessment (SSFRA) for the Proposed Development (September 2025) (Appendix 12-1). The SSFRA assessed the flood risk associated with the proposed outfall pipe and associated headwall. The primary flood risk is associated with fluvial flooding on the River Barrow, with the headwall and outfall pipe located within the modelled Fluvial Flood Zone A and B. However, these elements are considered to be 'Water Compatible' and are not subject to the requirements of a Justification Test. Hydraulic modelling confirmed that the proposed headwall and outfall pipe will not result in an adverse impact to the existing hydrological regime or increase the flood risk in adjacent lands. There is no predictive increase in flood extents when comparing the undeveloped baseline scenario with the proposed development scenario. The SSFRA concludes that the potential flood risk to and from the proposed outfall pipe and headwall is considered to be low, and is considered to be appropriate from a flood risk perspective. Full details of the flood risk assessment and associated hydraulic and flood models are presented in Appendix 12-1.

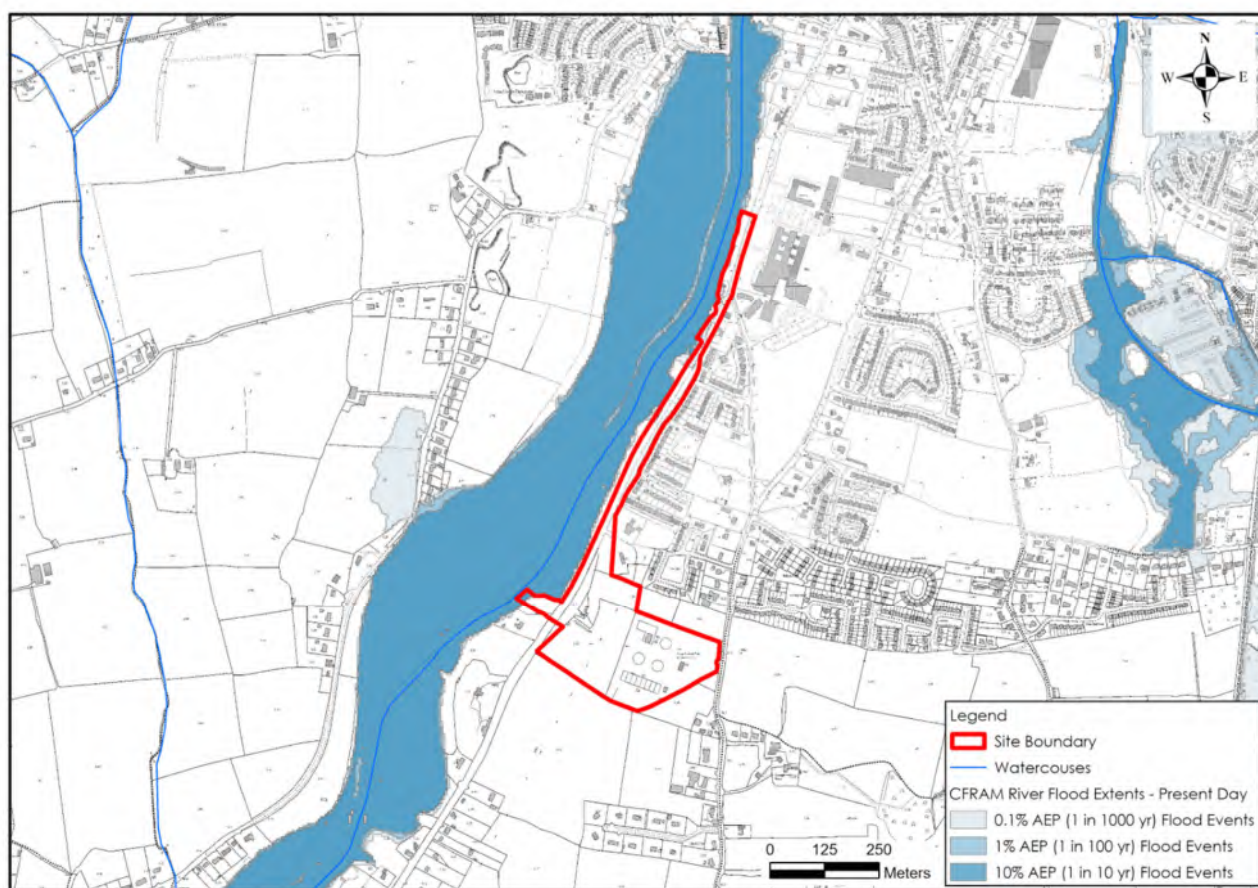


Figure 12-3: CFRAM Fluvial Flood Zone Mapping

12.3.6 Surface Water Quality

12.3.6.1 Biological Q-Rating

Biological Q-rating data for EPA monitoring points on the River Barrow are shown in Table 12-6 below. The Q-Rating is a water quality rating system based on both the habitat and the invertebrate community assessment and is divided into status categories ranging from 0-1 (Poor) to 4-5 (Good/High).

The most recent data available (2023) shows that the Q-rating for the River Barrow in the vicinity of the Proposed Development Site is of 'Moderate' Q-status (Q3-4). The closest EPA monitoring point on the River Barrow upstream of the Proposed Development Site is located ~1km upstream of Carlow Bridge (EPA Station ID: RS14B012200). Here the River Barrow achieved a Q-rating of Q3-4 in 2023. ~ 1km southwest and downstream of the Carlow WwTP in the vicinity of the Woodford Dolmen Hotel (EPA Station ID: RS14B012455), the River Barrow achieved a Q-rating of Q3-4 in 2023. Further downstream at Milford Bridge (EPA Station ID: RS14B012600) the Barrow also achieved a Q-rating of Q3-4 in 2023.

The Q-values reflect average water quality at any given location and Q-value's of Q3-4 indicate that the waters are slightly polluted and in an unsatisfactory condition. The EPA monitoring stations are shown in Figure 12-4.

Table 12-6: Latest and Historic EPA Water Quality Monitoring Q-Rating Values (2003-2020)

Watercourse	Station ID	Easting	Northing	Year	EPA Q-Rating (Status)
River Barrow	RS14B012200	272007	177778	2023	Q3-4 (Moderate)
River Barrow	RS14B012455	270653	174173	2023	Q3-4 (Moderate)
River Barrow	RS14B012600	269975	170430	2023	Q3-4 (Moderate)



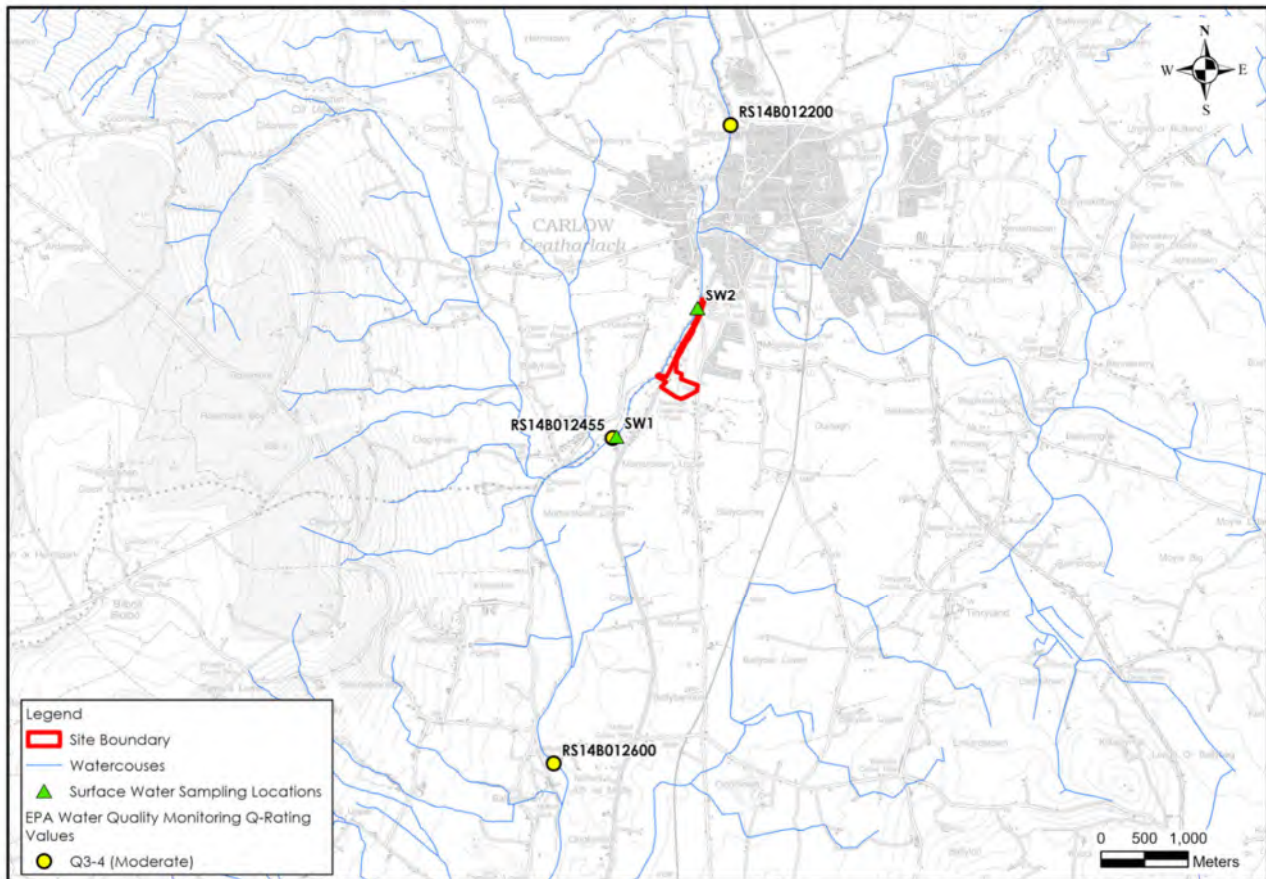


Figure 12-4: EPA Monitoring Locations and Surface Water Sampling Locations

12.3.6.2 Surface Water Sampling

Long-Term Ambient Water Quality Monitoring

Carlow County Council have been completing long-term water quality monitoring on the Barrow River upstream and downstream of the Proposed Development Site. As part of the baseline assessment of the River Barrow adjacent to the Proposed Development Site, HES has reviewed the recent (2020 to November 2024) available water quality data for the Barrow_160 SWB (i.e. the SWB adjacent to the site). Data from 2 no. monitoring stations was consulted, the Mortarstown Upstream station (located at Gaignecullen Bridge – Station Code: RS14B012310) and Mortarstown Downstream station (located at Dolmen Mews, ~1km downstream of the WwTP outfall – Station Code: RS14B012460). Between January 2020 and November 2024 a total of 54 no. samples were obtained at each of these stations. The data is available to download on www.catchments.ie/data (Note that no data for 2025 was available at the time of analysis – 18th February 2026). The data from 8th January 2-2- to 14th February 2024 was used in the WAC which is included as Appendix 12-3. Additional data to November 2024 is provided here for completeness.

During this time period (January 2020 to November 2024), there was a slight increase in average and 95th percentile concentrations (the concentration below which 95% of the data fall) of BOD and ammonia concentrations downstream of the WwTP. The average ortho-phosphate concentration also increased slightly downstream of the WwTP, whilst the 95th percentile concentration was the same upstream and downstream of the WwTP. These results are summarised with respect to the Surface Water Regulations (S.I. 272/2009) as follows:

- During this time period the average BOD concentration upstream of the Mortarstown WwTP was 1.66mg/l whilst the average downstream concentration was 1.72mg/l. BOD concentrations at these stations exceed the 'Good' status threshold of $\leq 1.5\text{mg/l}$ set out in S.I. 272 of 2009. The 95%tile concentrations upstream and downstream of the WwTP were 4.1 and 4.12mg/l respectively. Both of these concentrations exceed the 'Good' status threshold set out in S.I. 272 of 2009 ('Good' status 95%tile BOD concentration $\leq 2.8\text{mg/l}$).
- The average ammonia concentration upstream of the WwTP was 0.063mg/l whilst the average downstream concentration was 0.064mg/l. The mean ammonia concentration both upstream and downstream of the WwTP can be considered to be of 'Good' status ($\leq 0.065\text{mg/l}$). The 95%tile concentrations upstream and downstream of the WwTP were 0.166 and 0.207mg/l, and exceed the 'Good' status threshold ($\leq 0.14\text{mg/l}$).
- The average ortho-phosphate concentration upstream (0.018mg/l) and downstream (0.020mg/l) of the WwTP are below the 'Good' status threshold of $\leq 0.035\text{mg/l}$. The 95%tile concentrations upstream and downstream of the WwTP were 0.048mg/l and were below the 'Good' status threshold of $\leq 0.075\text{mg/l}$.

Figure 12-5, Figure 12-6 and Figure 12-7 present timeseries of BOD, ammonia and ortho-phosphate concentrations from January 2020 to November 2024. As discussed above there is a slight observable increase in the concentrations downstream of the WwTP. As seen in Figure 12-6, an extreme ammonia value was recorded on 16th November 2023 (upstream concentration of 76mg/l and downstream concentration of 68mg/l). Whilst mean concentrations can be impacted by such outliers, the mean concentration of ammonia (Jan 2020 to November 2024) achieved Good status both upstream and downstream of the WwTP.



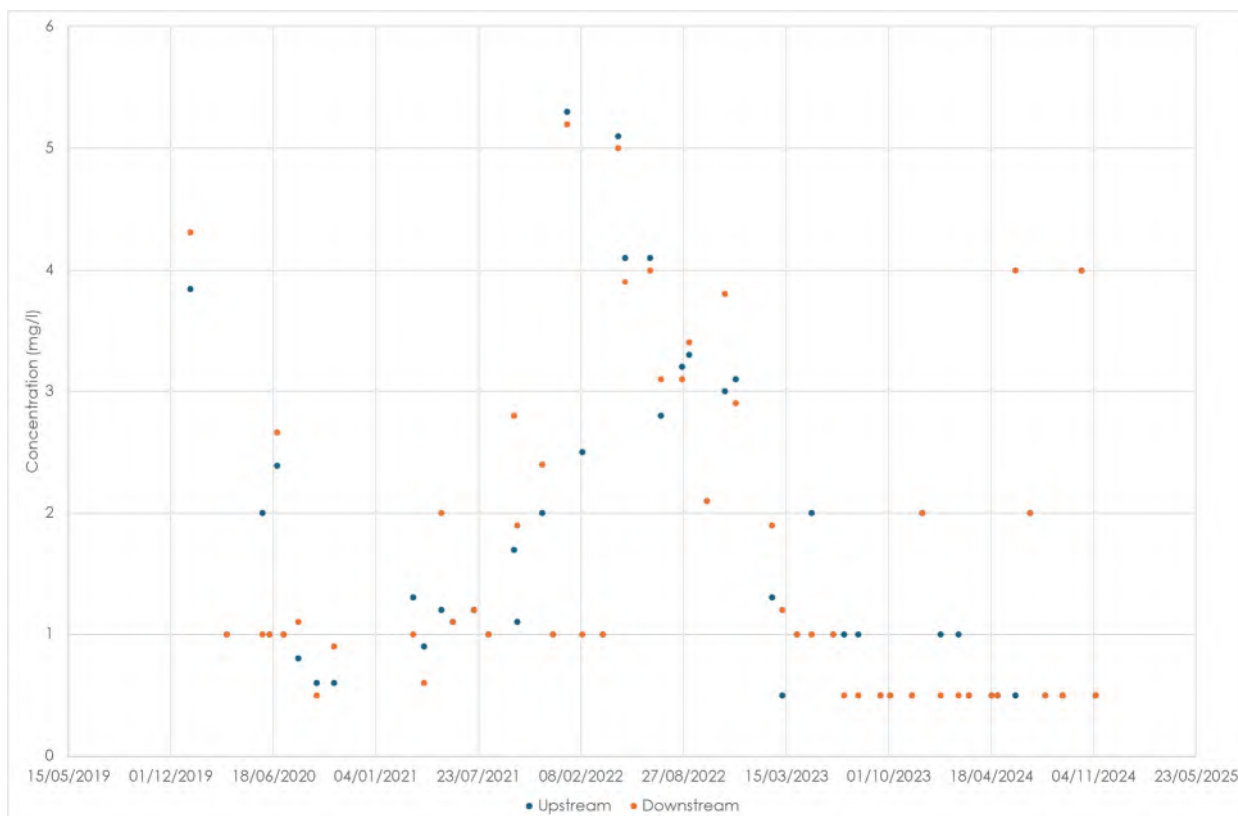


Figure 12-5: BOD Concentrations at EPA Station ID: RS14B012200 (Upstream) and at EPA Station ID: RS14B012460 (Downstream) of the WwTP (Jan 2020 – Nov 2024)

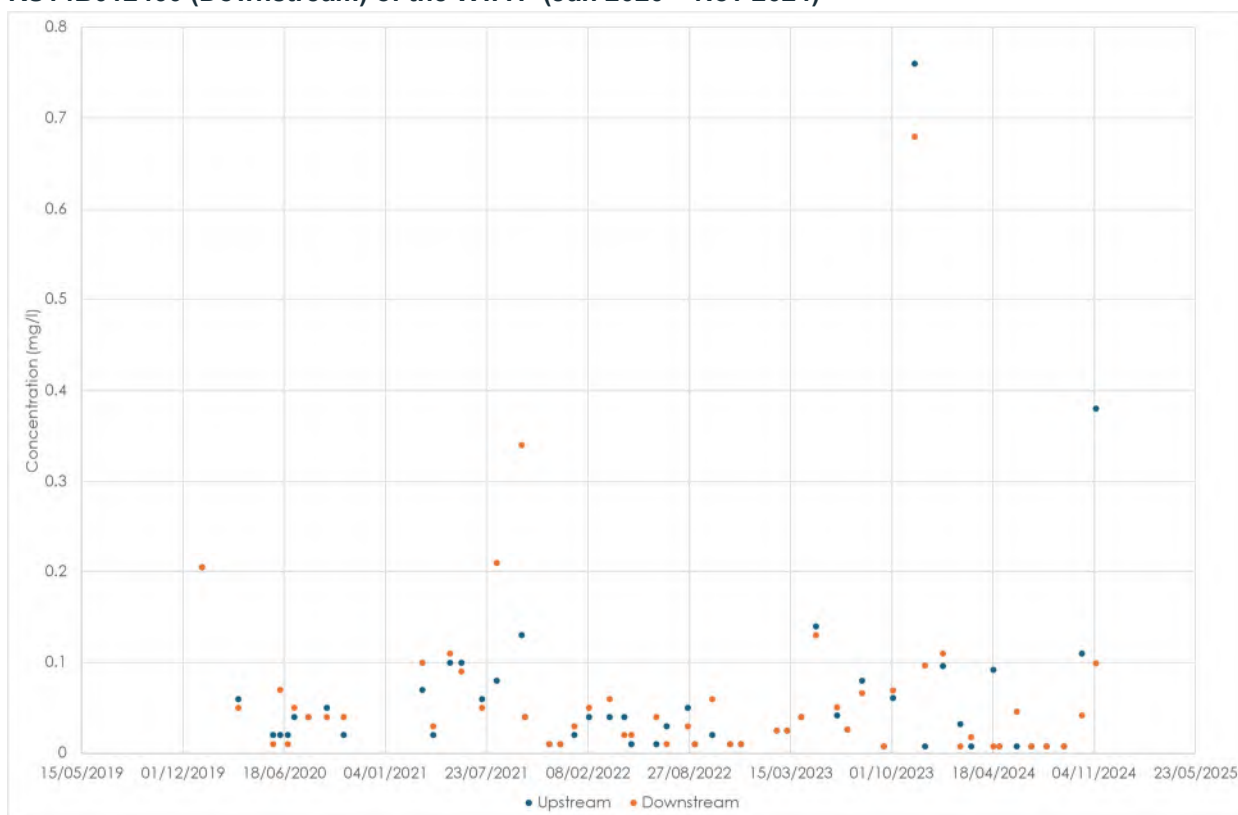


Figure 12-6: Ammonia Concentrations at EPA Station ID: RS14B012200 (Upstream) and at EPA Station ID: RS14B012460 (Downstream) of WwTP (Jan 2020- Nov 2024)

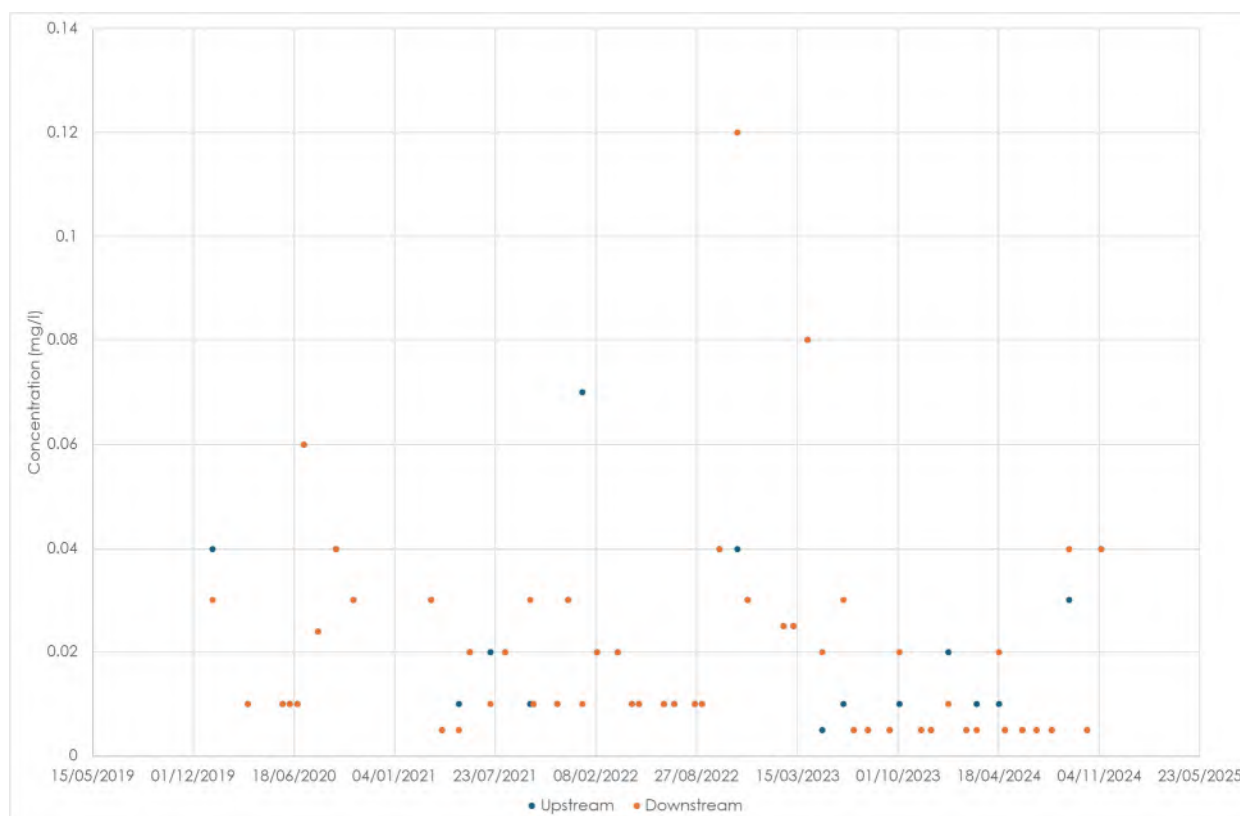


Figure 12-7: Ortho-phosphate Concentrations at EPA Station ID: RS14B012200 (Upstream) and at EPA Station ID: RS14B012460 (Downstream) of the WwTP (Jan 2020 – Jan 2024)

Atkins Water Quality Monitoring (2021)

Surface water monitoring was previously completed by Atkins at 2 no. locations on the River Barrow on 28th June and 22nd September 2021. SW1 is located on the River Barrow, downstream of Mortarstown WwTP, at the Dolmen Hotel. SW2 is located upstream of the Kilkenny Road Pumping Station. The locations of these sampling points are shown in Figure 12-4 above.

Summary of the results of the laboratory analysis are shown alongside relevant water quality regulations in

Table 12-7. The original laboratory reports from the Atkins 2021 monitoring rounds are included as Appendix 12-4.

Specific electrical conductivity (SPC) values ranged between 670 and 680 μ S/cm. Dissolved Oxygen was recorded as 8.4mg/l at both sampling locations on 28th June 2021. The pH values were basic, ranging between 8.3 and 8.5. Phosphorus and orthophosphate concentrations were below the level of detection of the laboratory during both sampling rounds.

In comparison to S.I. No. 272/2009, all of the 4 no. samples exceeded the 'Good' status threshold for BOD (Biochemical Oxygen Demand). These samples would be considered as outliers in comparison with the long-term EPA water quality monitoring data presented above. In relation to ammonia, both samples achieved 'Good' status during the first monitoring round, while both samples exceeded the 'Good' status threshold during the second round of sampling. For orthophosphate, all samples were below the level of detection of the laboratory (<0.05mg/l) and within the expected range in comparison with the long-term EPA monitoring data.

Table 12-7: Atkins Surface Water Quality Monitoring (2021)

Parameter	EQS	Monitoring Locations			
		SW1		SW2	
		28/06/2021	22/09/2021	28/06/2021	22/09/2021
pH	6.5 – 9.5	8.4	8.4	8.5	8.3
EC (µS/cm)	1000	670	680	680	680
Suspended Solids (mg/l)	25	12	17	6	14
BOD (mg/l)	≤1.3 to ≤1.5	4	5	4	25
DO (mg/l)	-	8.4	-	8.4	-
Chloride (mg/l)	250	37	110	36	43
Ammonia as N (mg/l)	≤0.065 to ≤0.04	<0.05	0.12	<0.05	0.15
Nitrite (mg/l)	-	0.052	0.065	0.045	0.067
Nitrate (mg/l)	-	12	17	12	17
Phosphorous (Total) (mg/l)	-	<0.02	<0.02	<0.02	<0.02
Orthophosphate (mg/l)	≤0.035 to ≤0.025	<0.05	<0.05	<0.05	<0.05

HES Water Quality Monitoring (2025)

Recent monitoring was completed by HES on 29th April 2025 at the same 2 no. locations previously sampled by Atkins (SW1 and SW2).

Field hydrochemistry (measurements of electrical conductivity (µS/cm), pH (pH units), dissolved oxygen (mg/l), temperature (°C) and turbidity (NTU) were taken at the 2 no. monitoring locations. The field hydrochemistry results are presented in Table 12-8. SPC values ranged from 641 to 647µS/cm which is well in EQS limits of 1,000µS/cm. pH ranged from 7.96 to 7.97, with dissolved oxygen ranging from 10.02 to 10.36mg/l. Temperature ranged from 15.7 to 15.9°C. Meanwhile, turbidity is ranged from 3.38 to 3.52NTU.

Surface water grab samples were also taken at these 2 no. locations for laboratory analysis on 29th April 2025. Results of the laboratory results are shown alongside relevant water quality regulations in Table 12-9 below. The laboratory reports from the HES 2025 sampling round are as Appendix 12-5.



Suspended solids were below the limit of detection of the laboratory (5mg/l) in both samples and were well below S.I. 293/1988 threshold limit of 25mg/l. Ammonia concentrations in both samples were found to be of 'High' status with regards to the threshold of ≤ 0.04 mg/l as detailed in S.I. 272/2009. BOD was found to be of 'High' status at SW1 where it was ≤ 1.3 mg/l (S.I. 272/2009) whilst the BOD concentration at SW2 (2mg/l) exceeded the 'Good' status threshold of ≤ 1.5 mg/l. Ortho-phosphate concentrations were at or below the limit of detection of the laboratory (0.02mg/l) and of 'High' status (i.e. ≤ 0.025 mg/l). BOD, ammonia and ortho-phosphate concentrations were within the normal range when compared to the long-term EPA monitoring data.

Table 12-8:HES Field Hydrochemistry (29/04/2025)

Parameter	EQS	Monitoring Locations	
		SW1	SW2
		29/04/2025	29/04/2029
pH	6.5 – 9.5	7.97	7.96
EC (μ S/cm)	1000	641	647
Suspended Solids (mg/l)	25	416	420
DO (mg/l)	-	10.02	10.36
Temp ($^{\circ}$ C)	-	15.7	15.9
Turbidity (NTU)	-	3.52	3.38

Table 12-9:HES Surface Water Sampling Laboratory Data (29/04/2025)

Parameter	EQS	Monitoring Locations	
		SW1	SW2
		29/04/2025	29/04/2025
Suspended Solids (mg/l)	25	<5	<5
BOD (mg/l)	≤ 1.3 to ≤ 1.5	<1	2
Chloride (mg/l)	250	24.5	24.6
Ammonia as N (mg/l)	≤ 0.065 to ≤ 0.04	0.03	0.02
Nitrite (mg/l)	-	<0.05	<0.05
Nitrate (mg/l)	-	17.7	19.5

Phosphorous (Total) (mg/l)	-	<0.1	<0.1
Orthophosphate (mg/l)	≤0.035 to ≤0.025	0.02	<0.02

12.3.6.3 Discharge Licence Monitoring (2009-2023)

The Carlow Town Agglomeration has been operating in accordance with discharge licence requirements since 2008 (Discharge Licence No: D0028-03) with the WwTP discharging treated effluent into the River Barrow. Condition 3 of the Discharge Licence sets out a series of conditions designed to ensure the protection of the receiving environment by way of control and limitation of surface water discharges.

The discharge licence sets out the emission limits of the effluent, with all discharge waters from the WwTP being controlled, managed and monitored as per the existing licence conditions. The WwTP discharges treated effluent to the River Barrow, with the discharge location shown on Figure 12-8. The discharge licence sets out a series of Emission Limit Values' (ELVs) which are included in Table 12-10. In addition, Schedule B3 of the licence outlines the no. of samples permitted to exceed the ELV in any given year depending on the quantity of samples taken in any one year. For example, when the quantity of samples taken in any given year is between 8 and 16 no. samples a total of 2 no. exceedances are permitted.

Following a review of the available Annual Environmental Reports (AERs) (www.epa.ie) a total of 2 no. non-compliance years, in respect of discharge emissions, have been recorded between 2010 and 2024 (please note that no AER is available for 2018). The years of non-compliance were 2011 and 2013. In 2011 both phosphorus and ortho-phosphate were non-compliant while non-compliance was limited to ortho-phosphate in 2013.

Since 2009, no exceedances have been recorded for Ammonia, COD, BOD, Suspended Solids or pH. Meanwhile, since 2013 there has not been more than 1 exceedance recorded for either Total Phosphate or Ortho-phosphorus (note that 2 no. exceedances are permitted given that there are generally 12-14 samples being taken per year). The data indicates that the WwTP has largely been compliant with the ELV's set out in the Wastewater Discharge Licence.

Table 12-10: Discharge Emission Limit Values

Parameter	Emission Limit Values (ELVs)	Total No. Samples (2010-2024, excluding 2018)	No. Non-Compliance Years
BOD	15mg/l	204	0
Ammonia-N	2mg/l	193	0
Phosphorus (total)	1mg/l	205	1
Ortho-phosphate	0.8 mg/l	205	2
COD	125mg/l	204	0
Suspended Solids	35mg/l	205	0



12.3.6.3.1 Ambient Water Quality Monitoring (2009-2023)

With the WwTP discharging treated effluent to the River Barrow, the discharge licence has also required ongoing ambient water quality monitoring in the River Barrow. Ambient surface water quality monitoring is being completed by UÉ both upstream and downstream locations of the discharge point.

The ongoing ambient monitoring indicates that the discharge from the WwTP is not having any significant impact on water quality in the receiving River Barrow. For the 13 no. years for which AERs are available (www.epa.ie), only 5 years record a deterioration in the status of BOD, ammonia and/or ortho-phosphate between the upstream and downstream sampling locations:

- In 2014, the River Barrow upstream of the discharge location was of 'Good' status with respect to ortho-phosphate. However, downstream of the discharge point, the annual mean concentration exceeded the 'Good' status threshold of $\leq 0.035\text{mg/l}$ as per S.I 272 of 2009.
- In 2020, the annual mean concentration of ammonia exceeded the 'Good' status threshold of $\leq 0.065\text{mg/l}$ downstream of the discharge location.
- In 2021, the annual mean concentration of ammonia and BOD were of 'Good' status upstream of the discharge location. Concentrations exceeded the 'Good' status threshold downstream of the discharge location.
- In 2022 and 2023, the annual mean concentration of orthophosphate was of 'High' status upstream of the discharge location, but concentrations exceeded the 'High' status threshold downstream of the discharge location. The downstream locations achieved 'Good' status with respect to orthophosphate.

Many of the AERs state that *"the concentration levels in the river increase slightly downstream of the discharge point"* however *"it is not known if it or is not caused by the WWTP"* and that *"other causes of deterioration in water quality in the areas are unknown"*.

Other parameters recorded during the ambient water quality monitoring include pH, total nitrogen, total phosphorus, suspended solids and dissolved oxygen. The data for ammonia, orthophosphate and BOD are summarised in Table 12-11 with respect to S.I. 272/2009. Summary data for other parameters is presented in Table 12-12.

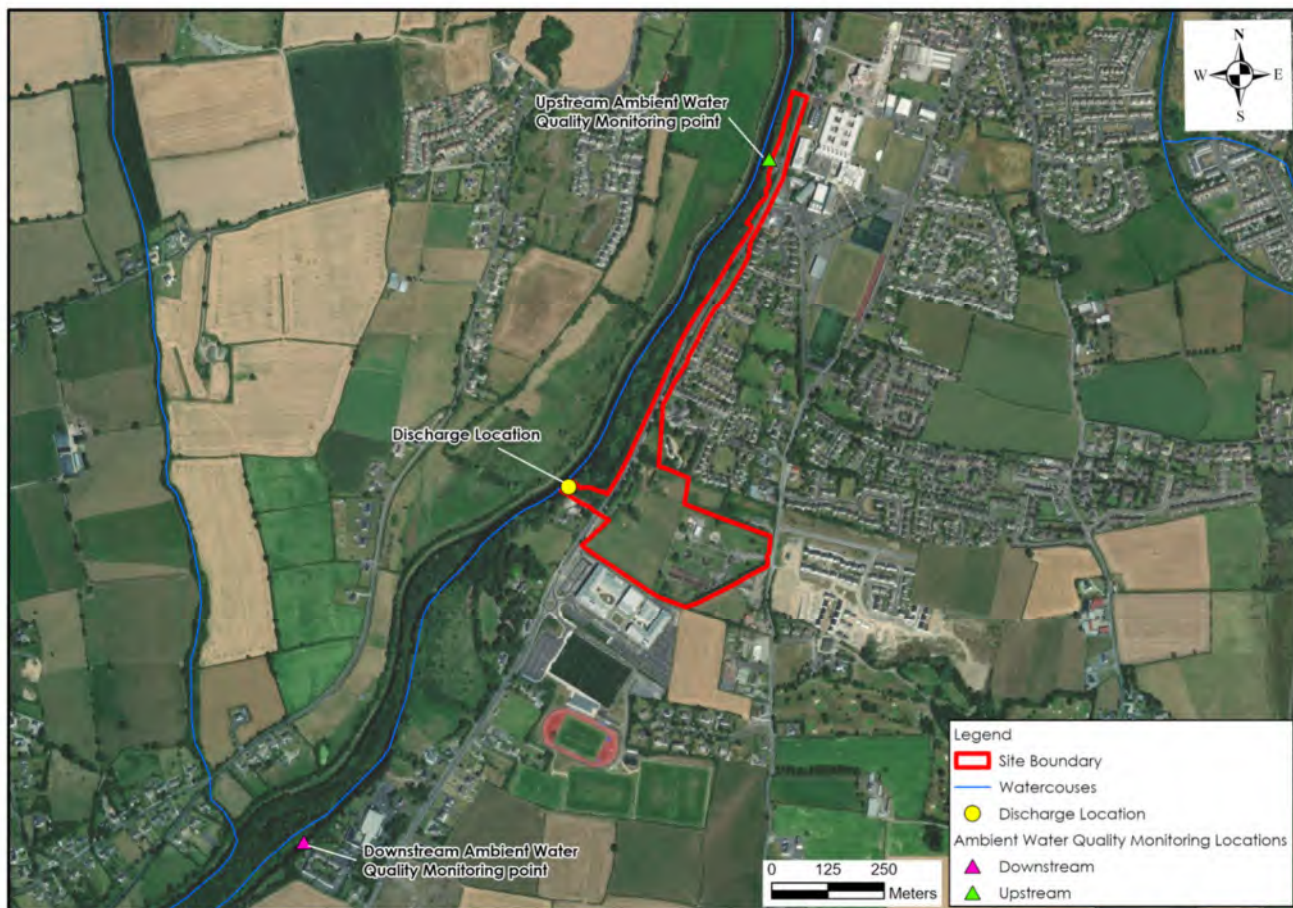


Figure 12-8: Existing discharge location and ambient water quality sampling locations

Table 12-11: Ambient Water Quality Monitoring (AER Reports 2010-2023) Reported as per S.I. 272/2009.

Parameter	Location	2023	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
BOD	Upstream														
	Downstream														
Ammonia	Upstream														
	Downstream														
Ortho-P	Upstream														
	Downstream														

High Status: ≤ 1.3 mg/l (mean) for BOD, ≤ 0.040 mg/l (mean) for Ammonia and ≤ 0.025 mg/l (mean) for ortho P

Good Status: ≤ 1.5 mg/l (mean) for BOD, ≤ 0.065 mg/l (mean) for Ammonia and ≤ 0.035 mg/l (mean) for ortho P

Exceeds Good Status threshold of ≤ 1.5 mg/l (mean) for BOD, threshold of ≤ 0.065 mg/l (mean) for Ammonia and threshold of ≤ 0.035 mg/l (mean) for Ortho P

No AER Available

Table 12-12: Summary of Discharge Licence Ambient Water Quality Monitoring

Parameter	Location	Annual Mean Range
pH	Upstream	7.8 – 8.3
	Downstream	7.9 – 8.39
Total Nitrogen (mg/l)	Upstream	3.8 – 6.0
	Downstream	3.79 – 5.01
Total Phosphorous (mg/l)	Upstream	0.033 – 0.166
	Downstream	0.037 - 0.087
Suspended Solids (mg/l)	Upstream	2.41 – 12.38
	Downstream	2.88 – 11.17
Dissolved Oxygen (mg/l)	Upstream	9.59 – 20
	Downstream	9.56 – 10.77

12.3.7 Hydrogeology

12.3.7.1 Desk Study Hydrogeological Data

The Ballyadams Formation is mapped to underly the majority of the Proposed Development Site and is described by the GSI as being comprised of crinoidal wackestone/packstone limestone. Meanwhile, the eastern section of the Proposed Development Site is underlain by Milford Formation comprised of peloidal calcarenitic limestone. The bedrock aquifer underlying the Proposed Development Site is classified by the GSI as being a Regionally Important Aquifer - Karstified (diffuse) (Rkd). A sand and gravel aquifer is also mapped to overlie the bedrock in the area of the Proposed Development Site. This aquifer is classified as a Regionally Important Gravel Aquifer (Rg) (www.gsi.ie). A bedrock and overburden aquifer map is shown as Figure 12-9.

In terms of the Groundwater Bodies (GWBs), the Proposed Development Site is underlain by 2 no. GWBs. The Proposed Development Site is directly underlain by the Athy-Bagenalstown Gravels GWB (IE_SE_G_160), which is associated with the sand and gravel subsoils in the local area. This aquifer is in turn underlain by a bedrock aquifer which forms part of the Bagenalstown Lower karstic GWB (IE_SE_G_157).-

The Athy-Bagenalstown Gravels GWB is associated with sand and gravel deposits which extend across Kildare, Laois and Carlow. The sands and gravels are very coarse and poorly sorted. Clay layers are often noted to separate individual layers of sand and gravel. Recharge to the sand and gravel aquifer is directly from precipitation landing on the ground surface. Discharge from the sand and gravel aquifer is expected to be as baseflow to local rivers and streams including the River Barrow.

The underlying Bagenalstown Lower karstic GWB is comprises of limestones. The overall topography of the Bagenalstown Lower GWB is greatest in the northeast (Blackstairs Mountains) and west (Castlecomer Plateau) with drainage directed southwards as represented by flow in the River Barrow. According to the GSI's GWB Characterisation Report (GSI, 2004), karstification is widespread in the Bagenalstown Lower GWB and includes

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the presence of turloughs, caves, dolines, swallow holes and springs. Transmissivities and well yields are variable while storativity in the bedrock is low. Groundwater flows through a network of enlarged bedding planes, fissures and conduits. Groundwater recharge in this GWB occurs via losing streams, and via point (e.g. swallow holes) and diffuse mechanisms. Most of the groundwater flow occurs in the upper epikarst layer and in solutionally enlarged bedding planes. The karstic flow paths are highly connected and support regional flow systems. The groundwater has a calcium bicarbonate signature.

The GSI note that there is likely to be hydraulic continuity between the sands and gravels of the Athy-Bagenalstown GWB and the underlying Bagenalstown Lower GWB.

The GSI (www.GSI.ie) do not map the occurrence of any karst features within the Proposed Development Site or in the surrounding lands. The closest GSI mapped karst feature is an enclosed depression located in the townland of Cappanaboe, situated ~5km northwest of the Proposed Development Site. No karst features were recorded during the site walkover surveys.

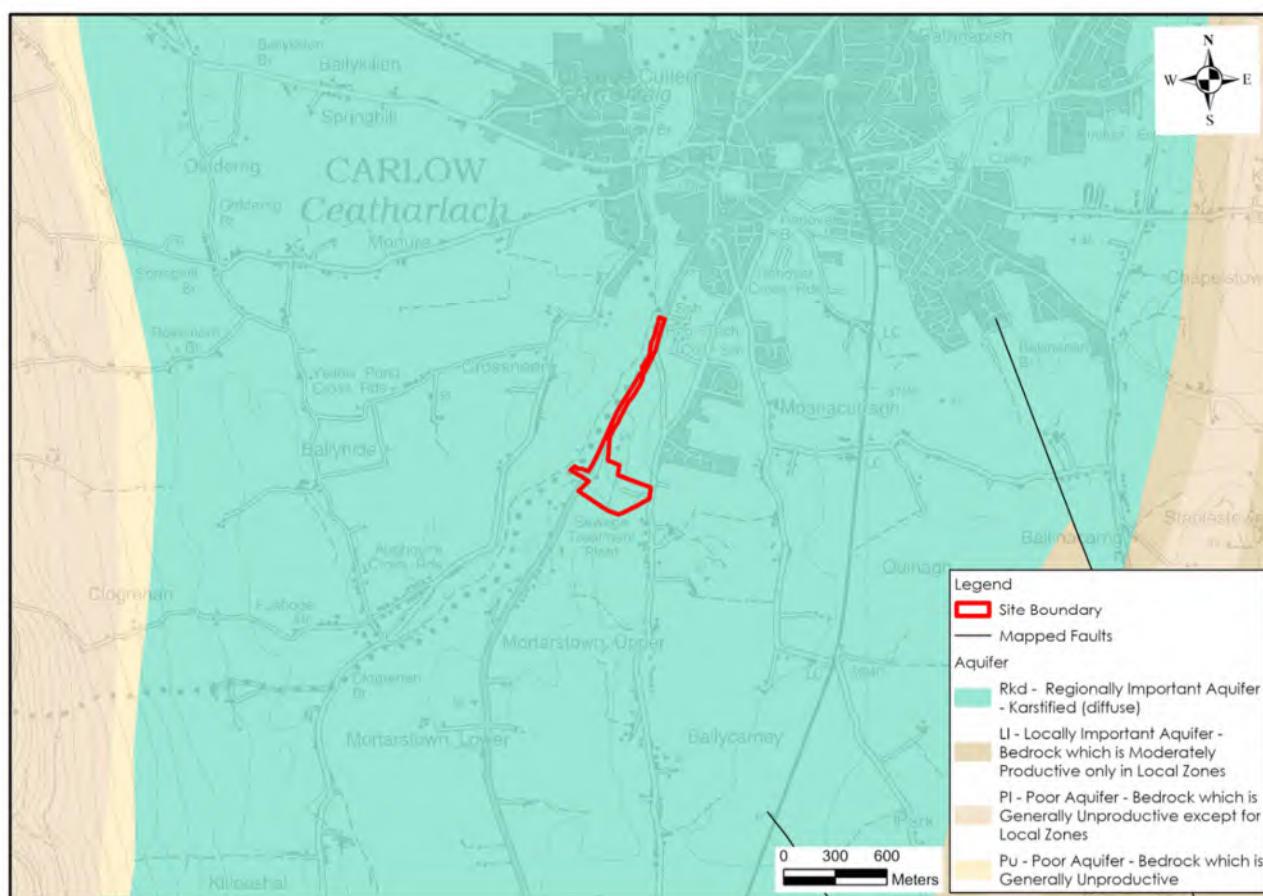


Figure 12-9: Bedrock Aquifer Map

12.3.7.2 Summary of Site-Specific Geological Data

A detailed description of the site geology is provided in Chapter 11 of this EIAR. The following is a brief summary of the relevant geological information that has a bearing on the hydrogeology of the Proposed Development Site.

The site investigations, completed by Priority Geotechnical Limited (PGL), comprised 8 no. trial pit excavations, 6 no. cable percussion boreholes, 5 no. rotary boreholes and geophysical surveys of the WwTP in February and March 2021. Further site investigation comprising of 5 no. cable percussion boreholes, 5 no. rotary boreholes and geophysical surveys of Kilkenny Road were completed in March to May 2022. The location of these site investigations are shown on Figure 12-10.

The depth to limestone bedrock in the north of the Proposed Development Site, at the existing Kilkenny Road Pumping Station, was recorded as 12.5mbgl (metres below ground level). Local geology was described as made ground (gravelly clay/silt and gravelly sand) to a depth of 3.6mbgl, underlain by sandy gravels with a high cobble content to a depth of 12.5mbgl.

Ground conditions vary across the Mortarstown WwTP site, where topsoil was recorded to depths of between 0.2 and 0.5mbgl, overlying cohesive glacial deposits comprising silt or clay to depths of between 2 and 3mbgl. Deeper granular deposits comprising medium dense to dense sands and sandy gravels were recorded to depths of between 14 and 17.1mbgl. Exploratory holes (RC101 and RC103) recorded sand and gravel layers to a depth of 25mbgl (43mOD) west of the existing tanks. Deeper clay deposits were recorded to 11.8mbgl at one location north of the tanks in BH07, and to 8mbgl to the west. Dense limestone boulders (possible bedrock) were encountered below the gravel at 16.5mbgl to a maximum depth of 21mbgl southwest of the existing tanks in RC05 and RC06. Medium strong limestone bedrock was encountered north of the tanks at 14.7mbgl in RC07, and at 14.4mbgl to the west in RC104.

The occurrence of sandy gravels corresponds to the glaciofluvial deposits of the Athy-Bagenalstown Gravels GWB as mapped by the GSI. These sandy gravel subsoils are permeable, allowing precipitation to infiltrate into the subsoils. This hydrogeological regime limits surface water runoff in the area of the Proposed Development Site.

12.3.7.3 Site Specific Hydrogeological Data

Table 12-13 below details the proposed founding strata and the proposed founding level of several elements of the Proposed Development. This table also details the depths of groundwater strikes encountered during the site investigations. Given the shallow nature of the groundwater table at the Proposed Development Site, temporary groundwater dewatering will be required during the construction phase and this is assessed in Section 12.5.6.

PGL subsequently installed standpipes in several of the drilled boreholes to facilitate groundwater monitoring. However, many of the exploratory holes were backfilled and could not be used to record groundwater levels. Manual groundwater monitoring was completed during site walkover surveys completed by HES and the results are presented in Table 12-14.

Table 12-13: Proposed Development and Site Investigations

Proposed Infrastructure Element	Site Investigation Locations	Founding Strata	Approx. Base of Founding Level (mbgl)	GW Ingress (mbgl)
Inlet Works	BH101/RC101	Sandy GRAVEL	1.3	6.0
	BH102/RC102	Sandy GRAVEL	2.3	Dry
Primary Settlement Tank	BH101/RC101	Gravelly silty SAND	8.8	6.0
	BH102/RC102	Silty SAND	9.8	n/a
	BH103/RC103	Clayey sandy GRAVEL	6.7	4.3 and 7.5

		BH104/RC104	Silty SAND	7.6	3.1 and 7.5
Stormwater Storage Tank		BH07/RC07	Sandy CLAY	8.1	4.5 and 13.9
		BH08	Not reached Terminated in GRAVEL	8.7	4.9
		TP06	Not reached Terminated in CLAY	8.4	n/a
Sludge Dewatering Building		BH07/RC07	Sandy gravelly CLAY	0.7	4.5 and 13.9
Picket Fence Thickener		BH07/RC07	Sandy gravelly CLAY	1.5	4.5 and 13.9
		TP07	Not reached Terminated in sandy CLAY	1.9	n/a
		TP13	Sandy CLAY	1.4	n/a
Sludge Blending Tank		BH07/RC07	Sandy gravelly CLAY	1.5	4.5 and 13.9
Centrate Pump Sump		BH07/RC07	Sandy CLAY	4.3	4.5 and 13.9
		BH08	Gravelly CLAY	4.8	4.9
Final Settlement Tank		BH05/RC05	SILT	10.6	7.6
		BH06/RC06	Silty GRAVEL	9.6	6.6
		BH105/RC105	Silty SAND	10	6.5
RAW/WAS Pump		BH05/RC05	SILT	10.6	7.6
		BH06/RC06	Silty GRAVEL	9.6	6.6
		BH105/RC105	Silty SAND	10	6.5

Table 12-14: Groundwater Monitoring

BH Number	Ref. Elevation (mOD)	GW Level Range (mbgl)	GW Level Range (mOD)
Pumping Station			
BH11	46.40	2.95	43.4
WwTP			



BH05	50.08	5.5 – 7.02	43.06 – 44.58
BH06	49.56	0.8 – 6.08	43.48 – 48.76
BH07	49.15	4.5 – 5.76	43.39 – 44.65
BH08	49.76	2.6	47.16
BH10	50.11	5.2	44.91

In addition, 8 no. trial pits were excavated at the Proposed Development Site and ranged in depth from 1.2-2.8mbgl. Groundwater was only encountered during the excavation of 1 no. trial pit (TP10) located towards the west of the existing WwTP site. Groundwater was encountered at TP10 at a depth of 2.6mbgl (45.18mOD) within gravelly sandy subsoils.

Based on the site-specific data a shallow groundwater table is present at the Proposed Development Site, hosted within the sand and gravel subsoils of the Athy-Bagenalstown Gravels GWB.

No direct assessment of the subsoil permeability was undertaken during the site investigations. However permeability was estimated by PGL (2021) using the Hazen's Formula outlined below. The Hazen's formula is a widely recognised method for calculating soil permeability for granular deposits however it is not suitable for finer and more cohesive soils.

$$K = 10^{-2}(D_{10})^2$$

Where: K = permeability coefficient (refer to Table 12-15)

D_{10} = Diameter of a particle for which 10% of the total grains

are smaller and 90% of the total grains are larger.

The gravel deposits underlying the existing Kilkenny Road Pumping Station yielded estimated permeabilities of 7.3×10^{-4} to 9×10^{-8} m/s, which can be described as good to low permeability. The variable permeability results from alternating concentrations of clay present in the gravels with the PSD analysis in BH11 revealing clay fractions ranging from 3-23%. The permeability of the granular subsoils encountered during the site investigations at the Mortarstown WwTP typically ranged from 1.6×10^{-3} to 1×10^{-8} m/s. Deposits of greater permeability were encountered at BH08 at a depth of 5.5mbgl. Here the slightly silty sandy gravel is estimated to have a permeability of 0.133m/s which is characteristic of very clean gravels (refer to Table 12-15). Permeabilities at the site investigations are shown in Table 12-16.



Table 12-15: Coefficient of Permeability (m/s) (BS 8004: 1986)

K (Permeability Coefficient)

1	10 ⁻¹	10 ⁻²	10 ⁻³	10 ⁻⁴	10 ⁻⁵	10 ⁻⁶	10 ⁻⁷	10 ⁻⁸	10 ⁻⁹	10 ⁻¹⁰
Clean gravels			Clean sands and sand-gravel mixtures			Very fine sands, silts and clay-silt laminate			Unfissured clays and clay-silts (>20% clays)	
			Dessicated and fissured clays							

Table 12-16: Estimated Permeabilities across the Proposed Development Site

BH/TP No:	Depth (mbgl)	Geological Description	Estimated Permeability
Pumping Station			
BH11	3.6	Very sandy gravel with high cobble content	7.29x10 ⁻⁴
BH11	4.5	Very sandy gravel with medium cobble content	9x10 ⁻⁸
TP12	0	Made Ground – very clayey gravelly sand	9x10 ⁻⁸
TP12	2.0	Made Ground – gravelly sandy silt	9x10 ⁻⁸
WwTP			
BH05A	0.5	Clayey very gravelly sand	1x10 ⁻⁶
BH08	5.5	Slightly silty sandy gravel	0.133
BH10	0.5	Clayey very sandy gravel	1.6x10 ⁻³
BH10A	0.5	Silty very sandy gravel	3.97x10 ⁻⁵
TP05	0.5	Clayey very sandy gravel	1.69x10 ⁻⁴
TP08	0.2	Clayey very gravelly sand	1x10 ⁻⁶
TP08	1.4	Slightly sandy gravelly clay	1x10 ⁻⁸
TP10	1	Slightly clayey sand and gravel	7.29x10 ⁻⁴

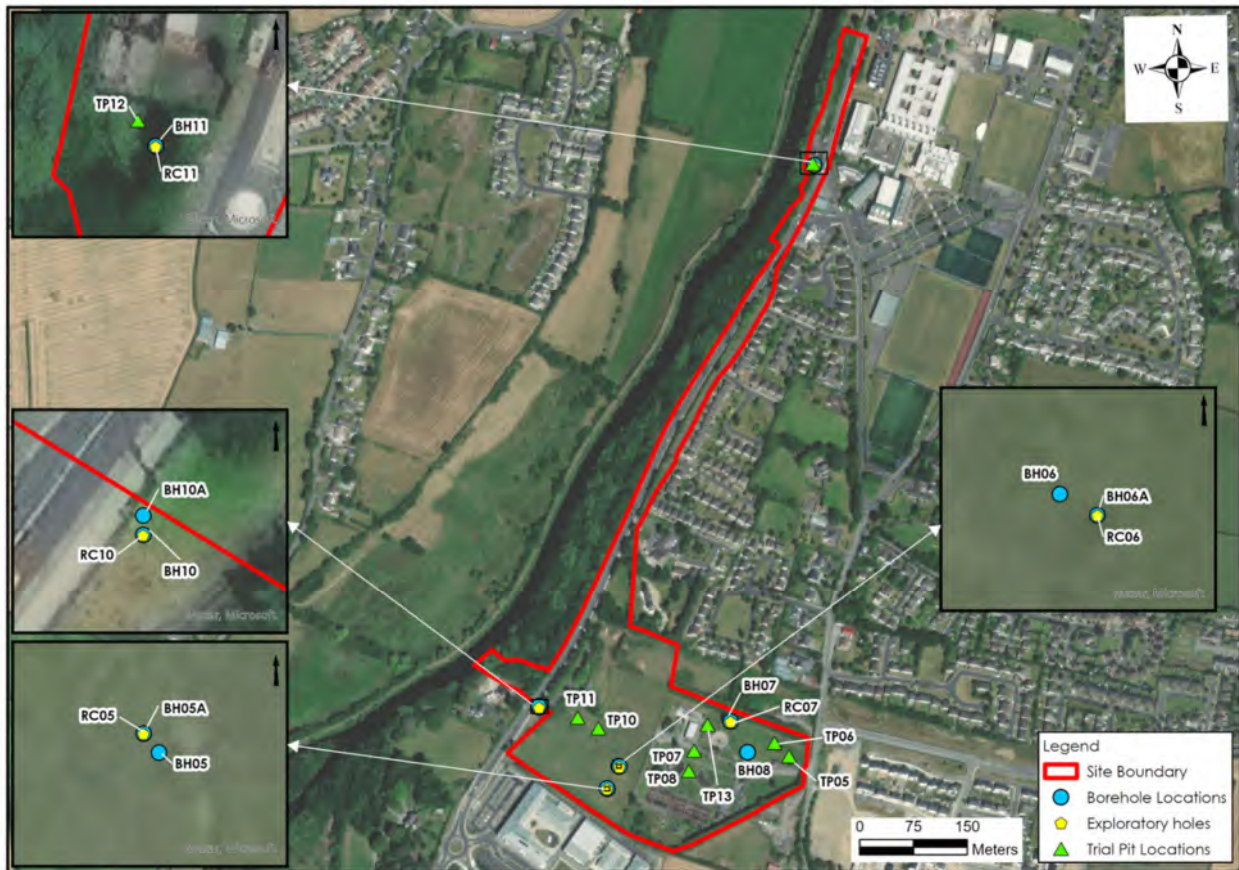


Figure 12-10: Boreholes and Trial Pit Locations

12.3.8 Groundwater Vulnerability

Groundwater Vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities (www.gsi.ie). Groundwater vulnerability maps are based on the type and thicknesses of soils/subsoils and the presence of karst features.

Groundwater vulnerability at the Proposed Development Site is mapped by the GSI as 'High' (www.gsi.ie). The high groundwater vulnerability is a result of the well-drained and permeable nature of the glacio-fluvial subsoils underlying the Proposed Development Site. The presence of these permeable strata have been verified through site specific investigations which encountered permeable sands and gravels.

12.3.9 Groundwater Hydrochemistry

There is no groundwater quality data available for the Proposed Development Site and groundwater sampling would generally not be undertaken for this type of development in terms of EIAR reporting.

No groundwater monitoring is required under the existing discharge licence as no discharge to ground is permitted.

The GSI (2004) state that there is no hydrochemical data available for the Athy-Bagenalstown Gravels GWB or the underlying Bagenalstown Lower GWB. However, groundwaters hosted in similar calcareous strata would have a calcium bicarbonate signature.

12.3.10 Water Framework Directive Water Body Status & Objectives

The Water Action Plan 2024 was published in September 2023 and is Ireland's 3rd River Basin Management Plan. It's objectives have been integrated into the design of the Proposed Development and include the following:

- Ensure full compliance with relevant EU legislation;
- Build on the achievements of the 2nd Cycle;
- Prevent deterioration and maintain a 'High' status where it already exists;
- Protect, enhance and restore all waters with aim to achieve at least 'Good' status by 2027;
- Ensure waters in protected areas meet requirements; and,
- Implement targeted actions and pilot schemes in focused sub-catchments aimed at restoring impacted waters and protecting waters from deterioration.

Our understanding of these objectives is that surface waters, regardless of whether they have 'Poor' or 'High' status, should be treated the same in terms of the level of protection and mitigation measures employed, i.e. there should be no negative change in status at all. Furthermore, any development must not in any way prevent a waterbody from achieving at least 'Good' status by 2027.

Strict mitigation measures (refer to Section 12.8) in relation to maintaining a high quality of surface water runoff from the development and groundwater protection will ensure that the status of both surface water and groundwater bodies in the vicinity of the site will be at least maintained (see below for WFD water body status and objectives) regardless of their existing status.

A full WFD Compliance Assessment is included as Appendix 12-6.

12.3.11 Groundwater Body Status

Local GWB status and risk result are available from www.catchments.ie and are summarized in Table 12-17 below. The Athy-Bagenalstown Gravels GWB experienced an improvement in WFD status from 'Poor' status in the 3rd WFD cycle (2016-2021) to 'Good' status in the most recent WFD cycle (2019-2024). Meanwhile, the Bagenalstown Lower GWB achieved 'Good' status in all WFD cycles. The overall status of a GWB applies to both the quantitative and chemical status of the GWB.

In terms of risk status, the Athy-Bagenalstown Gravels GWB has been deemed to be 'at risk' of failing to meet its WFD objectives. The Bagenalstown Lower GWB is deemed to be 'not at risk'. Agriculture has been identified as a significant pressure on the Athy-Bagenalstown Gravels GWB. No significant pressures have been identified on the Bagenalstown Lower GWB.



Table 12-17: Summary WFD Information for Groundwater Bodies

GWB	Overall Status (2013-2018)	Overall Status (2016-2021)	Overall Status (2019-2024)	Risk Status	Pressures
Athy-Bagenalstown Gravels	Good	Poor	Good	At Risk	Agriculture
Bagenalstown Lower	Good	Good	Good	Under Review	None

12.3.12 Surface Water Body Status

A summary of the WFD status and risk result of the River Barrow immediately upstream and downstream of the Proposed Development Site are shown in Table 12-18 below. Local Surface Waterbody (SWB) Status and risk results are available from www.catchments.ie.

In the vicinity and downstream of the Proposed Development Site, the River Barrow (Barrow_160, _170 and _180 SWBs) has been assigned 'Moderate' status in the latest WFD cycle (2019-2024). These SWBs are listed as being 'at risk' of failing to meet their respective WFD objectives. Hydromorphology is listed as a significant pressure on the Barrow_160 and the Barrow_170 SWBs. Urban run-off is listed as a significant pressure on the Barrow_160 and the Barrow_180 SWBs. Meanwhile, agriculture is also listed as a significant pressure on the Barrow_170 and the Barrow_180 SWBs.

The 3rd Cycle Barrow Catchment Report (EPA, 2024) states that the issues driven by these pressures are mainly nutrient pollution, altered morphological condition (habitat) and organic pollution impacts for surface water, and nutrient pollution, chemical quality diminution for surface water and chemical pollution for groundwaters.

Table 12-18: Summary WFD Information for the River Barrow

SWB	Overall Status (2013-2018)	Overall Status (2016-2021)	Overall Status (2019-2024)	Risk Status	Pressures
Barrow_160	Moderate	Moderate	Moderate	At Risk	Hydromorphology and Urban Run Off
Barrow_170	Moderate	Moderate	Moderate	At Risk	Hydromorphology and Agriculture
Barrow_180	Moderate	Moderate	Moderate	At Risk	Agriculture and Urban Run Off

12.3.13 Designated Sites and Habitats

In the Republic of Ireland, designated sites include proposed National Heritage Areas (pNHAs), National Heritage Areas (NHAs), Special Areas of Conservation (SAC) and Special Protection Areas (SPA's).

The north of the Proposed Development Site encroaches upon the River Barrow and River Nore SAC (Site Code: 002162) in the vicinity of the existing Kilkenny Road Pumping Station and in the south of the Proposed Development Site to the west of the R448. This designated site comprises the freshwater stretches of the Barrow and Nore River Catchments as far upstream as the Slieve Bloom Mountains and includes the

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downstream tidal and estuarine elements. The site is designated as an SAC for several water dependent species and habitats. Given the nature of the Proposed Development, comprising the upgrade of an existing WwTP which discharges to the River Barrow, the Proposed Development has the potential to effect the status and conservation objectives of the SAC.

In addition, several pNHAs are located downstream of the Proposed Development Site along the River Barrow. These include Cloghrick Wood pNHA (Site Code: 000806), located ~4.4km south of the Proposed Development Site, Clohastia pNHA (Site Code: 000830) located to the northeast of the Graiguenamanagh, ~28km south of the Proposed Development Site (straight line distance). The River Barrow Estuary pNHA (Site Code: 000698), located ~39km south of the Proposed Development Site (straight line distance). The Proposed Development is hydrologically connected with these designated sites via the River Barrow. However, given the distance between Clohastia pNHA and the River Barrow Estuary pNHA and the Proposed Development Site there is no potential for significant effects to occur.

No salmonid protected rivers are mapped downstream of the Proposed Development Site.

The closest designated shellfish areas downstream of the Proposed Development Site is the Waterford Harbour (Cheekpoint/Arthurstown/Creadon) shellfish area. This designated shellfish area is located ~60km south of the Proposed Development Site (straight line distance). The closest protected downstream bathing waters are at Duncannon, Co. Wexford. These designated bathing waters are located ~65km south of the Proposed Development Site (straight line distance). A map of local designated sites is included as Figure 12-11.

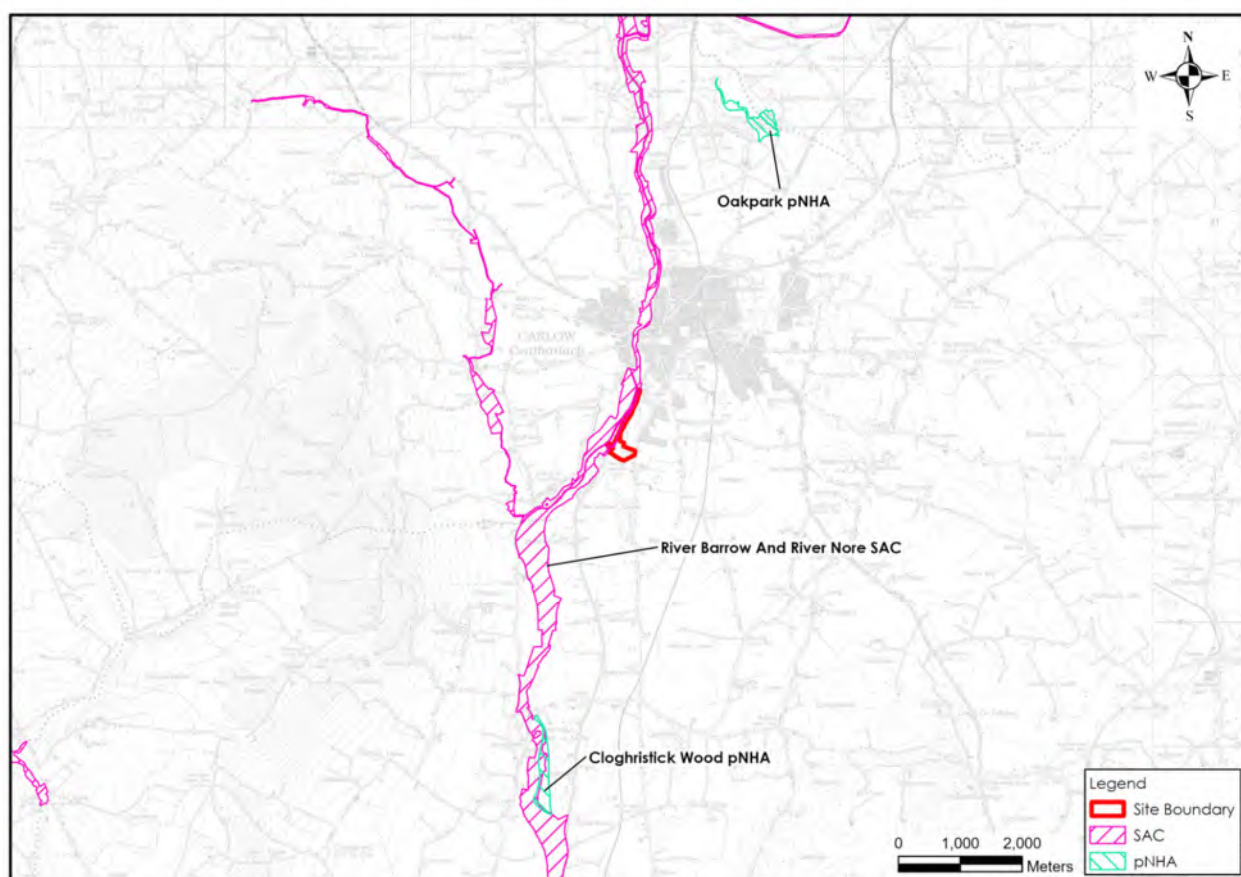


Figure 12-11: Designated Sites Map

12.3.14 Water Resources

12.3.14.1 Groundwater Resources

The location of the Proposed Development Site does not coincide with the location of any mapped Public Water Supply (PWS), Group Water supply (GWS) or National Federation Groundwater Schemes (NFGWS).

The closest mapped Group Water Scheme (GWS) is the Ballinabranna GWS, located ~3.1km southwest of the Proposed Development Site and to the west of the River Barrow. The River Barrow acts as a hydraulic barrier between the Proposed Development Site and this GWS.

A search of private well locations (accuracy of 1 – 50m) was undertaken using the GSI well database (www.gsi.ie). The GSI does not record the presence of any wells with an accuracy of <50m in the immediate vicinity of the Proposed Development Site. There are several wells in the local area with locational accuracies of 1km reported as having poor to good yields. It is noted that the GSI well database is not exhaustive. However, the Proposed Development Site is located in an urban area with water supply served to houses in the surrounding area by the mains supply.

The GSI also map a public water supply well (GSI Name: 2617SWW407) ~1.1km to the southeast of Mortarstown WwTP. This well is reported to have a moderate yield class and the source is within the granular subsoils. There is no potential for this PWS to be impacted by the Proposed Development due to the local hydrogeological regime, whereby groundwater at the site will flow towards the River Barrow.

Meanwhile, all GWBs within the Republic of Ireland, including the Athy-Bagenalstown Gravels and Bagenalstown Lower GWBs, are listed as Drinking Water Protected Areas (DWPAs).

12.3.14.2 Surface Water Resources

According to the 3rd Cycle Barrow Catchment Report (EPA, 2024) there are 6 no. SWBs protected for drinking water abstraction in the Barrow WFD catchment. However, these DWPAs are not located in the vicinity of the Proposed Development Site. According to the EPA's abstraction register, the closest downstream DWPA is located on the Barrow_240 SWB downstream of Graiguenamanagh. This DWPA is located ~32km south of the Proposed Development Site (straight line distance). Meanwhile, the abstraction for Carlow Town is located on the Burren River upstream of the Proposed Development Site.

12.3.15 Receptor Sensitivity

Due to the nature of the Proposed Development comprising of upgrades to an existing WwTP which discharges treated effluent to the River Barrow, surface water is the main potential sensitive receptor.

Surface waters in the vicinity of the Proposed Development Site can be considered to be of Extremely High Importance (refer to Table 12-1) due to their designation as a site of international importance *i.e.* River Barrow and River Nore SAC. This SAC contains water dependent habitats and species and has the potential to be affected by the Proposed Development. The River Barrow has also been listed as a Nutrient Sensitive Area whose waters are listed in the Urban Wastewater (Nutrient -Sensitive Areas) Regulations (S.I. 403/2025) . Therefore, the River Barrow, and the River Barrow and River Nore SAC will be included for further assessment due to their sensitivity, close proximity and hydrological connectivity to the Proposed Development Site.

In addition, several pNHAs are also hydrologically linked with the Proposed Development Site via the River Barrow. Cloghrick Wood pNHA is located ~4km southwest of the Proposed Development Site along the River Barrow and will be included in the assessment due to its proximal location to the Proposed Development.

Other designated sites located further downstream have no potential to be affected by the Proposed Development due to their distant location from the Proposed Development Site and the large volumes of water within the River Barrow. The mitigation measures prescribed in this EIAR will ensure the protection of the hydrological environment in the immediate vicinity of the site, therefore, also protecting all receptors located further downstream.

In terms of groundwater receptors, the Regionally Important Gravel and Karst Aquifers underlying the Proposed Development Site are considered to be of Extremely High Importance (refer to Table 12-2). These groundwaters support the River Barrow and River Nore SAC, which is of high value on an international scale, and flows immediately to the west of the Proposed Development Site. Groundwater quality and quantity will be at risk during the construction and operational phases of the Proposed Development due to the permeable nature of the local subsoils. Therefore, local groundwater quality and quantity will be considered in the impact assessment.

In terms of water resources, the GSI mapped PWS (GSI Name: 2617SWW407) ~1.1km to the southeast of Mortarstown WwTP, is not included in the assessment. Groundwater in the area of the Proposed Development Site will flow to the west, towards the River Barrow. There is no potential for significant effects on this PWS. All surface water drinking supplies have also been screened out due to their distant location from the Proposed Development Site.

12.4 Characteristics of the Proposed Development

A full description of the Proposed Development is provided in Chapter 2.

In summary the Proposed Development will comprise of the decommissioning of the existing Kilkenny Road Pumping Station, the construction of a new pumping station to the west of the existing Mortarstown WwTP and the upgrade of the WwTP. A micro tunnel gravity trunk sewer will be constructed to connect the existing pumping station to the new pumping station. This tunnel will travel from the inlet at the existing Kilkenny Road Pumping Station along the R448 before traversing agricultural land and connecting to the WwTP.

The Proposed Development aims to increase the treatment capacity of the WWTP; replace equipment and electrical control equipment nearing the end of their working design life and address deficiencies related to stormwater storage volumes and shallow walled final settlement tanks. The existing Ø600mm outfall pipe will be replaced by a new Ø900mm outfall pipe discharging via a concrete headwall constructed to UÉ specifications.

The key elements of the Proposed Development that have been considered in terms of potential effects on the water environment include:

- The replacement of natural surface with impermeable surfaces;
- Demolition of certain existing infrastructures;
- Shallow earthworks and levelling required for landscaping, building foundations etc;
- Micro tunnelling along the R488;
- Deeper earthworks and excavations required for the construction of the new pump station (14.3mbgl), stormwater tank, settlement tanks (primary and final), RAS/WAS sump (10.5mbgl), sludge blending tank, picket fence thickener, aeration tanks and foul pump sump;
- Construction of the new outfall and outfall chamber adjacent to the River Barrow. The construction will require a temporary instream cofferdam to install the headwall on the riverbank; and,
- The discharge of treated effluent to the River Barrow.



12.4.1 Operational Phase Discharge

During the Operational Phase the Proposed Development will operate in accordance with its discharge licence. The Proposed Development will upgrade the existing WwTP from its current design capacity of 36,000PE (population equivalent) to a future forecasted 25-year design horizon loading of 58,500PE. Details on the proposed Dry Weather Flows (DWF) and the future design flow (1.25*DWP) are shown in Table 12-19.

Table 12-19: Proposed Design Requirements

Design Parameter	Proposed Design (25-year horizon)
P.E.	58,500
DWF (m ³ /day)	15,344
Future Design Flow (m ³ /day)	16,416

The plant will be designed to meet both the discharge quality standards set out in Urban Wastewater (Nutrient – Sensitive Areas) Regulations (S.I. 403/2025), and to a standard which will allow the River Barrow to meet at least ‘Good’ status as required by the WFD and the Surface Water regulations. Emission Limit Value (ELV) requirements calculations and assimilative capacity assessments were carried out as part of the plant design. The purpose of carrying out ELV calculations was to determine the effluent discharge conditions required for the receiving watercourse to meet ‘Good’ WFD status. The results are included in full in the WAC Assessment Report attached as Appendix 12-3. A water quality impact assessment has been carried out in accordance with UÉ’s Technical Guidance to determine the current water quality impacts of the discharge and to calculate the required ELVs for the upgraded WwTP which will protect the environment from future deterioration in water quality under future loading scenarios, recognising the requirements of the legislative framework. According to the WAC, the water quality of the River Barrow upstream of the WwTP currently fails to comply with good status requirements with respect to BOD and is on the limit with respect to good status requirement for ammonia, therefore the “notionally clean” approach has been applied to BOD and ammonia to account for upstream pressures on water quality and to allow an assessment of the impacts of the WwTP discharges in accordance with the ‘Polluter Pays’ principle of the Water Framework Directive and in line with current licensing approaches under the WWDA regulations.

The WAC Assessment used a simple mass balance approach to calculate ELVs which take an appropriate percentage of the available assimilative capacity in the river, given upstream water quality and the sensitivity of the receiving environment. The calculation is carried out using effluent flows which have been specified to represent the future design capacity of the WwTP. The recommended ELVs calculated using the simple mass balance approach are shown in Table 12-20.

By adhering to the calculated ELVs, it can be ensured that the quality of the receiving River Barrow downstream of the discharge point will meet the necessary standard for the river to maintain at least ‘Good’ WFD status.

Table 12-20: Proposed Upgraded WwTP Emission Limit Values (UÉ).

Design Parameter	ELV (mg/L)
BOD	25 (as per UWWTD regs)
Ammonia	2.0 (in line with the current Discharge Licence)
Ortho-phosphate	1.0

12.5 Potential Effects During Construction Phase

The likely significant effects on the water environment during the construction phase of the Proposed Development are discussed below.

12.5.1 Potential Effects from Earthworks Resulting in Suspended Solids Entrainment in Surface Waters

Construction phase activities that will require earthworks resulting in the removal of vegetation cover and the excavation of topsoil and mineral subsoil. The total volume of cut and fill is estimated to be ~42,160m³. Further details are provided in Chapter 2.

The generation of silt laden run-off during construction activities may result in short-term negative effects on downstream surface water quality. The potential sources of sediment laden water include:

- Runoff during enabling works, site clearance and groundworks that would be required to facilitate works associated with the Proposed Development. The potential for silt laden runoff would continue throughout the construction phase until the works have been completed;
- Demolition works at the Mortarstown WwTP and decommissioning of Kilkenny Road Pumping Station;
- The Proposed Development will require construction adjacent to the River Barrow to accommodate the construction of the new outfall outlet which may disturb sediment on the riverbank and lead to an increase in suspended solid concentrations; and,
- Stockpiled excavated material during the construction phase will provide a point source of exposed sediment.

These activities, if unmitigated, will likely result in the release of suspended solids to surface water and could result in an increase in the suspended sediment load, resulting in increased turbidity which in turn could affect the water quality and fish stocks of downstream water bodies and the River Barrow.

The greatest potential for effects on surface water quality would be associated with the works in close proximity to the River Barrow. Where works are distant from the river, the local hydrogeological regime is dominated by high rates of groundwater recharge due to the high permeability of the sand and gravel subsoils. These subsoils are excellent natural filters and would remove sediment from water after a couple of metres of flow.

Pathways: Drainage and surface water discharge routes.

Receptors: Water quality in the River Barrow.

Pre-Mitigation Potential Effects: Indirect, negative, moderate, temporary, likely effect on the River Barrow.

12.5.2 Potential Effects on Surface Water Quality from Excavation Dewatering

Some groundwater seepages will likely occur in excavations, and this will create additional volumes of water to be treated by the water management system.



Based on the site data a shallow groundwater table is present at the Proposed Development Site, hosted within the glacial outwash sand and gravels of the Athy-Bagenalstown Gravels GWB. Inflows into these excavations will require management and treatment to reduce suspended sediments.

Pathways: Drainage and surface water discharge routes.

Receptors: Water quality in the River Barrow.

Pre-Mitigation Potential Effects: Indirect, negative, moderate, temporary, likely effect on the River Barrow.

12.5.3 Potential Effects from the Release of Hydrocarbons

Accidental spillage during refuelling of construction plant with petroleum hydrocarbons is a significant pollution risk to groundwater, surface water and associated ecosystems, and to terrestrial ecology. The accumulation of small spills of fuels and lubricants during routine plant use can also be a pollution risk. Hydrocarbon has a high toxicity to humans, and all flora and fauna, including fish, and is persistent in the environment. It is also a nutrient supply for adapted micro-organisms, which can rapidly deplete dissolved oxygen in waters, resulting in death of aquatic organisms

Pathways: Surface water and groundwater flowpaths

Receptors: Surface water quality in the River Barrow and groundwater quality in the underlying gravel aquifer (Athy-Bagenalstown Gravels GWB) and karst bedrock aquifer (Bagenalstown Lower GWB).

Pre-Mitigation: Potential Effects:

Negative, indirect, moderate, temporary, likely effect on groundwater quality.

Negative, indirect, significant, temporary, likely effect on surface water quality.

12.5.4 Potential Effects from the Release of Cement-Based Products

Concrete and other cement-based products are highly alkaline and corrosive and can have significant negative impacts on water quality. They generate very fine, highly alkaline silt (pH 11.5) that can physically damage fish by burning their skin and blocking their gills. A pH range of $\geq 6 \leq 9$ is set in S.I. No. 293 of 1988 Quality of Salmonid Water Regulations, with artificial variations not in excess of ± 0.5 of a pH unit. Entry of cement-based products into the site drainage system, into surface water runoff, and hence to surface watercourses or directly into watercourses represents a risk to the aquatic environment.

Batching of wet concrete at the Proposed Development Site and washing out of transport and placement machinery are the activities most likely to generate a risk of cement-based pollution. Placed concrete in foundations can have minor local impacts on groundwater quality over time. However, due to limited surface area of exposed concrete, the anoxic conditions below ground, and the high rate of dilution from the wider groundwater system relative to the small volumes of groundwater that would come in contact with the concrete, the potential for impacts are low.

Pathways: Surface water and groundwater flowpaths.



Receptors: Surface Water hydrochemistry in the River Barrow and groundwater hydrochemistry in the underlying gravel aquifer (Athy-Bagenalstown Gravels GWB) and karst bedrock aquifer (Bagenalstown Lower GWB).

Pre-Mitigation Potential Effects: Indirect, negative, moderate, short-term, likely effect on surface water and groundwater quality.

12.5.5 Potential Effects from Wastewater Disposal

Release of effluent from on-site temporary wastewater treatment systems required for construction workers during the construction phase has the potential to impact on groundwater and surface waters. However, during the construction phase it is proposed that workers will utilise self-contained welfare facilities at the site. There will be no additional source of wastewater generated during the construction phase.

Pathways: Groundwater flowpaths and site drainage network.

Receptors: Groundwater quality (Athy Bagenalstown Gravels and Bagenalstown Lower GWBs) and surface water quality (River Barrow).

Pre-Mitigation Potential Effects:

Indirect, negative, imperceptible, temporary, unlikely effect to surface water quality.

Indirect, negative, imperceptible, temporary, unlikely effect to groundwater quality.

12.5.6 Potential Effects on Groundwater Levels Due to Temporary Dewatering

Temporary dewatering of excavations during the construction phase has the potential to impact on local groundwater levels.

Groundwater monitoring has revealed a shallow groundwater table at the Proposed Development Site, hosted in the permeable sands and gravels of the Athy-Bagenalstown GWB. Consequently, any excavations required for the Proposed Development will likely require temporary dewatering during the construction phase.

As detailed in Table 12-13, the construction of the new stormwater storage tank, primary and final settlement tanks, centrate pump sump, RAS/WAS Sump at the WwTP will extend below the shallow groundwater table and will require temporary dewatering to facilitate the construction works.

Furthermore, the location of the new pumping station was chosen due to its relative distant location from the river which will reduce the risks of groundwater intrusion from river seepage. However, the recorded groundwater levels in the area are still high and temporary dewatering will be required during construction works.

The potential for effects due to works along the R448 will be limited due to the use of micro tunnelling which is a trenchless installation technique. There will only be the requirement for entry and exit pits to be constructed. Some temporary dewatering will be required at these excavation locations.

Dewatering during the construction phase has the potential to impact local groundwater levels. However, any potential effects will be localised and of a short-duration.

Pathway: Drainage and surface water discharge routes.



Receptors: Groundwater levels in the underlying gravel aquifer (Athy-Bagenalstown Gravels GWB) and associated groundwater levels in local wells.

Pre-Mitigation Potential Effect: Negative, imperceptible, direct, short-term, likely effect on local groundwater levels and local groundwater supplies.

12.5.7 Potential Effects Associated with Construction of New Outfall

The upgraded WwTP will discharge treated effluent to the River Barrow at reference 271,179E 174,892N. The existing Ø600mm outfall pipe will be replaced by a new Ø900mm outfall pipe discharging via a concrete headwall constructed to UÉ specifications. The outfall pipe will be constructed to the north side of the existing outfall. The construction of the new outfall and associated headwall will involve some instream works which has the potential to effect local surface water quality in the River Barrow. It is proposed that the outfall pipe will enter the river ~1.5m below the low water level.

In-stream works have the potential to result in elevated concentrations of suspended solids in the River Barrow which will have a negative effect on surface water quality and associated water dependent ecosystems. The effects would be temporary due to the short-duration of these works.

The instream works also have the potential to interfere with the hydrological regime and flows in the River Barrow. A Hydrodynamic Technical Report (IE Consulting, 2025) is included as Appendix 12-2. This report assesses and quantifies the potential short-term (Construction Phase) impacts of the proposed new outfall pipe and associated headwall on the existing hydrological regime of the River Barrow. The hydraulic modelling and analysis indicated that the construction of the outfall pipe and headwall would not have a significant adverse impact to the existing baseline water levels and flows. A minor limited increase in water levels and flow velocities will occur as a result of the sheet piling, however these effects are limited to the immediate construction area and will not result in an increase in erosion, accretion or sediment transport at this location. The sheet piling will be a temporary construction and will only be in place for a short duration whilst the construction works are ongoing.

Pathways: Surface water flowpaths.

Receptors: Surface water quality and flow regimes within the River Barrow.

Pre-Mitigation Potential Effects: Negative, significant, direct, temporary, likely effect on local surface water quality in the River Barrow. Negative, slight, direct, temporary, likely effect on local surface water flows and water levels in the River Barrow adjacent to the construction works.

12.5.8 Potential Effects During Micro Tunnelling

Effects on local surface and groundwater quality may occur during micro tunnelling along the R448.

Micro tunnelling is a trenchless pipeline installation technique that is widely used for the installation of services. This construction methodology was chosen due to the depth required for the services and the non-disruptive nature of this method in comparison to the open-trench methodology. However, there is a risk of indirect impacts from sediment laden runoff during the launch pit and reception pit excavation works. There is also the unlikely risk of fracture blow out and contamination of the watercourse with drilling fluid.

Pathway: Surface water and groundwater flows.



Receptor: Surface water quality within the River Barrow and local groundwater quality.

Pre-Mitigation Potential Effect: Negative, moderate, indirect, temporary, likely effect on surface and groundwater quality.

12.5.9 Potential Effects on Hydrologically Connected Designated Sites

Groundwater and surface water flowpaths in the local area will discharge to the River Barrow to the west of the Proposed Development Site. In this area the River Barrow forms part of the River Barrow and River Nore SAC (Site Code: 002162) with several sensitive water dependent species and habitats. Cloghrystick Wood pNHA (Site Code: 000806) is located ~4.4km south of the Proposed Development Site along the River Barrow and is included in the impact assessment for the purpose of a conservative assessment. All other designated sites have been screened out due to their distant location from the Proposed Development Site.

Due to the nature of the proposed works significant effects will occur in the absence of mitigation measures.

Pathway: Surface water and Groundwater flowpaths.

Receptor: River Barrow and River Nore SAC and Cloghrystick Wood pNHA.

Pre-Mitigation Potential Effect: Negative, significant, direct, short-term, likely effect on the River Barrow and River Nore SAC and Cloghrystick Wood pNHA.

12.5.10 Potential Effects on Surface and Groundwater WFD Status

The EU Water Framework Directive (2000/60/EC) requires that all member states protect and improve water quality in all waters, with the aim of achieving good status by 2027 at the latest. Any new development must ensure that this fundamental requirement of the Directive is not compromised. The status of the groundwater and surface water bodies in the vicinity and downstream of the Proposed Development Site are described in Section 12.3.11 and 12.3.12 respectively.

Potential effects on groundwater and surface water quality and quantity as a result of the Proposed Development has the potential to negatively affect the WFD status of ground and surface water bodies in the vicinity and downstream of the proposed development. A full WFD Compliance Assessment is included as Appendix 12-6.

Pathway: Surface water and Groundwater flowpaths.

Receptor: WFD status of downstream SWBs and underlying GWB.

Pre-Mitigation Potential Effect:

Negative, imperceptible, direct, short-term, unlikely effect on the underlying GWBs.

Negative, moderate, indirect, short-term, likely effect on the WFD SWBs.



12.6 Potential Effects During Operational Phase

12.6.1 Potential Effects from Effluent Discharge on Surface Water Quality

The upgraded WwTP will discharge treated effluent to the River Barrow. While there are obvious benefits for the hydrology environment resulting from the efficient operation of the upgraded WwTP, discharging treated wastewater may also release substances into the receiving environment such as suspended solids and organic compounds (despite compliance of the quality of treated wastewater with the established standards).

The proposed development will also result in a reduced frequency and volume of stormwater/combined sewer overflows due to increased pumping, storage and treatment capacity of the upgraded WwTP. This will have a positive effect on downstream surface water quality.

Refer to Section 12.4.1 for details on the proposed WwTP discharge volumes and quality. Please refer to Appendix 12-3 for the WAC Assessment Report which calculates the ELVs for the future design capacity of the WwTP which will ensure that the effluent has no significant effects on downstream water quality.

Pathway: Surface water flowpaths.

Receptor: Surface water quality within the River Barrow.

Pre-mitigation Potential Effect: Negative, imperceptible, direct, long-term, likely effect on local surface water quality in the River Barrow.

12.6.2 Potential Effects of Effluent Discharge on Downstream Surface Water Quantity

During the operational phase of the Proposed Development the upgraded WwTP will be discharging directly into the River Barrow. The proposed discharge rate is 16,416m³/day, which equates to a flow of 0.19m³/s. The 99%ile flow in the River Barrow ~2km upstream of the Proposed Development Site at Barrow New Bridge (EPA Station Code: 14022) is 7.69m³/s. This means that flows in the Barrow exceed 7.69m³/s 99% of the time. Therefore, the proposed discharge volume equates to only 2.3% of the extreme low flow condition in River Boyne. Hence, the increase in discharge associated with the Proposed Development is very small in comparison to the existing natural flows within the River Barrow. In reality, when the river is in low flow the WwTP will not be discharging at its maximum.

Pathway: Surface water flowpaths.

Receptor: Surface water quantity / flow volumes within the River Barrow.

Pre-Mitigation Potential Effect: Negative, imperceptible, direct, long-term, likely effect on local surface water quantity and flow volumes in the River Barrow.

12.6.3 Potential Effects from Leaks or Plant Failure

During the operational phase of the Proposed Development, there is an ongoing risk of plant and infrastructure failure which would result in accidental leaks and spills of wastewater.



The existing discharge licence defines an incident as:

1. Any discharge that does not comply with the licence requirements.
2. Any incident with the potential for environmental contamination of surface water or groundwater, or posing an environmental threat to land, or requiring an emergency response by the relevant Water Services Authority.

The occurrence of such incidents would have the potential negatively affect local groundwater and surface water quality in the vicinity and downstream of the Proposed Development Site.

These risks are common across all operational WwTP including the existing Carlow agglomeration. As part of the requirements of the existing discharge licence, the licensee is required to report of any accidents or incidents associated with the WwTP and include all remedial actions undertaken.

Pathways: Surface water and groundwater flowpaths.

Receptors: Surface water quality within the River Barrow and underlying groundwater quality.

Pre-Mitigation Potential Effects: Negative, imperceptible, direct, temporary, unlikely effect on local surface water quality in the River Barrow and local groundwater quality.

12.6.4 Potential Effects from the Replacement of Natural Surfaces with Lower Permeability Surfaces

Progressive replacement of the natural vegetated surface with impermeable surfaces could potentially result in an increase the local rates of surface water runoff and decrease rates of groundwater recharge within the Proposed Development Site.

The replacement of natural surfaces with proposed infrastructure will reduce recharge rates to the underlying Athy-Bagenalstown Gravels GWB. However, given the small footprint of the Proposed Development in comparison to the total area underlain by this GWB (102km²), any potential change in groundwater recharge as a result of the Proposed Development is negligible in comparison to the total volume of water within this gravel aquifer.

The Proposed Development will increase local surface water runoff rates due to the loss of natural vegetated surfaces. However, the footprint of the Proposed Development is infinitely small in comparison to the total upstream catchment of the River Barrow, with the total catchment area of the Barrow downstream of the Proposed Development Site is 2,255km² (EPA Node: 14_184). Therefore, any potential increase in surface water runoff rates will have an imperceptible effect on surface water quantity within the River Barrow downstream of the Proposed Development Site.

Pathways: Surface water and groundwater flowpaths.

Receptors: Surface water quantity within the River Barrow and groundwater quantity within the underlying Athy-Bagenalstown GWB.

Pre-Mitigation Potential Effects:

Negative, imperceptible, indirect, permanent, unlikely effect on local surface water quantity in the River Barrow.

Negative, imperceptible, indirect, permanent, likely effect on groundwater quantity in the Athy-Bagenalstown GWB.



12.6.5 Potential Effects on Hydrologically Connected Designated Sites

The proposed discharge from the WwTP could transfer poor quality surface water that may affect the River Barrow and River Nore SAC and the River Barrow_160 NSA.

Pathway: Surface water flowpaths.

Receptor: Down-gradient water quality in the River Barrow and River Nore SAC and the River Barrow_160 NSA.

Pre-mitigation Potential Effect: Indirect, negative, imperceptible, long-term, likely effect.

12.6.6 Potential Effects on Surface and Groundwater WFD Status

The potential effects on groundwater during the operational phase of the Proposed Development are much reduced in comparison to the construction phase described above.

The main potential for effects is associated with the discharge to the Barrow_160 SWB. The discharge of wastewater could potentially effect the status of this SWB. However, there will be no discharge of untreated wastewaters. A high degree of treatment will be provided by the upgraded WwTP. The upgraded WwTP has been designed with ELVs, calculated to ensure that the Proposed Development does not prevent the receiving waterbodies from achieving “Good” status in the future. A full WFD Compliance Assessment is included as Appendix 12-6.

Pathway: Surface water flowpaths, groundwater recharge and groundwater flowpaths.

Receptor: Down-gradient SWBs and underlying GWBs.

Pre-mitigation Potential Effect:

Negative, moderate, indirect, likely, long-term effect on the WFD status of downstream SWBs.

Negative, imperceptible, indirect, unlikely, long-term effect on the underlying GWB.

12.6.7 Potential Effects of New Outfall on Flows and Water Levels in the River Barrow

The construction of the new outfall and associated headwall have the potential to interfere with the hydrological regime and flows in the River Barrow. A Hydrodynamic Technical Report (IE Consulting, 2025) is included as Appendix 12-2. This report assesses and quantifies the potential long-term (Operational Phase) impacts of the proposed new outfall pipe and associated headwall on the existing hydrological regime of the River Barrow. The hydraulic modelling and analysis indicated that the outfall pipe and headwall would not increase in peak fluvial water levels or flow velocities in comparison to the existing baseline scenario. Furthermore, the assessment found that the constructed headwall will not result in an increase in the peak flood water levels in comparison to the existing baseline scenario.

Pathways: Surface water flowpaths.



Receptors: Surface water flow regimes within the River Barrow.

Pre-Mitigation Potential Effects: No effect.

12.7 Cumulative Effects

Indirect cumulative effects can occur with the Proposed Development and other developments via surface water and groundwater flowpaths, but these are restricted by connectivity and proximity.

A screening assessment has been completed on other projects and developments using connectivity for hydrology and groundwater flow directions and proximity for hydrogeology.

Given the nature of the Proposed Development consisting of a direct discharge of effluent to the River Barrow and the Proposed Development Sites proximity to the River Barrow, the primary potential for cumulative effects will be from interactions with other activities within the River Barrow catchment which can effect surface water quality and surface water quantity.

The assessment of cumulative effects is divided as follows:

- Cumulative effect assessment with other wastewater treatment plants within the Barrow Catchment;
- Cumulative effect assessment with existing IPC Licences; and,
- Cumulative effect assessment with other land uses within the Barrow Catchment.

12.7.1 Cumulative Effects with other Urban Wastewater Treatment Plants

Urban WwTPs located both upstream and downstream of the Proposed Development Site within the Barrow Catchment are presented in Table 12-21.

The Proposed Development has the potential to interact with the discharges from other urban WwTPs upstream and downstream of the Proposed Development Site.

The 3rd Cycle Barrow Catchment Report (EPA, 2024) states that Urban WwTPs are a significant pressure in 15 at risk waterbodies. None of these at risk SWBs are located downstream of the Proposed Development Site.

Table 12-21: WwTPs listed as significant pressures in at risk waterbodies (3rd Cycle Barrow Catchment Report)

Facility Name	At risk waterbody	4 th WFD Cycle Status
Portarlington D0158	Barrow_080	Moderate
Portlaoise D0001	TriogUE_020	Poor
Daingean D0226	Daingean_020	Poor
Mountmellick D0152	Owenass_020	Moderate
Coill Dubh D0242	Slate_020	Poor
Rathangan D0175	Slate_070	Moderate
Derrinturn D0244	Figile_010	Poor
Nurney A0080	Ballynaboley Stream_010	Poor
Monasterevin D0177	Barrow_100	Moderate
Tinryland WWTP A0099	Burren_050	Moderate
Ballinkillen WWTP A0094	Black(Borris)_020	Good
Cloneygowan A0167	Cushina_020	Good
Kileen A0153	Douglas(Laois)_030	Good
Coolanagh A0136	Douglas(Laois)_030	Good
Ballitore A0129	Greese_030	Moderate
Castleroe West A0127	Greese_060	Moderate

Furthermore, the EPA (EPA, 2021) state that 5 no. previously impacted waterbodies are no longer at risk from urban wastewater pressures with the following agglomerations no longer being considered as significant pressure since Cycle 2 of the WFD:

- Athy (D0003)
- Borris (D0248)
- Stradbally (D0292)
- Goresbridge (D0529)
- Muinebheag and Leighlinbridge (D0090)
- Old Leighlin (A0096)

Several of these agglomerations (Borris, Goresbridge, Muinebheag and Leighlinbridge) are located downstream of the Proposed Development Site. Therefore, the treatment of urban wastewaters downstream of the Proposed Development Site is improving and there is an associated improvement in water quality in the River Barrow. The proposed upgrade works will likely contribute to further improvements in surface water quality.

12.7.2 Cumulative Effects with IPC Licence Emissions

The Proposed Development Site is located in the River Barrow catchment and Table 12-22 lists all active IPC licences in the Barrow catchment directly upstream and downstream on the Proposed Development Site.

Effluent discharge from the Proposed Development may interact with industrial emissions. Cumulative effects may include elevated concentrations of suspended solids and nutrients (ammonia and orthophosphate) in the River Barrow and an associated deterioration in surface water quality.

There is only 1 no. active IPC licence located within 10km of the Proposed Development. Approximately 2.4km to the northeast the Irish Sugar Company are operating under IPC licence conditions (Licence No: P0222). All emissions to surface waters are treated and monitored to ensure that the industrial activities do not impact the local water quality. With the ongoing mitigation measures designed for the protection of surface waters under the IPC Licence no cumulative effects will occur.-

All other IPC licences in the River Barrow catchment are significant distances (>15km) from the Proposed Development and due to the large volumes of flow within the River Barrow, no cumulative effects will occur.

No cumulative impacts on hydrogeology will occur due to the local hydrology with groundwater discharging as baseflow into the River Barrow. Therefore, cumulative effects on groundwater are negligible.

Table 12-22: IPC Licences within the Barrow Catchment

Active IPC Licence No:	Name	Category	~Distance from the Proposed Development Site
P0261	Peerless Rug Europe	Industry (emissions to sewer)	~18km NW and upstream of the Proposed Development Site
P0222	Irish Sugar Limited (Carlow)	Industry (emissions to water)	~2.4km NE and upstream of the Proposed Development Site
P0555	Alltech Farming Solutions Ltd	Industry (emissions to water)	~23km S and downstream of the Proposed Development Site

12.7.3 Cumulative Effects Associated with the Wider Landuse in the Barrow Catchment

The Proposed Development Site lies within the largely agricultural River Barrow surface water catchment and any discharge has the potential to interact with the agricultural practices in the surrounding lands and could contribute to a deterioration of downstream surface water quality.

Agriculture is the most significant pressure on river waterbodies in the Barrow Catchment. Common issues in relation to agriculture relate to diffuse phosphorous loss to surface waters from runoff from yards, roadways or other compacted surfaces or runoff from poorly draining soils. The entrainment of sediment in surface watercourses is also a problem which results from land drainage works and bank erosion.

Any discharge/effluent being released into the River Barrow has the potential to interact with the agricultural facilities and could contribute to a deterioration of downstream surface water quality.

However, the River Barrow already receives discharge from Mortarstown WwTP. Surface water quality monitoring completed in accordance with discharge licence requirements does not show a significant change in water quality upstream and downstream of the discharge location. The current discharge is having no impact on water quality in the river.

The WAC assessment proves the ability of the River Barrow to receive this treated wastewater without deleterious effects and without damaging aquatic life and ecosystems. Therefore no cumulative effects will occur with agricultural activities in the Barrow Catchment.

12.7.4 Climate Change as a Cumulative Pressure

The changes in rainfall patterns associated with future climate change (as detailed in Section 12.3.2) will result in reduced low flows associated with an increased frequency of summer droughts and increased evaporation rates. The future Q95 flow in the Barrow River will therefore be lower than at present due to climate change pressures. An ICARUS report (ICARUS, 2020) developed a system for categorising the vulnerability of a river catchment to reductions in flow and the range of potential reductions predicted under various future emission climate change scenarios. According to the report (ICARUS, 2020), the Q95 flow in the Barrow Catchment would be reduced by 11% by 2080 for a Representative Concentration Pathway of 4.5 (RCP 4.5 represents a moderate scenario where emissions peak around 2040). As stated in Section 12.3.3.1 the scaled 95%tile flow at the Proposed Development Site is currently 9.613m³/s. This would reduce to 8.555m³/s for the RCP 4.5 scenario.

The upgraded WwTP has been designed to ensure that the proposed discharge of treated effluent from the upgraded WwTP does not prevent the River Barrow from achieving 'Good' WFD status. The calculations are based on the existing low flows in the River Barrow. A reduction in low river flows associated with climate change would require slightly lower ELVs. Whilst the proposed upgraded WwTP is not designed to meet these lower ELVs the design is mindful of possible future adaptations and ensures that there are no particular constraints incorporated into the current design that could restrict future adaptations or upgrades which may be required in the future.

12.8 Mitigation Measures

12.8.1 Mitigation Measures During Construction Phase

12.8.1.1 Potential Effects from Earthworks Resulting in Suspended Solids Entrainment in Surface Waters

Management of surface water runoff and subsequent treatment prior to release off-site will be undertaken during construction work as follows:

- Prior to the commencement of earthworks, silt fencing will be placed down-gradient of the construction areas where drains and drainage pathways are present;
- These will be embedded into the local soils to ensure all site water is captured and filtered;
- All surface drains within and down-gradient of the earthworks/ construction area will be blocked temporarily or where there are minors flows silt fencing will be placed within the existing drain;
- No pumped construction water will be discharged directly into the main surface watercourse;
- Pumped water (if necessary) will be discharged via a silt bag which will filter any remaining sediment from the pumped water. If silt bags are required, the entire silt bag discharge area will be enclosed by a perimeter of double silt fencing. Any discharge of pumped water will be onto a vegetated surface, local to the excavation, for infiltration to ground;
- Daily monitoring of the excavation/earthworks and associated water management systems will be completed by a suitably qualified person during the construction phase (Ecological Clerk of Works (ECoW)). All necessary preventative measures (detailed in this Section and Section 12.8.1.2) will be implemented to ensure no entrained sediment, or deleterious matter will enter the River Barrow; and,
- Earthworks will take place during periods of low rainfall to reduce run-off and potential siltation of watercourses. Monitoring of weather forecasts will be completed (by the ECoW) and construction works will be postponed in the event of an orange or red weather warning for rainfall.

In addition, the sands and gravels deposits associated with the Athy-Bagenalstown GWB are excellent filters and will polish treated construction water within a couple of meters of flow.

12.8.1.2 Potential Effects on Surface Water Quality from Excavation Dewatering

Management of groundwater seepages and subsequent treatment prior to discharge into the drainage network will be undertaken as follows:

- Appropriate interceptor drainage, to prevent upslope surface runoff from entering excavations will be put in place;
- If required, pumping of excavation inflows will prevent build-up of water in the excavation;
- The interceptor drainage will be discharged onto natural vegetated surfaces downgradient of the excavations and not directly to surface waters;
- The pumped water volumes from excavations will be discharged via temporary volume and sediment attenuation ponds adjacent to excavation areas;
- There will be no direct discharge to surface watercourses, and therefore no risk of hydraulic loading or contamination will occur;
- Treated water from excavations will be discharged over vegetative surfaces and will percolate into the ground due to the permeable nature of the local soils and subsoils;



- Daily monitoring of excavations by a suitably qualified person (ECoW) will occur during the construction phase. If high levels of groundwater seepage inflow occur into the excavation, excavation works will immediately be stopped and a geotechnical assessment undertaken; and,
- The sand and gravel subsoils are excellent filters and will polish treated construction water within a couple meters of flow.

12.8.1.3 Potential Effects from the Release of Hydrocarbons

The proposed mitigation measures to prevent the release of hydrocarbons include the following:

- All plant will be inspected and certified to ensure they are leak free and in good working order prior to use on site;
- On-site re-fuelling of machinery will be carried out using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer or truck will be re-filled off site and will be towed/driven around the site to where machinery is located. The 4x4 jeep/fuel truck will also carry fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser will be parked on a level area in the construction compound when not in use and only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations;
- Fuels stored on site will be minimised. Any storage areas will be bunded appropriately for the fuel storage volume for the period of the construction;
- The electrical control building will be bunded appropriately to the volume of oils likely to be stored and to prevent leakage of any associated chemicals and to groundwater or surface water. The bunded area will be fitted with a storm drainage system and an appropriate oil interceptor;
- The plant used will be regularly inspected for leaks and fitness for purpose;
- An emergency plan for the construction phase to deal with accidental spillages will be contained within the Construction Environmental Management Plan (CEMP). These measures are summarised as follows:
 - The source of the spill will be identified and stopped;
 - The Environmental Manager will be immediately notified of the spill so that they can take appropriate action;
 - The spill will be contained using spill control materials (for example absorbent pads), ensuring not to spread the spill within the wider environment;
 - If possible, cover or isolate vulnerable areas such as surface water drains;
 - The spill will be cleaned using spill control materials which will be disposed of by a fully licenced waste contractor with the appropriate permits;
 - The Environmental manager will inspect the site to ensure that all measures are in place to prevent further spillage from occurring. Any storage areas are to be fully bunded and spill kits available to deal with accidental spillages; and
 - The Environmental Manager will notify the county council of the spillage and the remedial and preventative actions undertaken.

12.8.1.4 Potential Effects from the Release of Cement-Based Products

The proposed mitigation measures to prevent the release of cement-based products include the following:

- No batching of wet-cement products will occur on site. Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place;
- Where possible pre-cast elements for culverts and concrete works will be used;
- No washing out of any plant used in concrete transport or concreting operations will be allowed on-site;



- Where concrete is delivered on site, only the chute will be cleaned, using the smallest volume of water possible. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed. Chute cleaning water is to be isolated in temporary lined wash-out pits located near proposed site compounds. These temporary lined wash-out pits will be removed from the site at the end of the construction phase;
- Will use weather forecasting to plan dry days for pouring concrete; and,
- Will ensure pour site is free of standing water and plastic covers will be ready in case of a sudden rainfall event.

12.8.1.5 Potential Effects from Wastewater Disposal

- During the construction phase, the self-contained welfare facilities at the site will be utilised.
- No additional water or wastewater will be sourced on the site, nor discharged to the site.
- Treated effluent will continue to be discharged as normal during the upgrade works.

12.8.1.6 Potential Effects on Groundwater Levels Due to Temporary Dewatering

The proposed excavations will be within the sands and gravels of the Athy-Bagenalstown Gravels GWB. This is classified as a Regionally Important Gravel Aquifer by the GSI, with site investigations revealing a shallow groundwater table, hosted by these sands and gravels. Estimated permeabilities for the subsoil deposits are variable due to the varying amounts of clay.

The water from excavations will be pumped a short distance to settlement ponds where it will recharge to ground. There will be no net change in groundwater volume, other than its displacement by a short distance during temporary dewatering works.

12.8.1.7 Potential Effects Associated with Construction of New Outfall

Sheet piles will be used in the construction of the headwall on the riverbank.

The use of sheet piles during the construction will significantly reduce the time during which the riverbank and riverbed will be disturbed. The installation and removal of the sheet piles over a short period of time will ensure that any effect relating to elevated concentrations of suspended solids arising from the disturbance of the riverbed will be brief. Due to the short time period required for construction the potential for effects is significantly limited. The flow in the river will continue around the installed temporary sheet pile cofferdam for the short duration of these works.

These works will require instream works and will be carried out in line with Inland Fisheries Ireland (2016) – Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters. Inland Fisheries Ireland. These instream works will be carried out between July and September with a dry working area being created using sheet piles to create a temporary cofferdam to allow for construction within the river. The works area will be dewatered using a pump and the water will be discharged to the adjacent grassland. The flow in the river will continue around the installed temporary cofferdam. The proposed works shall only take place during favourable dry weather conditions. All material will be stockpiled as far from the riverbank as practicable and will be covered during the construction phase to avoid sediment entrainment in surface water runoff.

Furthermore, IE Consulting completed a Hydrodynamic Assessment of the Proposed Outfall Pipe and Headwall to assess and quantify the potential short-term (construction stage) impacts to the existing hydrodynamic and hydrological regime of the River Barrow. Modelling revealed that the proposed outfall pipe and headwall are not predicted to result in an adverse impact to the existing baseline water levels and flow velocities. The assessment recommended that the sheet piling used in the construction is to be built to a level of 46.25m which is 0.68m



above the 50% AEP plus Climate Change (1 in 2 year flood event plus climate change) and 2.52m above the 5%tile plus climate change fluvial flood level. The assessment also includes the following additional mitigation for the construction phase:

- The contractor shall ultimately determine the level of exceedance they deem to be acceptable. They must also consider the time required to remove the equipment from the channel if a flood event requires that the works are to be abandoned.
- It is recommended that a designated person monitors and records rainfall data from Met Éireann within the River Barrow catchment before construction and every 2 hours during constructions.
- Water levels immediately upstream of the proposed WwTP outfall will also be monitored and recorded before construction begins, and then every hour whilst construction is ongoing.

12.8.1.8 Potential Effects During Micro Tunnelling

- The works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance;
- Before any ground works are undertaken, silt fencing will be embedded into the local soils to ensure all site water is captured and filtered;
- The area around the bentonite batching, pumping and recycling plant will be bunded using terram (as it will clog) and sandbags in order to contain any spillages;
- Drilling fluid returns will be contained within a sealed tank / sump to prevent migration from the works area. A closed-loop system will be used to reduce the overall waste by separating the spoil/returns from the fluid which can be recirculated and reused;
- Spills of drilling fluid will be cleaned up immediately and contained in an adequately sized skip before being taken off-site;
- If rainfall events occur during the works, there will be a requirement to collect and treat small volumes of surface water from areas of disturbed ground (i.e. soil and subsoil exposures created during site preparation works);
- This will be completed using a shallow swale and sump down slope of the disturbed ground; and water will be pumped to a proposed settlement pond area at least 50m from a watercourse;
- The discharge of water onto vegetated ground will be via a silt bag which will filter any remaining sediment from the pumped water. The entire percolation area will be enclosed by a perimeter of double silt fencing;
- Any sediment laden water from the works area will not be discharged directly to a watercourse or drain;
- Works shall be suspended in the event of an orange or red weather warning for rainfall;
- Daily monitoring of the compound works area; the water treatment and pumping system and the percolation area will be completed by a suitably qualified person during the construction phase. All necessary preventative measures will be implemented to ensure no entrained sediment, or deleterious matter is discharged to the watercourse;
- If high levels of silt or other contamination is noted in the pumped water or the treatment systems, all construction works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied;
- On completion of the works, the ground surface disturbed during the site preparation works and at the entry and exit pits will be carefully reinstated and re-seeded at the soonest opportunity to prevent soil erosion;
- There will be no batching of cement;
- All plant will be checked and inspected for purpose of use prior to mobilisation.

Fracture Blow-out (Frac-out) Prevention and Contingency Plan:

- The drilling fluid will be non-toxic and naturally biodegradable (i.e., Clear Bore Drilling Fluid or similar will be used);



- The area around the drilling fluid batching, pumping and recycling plants will be banded using terram and/or sandbags to contain any potential spillage;
- One or more lines of silt fencing will be placed between the works area and the adjacent river;
- Spills of drilling fluid will be cleaned up immediately and transported off-site for disposal at a licensed facility;
- Adequately sized skips will be used where temporary storage of arisings are required;
- The drilling process / pressure will be constantly monitored to detect any possible leaks or breakouts into the surrounding geology or local watercourse;
- This will be gauged by observation and by monitoring the pumping rates and pressures. If any signs of breakout occur then drilling will be immediately stopped;
- Any frac-out material will be contained and removed off-site;
- The drilling location will be reviewed, before re-commencing with a higher viscosity drilling fluid mix; and,
- If the risk of further frac-out is high, a new drilling alignment will be sought.

12.8.1.9 Potential Effects on Hydrological Connected Designated Sites

Even in the absence of mitigation measures the Proposed Development is considered to have a long term positive effect on local water quality due to the efficient operation of the upgraded WwTP. There is the potential for short-term negative effects on surface water quality during construction, however, these effects will be of a short duration and will be limited given the volume of water within the River Barrow. Nevertheless, detailed, tried and tested, best practice mitigation measures for the protection of surface and groundwater quality during the construction phase will ensure that there is no significant negative effect on the River Barrow and River Nore SAC and other downstream designated sites.

With respect to the mitigation measures:

- Mitigation measures for sediment control are detailed in Section 12.8.1.1 and 12.8.1.2.
- Mitigation measures for the control of hydrocarbons during construction works are detailed in Section 12.8.1.3.
- Mitigation measures for the control of cement-based products during construction works are detailed in Section 12.8.1.4.
- Mitigation measures in relation to wastewater are prescribed in Section 12.8.1.5
- Mitigation measures in relation to the construction of the new outfall are prescribed in Section 12.8.1.7.
- Mitigation measures in relation to micro tunnelling are detailed in Section 12.8.1.8.
- Implementation of these mitigation measures will ensure the protection of surface water quality in receiving waters.

12.8.1.10 Potential Effects on Surface and Groundwater WFD Status

With respect to the mitigation measures:

- Mitigation measures for sediment control are detailed in Section 12.8.1.1 and 12.8.1.2.
- Mitigation measures for the control of hydrocarbons during construction works are detailed in Section 12.8.1.3.
- Mitigation measures for the control of cement-based products during construction works are detailed in Section 12.8.1.4.
- Mitigation measures in relation to wastewater are prescribed in Section 12.8.1.5
- Mitigation measures in relation to the construction of the new outfall are prescribed in Section 12.8.1.7.



- Mitigation measures in relation to micro tunnelling are detailed in Section 12.8.1.8.

The implementation of these mitigation measures during the construction phase of the development will ensure the qualitative and quantitative status of the receiving groundwaters waters will not be altered by the Proposed Development.

12.8.2 Mitigation Measures During Operational Phase

12.8.2.1 Potential Effects from Effluent Discharge on Surface Water Quality

Emission Limit Value (ELV) requirements calculations and assimilative capacity assessments were carried out by UÉ as part of the plant design. The purpose of carrying out ELV calculations was to determine the effluent discharge conditions required for the receiving watercourse to meet “Good” status as per guidelines specified by the Water Framework Directive (WFD).

By adhering to the ELVs as calculated, it can be ensured that the quality of the effluent is compatible with the long-term objectives for the receiving surface waterbody under the WFD (i.e. the discharge of treated effluent will not jeopardise the ability of the receiving SWB to achieve Good WFD status in the future).

Given the high level of treatment of the proposed upgraded WwTP, the overall impact of the proposed discharge will be imperceptible. Mitigation has been provided by design and as such no further mitigation is required, other than appropriate monitoring and maintenance of the operation of the WwTP.

The Proposed Development will also operate under discharge licence conditions which include:

- Complying with the Emission Limit Values (ELVs) and ensuring that no specified discharge from the wastewater works exceed these ELVs;
- Ensuring that there is no deterioration in the quality of the receiving waters as a result of the discharge;
- Ongoing maintenance of all plant and equipment to ensure that no unauthorised wastewater discharge takes place;
- Continued sampling, analyses and measurement of key water quality parameters in the discharge effluent;
- Continued sampling, analyses and measurement of key water quality parameters in the ambient environment (i.e. River Barrow upstream and downstream of the Proposed Development Site);
- Ongoing maintenance and calibration of all instrumentation;
- Maintain corrective action procedures and undertake corrective action in the unlikely event that the specific requirements of the licence not be fulfilled;
- Continued monitoring of the influent stream in order to measure mass loadings to the WwTP;
- In the case of an incident the EPA will be notified as soon as practicable and where the incident relates to discharge to water the Inland Fisheries Ireland (IFI) will be notified; and,
- All complaints of an environmental nature will be recorded.

No additional mitigation measures beyond those outlined in the discharge licence are deemed necessary.

12.8.2.2 Potential Effects of Effluent Discharge on Downstream Surface Water Quantity

During this time all on-site procedures will be completed under licence from the EPA with UÉ reporting to the EPA until the discharge licence is surrendered. No additional mitigation measures beyond those outlined in the discharge licence are deemed necessary.



12.8.2.3 Potential Effects from Leaks or Plant Failure

During the operational phase of the proposed development the facility will continue to operate under the discharge licence conditions. All incidents, or failures will be reported to the EPA and dealt with in accordance with best practice UÉ guidelines.

12.8.2.4 Potential Effects from the Replacement of Natural Surfaces with Lower Permeability Surfaces

There is no potential for significant effects due to the small footprint of the Proposed Development in comparison to the overall scale of the catchment to the adjacent River Barrow. Any rainfall falling on the site will recharge to ground as per the existing hydrogeological regime.

No additional mitigation measures are required.

12.8.2.5 Potential Effects on Hydrologically Connected Designated Sites

The WwTP has been designed with ELVs calculated to ensure that the discharge of treated effluent will not impact the ability of the receiving watercourse to achieve “Good” status as per guidelines specified by the Water Framework Directive (WFD).

Given the high level of treatment of the proposed upgraded WwTP, the overall impact of the proposed discharge will be imperceptible. Therefore, there will be no potential for effects on water quality within the SAC adjacent to the outfall location or any other downstream designated site.

12.8.2.6 Potential Effects on Surface and Groundwater WFD Status

No specific mitigation measures are required. The WwTP has been designed to ensure compliance with the WFD and that the Proposed Development will not prevent the receiving downstream SWBs from achieving their WFD objectives. There are other pressures in the catchment upstream of the WwTP which if addressed will allow the SWBs to achieve Good WFD status.

12.8.2.7 Potential Effects of New Outfall on Flows and Water Levels in the River Barrow

The Hydrodynamic Technical Report (IE Consulting, 2025) included as Appendix 12-2 found that there would be no effects during the Operational Phase. No specific mitigation measures are proposed/required

12.9 Post-Mitigation Residual Effects

12.9.1 Post-Mitigation Residual Effects from Construction Phase

12.9.1.1 Potential Effects from Earthworks Resulting in Suspended Solids Entrainment in Surface Waters

Post Mitigation Residual Effects: The potential for the release of suspended solids to surface watercourse receptors is a risk to surface water quality. Proven and effective measures to mitigate the risk of releases of suspended sediment have been proposed above and will break the pathway between the potential sediment sources and the receptor (i.e. the River Barrow). The residual effect is considered to be - Negative, imperceptible, indirect, temporary and unlikely effect on the River Barrow.

Significance of Effects: For the reasons outlined above and with the implementation of the listed mitigation measures, no significant effects on surface water quality will occur.

12.9.1.2 Potential Effects on Surface Water Quality from Excavation Dewatering

Post Mitigation Residual Effects: The potential release of suspended sediment from water removed from excavations poses a threat to downstream surface water quality. However due to the nature of the local hydrogeological regime, dominated by high groundwater recharge rates and low rates of surface water runoff, combined with the proposed mitigation measures, the pathway between the potential sources and local surface water receptors (i.e. the River Barrow) will be broken. The residual effect is considered to be - Negative, imperceptible, indirect, temporary and unlikely effect on the River Barrow.

Significance of Effects: For the reasons outlined above and with the implementation of the listed mitigation measures, no significant effects on surface water quality will occur.

12.9.1.3 Potential Effects from the Release of Hydrocarbons

Post Mitigation Residual Effects: The potential for the release of hydrocarbons to groundwater and watercourse receptors is a risk to surface water and groundwater quality, and also the aquatic quality of the surface water receptors. Proven and effective measures to mitigate the risk of releases of hydrocarbons have been proposed above and will break the pathway between the potential source and each receptor. The residual effect is considered to be - Negative, imperceptible, indirect, temporary, unlikely effect on groundwater (Athy-Bagenalstown Gravels GWB) and surface water quality (River Barrow).

Significance of Effects: For the reasons outlined above, and with the implementation of the listed mitigation measures, no significant effects on surface water or groundwater quality will occur.

12.9.1.4 Potential Effects from the Release of Cement-Based Products

Post Mitigation Residual Effects: The potential for the release of cement-based products or cement truck wash water to groundwater and watercourse receptors is a risk to surface water and groundwater quality, and also the aquatic quality of the surface water receptors. Proven and effective measures to mitigate the risk of releases cement-based products or cement truck wash water have been proposed above and will break the pathway between the potential source and each receptor. The residual effect is considered to be - Negative, imperceptible, indirect, temporary, unlikely effect on the hydrochemistry of downstream surface watercourses including the River Barrow and groundwater hydrochemistry in the Athy-Bagenalstown GWB.

Significance of Effects: For the reasons outlined above, and with the implementation of the listed mitigation measures, no significant effects on surface water or groundwater quality will occur.

12.9.1.5 Potential Effects from Wastewater Disposal

Post Mitigation Residual Effects: During the construction phase, self-contained welfare facilities at the site will be utilised, and no additional water or wastewater will be sourced or discharged to the site. Treated effluent will continue to be discharged as normal throughout the upgrade works

The residual effect is considered to be - Negative, imperceptible, indirect, temporary, unlikely effect on surface water (River Barrow) or groundwater quality (Athy Bagenalstown GWB).

Significance of Effects: For the reasons outlined above, and with the implementation of the listed mitigation measures, no significant effects on surface water or groundwater quality will occur.

12.9.1.6 Potential Effects on Groundwater Levels Due to Temporary Dewatering

Post Mitigation Residual Effects: While the Proposed Development will require dewatering at some work areas, the dewatering will be temporary and of short duration. There will be no long-term effects associated with this temporary dewatering. Due to the relatively shallow nature of the proposed works and the large separation distance between the works and any local wells, the residual effect is considered to be negligible.

Significance of Effects: For the reasons outlined above, and with the implementation of the listed mitigation measures, no significant effects on groundwater quantity will occur.

12.9.1.7 Potential Effects Associated with Construction of New Outfall

Post Mitigation Residual Effects: The use of sheet piles will limit the disturbance caused by the instream works associated with the proposed new outfall to the River Barrow. The riverbank only has the potential to be disturbed during the insertion and removal of the sheet piles. The residual effect is considered to be Negative, moderate, direct, temporary, likely effect on surface water quality in the River Barrow. The hydrodynamic assessment (Appendix 12-2) concludes that there may be some localised impacts on water levels and velocities during the construction phase in the immediate vicinity of the proposed outfall when compared to the baseline conditions, but that these become negligible 100m upstream and downstream of the outfall. The residual effect is considered to be a Negative, slight, direct, temporary, effect on flows in the River Barrow local to the works locations. There will be no impact 100m from the outfall location.

Significance of Effects: For the reasons outlined above, and with the implementation of the listed mitigation measures, no significant effects on surface water quality or surface water flows will occur.

12.9.1.8 Potential Effects Associated with Micro Tunnelling

Post Mitigation Residual Effect: Due to the avoidance of instream works, the works being mainly carried out in the corridor of a public road along with the proposed mitigation measures the residual effect is considered to be negative, imperceptible, indirect, temporary, likely effect on surface water in the downstream watercourses.

Significance of Effects: For the reasons outlined above, no significant effects on surface water quality will occur.



12.9.1.9 Potential Effects on Hydrologically Connected Designated Sites

Post Mitigation Residual Effects: Construction activities pose a threat to designated sites hydrologically linked with the Proposed Development Site. Proven and effective measures to mitigate the risk of surface and groundwater contamination have been proposed which will break the pathway between the potential source and the downstream receptor. These mitigation measures will ensure that surface water runoff from the Proposed Development Site will be equivalent to baseline conditions and will therefore have no impact on the status or ecology of the protected species and habitats within the designated sites. The residual effect is considered to be Negative, imperceptible, indirect, short term, unlikely effect on the River Barrow and River Nore SAC.

Significance of Effects: For the reasons outlined above, no significant effects on any designated sites will occur.

12.9.1.10 Potential Effects on Surface and Groundwater WFD Status

Post Mitigation Residual Effects: Mitigation for the protection of surface and groundwater during the construction phase of the Proposed Development will ensure the qualitative and quantitative status of the receiving waters will not be altered by the Proposed Development.

There will be no change in GWB or SWB status in the underlying GWB or downstream SWBs resulting from the Proposed Development. There will be no change in quantitative (volume) or qualitative (chemical) status, and the underlying GWB and downstream SWBs are protected from any potential deterioration.

The residual effect on Groundwater Bodies is considered to be - No residual effect.

The residual effect on Surface Water Bodies is considered to be - No residual effect.

Significance of Effects: For the reasons outlined above, no significant effects on WFD Groundwater Bodies and Surface Water Bodies status, risk or future objectives will occur as a result of the Proposed Development.

12.9.2 Post Mitigation Residual Effects from Operational Phase

12.9.2.1 Potential Effects from Effluent Discharge on Surface Water Quality

Post Mitigation Residual Effects: Due to the nature of the Proposed Development, being an upgrade to the existing wastewater treatment facilities, the Proposed Development will result in an improved treatment of wastewater at Mortarstown. The treated effluent will be monitored and will be discharged in accordance with its IPC licence conditions. We consider that the residual effect is Negative, imperceptible, indirect, long-term, likely effect on surface water quality in the River Barrow.

Significance of Effects: For the reasons outlined above, no significant effects on surface water quality will occur.

12.9.2.2 Potential Effects from Effluent Discharge on Surface Water Quantity

Post Mitigation Residual Effects: The Proposed Development will cater for the increasing population and associated increasing volumes of wastewater in the Carlow area. However, the wastewater treatment plant will provide significant attenuation in the form of stormwater tanks and settlement tanks and therefore we consider that the residual effect is Negative, imperceptible, indirect, long-term, likely effect on surface water quantity River Barrow.



Significance of Effects: For the reasons outlined above, no significant effects on surface water quantity will occur.

12.9.2.3 Potential Effects from Leaks or Plant Failure

Post Mitigation Residual Effects: With the implementation of the continued monitoring and maintenance under the discharge licence conditions we consider that the residual effects are Negative, imperceptible, indirect, temporary, likely effect on the River Barrow and the underlying Athy-Bagenalstown GWB.

Significance of Effects: For the reasons outlined above, no significant effects on surface water quantity will occur.

12.9.2.4 Potential Effects from the Replacement of Natural Surfaces with Lower Permeability Surfaces

Post Mitigation Residual Effects: Due to the nature of the local hydrogeological regime (high rates of groundwater recharge and low rates of surface water runoff) and given the small footprint of the proposed development, we consider that residual effects are - Negative, imperceptible, indirect, permanent, likely effect on the River Barrow and the underlying Athy-Bagenalstown GWB.

Significance of Effects: For the reasons outlined above, no significant effects on surface water quantity will occur.

12.9.2.5 Potential Effect on Surface and Groundwater Body WFD Status

Post Mitigation Residual Effects: Due to the local hydrogeological regime at the Proposed Development Site, the minor and infrequent nature of works during the operational phase, coupled with the implementation of the proposed mitigation measures for the protection of groundwater and surface water quality we consider that there will be no residual effect on the WFD status of the underlying groundwater bodies (Athy-Bagenalstown GWB and Bagenalstown Lower GWB) and/or downstream surface waterbodies (Barrow_160, _170 and _180).

Significance of Effects: For the reasons outlined above, no significant effects on SWB or GWB WFD status will occur.

12.9.2.6 Potential Effects of New Outfall on Flows and Water Levels in the River Barrow

Post Mitigation Residual Effects: The hydrodynamic assessment (Appendix 12-2) concludes that there will be no long-term effects on water levels or flow regimes from the construction of the outfall and headwall. There will be no residual effect.

Significance of Effects: No effects on surface water flows or water levels will occur.

12.10 Do-Nothing Scenario

If the Proposed Development were not to proceed, the existing Mortarstown WwTP operations will continue. The upgrade of the WwTP is required to provide treatment capacity for Carlow and its surroundings and to achieve both UWWTD standards and WWDLELVs for current and future flows and loadings to the plant. The existing WwTP will experience extreme hydraulic overloading which may worsen with population growth and planned development within the catchment. The aged infrastructure is declining and incapable in terms of operation and sizing. This would have a negative impact on water quality in the River Barrow.

Regardless of whether the Proposed Development proceeds or not, future rainfall patterns will change as a result of climate change. Future annual rainfall is projected to increase overall. During winter, rainfall is projected to increase across all future climate change scenarios (an increase of 11% for the 1.5°C scenario and an increase of 22.2% for the 4°C scenario are predicted for Co. Carlow). For summer, beyond 2°C of global warming there is a trend of decreasing rainfall (-7.8% for the 3°C scenario -12.9% for the 4°C scenario). This increase in rainfall will increase winter flow volumes in the River Barrow. However, the increase in precipitation rates, and intense rainfall events, will also increase the occurrence of stormwater overflows, as the existing Mortarstown WwTP operations would not have the capacity to cope with the increasing flow volumes. The increase in summer droughts will result in a reduction in low river flows. This will have a negative effect on water quality in the River Barrow.

12.11 Risk of Major Accidents and Disasters

The main risk of MADs associated with wastewater treatment plants is related to the discharge of raw sewage into the environment and the potential effect that this would have on downstream water quality and associated water dependent ecosystems. Mitigation measures and monitoring at the WwTP will ensure that the associated risk is negligible/none.

12.12 Assessment of Health Effects

Potential health effects arise mainly through the potential for surface water contamination associated with the discharge of raw sewage into the River Barrow. Mitigation measures and monitoring at the WwTP will ensure that the associated risk is negligible/none.

12.13 Monitoring Measures

During the construction phase of the Proposed Development visual monitoring will be undertaken as part of regular site audits to ensure discharge to the River Barrow is not impacted by the construction works. During the construction phase the contractor is also required to monitor weather forecasts to inform construction operations.

During the operational phase the final effluent will be monitored in accordance with the terms of the Wastewater Discharge Licence. No additional monitoring is proposed.

Similarly, the receiving waters of the River Barrow will continue to be monitored in accordance with the requirements of the different directive and statutory instruments. No additional monitoring is proposed other than those detailed in the discharge licence.

13. CULTURAL HERITAGE

13.1 Introduction

The chapter assesses the impacts of the proposed development as described in Chapter 2 on the known and potential cultural heritage resource concerning the integrity, continuity and context of same for future generations and based on this assessment it then identifies appropriate mitigation strategies. Cultural heritage encompasses several aspects of tangible assets (e.g. archaeological monuments, architectural heritage structures; artefacts; and underwater archaeological remains, cultural centres) and intangible assets (e.g. folklore, oral tradition and language). Cultural heritage may also include properties that form repositories for objects of cultural heritage significance, such as museums, galleries and parks, or have notable associations with historical events or personages.

The recorded and potential cultural heritage resource within a study area that encompasses the lands within the boundary of the proposed development and lands extending for 500m in all directions from its location was assessed in order to compile a comprehensive cultural heritage baseline and context for the proposed development.

13.2 Methodology

13.2.1 Introduction

This section commences with an outline of the criteria used to assess the significance of impacts on the known and potential elements of the cultural heritage resource within the study area. Details are then provided on how the baseline information was collated which, in summary, was by a combination of desktop research followed by a number of site inspections. A targeted Underwater Archaeological Impact Assessment of a proposed outfall area at the bank of the River Barrow was also carried out by the Archaeological Diving Company (ADCO) under a licence issued by the National Monuments Service, Department of Housing, Local Government and Heritage.

13.2.2 Assessment Criteria

The methodology for this assessment has been prepared in accordance with current Irish and European guidance on Environmental Impact Assessment (EIA). This includes the Environmental Protection Agency (EPA) *Draft Advice Notes for Preparing Environmental Impact Statements* (EPA, 2015) and the *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* (EPA, 2022). The assessment has been undertaken in compliance with the requirements of Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, as amended by Directive 2014/52/EU. Regard has also been given to the relevant provisions of the Planning and Development Act 2000 (as amended) and the Planning and Development Regulations 2001 (as amended),

The following summation of the criteria applied to determine the nature of effects is provided in order to clearly and concisely outline the methodology specifically applied to the cultural heritage resource.

The duration of effects is assessed based on the following criteria:

- Momentary (seconds to minutes)
- Brief < 1 day
- Temporary <1 year



- Short-term 1-7 years
- Medium Term 7-15 years
- Long Term 15-60 years
- Permanent > 60 years
- Reversible: Effects that can be undone, for example through remediation or restoration

The quality of effect on the cultural heritage resource can be positive, neutral or adverse.

- Positive: a change which improves the quality of the cultural heritage environment (e.g. increasing amenity value of a site in terms of managed access, signage, presentation etc. or high-quality conservation/restoration and re-use of an otherwise vulnerable derelict structure).
- Neutral: no change or effects that are imperceptible, within the normal bounds of variation for the cultural heritage environment.
- Adverse: a change which reduces the quality of the cultural heritage resource (e.g. visual intrusion on the setting of an asset, physical intrusion on features/setting of a site)

The types of effect on the cultural heritage resource can be described as follows:

- Direct: where a cultural heritage site is physically located within the footprint of the proposed development, which will result in the removal or amendment of its existing remains.
- Indirect: where a cultural heritage site or its setting is located in close proximity to the footprint of the proposed development.
- Cumulative Effect: The addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects.
- 'Worst-case' Effect: The effects arising from a Project in the case where mitigation measures substantially fail.
- Indeterminable Effect: When the full consequences of a change in the environment cannot be described.
- Irreversible Effect: When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost.
- Residual Effect: The degree of environmental change that will occur after the proposed mitigation measures have taken effect.

The magnitude of effect is based on the degree of change, incorporating any mitigation measures, and is based on a consideration of the character, duration, probability and consequences (Table 13-1). The magnitude can be adverse or positive and is ranked without regard to the value of the asset according to the following scale: High; Medium; Low and Negligible. The descriptions of magnitudes presented in Table 13-1 are based on criteria published in *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties* (ICOMOS 2011, 16-7).

Table 13-1: Magnitudes of Effect on Cultural Heritage Assets (after ICOMOS 2011)

Magnitude	Description
High	Most or all key archaeological or architectural materials affected such that the resource is totally altered Comprehensive changes to setting Changes to most or all key historic landscape elements, parcels or components; extreme visual effects; fundamental changes to use or access; resulting in total change to historic landscape character unit

Magnitude	Description
	Major changes to area that affect Intangible Cultural Heritage activities or associations or visual links and cultural appreciation
Medium	Changes to many key archaeological or historic building materials/elements such that the resource is clearly/significantly modified. Considerable changes to setting that affect the character of the archaeological asset. Changes to the setting of a historic building, such that it is significantly modified. Change to many key historic landscape elements, parcels or components, visual change to many key aspects of the historic landscape, considerable changes to use or access, resulting in moderate changes to historic landscape character. Considerable changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation.
Low	Changes to key archaeological materials/historic building elements, such that the resource is slightly altered/slightly different. Slight changes to setting of an archaeological monument. Change to setting of a historic building, such that it is noticeably changed. Change to few key historic landscape elements, parcels or components; slight visual changes to few key aspects of historic landscape; slight changes to use or access; resulting in limited change to historic landscape character. Changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation.
Negligible	Very minor changes to key archaeological materials or setting. Slight changes to historic building elements or setting that hardly affect it. Very minor changes to key historic landscape elements, parcels or components; virtually unchanged visual effects; very slight changes to use or access; resulting in very small change to historic landscape character. Very minor changes to area that affect the Intangible Cultural Heritage activities or associations or visual links and cultural appreciation.

While various national and local authority legal designations exist for elements of the Irish cultural heritage resource (see Section 13.3.1 and 13.3.2), there is no formal criteria for grading the value/sensitivity of individual



assets. The evaluations used in this assessment have, therefore, been informed by guidelines presented in the *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties* (ICOMOS 2011). The evaluation of the value/sensitivity of cultural heritage assets is not intended as definitive but rather as an indicator which contributes to a wider judgment based on the individual circumstances of each asset. The application of values included a consideration of their legal designations (e.g., National Monuments in State Care), condition; documentary/historical significance, group value, rarity, visibility in the landscape, fragility/vulnerability and amenity value on a case-by-case basis.

Archaeological sites which possess little, or no surface expressions may retain low-medium sensitivity to effects on their wider setting while levelled archaeological sites that retain no visible surface traces are typically not sensitive to setting effects. It is noted that archaeological monuments, whether extant or levelled, have the potential to possess sub-surface attributes, including artefacts and other archaeological remains, which may possess values that cannot be discerned without recourse to archaeological excavation but are unlikely to be affected in the absence of direct effects. The values of known or potential cultural heritage assets are ranked according to the following scale as defined by ICOMOS: Very High; High; Medium; Low, Negligible and Unknown (Table 13-2). The values/sensitivities assigned to identified assets within the study area were determined following the completion of desktop research and site inspections and are outlined in Section 13.3. The significance of effect can be described as Profound, Very Significant, Significant, Moderate, Slight, Not Significant or Imperceptible (Table 13-3) and is assigned based on the combined evaluation of effect magnitude and the value/sensitivity of the asset (Table 13-4). The descriptions of the significance effects provided in Table 13-3 are sourced from the EPA EIAR guidelines (2022) which provides general descriptions of these varying levels of significance of effects.

Table 13-2: Factors for assessing the Value of Cultural Heritage Assets (after ICOMOS 2011)

Value	Asset Type
Very High	World Heritage Sites (including Tentative List properties) Sites, buildings or landscapes of acknowledged international importance Intangible associations with individuals or innovations of global significance
High	Nationally designated sites, buildings and landscapes of significant quality, rarity, preservation and importance Undesignated assets of the quality and importance to be designated Assets that can contribute significantly to acknowledged national research objectives Archaeological Landscapes with significant group value Intangible associations with individuals or innovations of national significance
Medium	Designated or undesignated assets that can contribute significantly to regional research objectives, including buildings that can be shown to have exceptional qualities in their fabric or historical associations Conservation Areas and historic townscapes containing buildings that contribute significantly to its historic character Intangible associations with individuals or innovations of regional significance
Low	Assets compromised by poor preservation and/or poor survival of contextual associations Assets of limited value, but with potential to contribute to local research objectives Historic Townscape or built-up areas of limited historic integrity in their buildings and settings Intangible associations with individuals or innovations of local significance
Negligible	Assets with very little or no surviving archaeological interest Landscapes little or no significant historical interest

Value	Asset Type
	Buildings or urban areas of no architectural or historical note; buildings of an intrusive character
Unknown	Assets whose importance has not been ascertained Buildings with some hidden (i.e., inaccessible) potential for historic significance

Table 13-3: Significance of Effects (EPA EIAR Guidelines 2022)

Significance	Description
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	An effect which causes noticeable changes in the character of the environment but without affecting its sensitivities
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends
Significant	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	An effect which obliterates sensitive characteristics

Table 13-4: Significance of Effects Matrix (per EPA EIAR Guidelines 2022)

Magnitude of Impact	High	Not Significant/ Slight	Moderate/ Significant	Significant/ Significant	Very Significant/ Profound
	Medium	Not Significant	Slight	Moderate/ Significant	Significant/ Very significant
	Low	Not Significant/ Imperceptible	Slight/ Not Significant	Slight	Moderate
	Negligible	Imperceptible	Not Significant/ Imperceptible	Not Significant/ Slight	Slight
		Negligible	Low	Medium	High
Value/Sensitivity of the Asset					

13.2.3 Desktop Study

The desktop study sought to identify all recorded archaeological, architectural and other cultural heritage sites within the study area and also endeavoured to identify any hitherto unrecorded features or areas of cultural heritage significance. The information collated during this research has provided an insight into the development of the study area over time and assisted in an evaluation of the potential presence of unrecorded cultural heritage sites, including sub-surface archaeological features.

The *Sites and Monuments Record* (SMR) and the *Record of Monuments and Places* (RMP) for County Carlow, published by the Archaeological Survey of Ireland were the principal sources consulted for identifying known archaeological sites. The current County Carlow Record of Protected Structures (RPS) and the National Inventory of Architectural Heritage (NIAH), including its survey of historic gardens, were consulted to assess the designated architectural heritage resource.

The following presents an overview of sources consulted as part of the desktop study:

- *Development Plans:* The County Carlow Development Plan 2022-2028 and the Carlow-Graigucullen Joint Urban Local Area Plan 2024-2030 were reviewed as part of the assessment. A section of the study area extends into an area of County Laois on the west side of the River Barrow and, therefore the Laois County Development Plan 2021-2027, including its Record of Protected Structures, was also reviewed.
 - *Archaeological Inventory of County Carlow:* This publication presents summary descriptions of the recorded archaeological sites within the county and was reviewed as part of the assessment. The inventory was published in 1993 and, therefore, the current SMR database was accessed in May 2026 via the National Monuments Service's Historic Environment Map Viewer (www.archaeology.ie) in order to ascertain if any archaeological sites have been identified within the study area since that publication date.
 - *Heritage Council of Ireland: Heritage Map Viewer:* This online mapping source (www.heritagemaps.ie) collates various cultural heritage datasets provided by, among others, the National Monuments Service, the National Museum of Ireland, Local Authorities, and the Office of Public Works and was reviewed in May 2026.
 - *UNESCO designated World Heritage Sites and Tentative List:* There are two World Heritage Sites in Ireland (Brú na Bóinne and Sceilg Mhichíl) and a number of other significant sites have been included in a Tentative List that has been put forward by Ireland for consideration in 2022⁹⁵. None of these designated or tentative sites are located within County Carlow.
 - *National Inventory of Architectural Heritage (NIAH) (Building and Historic Garden Surveys):* Relevant current datasets were accessed in May 2026 via www.buildingsofireland.ie
 - *Database of Irish Excavation Reports:* This online database publishes summary accounts of licensed archaeological excavations carried out in Ireland (North and South) from 1969 to present. Summaries of the database entries for investigations carried out within the study area are provided within Section 13.3 of this chapter. Current data was accessed via www.excavations.ie in May 2026.
 - *Historical publications and cartographic sources:* various published and unpublished sources and historical maps were consulted. Extracts from historical maps and other figures are presented within the chapter and a list of consulted publications is provided in the references section.
 - *Satellite/LiDAR imagery:* A review of online satellite imagery of the study area, published by Tailte Éireann, Google Earth, and LiDAR imagery published online by the Geological Survey of Ireland, was undertaken in order to review the extent of modern interventions and to ascertain if any traces of unrecorded archaeological sites were visible on any images.
- Placenames Database of Ireland:* this online database (www.logainm.ie) provides a comprehensive management system for data, archival records and place names research conducted by the State and was reviewed in May 2026.
- *Irish National Folklore Collection:* transcribed material from the National Folklore Schools Collection archive has been digitised and published at www.duchas.ie, which also publishes relevant images in its online Photographic Collection. The foundational collection - the *Irish Folklore Commission Collection 1935-1970* - was inscribed into the *UNESCO Memory of the World Register* (2017) in recognition of its 'world significance' and 'outstanding universal value to culture'. The online collection was reviewed in May 2026.

⁹⁵<https://www.worldheritageireland.ie/news/news-single-view/article/ministers-announce-new-world-heritage-tentative-list-for-ireland/?cHash=376a52892e7c00bd7825a9d98fe89068>

- *Topographical Files of the National Museum of Ireland*: These files are archived in the National Museum's premises in Kildare Street, Dublin and contain paper and digital files pertaining to known information on the circumstances and locations of the discovery of Irish archaeological objects. The archive was inspected during the compilation of this assessment.

13.2.4 Site Inspections

The proposed development site was inspected in October 2020, August 2021, July 2022 and May 2025 and extracts from the compiled photographic record are presented in Appendix 13-1, Volume 3. The locations of proposed development areas and their environs were assessed in terms of historic landscape, existing land use, modern developments, vegetation cover as well as the settings of known archaeological features and the nature of the surrounding built environment in order to assess the potential for the presence of unrecorded archaeological sites and undesignated architectural heritage structures.

13.2.5 Underwater Archaeological Effects Assessment

Following consultations with the National Monuments Service of the Department of Housing, Local Government and Heritage, an underwater archaeological survey of the location of a proposed outfall on the east bank of the River Barrow was carried out by the Archaeological Diving Company (ADCO) in August 2022. The results of the survey are summarised in Section 13.3.9 of this chapter and the full ADCO report is provided in Appendix 13-2, Volume 3 of the EIAR.

13.2.6 Statutory Consultations

A scoping report was issued to the National Monuments Service (NMS) through the Development Applications Unit (DAU) in July 2021. The NMS recommended that an Underwater Archaeological Impact Assessment of proposed works at the River Barrow bank and channel should be carried out as part of the EIAR. As noted in Section 13.2.5, the underwater archaeological assessment was carried out by ADCO in August 2022.

13.3 Receiving Environment

This EIAR chapter was prepared in accordance with the requirements of European Union Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive') as amended by Directive 2014/52/EU. The requirements of the following legislation are complied with:

- Directives 2011/92/EU and 2014/52/EU on the assessment of the effects of certain public and private projects on the environment, including Circular Letter PL 1/2017: Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive).
- S.I. No. 349 of 1989: European Communities (Environmental Impact Assessment) regulations and subsequent amendments; and S.I. 600 of 2001 Planning and Development Regulations and subsequent amendments, on the assessment of the effects of certain public and private projects on the environment.
- S.I. No. 296 of 2018: European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 which transposes the provisions of Directive 2014/52/EU into Irish law.
- Planning and Development Act, 2000 (as amended).
- Heritage Act 1995 (as amended).
- National Monuments Act 1930 (as amended).
- National Cultural Institutions Act (1997).
- Historic and Archaeological Heritage and Miscellaneous Provisions Act 2023.

The administration of national policy in relation to archaeological and architectural heritage resources is the responsibility of the National Monuments Service (NMS) and the National Built Heritage Service (NBHS) which are both currently based in the Department of Housing, Local Government and Heritage (DHLGH). The management and protection of cultural heritage is under a framework of national laws and policies drafted in accordance with the provisions of various international conventions and treaties ratified by the Irish state. These include the Valetta Treaty (1995) (formally the European Convention on the Protection of the Archaeological Heritage, 1992) ratified by Ireland in 1997; the European Convention on the Protection of Architectural Heritage (Granada Convention, 1985), ratified by Ireland in 1997; and the UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage, 2003, ratified by Ireland in 2015.

This chapter of this EIAR was prepared having regard, where relevant, to guidance contained in the following documents:

- Environmental Protection Agency (2022) *Guidelines on the Information to be contained in Environmental Impact Assessment Reports*.
- Department of Arts, Heritage and Gaeltacht (2011) *Architectural Heritage Protection: Guidelines for Planning Authorities*.
- Department of Arts, Heritage, Gaeltacht and the Islands (1999) *Framework and Principles for the Protection of Archaeological Heritage*.
- Office of the Public Regulator (2022) *A Guide to Architectural Heritage*.
- Office of the Public Regulator (2021) *Archaeology in the Planning Process*.
- International Council on Monuments and Sites (ICOMOS) (2011) *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties*.

13.3.1 Archaeological Heritage Legal and Planning Context

The Historic and Archaeological Heritage and Miscellaneous Provisions Act 2023 was signed into law in October 2023. The DHLGH published an online guidance document in relation to this Act in November 2023⁹⁶ which provides an overview of its current status, and this is summarised hereafter. While the Act is now law most of its provisions will not enter into force until the Minister has made one or more “Commencement Orders”. This means that section 7 of the Act (which provides for the repeal of the National Monuments Acts 1930 (as amended) and related legislation) has not entered into force. Accordingly, the National Monuments Acts 1930 (as amended) remain fully in force and will continue to do so for the time being. The Act contains transitional provisions which will, if necessary, enable certain aspects of the existing National Monuments Acts 1930 (as amended) to continue in operation notwithstanding their repeal post-commencement of the Act while successor provisions are being brought fully into operation. This includes provisions enabling the Record of Monuments and Places to continue to have effect pending the establishment of a new Register of Monuments. A commencement order made on 31st May 2024, insofar as it relates to the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999 (other than section 5), has come into operation. On 12th December 2024, further provisions of the Act came into operation, and these relate to historic wrecks and underwater archaeological objects, and also for Irish citizens (and a range of specified other persons), and vessels operating in international waters if they intend to engage in activities directed at underwater cultural heritage.

⁹⁶<https://www.archaeology.ie/news/enactment-of-historic-and-archaeological-heritage-and-miscellaneous-provisions-act-2023-and>

The National Monuments Act 1930 (as amended), the Heritage Act 1995 (as amended) and relevant provisions of the National Cultural Institutions Act, 1997 (as amended) therefore remain the primary means of ensuring the satisfactory protection of the archaeological resource.

Section 2 of the National Monuments Act, 1930 defines a National Monument as ‘a monument or the remains of a monument, the preservation of which is a matter of national importance’. The State may acquire or assume guardianship of examples through agreement with landowners or under compulsory orders. The prior written consent of the Minister is required for any works at, or in proximity to, a National Monument in the ownership or guardianship of the State, the Minister or a local authority, or those which are subject to a Preservation Order. There are no National Monuments or archaeological sites with Preservation Orders located within the study area.

The National Monuments (Amendment) Act, 1994 established the Record of Monuments and Places (RMP), which is based on the earlier Register of Historic Monuments (RHM) and Sites and Monuments Record (SMR), and this provides county-based lists of all known archaeological sites with accompanying maps. All recorded archaeological sites listed in the RMP receive statutory protection under the National Monuments Act 1994 and the NMS must be given two months’ notice in advance of any work proposed at their locations. There are no recorded archaeological sites located within the study area and the pumping station and wastewater treatment plants are located at distances of 815m and 1,580m outside the Zone of Notification around the medieval core of Carlow town as designated by the Archaeological Survey of Ireland.

Section 10.12 of the County Carlow Development Plan 2022-2028 details following policies in relation to the archaeological resource:

- AH. P1: Secure the preservation (either in situ or by record) of all archaeological monuments included in the Record of Monuments and Places (RMP) and their settings, and of all sites and features of significant archaeological or historical interest, including potential and previously unknown sites or features, in consultation with the National Monuments Service in the Department of Housing, Local Government and Heritage;
- AH. P2: Protect and conserve underwater archaeological heritage in the inland waters of the County, including potential and previously unknown sites or features, in consultation with the National Monuments Service in the Department of Housing, Local Government and Heritage;
- AH. P3: Protect, conserve and enhance the archaeological heritage of the County, and to manage development in a manner that avoids adverse impacts on sites, monuments, features or objects of significant archaeological or historical interest, including areas and sites of archaeological potential. There will be a presumption in favour of the ‘preservation in situ’ of archaeological heritage in accordance with the ‘Framework and Principles for the Protection of Archaeological Heritage (DAGHI 1999) or any superseding national policy document;
- AH. P4: Ensure that any development proposal that may, by reason of location, scale, nature, layout or design, have potential implications for archaeological heritage (including areas and sites of archaeological potential), shall be subject to an archaeological assessment. The archaeological assessment will seek to ensure that the development proposal can be sited and designed to avoid impacting on archaeological heritage. Any archaeological excavation shall be carried out in accordance with best practice outlined by the NMS, the National Museum of Ireland and the Institute of Archaeologists of Ireland. In all such cases the Planning Authority shall consult with the National Monuments Service in the Department of Housing, Local Government and Heritage.
- AH. P5: Have regard to the Record of Monuments (RMP) and Places, the Urban Archaeology Survey and archaeological sites identified subsequent to the publication of the RMP when assessing planning applications for development. No development shall be permitted in the vicinity of a recorded feature, where it detracts from the setting of the feature or which is injurious to its cultural or educational value.



- AH. P6: Protect the Zones of Archaeological Potential (Zones of Archaeological Notification) located within both urban and rural areas as identified in the Record of Monuments and Places (RMP).

13.3.2 Architectural Heritage Legal and Planning Context

The protection of architectural heritage is provided for through a range of legal instruments that include the Heritage Act (1995), and the Planning and Development Act 2000 (as amended). The Heritage Act 1995 (as amended) defines architectural heritage as including:

all structures, buildings, traditional and designed, and groups of buildings including streetscapes and urban vistas, which are of historical, archaeological, artistic, engineering, scientific, social or technical interest, together with their setting, attendant grounds, fixtures, fittings and contents.

The conservation principles of care and protection of architectural heritage and the facilitation of the listing of significant buildings of architectural heritage merit are set out in Part IV of the Planning and Development Act 2000 (as amended). This requires planning authorities to maintain a Record of Protected Structures (RPS) of structures with special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest, to be included in their Development Plans. A protected structure also includes the land and other structures within its curtilage. While the notion of curtilage is not defined by legislation, the *Architectural Heritage Protection Guidelines for Local Authorities* (Dept. Arts, Heritage and the Gaeltacht 2011), describes it as the parcel of land immediately associated with a structure and which is (or was) in use for the purposes of the structure. Any changes that materially affect the character of a protected structure require planning permission. In addition, planning authorities must provide for the preservation of places, groups of structures and townscapes of architectural heritage significance within their administrative areas through the designation of Architectural Conservation Areas (ACAs).

The National Inventory of Architectural Heritage (NIAH) was established to record architectural heritage structures within the State. While inclusion in the NIAH does not provide statutory protection to a structure it is intended to advise Local Authorities on compilation of their Record of Protected Structures. The NIAH also includes a Designed Landscapes and Historic Gardens Survey which comprises a non-statutory, desk-based survey of such features.

The Carlow County Development Plan 2022-2028 includes a range of policies for the protection of the architectural heritage resource, including the following examples relevant to the proposed development:

- BH. P1: Promote the conservation and reuse of early traditional structures, roofscapes of historic centres and the recognition of interrelationships between sites and landscape features in terms of the insertion of new buildings and managing their impact on the historic environment;
- PS. P1: Ensure the protection of the architectural heritage of County Carlow, through the identification of Protected Structures, the designation of Architectural Conservation Areas, and the recognition of structures and features in the County that make a positive contribution to vernacular and industrial heritage;
- PS. P2: Ensure the protection and conservation of the character, setting and special interest of all buildings, structures (or parts of structures) and sites, listed in the Record of Protected Structures, including their curtilage, attendant grounds, and fixtures and fittings;
- PS. P3: Ensure that all development proposals that affect a protected structure or a proposed protected structure, including proposals for modifications, alterations, refurbishment or extensions, are sympathetic to and protect, conserve and retain the character, setting and special interest of the protected structure or proposed protected structure, in accordance with the 'Architectural Heritage Protection: Guidelines for Planning Authorities' (Department of Arts, Heritage and the Gaeltacht, 2011);
- PS. P6: Require that development proposals do not obscure views of the principal elevations of protected structures;



- CH. P1: Encourage the protection, conservation, promotion and enhancement of Country Houses, Demesnes and Gardens in the County and support public awareness, enjoyment of and access to these sites where appropriate and in cooperation with owners and other interested parties, including Government Departments and state agencies;
- CH. P2: Preserve and protect, where appropriate, historic gardens and designed landscapes identified in the National Inventory of Architectural Heritage;
- CH. P3: Discourage development that would lead to a loss of, or cause damage to, the character, the principal components of, or the setting of Country Houses, Demesnes and Gardens.
- CH. P4: Protect and promote heritage and traditional varieties of plants and trees within historic designed landscapes, demesnes and gardens, and to protect, preserve and enhance biodiversity within these places where appropriate;
- CH. P5: Consider the “Guidance Notes for the Appraisal of Historic Gardens, Demesnes, Estates and their Settings” published by Cork County Council 2006, in the appraisal and description of the impacts of development proposals in County Carlow within or in close proximity to country houses and demesnes on historic designed landscapes, demesnes and gardens;
- VA. P2: Protect and conserve vernacular architecture through the use of the RPS, ACAs, and in the normal course of development management, which contributes to the character of areas and/or where it consists of rare or special interest examples of a building or structure type;
- VA. P3: Require development proposals affecting vernacular buildings to be accompanied by a detailed measured survey, photographic record and written report carried out by a professional with appropriate conservation expertise and, preferably, an understanding of vernacular buildings. Early consultation with the planning authority is strongly advised.
- VA. P6: Resist and discourage the demolition of vernacular architecture, and promote the sympathetic renewal, maintenance, adaptation and re-use of historic building stock, and encourage the retention and repair of original fabric such as windows, doors, wall renders, roof coverings, shopfronts, pub fronts and other significant features, whether protected or not.

13.3.3 EIA Legislative Framework

The EIA Directives (from 1985 to 2014) set out the requirement for an EIA in European law. This assessment has been prepared in accordance EIA requirements of codified Council Directive 2011/92/EU as amended by EIA Council Directive 2014/52/EU, per current Planning Legislation, concerning EIA assessment: Planning and Development Act, 2000 (as amended) (Part X) and in Part 10 of the Planning and Development Regulations, 2001 (as amended). Ireland has transposed EU Directive 2014/52/EU by way of the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 which came into operation on 1st September 2018. The Regulations provide for the transposition of the 2014 EIA Directive and give further effect to the 2011 EIA Directive by way of extensive amendments to existing planning law.

13.3.4 Archaeological Context

There are no recorded archaeological sites within the study area extending for 500m from proposed development and it is located 625m outside the Zone of Archaeological Potential around the historic core around Carlow town as defined by the NMS (Figures 13.1 and 13.2). The following section nonetheless presents brief summary details of the main periods within the Irish archaeological record with references to recorded archaeological sites within the wider environs of the study area in order to provide an archaeological and historical context for the proposed development. Datasets have been interrogated and retrieved from state and local area authority sources and are considered accurate and current per publicly available information. The dating framework used for each period of the archaeological record is based on the *Guidelines for Authors of Reports on Archaeological Excavations* published by the National Monuments Service (2006).



There are three designated Protected Structures within the study area, two of which are also listed in the National Inventory of Architectural Heritage (NIAH) (Figure 13-1) and details on these structures are provided in Section 13.3.5.



Figure 13-1: Designated Cultural Heritage Assets within the study area and its environs (archaeological sites indicated by red dots and designated architectural heritage structures by cyan dots)



Figure 13-2: Location of Proposed Development (yellow) in relation to Carlow town Zone of Archaeological Potential (red)

13.3.4.1 Prehistoric periods

Until recent years the earliest recorded evidence for human settlement in Ireland dated to the Mesolithic period (7000–4000 BC) although dating evidence recovered from a cave site in Co. Clare suggests that humans may have been present on the island during the Palaeolithic period. While the Mesolithic period hunter-gatherers did not construct any settlements or monuments that leave any above ground traces, their presence in an area can often be identified by scatters of worked flints in ploughed fields, shoreline shell middens and traces of their temporary camps are occasionally uncovered during ground works. The archaeological record indicates that these nomadic groups tended to favour coastal, lake and river shorelines which provided a transport resource through the heavily forested landscape as well as a food source for elements of their varied diet. The Neolithic period (4000-2400 BC) began with the arrival and establishment of agriculture as the principal form of economic

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subsistence, which resulted in more permanent settlements within farmlands created in areas of cleared forestry. As a consequence of the more settled nature of agrarian life, new site-types (e.g. megalithic tombs) and new artefacts, including pottery, begin to appear in the archaeological record during this period. Metalworking arrived in Ireland with the advent of the Bronze Age period (c. 2400–500 BC) which saw the introduction of a new artefactual assemblage, including metal objects. This period was also associated with the construction of new monument types such as standing stones, stone rows, stone circles and burnt mounds known as fulachta fia. The arrival of iron-working technology in Ireland saw the advent of the Iron Age (500 BC – 400 AD). This period has traditionally been associated with a Celtic ‘invasion’ but recent archaeological evidence also indicates a gradual acculturation of the Irish Bronze Age communities following centuries of contacts with Celtic-type cultures in Europe. While there are no recorded prehistoric sites located within the study area, its location close to a river channel comprises a setting that has been utilised by human settlers since the Mesolithic period onward. It is also noted that there are two recorded levelled ring-ditches (LA037-015---- & LA037-018----) of potential Bronze Age date within lands outside the study area on the west side of the river demonstrating that the wider landscape that has been occupied since at least the late prehistoric period (Figure 13-1). These sites are located at distances of 740m (LA037-015----) and 820m (LA037-018----) from the nearest element of the proposed development. A review of the Topographical Files of the National Museum of Ireland (NMI) also revealed that the archive contains an entry for the discovery of two Bronze Age artefacts within the townland of Mortarstown North and these comprised a flat and a palstave bronze axehead (NMI refs. 1939:32 and 1939:33).

13.3.4.2 Early medieval period

This period began with the introduction of Christianity in Ireland and continued up to the arrival of the Anglo-Normans during the 12th-century (c.400–1169 AD). The establishment of the Irish church had profound implications for political, social and economic life in Ireland and is attested to in the archaeological record by the presence of church and monastic sites as well as associated places for burial and holy wells. This period saw the emergence of the first phases of urbanisation around the large monasteries and Hiberno-Norse port settlements although the dominant settlement pattern of the period continued to be rural-based and centred on enclosure sites known as ringforts. There are no recorded early medieval sites located within the study area. It has been noted that the convergence of the Rivers Barrow and Burrin in the area now occupied by Carlow town centre may have been the location of the Óenach Carman, an ancient tribal assembly for Leinstermen (Smyth 1982, 35). The recorded levelled sites of an enclosure and ringfort (CW007-019--- & LA037-033----), both located within lands outside the study area, demonstrates the presence of farming communities within the surrounding landscape during the early medieval period (Figure 13-1). These sites are located at distances of 620m (LA037-003----) and 590m (CW007-019---) from the nearest element of the proposed development.

13.3.4.3 High and Late medieval periods

The arrival of Anglo-Normans in the late 12th century broadly marks the advent of the late medieval period which continued until c.1400 AD and was then followed by the late medieval period which extended to c. 1550 AD. These periods saw the continuing expansion of Irish urbanisation as many of the port cities developed into international trading centres and numerous villages and towns began to develop as local or regional market centres. While masonry castles were constructed in the earlier centuries of the late medieval period, the descendants of the Anglo-Norman gentry began the widespread construction of tower-houses as fortified residences within their landholdings at the start of the 15th century and this trend was subsequently adopted by wealthy Irish families within areas under Gaelic control. In the late 12th century Carlow was established as a caput of John de Clahull, being part of Strongbow’s grant of Obargi to the latter in the early 1170’s. There is a reference in 1181 to Hugh de Lacy building a castle beside the River Barrow possibly on the site of the present masonry castle which was constructed in the early 1220s by William Marshall the Elder who had taken control of Carlow from de Clahull between c. 1200 and 1210. The town was granted a charter in 1223 and while there are 14th century documents that indicate that it was surrounded by defences, there are no visible traces of a town wall and its potential location is unknown (Bradley 1989). The town was subjected to numerous Gaelic

Irish attacks from the 14th century onward and in 1534 the castle was captured by Silken Thomas during his short-lived revolt but was shortly thereafter retaken. The study area is within lands that likely formed an agricultural area outside the south end of the medieval town and nearest section of the proposed development is located 625m outside the Zone of Archaeological Potential around the historic core of the settlement as designated by the National Monuments Service (Figure 13-2).

13.3.4.4 Post-medieval and Early Modern Periods

The centuries following 1550 are referred to as the post-medieval period, which is generally considered to continue into the mid-19th century with the period thereafter often described as early modern. The first century of the post-medieval period was a turbulent time in Irish history with a prolonged period of warfare between the 1560s and 1603 and again during the mid-17th century Confederate Wars which ended with extensive dispossession of forfeited Gaelic lands. An agricultural boom in the late 18th and early 19th centuries saw a rise in prices for both tillage and dairy produce which resulted in landlords investing in extensive land improvement works within their holdings to increase land productivity. This included extensive enclosure of open lands into enclosed field systems many of which survive to the present-day. The post-medieval period saw the development of high and low status stone houses throughout the Irish countryside and rural settlement clusters at this time typically consisted of single-storey thatched cottages with associated farm buildings while two-storey farmhouses became more common in the 19th century. The settlement pattern throughout much of the rural landscape was greatly affected by the famine period in the middle of the 19th century.

The town of Carlow was burnt in 1641 during the Confederate Wars and in 1650 the Cromwellian General Ireton placed the town castle under siege which resulted in its walls being breached by artillery during its capture. The Down Survey of Ireland compiled as part of the subsequent Plantation period records that the study area formed part of the holdings of Henry O'Brien, Earl of Thomond and contained 300 plantation acres of profitable lands. Carlow town began to prosper as a market and garrison town in subsequent centuries, largely due to its setting along a navigable river and as the main market town within a region containing good quality agricultural lands. This period saw much expansion and renewal of the town centre although the medieval street pattern was maintained with growth generally taking place along the roads leading to the settlement. The 19th century *Topographical Dictionary of Ireland* (Lewis 1837) notes the presence of good quality lands surrounding the town but contains no references to notable houses or other features within the Mortarstown area. The study area remained as agricultural lands outside the urban settlement for the duration of the post-medieval period with modern suburbs and commercial developments gradually extending into the area as the 20th century progressed. The layout of the locations now containing the wastewater treatment plant and pumping station during the 19th and early 20th centuries is discussed further in the cartographic review presented below.

13.3.4.5 Excavations Database

A review of the Excavations Database revealed that two archaeological site investigations have been previously carried out within the study area. These comprised pre-development investigations at the locations of a proposed vocational school (Licence No 14E0224) in a field immediately adjoining the southern boundary of the wastewater treatment plant and a sports complex on the south side of the school which is c. 250m to the south of the boundary (Licence No. 16E0086). Nothing of archaeological significance was identified at either location.

Excavator: Rob O'Hara (Licence: 14E0224)

Test trenching was carried out at the site of the proposed Carlow Vocational School and Carlow Institute of Further Education, a 4.45 ha green-field site in Mortarstown Upper, Co. Carlow. Eight test trenches totaling 1200m were excavated within the site following a geophysical survey. Topsoil was shallow and quite uniform, generally less than 0.25m across the area. Subsoil was grey brown sandy clay with frequent angular stones and frequent modern pottery sherds and glass shards. No archaeological finds or features were recorded.



Excavator: Aidan O'Connell (Licence: 16E0086)

An assessment was carried out at the site of the proposed IT Carlow Sports Campus, a 12.7ha green-field site in Mortarstown Upper, Co. Carlow. A geophysical survey of the site (16R0028) was carried out followed by targeted test trenching. A total of 22 trenches were mechanically excavated across the site under archaeological supervision. No archaeological material was recorded in any of the trenches.

A wide range of previously unrecorded, sub-surface archaeological sites dating from prehistory onward were uncovered within the wider landscape during pre-construction investigations undertaken on the route of the N9/N10 Kilcullen to Waterford road scheme which extends c.5km to the south and east of the study area. While not in close proximity to the proposed development areas, the results of these investigations demonstrate the potential for the presence of sub-surface archaeological remains within the general region.

13.3.5 Designated Architectural Heritage Constraints

There are no Protected Structures or structures listed in the National Inventory of Architectural Heritage (NIAH) within the boundary of the proposed development and it is not located within, or adjacent to, an Architectural Conservation Area (ACA). The existing built environment within the wastewater treatment plant and pumping station are modern in date and are associated with their existing water service functions. The built environment within properties adjacent to the rising main between the two locations is modern in date and no designated architectural heritage structures are within the environs of its route. A section of a proposed new outfall pipe extending westwards from the treatment plant to the River Barrow will extend through a wooded area on the east side of the river which was located within the former lands of Erindale House, an early 19th century house listed as a Protected Structure (CW66) in the County Carlow Development Plan 2022-2028. The house is also included in the NIAH (ref. 10300702) and its attendant lands are listed in the NIAH Historic Garden Survey (ref. 3860). Erindale House is located c.230m to the south of the proposed outfall pipe, which will extend through an area that has been separated from the house's grounds by a modern residential house (Figures 13-1). A roadside stable building further to the south of the Erindale House is also listed as a Protected Structure (CW395) and this is located 300m to the south of the proposed outfall pipe. As detailed in Section 13.3.6, the consulted historic OS historic maps do not depict any potential curtilage features, such as outbuildings or gardens, associated with Erindale House along the route of the proposed outfall pipe. A 19th century thatched house located 100m to the southeast of the wastewater treatment plant is also listed as a Protected Structure (CW396) and is included in the NIAH (ref. 10300710). The consulted OS maps do not show any potential curtilage features associated with this house extending into the boundary of the proposed development. These three designated architectural heritage structures located within the study area have been assigned Regional ratings in the current County Carlow Record of Protected Structures and by the NIAH.

A review of the Record of Protected Structures published in the Laois County Development Plan 2021-2027 revealed that it does not include any structures located within the section of the study area that extends into that county.

13.3.6 Review of Cartographic Sources and Satellite/LiDAR Imagery

The reviewed cartographic sources comprised the Down Survey map (surveyed 1650's) (Figure 13-3), the first edition 6-inch OS map (published 1842) (Figure 13-4) and the 25-inch OS map (published 1909) (Figure 13-5). The Down Survey Map shows no structures or other features within the Mortarstown Upper area, which formed part of the townland of Carlow in lands to the south of the town. The first edition 6-inch and 25-inch OS maps depict the location of the existing wastewater treatment plant and the green field area to the west as enclosed fields. There are two adjacent small, unnamed buildings depicted in a section of proposed development site



located to the west of the existing treatment plant and to the east of the Kilkenny Road. The cartographic depictions of these structures are indicative of a small residential house and an associated outbuilding.

Both editions of the historic OS maps show the route of the proposed outfall to the west of the Kilkenny Road extending through a strip of woodland located within lands c.230m to the north of Erindale House (Protected Structure CW66). There are no potential curtilage structures associated with Erindale House shown along the proposed outfall route on either of the historic OS maps. In addition, the maps do not depict any riverine features of potential cultural heritage interest within the environs of the proposed outfall on the east bank of the River Barrow.

Both editions of the historic OS maps show a public roadway along the route of the existing section of the Kilkenny Road (R448) which extends to the pump station area in the north end of the proposed development. The maps do not depict any features of potential cultural heritage interest along the section of road within the boundary of the proposed development, such as historic bridges or water pumps, and the majority of the lands adjacent to the road are depicted as vacant fields. The historic OS maps both show the location of the existing pumping station site as a narrow area of vacant ground between the Kilkenny Road (R448) and the river to the west.

A review of Tailte Éireann and Google Earth online satellite imagery dating from 1995 onward show the existing modern water service infrastructure at the treatment plant and pumping station and no potential unrecorded archaeological sites were noted within the green field lands within the boundary of the proposed development on any of the reviewed images. A review of LiDAR datasets published online by the Geological Survey of Ireland⁹⁷ revealed that this resource contains an Office of Public Works LiDAR dataset which extends across the green field area within the south end of the proposed development. A review of the imagery did not reveal any traces of potential unrecorded archaeological sites within this location (Figure 13-6).

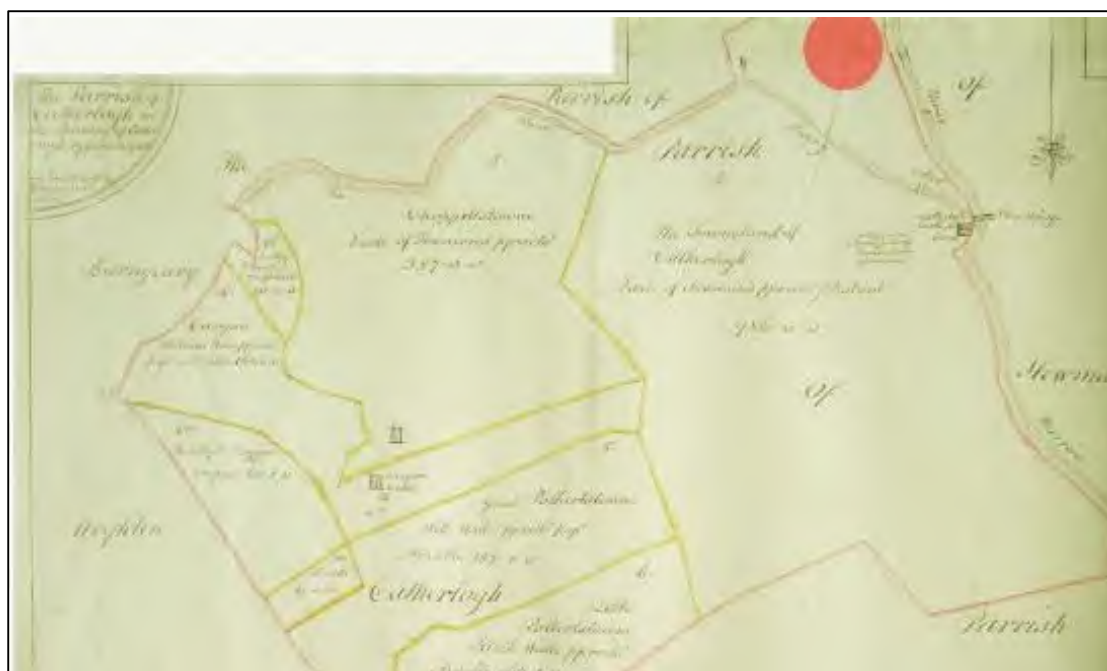


Figure 13-3 Down Survey map with the Mortarstown area indicated in red (Source: www.downsurvey.tcd.ie)

⁹⁷ <https://dcenr.maps.arcgis.com/apps/webappviewer/index.html?id=b7c4b0e763964070ad69bf8c1572c9f5>



Figure 13-4: 6-inch OS map (1842) of proposed development with enlarged view of two internal buildings inset

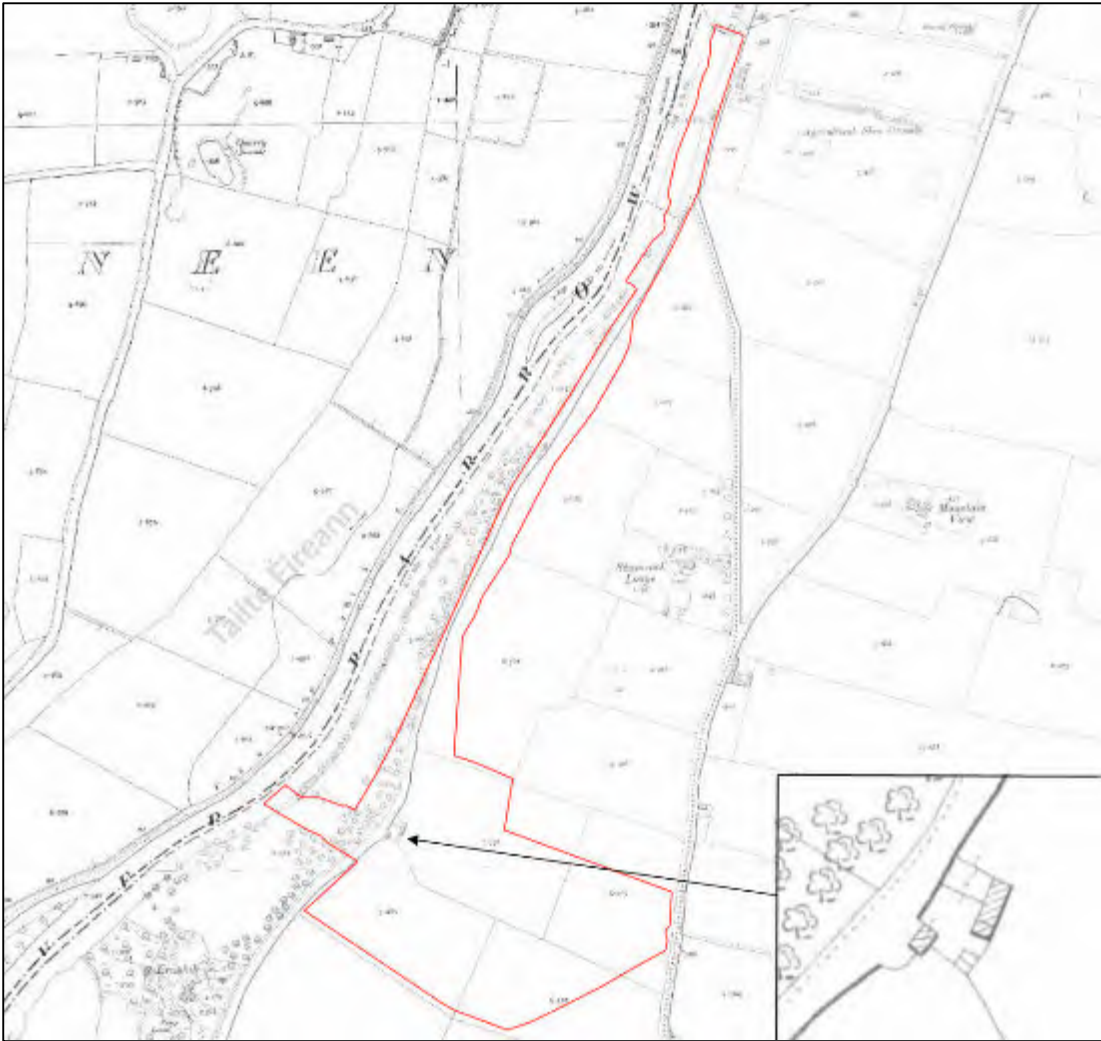


Figure 13-5: 25-inch OS map (1909) with enlarged view of two internal buildings inset



Figure 13-6: LiDAR imagery showing green field area in south end of proposed development

13.3.7 Undesignated Cultural Heritage Assets

While encompassing the archaeological and designated architectural heritage resources, cultural heritage also includes various undesignated assets such as folklore, vernacular structures, placenames and historical associations. A review of online records of the National Folklore Collection⁹⁸ revealed that this resource contains no stories or traditions associated with the townland of Mortarstown Upper. Townlands are the smallest unit of land division in the Irish landscape, and many may preserve early Gaelic territorial boundaries that pre-date the Anglo-Norman conquest. Their layouts and names were recorded and standardised by the Ordnance Survey in the 19th century, and the Gaelic origins of some names may indicate of the presence of an archaeological site within a townland, e.g., placename elements such as 'rath' or 'lis' (ringfort) or 'temple' or 'kill' (church). The proposed development is located within the townland of Mortarstown Upper (*Baile Mhoirtéil Uachtarach*) which the Placenames Database⁹⁹ suggests may originate from an association with a family named Mortell. As detailed in Section 13.3.6, a review of historic OS maps revealed that they depict two adjacent small structures within the south end of the proposed development and further detail on these undesignated features are provided in Section 13.3.8 (Site Inspection).

⁹⁸ www.duchas.ie

⁹⁹ www.logainm.ie

13.3.8 Site Inspection

The proposed development was inspected in clear weather conditions in October 2020, August 2021, July 2022 and May 2025. The existing wastewater treatment plant is bounded to the north and west by agricultural land, to the east by Green Road and to the south by the Carlow Institute of Further Education. The general terrain within the plant is level and the existing modern infrastructure is situated in landscaped green areas created during the construction of the plant. The ground levels on the footprint of the existing infrastructure within the plant appear to have been reduced down into natural subsoil levels and this developed area is deemed to be of negligible archaeological potential. The existing boundary of the plant is enclosed on all sides by modern palisade fencing and to the north, south and west this fencing is lined with leylandii conifers cut to a uniform height. The proposed western extension to the plant will extend into a vacant pasture field adjacent to the western boundary which was in use as sheep-grazing at the time of inspection. No visible surface traces of any potential unrecorded archaeological sites were noted within the green field area.

The proposed development site contains a small cottage building located on the east side of a diverted section of the Kilkenny Road (R448). A small building is depicted at this location on the historic OS maps indicating that the cottage predates the publication of the 1st edition 6-inch OS map in 1842 (see Figures 13-4 and 13-5). This building, which is not listed as a Protected Structure or included in the NIAH, was in use as an occupied residence during the site inspections carried out between 2020 and 2022. It has since been purchased by the developer and was vacant at the time of inspection in May 2025. The building comprises a single-storey, 3-bay cottage containing modern insertions including windows, doors, roofing and internal fixtures and fittings. A lean-to structure and a garage building adjoining the south side of the cottage are of modern appearance as are the concrete boundary walls of a small front lawn area to the west. There were no surface traces of a second small structure, potentially a shed, indicated on the OS maps within a roadside area in the property to the southwest of the cottage. The rear of the property contains an overgrown back plot which is bound by a modern fence and land drain on the east side. While not a designated architectural heritage structure, the cottage does comprise a feature of local vernacular interest albeit one that has been somewhat compromised by modern interventions.

The proposed outfall pipe will extend westwards from the plant extension across the Kilkenny Road (R448) and then will extend through a strip of woodland to the bank of the River Barrow. The roadside boundary of the woodland along the outfall pipe route by a modern timber fence and no traces of a boundary wall, or other structures, associated with Erindale House to the south were noted in this area. There is no inter-visibility between the proposed outfall route in the wooded area and Erindale House due to the presence of a modern residential house constructed between their locations. The eastern end of the woodland comprises a level area which extends to a steep downslope that overlooks a strip of level woodland extending to the riverbank. The ground levels within all areas of the woodland were obscured by thick undergrowth and fallen trees but no structural remains of any date were identified. A description of the riverbank area containing the proposed outfall is provided in Section 13.3.9 and Appendix 13.2, Volume 3 of the EIAR.

The section of the Kilkenny Road (R448) within the boundary of the proposed development extending to the existing pumping station has a modern tarmac surface with a pavement on the east side and the proposed development will require the construction of a microtunnel gravity sewer along this section of road. While a roadway is depicted along its route on the historic OS maps, the existing road carriageway was likely widened during the 20th century to accommodate modern vehicular traffic loads. The built environment within properties adjacent to this section of the roadway within is modern in date and includes residential and commercial properties. There are no recorded archaeological sites or designated architectural heritage structures within these adjacent properties.

The existing pumping station in the north end of the proposed development is bound to the north by a brownfield area containing a modern hardstand, to the east by the Kilkenny Road, to the west by concreted ground surface adjacent to the river and to the south by an area of overgrowth. The internal area of the pumping station is occupied by modern infrastructure and the original ground levels within its boundary appear to have been

subject to extensive ground disturbance. No features of potential cultural heritage interest were noted during an inspection of this area.

13.3.9 Underwater Archaeological Survey

The Archaeological Diving Company (ADCO) was appointed to carry out an Underwater Archaeological Impact Assessment (UAIA) of a section of the River Barrow at Mortarstown Upper, Carlow Town, where an upgrade to the existing Mortarstown Wastewater Treatment Plant (WWTP) is proposed. As part of the proposed upgrade works, it is proposed to insert a new outfall structure on the east bank of the River Barrow positioned close to an existing WwTP outfall. The on-site survey work was carried out on 9th August 2022, under dive and detection licences issued by the DHLGH (Licences 22D0069, and 22R0225).

The UAIA comprised systematic visual inspection of the River Barrow, extending 38m upstream and 30m downstream of the proposed outfall location. The assessment also sought to provide a detailed account of riverbed topography, to assess the potential of riverbed deposits to retain archaeological material and identify any additional features/structures of archaeological or historic significance that may be present. This work included a walkover survey of the proposed attendant bank structure. In addition, targeted metal-detection was employed to help assess the bankside/riverbed area and highlight any metallic concentrations present.

No archaeologically significant features, structures, or deposits were encountered for the river assessment area. Likewise, metal-detection across a series of riverbed areas did not yield any items of interest. A full copy of the UAIA report is provided in Appendix 13.2, Volume 3 of the EIAR.

13.4 Potential Effects on Cultural Heritage during Construction Phase

There are no recorded archaeological sites located within the 500m study area extending around proposed development and, therefore, no impacts on the known archaeological resource are predicted during the construction phase. The areas within the existing treatment and pumping station properties have been previously subject to ground disturbance works during the construction of the existing infrastructure and the potential for adverse impacts on unrecorded, sub-surface archaeological sites and features within these disturbed areas is deemed to be negligible. The proposed demolition of modern infrastructure within the boundary of the proposed development will have a likely neutral effect on the cultural heritage resource.

The potential exists for adverse direct impacts on any unrecorded, subsurface archaeological remains in the following work areas

- Ground excavation works within green field areas to the west of the existing wastewater treatment plant;
- Ground excavation works required to facilitate the construction of the proposed outfall within woodland, riverbank and in-channel areas, including piling works; and
- Any ground excavation works required to facilitate the construction of a microtunnel gravity sewer along Kilkenny Road.

The existence, nature and extent of any unrecorded sub-surface or underwater archaeological remains within these areas within the boundary of the proposed development are unknown. The significance of potential construction phase effects, therefore, cannot be accurately quantified but it is noted that ground excavation works will have the potential to result in permanent, direct, moderate-significant adverse effects on any such potential remains and this will require mitigation.



There are no designated architectural heritage structures located within or directly adjacent to the proposed development and it is not located within an Architectural Conservation Area. The construction phase of the proposed development will, therefore, have no predicted direct impacts on the designated architectural heritage resource. A proposed outfall pipe extending to the west of the wastewater treatment plant will extend to an overgrown section of the riverside through a wooded area that formerly formed part of the landholding of Erindale House which is a Protected Structure (CW066). Erindale House is located within a private property not accessible for inspection, and is screened by trees, but is deemed to be of likely medium-high value based on its designation. There are no associated curtilage structures located on the proposed outfall pipe which extends through an area that is now separated from the existing Erindale property by a modern residential house. While the proposed outfall pipe will result in no predicted impacts on Erindale House, it will result in a temporary, direct, slight effect on an area formerly within its grounds during the construction phase. The construction phase will result in no predicted impacts on Protected Structure CW396, a 19th century thatched house located c.100m to the southeast of the existing wastewater treatment plant, or on Protected Structure CW395, a roadside stable building located c.300m to the south of the proposed outfall pipe (Figure 13-1).

As detailed in Section 13.3.8, a single-storey cottage is located within an area of the proposed development site to the west of the Kilkenny Road (R448) (Figures 13-4 and 13-5). While not a designated architectural heritage structure, the cottage does comprise a structure of local (low) vernacular significance, albeit one that has been somewhat compromised by modern interventions. The cottage will be retained in situ as part of the proposed development and, therefore, no direct adverse effects on this structure are predicted during the construction phase. No likely significant effects on known cultural heritage constraints will arise as a result of the construction phase.

13.5 Potential Effects on Cultural Heritage during Operational Phase

There are no recorded archaeological sites located within the 500m study area and following the successful implementation of the mitigation measures presented in Section 13.6, the operational phase of the proposed development will have no predicted impacts on known or potential elements of the archaeological resource.

There are no buildings listed as Protected Structures located within, or adjacent to, the proposed development areas and they are not located within an Architectural Conservation Area. The outfall pipe extends through the area of woodland that formerly formed part of the landholding of Erindale House will comprise a buried underground feature during the operational phase. It is, therefore, concluded that the operational phase of the proposed development will have no predicted impacts on the designated architectural heritage resource. The single-story cottage within the boundary of the proposed development will be retained in situ during the operational phase and no direct effects to this undesignated structure of local (low value/sensitivity) vernacular interest will occur. The proposed development will result in a medium magnitude of effect on this structure which will result in a long-term, indirect, adverse effect of slight significance. No likely significant effects on the cultural heritage resource will arise as a result of the operational phase.

13.6 Mitigation Measures

13.6.1 Construction Phase

A programme of archaeological monitoring of ground excavation works during the construction phase will be undertaken by a suitably qualified archaeologist licensed by the National Monument Service within the following areas:



- Topsoil stripping works in greenfield areas within and to the west of the existing wastewater treatment plant
- Ground excavation works required to facilitate the construction of the proposed outfall within woodland, riverbank and in-channel areas to the west of Kilkenny Road
- Any ground excavation work required to facilitate the construction of a microtunnel gravity sewer along Kilkenny Road.

In the event that any archaeological remains are identified during the course of archaeological supervision of works they will be recorded and securely cordoned off while the National Monuments Service are consulted to determine further appropriate mitigation measures, which may entail preservation *in situ* by avoidance or preservation in record by archaeological excavation. The ground levels within the footprint of the proposed upgrade works to the existing infrastructure within the wastewater treatment plant and pumping station have been previously disturbed and archaeological monitoring of demolition works within these areas is not considered to be required.

13.6.2 Operational Phase

Given the factors outlined in Section 13.5 of this chapter combined with the implementation of the mitigation measures presented in Section 13.6.2 which will provide for either the avoidance or the proper and adequate recording of any currently unrecorded archaeological features within its boundary, there will be no mitigation measures required for the cultural heritage resource during the operational phase.

13.7 Residual Effects

The proposed development site does not contain any recorded archaeological sites or designated architectural heritage structures and no residual effects on these elements of the cultural heritage resource are predicted. The mitigation measures presented in Section 13.6 will provide for either the preservation in situ of any potential unknown, sub-surface archaeological features within the proposed development site or the proper and adequate recording of such potential features by full archaeological excavation. Preservation in situ shall allow for a negligible magnitude of effect resulting in a potential not significant/imperceptible significance of residual effect on the potential unrecorded archaeological resource. Preservation by record shall allow for a high magnitude of effect, albeit ameliorated by the creation of a full and detailed archaeological record, the results of which shall be publicly disseminated. This shall result in a potential slight/moderate range of significance of effect in the context of residual effect on the potential unrecorded archaeological resource. No likely significant residual effects on the cultural heritage resource will arise.

13.8 Monitoring Measures

There are a number of obligatory processes required as part of archaeological licence applications to the National Monuments Service and these will allow for monitoring of the successful implementation of the archaeological mitigation measures presented in Section 13.6.1. A method statement detailing the proposed strategy for archaeological supervision of ground works during the construction phase will be submitted for approval to the National Monuments Service as part of the licence application. This will clearly outline the proposed extent of ground works and outline the consultation process to be enacted in the event that any unrecorded archaeological remains are identified, which may include preservation *in situ* by avoidance or preservation in record by archaeological excavation. A report will be compiled on all archaeological site investigations which will clearly present the results in written, drawn and photographic formats. Copies of this report will be submitted to Carlow County Council, the National Monuments Service and the National Museum of Ireland.

14. MATERIAL ASSETS

14.1 Introduction

According to relevant EPA guidance (EPA, 2022) the following topics warrant consideration under material assets:

- Built Services;
- Roads and Traffic; and
- Waste Management.

Roads and traffic have been assessed separately as part of this EIAR. Refer to Chapter 10 – Traffic. Therefore, this chapter identifies describes and assesses the likely significant effects on material assets serving the proposed development specifically in relation to existing and proposed built services (i.e., foul sewerage, surface water drainage, water supply, gas, electricity, and telecommunications utilities), and waste management; both of which are assessed separately within this section.

14.2 Legislation, Policy and Guidance

This EIAR chapter was prepared in accordance to the following:

- ‘Guidelines on the information to be contained in Environmental Impact Assessment Reports’ (EPA, 2022);
- ‘Advice Notes on Current Practice (in preparation of Environmental Impact Statements)’ (EPA, 2003);
- European Commission (2017) Environmental Impact Assessment of Projects;
- Guidance on the preparation of the Environmental Impact Assessment Report and;
- Government of Ireland (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment.

14.3 Study Assessment and Methodology

The EPA ‘Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR)’ (2022) was used for this assessment.

14.4 Built Services

14.4.1 Assessment Methodology

The methodology used to prepare this section of the EIAR is in accordance with the EPA ‘*Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR)*’ (2022). The study area for assessment of built services is the redline boundary of proposed development depicted in Figure 1-1. The following sources have been used to collate information on built services within the proposed development:

- ESB Network Utility Plans;
- Eir, Virgin Media and ENET Telecommunications Plans;
- Available utility information and maps received from UÉ;



- Carlow County Development Plan 2022 – 2028;
- Proposed WWTP Red Line Boundary, drawing ref: 5161805_EWE_DR_MOR_5005 (AtkinsRéalis, 2026).
- Surface water runoff, foul drainage discharge and water supply requirements have also been designed in accordance with the following guidelines / policies:
 - Greater Dublin Strategic Drainage Study (GDSDS)
 - CIRIA C697 (2007), The SuDS Manual V6; and,
 - UÉ's Code of Practices and Technical Standards (IW-CDS-5030-03 & IW-TEC-800).

14.4.2 Receiving Environment

The proposed Wastewater Treatment Plant (WWTP) is located partly within the footprint of the existing WWTP and extends into adjoining agricultural lands, vegetated/scrub areas, and sections of hardstanding associated with road and lane crossings. The site is predominantly surrounded by agricultural land, with a number of nearby sensitive receptors.

To the north of the site lies the South East Technological University (SETU) campus, with Tyndall College located further to the south. The western boundary is defined by the Kilkenny Road (R448), a grazing field, and two existing residential dwellings. Lands to the east comprise agricultural fields, established residential properties, and a residential development currently under construction.

The Pumping Station is bounded to the south and east by the Kilkenny Road (R448), with the Carlow Institute of Technology and associated student accommodation located to the east. Vegetation and mature trees line the southern, western, and northern boundaries, with the River Barrow situated immediately to the west and north of the site.

Consultation with relevant bodies has been undertaken to determine existing utilities present in the vicinity of the Site. A complete set of all utility / service data received has been integrated into the site layout and presented in Appendix 14.1, Volume 3 of this EIAR.

14.4.2.1 Storm Water Drainage

Existing surface water drainage infrastructure is presented in the drawings submitted as part of the planning application submission (Drawing Ref: 5161805_EWE_DR_MOR_5190 and 5161805_EWE_DR_MOR_5191). Existing surface water infrastructure is located along the existing internal access roads to within the existing facility site and along Kilkenny Road. Surface water run-off from the existing facility is discharged to the River Barrow via existing stormwater infrastructure.

14.4.2.2 Foul Water Drainage

There is an existing foul drainage network located from the north of the site that discharges to the Mortarstown Wastewater Treatment Plant (WwTP) and along Kilkenny Road, to the north of the Mortarstown WwTP. Existing foul services within the site are shown on the planning drawings submitted (Drawing Ref: 5161805_EWE_DR_MOR_5522 -24).

14.4.2.3 Water Supply & Distribution

There is an existing potable water supply and watermains have been identified along the roads surrounding the site as shown on the planning drawings submitted. (Drawing Ref: 5161805_EWE_DR_MOR_5522-24).

14.4.2.4 ESB Supply

Existing ESB utilities are located in the vicinity and throughout the existing facility site. Existing underground electrical cables have been identified within the vicinity of the proposed WwTP upgrades and associated development. There is a low voltage underground line traverses from the east to the north the WwTP site. In addition, there is an existing overhead line that runs from west to south east of the site.

Refer to planning drawings submitted (Drawing Ref: 5161805_EWE_DR_MOR_5522- 29).

14.4.2.5 Gas Supply

Gas utilities are located along Kilkenny road along the eastern boundary of the site and along the western boundary as indicated on the planning drawings submitted (Drawing Ref: 5161805_EWE_DR_MOR_5522- 24).

14.4.2.6 Telecommunications

14.4.2.6.1 eir Network

eir communication utilities have been identified within the vicinity of the proposed development along Kilkenny Road and adjacent to the roads along the southern and western boundary of the Mortarstown WwTP site (Drawing Ref: 5161805_EWE_DR_MOR_5522-24).

14.4.2.6.2 Virgin Media

There are no Virgin Media communication utilities on site or near the Mortarstown WwTP site. Existing Virgin Media utilities are located in the residential areas surrounding the proposed and adjacent to the Kilkenny Road.

14.4.2.6.3 ENET

There are no ENET utilities on site or near the Mortarstown WwTP site. Existing ENET utilities are located within the vicinity of the existing Kilkenny Pumpstation.

14.4.2.7 Lighting

Existing lighting ducts have been identified along the existing internal access roads and within the vicinity of the existing facility, as well as a number of lighting poles. Refer to the planning drawings submitted (Drawing Ref: 5161805_EWE_DR_MOR_5195- 96) for further details.

14.4.3 Assessment of Effects

14.4.3.1 Characteristics of the proposed development

A detailed description of the proposed development is presented in Chapter 2 - Proposed Development. To identify, describe and assess the likely significant effects from the proposed development, the characteristics of the proposed built services / utilities are considered, as summarised below.

14.4.3.2 Surface Water / Storm Water Drainage

Following the diversion of the flows to the new process stream, the existing storm tank will be demolished and 2no. storm tanks with associated pipework and chambers are proposed.

As part of the stormwater management upgrade, flows exceeding the full flow to treatment (FFT) will overflow downstream of screening and grit removal and be directed to a new stormwater storage tank system with a total

effective capacity of 6,231 m³, equivalent to 2.95 hours of Formula A – FFT at 58,500PE. If a storm event exceeds this capacity, the screened and de-gritted wastewater will overflow to the WwTP outlet chamber and discharge to the River Barrow. The existing 1,560 m³ final settlement tanks will be repurposed as stormwater storage tanks and supplemented by 2 no. newly constructed tanks providing an additional 4,650 m³ of storage. If all tanks reach capacity, overflow will be recorded via a flow monitor. Once the storm subsides, stored water will be returned to the inlet works using a duty/standby pump set at 548 m³/h, initiated when inlet flow drops below 2 DWF (1,097 m³/h).

14.4.3.3 Foul Drainage

It is proposed to undertake minimal modifications to the sewer network at the Kilkenny Road pumping station site however, it would be necessary to divert the existing 225mm diameter gravity sewer connecting the Southern Gardens to the pumping station. By incorporating the sufficiently deep microtunnel gravity sewer, existing sewers can be intercepted and discharged to the treatment plant by gravity.

All foul drainage related works will be carried out in accordance with all relevant UÉ guidelines and any Site-specific additional requirements.

14.4.3.4 Water Supply and Distribution

The new pumping station will avail of the WwTP's potable water supply system. An extension of potable water mains from the new inlet works is proposed.

The existing WwTP has a borehole to the east of the site that supplies the site with clean water. An existing 80mm watermain transfers this water to the required locations around the site (inlet screens, sludge dewatering building and other various locations). The design intent is to retain the existing borehole and supply a new pumping arrangement and rising main to supply the site with clean water. The existing potable water supply to WwTP will be retained to continue the supply for potable water supply for administration building, emergency shower and eye wash and hydrants at the WwTP site.

14.4.3.5 ESB

Prior to construction, existing low voltage power distribution will be diverted and rerouted. Power supply, and the requirement for any alterations to the existing power supply network for the development of the subject Site, will be agreed with ESB Networks in advance of construction. Consultation with ESB regarding the diversion has commenced. All power supply related works will be carried out in accordance with ESB Networks relevant guidelines. Refer to the planning drawings submitted (Drawing Ref: 5161805_EWE_DR_MOR_5525 -29) for further details on the proposed ESB diversions.

14.4.3.6 Solar Power Generation

Solar PV panels are proposed and will provide 15% of the energy demand of the Mortarstown WwTP. Refer to the planning drawings submitted (Drawing Ref: 5161805_EWE_DR_MOR_5163).

14.4.3.7 Telecommunications

There will be no telecommunication supply related works for the proposed development.

14.4.3.8 Lighting

An Outdoor Lighting Report was prepared by Lighting Reality (2025), as presented in full in the Planning submission. This report was prepared in accordance with relevant standards and guidelines and which will be



implemented as part of the proposed development. The Outdoor Lighting Report has also been developed in consultation with bat and biodiversity specialists and is in line with the guidelines and legislation for the protection of bats with an aim of minimising disruption and disturbance to local bat populations. As included within the report, the 'Guidance Note 08/23; Bats and Artificial Lighting at Night - Institute of Lighting Professionals' has been considered with regards to reducing impact on bat population (Refer to Appendix 14.2, Volume 3 of this EIAR, Outdoor Lighting Report, 2025).

14.4.3.9 Potential Effects during the Construction & Demolition phase

The following potential impacts could occur during the Construction phase: -

- Damage to existing foul water network along Kilkenny Road along the eastern site boundary;
- Damage to existing overhead and underground power supply which runs through site; and
- Potential power outages to existing services in the surrounding area during the diversion and rerouting of the supply networks within the site.

Given the nature and scale of proposed development and the fact that a CEMP will be prepared and implemented by the contractor during construction and demolition these potential effects are considered to be unlikely and should they occur, would be temporary and moderate adverse in nature. There will be no likely significant effects regarding built services during construction.

14.4.3.10 Potential Effects during the Operational Phase

- As part of the proposed development solar photovoltaic system for renewable power generation is proposed on the grassed site west of the WwTP works. The site can accommodate approximately 1,700 m² of solar panels producing 330,000 kWh per year. This power is to be used onsite to run the site when the power is available thereby reducing dependence on fossil fuels and resulting in a reduction in greenhouse gas emissions.
- As previously stated, all power and lighting will be diverted and rerouted within the proposed development in accordance with the relevant service providers guidelines and requirements and standard best practice guidelines.

There will be no likely significant effects regarding built services during the operational phase.

14.4.4 Do Nothing Effect

The Material Assets Assessment assumes that under the 'Do-Nothing' scenario the proposed scheme would not be developed. There will likely be significant effects regarding built services under the 'Do-Nothing' scenario as the current flow of and concentration of the waters arising from the production processes on site is variable and could limit the potential treatment capacity of the sewer system due to this variability.

UÉ have indicated that there is insufficient headroom in the WwTP (in accordance with the wastewater discharge licence D0028-01) to treat the future expected loads arising from the facility due to both capacity issues and an inability to accommodate fluctuations in loading. In order to maintain production capacity, the current pre-treatment capacity will need to be increased, as will effluent balancing/storage to ensure that the site maintains compliance with proposed end user agreement effluent limits.

14.4.5 Mitigation Measures

14.4.5.1 Construction & Demolition Phase

The following mitigation measures will be implemented during the construction and demolition phase;

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- A Construction Environmental Management Plan (CEMP) has been prepared to support this planning application. Prior to the commencement of construction works, the appointed contractor will update and, where necessary, revise the CEMP to reflect any conditions that may be attached to the planning permission. The CEMP will take account of all of the environmental considerations (including water, dust and noise nuisance control; soil / stockpile management; temporary groundwater management; appropriate Site management of compound area; fuel, oil and chemical storage and use; and waste management) set out in the CEMP submitted as part of this planning application;
- Diversion, rerouting and relocation of the following services will take place prior to construction; existing watermains and hydrants, existing lighting ducts and light poles, and existing underground electrical cables.
- The construction compounds will include adequate, temporary, self contained welfare facilities;
- All newly installed utilities/ services will be assessed, tested and certified as required prior to being fully commissioned;
- Connections to the existing and proposed foul networks will be coordinated with the relevant utility provider. All works associated with the existing utilities for the proposed development will be carried out in strict accordance with the guidelines of the relevant stakeholders (specifically ESB, and UÉ), Health and Safety Authority and any additional site-specific requirements;
- A copy of all available existing, and as built utility plans will be maintained on Site during the construction of the proposed development. The underground power lines and foul and water mains within the existing UÉ services, located onsite will be clearly marked and all Site personnel will be made aware of the known location of any onsite underground or over ground services during the construction phase; and,
- Local drainage will be surveyed and, where necessary, blocked off to prevent runoff of potentially contaminated surface water entering the surface water drainage system. A detailed Surface Water Management Plan will be included in the CEMP to be prepared by the Contractor, to deal with the treatment of surface water runoff prior to discharge to the site drainage system.

14.4.5.2 Operational Phase

No mitigation measures are required during the operational phase.

14.5 Waste Management

This section of the EIAR has been prepared in accordance with the EPA 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' (2022), and 'Best Practice Guidelines on the Preparation of Waste Management Plans for Construction & Demolition Projects' (EPA 2021).

The waste management strategy during the construction phase of the Proposed development has been developed in accordance with the National Waste Management Plan for a Circular Economy 2024 – 2030 which was published in March 2024 and replaces all Regional Waste Management Plans. The overarching objectives of the NWMP have been incorporated into the latest development plans pertinent to this Site i.e. Carlow County Development Plan 2022-2028 (CCDP). According to NWMP (2024) the National Waste Management Plan has the following objectives:

- Prevent or minimise the production of waste in the first instance;
- Reduce, re-use and recycle to the maximum extent possible;
- Endeavour to recover energy from waste where possible; and
- Ensure the efficient and safe disposal of any residual waste.



This assessment has also been informed by findings of the Chapter 11 Land, Soils and Geology section of this EIAR. Additionally, the following relevant best practice guidance documents and Development Plans were consulted:

- Design out Waste: Preparation of Waste Reduction Factsheets for Design Teams' (EPA, 2015);
- EPA National Waste Statistics Summary Report 2020 (EPA 2020); and
- Carlow County Development Plan 2022–2028 (CCDP, 2022).

14.5.1 Receiving Environment

Based on a review of available historic mapping and aerial photography, historic land-use at the Site was greenfield before being developed as the current WwTP. The GSI bedrock geology 100k map identified the underlying bedrock of the site as the Clontail Formation, comprised of Calcareous red-mica greywacke. Based on all available evidence, including soil analytical data and findings from the geotechnical investigation (as detailed in Chapter 11 – Land, Soils and Geology), and taking account of proposed mitigation measures, soils beneath the Site are not considered likely to have a significant effect on human health, building and services, or environmental receptors.

14.5.2 Potential Effects of the Proposed Development

14.5.2.1 Characteristics of the proposed development

A detailed description of the proposed development is presented in Chapter 2 – Proposed Development. The following summary relates to the characteristics of the proposed development in relation to waste management. The proposed development will be designed, planned, constructed and operated to minimise waste generation at every stage.

The management of waste generated during the construction and demolition phases will be in accordance with the Outline CEMP (AtkinsRealis, 2026), and Outline Resource and Waste Management Plan (RWMP) (AtkinsRealis, 2026) submitted as part of this application. The scope of works for the proposed development includes the construction of an Effluent Balancing and Resource Recovery System and associated infrastructure and access road. The following waste streams will be generated during the construction and demolition phases: concrete, mechanical, electrical containment, wood, glass, aluminium, iron and steel, insulation material, construction material containing asbestos and soils.

14.5.2.2 Potential Effects during Construction and Demolition phases

During the construction phase, it is estimated that approximately 150m³ water will be used each month for general construction activities, excluding any water-intensive activities such as commissioning.

It has been estimated that the various waste streams will be generated and managed as follows (refer also to the RWMP submitted as part of this application).

Table 14-1 identifies the estimated volume of waste for each key stream that will be generated during the construction and demolition phases of the proposed development.

It should be noted that predicted construction waste volumes consists of: mixed C&D Waste, wood/timber, metals, papers, plastics and packaging, canteen/office waste, and other waste types comprising of non-recycling waste such as soiled paper and plastics.



Table 14-1 - Estimated Volume of waste generation

Waste Stream	Estimated Volume (m³)
Demolition Waste	876
Construction Waste (excluding soils)	1060
Contaminated Soils	334
Non-contaminated Soils	86,000
Hazardous Waste (asbestos)	TBC
Total Volume	88,270

14.5.2.2.1 Demolition Waste

The total demolition waste (excluding asbestos-containing material) is estimated to be approximately 876 m³. The Contractor will be required to ensure that all demolition materials are appropriately managed, stored, and disposed of in accordance with all relevant waste legislation and guidance.

Asbestos surveys must be undertaken prior to the commencement of any demolition works. No demolition activities will be permitted until written confirmation has been obtained confirming that all structures scheduled for demolition have been certified as free from asbestos-containing material.

14.5.2.2.2 Asbestos

Existing plant/items to be demolished as part of the proposed development is as follows:

- Storm tank;
- Inlet works;
- Various small chambers within the site; and,
- Existing sludge cake transfer facility.

All identified asbestos will be removed by an asbestos removal contractor and appropriately disposed off before demolition works commence. All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010. All waste removed offsite will be appropriately characterised (under the correct LoW / EWC code), transported and disposed of in accordance with relevant waste management legislation (including but not limited to the Waste Management Act of 1996, 2001 and 2003 and all subsequent waste management regulations as amended). All waste management and disposal / recovery records will be maintained onsite throughout the Proposed Development and will be made available for viewing by the Client, Employer's Representative and statutory consultees (CCC and EPA) as required.

14.5.2.2.3 Contaminated Soils

The estimated volume of contaminated soil generated during the construction phase (334m³) is based on the area determined to potentially be contaminated with Japanese Knotweed. The contaminated soil will be removed offsite in accordance with all relevant invasive species and waste management legalisation.

14.5.2.2.4 Native Non-Contaminated Soils

The estimated volume of soil (including contaminated soils) generated during the construction phase (ca. 88,834 m³) will be minimised by reducing / eliminating the need for excavation. Lime stabilisation may also be used to reduce the amount of soils generated onsite. The balance of soil materials excavated from the site will be reused

where possible for landscaping purposes, and infill where appropriate, ensuring that any residual soil waste is kept to a minimum. Any surplus soil will be characterised and removed offsite in accordance with all relevant waste management legislation. Based on preliminary engineering calculations it is anticipated that ca. 86,000 m³ of non-contaminated soils, and 334 m³ of contaminated soils will require offsite disposal while, 2,600 m³ of soil will be reused on site.

14.5.2.2.5 Construction Waste

Construction waste volumes consists of: mixed C&D Waste, wood/timber, metals, papers, plastics and packaging, canteen/office waste, and other waste types comprising of non-recycling waste such as soiled paper and plastics. The total estimated volume is ca. 1060m³.

Mixed C&D Waste

Following segregation onsite, any residual mixed C&D waste (ca. 127 tonnes) arising from the onsite construction and demolition works, will be collected and stored in areas specifically for mixed C&D waste; these will be removed offsite for subsequent offsite separation and disposal at an approved waste disposal / recovery facility.

Wood / Timber

Timber waste (ca. 252 tonnes) will be segregated in order to prevent contamination by other wastes and will be stored so as to limit the potential for this material to rot. Wooden pallets will be returned to relevant suppliers where possible. Timber offcuts will be reused onsite where feasible. A covered receptacle for waste wood will be placed in the waste storage area, prior to removal from Site for recycling. All such timber will be free from chemical treatment.

Metals

Metal waste (ca.165 tonnes) will be generated during the project, particularly arising from the use of rebar. All waste metal will be segregated offsite at the waste disposal / recovery facility for reuse and recycling. Given the significant scrap value associated with metal waste, this waste will be stored in a dedicated container within a secure part of the Site, and regular collections from Site to the waste recycling facility will limit the potential for unauthorised entry and theft

Paper, Plastics and Packaging

Packaging wastes (ca.114 tonnes) will be removed (paper / cardboard / plastic / general waste) offsite for subsequent offsite separation and disposal at a waste disposal / recovery facility. Waste packaging will be stored in dedicated containers in the waste storage area for collection and subsequent segregation and recycling.

Canteen / Office Waste

Onsite staff canteens will generate food and packaging waste (ca.167 tonnes). Dedicated containers will be provided at each canteen to permit easy segregation of these wastes; brown bins will be provided for compostable food waste, green bins will be provided for dry recyclables (packaging, hard plastic, paper, cardboard, tetrapak etc.) and black bins will be provided for any residual waste.

Other Wastes

In addition to the above waste streams other waste materials will be generated during the construction phase. These residual wastes will typically comprise non- recycling waste such as soiled paper / cardboard / plastics / cloth, canteen food waste, fibreglass, polystyrene insulations and plasterboard. These materials will be stored separately to all other waste streams to prevent any cross contamination. These waste types are estimated to make up ca. 4% of construction waste composition by volume.



14.5.2.3 Potential Effects during Operational Phase

During the operational phase, all waste materials will be removed from the proposed development and transported to an appropriately permitted or licensed waste disposal or recovery facility. All waste handling, transport, and disposal activities will be carried out in full compliance with relevant waste management legislation, including (but not limited to) the Waste Management Acts 1996–2011.

Under normal operating conditions, the outfall line will convey and discharge treated wastewater only. During rainfall events, the outfall will also receive stormwater drained from roads within the WwTP site. Prior to discharge, this drainage water will pass through an oil interceptor to remove hydrocarbons mobilised by rainwater. In exceptional circumstances specifically when the stormwater holding tanks reach capacity, screened, de-gritted, and de-greased wastewater may overflow from the stormwater holding tanks and be discharged via the outfall line.

The WwTP is served by an existing stormwater collection system that discharges to the existing final effluent chamber. As part of the upgrade works, the surface water drainage network will be extended, and new pipework will be connected to the existing system. Consistent with the measures outlined above, all drained rainwater will be directed through the new oil interceptor to ensure removal of hydrocarbons prior to discharge.

Sludge will both be imported and generated during operation and will be collected by a licensed waste haulier and transported for treatment at a licensed waste facility in accordance with applicable waste legislation.

Although waste will be generated during the operational phase, all waste streams will be managed in accordance with statutory waste and environmental requirements, regional waste policy, and best-practice waste management guidance. The potential effects associated with waste transport, disposal, or recovery at appropriately permitted or licensed facilities will be long-term and imperceptible. No likely significant effects relating to waste management are anticipated during operation. Table 14-2 shows the estimated volumes to be generated during the operational phase.

Table 14-2 - Estimated Volumes of waste during the operational phase

Source	Estimated Waste Quantities (L)			Estimated Monthly quantities Generated		No of Bin Lifts Per Month			
	Dry Recyclables (Cardboard, Paper, Plastics)	General Waste (Canteen Waste, General Waste, Non Recyclables)	Hazardous waste	(L)	(KG)	1100L Green Bin	1100L Black Bin	2000L Skip	20000L Skip
Screening	0	0	6,750	6,750	7,724	0	0	4	0
Grit Removal	0	0	27,000	27,000	54,000	0	0	14	0
Dewatered Sludge	0	0	240,000	240,000	264,000	0	0	0	12
Admin Building	240	120	0	360	72	1	1	0	0



14.5.3 Mitigation Measures

14.5.3.1 Construction Phase

The following mitigation measures will be implemented during the construction phase:

- All waste management procedures implemented onsite during the construction phase will be in accordance with the Outline CEMP submitted as part of this planning application, and a project specific RWMP to be prepared by the Contractor, in accordance with the '*Best Practice Guidelines on the Preparation of Waste Management Plans for Construction & Demolition Projects*' (EPA 2021). The RWMP will take account of the relevant requirements of the Outline CEMP, the EIAR and any relevant planning conditions etc., and will be prepared by the Contractor in advance of the commencement of any construction or demolition works.
- The contractor will supply all waste containers / skips, as required, for each of the identified waste streams. Waste will be segregated and removed to licensed facilities by licenced hauliers and all containers will be emptied before they are full to avoid overflowing. The contractor is to provide a waste forecast for waste types and quantities expected to be generated.
- Good working practices and take back schemes will be used to reduce the amount of waste generated, as an initial step, with waste management routes for each waste stream to be recorded in the site Waste Management Plan. There is a target of 98% diversion of construction waste from landfill to be achieved with a minimum diversion of 90%. In order to reduce waste generation as far as possible, off cuts, surplus materials and packaging is to be returned to suppliers for closed loop recycling, single used plastics are to be avoided where possible and all materials are to be stored correctly to avoid waste generation from damage and contamination of incorrectly stored materials.
- All waste materials will be segregated onsite into the various waste streams, via. dedicated skips and storage areas. All waste will be removed from Site by one or more waste haulage contractor(s) who hold a current valid waste collection permit issued by the National Waste Collection Permit Office (NWCPO). All waste materials generated during the construction phase will be removed offsite to an appropriately permitted or licenced waste disposal / recovery facility. All waste removed offsite will be appropriately characterised (under the correct LoW / EWC code), transported and disposed of in accordance with relevant waste management legislation (including but not limited to the Waste Management Act of 1996 and 2001, as amended and all subsequent waste management regulations). All waste management and disposal / recovery records will be maintained onsite throughout the Proposed Development and will be made available for viewing by the Client, Employer's Representative and statutory consultees (CCC, EPA) as required.
- Scheduling and planning the delivery of materials will be carried out on an '*as needed*' basis to limit any surplus materials;
- Materials will be ordered in sufficient dimensions so as to optimise the use of these materials onsite, and will be carefully handled and stored so as to limit the potential for any damage;
- Where feasible, sub-contractors will be responsible for the provision of any materials they require onsite in order to help reduce any surplus waste;
- All loaded trucks entering and exiting the Site will be appropriately secured and covered;
- Dust will be controlled at entry and exits to the Site using wheel washes (as required) and/or road sweepers, and tools and plant will be washed out and cleaned in designated areas. Wheel / road sweeper washings will be contained and treated prior to discharge;
- Secure lockable and controlled storage to be provided for the storage of chemicals and other hazardous materials, e.g., asbestos;
- The Contractor is to provide details of proposed measures to be implemented to mitigate against Foreign Object Debris (FOD) and windblown materials; and,

- Secure lockable and controlled storage to be provided for the storage of chemicals and other hazardous materials, e.g., asbestos.

14.5.3.2 Operational Phase

During the operational phase of the proposed development (following the proposed treatment), treated waters will be discharged to the River Barrow via the proposed outfall pipe and cofferdam / temporary shoring. All Emission Values in the Wastewater Discharge Licence (WWDL) will be adhered to during the operational phase.

Sludge will be produced at a maximum rate of ca. 4,095 kgDS/day (ie. 2,086 kgDS/day (Primary sludge), 1,859 kgDS/day (secondary sludge) and 150 kgDS/day (precipitant sludge)) and will be removed in sealed tankers by licenced hauliers and will be treated at a licenced waste facility. The sealed tankers will prevent release of odour emissions at any significant rate. The operation and disposal of the sludge will be in accordance with Urban Wastewater Treatment Directive 91/271/EEC and Waste Management Act 1996 as amended. The sludge cake will meet the Class A Bio Solids standards.

At present, sludge cake waste from the sludge facility is covered and transported off site by trailers. The sludge is stored 5 km away on a farm known as “Penders yard “ a covered facility, whereby the trailer can be driven in and tipped in large hangar type sheds. It is then land spread , with a land management programme through the contractor ENVA. ENVA also manage the storage at Penders and there is adequate storage here to hold the sludge over the period from October to February when land spreading cannot happen.

Other waste to be considered from the site is the ragging and grit screenings from the inlet works and storm screen. These are 3 standard skips which are always kept covered as they are filled and transported to a licensed facility.

Waste management during the operational phase of the development will be undertaken by private waste contractors (in accordance with statutory waste management and environmental requirements, regional waste related policy, and best practice waste management guidance), and regulated by Carlow County Council. Therefore, no further mitigation measures are required with regards to the transport and disposal or recovery of all waste streams which will be generated during the operational phase.

14.6 Residual Effects

Cumulative effects on built services and waste management have been considered between both project elements and with other proposed / committed future developments within the vicinity of the study area. Further details are provided in Chapter 16 – Cumulative Effects. It has been determined that there will be no likely significant impact as a result of cumulative effects.

Taking account of the proposed mitigation measures for Material Assets, specifically built services the residual effects of the proposed development will be short-term and slight adverse during the construction and demolition phase, and long-term and not significant during the operational phase. There will be no likely significant residual effects associated with waste management and / or generation.

Taking account of the proposed mitigation measures for Material Assets, specifically waste management, the residual effects of the proposed development will be short-term and imperceptible during the construction phase, and long-term and imperceptible during the operational phase. There will be no likely significant residual effects associated with waste management and / or generation.

14.7 Do Nothing Scenario

The Material Assets Assessment assumes that under the 'Do-Nothing' scenario the proposed development would not be developed. Thus, the disposal of excavation and other construction waste associated with the Proposed Development would not occur. The do-nothing scenario will have a neutral and imperceptible effect on the Site with regards to Material Assets. There will likely be significant effects regarding waste under the 'Do-Nothing' scenario as the current overloading of Mortarstown WwTP will not be alleviated and headroom to treat predicted catchment growth will not be provided. As a result, the proposed development is required to ensure that the site maintains compliance with the Urban Wastewater Treatment Directive (UWWTD) and wastewater discharge licence D0028-01 (WWDL) discharge standards; and that treated effluent shall comply with the current Wastewater Discharge Licence (WWDL) Emission Limit Values (ELV's).

14.8 Monitoring Measures

The Contractor will be responsible for maintaining waste records and documentation for the full duration of the construction phase. The Contractor will track and monitor all waste volumes transported offsite. All waste records will be maintained onsite throughout the Proposed Development and will be made available for viewing by the Client, Employer's Representative and statutory consultees (UÉ, CCC, EPA) as required.

All waste soils (including made ground) will be classified in accordance with the EPA Guidance Document 'Waste Classification, List of Waste & Determining if Waste is Hazardous or Non-Hazardous' (2015). It will be the Contractors responsibility to ensure that representative soil samples are taken in advance of removal and disposal offsite. As noted previously, it will be the Contractors responsibility to ensure that all waste soils are classified correctly and managed, transported and disposed of offsite in accordance with the requirements of the Waste Management Act 1996, as amended, the Waste Framework Directive 2008/98/EC of the European Parliament and Council on waste and any relevant subsequent waste management legislation.

14.9 Difficulties encountered during preparation of this chapter

There were no difficulties encountered when preparing this chapter.

15. MAJOR ACCIDENTS AND DISASTERS

15.1 Introduction

This chapter assesses the expected effects deriving from the vulnerability of the Proposed Development to risks of major accidents and/or disasters associated with the proposed Wastewater Treatment Plant (WwTP) Upgrade at Mortarstown, Co. Carlow. This chapter identifies and evaluates events with the potential to cause significant adverse effects on human health, the environment, or property, during the construction, operation, and decommissioning phases. The assessment considers both internal risks (such as fires, explosions, or structure failures) and external hazards (such as extreme weather events, flooding, or nearby industrial accidents). The evaluation is carried out in accordance with the requirements of the Directive (EU) 2011/92 as amended by Directive (EU) 2014/52 and relevant national best practice guidance, ensuring that appropriate mitigation and emergency response measures are identified to prevent, control, or respond effectively to any foreseeable major accidents or disasters scenario.

The development will consist of the upgrade the existing Mortarstown WwTP, construction of a new pumping station at the treatment plant site, construction of a new microtunnel gravity sewer between the existing and the new pumping station along Kilkenny Road, construction of new Outfall pipe including a microtunnel for section crossing under the Regional road (R448), new rising main, landscaping, boundary treatments, and all ancillary site works. This includes the associated internal roads, lighting, security fencing, and landscaping.

The current WwTP access from Green Road will be retained. A new internal access point is provided to facilitate entry to the rear of the UÉ-owned property which is a vacant cottage situated to the west of the WwTP boundary. The current Kilkenny Road Pumping Station access will also be retained.

The proposed WwTP upgrade works will be developed to the west of the existing plant footprint, taking in areas of agricultural land and part of the adjoining UÉ property.

A full description of the Proposed Development is available in Chapter 2 Proposed Development.

15.2 Study Assessment and Methodology

15.2.1 Guidance and Legislation

Alongside the legislation, policy, and guidance outlined in Chapter 1, the following relevant legislation, policy, and best practice guidance has informed the preparation of this chapter:

- EPA 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports' (2022);
- EIAR Directive 2011/92 as amended by Directive (EU) 2014/52, which requires consideration of "the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or natural disasters relevant to the project consented."
- EPA 'Advice Notes on Current Practice in the Preparation of Environmental Impact Statements' (2018);
- Health and Safety Authority Guidance on Technical Land-Use Planning Advice, for planning authorities and COMAH establishment operators (2023);
- Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2015;
- Building Regulations (Part A Amendment) Regulations 2012 (as amended) (SI No. 138 of 2012);



- Safety, Health, and Welfare at Work (Construction) Regulations 2013 (as amended) (S.I. No. 291 of 2013)(hereafter referred to as the Construction Regulations ; and
- A Framework for Major Emergency Management. Guidance Document 10 (DECLG 2015).

The EPA Guidelines, 2022, state that:

“To address unforeseen or unplanned effects the Directive further requires that the EIAR takes account of the vulnerability of the project to risk of major accidents and /or disasters relevant to the project concerned and that the EIAR therefore explicitly addresses this issue. The extent to which the effects of major accidents and / or disasters are examined in the EIAR should be guided by an assessment of the likelihood of their occurrence (risk). This may be supported by general risk assessment methods or by systematic risk assessments required under other legislation e.g. a COMAH (Control of Major Accident Hazards involving Dangerous Substances) assessment.

The potential for a project to cause risks to human health, cultural heritage or the environment due to its vulnerability to external accidents or disasters is considered where such risks are significant, e.g. the potential effects of floods on sites with sensitive facilities. Where such risks are significant then the specific assessment of those risks in the form of a Seveso Assessment (where relevant) or Flood Risk Assessment may be required.”

15.2.2 Definition of Major Accident

For the purpose of this assessment, the definition of a ‘Major Accident’ is taken from the guidelines on Major Accidents and Disasters within EIA published by Institute of Environmental Management and Assessment (IEMA, 2020).

“A major accident is an event (for instance, train derailment or major road traffic accident) that threatens immediate or delayed serious environmental effects to human health, welfare and / or the environment and requires the use of resources beyond those of the client or its appointed representatives (i.e., contractors) to manage.” Major accidents can be caused by disasters resulting from both man-made and natural hazards. A disaster is a man-made / external hazard (such as an act of terrorism) or a natural hazard (such as an earthquake) with the potential to cause an event or situation that meets the definition of a major accident. In general, major accidents and / or disasters should be considered as part of an assessment where the development has the potential to cause the loss of life, permanent injury and/or temporary or permanent destruction of an environmental receptor which cannot be restored through minor clean-up and restoration.”

For the purpose of this assessment, the definition of a ‘Disaster’ is as follows (IEMA, 2020):

“a natural hazard (e.g. earthquake) or a man-made external hazard (e.g. act of terrorism) with the potential to cause an event or situation that meets the definition of a major accident.”

For the purposes of this assessment, the definition of ‘Vulnerability’ is as follows (IEMA, 2020):

“Vulnerability – describes the potential for harm as a result of an event, for example due to sensitivity or value of receptors. In the context of the EIA Directive, the term refers to ‘exposure and resilience’ of the proposed development to the risk of a major accident and / or disaster. Vulnerability is influenced by sensitivity, adaptive capacity, and magnitude of impact; and Significant environmental effect (in relation to a major accident and / or disaster assessment) – includes the loss of life, permanent injury and temporary or permanent destruction of an environmental receptor which cannot be restored through minor clean-up and restoration.”



15.2.3 Site Specific Risk Assessment Methodology

The analysis of the predicted impacts of the Proposed development, with respect to major accidents and disasters, on human health and the environment during construction and operation are presented in this Chapter. The risk assessment identifies and quantifies risks focusing on potentially significant adverse effects of the Proposed Development on the environment, deriving from its vulnerability to risks of relevant major accidents and/or disasters. The approach to identifying and quantifying risks associated with the Proposed development by means of a site's specific risk assessment is derived from the EPA Guidelines on the Preparation of an EIAR (EPA, 2022) and all other documents outlined above.

Assessment methods quantify and predict the magnitude and significance of impacts. The methods employed for assessment and evaluation of the environmental topics for this Chapter are based on:

Schedule 6 of the Planning and Development Regulations, 2001, lists the information to be contained in an EIAR:

“a description of the expected significant adverse effects on the environment of the proposed development deriving from its vulnerability to risks of major accidents and/or disasters which are relevant to it. Relevant information available and obtained through risk assessments pursuant to European Union legislation such as the Seveso III Directive or the Nuclear Safety Directive or relevant assessments carried out pursuant to national legislation may be used for this purpose, provided that the requirements of the Environmental Impact Assessment Directive are met.

Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for, and proposed response to, emergencies arising from such events.”

1. Geospatial Analysis (cumulative impacts only – used to identify planning permissions/applications and Seveso Establishments within a 5km radius, no domino effects are expected outside of 5km).
2. Flood Risk Assessment following The Planning System and Flood Risk Management Guidelines for Planning Authorities published by the OPW in 2009 (OPW Guidelines).
3. IE Consulting completed a Site-Specific Flood Risk Assessment (SSFRA) 2025

15.2.4 Background to Control of Major Accident Hazards (COMAH) Involving Dangerous Substances Regulations

The Seveso III Directive (2012/18/EU) requires Member States to apply land-use or other relevant policies to ensure that appropriate distances are maintained between residential areas, areas of substantial public use and the environment, including areas of particular natural interest and sensitivity and hazardous establishments. For existing establishments, Member States are required to implement, if necessary, additional technical measures so that the risk to persons or the environment is maintained at an acceptable level.

The purpose of the Chemicals Act (Control of Major Accident Hazards Involving Dangerous Substances) Regulations (S.I. 209 of 2015) (COMAH Regulations) is to transpose the Seveso Directive into Irish law and lay down rules for the prevention of major accidents involving dangerous substances, and to seek to limit as far as possible the consequences for human health and the environment of such accidents, with the overall objective of providing a high level of protection in a consistent and effective manner.

The Health and Safety Authority (HSA) is the Competent Authority in Ireland as defined by Chemicals Act, Control of Major Accident Hazards Involving Dangerous Substances (COMAH) Regulations 2015, which implement the Seveso III Directive in Ireland. The HSA is responsible for ensuring that the impacts of facilities

which fall within the remit of this legislation are considered with respect to land use planning. This is achieved through the provision of technical advice to planning authorities.

The COMAH Regulations do not apply to the Proposed development as the Proposed development will not store significant quantities of hazardous materials which are in excess of the defined COMAH thresholds set out in Schedule 1 of the COMAH Regulations.

15.2.5 Site Specific Risk Assessment Methodology

The risk assessment identifies and quantifies risks focusing on potentially significant adverse effects of the Proposed Development on the environment, deriving from its vulnerability to risks of relevant major accidents and/or disasters. The approach to identifying and quantifying risks associated with the Proposed development by means of a sites specific risk assessment is derived from the EPA Guidelines on information to be contained in EIAR (EPA, 2022).

The criterion for categorising impact is derived from the EPA's Guidance on Assessing and Costing Environmental Liabilities (2014). In this guidance, the risk assessment methodology commences with the establishment of risk classification criteria followed by risk analysis based on these criteria. Risk classification tables are required in order to evaluate and rank the risks compared with each other. They form the basis for rating the likelihood of an event occurring and the consequences of impact if the event occurs. The approach used in this assessment is summarised as follows and has been derived from relevant guidance as described above:

- Identification of hazardous substances which could be present over the lifecycle of the Proposed development, including flammable substances, materials harmful to the environment and materials harmful to human health;
- Consideration of the quantities and storage arrangements associated with these substances and the prospective area operations at the Proposed development involving these materials;
- Identification of potential MA&D Risk Events associated with these materials and operations. Assessment of the vulnerability of the Proposed development to disasters as a result of, for example, location, infrastructure, climatic conditions, and geological events;
- Where credible MA&D Risk Events and Disasters are identified, the reasonable worst-case consequence of each Risk Event is assessed in qualitative terms, based on factors including receptors which could be affected, and mitigation measures already in place (see Table 15-1); and,
- The likelihood and consequence ratings are combined to form a risk score for risk evaluation (see Table 15-2).

Table 15-1 Risk Classification - Likelihood

Rating	Category	Description
1	Very low	Very low chance of hazard occurring
2	Low	Low chance of hazard occurring
3	Medium	Medium chance of hazard occurring
4	High	High chance of hazard occurring
5	Very high	Very high chance of hazard occurring



Table 15-2 Risk Classification - Consequence

Rating	Category	Description
1	Trivial	Small number of people affected, no fatalities No contamination to environment.
2	Minor	Single fatality: limited number of people affected; a few serious injuries Localised contamination effects of short duration.
3	Moderate	Significant number of people in affected area impacted with multiple fatalities Contamination effects widespread or of extended duration.
4	Major	5 to 50 fatalities, up to 100 serious injuries Heavy contamination, localised effects, or extended duration.
5	Massive	Large numbers of people impacted with a significant number of fatalities (>50), injuries in the hundreds Very heavy contamination, widespread effects of extended duration.

The risks are then ranked according to their own risk score (1-5) in a colour coded matrix able which allows risks to be easily displayed and prioritised. The colour codes are as follows and indicated in Table 15-3 below:

- Red – high level risks requiring priority action (overall risk scores of 15-25);
- Yellow – medium-level risks requiring action, but not as critical as red-coded risks (overall risk scores of 8-12); and
- Green (light and dark) – low-level risks requiring continuing awareness and monitoring on a regular basis (overall risk scores of 1-6).

Table 15-3 Example Risk Matrix

		Consequence →				
		Trivial	Minor	Moderate	Major	Massive
↑ Likelihood	Very High	Low	Medium	High	High	High
	High	Low	Medium	Medium	High	High
	Medium	Low	Low	Medium	Medium	High
	Low	Low	Low	Low	Medium	Medium

15.2.6 Forecasting Methods and Difficulties Encountered

No difficulties were encountered in completing this chapter.

15.3 Receiving Environment

The EIA Directive requires the following to be described relating to the baseline scenario:

“A description of the relevant aspects of the current state of the environment (baseline scenario).”



15.3.1 Nearby Seveso Establishments

Seveso establishments have a “consultation distance” which is defined as “a distance or area relating to an establishment, within which there are potentially significant consequences for human health or the environment from a major accident at the establishment” (COMAH Regulations).

There are no Seveso sites within 5km of the Proposed development site and the site is not located within the consultation zones of any Seveso establishment; therefore, there are no constraints to the Proposed development from nearby Seveso establishments.

15.3.2 Nearby Aerodromes

There are no Aerodromes or Airfields within 5 km of the Proposed development ; therefore, there are no constraints on the Proposed development from nearby Aerodromes or Airfields.

15.3.3 Seismic Activity

In Ireland, seismic activity is recorded by the Irish National Seismic Network. The Geophysics Section of the School of Cosmic Physics, Dublin Institute for Advanced Studies, has been recording seismic events in Ireland since 1978 (www.dias.ie). This network consists of several seismometers that are located throughout Ireland.

Figure 15-1 illustrates historical and recorded seismic events since 1980.

Seismic activity and earthquake risk in Ireland are generally considered to be low. This is because Ireland is located on the western edge of the Eurasian Plate, which is a tectonic plate that is not known for its seismic activity. However, earthquakes can still occur in Ireland, although they are typically small and have little impact.

It can be seen in that there is no seismic activity recorded in the vicinity of the Proposed development . Therefore, the likelihood of seismic activity impacting the Proposed development is negligible; therefore, not significant.

15.3.4 Landslides

Much of the Earth’s surface is covered by unconsolidated sediments which can be especially prone to instability. Instability is often significantly increased by man’s activities in building houses, roads, drainage, and agricultural changes, which can result in landslides, mud flows, bog bursts, and debris flows. These can cause damage to property, infrastructure, the natural environment, and can also pose a risk to human life.

In general, risk of landslides in Ireland is considered to be low, as the country is not located in a region with high seismic activity or large mountain ranges. Landslides are more common in unconsolidated material than in bedrock, and where the sea constantly erodes the material at the base of a cliff landslides and falls lead to recession of the cliffs. Landslides have occurred in Ireland in recent years in upland peat areas due to disturbance of peat associated with construction activities.

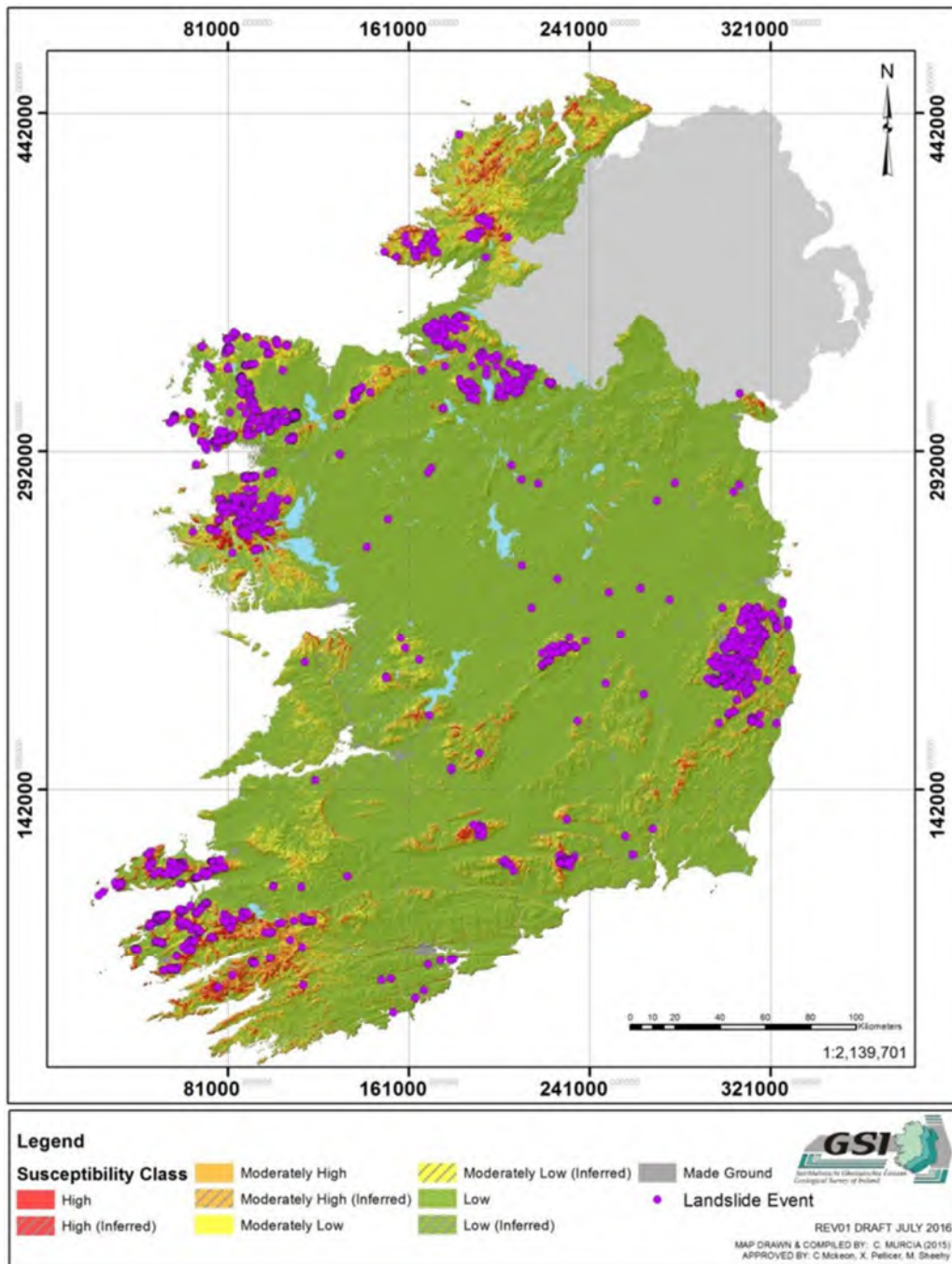


Figure 15-1 - Landslide Susceptibility Map (GSI Ireland)

The GSI Landslide Susceptibility Map (Figure 15-2) above identifies areas which are subject to landslides and is measured from low to high. Figure 15-2 considers the location of landslides and what causes them (slope, soil type, and the impact of the flow of water). No landslide susceptibility issues have been noted in the vicinity of the site. The closest landslide event reported is located ca. 10km north west of the site at Maidenhead/Arless, County Laois. It can be seen in Figure 15-2 that the Proposed development and the surrounding area have a low susceptibility of landslides. Therefore, the likelihood of a landslide impacting the Proposed development is negligible; therefore, not significant.

15.3.5 Rainfall

Long term rainfall and evaporation data were sourced from Met Éireann. The nearest rainfall station is Carlow (Oak Park), located ~4km northeast of the Proposed Development Site and has an Average Annual rainfall (AAR) of 840.2mm.

In addition to average rainfall data, extreme value rainfall depths are available from Met Eireann. The table below presents return period rainfall depths for the area of the Proposed Development Site. These data are taken from <https://www.met.ie/climate/services/rainfall-return-periods> and they provide rainfall depths for various storm durations and sample return periods (1-year, 5-year, 30-year, 100-year).

Table 15-4: Mortarstown WwTP – Return Period Rainfall Depths (mm)

Duration	Return Period (Years)			
	1	5	30	100
5 mins	3.5	5.7	9.5	12.9
15 mins	5.7	9.4	15.5	21.2
30 mins	7.5	11.9	19.1	25.6
1 hours	9.8	15.1	23.4	30.8
6 hours	19.7	27.9	40.0	49.9
12 hours	25.7	35.4	49.1	60.2
24 hours	33.7	44.9	60.4	72.5
2 days	41.2	53.9	71.1	84.4

15.3.6 Site Drainage

The existing drainage regime is characterised by a lack of surface water features. This is due to the permeable nature of the underlying subsoils, which comprise of sands and gravels. Therefore, the hydrogeological regime of the Proposed Development Site is characterised by low rates of surface water runoff and high rates of groundwater recharge.

To the west of the R448, where the topographic gradient increases higher rates of surface water runoff are likely to occur, with this runoff discharging into the River Barrow.

15.3.7 Flooding

To identify those areas as being at risk of flooding, OPW's indicative river and coastal flood map, CFRAM Flood Risk Assessment maps (www.floodinfo.ie), historical mapping (i.e. 6" and 25" base maps) and the Geological Survey of Ireland Groundwater Flood Maps (www.floodinfo.ie) were consulted.



Several recurring flood incidents and historic flood events are recorded in the vicinity of the Proposed Development Site. A recurring flood event is mapped by the OPW on the western bank of the River Barrow to the southwest of the existing Kilkenny Road Pumping Station (Flood ID: 2741). Here the River Barrow is reported to overflow its banks at Crossneen every year following heavy rainfall. Further downstream, a recurring fluvial flood event (Flood ID: 2960) is mapped at Milford, Co. Carlow, ~4km southwest of Mortarstown WwTP. Recurring fluvial flood events on the River Barrow are also reported further downstream at Leighlinbridge (Flood ID: 255) and Bagenalstown (Flood ID: 2952) Co. Carlow and Graiguenamanagh, Co. Kilkenny. Meanwhile, upstream of the Proposed Development Site, several historic fluvial flood events dating from 2008 and 2009 are reported in Carlow town centre.

The GSI Winter 2015/2016 Surface Water Flood Map (www.floodinfo.ie) shows surface water flood extents during the 2015/2016 flood event. This flood event is recognised as being the largest event on record in many areas. This flood map records some areas of fluvial flooding along the River Barrow in the vicinity of the existing Kilkenny Road Pumping Station. However, this flood zone does not extend any significant distance from the river. No additional flood zones are recorded in the Proposed Development Site. This historic flood map indicates that River Barrow preferentially flooded its western bank during this historic flood event.

The CFRAM fluvial flood maps are available for the area of the Proposed Development Site. The CFRAM also shows that in this area the River Barrow preferentially floods its western bank. CFRAM maps records the presence of an embankment along the River Barrow's eastern bank, to the west of the Proposed Development Site. The western section of the existing Kilkenny Road Pumping Station is mapped within the 10-year fluvial flood zone (*i.e.* Fluvial Flood Zone A). Further south, in the vicinity of Mortarstown WwTP, fluvial flood zones do not extend to the east of the R448. This area of the Proposed Development Site is located in Fluvial Flood Zone C (*i.e.* low risk of fluvial flooding) A map showing the modelled CFRAM fluvial flood zones is included as Figure 15-3 below.

Flood risk assessments must also consider increased rainfall rates associated with climate change. The Mid-Range Future Scenario (increase in rainfall of 20%) and High-End Future Scenario (increase in rainfall of 30%) fluvial flood maps show an increased area of fluvial flooding along the River Barrow for both scenarios. In both scenarios the north of the Proposed Development Site is mapped in the 1 in 100-year fluvial flood zone (Fluvial Flood Zone A) at the location of the existing Kilkenny Road Pumping Station. Further south, the low probability fluvial flood zones (1 in 1,000-year flood event) do not extend to the east of the R448.

Therefore, the primary risk of flooding at the Proposed Development Site is associated with fluvial flooding due to the sites close proximity to the River Barrow. While the majority of the Proposed Development Site is located in Fluvial Flood Zone C with a low risk of flooding, some sections in the east, adjacent to the River Barrow, are located in Fluvial Flood Zone A.

IE Consulting completed a Site-Specific Flood Risk Assessment (SSFRA) for the Proposed Development (September 2025). The SSFRA can be found in Appendix 12-1 in Volume 3 of the EIAR and assessed the flood risk associated with the proposed outfall pipe and associated headwall. The primary flood risk is associated with fluvial flooding on the River Barrow, with the headwall and outfall pipe located within the modelled Fluvial Flood Zone A and B. However, these elements are considered to be 'Water Compatible' and are not subject to the requirements of a Justification Test. Hydraulic modelling confirmed that the proposed headwall and outfall pipe will not result in an adverse impact to the existing hydrological regime or increase the flood risk in adjacent lands. There is no predictive increase in flood extents when comparing the undeveloped baseline scenario with the proposed development scenario. The SSFRA concludes that the potential flood risk to and from the proposed outfall pipe and headwall is considered to be low, and is considered to be appropriate from a flood risk perspective.



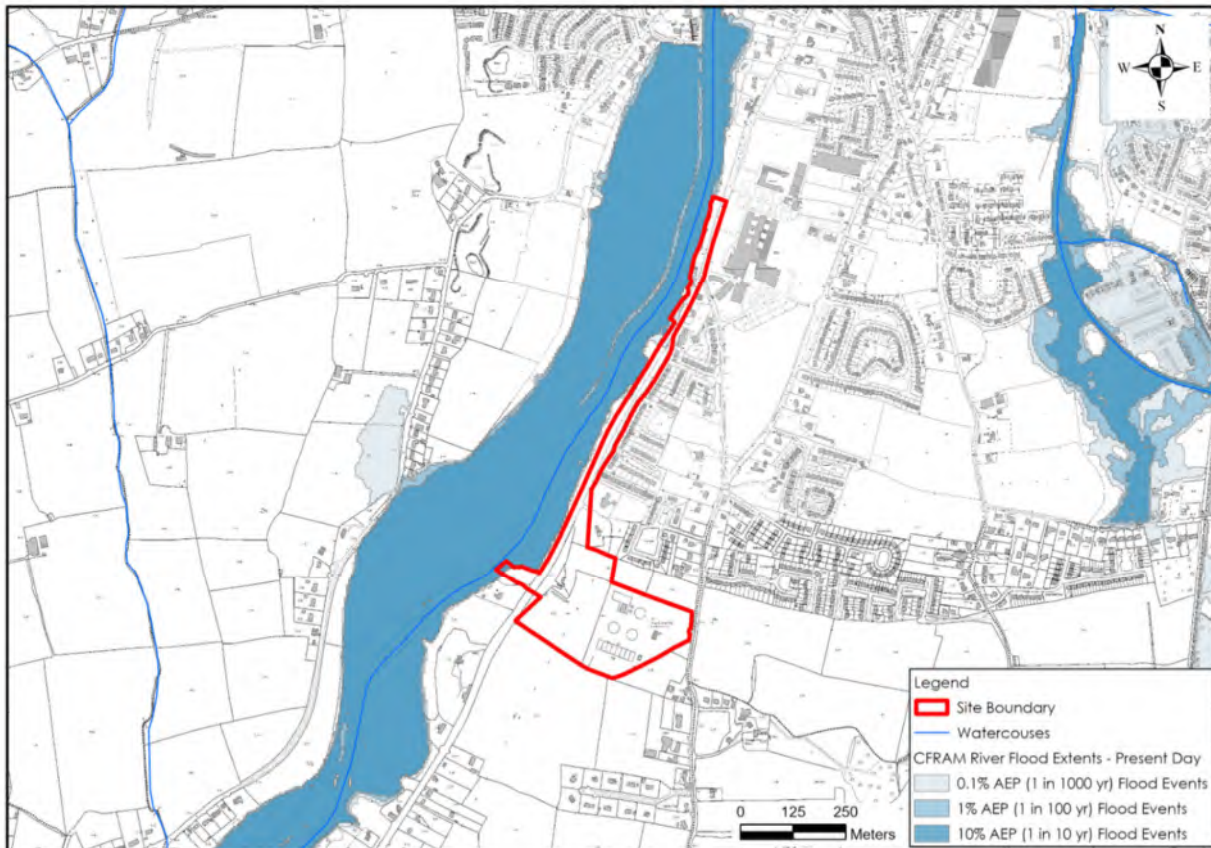


Figure 15-2 - CFRAM Fluvial Flood Zone Mapping

15.3.8 Groundwater Vulnerability

Groundwater Vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities (www.gsi.ie). Groundwater vulnerability maps are based on the type and thicknesses of soils/subsoils and the presence of karst features.

Groundwater vulnerability at the Proposed Development Site is mapped by the GSI as 'High' (www.gsi.ie). The high groundwater vulnerability is a result of the well-drained and permeable nature of the glacio-fluvial subsoils underlying the Proposed Development Site. The presence of these permeable strata have been verified through site specific investigations which encountered permeable sands and gravels.

15.3.9 Surface Water Body Status

A summary of the WFD status and risk result of the River Barrow immediately upstream and downstream of the Proposed Development Site are shown in the table below. Local Surface Waterbody (SWB) Status and risk results are available from www.catchments.ie.

In the vicinity and downstream of the Proposed Development Site, the River Barrow (Barrow_160, _170 and _180 SWBs) has been assigned 'Moderate' status in the latest WFD cycle (2019-2024). These SWBs are listed as being 'at risk' of failing to meet their respective WFD objectives. Hydromorphology is listed as a significant pressure on the Barrow_160 and the Barrow_170 SWBs. Urban run-off is listed as a significant pressure on the

Barrow_160 and the Barrow_180 SWBs. Meanwhile, agriculture is also listed as a significant pressure on the Barrow_170 and the Barrow_180 SWBs.

The 3rd Cycle Barrow Catchment Report (EPA, 2024) states that the issues driven by these pressures are mainly nutrient pollution, altered morphological condition (habitat) and organic pollution impacts for surface water, and nutrient pollution, chemical quality diminution for surface water and chemical pollution for groundwaters.

Table 15-5: Summary WFD Information for the River Barrow

SWB	Overall Status (2013-2018)	Overall Status (2016-2021)	Overall Status (2019-2024)	Risk Status	Pressures
Barrow_160	Moderate	Moderate	Moderate	At Risk	Hydromorphology and Urban Run Off
Barrow_170	Moderate	Moderate	Moderate	At Risk	Hydromorphology and Agriculture
Barrow_180	Moderate	Moderate	Moderate	At Risk	Agriculture and Urban Run Off

15.3.10 Designated Sites and Habitats

In the Republic of Ireland, designated sites include proposed National Heritage Areas (pNHAs), National Heritage Areas (NHAs), Special Areas of Conservation (SAC), and Special Protection Areas (SPA's).

The north of the Proposed Development Site encroaches upon the River Barrow and River Nore SAC (Site Code: 002162) in the vicinity of the existing Kilkenny Road Pumping Station and in the south of the Proposed Development Site to the west of the R448. This designated site comprises the freshwater stretches of the Barrow and Nore River Catchments as far upstream as the Slieve Bloom Mountains and includes the downstream tidal and estuarine elements. The site is designated as an SAC for several water dependent species and habitats. Given the nature of the Proposed Development, comprising the upgrade of an existing WwTP which discharges to the River Barrow, the Proposed Development has the potential to effect the status and conservation objectives of the SAC.

In addition, several pNHAs are located downstream of the Proposed Development Site along the River Barrow. These include Cloghrick Wood pNHA (Site Code: 000806), located ~4.4km south of the Proposed Development Site, Clohastia pNHA (Site Code: 000830) located to the northeast of the Graiguenamanagh, ~28km south of the Proposed Development Site (straight line distance). The River Barrow Estuary pNHA (Site Code: 000698), located ~39km south of the Proposed Development Site (straight line distance). The Proposed Development is hydrologically connected with these designated sites via the River Barrow. However, given the distance between Clohastia pNHA and the River Barrow Estuary pNHA and the Proposed Development Site there is no potential for significant effects to occur.

No salmonid protected rivers are mapped downstream of the Proposed Development Site.

The closest designated shellfish areas downstream of the Proposed Development Site is the Waterford Harbour (Cheekpoint/Arthurstown/Creadon) shellfish area. This designated shellfish area is located ca. 60km south of the Proposed Development Site (straight line distance).



The closest protected downstream bathing waters are at Duncannon, Co. Wexford. These designated bathing waters are located ca. 65km south of the Proposed Development Site (straight line distance).

A map of local designated sites is presented below.

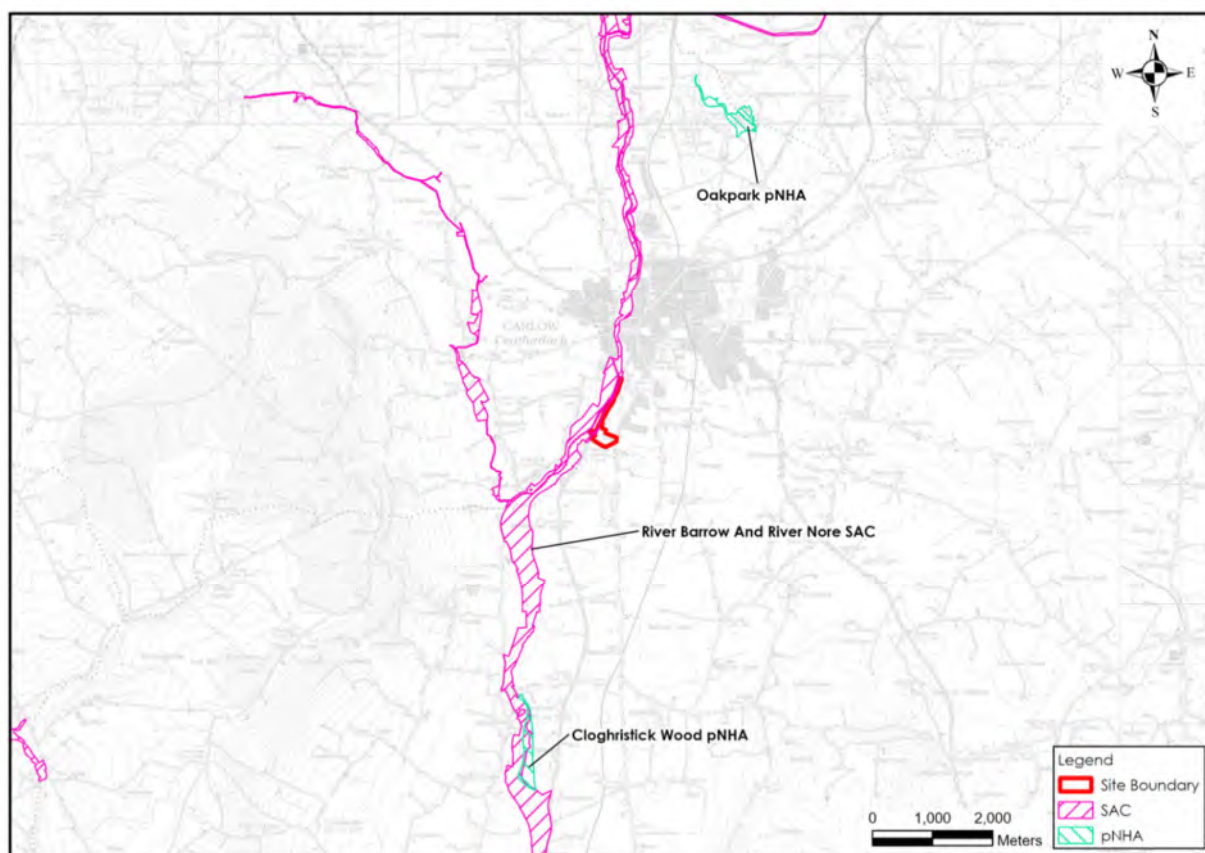


Figure 15-3 - Designated Sites Map

15.3.11 Receptor Sensitivity

Due to the nature of the Proposed Development comprising of upgrades to an existing WwTP which discharges treated effluent to the River Barrow, surface water is the main potential sensitive receptor.

Surface waters in the vicinity of the Proposed Development Site can be considered to be of Extremely High Importance due to their designation as a site of international importance *i.e.* River Barrow and River Nore SAC. This SAC contains water dependent habitats and species and has the potential to be affected by the Proposed Development. The River Barrow has also been listed as a Nutrient Sensitive Area whose waters are listed in the Urban Wastewater (Nutrient -Sensitive Areas) Regulations (S.I. 403/2025). Therefore, the River Barrow, and the River Barrow and River Nore SAC will be included for further assessment due to their sensitivity, close proximity and hydrological connectivity to the Proposed Development Site.

In addition, several pNHAs are also hydrologically linked with the Proposed Development Site via the River Barrow. Cloghrislick Wood pNHA is located ca. 4km southwest of the Proposed Development Site along the River Barrow and will be included in the assessment due to its proximal location to the Proposed Development.

Other designated sites located further downstream have no potential to be affected by the Proposed Development due to their distant location from the Proposed Development Site and the large volumes of water

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within the River Barrow. The mitigation measures prescribed in this EIAR will ensure the protection of the hydrological environment in the immediate vicinity of the site, therefore, also protecting all receptors located further downstream.

In terms of groundwater receptors, the Regionally Important Gravel and Karst Aquifers underlying the Proposed Development Site are considered to be of Extremely High Importance. These groundwaters support the River Barrow and River Nore SAC, which is of high value on an international scale, and flows immediately to the west of the Proposed Development Site. Groundwater quality and quantity will be at risk during the construction, operational and decommissioning phases of the Proposed development due to the permeable nature of the local subsoils. Therefore, local groundwater quality and quantity will be considered in the impact assessment.

15.4 Characteristics of the Proposed Development

The purpose of this section is to provide an overview of the key relevant details of the construction, operational and decommissioning phases of the Proposed development. The information presented in this section is informed by the Proposed Development design, but it is not a complete description of the Proposed development. Therefore, it should be read in conjunction with the full project package (see Chapter 2).

Chapter 2 provides a detailed overview of the lifecycle of the project, including reference to the civil engineering, drawings, plans, reports, and other relevant documents in order to define the Proposed development.

15.5 Potential Effects During Construction Effects

15.5.1 Flammable Gas Cylinders

Construction and maintenance activities may require welding which can be carried out using compressed gases such as acetylene. There is the potential for a release of flammable gas, including an explosive depressurisation event, for example due to accidental damage to a gas cylinder, pressure regulator, or associated pipework. The released gas could be ignited, resulting in a fire or explosion. The potential risks of which could include harm to persons due to thermal radiation and damage to property and the environment.

15.5.2 Concrete

There is the potential for an accidental release of concrete into the soil, or surface water during the construction of the proposed upgrades. Concrete is not classified hazardous in accordance with the Chemical, Label and Packaging (CLP) Regulations (EC No. 1272/2008); however, concrete paste is alkaline (pH 10-14); therefore the potential impacts if concrete enters the environment via a release to water, include:

- Raising the pH causing harm to aquatic ecosystems
- Cause sedimentation on aquatic beds, which could harm flora and fauna.

15.5.3 Fuel Storage

Small quantities of diesel will be present on-site for use in construction vehicles and equipment. All site vehicles used will be refuelled in bunded and adequately sealed and covered areas in the construction compound area.

Diesel is classified as an ignition category 3 substance, following the criteria in the Guidance on Technical Land Use Planning (HSA, 2023); therefore, it has an ignition probability of 0. Therefore, there is no potential for flammable hazards associated with diesel and it is therefore scoped out from further assessment.

Diesel is also classified as harmful to the environment.

Due to the small quantities of diesel involved, a spill of diesel will not have the potential to meet the criteria for a major accident; therefore, it is scoped out from further assessment.

15.5.4 Major Accidents and Disasters

General construction activities will include ground preparation, excavation, construction of structures. These activities will require the use of vehicles and tools. The hazards associated with activities include the potential for vehicle impact, particularly during reversing and vehicle overturning. The controls around this work will be managed by appropriate risk assessments to control the risks to people, the environment and also to the existing operational areas.

A site-specific Construction Environmental Management Plan (CEMP) and a Health and Safety Plan will be produced by the Construction Contractor, covering the construction and commissioning of the Proposed development. The detailed CEMP will be prepared to ensure compliance with relevant health and safety legislation including the Safety, Health, and Welfare at Work Act (2005).

An emergency plan for the construction phase to deal with accidental spillages will be contained within the CEMP. These measures are summarised as follows:

- The source of the spill will be identified and stopped;
- The Environmental Manager will be immediately notified of the spill so that they can take appropriate action;
- The spill will be contained using spill control materials (for example absorbent pads), ensuring not to spread the spill within the wider environment;
- If possible, cover or isolate vulnerable areas such as surface water drains;
- The spill will be cleaned using spill control materials which will be disposed of by a fully licenced waste contractor with the appropriate permits;
- The Environmental manager will inspect the site to ensure that all measures are in place to prevent further spillage from occurring. Any storage areas are to be fully bunded and spill kits available to deal with accidental spillages; and
- The Environmental Manager will notify the county council of the spillage and the remedial and preventative actions undertaken.

The following risks of major accidents or disasters associated with the Proposed development have been identified for further assessment:

- Extreme heat or cold weather resulting in structural damage and/or pollution to soils, groundwater or surface waters
- Storm events (including lightning) resulting in structural damage and/or pollution to groundwater and surface waters
- Flooding
- Flash fire, Explosion or Jet fire following compressed gas cylinder release (e.g. acetylene for welding)
- Release of Concrete paste to surrounding environment
- Release of silt laden waters, muds, drilling spoils, hydrocarbons from the drilling equipment, stripped soil, and drilled cuttings

The impact and likelihood of these scenarios is assessed below. There are no likely impacts on the Proposed Development to off-site receptors during the construction phase in relation to major accidents and disasters.

Table 15-6 - Assessment of Major Accidents and Disasters for Construction Phase

Risk ID	Major Accident	Effect	Consequence Rating	Basis of Consequence	Likelihood Rating	Basis of Likelihood	Risk Score
C1	Extreme heat or cold weather resulting in result structural damage and/or pollution to soils, groundwater, or surface waters	Human health, biodiversity, soils and geology, hydrology, and hydrogeology	2	The Proposed development will be constructed, and operated in accordance with all relevant planning, building and environmental licencing codes (Building Regulations, 2012).	1	All construction activities will be suspended during extreme weather events.	2
C2	Storm events (including lightning) resulting in structural damage and/or pollution to groundwater and surface waters	Human health, biodiversity, soils and geology, hydrology, and hydrogeology	2	The engineering design of the Proposed development will incorporate lightning mitigation. This will be assessed in accordance with recognised industry standards such as EN/IEC 62305.	1	All construction activities will be suspended during extreme weather events.	2
C3	Flooding	Human health, biodiversity, soils and geology, hydrology, and hydrogeology	2	A Flood Risk Assessment was prepared in accordance with 'The Planning System and Flood Risk Management - Guidelines for Planning Authorities' issued by the Department of Environment, Heritage, and Local Government in November 2009.	1	This area of the Proposed Development Site is located in Fluvial Flood Zone C (i.e. low risk of fluvial flooding). The SSFRA concludes that the potential flood risk to and from the proposed outfall pipe and headwall is considered to be low, and is considered to be appropriate from a flood risk perspective.	2
C4	Flash fire, Explosion or Jet fire following compressed gas cylinder release (e.g. acetylene for welding)	Human Health	3	There is potential for harm to persons on-site in the vicinity of the hazardous gas release. A Site Emergency Response Plan will be developed prior to the commencement of operations and will include	1	European Industrial Gases Association standard procedures will be used for the storage and use of gas cylinders. When not in use, cylinders will be stored in external, well-ventilated areas and when in use, appropriately certified equipment will reduce the potential	3

Risk ID	Major Accident	Effect	Consequence Rating	Basis of Consequence	Likelihood Rating	Basis of Likelihood	Risk Score
				detailed procedures in the event of a major accident.		for ignition if a flammable gas is accidentally released. Detailed method statements, plans, and assessments will be produced to carry out gas activities safely.	
C5	Release of Concrete paste to surrounding environment	Biodiversity, soils and geology, hydrology, and hydrogeology	3	The low quantities associated with a potential release would not likely result in serious consequences. Proposed development site has hydrological links to designated sites.	1	Temporary storage systems will be present during construction of the Proposed development and Overall Project. Containment systems to intercept any material released will be developed within a Construction Phase Environmental Management Plan (CEMP) and standard techniques will be used to pour cement onto prepared areas. Where possible, ready-mixed and pre-cast elements will be used.	3
C6	Release of silt laden waters, muds, drilling spoils, hydrocarbons from the drilling equipment, stripped soil, bentonite, and drilled cuttings during Horizontal Directional Drilling	Biodiversity, Hydrology and hydrogeology, soil, and geology	3	The low quantities associated with a potential release would not likely result in serious consequences. Proposed development site has hydrological links to designated sites.	1	Adequate mitigation measures will be present to collect and stop any spill going into the water and soil. Such as silt fencing, bunding around drill inlet and outlet points, use of PVC lining. Spill collection measures, general pollution control measures. A CEMP will be in place prior to construction which will set out the approach to preventing a release to the environment. Daily monitoring of the excavation/earthworks and associated water management systems will be completed by a suitable qualified person during the construction phase.	3



15.6 Potential Effects During Operational Phase

The following potential risks of major accidents or disasters in connection with the Proposed development have been assessed:

- Extreme heat or cold weather resulting in structural damage and/or pollution to soils, groundwater, or surface waters;
- Storm events resulting in structural damage and/or pollution to groundwater and surface waters;
- Flooding;
- Release of hazardous material and/or effluent leak following plant failure and/or pollution to soils, groundwater, or surface waters.

The impact and likelihood of these scenarios is assessed in Table 15-7. There are no likely impacts on the proposed development or to off-site receptors during the operational phase in relation to major accidents and disasters.



Table 15-7 Assessment of Major Accidents and Disasters for Operational Phase

Risk ID	Major Scenario	Accident	Effect	Consequence Rating	Basis of Consequence	Likelihood Rating	Basis of Likelihood	Risk Score
O1	Flooding		Human health, biodiversity, soils and geology, hydrology, and hydrogeology	2	A Flood Risk Assessment was prepared in accordance with 'The Planning System and Flood Risk Management -Guidelines for Planning Authorities' issued by the Department of Environment, Heritage, and Local Government in November 2009. It was concluded that the Proposed development is within Flood Zone C.	1	The flood risk assessment concluded that there is no flood risk to the site.	2
O2	Extreme Weather (e.g. heat, cold, wind and storms, resulting in structural damage)		Human health, biodiversity, soils and geology, hydrology, and hydrogeology	2	Increases in extreme weather could lead to operational instability in equipment, including electrical apparatus that is sensitive to temperature and humidity, e.g. sensors and/or ventilation systems . While extreme temperatures may cause temporary interruptions to operations at the Proposed development , they are not expected to lead to incidents with the potential to cause a major accident or disaster. Increasing atmospheric wind speeds could cause structures to become unstable. In a worst-case event, these structures could fall and/or collapse resulting in harm to people in the vicinity. The structural engineering design of the facilities will calculate wind loading and other requirements based on industry standard guidance and methods.	1	The Proposed development will be constructed, and operated in accordance with all relevant planning, building and environmental licencing codes (Building Regulations, 2012). The engineering design of the facilities will take operation at future climatic conditions into account.	2
O3	Storm events (including lightning) resulting in structural		Human health, biodiversity, soils and	2	The engineering design of the Proposed Development will incorporate lightning mitigation. This will be assessed in accordance with	1	A Standard Operating Procedure will be implemented for plant operation by	2

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Risk ID	Major Scenario	Accident	Effect	Consequence Rating	Basis of Consequence	Likelihood Rating	Basis of Likelihood	Risk Score
	damage to groundwater and surface waters	and/or to and	geology, hydrology, and hydrogeology		recognised industry standards such as EN/IEC 62305.		personnel during extreme heat and cold.	
O4	Release of hazardous material and/or Effluent leak following plant failure and/or pollution to soils, groundwater, or surface waters		Biodiversity, soils and geology, hydrology, and hydrogeology	3	There is potential for high levels of organic matter and nutrients to enter surface waters and groundwater. This could lead to eutrophication, causing oxygen depletion and environmental degradation. Proposed development site has hydrological links to designated sites.	1	The Proposed Development will also operate under discharge licence conditions which will include, but not limited to, Emission Limit Values (ELV) to ensure the receiving watercourses meet "Good" status as per guidelines specified by the Water Framework Directive (WFD). The proposed WwTP has a surface water drainage system which includes infrastructure such as filter drainage along access road, a kerb and gulley drainage system within the WwTP site and surface drainage outlet pipe to connection to storm water overflow pipeline which includes an oil/petrol interceptor.	3



15.7 Potential Effects During the Decommissioning Phase

Mortarstown WwTP is owned and operated by UÉ. They will be responsible for the future intentions of this facility if the plant were decommissioned. The design lifespan of the upgraded plant is 25 years but it is anticipated that it will be maintained, and periodic upgrading undertaken over a longer lifetime to meet future demand and upgrades in technology.

In the event of facility shutdown UÉ will decommission, render safe or remove for disposal/recovery, all materials, waste, ground, plant, and equipment that could result in environmental pollution.

Decommissioning would follow a staged, compliant process focused on safety, environmental protection, and traceable documentation in accordance with prevailing best practice at the time of closure.

Under Licence requirements, an Environmental Liabilities Risk Assessment (ELRA) and/or a Closure, Restoration and Aftercare Management Plan (CRAMP) will be prepared. This will include stakeholder notifications, risk assessments (covering odour, confined spaces, and residual chemicals), and a method statement for flow diversion. It is anticipated that any shutdown of all or part of the site operations would be preceded by a scaling down of activities therefore further reducing the quantities of materials, particularly chemicals to be dealt with. Wastewater would be gradually rerouted to the replacement works or temporary treatment so the plant could be safely run down.

The decommissioning process would involve the safe isolation of all infrastructure, removal of gas, and the de-energisation of equipment. All tanks and pipelines would be isolated, drained, cleaned, and made gas-safe, with residual sludge dewatered and removed to an approved facility. Above-ground equipment, such as valves, pipework, gantries, platforms, kiosks, and associated infrastructure, would be dismantled and removed from site by suitably qualified contractors. Materials would be segregated and sent for re-use, recycling, or licensed disposal in line with legislative requirements and commercial viability.

MEICA systems would be de-energized, disconnected, and either removed for reuse/recycling or disposed of per Waste Electrical and Electronic Equipment (WEEE) and hazardous waste disposal requirements.

Structural works would then proceed under a demolition plan and civil structures would be demolished using controlled methods, with concrete and steel segregated for recycling. Sub-surface foundations may be broken to a depth of 1m below ground level, with the remainder left *in-situ*.

Successful decommissioning will only be complete when all buildings, infrastructure, equipment, materials, wastes, or any other materials, which could result in environmental pollution, are removed from the site and recycled, recovered, or disposed of in accordance with all regulations in force at the time.

There are no likely impacts on the proposed development or to off-site receptors during decommissioning in relation to major accidents and disasters.

15.8 Mitigation Measures

The Proposed development has been designed in line with good industry practice, and mitigation against the risk of major accidents and/or disasters is embedded through the design, in accordance with planning and legislative requirements. There is a layered suite of mitigation measures embedded across design, construction, operation and decommissioning to prevent, detect and respond to major accidents and disasters. This includes regulatory compliance with Industrial Emissions licensing and adherence to national and international codes and standards.



As no likely significant effects were identified for the construction, operational and decommissioning phases, no additional mitigation measures are proposed.

15.9 Monitoring Measures

15.9.1 Monitoring during Construction

As outlined above, a detailed CEMP will be prepared prior to the commencement of the any works and monitoring measure will be implemented during construction. The CEMP will be a live document maintained by the appointed Contractor and will ensure that potential risks of major accident and/or disaster are monitored, as required.

Refer to Volume 3 of this EIAR for the Outline CEMP.

15.9.2 Monitoring during Operation

UÉ and the contractors responsible for the operation of the WwTP will continue to assess the risk of major accidents and/or disasters on site on an on-going basis during operation. The maintenance programme, record or reported incidents, as well as general site operations will be monitored on a regular basis.

15.10 Residual Effects

The residual effects are the final predicted or intended effects which occur after the proposed mitigation measures have been implemented. As no likely significant effects were identified, there is no potential for residual effects.

Do-Nothing Scenario

The EIA Directive requires the following to be described relating to the future receiving environment (the 'Do Nothing' scenario):

“an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.”

If the Proposed Development were not to proceed, the existing Mortarstown WwTP operations will continue. The upgrade of the WwTP is required to provide treatment capacity for Carlow and its surroundings for current and future flows and loadings to the plant. The existing WwTP will experience extreme hydraulic overloading which may worsen with population growth and planned development within the catchment. The aged infrastructure is declining and incapable in terms of expected operation and sizing. This could increase the likelihood of a release of effluent to the surrounding area which would have a negative impact on the surrounding hydrological and hydrogeological environment.

15.11 Difficulties encountered during preparation of this chapter

No difficulties were encountered in completing this chapter.



16. CUMULATIVE EFFECTS

16.1 Introduction

Cumulative effects are changes to the environment that arise because of an action in combination with other actions. This Chapter assesses the potential for the Proposed Development to act in combination with permitted developments / projects within the vicinity to result in cumulative impacts on the environment. It will examine whether the addition of effects from the Proposed Development itself or in combination with the effects of other permitted projects will have more significant effects when combined.

The EIAR has considered and assessed the interactive effects due to construction and operation of the Proposed Development. Competent technical experts, as presented in Chapter 1 of this EIAR, have carried out a cumulative effects assessment with respect to the following specific environmental factors:

- Population and Human Health
- Biodiversity
- Noise & Vibration
- Land, Soil and Geology
- Water
- Air Quality & Odour
- Climate
- Material Assets
- Cultural Heritage
- Landscape & Visual Impact Assessment
- Traffic
- Major Accidents and Disasters.

The EIA Directive states that an EIAR should contain cumulative effects, which are defined as:

‘A description of the likely significant effects of the project on the environment resulting from...the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources.’

The cumulative effects assessment considers developments which have potential for cumulative effects with the Proposed Development and which have planning permission and/or which are in the planning system but where a planning decision is not expected to have been made by the time the Proposed Development is operational.

Interactions are considered in Chapter 17 of this EIAR which identifies the principal interactions between the potential impacts of the various environmental factors (i.e. Chapter 4 to Chapter 15).

16.2 Methodology

Cumulative effects are defined as “the addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects” (EPA, 2022).

All developments within a 2 km radius of the Proposed Development that have been approved by Carlow County Council, Laois County Council, or An Coimisiún Pleanála (ACP) within the last five years were reviewed. An initial screening of planning applications in the vicinity was undertaken, during which developments were assessed on an individual basis. Developments that were already constructed, were small in scale (e.g., extensions or retention works), or were located at a sufficient distance from the Proposed Development were not considered further in this assessment.



The following sources were consulted as part of the review:

- Carlow County Council Planning Website: www.eplanning.ie/CarlowCC/searchtypes
- Laois County Council Planning Website: [ePlan – Find a Planning Application](http://ePlan-Find-a-Planning-Application)
- An Coimisiún Pleanála Website: www.pleanala.ie
- Transport Infrastructure Ireland (TII) Website (where relevant)

A review of large-scale developments within the immediate environs of the Proposed Development, approved within the last five years (last reviewed: May 2026), indicates that the majority have either been constructed, are small in scale, or are located at a sufficient distance such that they are unlikely to give rise to significant cumulative effects. No active projects were identified within the footprint of the Proposed Development.

Following this initial screening, a shortlist of 27no. projects were identified and assessed in further detail (May 2026) (as presented in Table 16-1). Each development was reviewed with respect to its location and nature, and assessed by individual specialists to identify potential cumulative effects within their respective environmental disciplines as part of the EIAR.

The cumulative effects assessment has been undertaken on a qualitative basis for each environmental topic, in accordance with the EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022). In line with these guidelines, cumulative effects refer to “the addition of many minor or insignificant effects, including the effects of other projects, to create larger, more significant effects.”

Carlow County Council has advised of a proposed infrastructure project, the Carlow Southern Relief Road, which is planned along the northern boundary of the wastewater treatment plant (WwTP) site. The scheme includes a river crossing, with the roundabout to the northwest of the site proposed to be elevated. The current programme indicates route selection is expected to be completed by Q4-2026, with a planning application anticipated in Q1 2028. This project has therefore been included in the cumulative effects assessment presented in Chapter 16 of this EIAR.

The list of projects considered is provided in Table 16-1.

Table 16-1 - Projects considered with respect to potential cumulative effects

File Number	Decision Date	Description	County	Cumulative Effect Assessment
20234	08/09/2020 Expired – 29/08/2025	Extension of Duration PL15/2 - erect a concrete batching plant and ancillary plant, a blockyard, office, a concrete washout facility and to widen an existing entrance on its land	Carlow	The application is for works located c. 3.72 km southwest of the Proposed Development. However, due to the nature of the works and distance from the proposed development both straight line and downstream, it is unlikely there will be significant cumulative effects as a result of the project. Planning permission has expired. Therefore, no cumulative significant effects are likely to occur.
20293	13/10/2020, Permission Expired - 09/11/2025	Modifications to development previously permitted under PL Ref: 15/324 & PL Ref: 18/178 comprising of (i) alterations to Pavilion building roof structure including revisions to roof lights (ii) revisions to material finishes on the elevations of the pavilion building. (iii) Revisions to the elevations and internal layout of the maintenance building. (iv) Revisions to Signage at main site entrance. (v) and all associated works. Planning Ref 18/178: Phase 2 of the New Sports Campus. The planning application relates to the a second phase of a previously permitted sports pitches development (permitted under PL. Ref 15/324):- This planning application therefore relates to 1) new pavilion building (1,241 sq.m), maintenance building (300 sq.m) with yard enclosure, ESB substation/switch room (28 sq.m), 2) 400 m 8 lane synthetic running track, long jump	Carlow	The application is for works located c. 210m southwest of the Proposed Development. However, due to the nature and scale, it is unlikely there will be significant cumulative effects as a result of the project. Planning permission has expired. Therefore, no cumulative significant effects are likely to occur.



		and track enclosure, 30m long synthetic cricket area, 3) new boundary wall along the western boundary where the site fronts the public road, 4) The drilling of well(s) on site with ancillary irrigation tank for irrigation of the pitches, 5) lighting to walking track permitted under PL Ref. 15/324, 6) minor revisions and adjustments to site layout and parking layout to include 6 no. additional car parking spaces to permitted car park permitted under PL. Ref. 15/324 and the addition of 104 no. carpark spaces to service the now proposed pavilion building and all ancillary services/associated landscaping works		
20311	23/03/2021 Expired – 22/04/2026	For the construction of a single storey extension to the South elevation of my existing dwelling and all associated site works	Carlow	The application is for works located c. 110m north of the Proposed Development. However, due to the nature and scale, it is unlikely there will be significant cumulative effects as a result of the project. Planning permission has expired. Therefore, no cumulative significant effects are likely to occur.
2071	08/4/2021 Expired – 09/05/2026	Application to construct 7 number commercial serviced sites, extension of existing road and footpath network, connection to existing on site services and attenuation, street lighting, general landscaping, advertising signage and all associated site works	Carlow	The application is for works located c. 4.4km northeast of the Proposed Development. However, due to the nature, scale and remoteness from the proposed development, it is unlikely there will be significant cumulative effects as a result of the project. Planning permission has expired. Therefore, no cumulative significant effects are likely to occur.



20180	13/07/2021 Expires – 12/08/2026	Planning for the installation of approximately 4.6 kilometres (km) of underground cables within the Carlow County Council (CCC) boundary and approximately 2.0 km within the Laois County Council (LCC) boundary with a voltage of up to 38 kilovolts and associated works, including a new substation within LCC, for the connection of the consented Bilboa Wind Farm (Planning Register References: Carlow County Council 11/154; An Bord Pleanála PL 01.240245) to the national electricity grid; upgrading of an existing forestry track within CCC; construction of two new onsite access tracks within CCC; re-orientation and increasing in size of a crane hardstanding within CCC; and road strengthening and widening along an updated turbine delivery route, within LCC, pursuant to the consented Bilboa Wind Farm (Planning Register References; Carlow County Council 11/154; An Bord Pleanála PL 01.240245).	Carlow / Laois	The application is for works located c. 3.72 km southwest of the Proposed Development. However due to the nature, scale and location, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.
21114	05/10/2021 Expires – 04/11/2026	Permission for development at a site of c.0.63 ha, (existing store permitted under Reg. Ref. PD3679). The development will consist of (a) Demolition of the existing discount foodstore and substation on the site of c.1411 sq. m; (b) Construction of a new part 1, part 2 storey discount foodstore (to include off licence use) with a gross floor area of c. 1,969 sq. m (net retail area 1,280 sq. m.); (c) Upgrade of the existing vehicular / pedestrian access from Hanover Road including relocation of the entrance 6 metres to the west; (d) Minor reconfiguration of the existing carpark and a reduction of 20 no. car parking spaces to provide a total of 100 no. car parking spaces and 10 no. bicycle spaces; (e)	Carlow	The application is for works located c. 1.2km north of the Proposed Development. However, due to the nature and scale, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.

		Replacement and relocation (c. 12m south) of the existing pole sign with a new internally illuminated, double sided, free standing, identification pole sign adjacent to the western boundary of the site, 4 no. single-sided internally illuminated gable signs on the south-east, south-west and north-west gables, 1 no. single-sided window sign at entrance door (north-west elevation) (f) c. 90 sqm of solar panels provided at roof level; (g) All landscaping / lighting, boundary treatment, engineering and site development works (including a single storey ESB substation and switch room c. 21 sqm).		
21360	18/11/2021 Expires – 16/02/2027	Site development works comprising site excavations and regrading, including removal of excess material, all within a site area of 9.8Ha. In the east and north-east of the existing MSD facility at Dublin Road, Pollerton Little and Oakpark, Carlow. The works will include: (i) regarding of existing landscaped berms along the north eastern site boundary; (ii) creation of new landscaped berms on the eastern boundary of the site; (iii) installation of a temporary access road from existing roundabout on the R448 regional road to facilitate the site development works; (iv) all associated site development and landscaping works.	Carlow	The application is for works located c. 4.6km northeast of the Proposed Development. However, due to the nature, scale and remoteness from the proposed development, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.
21294	16/12/2021 Expires – 19/06/2028	Permission for development consisting of an air dome (1.428.7m2) for multi-use sports activities, primarily used for 2 no. indoor tennis courts. Works to include carpark and all associated site works. The existing facility is currently fully serviced by the	Carlow	The application is for works located c. 173m from the Proposed Development. However, due to the nature and scale, it is unlikely there will be significant cumulative effects as a result of the project.



		existing services permitted and constructed under PL.Ref. 15/324 and PL. Ref. 18/178.		Therefore, no cumulative significant effects are likely to occur.
22110	07/08/2022 Expires – 16/08/2027	Application for development of a new Sterile Manufacturing Facility at the site of our existing biologics formulation and filling facility at Dublin Road, Pollerton Little and Oakpark, Carlow. The development comprises a total gross floor area of c.7,787sqm, including; (i) a new two-storey production building (c.7,641sqm and maximum height 18m) incorporating production suites, utilities, warehouse, workshops, laboratories, offices and plant rooms; (ii) a single storey MV electrical building (c.146sqm and maximum height 4.5m); (iii) an external utilities yard comprising; covered wastewater management area, process waste tanks and sumps, process water storage tank, heat pumps, a new generator, an elevated pipe rack, and other miscellaneous pumps, plant and equipment; (iv) 85 no. new car parking spaces, and a new covered bicycle rack; (v) a temporary contractor's construction compound for the duration of the construction works; (vi) all associated permanent site development works, including; roads, paths, yards, underground services, and site landscaping. The extended utilisation of a temporary site access road from the existing roundabout on the R448 regional road; as permitted under Planning Permission Ref. 21/360, is being sought for the duration of the proposed construction works.	Carlow	The application is for works located ca. 4.4km northeast of the Proposed Development. However, due to the nature, scale and remoteness from the proposed development, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.
22163	16/02/2023 Expires – 21/03/2033	Application for a 10 year planning permission for a solar farm and associated works, comprising (1) A	Carlow	The application is for works located c. 8.5km southeast of the Proposed



		solar farm which will connect to the national electricity grid on lands with a total area of circa 128 hectares, consisting of solar panels on ground mounted frames, 18 no. single storey electrical inverter/transformer stations, equipment container, underground cabling within the solar farm site and within the N80 and L-3046 public roads to connect solar farm field parcels, security fencing, satellite communications pole, CCTV, access tracks inclusive of 9 no. agricultural bridges (including 1 no. bridge over the river Burrin), temporary construction compounds, landscaping and all associated ancillary development works. (2) minor amendments to a neighbouring solar farm planning permission (Carlow County Council planning reference 20143 & An Bord Pleanála reference: 307891-20) to facilitate future grid connection and additional access tracks for the proposed development. These amendments will comprise of the removal of 1,837 sqm of solar panels, provision of additional access tracks and focused removal of hedgerows to accommodate same, and the laying of 1,788 metres of 33kV underground cabling for the purposes of the future grid connection. (3) Construction and operational access for the solar farm will be via entrances from the L-7111, L-3046 and L-3049. The operational lifespan of the solar farm will be 35 years.		Development. However, due to the nature, scale and remoteness from the proposed development, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.
2360019	24/07/2023 Expires – 25/03/2028	Permission to alter previously approved planning, Ref No: PL20/98. for the installation of 2 no. waste water treatment systems and percolation areas and associated site works on site	Carlow	The application is for works located c. 10m south of the Proposed Development. The works proposed are minor relating to installation of two waste water treatment systems. They are located to the front of



				the properties as far from the river as possible. The addition of further treatment will be beneficial to water quality in the area. Due to the nature and scale, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.
2360289	18/09/2023 Expires – 22/10/2028	Completion of previously approved developments (P.A. Ref: 04/890 as varied by 07/939, including Extensions of Duration Permissions 09/597, 12/220 and 17/658) as they relate to House Nos. 51 to 80 (28 no. semi-detached two-storey three-bedroom and two no. semi-detached two-storey four-bedroom houses) and the provision of landscaping, including boundary treatments; and the provision of all other associated site excavation, infrastructural and site development works above and below ground	Laois	The application is for works located 0.7km west southwest of the Proposed Development. However, due to the nature and scale, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.
2360101	12/01/2024 Expires – 12/06/2028	Permission for (1) the demolition of existing 2-storey industrial buildings, (2) the construction of 32no. dwelling units consisting of 2no. one-bed (single-storey) duplex apartments and 13no. two bed (single-storey) duplex apartments, 15no. three bed (2-storey) duplex apartments, 2no. three bed (semi-detached) townhouses, (3) car parking with new vehicular entrance (4), boundary treatments, (5) bicycle storage provision and storage outbuildings, (6) soft and hard landscaping, (7) ESB provision, (8) connection to existing site services and all ancillary site development works	Carlow	The application is for works located c. 1.41km north of the Proposed Development. However, due to the nature and scale, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.



2360263	09/07/2024 Expires – 18/05/2030	Change of use from quarry to recovery activities, over a total area of 4.84-hectares, comprising: -The infilling of lands as a soil recovery facility with inert waste consisting of suitable uncontaminated soil & stone and dredging spoil, to improve land for agricultural use (i.e., 4.792-hectare area, total net import of 199,500 tonnes over 8 years); -An Administration Area (i.e., 0.048-hectare area), to include a site hut/site office and portable chemical toilet; and -All associated site works and services required to facilitate the development.	Carlow	The application is for works located c. 5.9km south of the Proposed Development. However, due to the nature of the works and distance from the proposed development both straight line and downstream, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.
2460072	14/10/2024 Expires – 11/11/2029	Application for development at a 1.54ha site consisting of a 38kV/MV electrical substation, underground cables (UGC) & assoc. works. Development will include: 1)Construction of a substation compound of approx. 2,850m2 gross area, with 2.6m high palisade fence around entire perimeter of substation, with the following electrical plant within the substation: 1No. prefabricated 38kV GIS module & foundation (c.31m2 & c.5.2m high); 1No. prefabricated MV GIS module & foundation (c.32m2 & c.4.7m high); 1No. prefabricated Control Room module & foundation (c.32m2 & c.4.7m high); 2No. 38/20kV 10 MVA transformers & assoc. bunds (c.15m2, c.4.5m high ea.); Telecommunication SCADA pole of c.10 metres in height; assoc. & ancillary outdoor electrical equipment & other apparatus, incl. installation of UGC; Internal access road of c.40m in length & c.5m wide within proposed substation; Compound lighting, boundary treatment, assoc. drainage, landscaping & all ancillary site development works; 2)Use of a portion of existing	Carlow	The application is for works located c. 4.7km northeast of the Proposed Development. However, due to the nature, scale and remoteness from the proposed development, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.

temporary road (c.200m in length) permitted as part of recent MSD Rathgall development (Planning Ref: 21/360 & 22/110) for permanent use to facilitate access to proposed substation; 3)Construction of new stone wall, fencing & gates at existing junction of temporary road with public road; 4)Construction of internal access road (c.140m in length) to proposed substation extending from existing temporary road on MSD lands to proposed substation; 5)Site clearance works related to proposed substation compound & access road incl. removal of existing shed, store building & flat at rear of former B&B (c.376m² & c.7.3m high), asphalt concrete yard adjacent to shed, septic tank, associated manholes & pipework, trees & hedgerow over a distance of c.8m to facilitate construction of new internal access road, 6)Installation of c.1.3km of double-circuit 38kV UGC along R448 road between proposed substation & existing Carlow–GraigUÉ 38kV OHL; 7)Installation of c.0.7km of single circuit 38kV UGC along R448 road between proposed substation & existing Carlow–Ballylinan 38kV OHL; 8)Installation of c.0.3km of 6 circuit MV UGC along R448 road between proposed substation & existing R448 roundabout; 9)Installation of new 12m high steel lattice mast on existing Carlow–GraigUÉ 38kV OHL; 10)Replacement of existing timber poleset (IMP1395) with new 15m high steel lattice mast on existing Carlow–Ballylinan 38kV OHL - located in Co. Kildare.

2460059	09/12/2024	Construct Phase 2 of an overall residential development of 131 dwellings plus Creche. Phase	Laois	The application is for works located 0.4km west of the Proposed Development.



	Expires – 21/01/2030	2 to consist of 24 dwellings to include: 2 No. Type A – three bedroom two storey semi-detached dwellings, 12 No. Type B – four bedroom two storey semi-detached dwellings, 6 No. Type C/C1 – four bedroom two storey semi-detached dwellings, 4 No. Type H – three bedroom two storey town houses, plus all landscaping and site enclosures plus all associated site works and services.		However, due to the nature and scale, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.
2460332	12/12/2024 Expires – 22/01/2030	The demolition of all existing structures within the Tinryland Wastewater Treatment Plant and the construction on an extended site (0.09 ha in total) which will consist of a new pumping station (17m ²), new below-ground storm tank (total storage of 123m ³), replacement welfare facility (33m ²), ground-mounted photovoltaic array (83 m ²), new palisade perimeter fencing (2.4m high) and associated works; the construction of a new rising main and gravity main (3.7km in length) along the Nurney Road, L1023 and N80, connecting to the existing wastewater sewer at Ballinacarrig; and all ancillary and associated temporary works.	Carlow	The application is for works located c. 2.7km east of the Proposed Development. However, due to the nature, scale and distance from both the proposed development and the River Barrow, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.
2460125	05/02/2025 Expires – 09/03/2030	The development at this site: Erindale, Mortarstown Upper, Carlow, Co. Carlow R93 E5Y0. A protected structure (RPS Ref. No. CW66) The development will consist/consists of: Demolition of a two-storey extension to the rear of the house and a single-story extension to the side of the original house. The construction of a new two-storey extension to the rear and two-storey (basement and ground) extension to the side. The reroofing of the house to there original detail,	Carlow	The application is for works located c. 132m of the Proposed Development. However, due to the nature and scale, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.



		refurbishment of original windows and replacement of some non-original windows. Reinstatement of two blocked up windows to the rear. Alterations to the internal layout. New mechanical and electrical services. Removal of septic tank and connections to mains. No parking or significant trees will be affected		
2460026	13/02/2025	Development will consist of essential maintenance and repair works to the Barrow Navigation, in accordance with Waterways Ireland's statutory remit, comprising the following: (i) Bank Revetment & Strengthening Works, (ii) Post-Flood Spot Dredging & Maintenance Dredging, (iii) Back-drain Maintenance, (iv) Small-scale Bank Repair Works, (v) Trackway Surface Upgrade Works, (vi) 10 no. Temporary Construction Compounds, (vii) Temporary mobile welfare units, and, (viii) All works ancillary and incidental to the maintenance and repair works referred to above. A Natura Impact Statement (NIS) has been prepared in respect of the planning application and will be submitted with the planning application	Carlow	The application is for works located at a number of location along the River Barrow, the closest works location to the Proposed Development is c. 2km downstream. Potential cumulative impacts are associated with the construction of the proposed outfall. However, given the scale and duration of the works along with the proposed mitigation measures any residual non-significant impacts will reach imperceptible levels due to dilution (suspended sediment and noise/vibrations) before reaching the nearest works. Therefore, no cumulative significant effects are likely to occur.
2460049	25/03/2025 Expires – 29/04/2030	Application to carry out essential maintenance and repair works to the Barrow Navigation, in accordance with Waterways Ireland's statutory remit, comprising the following: (i) Maintenance and repair works to the Barrow Navigation comprising post-flood spot dredging and maintenance dredging, (ii) A new temporary access road providing access to the Barrow trackway from Leighlin Road to facilitate the	Laois	The application is for works located c. 0.3km west of the Proposed Development. The closest work is for the maintenance program is dredging of the Clogrennan Canal 300m downstream of the proposed new outfall. The proposed dredging works are located off the Main River Barrow Channel in the Canal. As the canal has a slow flow suspended solids will quickly fall

		proposed works, (iii) Temporary mobile welfare units and , (iv) All works ancillary and incidental to the maintenance and repair works referred to above.		out of suspension. Given this, and the short duration for the installation of the proposed new outfall it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.
2560137	Granted – 03/12/2025 Expires – 02/12/2035	A 10 Year Planning Permission for a solar farm with a total area of circa 57 hectares. The solar farm will consist of solar panels on ground mounted frames, 8 no. single storey electrical inverter/transformer stations, 2 no. single storey spare parts containers, 1 no. Ring Main Unit, 3 no. weather stations, underground electrical ducting and cabling within the development site, private lands and within the L4038, L8185, R448, L3051, L3052 and L3050 public roads to connect solar farm field parcels, security fencing, CCTV, access tracks, 5 no. watercourse/drain deck crossings and 2 no. horizontal directional drill crossings (under M9 motorway and the Dublin - Waterford railway), temporary construction compounds, landscaping and all associated ancillary development and drainage works. Construction and operational access will be via 2 no. existing entrances from the R448 and L1010. Sections of the proposed underground electrical cabling will traverse the solar farms proposed under Carlow County Council References 24/60043 and 24/60205, but will not alter infrastructure proposed under these applications. The operational lifespan of the solar farm will be 40 years and planning permission is requested for this duration. A Natura Impact	Carlow	The application is for works located c. 1.4km southeast of the Proposed Development. The redline boundary for the solar farm abuts the River Barrow (4.3km downstream of the Proposed Development) for approximately 100m, however, the solar farm within the redline boundary has been located at a minimum of 100m from the river bank. Given the scale and duration of the proposed development (proposed outfall) with the proposed mitigation measures any residual non-significant impacts will reach imperceptible levels due to dilution (suspended sediment and noise/vibrations) before reaching the solar farm 4.3km downstream. Therefore, no cumulative significant effects are likely to occur.

		Statement (NIS) has been prepared and will be submitted to the Planning Authority with the application.		
2560210	31/07/2025 Expires – 08/09/2030	Application to carry out development which will consist of: (a) The provision of 98no. two-storey semi-detached dwellings consisting of the following unit mix: 8no. 4-bed dwellings, 82no. 3-bed dwellings, and 8no. 2-bed dwellings, (b) Provision of new internal roadways and footpaths by extension of the existing residential access road from Meadows Way, with associated works to facilitate vehicular, pedestrian and cycle access and car parking; (c) Provision of a shared footpath and cycle lane connection with previously approved adjacent housing development (Planning Reference 23/3 and 24/60059); (d) Provision of open space areas to include all hard and soft landscape works, planting and boundary treatments; (e) All other associated site excavation, infrastructural and site development works above and below ground including; surface water drainage system, foul sewerage network including connection to previously approved foul pumping station (Planning Reference 23/60019), public lighting and all ancillary site development works	Laois	The application is for works located ca. 0.7km west of the Proposed Development. However, due to the nature and scale, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.
2460398	19/11/2025 Expires – 21/12/2030	48no. residential units (43no.- three bed dwellings, 2no.- four bed dwellings, & 3no.- two bed dwellings), a Childcare Facility (of 319sq.m) and all associated car parking, play areas, landscaping, and all associated site works to include a construction access from the partially complete Carlow Inner Relief Road direct to the proposed	Carlow	The application is for works located c. 200m east of the Proposed Development. The Key Ecological Receptors are predominately associated with the river Barrow and the western side of the proposed WWTP. Given the nature and scale of this application and that it is



		site. The subject site has a gross area of 2.739ha and is located at Mortarstown, Carlow, Co. Carlow with proposed access from the partially completed Carlow Inner Relief Road and through the practically complete Cluain Buí residential development.		located east of the Proposed Development with existing residential properties located between the two sites it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.
2560406	Further Info request – 12/02/2026	(a) Demolition of two-story section of the hotel on North Elevation, demolition of 2 no. stairwell North & South elevations and demolition of existing store and arch gateway to the South. (b) A Proposed 3-storey 42 room extension over plant room / store rooms (c) Proposed leisure centre, gym, spa, treatment rooms, changing rooms, café / reception area, function / meeting rooms all other associated developments. (d) Proposed roof garden / terrace areas, (e) Proposed bin store to the rear, (f) Proposed revised layout and extension of the car park to include, 192 no. standard car parking spaces, 14 no. Disabled spaces, 4 no. Ev Charging Spaces, 48 no. Ducted Ev Spaces, 3 no. Bus Set down areas, 258 Total spaces. (g) Proposed ESB substation, (h) Proposed signage to building elevation and free standing site/directional signage, (i) Internal amendments and all associated site works necessary to facilitate the proposed development.	Carlow	The application is for works located c. 744m southwest of the Proposed Development. Given the nature and scale of this application and that it is located east of the Proposed Development with existing residential properties located between the two sites it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.
2460205	Granted – 27/05/2025 Expire – 02/12/2035	A 10 Year planning permission for a solar farm with a total area of circa 73 hectares in the townlands of Ballybar Lower, Ballybar Upper, Ballycarney, Ballyloo, Linkardstown, Park and Tinryland in County Carlow. The solar farm will consist of solar	Carlow	The application is for works ca. 1.6km southeast of the Proposed Development. Due to the distance from the proposed development and nature of the project it is



		panels on ground mounted frames, 11 no. single storey electrical inverter/transformer stations, 3 no. single storey spare parts containers, 2 no. Ring Main Units, 3 no. weather stations, underground electrical ducting and cabling within the development site, private lands and within the L1010, L3051, L3052 and L3050 public roads to connect solar farm field parcels, security fencing, CCTV, access tracks, 3 no. watercourse/drain deck crossings and 2 no. horizontal directional drill crossings (under M9 motorway and L3050), temporary construction compounds, landscaping and all associated ancillary development and drainage works. Construction and operational access will be via 2 no. entrances from the L1022 and L1010. Sections of the proposed underground electrical cabling will traverse the solar farm proposed under Carlow County Council Reference 24/60043, but will not alter infrastructure proposed under that application. The operational lifespan of the solar farm will be 40 years and planning permission is requested for this duration.		unlikely to have cumulative effects with the Proposed. Therefore cumulative impacts are unlikely to occur
2660088	New application – received 30/03/2026	the construction of a domestic garage all associated site works (in the curtilage of a protected structure CT69)	Carlow	This application is located ca. 500m north of the gravity sewer route. Due to the distance and nature of the works it is unlikely to have cumulative impacts with the Proposed Development. Therefore cumulative impacts are unlikely to occur.
Carlow Southern Relief Road	Project is currently in Phase 2 Options Selection.	The CSRR is a long-term strategic project that will provide a 7-8 km multi-modal transport corridor around the southern part of Carlow town. The	Carlow / Laois	This project is currently at option selection stage.



project aims to reduce traffic congestion in the town centre, provide improved and/or new transport facilities and improve safety for pedestrians and cyclists.

The project Study Area spans the Carlow – Laois border and is currently served by the M9 motorway (Dublin–Waterford) and the N80 (Tullamore–Rosslare Port). The River Barrow, River Burren, and the Dublin – Waterford rail line also run through the Study Area.

In consultation with Carlow County Council, the design has been refined to avoid overlap with the Southern Relief Road layout.

Therefore cumulative impacts are unlikely to occur.



16.3 Cumulative Effects

16.3.1 Population and Human Health

The proposed site on which the upgrades of the WwTP are proposed are zoned 'Utilities & Strategic Infrastructure' under the Carlow County Development Plan 2022-2028 (CDP)¹⁰⁰ with the objective 'to provide for the needs of all transport users and other utility providers'. The area to the north of the WwTP is not zoned. The area where the new outfall pipe is proposed is zoned as 'Amenity & Open Space' zoning with the objective 'To preserve, provide for and improve active and passive recreational public and private open space' and a small portion zoned for 'Established Residential' zoning with the objective 'to protect and enhance the amenity of developed residential communities'. As the Proposed Development is in agreement with land use zoning requirements, cumulative effects with this Plan are therefore not anticipated.

Following a review of Planning Applications, and proposed projects in the local area, the Population and Human health assessment has not identified potential cumulative effects above and beyond what has been identified in respective technical chapters Climate change mitigation and adaptation (Chapter 8), Air Quality and Odour (Chapter 7), Water Quality (Chapter 12), Land Quality (Chapter 11), Noise and Vibration (Chapter 9), and Major Accidents and Disasters (Chapter 15). All work will be carried out in accordance with appropriate safety guidance and legislative requirements. Such considerations apply for the project in isolation and in combination with any other projects.

16.3.2 Biodiversity

Whereas Chapter 16 Cumulative Effects of this EIAR presents an assessment of the likely cumulative impacts from the proposed development in combination with other plans and projects, integrating all environmental topics, this section focusses on the potential for significant cumulative impacts on Biodiversity, with particular reference to the Key Ecological Receptors as identified above.

A search of Carlow County Council, Laois County Council planning and An Coimisiún Pleanála (formerly "An Bord Pleanála") planning applications has been undertaken for applications submitted within the last 5 years within 2km of the Proposed development (last accessed 16/01/2026). Near the proposed works, projects that have been granted planning permission include retention of existing developments, agricultural developments, typical extensions to domestic dwellings or the construction of new domestic dwellings. Regarding potential impacts to water quality, these projects will have to comply with the EPA's *Code of Practice for Domestic Wastewater Treatment Systems* (EPA, 2021). These developments have conditions attached to their planning permission relating to sustainable development, such as siting of septic tanks, foul surface water and effluent drainage facilities, and clean surface water run-off drainage facilities. Therefore, it is not anticipated that the developments that have been granted permission will have any significant effects in combination with the Proposed development.

Key developments which shall be considered are large-scale developments in the region of the Proposed development. The planning applications that have been considered are in Table 16-2. As per this table, there are no cumulative impacts between the Proposed development and any relevant planning applications. The aim of the proposed development is to increase the P.E. capacity of the WwTP so that there is sufficient capacity to cater for the growing population of the agglomeration for the next 25 years. As such this project is required

¹⁰⁰ Carlow County Council Development Plan 2022 – 2028 [Layout](#)

to ensure residential and commercial projects in the agglomeration can proceed without causing cumulative effects through there associated waste.



Table 16-2 - Cumulative Impact Assessment for Biodiversity.

Case No.	Decision Date	Description	Cumulative Impact Assessment
2460398	19/11/2025	48no. residential units (43no.- three bed dwellings, 2no.- four bed dwellings, & 3no.- two bed dwellings), a Childcare Facility (of 319sq.m) and all associated car parking, play areas, landscaping, and all associated site works to include a construction access from the partially complete Carlow Inner Relief Road direct to the proposed site. The subject site has a gross area of 2.739ha and is located at Mortarstown, Carlow, Co. Carlow with proposed access from the partially completed Carlow Inner Relief Road and through the practically complete Cluain Buí residential development.	The application is for works located c. 200m east of the Proposed Development. The KERs discussed in this chapter are predominately associated with the river Barrow and the western side of the proposed WWTP. Given the nature and scale of this application and that it is located east of the proposed development with existing residential properties located between the two sites it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.
2360019	24/07/2023	Permission to alter previously approved planning, Ref No: PL20/98. for the installation of 2 no. waste water treatment systems and percolation areas and associated site works on site	The application is for works located c. 10m south of the Proposed Development. The works proposed are minor relating to installation of two waste water treatment systems. They are located to the front of the properties as far from the river as possible. The addition of further treatment will be beneficial to water quality in the area. Due to the nature, scale and timing, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.
2460125	05/02/2025	The development at this site: Erindale, Mortarstown Upper, Carlow, Co. Carlow R93 E5Y0. A protected structure (RPS Ref. No. CW66) The development will consist/consists of: Demolition of a two-storey extension to the rear of the house and a single-story extension to the side of the original house. The construction of a new two-storey extension to the rear and two-storey (basement and ground) extension to the side. The reroofing of the house to there original detail, refurbishment of original windows and replacement of some non-original windows. Reinstatement of	The application is for works located c. 132m of the Proposed Development. However, due to the nature and scale, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.



Case No.	Decision Date	Description	Cumulative Impact Assessment
		two blocked up windows to the rear. Alterations to the internal layout. New mechanical and electrical services. Removal of septic tank and connections to mains. No parking or significant trees will be affected	
21294	16/12/2021	Permission for development consisting of an air dome (1,428.7m ²) for multi-use sports activities, primarily used for 2 no. indoor tennis courts. Works to include carpark and all associated site works. The existing facility is currently fully serviced by the existing services permitted and constructed under PL. Ref. 15/324 and PL. Ref. 18/178.	The application is for works located c. 173m of the Proposed Development. However, due to the nature and scale, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.
2460026	13/02/2025	Development will consist of essential maintenance and repair works to the Barrow Navigation, in accordance with Waterways Ireland's statutory remit, comprising the following: (i) Bank Revetment & Strengthening Works, (ii) Post-Flood Spot Dredging & Maintenance Dredging, (iii) Back-drain Maintenance, (iv) Small-scale Bank Repair Works, (v) Trackway Surface Upgrade Works, (vi) 10 no. Temporary Construction Compounds, (vii) Temporary mobile welfare units, and, (viii) All works ancillary and incidental to the maintenance and repair works referred to above. A Natura Impact Statement (NIS) has been prepared in respect of the planning application and will be submitted with the planning application	The application is for works located at a number of location along the River Barrow, the closest works location to the proposed development is c. 2km downstream. Potential cumulative impacts are associated with the construction of the proposed outfall. However, given the scale and duration of the works along with the proposed mitigation measures any residual non-significant impacts will reach imperceptible levels due to dilution (suspended sediment and noise/vibrations) before reaching the nearest works. Therefore, no cumulative significant effects are likely to occur.
2560137	Approved 03/12/2025	A 10 Year Planning Permission for a solar farm with a total area of circa 57 hectares. The solar farm will consist of solar panels on ground mounted frames, 8 no. single storey electrical inverter/transformer stations, 2 no. single storey spare parts containers, 1 no. Ring Main Unit, 3 no. weather stations, underground electrical ducting and cabling within the development site, private lands and within the L4038, L8185, R448, L3051,	The application is for works located c. 1.4km southeast of the Proposed Development. The redline boundary for the solar farm abuts the River barrow (4.3km downstream of the proposed development) for approximately 100m, however, the solar farm within the redline boundary has been located at a minimum of 100m from the river bank. Given the scale and duration of the proposed development (proposed outfall) with



Case No.	Decision Date	Description	Cumulative Impact Assessment
		L3052 and L3050 public roads to connect solar farm field parcels, security fencing, CCTV, access tracks, 5 no. watercourse/drain deck crossings and 2 no. horizontal directional drill crossings (under M9 motorway and the Dublin - Waterford railway), temporary construction compounds, landscaping and all associated ancillary development and drainage works. Construction and operational access will be via 2 no. existing entrances from the R448 and L1010. Sections of the proposed underground electrical cabling will traverse the solar farms proposed under Carlow County Council References 24/60043 and 24/60205, but will not alter infrastructure proposed under these applications. The operational lifespan of the solar farm will be 40 years and planning permission is requested for this duration. A Natura Impact Statement (NIS) has been prepared and will be submitted to the Planning Authority with the application.	the proposed mitigation measures any residual non-significant impacts will reach imperceptible levels due to dilution (suspended sediment and noise/vibrations) before reaching the solar farm 4.3km downstream. Therefore, no cumulative significant effects are likely to occur.
2360263	09/07/2024	Change of use from quarry to recovery activities, over a total area of 4.84-hectares, comprising: -The infilling of lands as a soil recovery facility with inert waste consisting of suitable uncontaminated soil & stone and dredging spoil, to improve land for agricultural use (i.e., 4.792-hectare area, total net import of 199,500 tonnes over 8 years); -An Administration Area (i.e., 0.048-hectare area), to include a site hut/site office and portable chemical toilet; and -All associated site works and services required to facilitate the development.	The application is for works located c. 5.9km south of the Proposed Development. However, due to the nature of the works and distance from the proposed development both straight line and downstream, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.
20180	13/07/2021	Application for the installation of approximately 4.6km of underground cables within the Carlow County Council (CCC) boundary and approximately 2.0km within the Laois County Council (LCC) boundary with a voltage of up to 38 kilovolts and associated works, including a new substation within LCC, for the connection of the consented Bilboa Wind Farm (Planning Register	The application is for works located c. 3.72 km southwest of the Proposed Development. However due to the nature, scale and location, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.



Case No.	Decision Date	Description	Cumulative Impact Assessment
		References: Carlow County Council 11/154; An Bord Pleanála PL 01.240245) to the national electricity grid; upgrading of an existing forestry track within CCC; construction of two new onsite access tracks within CCC; re-orientation and increasing in size of a crane hardstanding within CCC; and road strengthening and widening along an updated turbine delivery route, within LCC, pursuant to the consented Bilboa Wind Farm (Planning Register References; Carlow County Council 11/154; An Bord Pleanála PL 01.240245).	
2460332	12/12/2024	The demolition of all existing structures within the Tinryland Wastewater Treatment Plant and the construction on an extended site (0.09 ha in total) which will consist of a new pumping station (17m ²), new below-ground storm tank (total storage of 123m ³), replacement welfare facility (33m ²), ground-mounted photovoltaic array (83 m ²), new palisade perimeter fencing (2.4m high) and associated works; the construction of a new rising main and gravity main (3.7km in length) along the Nurney Road, L1023 and N80, connecting to the existing wastewater sewer at Ballinacarrig; and all ancillary and associated temporary works.	The application is for works located c. 2.7km east of the Proposed Development. However, due to the nature, scale and distance from both the proposed development and the River Barrow, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.
22163	16/02/2023	Application for a 10 year planning permission for a solar farm and associated works, comprising (1) A solar farm which will connect to the national electricity grid on lands with a total area of circa 128 hectares, consisting of solar panels on ground mounted frames, 18 no. single storey electrical inverter/transformer stations, equipment container, underground cabling within the solar farm site and within the N80 and L-3046 public roads to connect solar farm field parcels, security fencing, satellite communications pole, CCTV, access tracks inclusive of 9 no. agricultural bridges (including 1 no. bridge over the River Burrin), temporary construction compounds, landscaping and all associated ancillary development works. (2) minor amendments to a neighbouring	The application is for works located c. 8.5km southeast of the Proposed Development. However, due to the nature, scale and remoteness from the proposed development, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.



Case No.	Decision Date	Description	Cumulative Impact Assessment
		solar farm planning permission (Carlow County Council planning reference 20143 & An Bord Pleanála reference: 307891-20) to facilitate future grid connection and additional access tracks for the proposed development. These amendments will comprise of the removal of 1,837 sqm of solar panels, provision of additional access tracks and focused removal of hedgerows to accommodate same, and the laying of 1,788 metres of 33kV underground cabling for the purposes of the future grid connection. (3) Construction and operational access for the solar farm will be via entrances from the L-7111, L-3046 and L-3049. The operational lifespan of the solar farm will be 35 years.	
22110	07/08/2022	Application for development of a new Sterile Manufacturing Facility at the site of our existing biologics formulation and filling facility at Dublin Road, Pollerton Little and Oakpark, Carlow. The development comprises a total gross floor area of c.7,787sqm, including; (i) a new two-storey production building (c.7,641sqm and maximum height 18m) incorporating production suites, utilities, warehouse, workshops, laboratories, offices and plant rooms; (ii) a single storey MV electrical building (c.146sqm and maximum height 4.5m); (iii) an external utilities yard comprising; covered wastewater management area, process waste tanks and sumps, process water storage tank, heat pumps, a new generator, an elevated pipe rack, and other miscellaneous pumps, plant and equipment; (iv) 85 no. new car parking spaces, and a new covered bicycle rack; (v) a temporary contractor's construction compound for the duration of the construction works; (vi) all associated permanent site development works, including; roads, paths, yards, underground services, and site landscaping. The extended utilisation of a temporary site access road from the existing roundabout on the R448 regional road; as permitted under	The application is for works located ca. 4.4km northeast of the Proposed Development. However, due to the nature, scale and remoteness from the proposed development, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.



Case No.	Decision Date	Description	Cumulative Impact Assessment
		Planning Permission Ref. 21/360, is being sought for the duration of the proposed construction works.	
21360	18/11/2021	Site development works comprising site excavations and regrading, including removal of excess material, all within a site area of 9.8Ha. In the east and north-east of the existing MSD facility at Dublin Road, Pollerton Little and Oakpark, Carlow. The works will include: (i) regrading of existing landscaped berms along the north eastern site boundary; (ii) creation of new landscaped berms on the eastern boundary of the site; (iii) installation of a temporary access road from existing roundabout on the R448 regional road to facilitate the site development works; (iv) all associated site development and landscaping works.	The application is for works located c. 4.6km northeast of the Proposed Development. However, due to the nature, scale and remoteness from the proposed development, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.
2460072	14/10/2024	Application for development at a 1.54ha site consisting of a 38kV/MV electrical substation, underground cables (UGC) & assoc. works. Development will include: 1)Construction of a substation compound of approx. 2,850m2 gross area, with 2.6m high palisade fence around entire perimeter of substation, with the following electrical plant within the substation: 1No. prefabricated 38kV GIS module & foundation (c.31m2 & c.5.2m high); 1No. prefabricated MV GIS module & foundation (c.32m2 & c.4.7m high); 1No. prefabricated Control Room module & foundation (c.32m2 & c.4.7m high); 2No. 38/20kV 10 MVA transformers & assoc. bunds (c.15m2, c.4.5m high ea.); Telecommunication SCADA pole of c.10 metres in height; assoc. & ancillary outdoor electrical equipment & other apparatus, incl. installation of UGC; Internal access road of c.40m in length & c.5m wide within proposed substation; Compound lighting, boundary treatment, assoc. drainage, landscaping & all ancillary site development works; 2)Use of a portion of existing temporary road (c.200m in length) permitted as part of recent MSD Rathgall development	The application is for works located c. 4.7km northeast of the Proposed Development. However, due to the nature, scale and remoteness from the proposed development, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.

Case No.	Decision Date	Description	Cumulative Impact Assessment
		(Planning Ref: 21/360 & 22/110) for permanent use to facilitate access to proposed substation; 3)Construction of new stone wall, fencing & gates at existing junction of temporary road with public road; 4)Construction of internal access road (c.140m in length) to proposed substation extending from existing temporary road on MSD lands to proposed substation; 5)Site clearance works related to proposed substation compound & access road incl. removal of existing shed, store building & flat at rear of former B&B (c.376m2 & c.7.3m high), asphalt concrete yard adjacent to shed, septic tank, associated manholes & pipework, trees & hedgerow over a distance of c.8m to facilitate construction of new internal access road, 6)Installation of c.1.3km of double-circuit 38kV UGC along R448 road between proposed substation & existing Carlow–GraigUÉ 38kV OHL; 7)Installation of c.0.7km of single circuit 38kV UGC along R448 road between proposed substation & existing Carlow–Ballylinan 38kV OHL; 8)Installation of c.0.3km of 6 circuit MV UGC along R448 road between proposed substation & existing R448 roundabout; 9)Installation of new 12m high steel lattice mast on existing Carlow–GraigUÉ 38kV OHL; 10)Replacement of existing timber poleset (IMP1395) with new 15m high steel lattice mast on existing Carlow–Ballylinan 38kV OHL - located in Co. Kildare.	
2360101	12/01/2024	Permission for (1) the demolition of existing 2-storey industrial buildings, (2) the construction of 32no. dwelling units consisting of 2no. one-bed (single-storey) duplex apartments and 13no. two bed (single-storey) duplex apartments, 15no. three bed (2-storey) duplex apartments, 2no. three bed (semi-detached) townhouses, (3) car parking with new vehicular entrance (4), boundary treatments, (5) bicycle storage provision and storage outbuildings,	The application is for works located c. 1.41km north of the Proposed Development. However, due to the nature and scale, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.



Case No.	Decision Date	Description	Cumulative Impact Assessment
		(6) soft and hard landscaping, (7) ESB provision, (8) connection to existing site services and all ancillary site development works	
21114	05/10/2021	Permission for development at a site of c.0.63 ha, (existing store permitted under Reg. Ref. PD3679). The development will consist of (a) Demolition of the existing discount foodstore and substation on the site of c.1411 sq. m; (b) Construction of a new part 1, part 2 storey discount foodstore (to include off licence use) with a gross floor area of c. 1,969 sq. m (net retail area 1,280 sq. m.); (c) Upgrade of the existing vehicular / pedestrian access from Hanover Road including relocation of the entrance 6 metres to the west; (d) Minor reconfiguration of the existing carpark and a reduction of 20 no. car parking spaces to provide a total of 100 no. car parking spaces and 10 no. bicycle spaces; (e) Replacement and relocation (c. 12m south) of the existing pole sign with a new internally illuminated, double sided, free standing, identification pole sign adjacent to the western boundary of the site, 4 no. single-sided internally illuminated gable signs on the south-east, south-west and north-west gables, 1 no. single-sided window sign at entrance door (north-west elevation) (f) c. 90 sqm of solar panels provided at roof level; (g) All landscaping / lighting, boundary treatment, engineering and site development works (including a single storey ESB substation and switch room c. 21 sqm).	The application is for works located c. 1.2km north of the Proposed Development. However, due to the nature and scale, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.
2460059	09/12/2024	Application to construct Phase 2 of an overall residential development of 131 dwellings plus Creche. Phase 2 to consist of 24 dwellings to include: 2 No. Type A – three bedroom two storey semi-detached dwellings, 12 No. Type B – four bedroom two storey semi-detached dwellings, 6 No. Type C/C1 – four bedroom two storey semi-detached dwellings, 4 No. Type H – three bedroom two storey town houses, plus all landscaping and site enclosures plus all associated site works and services.	The application is for works located 0.4km west of the Proposed Development. However, due to the nature and scale, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.

Case No.	Decision Date	Description	Cumulative Impact Assessment
2360289	18/09/2023	Completion of previously approved developments (P.A. Ref: 04/890 as varied by 07/939, including Extensions of Duration Permissions 09/597, 12/220 and 17/658) as they relate to House Nos. 51 to 80 (28 no. semi-detached two-storey three-bedroom and two no. semi-detached two-storey four-bedroom houses) and the provision of landscaping, including boundary treatments; and the provision of all other associated site excavation, infrastructural and site development works above and below ground	The application is for works located 0.7km west southwest of the Proposed Development. However, due to the nature and scale, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.
2560210	31/07/2025	Application to carry out development which will consist of: (a) The provision of 98no. two-storey semi-detached dwellings consisting of the following unit mix: 8no. 4-bed dwellings, 82no. 3-bed dwellings, and 8no. 2-bed dwellings, (b) Provision of new internal roadways and footpaths by extension of the existing residential access road from Meadows Way, with associated works to facilitate vehicular, pedestrian and cycle access and car parking; (c) Provision of a shared footpath and cycle lane connection with previously approved adjacent housing development (Planning Reference 23/3 and 24/60059); (d) Provision of open space areas to include all hard and soft landscape works, planting and boundary treatments; (e) All other associated site excavation, infrastructural and site development works above and below ground including; surface water drainage system, foul sewerage network including connection to previously approved foul pumping station (Planning Reference 23/60019), public lighting and all ancillary site development works	The application is for works located ca. 0.7km west of the Proposed Development. However, due to the nature and scale, it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no cumulative significant effects are likely to occur.
2460049	25/03/2025	Application to carry out essential maintenance and repair works to the Barrow Navigation, in accordance with Waterways Ireland's statutory remit, comprising the following: (i) Maintenance and repair works to the Barrow Navigation comprising post-flood spot dredging and maintenance dredging, (ii) A new temporary access	The application is for works located c. 0.3km west of the Proposed Development. The closest work is for the maintenance program is dredging of the Clogrennan Canal 300m downstream of the proposed new outfall. The proposed dredging works are located off the Main River Barrow Channel



Case No.	Decision Date	Description	Cumulative Impact Assessment
		road providing access to the Barrow trackway from Leighlin Road to facilitate the proposed works, (iii) Temporary mobile welfare units and , (iv) All works ancillary and incidental to the maintenance and repair works referred to above.	in the Canal. As the canal has a slow flow suspended solids will quickly fall out of suspension. Given this, and the short duration for the installation of the proposed new outfall it is unlikely there will be significant cumulative effects as a result of the project. Therefore, no significant cumulative effects are likely to occur.
2460205	Approved 27/05/2025	10-year planning permission for a solar farm with a total area of c. 73 ha in the townlands of Ballybar Lower, Ballybar Upper, Ballycarney, Ballyloo, Linkardstown, Park and Tinryland in Co. Carlow. The solar farm will consist of solar panels on ground-mounted frames, 11 no. single-storey electrical inverter/transformer stations, 3 no. single-storey spare parts containers, 2 no. Ring Main Units, 3 no. weather stations, underground electrical ducting and cabling within the development site, private lands and within the L1010, L3051, L3052 and L3050 public roads to connect solar farm field parcels, security fencing, CCTV, access tracks, 3 no. watercourse/drain deck crossings and 2 no. horizontal directional drill crossings (under M9 motorway and L3050), temporary construction compounds, landscaping and all associated ancillary development and drainage works. Construction and operational access will be via 2 no. entrances from the L1022 and L1010. Sections of the proposed underground electrical cabling will traverse the solar farm proposed under Carlow County Council Reference 24/60043, but will not alter infrastructure proposed under that application. The operational lifespan of the solar farm will be 40 years and planning permission is requested for this duration.	The application is for works c. 1.6km southeast of the proposed development. Given the nature and location of this project, there will be no significant cumulative effects in combination with the proposed development.
2560328	On Hold Received 24/10/2025 (Further	– Residential development of 52 dwellings consisting of; 3 no. block type A buildings, each consisting of 4 no. 2-bed own-door apartments and 4 no. 2-bed town houses, plus 3 no. block type B buildings, each consisting of 2 no. 2-bed own-door ground-floor	The application is for works located c. 127m west of the proposed gravity sewer (on the other side of the River Barrow). Given the nature and scale of this project, there will be no



Case No.	Decision Date	Description	Cumulative Impact Assessment
	Information ReqUÉsted)	apartments and 2 no. 3-bed duplex apartments, plus 2 no. block type C buildings, each consisting of 2 no. 2-bed own-door apartments and 2 no. 2-bed town houses, plus 2 no. block type D buildings, each consisting of 2 no. 2-bed own-door apartments and 2 no. 3-bed town houses, plus all associated parking, public open space provision, landscaping and boundary treatments, water and utility services and connections, lighting and all enabling works, site works and ancillary development works above and below ground plus new site entrance.	significant cumulative effects in combination with the proposed development.
2560406	On Hold – Received 10/12/2015 (Further Information ReqUÉsted)	(a) Demolition of 2-story section of the hotel on North Elevation, demolition of 2 no. stairwell North & South elevations and demolition of existing store and arch gateway to the South. (b) A Proposed 3-storey 42 room extension over plant room / store rooms (c) Proposed leisure centre, gym, spa, treatment rooms, changing rooms, café / reception area, function / meeting rooms all other associated developments. (d) Proposed roof garden / terrace areas, (e) Proposed bin store to the rear, (f) Proposed revised layout and extension of the car park to include, 192 no. standard car parking spaces, 14 no. Disabled spaces, 4 no. EV Charging Spaces, 48 no. Ducted EV Spaces, 3 no. Bus Set down areas, 258 Total spaces. (g) Proposed ESB substation, (h) Proposed signage to building elevation and free standing site/directional signage, (i) Internal amendments and all associated site works necessary to facilitate the proposed development.	The application is for works located c. 700m southwest of the proposed development. Given the nature of this project and its location relative to the proposed development, there will be no significant cumulative effect in combination with the proposed development.
2460258	Approved 24/01/2025	South East Technological University (SETU) Carlow application for planning permission at the SETU Carlow Campus, Kilkenny Road, County Carlow, on a site measuring 0.552ha bounded by the Kilkenny Road to the west. The proposed development reflects the previously granted planning application on the subject site	The application is for works located c. 292m north of the underground gravity sewer. Given the nature of this project and its location relative to the proposed development and sensitive ecological receptors, there will be no significant cumulative effect in combination with the proposed development.



Case No.	Decision Date	Description	Cumulative Impact Assessment
		under Pl. Ref. 19/492. The site is to be accessed by an existing vehicular entrance to SETU Carlow Campus off the Kilkenny Road. The development will consist of the following: i. Construction of a part single-storey, part 4-storey Third Level Educational Health Sciences Building of 6,133m² gross internal floor area. The building will comprise science laboratories, clinics, sports and health science spaces including large gym labs and running track, and administration rooms with a central roof-lit social space on the upper floors and large entrance hall in the south east corner of the building. ii. Provision of plant and screening at roof level. iii. Provision of 176 no. bicycle parking spaces. iv. Provision of 105m² sheltered bicycle store on the eastern boundary of the campus. v. All associated site development works, site services, signage, provision of Sustainable Drainage Systems (SuDS), and landscaping works.	



16.3.2.1 Other Wastewater Treatment Plants

The proposed development has the potential to interact with the discharges from other Urban WwTPs upstream and downstream of the Mortarstown WwTP site. The Third Cycle Barrow Catchment Report (EPA, 2024) states that Urban WwTPs are a significant pressure in 15no. 'At-risk' surface waterbodies. None of these 'At-risk' surface waterbodies are located downstream of the Mortarstown site. Furthermore, 5 no. previously impacted waterbodies are no longer 'At risk' from urban wastewater pressures with the following agglomerations no longer being considered as significant pressure since Second Cycle of the WFD:

- Athy (D0003)
- Borris (D0248)
- Stradbally (D0292)
- Goresbridge (D0529)
- Muinebheag and Leighlinbridge (D0090)
- Old Leighlin (A0096)

Several of these agglomerations (Borris, Goresbridge, Muinebheag and Leighlinbridge) are located downstream of the Mortarstown WwTP. Therefore, the treatment of urban wastewater downstream of the proposed development is improving and there is an associated improvement in water quality in the River Barrow. The proposed upgrade works will likely contribute to these improvements. As such, there is a positive in-combination effect in this regard.

16.3.3 Landscape and Visual

The following development has been identified within the study area in consideration of cumulative landscape and visual effects with other projects.

Proposed Carlow Southern Relief Road

The Carlow Southern Relief Road (CSRR) is a long-term strategic infrastructure project that will provide a 7–8 km multi-modal transport corridor around the southern part of Carlow town. A section of the proposed CSRR would pass to the north of the Mortarstown Wastewater Treatment Plant (WwTP), including two roundabout junctions in close proximity to the site.

At this stage, the CSRR is at the options selection phase, and no detailed design or mitigation information (e.g. landscape planting proposals) is available. It is anticipated, however, that some existing screen planting vegetation to the northeast and northwest of the WwTP may be removed to accommodate the new road alignment. This could result in partial opening of views into the WwTP site from the proposed road and its junctions with the R448 Kilkenny Road and Green Road.

From a visual amenity perspective if mitigation planting is not provided along the proposed road adjacent to the WwTP, locally adverse visual effects could arise for road users and nearby receptors at Kilkenny Road and Green Road. The cumulative visual effect for these receptors is therefore assessed as moderate adverse.

From a landscape perspective, the introduction of the CSRR would not materially alter the existing suburban landscape character surrounding the WwTP. The combined presence of both developments would result in a slight adverse cumulative landscape effect, which is not significant.

There would be no additional significant cumulative landscape and visual effects arising from the proposed development and in combination with other development within the study area.



16.3.4 Air Quality and Odour

With regards to cumulative impacts, the baseline air quality analysis carried out as part of the assessment identified that all levels of classical air pollutants were less than the allowable guideline and statutory limit values. This baseline assessment would have considered the existing environment while the air quality impact assessment has considered the proposed facility. Given that all baseline and process contribution air quality pollutants were below statutory and guideline limit values for such pollutants, cumulative impact can be considered compliant with the regulatory limit value.

With regards to Odour, all receptors in the vicinity of the proposed facility will perceive an odour concentration less than or equal to 2.30 OUE/m³ for the 98th percentile of hourly averages for the worst case met year Oak Park 2020. There will be a net overall improvement in odour air quality in the vicinity of the facility as a result of the development and the impact associated with the proposed development is considered Negligible.

16.3.5 Climate

With respect to the requirement for a cumulative assessment the ISEP (ISEP, 2022) and TII (TII, 2022) guidance on which the assessment is based states that:

“the identified receptor for the GHG Assessment is the global climate and impacts on the receptor from a project are not geographically constrained, the normal approach for cumulative assessment in EIA is not considered applicable. By presenting the GHG impact of a project in the context of its alignment to Ireland’s trajectory of net zero and any sectoral carbon budgets, this assessment will demonstrate the potential for the project to affect Ireland’s ability to meet its national carbon reduction target. This assessment approach is considered to be inherently cumulative”.

Any future projects within the vicinity of the wastewater treatment works, but not related to the wastewater treatment works, such as the Carlow Southern Relief Road (planning application due 2028) sit outside the scope of this cumulative assessment. GHG emissions associated with this project should be subject to its own GHG assessment and will also be subject to alignment with Ireland’s trajectory of net zero by 2050 and the relevant sectoral carbon budgets.

As per the above, the cumulative effect of the proposed development in relation to GHG emissions is considered *direct, long-term, negative and slight*, which is overall *not significant* in EIA terms.

16.3.6 Noise and Vibration

The list of developments below have been reviewed for any potential for significant cumulative noise or vibration impacts.

Table 16-3: Project list (Noise and Vibration)

Carlow Council reference.	County Planning	Brief Description	Distance	Comment
20311		Dwelling extension	10 m	Considering the residential nature of these developments, no significant cumulative effects are likely.
2098		2 dwellings	10 m	



2360019	WWTP	10 m	This relates to the existing pumping station – as the nature of the development will not change, no significant cumulative effects are likely.
2460398	48 residential units	200 m	Considering the residential nature of these developments and the distance to the proposed development boundary, no significant cumulative effects are likely.
2460125	Dwelling Refurbishment	132 m	
21294	Air Dome	173 m	Considering the amenity nature of the development and the distance to the proposed development boundary, no significant cumulative effects are likely.
20293	Pavilion Bldg	210 m	
2460059	131 Dwellings	0.4 km	Considering the residential nature of these developments and the distances to the proposed development boundary, no significant cumulative effects are likely.
2360289	Dwellings	0.7 km	
2560210	98 Dwellings	0.7 km	
2460049	River Barrow works	0.3 km	

16.3.6.1 Carlow Southern Relief Road

The Carlow Southern Relief Road is a future road infrastructure project along the northern boundary of the proposed development in the area between the development and The Glen housing estate. NSLs R09 to R16 within The Glen would be closer to the Relief Road than to the Proposed Development. Given that the predicted noise levels due to the Proposed Development are 27 to 31 dB $L_{Aeq,T}$, and that the baseline noise levels are 53 dB $L_{Aeq,T}$ by day, 42 dB $L_{Aeq,T}$ during the evening and 39 dB $L_{Aeq,T}$ by night, it is considered that there is no significant potential for adverse cumulative noise effects due to the proposed development, in combination with the Carlow Southern Relief Road.

16.3.7 Traffic

16.3.7.1 Cumulative Developments Analysis

A review of large-scale developments in the immediate environs of the Proposed Development, approved by Carlow County Council, Laois County Council, or An Coimisiún Pleanála within the last five years, has been undertaken).

As outlined previously, the majority of trips associated with the Proposed Development—during both the construction and operational phases—are expected to occur outside the typical network peak hours (7:00–9:00 a.m. and 4:00–6:00 p.m.).

Given the low level of traffic generation and its timing relative to peak periods, no cumulative traffic assessment is required. The cumulative traffic effect of the Proposed Development is therefore considered “imperceptible”, meaning an effect that is measurable but does not result in any significant consequences for the surrounding road network.

16.3.7.2 Carlow Southern Relief Road

The Carlow Southern Relief Road (CSRR) is a long-term strategic infrastructure project that will provide a 7–8 km multi-modal transport corridor around the southern part of Carlow town. A section of the proposed CSRR is anticipated to pass to the north of the Mortarstown Wastewater Treatment Plant (WwTP), including two roundabout junctions located in close proximity to the site.

At this stage, the CSRR remains at the Option Selection phase, and no detailed design or mitigation measures (such as landscape planting proposals) are available. However, as outlined in Section 10.9, the proposed development is expected to generate a maximum of 16 PCU during the operational phase, which represents a very low level of traffic.

Given the limited traffic generation and its negligible contribution to overall network volumes, the cumulative traffic effect of the proposed development on the CSRR can be considered “imperceptible”, meaning an effect that is measurable but does not result in any significant consequence for the surrounding road network.

16.3.8 Water

Indirect cumulative effects can occur with the Proposed Development and other developments via surface water and groundwater flowpaths, but these are restricted by connectivity and proximity.

A screening assessment has been completed on other projects and developments using connectivity for hydrology and groundwater flow directions and proximity for hydrogeology.

Given the nature of the Proposed Development consisting of a direct discharge of effluent to the River Barrow and the Proposed Development Sites proximity to the River Barrow, the primary potential for cumulative effects will be from interactions with other activities within the River Barrow catchment which can effect surface water quality and surface water quantity.

The assessment of cumulative effects is divided as follows:

- Cumulative effect assessment with other wastewater treatment plants within the Barrow Catchment;
- Cumulative effect assessment with existing IPC Licences; and,
- Cumulative effect assessment with other land uses within the Barrow Catchment.

16.3.8.1 Cumulative Effects with other Urban Wastewater Treatment Plants

Urban WwTPs located both upstream and downstream of the Proposed Development Site within the Barrow Catchment are presented below.

The Proposed Development has the potential to interact with the discharges from other urban WwTPs upstream and downstream of the Proposed Development Site.

The 3rd Cycle Barrow Catchment Report (EPA, 2024) states that Urban WwTPs are a significant pressure in 15 at risk waterbodies. None of these at risk SWBs are located downstream of the Proposed Development Site.

Table 16-4: WwTPs listed as significant pressures in at risk waterbodies (3rd Cycle Barrow Catchment Report)

Facility Name	At risk waterbody	4 th WFD Cycle Status
Portarlinton D0158	Barrow_080	Moderate
Portlaoise D0001	TriogUE_020	Poor
Daingean D0226	Daingean_020	Poor
Mountmellick D0152	Owenass_020	Moderate
Coill Dubh D0242	Slate_020	Poor
Rathangan D0175	Slate_070	Moderate
Derrinturn D0244	Figile_010	Poor
Nurney A0080	Ballynaboley Stream_010	Poor
Monasterevin D0177	Barrow_100	Moderate
Tinryland WWTP A0099	Burren_050	Moderate
Ballinkillen WWTP A0094	Black(Borris)_020	Good
Cloneygowan A0167	Cushina_020	Good
Kileen A0153	Douglas(Laois)_030	Good
Coolanagh A0136	Douglas(Laois)_030	Good
Ballitore A0129	Greese_030	Moderate
Castleroe West A0127	Greese_060	Moderate

Furthermore, the EPA (EPA, 2021) state that 5 no. previously impacted waterbodies are no longer at risk from urban wastewater pressures with the following agglomerations no longer being considered as significant pressure since Cycle 2 of the WFD:

- Athy (D0003)
- Borris (D0248)
- Stradbally (D0292)
- Goresbridge (D0529)
- Muinebheag and Leighlinbridge (D0090)
- Old Leighlin (A0096)

Several of these agglomerations (Borris, Goresbridge, Muinebheag and Leighlinbridge) are located downstream of the Proposed Development Site. Therefore, the treatment of urban wastewaters downstream of the Proposed

Development Site is improving and there is an associated improvement in water quality in the River Barrow. The proposed upgrade works will likely contribute to further improvements in surface water quality.

16.3.8.2 Cumulative Effects with IPC Licence Emissions

The Proposed Development Site is located in the River Barrow catchment and the table below lists all active IPC licences in the Barrow catchment directly upstream and downstream on the Proposed Development Site.

Effluent discharge from the Proposed Development may interact with industrial emissions. Cumulative effects may include elevated concentrations of suspended solids and nutrients (ammonia and orthophosphate) in the River Barrow and an associated deterioration in surface water quality.

There is only 1 no. active IPC licence located within 10km of the Proposed Development. Approximately 2.4km to the northeast the Irish Sugar Company are operating under IPC licence conditions (Licence No: P0222). All emissions to surface waters are treated and monitored to ensure that the industrial activities do not impact the local water quality. With the ongoing mitigation measures designed for the protection of surface waters under the IPC Licence no cumulative effects will occur.-

All other IPC licences in the River Barrow catchment are significant distances (>15km) from the Proposed Development and due to the large volumes of flow within the River Barrow, no cumulative effects will occur.

No cumulative impacts on hydrogeology will occur due to the local hydrology with groundwater discharging as baseflow into the River Barrow. Therefore, cumulative effects on groundwater are negligible.

Table 16-5: IPC Licences within the Barrow Catchment

Active IPC Licence No:	Name	Category	~Distance from the Proposed Development Site
P0261	Peerless Rug Europe	Industry (emissions to sewer)	~18km NW and upstream of the Proposed Development Site
P0222	Irish Sugar Limited (Carlow)	Industry (emissions to water)	~2.4km NE and upstream of the Proposed Development Site
P0555	Alltech Farming Solutions Ltd	Industry (emissions to water)	~23km S and downstream of the Proposed Development Site

16.3.8.3 Cumulative Effects Associated with the Wider Landuse in the Barrow Catchment

The Proposed Development Site lies within the largely agricultural River Barrow surface water catchment and any discharge has the potential to interact with the agricultural practices in the surrounding lands and could contribute to a deterioration of downstream surface water quality.

Agriculture is the most significant pressure on river waterbodies in the Barrow Catchment. Common issues in relation to agriculture relate to diffuse phosphorous loss to surface waters from runoff from yards, roadways or other compacted surfaces or runoff from poorly draining soils. The entrainment of sediment in surface watercourses is also a problem which results from land drainage works and bank erosion.

Any discharge/effluent being released into the River Barrow has the potential to interact with the agricultural facilities and could contribute to a deterioration of downstream surface water quality.

However, the River Barrow already receives discharge from Mortarstown WwTP. Surface water quality monitoring completed in accordance with discharge licence requirements does not show a significant change in water quality upstream and downstream of the discharge location. The current discharge is having no impact on water quality in the river.

The WAC assessment proves the ability of the River Barrow to receive this treated wastewater without deleterious effects and without damaging aquatic life and ecosystems. Therefore no cumulative effects will occur with agricultural activities in the Barrow Catchment.

16.3.8.4 Climate Change as a Cumulative Pressure

The changes in rainfall patterns associated with future climate change (as detailed in Section 12.3.2) will result in reduced low flows associated with an increased frequency of summer droughts and increased evaporation rates. The future Q95 flow in the Barrow River will therefore be lower than at present due to climate change pressures. An ICARUS report (ICARUS, 2020) developed a system for categorising the vulnerability of a river catchment to reductions in flow and the range of potential reductions predicted under various future emission climate change scenarios. According to the report (ICARUS, 2020), the Q95 flow in the Barrow Catchment would be reduced by 11% by 2080 for a Representative Concentration Pathway of 4.5 (RCP 4.5 represents a moderate scenario where emissions peak around 2040). As stated in Section 12.3.3.1 the scaled 95%tile flow at the Proposed Development Site is currently 9.613m³/s. This would reduce to 8.555m³/s for the RCP 4.5 scenario.

The upgraded WwTP has been designed to ensure that the proposed discharge of treated effluent from the upgraded WwTP does not prevent the River Barrow from achieving 'Good' WFD status. The calculations are based on the existing low flows in the River Barrow. A reduction in low river flows associated with climate change would require slightly lower ELVs. Whilst the proposed upgraded WwTP is not designed to meet these lower ELVs the design is mindful of possible future adaptations and ensures that there are no particular constraints incorporated into the current design that could restrict future adaptations or upgrades which may be required in the future.

16.3.9 Land, Soils and Geology

The proposed development is located just south of Carlow Town and as such there are a large number of committed developments in the general Carlow Town area. The majority of these developments have been screened out as based on the scale and nature of the development and their location they not likely to have a perceptible cumulative impact with the proposed upgrade of the WwTP and PS. The following developments the potential to have a cumulative impact in combination with the upgrade of the WwTP and PS:

Case Number	Decision Date	Description	County	Cumulative Assessment	Impact
2460398	19/11/2025	48no. residential units (43no.- three bed dwellings, 2no.- four bed dwellings, & 3no.- two bed dwellings), a Childcare Facility (of 319sq.m) and all associated car parking, play areas, landscaping, and all associated site works to include a construction access from the partially complete Carlow Inner Relief Road direct to the proposed site. The subject site has a gross area of 2.739ha and is located at Mortarstown, Carlow, Co. Carlow with proposed access from the partially completed Carlow Inner Relief Road and through the practically complete Cluain Bui residential development.	Carlow	The application is for works located ca. 200m east of the Proposed Development. Due to the nature and scale of this project, it is likely there will be cumulative effects during construction of the proposed development. Cumulative operational effects are likely. Therefore, cumulative effects cannot be ruled out. When the mitigation measures outlined in section 11.8 are implemented there will not be a significant impact on land, soils and geology environment.	

No significant cumulative impacts on land, soils and geology environment are anticipated during the construction or operational phases as long as mitigation measures outlined below are put in place

16.3.10 Cultural Heritage

Given the absence of any recorded archaeological sites within the 500m study area surrounding the proposed development, the expansion of the southern suburbs of Carlow town into the study area during the 20th century has not resulted in the removal of any known archaeological sites within the environs of the proposed development. In addition, the combined results of a number of phases of archaeological investigations undertaken within the educational campus to the south of the existing wastewater treatment plant did not reveal any previously unrecorded features of archaeological significance. There are three buildings listed as Protected Structures located within the study area (see Figure 13-1 and Section 13.3.5) and none of these of these structures have been directly impacted by any modern developments undertaken within the area. Given the absence of any predicted moderate to significance effects on the cultural heritage resource arising from the proposed development, in combination with the nature of the baseline environment within the study area, it is, therefore, concluded that the proposed development will not contribute to any likely significant cumulative impacts on the cultural heritage resource.

16.3.11 Material Assets

With regard to proposed waste management strategies, no potential cumulative effects are anticipated during the construction and operational phases of the proposed development. No cumulative effects are anticipated during the construction or operational phases of the proposed development associated with built services.



16.3.12 Risk of Major Accidents and Disaster

A search of Carlow County Council, Laois County Council planning and ACP planning applications has been undertaken for applications submitted within the last 5 years within 2km of the Proposed development. Near the proposed works, projects that have been granted planning permission include retention of existing developments, agricultural developments, solar farms, typical extensions to domestic dwellings or the construction of new domestic dwellings.

There are no expected impacts from project within 5km of the Proposed development , from a major accidents and disasters perspective, as such, there are no significant cumulative effects with the Proposed development from a major accidents and disasters perspective.

17. INTERACTIONS

17.1 Introduction

This chapter describes the interactions between effects on different environmental factors. All potential interactions have been addressed as required throughout the EIAR, considering both the construction and operational stages of the proposed development. During each stage of the assessment, contributors liaised with one another (where relevant) to ensure that inter-relationships between environmental topics were fully understood and robustly assessed. This coordinated approach ensured that combined, cumulative, and interactive effects arising during construction activities and throughout the operational lifetime of the development have been appropriately identified and evaluated.

17.2 Summary of Interactions

The interactions between each of the technical topics have been considered to determine the potential direct and indirect environmental impacts, via. various pathways. This section has been prepared in accordance with EPA 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (2022), which states:

'Some topics could be placed under more than one heading, for example where hydrogeology is a relevant topic it may be relevant under the heading of 'Aquatic Ecology' as well as under 'Water' or 'Ground Water.' Another example would be amenity which may be relevant under 'Population and Human Health' and 'Landscape'. The requirement for the EIAR to consider 'Interactions' addresses this issue by ensuring that effects are cross-referenced between topics, thus reducing the need to duplicate coverage of such topics.'

A summary matrix showing key interaction and interdependencies between environmental attributes is presented in Table 17-1. Each environmental topic is discussed below, in Section 17.3 (Population and Human Health) to Section 17.14 (Major Accidents and Disasters).

Table 17-1 - Summary Interactions Matrix of Interactions between Environmental Factors

	Chapter 4 – Population & Human Health		Chapter 5 - Biodiversity		Chapter 6 – Landscape & Visual		Chapter 7 – Air Quality & Odour		Chapter 8 - Climate		Chapter 9 – Noise & Vibration		Chapter 10 - Traffic		Chapter 11 – Land, Soils & Geology		Chapter 12 - Water		Chapter 13 – Cultural Heritage		Chapter 14 – Material Assets		Chapter 15 – Major Accidents and Disasters			
	Con. <i>101</i>	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.
Chapter 4 – Population & Human Health			x	x	x	x	√	√	√	√	√	√	√	√	√	√	√	√	x	x	x	x	x	x	x	x
Chapter 5 - Biodiversity	x	x			√	√	√	√	x	x	√	√	x	x	x	x	√	√	x	x	√	√	x	x	x	x
Chapter 6 – Landscape & Visual	x	x	√	√			x	x	x	x	x	x	x	x	√	x	√	√	√	x	x	x	x	x	x	x
Chapter 7 – Air Quality & Odour	√	√	x	x	x	x			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Chapter 8 - Climate	x	x	x	x	x	x	√	√			x	x	√	√	√	√	√	√	x	x	√	x	x	x	x	x

¹⁰¹ Note: Con. Refers to Construction Phase. Op. refers to Operational Phase

Legend: x denotes no interaction / interdependency; √ denotes interaction / interdependency identified, further consideration warranted; Grey cells denote topic under assessment.

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	Chapter 4 – Population & Human Health		Chapter 5 - Biodiversity		Chapter 6 – Landscape & Visual		Chapter 7 – Air Quality & Odour		Chapter 8 - Climate		Chapter 9 – Noise & Vibration		Chapter 10 - Traffic		Chapter 11 – Land, Soils & Geology		Chapter 12 - Water		Chapter 13 – Cultural Heritage		Chapter 14 – Material Assets		Chapter 15 – Major Accidents and Disasters	
Chapter 9 – Noise & Vibration	x	x	x	x	x	x	x	x	x	x			√	x	x	x	x	x	x	x	x	x	x	x
Chapter 10 – Traffic	√	√	x	x	x	x	√	x	√	x	√	√			x	x	x	x	x	x	x	x	x	x
Chapter 11 – Land, Soils & Geology	x	x	x	x	x	x	√	√	x	x	x	x	x	x			√	√	x	x	x	x	x	x
Chapter 12 - Water	√	x	√	√	x	x	x	x	x	x	x	x	x	x	√	x			x	x	x	x	x	x
Chapter 13 – Cultural Heritage	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x	x
Chapter 14 – Material Assets	x	x	√	x	x	x	√	x	√	x	x	x	x	x	√	x	√	x	x	x			x	x
Chapter 15 – Major Accidents and Disasters	x	x	x	x	x	x	x	x	x	x	x	x	x	x	√	x	√	x	x	x	x	x		

Note: *Con.* Refers to Construction Phase. *Op.* refers to Operational Phase

Legend: x denotes no interaction / interdependency; √ denotes interaction / interdependency identified, further consideration warranted; Grey cells denote topic under assessment.

17.3 Population and Human Health

Population and Human Health attributes interact with other environmental attributes, as outlined in Chapter 4 of this EIAR; summarised as follows:

- **Climate Change** – Potential impacts on the climate environment could result in associated human health impacts. However, the mitigation measures described in Chapter 4 – Population and Human Health, and those relevant in Chapter 8 – Climate will ensure that this will not occur
- **Air Quality and Odour** – Potential impacts on the receiving air quality and odour could also result in associated human health impacts. However, the mitigation measures described in Chapter 4 – Population and Human Health, and those relevant in Chapter 7 – Air Quality and Odour will ensure that this will not occur.
- **Water Quality** – The potential increase in surface water discharge would have the potential to increase the flood risk downstream of the site and potentially impact Population and Human Health. However, as described in Chapter 12 – Water, the proposed increase in discharge associated with the proposed upgrade of the WwTP is very small in comparison to flows within the River Barrow. Therefore, there will be no increase in downstream flood risk.

Potential impacts on the receiving water environment could also result in associated human health impacts. However, the mitigation measures described in Chapter 4 – Population and Human Health, and those relevant in Chapter 12 – Water will ensure that these are minimized.

- **Land Quality** – Potential impacts on the receiving land, soils and geology environment could also result in associated human health impacts. However, the mitigation measures described in Chapter 4 – Population and Human Health, and those relevant in Chapter 11 – Land, Soil and Geology will ensure that this will not occur.
- **Noise and Vibration** – Potential impacts on the receiving Noise and Vibration environment could also result in associated human health impacts. However, the mitigation measures described in Chapter 4 – Population and Human Health, and those relevant in Chapter 9 – Noise and Vibration will ensure that this will not occur.
- **Traffic** – Potential impacts on the receiving traffic and transportation environment could also result in associated Population and Human Health impacts. However, the mitigation measures described in Chapter 4 – Population and Human Health, and those relevant in Chapter 10 – Traffic will ensure that this will not occur.

17.4 Biodiversity

There are significant interactions and inter-relationships between Chapter 5 Biodiversity and several other technical chapters of this EIAR. These are summarised as follows:

There are significant interactions and inter-relationships between Chapter 5 Biodiversity and several other technical chapters of this EIAR. These are summarised as follows:

- **Chapter 6 Landscape and Visual:** The ecological mitigation and enhancement recommended in Section 5.6 includes measures such as the retention of existing vegetation, e.g. hedgerows and treelines, replacement of vegetation lost during construction, and planting of new vegetation. While these measures are primarily intended to mitigate negative effects and maximise positive effects on Biodiversity, it is expected that they will also have a positive effect in terms of Landscape and Visual, both intrinsically, e.g.

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the aesthetic value of the planting, and by visually screening residential areas from the WwTP site and the Kilkenny Road.

- **Chapter 7 Air Quality:** Similar to Chapter 6, the retention, replacement, and additional planting recommended to maximise the Biodiversity value of the proposed development has a slight benefit in terms of Air Quality as the vegetation retained, replaced, and added will absorb some of the Air Quality impacts associated with the proposed development.
- **Chapter 9 Noise and Vibration:** There is a significant interaction between Biodiversity and Noise and Vibration in terms of the propagation, both through air and under water, of noise and vibration from the driving of sheet piles to form the temporary cofferdam for construction of the new outfall to the River Barrow. The effects of this on Biodiversity, particularly aquatic species and Otter, have been assessed in this Chapter 5. Seasonal and daily working hour restrictions and the use of hydraulic pushing or vibratory pile driving rather than percussive methods will minimise the impact of noise and vibration from piling on sensitive ecological receptors. In addition, similar to Chapters 6 and 7 as discussed above, the retention of as much vegetation as possible during construction, as recommended in Section 5.6, will contribute to reducing the impact of construction noise on sensitive receptors. Similarly, retention and enhancement of vegetation around the WwTP will contribute to minimising the noise from WwTP operations on nearby sensitive receptors.
- **Chapter 11 Land, Soils and Geology and Chapter 14 Material Assets:** There is an interaction between the Biodiversity chapter and the Land, Soils and Geology and Material Assets chapters in terms of invasive non-native plant species. The presence of invasive non-native plant species such as Japanese Knotweed, as detailed in Section 5.3.5, is considered to be a negative effect on the health of soils and value of lands, and any introduction or further spread of such species would be a further negative effect. The invasive non-native species mitigation and biosecurity measures in Sections 5.6.1.5 and 5.6.2.5 will ensure that this risk is controlled during construction and eventually reduced through the eradication of Japanese Knotweed from the site. Furthermore, the planting proposals for Biodiversity will likely lead to an increase in soil health within the areas in question in the long term.
- **Chapter 12 Water:** The most significant inter-relationship between Biodiversity and another chapter is with the Water chapter. As detailed in the Biodiversity chapter, both the construction of the proposed development and ongoing discharge of treated wastewater from the outfall, as well as the discharge of untreated wastewater during overflow events, has the potential to have significant negative effects on Biodiversity in the River Barrow, including on habitats and species for which the river is designated as a Special Area of Conservation (SAC) under the Habitats Directive (92/43/EEC). However, both the design of the upgraded WwTP and the mitigation measures prescribed (both in the Biodiversity chapter and in the Water chapter) in relation to its construction will ensure that any negative impacts on water quality, via groundwater or surface water pathways, will not significantly affect the Key Ecological Receptors.

There are no other significant interactions or inter-relationships between Chapter 5 Biodiversity and the other chapters within this EIAR. Chapter 17 presents a comprehensive overview of all interactions or inter-relationships between the different technical chapters in this EIAR.

17.5 Landscape and Visual

From a landscape and visual perspective, the construction and operation of the extension to the existing water treatment plant and associated underground pipeline may alter soils, vegetation, landform, and land cover. These changes may interact with biodiversity, hydrology, land, soils and geology, and the visual setting of cultural heritage assets. Such interactions should be considered alongside the findings of specialist assessments. The mitigation measures proposed will be implemented to ensure adverse impacts do not occur.



17.6 Air Quality and Odour

Interactions with human health and population are likely to arise during the construction and operational phase, however the mitigation measures that will be put in place during the construction and operational phase of the Proposed Development will ensure that the impact of the development complies with all guideline odour air quality limit values which are based on the protection of human health and for the minimisation of odour impact. Therefore, the impact of construction and operation of the Proposed Development is likely to be Minor and imperceptible with respect to human health. This is further discussed within Chapter 4. - Human and Population Health.

17.7 Climate

Climate has the potential to interact with a number of other environmental attributes.

Land, Soils, Geology and Hydrology

The impact of flood risk has been assessed, and the surface water drainage network will be designed and upgraded to cater for increased rainfall in future years as a result of climate change. Climate change as a cumulative pressure has also been included within the Water Chapter (Chapter 12) of this EIAR which determined the increase in summer droughts will result in a reduction in low river flows. This will have a negative effect on water quality in the River Barrow. However, future adaptation is possible to mitigate against the impact of low flows. The effect of the interactions between climate and land, soils, geology and hydrology are *direct, short-term, negative* and *imperceptible* during the construction phase and *direct, long-term, negative* and *slight* during the operational phase, which is overall *not significant* in EIA terms.

Air Quality

Air quality and climate have interactions due to the emissions from the burning of fossil fuels during the construction and operational phases generating both air quality and climate impacts. There is no impact on climate due to air quality. However, the sources of impacts on air quality and climate are strongly linked.

Traffic and Transportation

During the construction and operational phase, there is the potential for interactions between climate and traffic. Vehicles accessing the site will result in emissions of CO₂, a greenhouse gas. The effects of the proposed development on climate have been assessed and the effects of the interactions between traffic and climate are considered to be *direct, short-term, negative* and *not significant* during the construction phase and *direct, long-term, negative* and *not significant* during the operational phase, which is overall *not significant* in EIA terms.

Waste

Waste management measures will be put in place to minimise the amount of waste entering landfill, which has higher associated embodied carbon emissions than other waste management such as recycling. The effect of the interactions between waste and climate are considered to be *direct, short-term, negative* and *not significant*, which is overall *not significant* in EIA terms.



17.8 Noise and Vibration

There are interactions between the noise and vibration assessment and traffic assessment. With increased traffic movements, the noise levels in the surrounding area increase. The impacts of the proposed development on the noise environment are assessed by reviewing the change in traffic flows on roads close to the site. In this assessment, the impact of the interactions between traffic and noise are considered to be imperceptible due to the low level changes in traffic flows associated with the proposed development.

17.9 Traffic

Possible interactions with other environmental attributes are summarised below:

- **Population and Human Health:** The proposed development is going to generate less than 10% of the existing volume and the resulting cumulative trips are going to be well within the capacity of all the links. In addition, no partial or full closure of road is suggested. Therefore, no significant impact on the local community is anticipated.
- **Air Quality –** Interactions between Air Quality and Traffic can potentially be significant during the construction and decommissioning phases. The impacts of the proposed development on air quality are assessed in Chapter 7 –Air Quality by reviewing the change in annual average daily traffic on roads close to the site, with the impact of the interactions between Traffic and Air Quality considered to be direct, short-term, neutral, localised and not significant during the construction and decommissioning phases. The impact of the interactions between Traffic and Air Quality during the operational phase are considered to be long-term, direct, negative and not significant during the operational phase.
- **Climate –** During the construction, operational and decommissioning phases, there is the potential for interactions between climate and traffic. Vehicles accessing the site will result in emissions of CO₂, a greenhouse gas. The effects of the proposed development on climate are assessed in Chapter 8 – Climate by reviewing the change in annual average daily traffic on roads close to the site, and the effects of the interactions between traffic and climate are considered to be direct, short-term, negative and not significant during the construction phase and direct, long-term, negative and not significant during the operational phase, which is overall not significant in EIA terms.
- **Noise and Vibration –** Increased traffic volumes during all phases of the Proposed development are expected, however the implementation of mitigation measures as per Chapter 9 – Noise and Vibration and relevant mitigation measures as per this chapter will ensure that these impacts are minimised when these topics do interact, and are not significant.

17.10 Land, Soil and Geology

- **Air Quality & Climate -** Potential impacts on the receiving Land, Soils and Geology environment could also impact on air quality conditions present. However, the mitigation measures described in Chapter 11 – Land, Soils & Geology, and those relevant in Chapter 7 - Air Quality & Climate will ensure that this will not occur.
- **Water -** Potential impacts on the receiving land, soils and geology environment could also impact on hydrology and hydrogeology conditions present. However, the mitigation measures described in Chapter 12 – Water, and those relevant in Chapter 11 – Land, Soils & Geology will ensure that this will not occur.



17.11 Water

Environmental factors are interconnected to some degree and interaction can exist between different environmental attributes. This section summarises the primary interactions between the water environment and other environmental attributes.

Water impacts have the potential for interaction with Population and Human Health, Land, Soils and Geology and Biodiversity.

Changes to the local groundwater and surface water regime have the potential to impact land, soils and geology. During the construction phase of the proposed development, temporary dewatering works may be required for below ground excavations. Dewatering will result in a lowering of the local groundwater table in the vicinity of the works which will cause previously saturated subsoils, which lay below the groundwater table, to rest above the groundwater table and no longer be saturated in water. This will be a local short-term temporary effect on soils/subsoils during the construction phase. Once construction is complete, pumping will be ceased and the groundwater table will return to its natural elevation.

The changes associated with the replacement of natural surfaces with lower permeability surfaces has the potential to alter the local hydrological regime which may impact soils/subsoils. For example, at some sites with poorly draining soils this may result in increased waterlogging within the site. This will not be the case at the proposed development site due to the local hydrogeological regime with low rates of surface water runoff and high rates of groundwater recharge, due to the permeable nature of the soils and subsoils at the site.

Any potential impact to surface water quality has the potential to impact on biodiversity in the River Barrow downstream of the proposed development site. The local hydrological network is intrinsically linked with biodiversity and ecological receptors downstream of the site. However, the mitigation measures proposed for the construction and operational phase of the proposed development will ensure there is no deterioration in surface water quality in the River Barrow downstream of the site. Therefore, there will be no impact on downstream biodiversity and ecological receptors.

The potential increase in surface water discharge would have the potential to increase the flood risk downstream of the site and potentially impact population and human health. However, the proposed increase in discharge associated with the proposed upgrade of the WwTP is very small in comparison to flows within the River Barrow. Therefore, there will be no increase in downstream flood risk.

17.12 Cultural Heritage

There are no predicted interactions with other environmental attributes foreseen in relation to the cultural heritage resource.

17.13 Material Assets

Biodiversity, Land, Soils and Geology, Water, Air Quality and Odour, and Climate – Waste management strategies during the Construction phase of the Proposed development have been informed by the receiving land, soils and geology environment. Refer to Chapter 5 Biodiversity, Chapter 7 – Air Quality and Odour, Chapter 8 Climate, Chapter 11 – Land, Soils and Geology, Chapter 12 – Water and relevant sections including mitigation measures described in Chapter 14 – Material Assets.



17.14 Major Accidents and Disasters

Land, Soils and Geology

Construction phase activities such as land clearing, excavations, stockpiling of materials etc. have the potential for interactions between major accidents and disasters and land and soils in the form of subsidence and landslides. The area surrounding the proposed development has a low susceptibility of landslides. Therefore, the likelihood of a landslide impacting the proposed development is negligible. It is predicted that there will be no significant interactions between major accidents and disasters and land, soils and geology (Chapter 11 - Land, Soils and Geology).

Water

Construction phase activities such as land clearing, excavations, stockpiling and preparation of materials etc. have the potential for interactions between major accidents and disasters and the surrounding hydrological environment. Containment systems to intercept any material released will be developed within a detailed Construction Phase Environmental Management Plan (CEMP) which will include adequate mitigation measures will be present to collect and stop any spill going into the surrounding environment.

It is predicted that there will be no significant interactions between major accidents and disasters and the surrounding hydrological environment (Chapter 12 - Water).

18. SCHEDULE OF COMMITMENTS

All mitigation and monitoring commitments detailed within this EIAR are presented in Table 18-1 and Table 18-2 below. Together these tables form the Schedule of Environmental Commitments which will be implemented during the construction, decommissioning and operations phases of the Proposed Development.

All of the mitigation and monitoring commitments have been incorporated into the Outline Construction Environmental Management Plan (CEMP), presented in Appendix 2-2, Volume 3 of the EIAR. This is a live document which will be updated to the Detailed CEMP, prepared by the Contractor and will include any future additional mitigation measures.



Table 18-1 - Schedule of Environmental Commitments- Mitigation Measures

Item Ref	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase	Decommissioning Phase
1.	Chapter 4 – Population and Human Health	▪ A Construction Environmental Management Plan and Construction Traffic Management Plan (CTMP) will be enacted during the construction phase, as is standard for projects of this scale. ▪ A Health and Safety Plan will be prepared by the Contractor for the construction of the Proposed Development in line with Safety, Health and Welfare at Work Act 2005. Emergency systems, like fire alarms are to be checked weekly and emergency escape drills are to be carried out frequently. ▪ The construction of the Proposed Development will comply with all of the requirements of this EIAR (Volume 1 to 3) as well as the Outline Construction Environmental Management Plan (CEMP) submitted as Appendix 2-2, Volume 3 of this EIAR. ▪ This document will be further developed and added to within the project specific Detailed CEMP which will be prepared by the Contractor in advance of the construction phase and will be fully implemented onsite for the duration of the construction phase of the project. ▪ Environmental monitoring will be carried out (including air quality and odour and noise and vibration) during the construction phase as detailed in Chapter 18 of this EIAR - Schedule of Commitments. ▪ Asbestos Containing Material (ACMs) will be removed in advance of any refurbishment or demolition works within the existing WwTP. ▪ ACMs will only be removed by a competent contractor in compliance with all relevant waste management and Health and Safety legislation. ▪ An Asbestos Survey of the Kilkenny pump station (scheduled to be decommissioned) will be undertaken prior to commencement of the proposed decommissioning works.			

Item Ref	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase	Decommissioning Phase
2.	Chapter 5 - Biodiversity	Protection of Water Quality - Chapter 12 (Water), particularly Section 12.8, sets out mitigation measures to address all water quality impacts from the proposed development. The Biodiversity chapter authors have reviewed these measures and consider them sufficient to protect relevant Key Ecological Receptors (KERs). The mitigation measures for water quality impacts associated with each impact source are set out in Chapter 12 Water as follows: - Sediment (from earthworks and dewatering) - Section 12.8.1.1 and 12.8.1.2. - Hydrocarbons - Section 12.8.1.3. - Cement-based materials - Section 12.8.1.4. - Wastewater - Section 12.8.1.5 - Outfall works - Section 12.8.1.7. - Micro-tunnelling - Section 12.8.1.8 Artificial Lighting - Construction works during hours of darkness will be kept to a minimum. Works should be limited to normal working hours (08:00 to 18:00), with the site being secured and lighting being switched off outside of these hours, subject to safety and security requirements (This does not apply to areas within the existing WwTP which are subject to existing operational lighting).			



Item Ref	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase	Decommissioning Phase
		- Any works lighting shall be directed away from the River Barrow and all trees and vegetation to be retained, following the principles set out below in relation to the permanent lighting design. - All in-stream works and works near the riverbank shall be restricted to daylight hours. Therefore, there shall be no artificial lighting of the river channel or riverbanks. - The proposed operational lighting is restricted to the access roads within the WwTP site itself (see Figure 5-19). No lighting is proposed west of Kilkenny Road. A lighting plan has been prepared for the WwTP site, which follows the below principles: - Lighting design will be flexible and fully take into account the presence of protected species. Appropriate lighting will be used, with more sensitive lighting regimes (in terms of both the type, extent and timing of light) deployed in wildlife-sensitive areas. - Dark zones will be used to separate habitats or features such as waterbodies, hedgerows, treelines and scrub from lighting by forming a dark perimeter around them. - Buffers will be used to protect dark zones and rely on ensuring light levels within a certain distance of a feature do not exceed defined limits. - The following, which is taken from Institute of Lighting Professionals <i>Guidance Note GN08/23</i>¹⁰², should be considered if choosing new luminaires: - - All luminaires should lack UV elements when manufactured. Metal halide, compact fluorescent sources should not be used.			

¹⁰² ILP (2023). *Guidance Note GN08/23 - Bats and Artificial Lighting at Night*. Institute of Lighting Professionals.

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		▪ LED luminaires should be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability. ▪ A warm white light source (2700 Kelvin or lower) should be adopted to reduce blue light component. ▪ Luminaires should feature peak wavelengths higher than 550nm. ▪ Column heights should be carefully considered to minimise light spill and glare visibility. This should be balanced with the potential for increased numbers of columns and upward light reflectance as with bollards. ▪ The use of bollard or low-level downward-directional luminaires is strongly discouraged. This is due to Issues such as unacceptable glare, poor illumination efficiency, unacceptable upward light output, increased upward light scatter from surfaces and poor facial recognition which makes them unsuitable for most sites. Therefore, they should only be considered in specific cases where the lighting professional and project manager are able to resolve these Issues. ▪ Only luminaires with an upward light ratio of 0% and with good optical control will be used. ▪ Luminaires must always be mounted on horizontally with no light output above 90° and/or no upward tilt. ▪ As a last resort, accessories such as baffles, hoods or louvres may be used to reduce light spill and direct it only to where it is needed. Installation of Temporary Cofferdam ▪ In-stream works are restricted to the period 1 July to 30 September. ▪ If works are required outside this window, a derogation under the Local Authorities (Works) Act, 1949 (as amended) would be			

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		required from the Inland Fisheries Section of the Department of Climate, Energy and the Environment. - Construction of the new outfall will take approximately three weeks, including cofferdam installation and removal. - It is anticipated that the outfall works will be completed within the permitted July–September period. - Any fish (and crayfish, if present) within the cofferdam area will be rescued prior to dewatering and released downstream or upstream outside the cofferdam. - Dewatered material from the cofferdam will be discharged to a settlement pond located at least 20 m from the river bank. - Wherever possible, piles shall be driven by hydraulic pressing. - Where this is not feasible, vibratory piling will be deemed acceptable. - Any percussive piling shall be limited to a small number (between 1 no. and 10 no.) strikes with an impact hammer to drive piles to refusal, where necessary. - During dewatering, the pump intake shall be fitted with a screen or mesh to prevent intake of any fish or other aquatic life. Any fish (and crayfish, if present) within the isolated area shall be rescued (prior to dewatering) and released into the river outside the cofferdam. The dewatering from the cofferdam will be to a settlement pond to be installed at a minimum of 20m from the river bank. Habitat Loss and Fragmentation - Tree felling and vegetation clearance shall be limited to the areas required for the construction of the proposed development. These			

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		areas shall be clearly delineated and marked out prior to commencement of tree felling and vegetation clearance. No tree felling or vegetation clearance will be permitted outside of these areas. ▪ The Tree Protection Plan shall be followed to ensure that there is no direct or indirect loss or damage to trees or other vegetation that is not within areas required to be cleared. ▪ Clearance of woodland and scrub immediately south of the existing WwPS shall not exceed a total area 520m² and shall under no circumstances encroach on the priority Annex I 'alluvial woodland' (zone A). ▪ Clearance for the temporary works area along the outfall pipeline shall not encroach into the adjoining zone A woodland outside the Red-Line Boundary. ▪ Vegetation clearance in zone A at the outfall location shall be strictly limited to that required to construct the new outfall. Protection of the 2 no. mature willow trees on the riverbank shall be of paramount importance and the measures in the Tree Protection Plan shall be strictly followed in this regard. ▪ Replacement and additional planting in each area shall be established at the earliest opportunity, subject to any seasonal recommendations set out in the Landscape Plan and Specification (EBLA, 2025), landscape rationale set out in Section 5.6. ▪ With regard to the tree group west and north of the cottage (see Tree Protection Plan Drawing No. 25025_TPP Sheet 2), the temporary works for the new WwPS have been rearranged to minimise habitat loss and fragmentation in this area, most especially to allow for the retention of the 2 no. mature Horse Chestnut trees (T675 and T676) and maintenance of a dark buffer			

Item Ref	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase	Decommissioning Phase
		zone around these trees to avoid negative impacts on the bat roosts identified. Biosecurity General - To prevent the import of invasive non-native species to the proposed development site, all vehicles, plant, equipment, and PPE shall be thoroughly checked for any signs of invasive species or their propagules, e.g. seeds or fragments of rhizomes, before being allowed on site, paying particular attention to wheels and tracks. - If there is any doubt as to the absence of invasive species materials, the vehicle/plant/equipment/PPE concerned shall be taken to one of the dedicated wash-down disinfection facilities described below and thoroughly cleaned and re-checked before being allowed on site. - The Biosecurity Standard Operating Procedure (SOP) set out in Section 3.1 of INVAS (2026), which is presented in Appendix 5-12, Volume 3 of the EIAR, shall be implemented for all works, including surveys, site investigations or any other activities on site. Terrestrial Environment During construction, works between the Kilkenny Road and the riverbank to construct the new outfall are assumed to interact with Japanese Knotweed and Himalayan Balsam. Therefore, the following shall be implemented: - The Contractor shall set up dedicated wash-down/disinfection facilities for use on entry to/exit from the two works areas west of			

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		the Kilkenny Road, i.e. the outfall area and the area south of the existing pumping station. ▪ All personnel, visitors, materials and equipment shall be thoroughly cleaned in this facility and be checked to ensure that they are free of any signs of invasive species or their propagules, e.g. seeds or fragments of rhizomes, before being allowed to leave the area. ▪ Washings built up in the wash-down/disinfection facility shall be periodically removed and stockpiled for removal as detailed in the first bullet point. ▪ All personnel and visitors shall be made aware of the presence of invasive species, the importance of preventing their spread, and the measures/protocol being implemented by the Contractor to that end. ▪ Appropriate signage shall be erected at entry and exit points from this area to alert all personnel and visitors to the presence of this species. ▪ All arisings from excavations in this area shall be treated as contaminated with invasive species material and shall be stockpiled accordingly, in a bunded area at least 20m from the riverbank, and then removed to an appropriately licensed waste facility. ▪ Works west of the Kilkenny Road in the vicinity of the existing WwPS shall be assumed to interact with Himalayan Balsam. The same arrangement as described above in relation to the outfall area is required here. ▪ Three-cornered Leek is present along the Kilkenny Road adjacent to the temporary works area for the southernmost intermediate tunnel shaft.			



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		- The works area will be restricted to the existing roadway and footpath where possible to avoid disturbance to the infested landscaped area on the eastern side of the road. - If works encroach into the infested area, any contaminated arisings will be removed off-site to an appropriately licensed waste facility. - Any vehicles, plant, equipment, or PPE that come into contact with infested material will be thoroughly cleaned and checked before leaving the area. - Any Ash (<i>Fraxinus excelsior</i>) trees or material encountered during vegetation clearance will be assumed to be infected with ash dieback (<i>Hymenoscyphus fraxineus</i>). - All ash material arising from clearance works will be managed and disposed of in accordance with best practice guidance, such as SEPA advice on infected plant material Aquatic Environment During construction, all in-stream works shall be assumed to interact with Nuttall's Waterweed and aphanomycosis ("crayfish Plague"). The following shall be implemented to control the risk of spread: - The Contractor shall set up a wash-down/disinfection facility for use on entry to/exit from the outfall works area, i.e. the works area west of the Kilkenny Road. Contaminated water from the biosecurity station will be tankered off site to a licenced waste facility. - The Contractor shall set up a wash-down/disinfection facility for use on entry to/exit from the outfall works area, i.e. the works area west of the Kilkenny Road. Contaminated water from the biosecurity station will be tankered off site to a licenced waste facility.			



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		- All personnel, visitors, materials and equipment which have been in contact with the riverbed material shall be thoroughly cleaned in this facility and be checked to ensure that they are free of invasive species material before being allowed to leave the area. - Washings built up in the wash-down/disinfection facility shall be periodically removed and stockpiled for removal as detailed in the first bullet point. - All personnel and visitors to site shall be made aware of the presence of aquatic invasive non-native species and diseases in the in-stream works area, the importance of preventing their spread, and the measures/protocol being implemented by the Contractor to that end. - Appropriate signage shall be erected on approach to the in-stream works area to alert all personnel and visitors to the presence of this species.¹⁰³ - The Check-Clean-Dry/Disinfect protocol shown in Figure 5-20 will apply to any vehicles, plant, equipment or PPE in contact with the water, including sheet piles/cofferdam units. - All arisings from the in-stream works area shall be treated as contaminated with Nuttall's Waterweed and crayfish plague and shall be stockpiled accordingly in a bunded area at least 20m from the riverbank. This material shall then be removed off-site to an appropriately licensed waste facility. - On their removal from the river following completion of the outfall works, the sheet piles shall be treated as per other materials or equipment used for in-stream works before leaving site.			

¹⁰³ Templates for invasive non-native species and biosecurity signage are available on *Invasives.ie* (<https://invasives.ie/resources/check-clean-dry-resources/>).

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		▪ To control the risk of the introduction or spread of aquatic invasive non-native species or diseases associated with the use of a barge for the temporary cofferdam works, the owner or operator of the barge shall submit the following to the Employer or Employer's Representative: ▫ Documentary evidence in the form of a completed and signed Marine Institute 'Cleaning and Disinfection Declaration Form' (Form No. C-038) or appropriate alternative, e.g. from Waterways Ireland, that the barge was fully cleaned and disinfected within 6 months immediately preceding its arrival on site; and, ▫ Records of the barge's movements during the 6 months immediately preceding its arrival on site. ▪ If the above cannot be provided, the barge shall be fully cleaned and disinfected, e.g. at the Waterways Ireland dry dock at Athy, c. 20km north of the works area via the Barrow Navigation, or at another suitable location. This shall be done, under the supervision of the Contractor's ecologist, who shall make a record of the cleaning and disinfection of the barge and include this in their monitoring file. ▪ The barge shall only be permitted to move to site once the Contractor's ecologist is satisfied that it does not pose a significant risk of importing aquatic invasive non-native species or diseases to the works area Protection of Birds ▪ Section 22(4) of the Wildlife Act makes it an offence to hunt or deliberately injure a wild bird, to take or remove eggs or nests, to			



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		destroy, injure or mutilate eggs or nests, or to disturb a wild bird on or near a nest containing eggs or unflown young. However, Section 22(5) states that it is not an offence to unintentionally kill or to injure a wild bird or unintentionally destroy, injure or mutilate eggs or nests while carrying out construction works. Notwithstanding this, every effort shall be made to avoid killing or injuring birds, destroying nests or eggs or disturbing birds near nests. - To further protect nesting birds and other wildlife, Section 40 of the Wildlife Act makes it an offence to <i>“cut, grub, burn or otherwise destroy, during the period beginning on the 1st day of March and ending on the 31st day of August in any year, any vegetation growing on any land not then cultivated”</i>. However, this does not apply to <i>“the clearance of vegetation in the course of road or other construction works or in the development or preparation of sites on which any building or other structure is intended to be provided”</i>. Notwithstanding this, every effort shall be made to avoid cutting/felling trees or clearing vegetation during this period. - Where tree felling or vegetation clearance is necessary between 1st March and 31st August, a suitably qualified and experienced ecologist will inspect the trees/vegetation and identify any active bird nests present. Any active nests will be protected and any surrounding cover (extent to be determined by suitably qualified ecologist) not cleared until such time as the nest is no longer active, as advised by the Contractor’s ecologist. Protection of Bats - The 2 no. Horse Chestnut trees (T675 and T676) in the garden of the cottage west of the WwTP were previously marked for removal to facilitate the construction of the new WwPS in this area. Bat surveys indicate the presence of at least 1 no. roost for 2 no. Brown			

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		Long-eared Bat in these trees. As per Section 5.6.1.4, the temporary works for the new WwPS have been rearranged to allow for the retention of these trees and maintenance of a dark buffer zone around them to avoid the bat roost(s). - The existing WwPS building is proposed to be decommissioned and not demolished. This building has been assessed as having 'Moderate' bat roost potential. No evidence of current use by bats was found during the surveys. As this building is not being demolished the potential bat roost habitat will remain. Protection of Otter - All open excavations shall be securely fenced off and include ramps/ladders outside of active working hours to prevent Otters of other species from becoming trapped within them. - No Otter holts or couches were identified in the immediate vicinity of the proposed works. Thus, based on the current baseline, there is no requirement for a Regulation 54 derogation licence. However, given the confirmed presence of otters in the vicinity and the significant time likely to elapse between the surveys and the commencement of works, the possibility that Otters may establish new holts or couches in the vicinity cannot be entirely excluded. Therefore, pre-construction surveys to identify any new Otter holts or couches (should they occur) will be undertaken in advance of works (including any investigatory or preparatory works). - These surveys will be undertaken by a suitably qualified and experienced ecologist (appointed by the Contractor) and in the appropriate survey seasons. - The results of these pre-construction surveys will determine the need or otherwise for any derogation licence (due to any changes			

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		in Otter use in the area in the intervening time between the planning application and start of works). The terms and conditions of any licence granted will be strictly observed. The Contractor will be responsible for applying for and executing any licences required, and will be assisted by their own suitably qualified and experienced ecologist. River Barrow and River Nore SAC - All specific mitigation required to address potential adverse effects on the integrity of the River Barrow and River Nore SAC is prescribed in the NIS (AtkinsRéalis Report Ref. 5161805DG0457 rev 0 - NIS) submitted alongside this EIAR. Landscaping - All planting proposed within the Mortarstown WwTP site will comprise native species of Irish provenance. - Existing screen planting along the northern, eastern, and southern boundaries of the site will be largely retained. Additional native species hedgerows will be planted along the entire boundary to the extension to the site to increase biodiversity. These hedgerows, as they mature, will also provide screening. - Grassland areas within the site will be managed to enhance biodiversity. Short grassland areas will be managed through a mowing regime of five cuts per year at approximately six-week intervals, with all arisings removed. Long grassland areas will be managed through a single annual cut, with all arisings removed. - Two wildlife ponds, incorporating marginal planting and pondside trees to provide partial shading, will be provided within the Mortarstown WwTP site. Additional orchard tree planting will be			

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		provided within the rear garden of the derelict cottage located to the west of the site. - Replacement tree and hedgerow planting will be provided where sections of existing trees and hedgerows are removed along Kilkenny Road (in the vicinity of Southern Gardens and Carraig Abhainn) to facilitate shafts for micro-tunnelling works. - The small area of woodland removed south of the Kilkenny Road pumping station will be allowed to naturally regenerate following completion of the works. In addition, a native hedgerow will be planted adjacent to the existing stone boundary wall near the Kilkenny Road pumping station.			
3.	Chapter 6 – Landscape and Visual	- Hedge planting and natural recolonisation of woodland will be provided to replace the woodland removed south of Kilkenny Road Pumping Station. - Any damage to existing stone walls at the Kilkenny Road Pumping Station will be made good - A comprehensive landscape scheme will be implemented at the WwTP site and to provide biodiversity enhancements. - Tree and hedge planting will be provided to replace tree and hedges lost on Kilkenny Road due to the provision of shafts for the micro tunnelling works.			
4.	Chapter 7 – Air Quality & Odour	Construction phase A dust control strategy has been developed based on recognised international best practice guidance which include IAQM 2014, BRE 2003, UK Government publications(2002), Scottish Office (1996), and USEPA 1997.			



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		- A Traffic Management Plan and a Dust Management Plan will be prepared to minimise dust emissions during construction. And will form part of the Construction Environmental Management Plan (CEMP). The plans will be finalised following completion of the detailed design for the proposed development. Site management - A site-specific Dust Management Plan (DMP) will be prepared and agreed with stakeholders before construction. The DMP will set out management and operational measures to prevent or minimise dust under normal and high-risk conditions (e.g. dry, windy weather). - The siting of activities and storage of materials will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance - As prevailing winds are predominantly south-westerly, material storage will be located downwind (north-west) of sensitive receptors where practicable. - Site management will allow for a rapid response to adverse weather, including restricting activities or implementing additional controls. - Dust generation is generally suppressed during rainfall >0.20 mm/day and increases when wind speeds exceed 10 m/s; particular care will be taken during high winds or gales. - Meteorological conditions are generally favourable for dust suppression, though additional controls will be applied during infrequent high-risk periods. - Dust control measures will be monitored with controls adjusted based on weather conditions.			

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		- A complaints register will be maintained on site, recording all dust-related complaints and remedial actions taken. - All dust control conditions will be strictly implemented, monitored, and reviewed regularly throughout the construction period. - If dust nuisance occurs outside the site boundary, site activities will be reviewed and corrective measures implemented immediately. The following measures shall be taken in order to avoid dust nuisance occurring under unfavourable meteorological conditions: - The operator must monitor performance to ensure that the proposed mitigation measures are implemented and that dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions; - A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out; - All dust control conditions contained within shall be achieved. - At all times, the procedures put in place will be strictly monitored and assessed. Site Roads and Routes - Browsers or suitable watering equipment will be available during periods of dry weather through the construction period. Research has found that watering can reduce dust emissions by 50% (USEPA, 1997). Watering shall be conducted during sustained periods to ensure that unpaved areas are kept moist. The required application rate frequency will vary according to soil type, weather conditions and vehicular use;			

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		- Any hard surface roads will be swept to remove mud and aggregate materials from their surface. Site traffic on Public roads Spillage and blow off of debris, aggregates and fine material onto public roads will be reduced to a minimum by employing the following measures: - Vehicles delivering or collecting material with potential for dust emissions shall be enclosed, covered or wetted at all times to restrict the escape of dust; - Public roads directly outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary. - Construction traffic will be restricted to standard working hours and exclude Sundays. Construction works will be carried out in accordance with guidance set out in Section 7.5.1			
		Operational Phase Scheduled emission points - All scheduled emission points will be regulated through the planning process, with emission limit values based on standards typical for this type of facility. - The assessment demonstrates that operational emissions will not result in air quality or odour impacts.			



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		- Predicted emission levels comply with Irish and European air quality and odour assessment criteria, including S.I. No. 787 of 2005. - Prevention of on-site delivery vehicles from leaving engines idling, even over short periods - Ensure all plant and machinery are well maintained and inspected regularly - All materials used during construction will be accompanied by certified datasheets which will set out the limiting operating temperatures. Temperatures can affect the performance of some materials, - The Contractor will be required to mitigate against the effects of fog, lighting and hail through site risk assessments and method statements.			
5.	Chapter 8 - Climate	Construction Phase - Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site. A construction waste management plan will be implemented to minimise construction waste sent to landfills. Recycling of materials will be promoted to and reduce the environmental footprint of the site. - Sourcing materials locally will be prioritised. This will help to reduce transport related GHG emissions and helps support local suppliers, further promoting economic sustainability. - Material choices and quantities will be reviewed during detailed design, to identify and implement any lower embodied carbon options, where feasible.			



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		Operational Phase - Emissions from site visits will be reduced by using local service providers and making visits multi-functional where possible to minimise additional trips. - Electricity consumption is a further contributor to operational emissions. - The installation of solar panels will reduce reliance on grid electricity generated from fossil fuels.as these will provide approximately 15% of the energy demand of Mortarstown WwTP. In line with the UÉ Sustainability Framework, additional climate commitments include: - Meeting 40% of energy demand from renewables and Power Purchase Agreements (PPAs) by 2035. - Halving energy intensity by 2030. Implementing a process emissions monitoring strategy by 2027			
6.	Chapter 9 – Noise and Vibration	Construction Phase With regard to construction activities, best practice operational and control measures for noise and vibration from construction sites are found within BS 5228 (2009 +A1 2014) Code of Practice for Noise and Vibration Control on Construction and Open Sites Parts 1 and 2. BS5228 includes guidance on several aspects of construction site practices, including, but not limited to:			



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		Selection of Quiet Plants ▪ This practice is recommended in relation to sites with static plant such as compressors and generators. It is recommended that these units be supplied with manufacturers' proprietary acoustic enclosures where possible. ▪ The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. ▪ The least noisy item should be selected wherever possible. Noise Control at Source ▪ Where replacement of noisy plant is not feasible, noise control at source will be implemented through modification of plant or enhanced sound-reduction measures in consultation with suppliers. ▪ Examples include stiffening panels, applying damping compounds, and fitting resilient materials to reduce resonance, rattling, or grinding noise. ▪ In accordance with BS 5228, significant noise sources will be enclosed where reasonably practicable, taking into account safety, access, ventilation, and mobility. ▪ Plant suitable for enclosure includes pumps, generators, and similar static equipment. ▪ All plant will be operated in accordance with manufacturers' instructions. ▪ Equipment will be located away from noise-sensitive receptors where possible, including loading and unloading areas.			



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		▪ Intermittently used plant (e.g. cranes) will be switched off or throttled down when not in active use. ▪ No plant will be left running unnecessarily. ▪ Directional noise sources will be oriented away from noise-sensitive areas where practicable. ▪ Acoustic engine covers will be kept closed during operation and idling. ▪ Materials will be lowered carefully and not dropped, with resilient coverings used where appropriate. ▪ Mobile plant (e.g. cranes, dump trucks, excavators, loaders) will use acoustic exhausts, maintain closed enclosures, and be switched off when not in use, achieving potential noise reductions of up to 10 dB. ▪ Percussive tools will be fitted with mufflers or sound-reducing equipment, air leaks sealed, and localised acoustic screens used near sensitive boundaries. ▪ Impulsive hammering during concrete mixer cleaning will be avoided. ▪ Materials handling will avoid dropping from excessive heights, with dump trucks and chutes lined with resilient materials. ▪ Demountable acoustic enclosures will be used for hand tools and breakers and relocated as required. ▪ All plant will be subject to regular maintenance to prevent unnecessary noise increases and maintain the effectiveness of mitigation measures. Screening			



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		- Noise screening is an effective additional control measure to reduce noise at sensitive receptors when used alongside other mitigation measures. - The effectiveness of screening depends on the height, length, and location of the screen relative to both the noise source and the receptor. - Screening is particularly useful for basement and ground-level works, helping to reduce noise impacts at adjacent ground-floor receptors. - Careful site layout planning can contribute to noise reduction, with site offices, storage areas, or material stockpiles positioned to act as informal noise barriers. - The use of localised mobile noise controls, such as mobile hoarding screens or acoustic quilts, is an effective means of reducing noise from high-noise plant. - These localised measures should be used where percussive or high-noise activities occur close to nearby noise-sensitive buildings. Liaison with the Public - A designated Noise Liaison Officer will be appointed for the construction phase. - All noise complaints will be recorded, investigated, and responded to promptly by the liaison officer. - Prior to particularly noisy activities (e.g. demolition, breaking, piling), the liaison officer will notify nearby noise-sensitive receptors. - Notifications will include the timing and expected duration of the noisy works to help manage expectations and reduce disturbance.			

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		Hours of Work - Construction works will be undertaken within the times below, taken from the Construction Management Plan: - Monday to Friday 07:00 to 19:00hrs - Saturday 07:00 to 14:00hrs - Sunday and Public Holidays No noisy work on site.			
7.	Chapter 10 - Traffic	Construction Phase: Outline Traffic Management - An Outline Traffic Management Plan (OTMP) is provided in Appendix 10-2, with a summary included in Table 10-4, Chapter 10. This provides an initial framework for the future Construction Traffic Management Plan (CTMP) and is a guidance document separate from the final CTMP to be prepared by the contractor. - The appointed contractor will liaise with relevant authorities, including Transport Infrastructure Ireland, Carlow County Council, and the Emergency Services, when developing the CTMP. - The CTMP shall be treated as a live document, allowing for updates to reflect changes in the construction programme, operations, or unforeseen circumstances, as required by the Employer, their agents, or relevant authorities. - The contractor shall ensure that the key elements of the OTMP are incorporated into the final CTMP. The principal contractor(s) must also agree upon and implement monitoring measures to assess the effectiveness of the CTMP. Upon finalisation, the contractor shall adopt the CTMP and its associated monitoring protocols. - The CTMP shall address the following key issues:			



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		▫ Parking will not be permitted along the side of any road. Proposed parking arrangements will utilise the existing WwTP site. ▫ Signage: All signage will comply with the Traffic Signs Manual – Chapter 8 and be agreed with Carlow County Council. ▫ Construction Route: Materials will be delivered directly to each site. HGV traffic will use National and Regional Roads. Deliveries via Kilkenny Road / Green Road junction. ▫ Material Delivery Timing: Deliveries restricted to 09:00–16:00 to minimise community impact. ▫ Speed Limits: Compliance with posted/legal speed limits will be emphasised to all staff, suppliers, and contractors. ▫ Micro Tunnel Gravity Sewer: Road closures along Kilkenny Road limited to 100m stretches. One side of the road will remain open via 'Stop/Go' system with a minimum 3m carriageway. No road closure for outfall pipe crossing under the Kilkenny Road. ▫ Regular cleaning of the road network near the site will be required ▫ Inspections and spot checks will ensure compliance with the CTMP by all project staff and suppliers. ▫ Emergency services will be contacted immediately via 112. Full incident details will be provided.			
8.	Chapter 11 – Land Soil and Geology	Construction Phase Soil and Waste Removal ▪ Stripping of topsoil will be carried out in a controlled and carefully managed way and coordinated with the staging for the			

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		development. At any given time, the extent of topsoil strip (and consequent exposure of subsoil) will be limited to the immediate vicinity of active work areas. ▪ Topsoil stockpiles will be protected for the duration of the works and not located in areas where sediment laden runoff may enter existing surface water drains. ▪ Topsoil stockpiles will also be located so as not to necessitate double handling. Mitigation measures as outlined in Chapter 14 – Material Assets, are also applicable to soil and waste removal. ▪ The design of road levels and finished levels has been carried out in such a way as to minimize cut/fill type earthworks operations. The duration that subsoil layers are exposed to the effects of weather will be minimised. ▪ Disturbed subsoil layers will be stabilised as soon as practicable (e.g. backfill of service trenches, construction of road capping layers, construction of building foundations and completion of landscaping). ▪ Similar to comments regarding stripped topsoil, stockpiles of excavated subsoil material will be protected for the duration of the works. Stockpiles of subsoil material will be located separately from topsoil stockpiles. Measures will be implemented to capture and treat sediment laden surface water runoff (e.g. surface water inlet protection and earth bunding adjacent to open drainage ditches). ▪ The overall excavation of material will be ca. 89,000m³ for the development, will be minimised as much as possible to reduce the impact on soils and geology. ▪ Subsoil where suitable will be reused onsite as fill material. Topsoil that can be used for amenity purposes will be stockpiled on the			



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		development area for use as required in the final landscaping of the development. - Any surplus material, or materials which are deemed not suitable for onsite reuse (including any potentially contaminated materials), will be managed, transported and disposed of in accordance with the requirements of the Waste Management Act 1996, as amended, and the Waste Framework Directive 2008/98/EC of the European Parliament and Council on waste. A project specific Resource and Waste Management Plan (RWMP) will be fully implemented onsite for the duration of the project. Soil /Geology Impact Mitigation - Earthworks plant and vehicles delivering construction materials to site will be confined to predetermined haul routes around the site; - Shoring of all deep excavations will be carried out to ensure sides do not collapse during the excavation of the tanks. - Vehicle wheel wash facilities will be installed in the vicinity of any site entrances and road sweeping implemented as necessary in order to maintain the road network in the immediate vicinity of the site. - Dust suppression measures (e.g. dampening down) will be implemented as necessary during dry periods; - The employment of good construction management practices will serve to minimise the risk of pollution from construction activities at the development in line with the Construction Industry Research and Information Association (CIRIA) publication entitled, Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors, CIRIA - C532 (2001) which are also detailed in			

Item Ref	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase	Decommissioning Phase
		Chapter 12 – Water (Hydrology and Hydrogeology). Specifically, with regard to soils and geology, the following will be adhered to; ▫ Fuels, lubricants and hydraulic fluids for equipment used on the construction site, as well as any solvents, oils, and paints will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice; Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the development for disposal or recycling; ▫ Any spillage of fuels, lubricants or hydraulic oils will be immediately contained, and the contaminated soil removed from the development and properly disposed of; ▫ All site vehicles used will be refuelled in bunded and adequately sealed and covered areas in the construction compound area. ▫ All plant and machinery will be serviced before being mobilised to site; ▫ No plant maintenance will be completed on site, any broken-down plant will be removed from site to be fixed; ▫ Refuelling will be completed in a controlled manner using drip trays at all times; ▫ Mobile bowzers, tanks and drums will be stored in secure, impermeable storage areas away from open water; ▫ Fuel containers will be stored within a secondary containment system, e.g. bunds for static tanks or a drip tray for mobile stores; ▫ Containers and bunding for storage of hydrocarbons and other chemicals will have a holding capacity of 110% of the volume to be stored;			

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		▫ Ancillary equipment such as hoses and pipes will be contained within the bund; ▫ Taps, nozzles or valves will be fitted with a lock system; ▫ Fuel and chemical stores including tanks and drums will be regularly inspected for leaks and signs of damage; ▫ Drip-trays will be used for fixed or mobile plant such as pumps and generators in order to retain oil leaks and spills ▪ Only designated trained operators will be authorised to refuel plant on site; ▪ Procedures and contingency plans will be set up to deal with emergency accidents or spills; ▪ An emergency spill kit with oil boom, absorbers etc. will be kept on-site for use in the event of an accidental spill. A specific team of staff will be trained in the use of spill containment; ▪ Strict supervision of contractors will be adhered to in order to ensure that all plant and equipment utilised on-site is in good working condition. Any equipment not meeting the required standard will not be permitted for use within the Site. This will minimise the risk of soils and bedrock becoming contaminated through site activity; and, ▪ Highest standards of site management will be maintained, and utmost care and vigilance followed to prevent accidental contamination or unnecessary disturbance to the site and surrounding environment during construction. A named person will be given the task of overseeing the pollution prevention measures agreed for the site to ensure that they are operating safely and effectively. ▪ Soils on the development may become unnecessarily compacted by machinery during construction. In order to protect against			

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		unnecessary compaction of soil by machinery, construction limits, accesses, and haulage roads will be clearly defined: ▪ In the event that contaminated ground is encountered during the construction works the following specific environmental management procedures will be adhered to; ▫ The contaminated material will be fully characterised in terms of lateral and vertical extent, and a detailed assessment of the potential environmental and human health impacts will be undertaken in accordance with industry standard best practice; ▪ Soil Excavated onsite during construction will be reused as 'Other granular 6F1/2 type' fill below the pavements and in landscaping to reduce the quantity of soil requiring disposal offsite. ▪ Any soil or topsoil required to be removed offsite to an appropriately licenced/ permitted soil disposal or recovery facility will be characterised in advance in accordance with the Waste Classification List of Waste & Determining if Waste is Hazardous or Non-hazardous (EPA, 2015) and the waste acceptance criteria for the relevant facility. ▪ Any waste generated during the works will be managed in accordance with the relevant waste legislation. Any contaminated material requiring offsite disposal will be transported and disposed of to a suitably licenced waste facility; ▪ Monitoring and protection measures (inclinometers, extensometers, piezometers, monitoring targets) will be implemented during the micro-tunnel construction. ▪ Continuous monitoring during construction of micro tunnel, maintaining slurry pressure and continuously monitoring excavation volumes passing through the machine.			



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		▪ Surface watch when TBM is passing critical locations (e.g. under roads) will reduce severity of impact by enable fast mitigative reaction (e.g. stop traffic). ▪ At excavations proximal to the River Barrow, the excavation temporary support will exclude water ingress with immediate excavation support and water exclusion provided by sheet pile cut-off walls on all sides. General The standard following precautionary measures will be implemented. ▪ All excavated materials will be stored away from the excavations, in an appropriate manner at a safe and stable location. The maximum height of temporary stockpiles will be 3m. ▪ A comprehensive monitoring and supervisory regime including monitoring of all excavations and stability assessments as required will be put in place to ensure that the proposed construction works do not constitute a risk to the stability of the site.			
		Operational Phase ▪ Fuels, lubricants, hydraulic fluids, solvents, oils, and paints will be handled carefully to avoid spills and stored in bunded, secure areas with appropriate spill containment. ▪ All chemicals used in the wastewater treatment process will be used and stored only in concreted or bunded areas, secured against unauthorised access or vandalism. ▪ Onsite equipment will be maintained in accordance with best practice to minimise leakage risks.			



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		- Any fuel or oil spills will be immediately contained, with contaminated soil or bedrock removed and disposed of appropriately off-site. - Refuelling of vehicles will take place only at bunded facilities on site or at suitable off-site locations. - Strict supervision of contractors will be maintained during routine maintenance to ensure all plant and equipment are in good working order. - Equipment that does not meet operational standards will not be permitted for use, reducing the risk of contamination. - These mitigation measures will be incorporated into a site-specific Environmental Management Plan, to be implemented during the operational phase. - Measures identified in Chapter 12 – Water (Hydrology and Hydrogeology) are also applicable to the protection of soils and bedrock during operation.			
		Decommissioning Phase The mitigation measures outlined in Section 11.8 Construction Phase will apply to the decommissioning phase. Further environmental soil testing will be carried out in advance of the decommissioning works to identify any potentially contaminated soils to determine any offsite suitable soil recovery/ disposal facilities as required.			
9.	Chapter 12 - Water	Mitigation Measures During Construction Phase Earthworks Resulting in Suspended Solids Entrainment in Surface Waters			

Item Ref	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase	Decommissioning Phase
		- Management of surface water runoff and subsequent treatment prior to release off-site will be undertaken during construction work as follows. - Prior to the commencement of earthworks, silt fencing will be placed down-gradient of the construction areas where drains and drainage pathways are present; - These will be embedded into the local soils to ensure all site water is captured and filtered; - All surface drains within and down-gradient of the earthworks/ construction area will be blocked temporarily or where there are minors flows silt fencing will be placed within the existing drain; - No pumped construction water will be discharged directly into the main surface watercourse; - Pumped water (if necessary) will be discharged via a silt bag which will filter any remaining sediment from the pumped water. If silt bags are required, the entire silt bag discharge area will be enclosed by a perimeter of double silt fencing. Any discharge of pumped water will be onto a vegetated surface, local to the excavation, for infiltration to ground; - Daily monitoring of the excavation/earthworks and associated water management systems will be completed by a suitably qualified person during the construction phase (Ecological Clerk of Works (ECoW)). All necessary preventative measures (detailed in Section 8.6) will be implemented to ensure no entrained sediment, or deleterious matter will enter the River Barrow; and, - Earthworks will take place during periods of low rainfall to reduce run-off and potential siltation of watercourses. Monitoring of weather forecasts will be completed (by the ECoW) and			



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		construction works will be postponed in the event of an orange or red weather warning for rainfall. - In addition, the sands and gravels deposits associated with the Athy-Bagenalstown GWB are excellent filters and will polish treated construction water within a couple of meters of flow. Surface Water Quality from Excavation Dewatering Management of groundwater seepages and subsequent treatment prior to discharge into the drainage network will be undertaken as follows: - Appropriate interceptor drainage, to prevent upslope surface runoff from entering excavations will be put in place; - If required, pumping of excavation inflows will prevent build-up of water in the excavation; - The interceptor drainage will be discharged onto natural vegetated surfaces downgradient of the excavations and not directly to surface waters; - The pumped water volumes from excavations will be discharged via temporary volume and sediment attenuation ponds adjacent to excavation areas; - There will be no direct discharge to surface watercourses, and therefore no risk of hydraulic loading or contamination will occur; - Treated water from excavations will be discharged over vegetative surfaces and will percolate into the ground due to the permeable nature of the local soils and subsoils;			



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		▪ Daily monitoring of excavations by a suitably qualified person (EcoW) will occur during the construction phase. If high levels of groundwater seepage inflow occur into the excavation, excavation works will immediately be stopped and a geotechnical assessment undertaken; and, ▪ The sand and gravel subsoils are excellent filters and will polish treated construction water within a couple meters of flow. Release of Hydrocarbons ▪ All plant will be inspected and certified to ensure they are leak free and in good working order prior to use on site; ▪ On-site re-fuelling of machinery will be carried out using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer or truck will be re-filled off site and will be towed/driven around the site to where machinery is located. The 4x4 jeep/fuel truck will also carry fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser will be parked on a level area in the construction compound when not in use and only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations; ▪ Fuels stored on site will be minimised. Any storage areas will be bunded appropriately for the fuel storage volume for the period of the construction; ▪ The electrical control building will be bunded appropriately to the volume of oils likely to be stored and to prevent leakage of any associated chemicals and to groundwater or surface water. The			



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		bunded area will be fitted with a storm drainage system and an appropriate oil interceptor; ▪ The plant used will be regularly inspected for leaks and fitness for purpose; ▪ An emergency plan for the construction phase to deal with accidental spillages will be contained within the Construction Environmental Management Plan (CEMP). These measures are summarised as follows: ▫ The source of the spill will be identified and stopped; ▫ The Environmental Manager will be immediately notified of the spill so that they can take appropriate action; ▫ The spill will be contained using spill control materials (for example absorbent pads), ensuring not to spread the spill within the wider environment; ▫ If possible, cover or isolate vulnerable areas such as surface water drains; ▫ The spill will be cleaned using spill control materials which will be disposed of by a fully licenced waste contractor with the appropriate permits; ▫ The Environmental manager will inspect the site to ensure that all measures are in place to prevent further spillage from occurring. Any storage areas are to be fully bunded and spill kits available to deal with accidental spillages; and ▫ The Environmental Manager will notify the county council of the spillage and the remedial and preventative actions undertaken. Release of Cement-Based Products ▪ No batching of wet-cement products will occur on site. Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place;			

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		- Where possible pre-cast elements for culverts and concrete works will be used; - No washing out of any plant used in concrete transport or concreting operations will be allowed on-site; - Where concrete is delivered on site, only the chute will be cleaned, using the smallest volume of water possible. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed. Chute cleaning water is to be isolated in temporary lined wash-out pits located near proposed site compounds. These temporary lined wash-out pits will be removed from the site at the end of the construction phase; - Will use weather forecasting to plan dry days for pouring concrete; and, - Will ensure pour site is free of standing water and plastic covers will be ready in case of a sudden rainfall event Wastewater Disposal - During the construction phase, self contained welfare facilities at the site will be utilised. - No additional water or wastewater will be sourced on the site, nor discharged to the site. - Treated effluent will continue to be discharged as normal during the upgrade works.			



		Potential Effects on Groundwater Levels Due to Temporary Dewatering - Proposed excavations will take place within the sands and gravels of the Athy–Bagenalstown Gravels Groundwater Body (GWB). This GWB is classified by the Geological Survey Ireland (GSI) as a Regionally Important Gravel Aquifer. - Groundwater encountered during excavations will be temporarily dewatered and pumped to settlement ponds. - Treated water from the settlement ponds will recharge to ground locally. - There will be no net loss of groundwater, aside from short-distance displacement during temporary dewatering works. Construction of New Outfall - Sheet piles will be used to construct the headwall along the riverbank to minimise the duration and extent of disturbance to the riverbank and riverbed. - Installation and removal of sheet piles will occur over a short period, limiting any increase in suspended solids. - Any effects on water quality will be temporary and localised, with river flow maintained around the temporary cofferdam. - In-stream works will be undertaken in accordance with Inland Fisheries Ireland (2016) Guidelines. Works will be restricted to the July–September in-stream window and carried out during favourable dry weather conditions. - A temporary sheet pile cofferdam will create a dry working area within the river channel. - The cofferdam will be dewatered using a pump, with water discharged to adjacent grassland.			



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		- Excavated materials will be stockpiled as far from the riverbank as practicable and covered to prevent sediment runoff. - A Hydrodynamic Assessment confirmed that the proposed outfall pipe and headwall will not adversely affect river water levels or flow velocities. - Sheet piles will be constructed to 46.25 m, providing allowance above relevant flood and climate-change scenarios. - The contractor will determine acceptable flood exceedance levels and ensure sufficient time to remove equipment if works must be abandoned. - A designated person will monitor and record Met Éireann rainfall data before construction and every 2 hours during works. - River water levels upstream of the outfall will be monitored prior to construction and recorded hourly during construction. Micro Tunnelling - The works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance - Before any ground works are undertaken, silt fencing will be embedded into the local soils to ensure all site water is captured and filtered; - The area around the bentonite batching, pumping and recycling plant will be bunded using terram (as it will clog) and sandbags in order to contain any spillages; - Drilling fluid returns will be contained within a sealed tank / sump to prevent migration from the works area. A closed-loop system will be used to reduce the overall waster by separating the spoil/returns from the fluid which can be recirculated and reused;			

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		- Spills of drilling fluid will be cleaned up immediately and contained in an adequately sized skip before been taken off-site; - If rainfall events occur during the works, there will be a requirement to collect and treat small volumes of surface water from areas of disturbed ground (i.e. soil and subsoil exposures created during site preparation works); - This will be completed using a shallow swale and sump down slope of the disturbed ground; and water will be pumped to a proposed settlement pond area at least 50m from a watercourse; - The discharge of water onto vegetated ground will be via a silt bag which will filter any remaining sediment from the pumped water. The entire percolation area will be enclosed by a perimeter of double silt fencing; - Any sediment laden water from the works area will not be discharged directly to a watercourse or drain; - Works shall be suspended in the event of an orange or red weather warning for rainfall; - Daily monitoring of the compound works area; the water treatment and pumping system and the percolation area will be completed by a suitably qualified person during the construction phase. All necessary preventative measures will be implemented to ensure no entrained sediment, or deleterious matter is discharged to the watercourse; - If high levels of silt or other contamination is noted in the pumped water or the treatment systems, all construction works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied. - On completion of the works, the ground surface disturbed during the site preparation works and at the entry and exit pits will be			

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		carefully reinstated and re-seeded at the soonest opportunity to prevent soil erosion; - There will be no batching of cement; - All plant will be checked and inspected for purpose of use prior to mobilisation. - Fracture Blow-out (Frac-out) Prevention and Contingency Plan: - The drilling fluid will be non-toxic and naturally biodegradable (i.e., Clear Bore Drilling Fluid or similar will be used); - The area around the drilling fluid batching, pumping and recycling plants will be bunded using terram and/or sandbags to contain any potential spillage; - One or more lines of silt fencing will be placed between the works area and the adjacent river; - Spills of drilling fluid will be cleaned up immediately and transported off-site for disposal at a licensed facility; - Adequately sized skips will be used where temporary storage of arisings are required; - The drilling process / pressure will be constantly monitored to detect any possible leaks or breakouts into the surrounding geology or local watercourse; - This will be gauged by observation and by monitoring the pumping rates and pressures. If any signs of breakout occur then drilling will be immediately stopped; - Any frac-out material will be contained and removed off-site; - The drilling location will be reviewed, before re-commencing with a higher viscosity drilling fluid mix; and, - If the risk of further frac-out is high, a new drilling alignment will be sought.			

		Hydrological Connected Designated Sites ▪ Mitigation measures for sediment control are detailed in Section 12.8.1.1 and 12.8.1.2. ▪ Mitigation measures for the control of hydrocarbons during construction works are detailed in Section 12.8.1.3. ▪ Mitigation measures for the control of cement-based products during construction works are detailed in Section 12.8.1.4. ▪ Mitigation measures in relation to wastewater are prescribed in Section 12.8.1.5 ▪ Mitigation measures in relation to the construction of the new outfall are prescribed in Section 12.8.1.7. ▪ Mitigation measures in relation to micro tunnelling are detailed in Section 12.8.1.8 ▪ Implementation of these mitigation measures will ensure the protection of surface water quality in receiving waters. Surface and Groundwater WFD Status ▪ Mitigation measures for sediment control are detailed in Section 12.8.1.1 and 12.8.1.2. ▪ Mitigation measures for the control of hydrocarbons during construction works are detailed in Section 12.8.1.3. ▪ Mitigation measures for the control of cement-based products during construction works are detailed in Section 12.8.1.4. ▪ Mitigation measures in relation to wastewater are prescribed in Section 12.8.1.5 ▪ Mitigation measures in relation to the construction of the new outfall are prescribed in Section 12.8.1.7. • Mitigation measures in relation to micro tunnelling are detailed in Section 12.8.1.8			

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		Operational Phase Effluent Discharge on Surface Water Quality The Proposed Development will also operate under discharge licence conditions which include: ▪ Complying with the Emission Limit Values (ELVs) and ensuring that no specified discharge from the wastewater works exceed these ELVs; ▪ Ensuring that there is no deterioration in the quality of the receiving waters as a result of the discharge; ▪ Ongoing maintenance of all plant and equipment to ensure that no unauthorised wastewater discharge takes place; ▪ Continued sampling, analyses and measurement of key water quality parameters in the discharge effluent; ▪ Continued sampling, analyses and measurement of key water quality parameters in the ambient environment (i.e. River Barrow upstream and downstream of the Proposed Development Site); ▪ Ongoing maintenance and calibration of all instrumentation; ▪ Maintain corrective action procedures and undertake corrective action in the unlikely event that the specific requirements of the licence not be fulfilled; ▪ Continued monitoring of the influent stream in order to measure mass loadings to the WwTP; ▪ In the case of an incident the EPA will be notified as soon as practicable and where the incident relates to discharge to water the Inland Fisheries Ireland (IFI) will be notified; and, ▪ All complaints of an environmental nature will be recorded.			



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		Effluent Discharge on Downstream Surface Water Quantity All on-site procedures will be completed under licence from the EPA with UÉ reporting to the EPA until the discharge licence is surrendered. Leaks or Plant Failure During the operational phase of the proposed development the facility will continue to operate under the discharge licence conditions. All incidents, or failures will be reported to the EPA and dealt with in accordance with best practice UÉ guidelines.			
10.	Chapter 13 – Cultural Heritage	Construction Phase - A programme of archaeological monitoring of ground excavation works during the construction phase will be undertaken by a suitably qualified archaeologist licensed by the National Monument Service within the following areas: - Topsoil stripping works in greenfield areas within and to the west of the existing wastewater treatment plant - Ground excavation works required to facilitate the construction of the proposed outfall within woodland, riverbank and in-channel areas to the west of Kilkenny Road - Any ground excavation work required to facilitate the construction of a microtunnel gravity sewer along Kilkenny Road. - In the event where archaeological remains are identified during archaeological supervision, works will cease locally and the area will be recorded and securely cordoned off.			



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		▪ The National Monuments Service will be consulted to agree appropriate mitigation. ▪ Mitigation may include preservation in situ by avoidance or preservation by record through archaeological excavation. ▪ Areas within the footprint of the proposed upgrade works have been previously disturbed. ▪ As a result, archaeological monitoring of demolition works within these previously disturbed areas is not considered necessary.			
	Chapter 14 – Material Assets	Construction Phase – Built Services The following mitigation measures will be implemented during the construction phase. ▪ A Construction Environmental Management Plan (CEMP) has been prepared to support this planning application. Prior to the commencement of construction works, the appointed contractor will update and, where necessary, revise the CEMP to reflect any conditions that may be attached to the planning permission. The CEMP will take account of all of the environmental considerations (including water, dust and noise nuisance control; soil / stockpile management; temporary groundwater management; appropriate Site management of compound area; fuel, oil and chemical storage and use; and waste management) set out in the CEMP submitted as part of this planning application. ▪ Diversion, rerouting and relocation of the following services will take place prior to construction; existing watermain and hydrants, existing lighting ducts and light poles, and existing underground electrical cables. ▪ The construction compounds will include adequate temporary welfare facilities including foul drainage and potable water supply;			

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		- All newly installed utilities/ services will be assessed, tested and certified as required prior to being fully commissioned. - Connections to the existing and proposed foul networks will be coordinated with the relevant utility provider. All works associated with the existing utilities for the proposed development will be carried out in strict accordance with the guidelines of the relevant stakeholders (specifically ESB, and UÉ), Health and Safety Authority and any additional site-specific requirements. - A copy of all available existing, and as built utility plans will be maintained on Site during the construction of the proposed development. The underground power lines and foul and water mains within the existing UÉ services, located onsite will be clearly marked and all Site personnel will be made aware of the known location of any onsite underground or over ground services during the construction phase; and, - Local drainage will be surveyed and, where necessary, blocked off to prevent runoff of potentially contaminated surface water entering the surface water drainage system. A detailed Surface Water Management Plan will be included in the CEMP to be prepared by the Contractor, to deal with the treatment of surface water runoff prior to discharge to the site drainage system. Waste Management - Asbestos Containing Material (ACMs) will be removed in advance of any refurbishment or demolition works within the existing WwTP. - ACMs will only be removed by a competent contractor in compliance with all relevant waste management and Health and Safety legislation.			



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		- An Asbestos Survey of the Kilkenny pump station (scheduled to be decommissioned) will be undertaken prior to commencement of the proposed decommissioning works. - All waste management procedures implemented onsite during the construction phase will be in accordance with the Outline CEMP submitted as part of this planning application, and a project specific RWMP to be prepared by the Contractor, in accordance with the <i>'Best Practice Guidelines on the Preparation of Waste Management Plans for Construction & Demolition Projects'</i> (EPA 2021). The RWMP will take account of the relevant requirements of the Outline CEMP, the EIAR and any relevant planning conditions etc., and will be prepared by the Contractor in advance of the commencement of any construction or demolition works. - The contractor will supply all waste containers / skips, as required, for each of the identified waste streams. Waste will be segregated and removed to licensed facilities by licenced hauliers and all containers will be emptied before they are full to avoid overflowing. The contractor is to provide a waste forecast for waste types and quantities expected to be generated. - Good working practices and take back schemes will be used to reduce the amount of waste generated, as an initial step, with waste management routes for each waste stream to be recorded in the site Waste Management Plan. There is a target of 98% diversion of construction waste from landfill to be achieved with a minimum diversion of 90%. In order to reduce waste generation as far as possible, off cuts, surplus materials and packaging is to be returned to suppliers for closed loop recycling, single used plastics are to be avoided where possible and all materials are to be stored correctly to avoid waste generation from damage and contamination of incorrectly stored materials.			

Item Ref	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase	Decommissioning Phase
		- All waste materials will be segregated onsite into the various waste streams, via. dedicated skips and storage areas. - All waste will be removed from Site by one or more waste haulage contractor(s) who hold a current valid waste collection permit issued by the National Waste Collection Permit Office (NWCPO). All waste materials generated during the construction phase will be removed offsite to an appropriately permitted or licenced waste disposal / recovery facility. - All waste removed offsite will be appropriately characterised (under the correct LoW / EWC code), transported and disposed of in accordance with relevant waste management legislation (including but not limited to the Waste Management Act of 1996 and 2001, as amended and all subsequent waste management regulations). - All waste management and disposal / recovery records will be maintained onsite throughout the project and will be made available for viewing by the Client, Employer's Representative and statutory consultees (CCC, EPA) as required. - Scheduling and planning the delivery of materials will be carried out on an 'as needed' basis to limit any surplus materials; - Materials will be ordered in sufficient dimensions so as to optimise the use of these materials onsite, and will be carefully handled and stored so as to limit the potential for any damage; - Where feasible, sub-contractors will be responsible for the provision of any materials they require onsite in order to help reduce any surplus waste; - All loaded trucks entering and exiting the Site will be appropriately secured and covered; - Dust will be controlled at entry and exits to the Site using wheel washes (as required) and/or road sweepers, and tools and plant			

Item Ref	Environmental Topic	Schedule of Environmental Commitments – Mitigation Measures	Construction Phase	Operational Phase	Decommissioning Phase
		will be washed out and cleaned in designated areas. Wheel / road sweeper washings will be contained and treated prior to discharge; ▪ Secure lockable and controlled storage to be provided for the storage of chemicals and other hazardous materials, e.g., asbestos; ▪ The Contractor is to provide details of proposed measures to be implemented to mitigate against Foreign Object Debris (FOD) and windblown materials; and, ▪ Secure lockable and controlled storage to be provided for the storage of chemicals and other hazardous materials, e.g., asbestos.			
11.	Chapter 15 - Major Accidents and Disasters	▪ The Proposed development has been designed in line with good industry practice, and mitigation against the risk of major accidents and/or disasters is embedded through the design, in accordance with planning and legislative requirements. ▪ There is a layered suite of mitigation measures embedded across design, construction, operation and decommissioning to prevent, detect and respond to major accidents and disasters. This includes regulatory compliance with Industrial Emissions licensing and adherence to national and international codes and standards.			



Table 18-2 - Schedule of Environmental Commitments - Monitoring Measures

Item Ref	Environmental Topic	Schedule of Environmental Commitments – Monitoring Measures	Construction Phase	Operational Phase	Decommissioning Phase
1.	Chapter 4 – Population and Human Health	Environmental monitoring will be carried out (including air quality and odour and noise and vibration) during the construction phase as detailed in Chapter 18 of this EIAR - Schedule of Commitments.			
		Operational Phase monitoring includes the final effluent being monitored in accordance with the terms of the Wastewater Discharge Licence and is detailed in all EIAR chapters (Chapter 6 – Landscape and Visual; Chapter 7 - Air Quality and Odour; Chapter 9 – Noise and Vibration; Chapter 11 – Land, Soils and Geology; and Chapter 12 – Water) and Chapter 18 - Schedule of Commitments).			
2.	Chapter 5 - Biodiversity	The Contractor shall retain the services of a suitably qualified and experienced ecologist for the duration of the works. The qualifications and experience of the Contractor's ecologist shall include, as a minimum: - ▪ BSc (Hons) or above in Ecology or a related environmental discipline, ▪ Full membership of the CIEEM or equivalent membership of a similar professional body, ▪ Demonstrable experience in providing ecological/environmental supervision on construction sites, including where there are in-stream works. The main duties of the Contractor's ecologist shall include the following: - ▪ Assist the Contractor in ensuring that the measures in this Biodiversity chapter and the NIS, any conditions of consents/licences and relevant guidelines are fully and properly implemented during construction.			

Item Ref	Environmental Topic	Schedule of Environmental Commitments – Monitoring Measures	Construction Phase	Operational Phase	Decommissioning Phase
		- Undertake pre-construction surveys for breeding or resting places of species listed on Annex IV to the Habitats Directive, most notably Otter and bats, as well as nesting birds and invasive non-native plant species. - Oversee the continued implementation of the biosecurity measures described above. - Advise the Contractor on any requirement for a derogation licence under Regulation 54 of the Habitats Regulations due to the presence of breeding or resting places of species listed on Annex IV to the Habitats Directive, if identified during the pre-construction surveys.¹⁰⁴ - Directly supervise key activities on site, particularly works near sensitive ecological receptors such as the River Barrow, woodlands and potential bat roost features. - Carry out weekly inspections of the site and document the implementation of the measures in this NIS, any conditions of consents/licences and relevant guidelines. The Contractor's ecologist's inspection records shall be available to UÉ or the Employer's Representative, An Coimisiún Pleanála, the NPWS and IFI, on request. - Provide monthly updates to UÉ or the Employer's Representative on the implementation of the mitigation measures detailed in this chapter and in the accompanying NIS, and any ecological/environmental incidents on site.			
		Operational Phase			

¹⁰⁴ The Contractor, with the assistance of the Contractor's ecologist, shall be responsible for applying for any such licence and observing its conditions.

Item Ref	Environmental Topic	Schedule of Environmental Commitments – Monitoring Measures	Construction Phase	Operational Phase	Decommissioning Phase
		Mitigation has been provided by design and as such no further mitigation is required, other than appropriate monitoring and maintenance of the operation of the WwTP. For a period of 4 years following completion of construction, UÉ shall maintain monitoring and treatment of invasive non-native species management measures, as well as the establishment of the landscaping and ecological enhancement measures described in this chapter. The upgraded WwTP will operate under Discharge Licence conditions, which will include: ▪ Complying with the ELVs and ensuring that no discharge from the wastewater works exceed these ELVs. ▪ Ongoing maintenance of all plant and equipment to ensure that no unauthorised wastewater discharge takes place. ▪ Continued sampling and analysis of key water quality parameters in the discharge effluent and in the ambient environment, i.e. River Barrow upstream and downstream of the discharge point. ▪ Continued monitoring of the influent stream in order to measure mass loadings to the WwTP. ▪ Ongoing maintenance and calibration of all instrumentation. ▪ Maintenance corrective action procedures and undertaking corrective action to address any non-compliances. ▪ Notifying the EPA as soon as practicable if an incident occurs and, if the incident relates to discharge to water, notifying IFI as well. ▪ Recording of all complaints of an environmental nature.			



Item Ref	Environmental Topic	Schedule of Environmental Commitments – Monitoring Measures	Construction Phase	Operational Phase	Decommissioning Phase
		No additional mitigation measures beyond those set out in the Discharge Licence are necessary.			
3.	Chapter 6 – Landscape and Visual	The proposed landscape planting for the site should include an initial 4 year post completion establishment maintenance period. The success of planting establishment and landscape management on the site should be checked and reviewed on a regular basis to ensure successful long term establishment. For this reason a landscape management plan for the site should be undertaken			
4.	Chapter 7 – Air Quality & Odour	- With respect to monitoring measures temporary dust deposition monitoring will be carried out at the facility during construction phase of the project in order to ensure the boundary levels of deposition and nuisance dust are within recommended limit which are typically less than 350 mg/m²/day. These locations and frequency of monitoring will be confirmed prior to the start of construction. - With regards to the operational phase of the project, the facility will be required to monitor odours to ensure compliance with the proposed limit values for the proposed facility (see Table 7-1). - Specific limit values will most likely form part of the requirements of the planning decision. The specific monitoring techniques will determine: - That the development is not impacting on the environment and or, - That the mitigation measures implemented at the facility are effective			



Item Ref	Environmental Topic	Schedule of Environmental Commitments – Monitoring Measures	Construction Phase	Operational Phase	Decommissioning Phase
5.	Chapter 9 – Noise and Vibration	- Construction noise monitoring will be carried out to monitor construction noise levels at the nearest noise-sensitive locations to the pumping station commissioning works. - In respect of the operational phase, given that the operational noise emissions will not exceed the adopted criterion noise monitoring is not applicable to the proposed development.			
6.	Chapter 11 – Land Soil and Geology	Monitoring during the construction phase in relation to the soil and geological environment are as follows: - Adherence to the site-specific Construction Environmental Management Plan (CEMP); - Construction monitoring of the works (e.g. inspection of existing ground conditions on completion of excavation for tanks, foundations and services). - Inspection of fuel / oil storage areas; - Monitoring cleanliness of adjacent road network, implementation of dust suppression and provision of vehicle wheel wash facilities; - Monitoring of contractor's stockpile management (e.g. protection of excavated material to be reused as fill, protection of soils for removal from site from contamination); and, - Monitoring sediment control measures (surface water inlet protection etc.). - Ongoing monitoring proposed as part of the surface water and groundwater monitoring on completion of the construction phase as outlined in Chapter 12 Water (Hydrology and Hydrogeology) will also monitor the potential impact on soils beneath the site. - Further soil characterisation will be required before the soil is transported for offsite recovery/ disposal.			



Item Ref	Environmental Topic	Schedule of Environmental Commitments – Monitoring Measures	Construction Phase	Operational Phase	Decommissioning Phase
		Monitoring and protection measures (inclinometers, extensometers, piezometers, monitoring targets) will be carried out during the construction of the micro-tunnel.			
7.	Chapter 12 - Water	- During the construction phase of the Proposed Development visual monitoring will be undertaken as part of regular site audits to ensure discharge to the River Barrow is not impacted by the construction works. During the construction phase the contractor is also required to monitor weather forecasts to inform construction operations. - During the operational phase the final effluent will be monitored in accordance with the terms of the Wastewater Discharge Licence. No additional monitoring is proposed. - Similarly, the receiving waters of the River Barrow will continue to be monitored in accordance with the requirements of the different directive and statutory instruments. No additional monitoring is proposed other than those detailed in the discharge licence.			
8.	Chapter 13 – Cultural Heritage	- A method statement detailing the proposed strategy for archaeological supervision of ground works during the construction phase will be submitted for approval to the National Monuments Service as part of the licence application. - This will clearly outline the proposed extent of ground works and outline the consultation process to be enacted in the event that any unrecorded archaeological remains are identified, which may include preservation <i>in situ</i> by avoidance or preservation in record by archaeological excavation. - A report will be compiled on all archaeological site investigations which will clearly present the results in written, drawn and photographic formats. Copies of this report will be submitted to			



Item Ref	Environmental Topic	Schedule of Environmental Commitments – Monitoring Measures	Construction Phase	Operational Phase	Decommissioning Phase
		Carlow County Council, the National Monuments Service and the National Museum of Ireland.			
9.	Chapter 14 – Material Assets	- The Contractor will be responsible for maintaining waste records and documentation for the full duration of the construction phase. - The Contractor will track and monitor all waste volumes transported offsite. All waste records will be maintained onsite throughout the project and will be made available for viewing by the Client, Employer's Representative and statutory consultees (UÉ, CCC, EPA) as required. - All waste soils (including made ground) will be classified in accordance with the EPA Guidance Document 'Waste Classification, List of Waste & Determining if Waste is Hazardous or Non-Hazardous' (2015). It will be the Contractors responsibility to ensure that representative soil samples are taken in advance of removal and disposal offsite. - As noted previously, it will be the Contractors responsibility to ensure that all waste soils are classified correctly and managed, transported and disposed of offsite in accordance with the requirements of the Waste Management Act 1996, as amended, the Waste Framework Directive 2008/98/EC of the European Parliament and Council on waste and any relevant subsequent waste management legislation.			
10.	Chapter 15 - Major Accidents and Disasters	- A detailed CEMP will be prepared prior to the commencement of the any works and monitoring measure will be implemented during construction. The CEMP will be a live document maintained by the appointed Contractor and will ensure that potential risks of major accident and/or disaster are monitored, as required. - Refer to Appendix 2-2, Volume 3 of this EIAR for the Outline CEMP.			



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