

EIAR FOR POWERSTOWN BIOENERGY

Volume 2 - Main Body of the EIAR

Chapter 13 – Surface Water and Hydrology

Prepared for:

Greengate Biogas 001 Ltd.



Date: June 2026

Document No:

P24188-FT-EN-ZZ-RP-EN-0012

Unit 6, Bagenalstown Industrial Park, Royal Oak Road,
Muine Bheag, Co. Carlow, R21 XW81, Ireland

T: +353 59 972 3800 | E: info@ftco.ie

CORK | DUBLIN | CARLOW

www.fehilytimoney.ie

TABLE OF CONTENTS

13. SURFACE WATER AND HYDROLOGY.....	1
13.1 Introduction.....	1
13.1.1 Mitigation by Avoidance and Design	1
13.2 Statement of Authority	6
13.3 Assessment Methodology	7
13.3.1 Relevant Legislation and Guidance	7
13.3.1.2 <i>Local Policy: Carlow County Development Plan 2022-2028 (Carlow County Council, 2022)</i>	8
13.3.1.3 <i>Relevant Guidance</i>	10
13.3.2 Desk Study.....	11
13.3.3 Field Assessment.....	11
13.3.4 Consultation	11
13.4 Baseline Environment.....	11
13.4.1 General Description of the Catchments.....	12
13.4.2 Surface Water Quality.....	16
13.4.3 Flooding.....	18
13.5 Potential Impacts.....	19
13.5.1 Do Nothing' Impacts	20
13.5.2 Construction Phase Impacts.....	20
13.5.3 Operational Phase Impacts	26
13.5.4 Major Accidents and Natural Disasters.....	26
13.5.5 Decommissioning Phase Impacts.....	28
13.5.6 Cumulative Impacts	29
13.5.7 Summary of Potential Impacts.....	30
13.6 Mitigation Measures	30
13.6.1 Construction Phase Mitigation	31
13.6.2 Operational Phase Mitigation	32
13.6.3 Decommissioning Phase Mitigation.....	33
13.7 Residual Impacts.....	33
13.7.1 Summary of Residual Impacts.....	33
13.8 Monitoring.....	34
13.9 References.....	36

LIST OF APPENDICES (VOLUME 3)

Appendix 13.1 – Flood Risk Assessment

Appendix 12.2 - Water Framework Directive Assessment

Appendix 12.3 - Hydraulic Capacity Assessment

LIST OF FIGURES

	<u>Page</u>
Figure 13-1: Water Framework Directive Catchments and Watercourses-Proposed Development and Proposed Gas Pipeline Route	13
Figure 13-2: Flood History (Source: www.floodinfo.ie).....	18

LIST OF TABLES

	<u>Page</u>
Table 13-1: Existing Watercourse Crossings and Structure Crossings along Proposed Gas Pipeline Route ...	14
Table 13-2: Summary of Potential Impacts	30
Table 13-3: Summary of Residual Impacts	34



13. SURFACE WATER AND HYDROLOGY

13.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) examines the likely effects of the proposed development on Hydrology and Water Quality in the local environment. The chapter includes a description of the baseline environment in respect of hydrology and water quality and considers the likely effects arising from the proposed development and proposed gas pipeline route during construction, operation and decommissioning.

This chapter of the EIAR is supported by Planning Drawings accompanying the planning application in Volume 4 of this EIAR and by the following Appendix documents provided in Volume 3 of this EIAR:

- Appendix 13.1: Site Specific Flood Risk Assessment (SSFRA)
- Appendix 13.2: Water Framework Directive Assessment
- Appendix 13.3: Hydraulic Capacity Assessment

Common terms and acronyms used throughout this EIAR can be found in Chapter 1 – Introduction. Information about the Existing and Proposed Development can be found in Chapter 3- Description of Existing and Proposed Development. Details about the surface water management are described in this chapter.

The list of drawings relevant to this chapter as included in Volume 4 of the EIAR is:

P24188-FT-XX-XX-DR-CE-0212	Proposed Site Drainage Plan
P24188-FT-XX-XX-DR-CE-0213	Proposed Site Drainage Plan: Sheet 1 of 6
P24188-FT-XX-XX-DR-CE-0214	Proposed Site Drainage Plan: Sheet 2 of 6
P24188-FT-XX-XX-DR-CE-0215	Proposed Site Drainage Plan: Sheet 3 of 6
P24188-FT-XX-XX-DR-CE-0216	Proposed Site Drainage Plan: Sheet 4 of 6
P24188-FT-XX-XX-DR-CE-0217	Proposed Site Drainage Plan: Sheet 5 of 6
P24188-FT-XX-XX-DR-CE-0218	Proposed Site Drainage Plan: Sheet 6 of 6

13.1.1 Mitigation by Avoidance and Design

Mitigation by avoidance and design forms the primary control on potential impacts to surface water hydrology and surface water quality. The drainage strategy for the Proposed Development has been designed to physically interrupt pollution pathways, control runoff rates, and provide multiple, redundant stages of treatment, containment, and isolation prior to any discharge.

13.1.1.1 *Storm Water Management Measures During Construction*

The stormwater lagoon will be the first piece of infrastructure constructed on site. It is described in the following section.



Stormwater Lagoon:

- During operation, all three hydraulic networks will discharge to a sealed lagoon, preventing infiltration to groundwater. During construction, all stormwater generated on site will discharge to the sealed lagoon.
- A forebay will be provided at the lagoon inlet to manage first-flush runoff and capture residual sediment.
- The lagoon will include a settling zone, sufficient storage volume, and a minimum freeboard of 300 mm.
- It will be designed for the 1-in-30-year storm event plus a 20% climate change allowance.
- Due to the quarry setting, the lagoon will operate as a drainless system, with exceedance flows managed by pumping during the operational phase. During construction, the lagoon will be emptied by tanker as required, ensuring that no stormwater is discharged from the site.
- A temporary version of the operational phase pump station associated with the lagoon will be equipped with water-quality sensors designed to continuously monitor lagoon water prior to reuse of stormwater as a construction water source. Reuse of stormwater will only occur where monitoring confirms acceptable water quality. Where monitored parameters indicate contamination or abnormal conditions, water will be tankered off site for further treatment and management at an authorised facility.

During construction, mitigation will focus on controlling sediment mobilisation, managing temporary drainage arrangements, and preventing accidental pollution. The construction of the proposed development includes the construction of the drainage system. There will be no discharge of stormwater from the site during the construction phase. All stormwater generated on site will be directed to and contained within the lined stormwater lagoon for containment, settlement, reuse where appropriate, and tankering off site where required. Monitoring of stormwater within the lagoon will be undertaken to determine its suitability for reuse as a construction water supply.

A temporary drainage treatment train will be implemented throughout the construction phase. Surface runoff generated within disturbed areas of the site will be collected and conveyed through a sequence of treatment measures comprising temporary interceptor drains, check dams, sediment traps, the stormwater lagoon forebay and the stormwater lagoon settlement zone prior to storage within the lagoon. The treatment train can be summarised as follows:

Runoff → Temporary Interceptor Drains → Check Dams → Sediment Traps → Lagoon Forebay → Lagoon Settlement Zone

This treatment sequence will progressively reduce flow velocities, promote sediment settlement, capture suspended solids at multiple stages and minimise the risk of polluted runoff entering the stormwater lagoon. The lagoon will provide the final stage of sediment settlement and water quality management prior to reuse on site or removal by tanker where required.



The following measures will be implemented during construction:

- Phased construction of drainage infrastructure to ensure that permanent drainage and treatment features are operational at the earliest practicable stage. The stormwater lagoon will be constructed in advance of earthworks.
- Installation of temporary sediment control measures, including silt fences, sediment traps, settlement areas, and temporary interceptor drains with check dams.
- Protection of the stormwater lagoon from uncontrolled inflows and excessive sediment loading during early construction phases through the use of temporary diversion ditches, check dams and sediment-control measures.
- Discharge from the stormwater lagoon to sealed tankers for off-site treatment and disposal where water quality monitoring identifies contamination or where excess volumes require removal.
- Water will be treated through a sequence of drainage elements, including the temporary and permanent sediment-control measures described above. The lagoon will provide additional treatment through settlement within the forebay and settlement zone.
- All temporary drainage measures, including interceptor drains, check dams, sediment traps, settlement areas and the stormwater lagoon, will be inspected regularly and following significant rainfall events. Accumulated sediment will be removed as required to maintain the effectiveness of the drainage system and preserve available storage capacity.
- Construction activities will be planned with consideration of forecast weather conditions. Activities with an increased risk of sediment mobilisation may be modified, suspended or rescheduled during periods of prolonged or intense rainfall where necessary to minimise pollution risk.
- Management of excavations and exposed soils to minimise erosion, including temporary stabilisation where required.
- Temporary stockpiles of soil and excavated material will be located away from drainage features where practicable and managed to minimise erosion and sediment runoff. Additional protection measures will be implemented where required during periods of prolonged or intense rainfall.
- Storage of fuels, oils and chemicals in bunded, sealed and designated areas, with refuelling restricted to controlled locations.
- Provision of spill kits and training of construction personnel in spill response procedures.
- An emergency pollution response procedure will be implemented on site. In the event of a spill, leak or other pollution incident, the source will be isolated immediately, contaminated material will be contained and recovered, and any contaminated water will be removed from site by an authorised contractor for treatment and disposal at an appropriately authorised facility.
- Strict control of concrete works to prevent alkaline runoff. All concrete wash out water will be collected in a dedicated tank and transported off Site by a permitted contractor to an authorised private WWTP.
- No direct discharge of stormwater to groundwater, surface water bodies or off-site drainage systems will occur during the construction phase.
- Protection of watercourse crossings along the gas pipeline route, with works undertaken at existing culverts or bridges in accordance with Inland Fisheries Ireland (IFI) guidance and OPW.



13.1.1.2 Storm Water Management Measures During Operation

The key design measures include:

- Development of the proposed development within a former quarry, thereby avoiding impacts on natural floodplains and minimising interference with existing surface water flow paths.
- Adoption of a fully separated drainage strategy, comprising three distinct hydraulic networks designed according to runoff quality and risk:
 - a drainage network serving plant carriageways and bunded tank areas;
 - a roof water drainage network collecting uncontaminated runoff from building roofs; and
 - an interceptor drainage network collecting clean overland flows from surrounding lands and quarry cut areas.

13.1.1.3 Plant Carriageway and Bunded Area Drainage Network

- Runoff from plant carriageways and circulation areas will be collected via gullies, eco-drains and drainage kerbs incorporating sumps, providing primary sediment control at source.
- Flows will discharge into TII-specified catchpits with a minimum sump depth of 300 mm, providing secondary sediment settlement.
- A petrol/oil interceptor, designed in accordance with TII specifications, will be installed to remove hydrocarbons from runoff generated in trafficked and operational areas.
- The plant drainage network will be equipped with water-quality sensors designed to continuously monitor the characteristics of water collected within the system.
- Penstocks will be installed downstream of the interceptor and upstream of the lagoon .
- Under normal operating conditions, uncontaminated runoff will be permitted to pass through the drainage network.
- In the event that water-quality parameters indicate the presence of contamination or a spillage, the penstocks will automatically close to prevent discharge to the lagoon.
- Contaminated runoff will instead be automatically diverted to the dedicated spillage containment system, thereby ensuring full isolation of polluted flows from the wider drainage system.
- A dedicated spillage containment system with a minimum capacity of 25 m³ will be provided to retain large spillages. This system will be located at a lower level than the drainage network to prevent reverse flows and to facilitate safe recovery and removal of contaminated material.
- Bunded areas associated with the tank farm and process infrastructure will be drained via a dedicated pumped system into the Plan Drainage System:
- The pumped system will also be fitted with water-quality sensors to continuously monitor runoff collected within bunded areas (See Section 13.8.)
- Where contamination is detected, the pump will automatically prevent discharge to the plant drainage network, ensuring isolation of potentially contaminated water within the bund.
- Only water confirmed to be uncontaminated will be permitted to discharge under controlled conditions.

This combination of continuous monitoring, automatic isolation, and controlled diversion provides an active and fail-safe layer of protection against accidental pollution.



13.1.1.4 Roof Water Drainage Network

- Clean roof water from industrial buildings will be collected via a dedicated roof water drainage network, fully separated from potentially contaminated runoff.
- Roof runoff will be conveyed through catchpits with sumps, allowing settlement of debris and fine particulates and providing access for inspection and maintenance.
- As roof water is uncontaminated, no hydrocarbon interception is required; however, the inclusion of catchpits provides additional resilience and operational control.
- Roof water will discharge to the lagoon, contributing to overall flow balancing and attenuation.

13.1.1.5 Interceptor Drainage Network

- Overland flows from surrounding lands and the existing quarry cut will be intercepted downslope of operational areas via a dedicated interceptor drainage system.
- The interceptor network will primarily comprise of vegetated swales, designed to reduce flow velocities and promote sediment settlement.
- Check dams will be installed at regular intervals along the swales to:
 - reduce runoff velocities;
 - increase hydraulic residence time;
 - promote settlement of suspended solids; and
 - improve water quality prior to discharge.
- Where space constraints prevent the use of swales, filter drains will be provided as an alternative interceptor element.
- Interceptor drainage flows will discharge to the lagoon.

13.1.1.6 Stormwater Lagoon

- All three hydraulic networks will discharge to a sealed lagoon, preventing infiltration to groundwater.
- A forebay will be provided at the lagoon inlet to manage first-flush runoff and capture residual sediment.
- The lagoon will include a settling zone, sufficient storage volume, and a minimum freeboard of 300 mm.
- It will be designed for the 1-in-30-year storm event plus 20 % climate change allowance.
- Due to the quarry setting, the lagoon will operate as a drainless system, with exceedance flows managed by pumping.
- Pumping of exceedance flows will be restricted to the greenfield runoff rate for the combined tributary catchments and will be controlled such that the total exceedance volume is discharged gradually over a minimum period of 24 hours (minimum retention time) recommended to the TII specifications or best practice, ensuring:
 - prevention of sudden downstream flooding;
 - replication of greenfield runoff behaviour; and
 - enhanced sedimentation and water-quality improvement prior to discharge.



- The pump station associated with the lagoon will be equipped with water-quality sensors designed to continuously monitor lagoon water quality prior to pumping exceedance flows.
- Pumping of exceedance flows will only occur where monitoring confirms water quality is compliant with the conditions of the IE licence issued by the EPA .
- Where monitored parameters indicate contamination or abnormal conditions, the pump system will automatically inhibit discharge, ensuring retention of potentially contaminated water within the lagoon for further treatment and management at an authorised facility.
- Pumping of water will commence 125 minutes following the start of the rainfall event as per Appendix 12.3 Hydraulic Capacity assessment.

These integrated, multi-stage and actively controlled design measures provide a robust, fail-safe approach to surface water management and significantly reduce the likelihood of adverse impacts on surface water quality, hydrological regimes, and downstream receptors.

13.2 Statement of Authority

This chapter has been prepared by Sara Hernandez Sosa and reviewed by Pablo Delgado of Fehily Timoney and Company. Their CVs are appended as Appendix 1.1 of Volume 3 of this EIAR.

Sara Hernandez Sosa is a Senior Engineer and Chartered Engineer with a master's degree in civil engineering from Alfonso X El Sabio University (Spain). She has eight years of experience across civil engineering projects, including urban development, transport infrastructure, drainage design, and infrastructure planning. She has also contributed to renewable energy projects. Early in her career, she gained broad multidisciplinary experience, and over the past five years she has specialized in hydraulics. She also contributed previously to the EIAR preparing the Surface Water and Hydrology chapter for a major scheme: the Ten-T Priority Route Improvement Project in Donegal.

Pablo Delgado, Principal Engineer and Chartered Civil Engineer, has accumulated more than 11 years of professional experience in the hydraulic engineering domain. His specific area of expertise lies in the planning, design, and construction of hydraulic infrastructure projects, where he closely collaborates with Clients and Contractors. Pablo's primary focus centres around producing practical and efficient designs while proactively addressing any challenges that may arise throughout the project's execution. He possesses extensive knowledge in hydraulic design, enabling him to develop industry-leading guidelines and exhibit a high level of proficiency in drainage design, standards, and tools. Additionally, Pablo has a successful track record of delivering drainage designs within diverse project environments such as Design and Build (D&B) and Public-Private Partnership (PPP), including contributions to hydrologic and hydraulic chapters for Environmental Impact Assessments (EIAR). Some of the projects to which he contributed in preparing these chapters include renewable energy developments such as the Shancloon Wind Farm and Cloonkett Wind Farm, as well as solar projects such as the Kilmorna Solar planning application, among others. His project portfolio encompasses engagements in the United Kingdom, Ireland, and Spain.



13.3 Assessment Methodology

The guidelines and methodology for impact assessment are detailed in Chapter 1 of Volume 2 of the EIAR, i.e. Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2022). Legislation and policies relevant to the project are detailed in Chapter 2 of Volume 2 of the EIAR. Additional - specific guidelines and sources were considered in this assessment:

- The design layout of the proposed project as per Chapter 3 of this EIAR and the drawings in Volume 4 of this EIAR.
- Legislation and policy as described in Section 13.3.1 and 13.3.2 in this Chapter and in Chapter 2.
- A desk-based assessment as per Section 13.3.3 of the surface water hydrology in the catchments relevant to the proposed development, including an assessment of the watercourses which will be intercepted by the proposed gas pipeline.
- A field assessment of the existing hydrological environment, to both verify desk-based assessment and record all significant hydrological features was undertaken as per Section 13.3.4.
- Consultation with stakeholders as per Section 13.3.4. and Chapter 5.

13.3.1 Relevant Legislation and Guidance

13.3.1.1 *Policy and Legislation*

The following policies and legislation have been considered in the development of this chapter to identify relevant objectives relating the surface water.

- EU Water Framework Directive (2000/60/EC) (European Union , 2000)
- River Basin Management Plan for Ireland 2022-2027 (Department of Housing, Local Government and Heritage, 2024)
- The Planning System and Flood Risk Management, Guidelines for Planning Authorities (DEHLG & OPW, 2009)
- Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Watercourses (Inland Fisheries Ireland, 2016)
- Carlow County Development Plan 2022-2028 (Carlow County Council, 2022)

Directive 2000/60/EC (WFD - Water Framework Directive) (European Union , 2000) of the European Parliament and Council established a framework for community action in the field of water policy. The WFD requires EU member states to aim to reach good chemical and ecological status for surface and ground waters; with good ecological status for surface waters and good quantitative status for groundwaters. The WFD established a strategic framework for managing the water environment and requires a River Basin Management Plan (RBMP) to be developed every six years. River Basin Management Plan 2018-2021 (Department of Housing, Local Government and Heritage, 2023) has been prepared by Department of Housing, Planning and Local Government which sets out the actions that Ireland will take to improve water quality and achieve 'good' ecological status in waterbodies (rivers, lakes, estuaries and coastal waters) by 2027.

The Third Cycle River Basin Management Plan 2022-2027 (Department of Housing, Local Government and Heritage, 2024). The Plan outlines the intended rollout of guidelines for planning authorities on the relationship between physical planning and river basin management planning.



The WFD has been transposed into Irish law primarily through the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003) and subsequent amendments (Government of Ireland, 2003).

13.3.1.2 Local Policy: Carlow County Development Plan 2022-2028 (Carlow County Council, 2022)

The County Development Plan (CDP) for County Carlow was reviewed and has informed the preparation of this chapter.

Cognisance was taken of particular guidance on hydrology from the policies and objectives of the CDP. The CDP lays down specific policies (P) and objectives (O) in relation to surface water drainage and Sustainable Drainage System (SuDS) as follows:

- **SW P1:** Ensure adequate surface water drainage systems are in place which meet the requirements of the Water Framework Directive and the River Basin Management Plan.
- **SW P2:** Ensure as an alternative to underground tanks and piped outfalls to watercourses, that all development proposals incorporate Sustainable Drainage Systems and to promote the use of green infrastructure e.g. green roofs, green walls, planting and green spaces for surface water retention purposes, as an integrated part of SuDS and maximise the multifunctional potential of these systems including benefits for biodiversity and amenity value wherever possible.
- **SW P3:** Require appropriate maintenance of surface water drainage infrastructure to avoid flood risk.
- **SW P4:** To require all new developments, to provide for separated drainage systems.
- **SW P5:** Seek to minimise in as far as is practical the discharge of additional and existing surface water to combined (foul and surface water) sewers (in existing combined sewer serviced areas) in order to maximise the capacity of existing collection systems for foul water”.

It is the objective of the Council to:

- **SW O1:** Require all development (including extensions to existing development) proposals to incorporate design criteria and SuDS measures in accordance with Carlow County Council SuDS Policy in order to reduce the potential impact of existing and predicted flood risks and to improve biodiversity and amenity value”.

The CDP sets out policies and objectives for water quality as listed here:

- **WQ P1:** Support the implementation of the relevant recommendations and measures as outlined in the River Basin Management Plan 2018-2021, and any associated Programme of Measures, or any such plan that may supersede same during the lifetime of this Plan. Development proposals shall not have an unacceptable impact on the water environment, including headwaters, surface waters, groundwater quality and quantity, river corridors and associated habitats. The Council will support the application and implementation of a catchment planning and management approach to development and conservation. Site specific assessments to determine localised pressures / impacts may be required as part of the development management process.
- **WQ P2:** Promote and comply with the environmental standards and objectives established for (i) bodies of surface water, by the European Communities (Surface Water) Regulations 2009 and (ii) groundwater, by the European Communities (Groundwater) Regulations 2010 or as may be amended during the period of this Plan.



- **WQ P3:** Ensure that the Water Framework Directive, the River Basin Management Plan and any subsequent Water Management Plans or statutory guidance are fully considered throughout the planning process”.

It is an objective of the Council to:

- **WQ O1:** Ensure through the implementation of the River Basin Management Plan, and any associated legislation, the protection and improvement of all drinking water, surface water and ground waters throughout the County”.

The CDP also lays down policies and objectives in relation to Flood Risk Management:

- **FR P3:** Ensure that all development proposals comply with the requirements of the Planning System and Flood Risk Management – Guidelines for Planning Authorities (DEHLG and OPW, 2009) and Circular PL2/2014 (or any amendments thereto), in particular through the application of the sequential approach and the Development Management Justification Test.
- **FR P4:** Require the submission of a Site-Specific Flood Risk Assessment (FRA) in areas at risk of flooding. The assessment shall be carried out by a suitably qualified and indemnified professional, shall be appropriate to the scale and nature of the risk to the proposed development and shall consider all sources of flooding. The FRA shall be prepared in accordance with the Planning System and Flood Risk Management - Guidelines for Planning Authorities and shall address climate change, residual risk, avoidance of contamination of water sources and any proposed site-specific flood management measures”.

This application has incorporated SuDs in the drainage design which has been designed to avoid any impacts on the water environment and complies with Water Framework Direction, surface water regulations and the River Basin Management Plan. A site specific flood risk assessment and a water framework directive assessment have been carried out.

The proposed development has been designed in accordance with the surface water, water quality and flood risk policies and objectives of the Carlow County Development Plan 2022–2028. The drainage strategy adopts a fully separated drainage system comprising three distinct hydraulic networks for roof water runoff, plant drainage and interceptor drainage, thereby supporting Policy SW P4. The proposed drainage infrastructure incorporates a range of Sustainable Drainage Systems (SuDS), including vegetated swales, check dams, filter drains, a stormwater lagoon incorporating a forebay and settlement zone, and a multi-stage treatment train designed to provide attenuation, sediment removal and water quality treatment. These measures support the objectives of Policies SW P1 and SW P2 and Objective SW O1 by ensuring appropriate management of surface water runoff, reducing pollutant loading, and minimising potential impacts on the receiving water environment. Furthermore, the drainage design includes water quality monitoring, hydrocarbon interception, pollution control measures, routine inspection and maintenance requirements, and emergency response procedures to safeguard surface water and groundwater resources. In combination, these measures support the water quality objectives of Policies WQ P1, WQ P2, WQ P3 and Objective WQ O1, while contributing to the long-term sustainable management and protection of the water environment in accordance with the Water Framework Directive and River Basin Management Plan.



In addition, a Site-Specific Flood Risk Assessment has been undertaken and the surface water management system has been designed to accommodate the 1-in-30-year rainfall event with an allowance for climate change. The proposed stormwater lagoon provides attenuation storage and controlled discharge, with exceedance flows restricted to the equivalent greenfield runoff rate and released gradually over an extended period. This approach replicates the natural hydrological response of the site, minimises the risk of downstream flooding, and ensures that the proposed development does not increase flood risk at the discharge location. Consequently, the proposed development supports the flood risk management objectives of Policies FR P3 and FR P4 through the implementation of a robust surface water management strategy and the application of appropriate flood risk assessment and mitigation measures.

13.3.1.3 Relevant Guidance

The following guidance have been considered in the development of this chapter to identify relevant objectives relating the surface water.

The Planning System and Flood Risk Management - Guidelines for Planning Authorities - Department of Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW), November 2009 (DEHLG & OPW, 2009).

- Environmental good practice on site guide (fourth edition) (C741) - Construction Industry Research and Information Association (CIRIA), January 2015. (CIRIA, 2015)
- Best Practice Guide BPGCS005 Oil Storage Guidelines (Enterprise Ireland)
- Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes (TII Publications, 2008)
- Guidelines on Planning for Watercourses in the Urban Environment (Inland Fisheries Ireland, 2020)
- Guidelines on protection of fisheries during construction works in and adjacent to waters' to allow cable construction (Inland Fisheries Ireland, 2016)
- The SuDS Manual (C753) - Construction Industry Research and Information Association (CIRIA, 2015)
- Control of water pollution from linear construction projects (C648) – Construction Industry Research and Information Association (CIRIA, 2006)
- Control of water pollution from construction sites. Guidance for Consultants and Contractors (C532) - Construction Industry Research and Information Association (CIRIA, 2001)
- UK Guidance for Pollution Prevention (GPP):
 - GPP2: Above ground oil storage tanks (Natural Resources Wales (NRW), Northern Ireland Environment Agency (NIEA), the Scottish Environment Protection Agency (SEPA), Energy Institute, Oil Care Campaign, 2021)
 - GPP4: Treatment and disposal of wastewater where there is no connection to the public foul sewer (Natural Resources Wales (NRW), Northern Ireland Environment Agency (NIEA), the Scottish Environment Protection Agency (SEPA), 2021)
 - GPP5: Works and maintenance in or near water (Natural Resources Wales (NRW), Northern Ireland Environment Agency (NIEA), the Scottish Environment Protection Agency (SEPA), 2018)
 - GPP8: Safe storage and disposal of used oil (Natural Resources Wales (NRW), Northern Ireland Environment Agency (NIEA), the Scottish Environment Protection Agency (SEPA), 2021)
 - GPP21: Pollution Incident Response Plans (Natural Resources Wales (NRW), Northern Ireland Environment Agency (NIEA), the Scottish Environment Protection Agency (SEPA), 2021)
 - GPP22: Dealing with Spills (Natural Resources Wales (NRW), Northern Ireland Environment Agency (NIEA), the Scottish Environment Protection Agency (SEPA), 2018)



- GPP26: Safe storage of Drums and intermediate Bulk Containers (IBCs), (Natural Resources Wales (NRW), Northern Ireland Environment Agency (NIEA), the Scottish Environment Protection Agency (SEPA), 2021)
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning and Local Government, 2018)

13.3.2 Desk Study

A desk study of the proposed development site and the surrounding area was completed as part of this assessment. The desk top study involved an examination of the hydrological aspects of the study area using the following sources of information:

- Ordnance Survey Ireland (OSI) and 6" mapping (www.geohive.ie)
- OPW Indicative Flood Maps (www.floodinfo.ie)
- EPA Catchment online mapping and details (www.catchments.ie)
- EPA flow data (www.epa.ie/hydronet)
- GSI Geological Survey Ireland Spatial Resources (www.gsi.ie)
- Met Eireann Meteorological Database (www.met.ie)
- Study of existing surface water/drainage features in the vicinity

13.3.3 Field Assessment

The field assessment of the existing hydrological environment within the proposed development site, and along the proposed route of the gas pipeline, was undertaken to verify the desk-based assessment, record all significant hydrological features, and evaluate the proposed crossing points along the route. A site walkover survey was completed in October 2025, during which the proposed watercourse crossings located at existing culverts and bridges were examined to determine their layout and construction. In addition, an assessment of the surrounding area of the Site and the local watercourses was carried out to identify the potential route of the storm water discharge during critical storm events from the proposed development.

13.3.4 Consultation

This EIAR chapter has been compiled in light of the comments received from consultees throughout the EIA process, the relevant elements of which are summarised hereunder and presented in detail in Chapter 5 - Scoping and Consultation. Of the consultees contacted, no specific comments relating to hydrology or surface water were received at the time of consultation.

13.4 **Baseline Environment**

The receiving environment is described in this section. This includes descriptions of the general catchments, water quality and flooding.



13.4.1 General Description of the Catchments

13.4.1.1 *The Site of the Proposed Development*

This section discusses the catchment characteristics of the watercourses surrounding the proposed development. Figure 13-1 shows the proposed development and gas pipeline within the hydrological environment.

The site lies within the River Barrow catchment (ID14), with surface water ultimately draining westwards toward the River Barrow, located approximately 300 m from the western site boundary. The site is situated within the sub-catchment delineated under the WFD as Barrow_SC_100 (Sub-catchment ID 14_4) and is located within one sub-basin, known as Barrow_180. The WFD Waterbody Barrow_180 (EU Code: IE_SE_14B012700) is contained in this sub-basin. This is a tributary of the River Barrow ("Powerstown Stream") approximately 400 m to the north of the proposed development and there is also another tributary of the River Barrow to the south of the site, approximately 750 m (Ballynaboley Stream_010). This tributary is within Ballynaboley Stream_010 sub-basin. Both tributaries are within the Barrow_SC_100 subcatchment.

The boundary of the River Barrow and River Nore SAC lies approximately 20 m west of the proposed development boundary, making the receiving environment highly sensitive to changes in water quality or hydrological regime.

The site comprises approximately 9 ha and is characterised by a depressed quarry floor, steep internal slopes, and areas of partial restoration. The hydrological regime is strongly influenced by the quarry topography, which has seasonal internal ponding, limited overland flow, and localised infiltration. Surface water drainage is currently informal, with no engineered drainage network

There are no direct discharges from the site to the River Barrow or any tributary watercourse.

The Standard Average Annual Rainfall (SAAR) for the site, according to the FSU node point ungauged (14_1391_5), is approximately 840.43 mm.



13.4.1.2 Proposed Gas Pipeline Route

The proposed gas pipeline route is 9.6 km from the anaerobic digestion plant biomethane network entry facility (BNEF) to an AGI in Clogrennan, Co. Carlow. As explained in Chapter 1, (GNI) the environmental impact assessment of the pipeline route is included in the EIAR for Powerstown Bioenergy. Gas Networks Ireland GNI will be responsible for obtaining development consent for the pipeline as a Statutory Undertaker.

The gas pipeline will be laid in the road network. The pipeline will be laid in the regional road R448 travelling south from the site for c. 2 km, before crossing beneath the River Barrow in the vicinity of Cardinal Moran Bridge. The gas pipeline will then follow the L3038 / L3039 local road northwards for c. 4.5 km before turning westerly along Milford Park Road. The pipeline crosses beneath the M9 motorway in the vicinity of the L3038 overbridge. It will travel along Milford Park Road for c. 1 km before turning north along the L3043 local road for c. 900 m.

The gas pipeline is located within one catchment of the Irish River Network System - the Barrow Catchment (ID 14). The site is situated within two sub-catchments delineated under the WFD as Barrow_SC_100 (Sub-catchment ID 14_4) and Barrow_SC_110 (Sub-catchment ID 14_5). The site is situated within three sub-basins, known as Rathornan_010, Barrow _170, and Barrow _180. The WFD Waterbodies Rathornan_010 (EU Code: IE_SE_14R430830), Barrow _170 (EU Code: IE_SE_14B012600), and Barrow_180 (EU Code: IE_SE_14B012700), are contained in these sub-basins.

Table 13- 1 below provides the different watercourse crossings with details of the streams, culverts and other structures.

Table 13-1: Existing Watercourse Crossings and Structure Crossings along Proposed Gas Pipeline Route

Crossing ID	Coordinates (ITM)	Description of Structure/Existing Watercourse Crossing
B1	X=670330.044 Y=667711.858	Concrete large culvert under the R448 for the Ballynaboley Stream_010 flowing west towards River Barrow
B2	X= 669415.998 Y= 666408.675	A concrete road bridge over the River Barrow (Barrow _180) with three spans carrying the R448. The bridge has narrow concrete verges which are not raised and wide hard shoulders. This is the Cardinal Moran bridge. It is proposed to cross the river using a trenchless construction methodology to avoid this bridge.
B3	X= 669245.328 Y= 667817.401	Two-Span Masonry Bridge under the L3038. The first opening consists of a concrete box culvert, and the second is a masonry conspan arch. There are two tributaries that converge at this location, separated by concrete blocks. They are referenced as Rathornan_010 as per the EPA Watercourses.
B4	X=669535.525 Y=670030.528	Arch masonry bridge over the Upper Tomard stream (EPA Code: 14U12), with an approximate width of 2.15 m, a height of approximately 1.40 m from the riverbed to the soffit, and an overall length of approximately 7.4 m.
B5	X=668736.970 Y=671280.560	Ditch/Land Drain (Mapped Feature). A ditch/land drain was observed, as shown on the 6" mapping. The ditch was dry at the time of inspection, and a small culvert was noted crossing under the road.
B6	X=668789.690 Y=671478.504	Ditch/Land Drain (Local Observation). A ditch/land drain was observed, and some locals advised that it occasionally floods adjacent land. The ditch was dry during the visit, and a small culvert/pipe was noted crossing the road.



Crossing ID	Coordinates (ITM)	Description of Structure/Existing Watercourse Crossing
B7	X= 669387.552 Y= 668556.121	Overbridge crossing the M9 motorway with raised verges. TII Structure (Eirspan Name Tomard Lower Road Overbridge 2 Ref no CW-M09-012.00). It is proposed to cross the motorway using a trenchless construction methodology to avoid any TII infrastructure. (No watercourse at this location)

The following section provides baseline contextual information for the watercourse crossings and the motorway crossing associated with the proposed gas pipeline. The section describes the hydrological and catchment characteristics at each crossing, including waterbody classification, general flow regime, downstream connectivity, and the presence of existing hydraulic or transport infrastructure.

Crossing B1 - Ballynaboley Stream

The proposed gas pipeline crosses the Ballynaboley Stream (EPA Waterbody ID: IE_SE_14B080700), which forms part of the Barrow_SC_100 sub-catchment. The watercourse consists of multiple upstream branches that converge into a single channel flowing generally from east to west, before discharging into the River Barrow downstream. An existing large culvert crossing is present beneath the R448 regional road, within which the proposed pipeline will traverse the existing culvert. Based on Flood Studies Update (FSU) ungauged node point 14_951_2, the contributing catchment area at the crossing is approximately 25.151 km², with a Standard Average Annual Rainfall (SAAR) value of 867.84 mm.

Crossing B2 - River Barrow

The proposed gas pipeline crosses the River Barrow (EPA Waterbody ID: IE_SE_14B012700), which lies within the Barrow_SC_100 and Barrow_SC_110 sub-catchments. The River Barrow flows predominantly from north to south and is intersected by several transport crossings along this reach, including a three-span bridge beneath the R448 regional road at Cardinal Moran Bridge. According to FSU ungauged node point 14_178_2, the upstream catchment area contributing to this crossing is approximately 2,372 km², with an associated SAAR value of 856.7 mm. It is proposed to cross the river at this location using a trenchless construction method, e.g. horizontal directional drilling.

Crossing B3 - Tributary Stream at Rathornan Bridge

The proposed gas pipeline crosses an unnamed tributary stream (EPA Waterbody ID: IE_SE_14R430830), which forms part of the Barrow_SC_110 sub-catchment. The stream is fed by multiple upstream branches and flows generally from west to east before joining the River Barrow downstream. An existing two-span bridge (Rathornan Bridge) is present beneath the L3038 local road. Based on FSU ungauged node point 14_488_1, the upstream catchment area at this location is approximately 13.081 km², with a SAAR value of 885.94 mm.

Crossing B4 - Minor Stream under L-3039

The proposed gas pipeline crosses a minor stream (EPA Waterbody ID: IE_SE_14B012700) within the Barrow_SC_110 sub-catchment, which ultimately drains to the River Barrow downstream. An existing crossing structure is present beneath the L-3039 local road. According to FSU ungauged node point 14_1671_1, the upstream catchment area is approximately 3.314 km², with a SAAR value of 869.63 mm.



Crossing B5 - Agricultural Drainage Ditch

The proposed gas pipeline crosses an existing agricultural drainage ditch that is predominantly used for land drainage. The ditch includes an existing culvert or pipe crossing. The crossing is located beneath the L-3043 local road. The pipe will either cross above the drain or will cross beneath using HDD.

Crossing B6 - Agricultural Drainage Ditch

The proposed gas pipeline crosses a second agricultural drainage ditch of similar character, which is also primarily used for agricultural drainage and contains an existing culvert or pipe crossing. This crossing is likewise located beneath the L-3043 local road. The pipe will either cross above the drain or will cross beneath using HDD.

Crossing B7- M9 Motorway Crossing

The existing L3043 road crosses the M9 motorway in a TII overbridge. It is proposed to cross the motorway at this location using a trenchless construction methodology such as horizontal directional drilling. This is described in Chapter 3 of Volume 2 of this EIAR.

13.4.2 Surface Water Quality

The EPA scheme of Biotic Indices or Quality (Q) Values was developed to determine the status of organic pollution in Irish rivers by assessing the occurrence of macro-invertebrate taxa with varying sensitivity to pollution. This process often involves the use of water chemistry parameters for determination of the WFD status of each waterbody. Baseline chemical water quality sub-elements of these waterbodies are available online from Catchments.ie (Environmental Protection Agency, 2026).

The closest Q Value Monitoring Locations to the proposed site on the River Barrow are Milford Bridge (station code: RS14B012600) upstream, and Cardinal Moran Bridge (station code: RS14B012680) downstream. The Milford Bridge monitoring station is at the demarcation point between the Barrow_180 and the Barrow_170 WFD Waterbodies, at (52.780635, -6.963590). The latest reported Q Values upstream and downstream of the proposed development is 3-4, indicating a 'Moderate' WFD Status and 'Slightly Polluted' Pollution Status for the River.

The latest chemical surface water sampling undertaken at the upstream station (RS14B012600) was in October 2025 (Environmental Protection Agency, 2026). The results indicate that there were elevated phosphorus levels in the stream, with 0.043 mg/l orthophosphate (as P) reported for this monitoring round. No chemical surface water results are available for the Cardinal Moran Bridge monitoring location (RS14B012680). Monitoring is ongoing for these Q Value Monitoring Stations.

There is one Q-Value Monitoring Station on the Rathornan_010 WFD Waterbody (station code: RS14R430830). However, this waterbody is not on a published monitoring programme. Therefore, there are no Q Value or chemistry data available from this monitoring location.



Powerstown Stream

Surface water monitoring data are also available for the Powerstown Stream, a tributary of the River Barrow which runs in a south westerly direction along the northern border of the proposed development. The Powerstown Stream is considered part of the Barrow_180 WFD Waterbody (European Code: IE_SE_14B012700). However, due to the proximity of this stream to the proposed development and the proposed discharging of stormwater runoff to this stream during 1 in 30-year storm events (see Section 6 of this report), an assessment of its baseline quality and status is included in this WFD Assessment. Surface water monitoring assessment reports for the Industrial Emissions Licence (License Number: W0025) for the existing Civic Amenity and Landfill, available on the EPA Leap website (Environmental Protection Agency, 2026).

The 2024 Surface Water Monitoring Report for the Powerstown Stream (Carlow County Council, 2024) undertook physiochemical and chemical analysis of stream water to assess quality and status in line with the EPA licence. The results indicate similar chemical conditions upstream and downstream of the existing Civic Amenity and Landfill. Chloride and ammonia were detected upstream and downstream, with Chloride exceeding the trigger level value of 50 mg/l, with a value of 53.3 mg/l at the downstream monitoring point during Q4 2024. The parameters analysed as part of the annual monitoring event include metals, sulphate, alkalinity, orthophosphate, and total oxidised nitrogen. The concentrations detected for these parameters were below their corresponding parametric values.

The most recent available biological assessment of surface water quality in the Powerstown Stream is from January 2025 (Limnos Consultancy on behalf of Carlow County Council, 2025). This report utilised the EPA's Quality Rating System (Q-Value) and macroinvertebrate data to assess the stream condition. The results indicate that the stream has a Q-Value of 3 (Poor WFD Status) both upstream and downstream of the existing civic amenity and landfill. This aligns with previous Q Value ratings assigned to this stream during previous monitoring rounds, with results between 2001 and 2013 fluctuating between Q3 (Poor WFD Status) and Q3-4 (Moderate WFD Status). The Powerstown Stream has been reported as having a value of Q3 between 2014 and 2022 (Conservation Services on behalf of Carlow County Council, 2022).

The Q Value results reported in 2025 indicate that the Powerstown Stream was in slightly poorer condition in 2024 than the Barrow_180 to which it drains. The report notes that the upstream site may be impacted by a quarry 1 km upstream of the site, and agricultural sources, with extensive tillage in the vicinity of the monitoring location. Small streams risk score (SSRS) and small streams characterisation score (SSCS) assessments were also undertaken. The results indicate a decline in quality of the Powerstown Stream from upstream to downstream, indicating an additional pressure on the lower site.

River Barrow

The closest EPA Q Value Monitoring Locations to the proposed Site on the River Barrow are Milford Bridge (station code: RS14B012600) upstream, and Cardinal Moran Bridge (station code: RS14B012680) downstream. The Milford Bridge monitoring station is at the demarcation point between the Barrow_180 and the Barrow_170 WFD Waterbodies, at (52.780635, -6.963590). The latest reported Q Value both upstream and downstream of the proposed development is 3-4, indicating a 'Moderate' WFD Status and 'Slightly Polluted' Pollution Status for the River Barrow.

The latest chemical surface water sampling undertaken at the upstream station (RS14B012600) was in October 2025 (Environmental Protection Agency, 2026). The results indicate that there were elevated phosphorus levels in the stream, with 0.043 mg/l orthophosphate (as P) reported for this monitoring round. No chemical surface water results are available for the Cardinal Moran Bridge monitoring location (RS14B012680) downstream of the proposed development. Monitoring is ongoing for these Q Value Monitoring Stations.

There is one Q-Value Monitoring Station on the Rathornan_010 WFD Waterbody (station code: RS14R430830).. There are no Q Value or chemistry data available from this monitoring location.



There is one Q-Value Monitoring Station on the Ballynaboley Stream (station code: RS14B080700). The latest reported Q Value at this monitoring station is Q3-4, indicating a 'Moderate' WFD Status. There are no chemical data available for this stream.

13.4.3 Flooding

A Site-Specific Flood Risk Assessment Report was carried out for the proposed development and is included in Appendix 13.1. A summary of the findings and conclusion are included in this section. A flood risk assessment was carried out for the site of the proposed development only. It was not carried out for the proposed gas pipeline route because any effects would arise only during the construction phase; if, for example, a culvert requires replacement or if a temporary watercourse diversion is needed. At this stage, it is not anticipated that the works associated with the proposed gas pipeline will result in impacts during the operational phase.

13.4.3.1 Flood History

The Office of Public Works (OPW) maintains the National Flood Hazard Mapping website (www.floodmaps.ie), which compiles records of observed and historical flood events to identify areas potentially at risk of flooding across Ireland. This dataset includes information derived from documented flood incidents, historical sources, and local authority records. A review of the available OPW flood mapping and historical flood event records indicates that no past flood events have been recorded at the subject site. However, a single historic flood event (indicated by the red triangle) has been recorded (undated) on the Powerstown Stream, and flood mapping indicates flooding occurring at additional nearby locations.

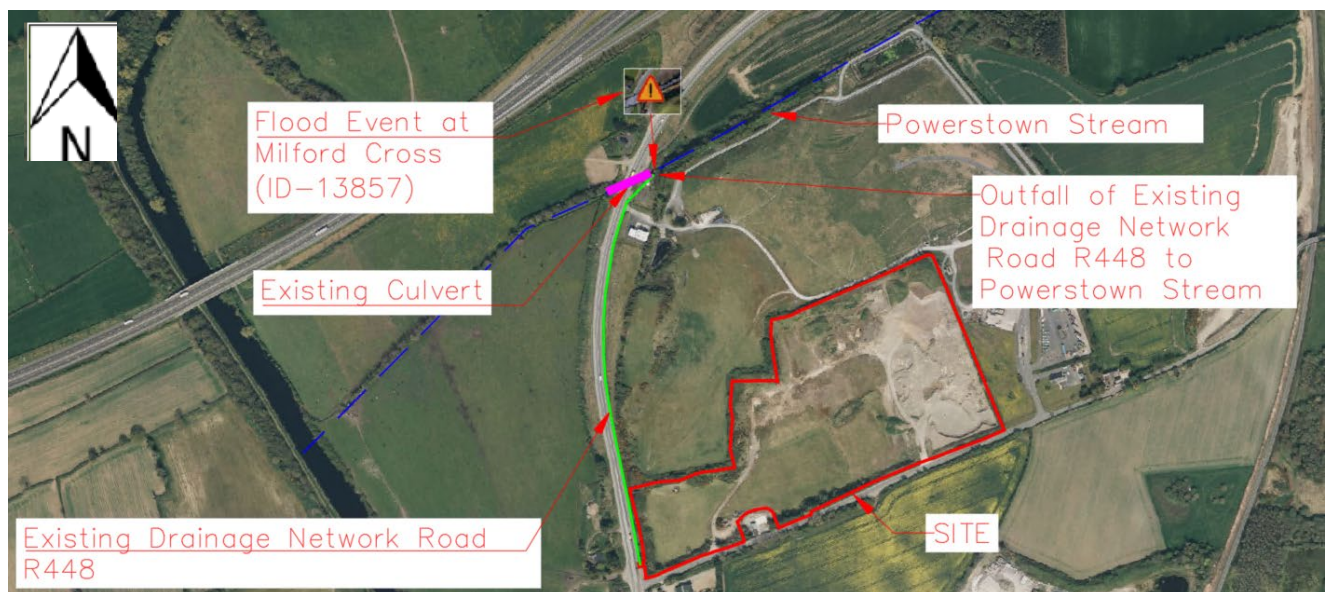


Figure 13-2: Flood History (Source: www.floodinfo.ie)

13.4.3.2 Flood Sources

A review of all relevant sources of flooding has been carried out as part of the Site-Specific Flood Risk Assessment, including fluvial, coastal, pluvial and groundwater flooding, in accordance with The Planning System and Flood Risk Management - Guidelines for Planning Authorities (DEHLG & OPW, 2009). The assessment makes use of mapping and datasets from FloodMaps.ie to identify potential flood-risk areas and to determine the appropriate flood zone classification for the site.



Fluvial Flooding

Based on FloodMaps.ie mapping, the site of the proposed development is not located within areas at risk of fluvial flooding for the 1% or 0.1% Annual Exceedance Probability (AEP) events and is therefore classified as Flood Zone C, indicating a low probability of flooding from rivers. The River Barrow is located to the west of the proposed development; however, fluvial flood extents associated with the river do not encroach upon the site.

Coastal Flooding

In relation to coastal flooding, mapping indicates that the site of the proposed development is not at risk of tidal flooding for the 0.5% or 0.1% AEP events. The site is therefore also classified as Flood Zone C for coastal flooding, with a low probability of inundation from the sea.

Pluvial Flooding

Pluvial or surface water flood mapping shows no identified flood vulnerability at the site of the proposed development for the assessed rainfall events. While the proposed development will introduce new buildings and infrastructure, a surface water drainage system incorporating a lagoon has been designed to manage runoff from the site. The system is designed to accommodate a 1 in 30-year storm event with an additional allowance for climate change, and it is not anticipated to increase flood risk on site or at the downstream discharge location.

Groundwater Flooding

Groundwater flood mapping indicates no groundwater flood risk at the site for the assessed probabilities. The proposed drainage strategy does not include infiltration measures and instead relies on attenuation and controlled discharge to a nearby watercourse during 1 in 30-year flood events if the stormwater lagoon is full, ensuring that groundwater levels and pathways are not affected. On this basis, the site is not considered to be at risk of groundwater flooding.

13.5 Potential Impacts

This section identifies the potential impacts on the hydrological environment in the absence of mitigation measures for the following phases which are discussed in each of the following sections for both the proposed development and the proposed gas pipeline:

- do nothing
- construction phase
- operational phase
- major accidents and natural disasters
- decommissioning phase
- cumulatively with other projects



13.5.1 Do Nothing' Impacts

If the proposed development was not constructed, it is likely that the site would remain as a quarry undergoing restoration works until the end of its planning consent. Thereafter it is assumed the newest planning consent would be invoked to restore a portion of the site by backfilling. The impact on the hydrological regime and surface water quality within the proposed development and the wider study area would remain largely unaltered. Surface water will continue to infiltrate to ground as per current conditions. In the absence of the proposed development, there is no requirement for a proposed gas pipeline from Powerstown Bioenergy to the AGI at Clogrennan. The existing road network would be subject to regular maintenance by Carlow County Council; it is unlikely that any of the water crossings would be subject to works in the short to medium term.

The potential do nothing impacts are neutral.

13.5.2 Construction Phase Impacts

13.5.2.1 *Proposed Development*

The proposed construction methodology is described in Chapter 3 and the management of such in respect of environmental protection is outlined in the Construction Environmental Management Plan (CEMP) in Appendix 3.1 in Volume 3 of this EIAR. During the construction period, the proposed development has the potential to impact on the hydrological regime near the site and on the quality of waters draining the site. To assess these potential impacts the main construction activities have been defined based on the information presented in Chapter 3, Description of the Proposed Development. From a hydrology and surface water quality perspective, the main construction elements are:

The key construction elements (listed in chronological construction order) are as follows:

1. Advanced Works (site clearance), Site Entrances, and Contractors Compound
2. Storm Water Management
3. Earthworks
4. Construction of the proposed development as per Chapter 3

The site lies at a lower elevation than the surrounding lands, forming a naturally enclosed topographic basin. This local topography provides a physical basis for stormwater containment, such that runoff generated during excavation and earthworks is expected to remain within the site boundary throughout the construction phase. The stormwater lagoon, which will be constructed at an early stage of the works, will operate as a sealed, lined and drainless system throughout construction, providing an engineered control measure in addition to the site's natural topographic containment.

Surface runoff from disturbed areas will be managed through a temporary drainage treatment train comprising interceptor drains, check dams, sediment traps, the lagoon forebay and the lagoon settlement zone. This treatment train will progressively reduce flow velocities, promote the settlement of suspended solids and provide multiple stages of treatment prior to storage within the lagoon. All stormwater generated on site will be directed to the lagoon for settlement and, where appropriate, reuse as a construction water source, or removal by sealed tanker for treatment and disposal at an authorised facility.



Taking account of both the site's natural topographic characteristics and the engineered stormwater management system, uncontrolled runoff entering off-site watercourses or drainage networks during rainfall events is considered unlikely, provided that the proposed measures are implemented and maintained throughout the construction phase. In the reasonably foreseeable worst-case scenario, where rainfall exceeds the design capacity of the lagoon or the performance of the drainage treatment train is temporarily reduced, lagoon water levels and water quality will be monitored. Where pre-defined trigger levels are approached or exceeded, corrective actions will be implemented, including additional tankering of stored water, removal of accumulated sediment, enhanced inspection and maintenance, and, where necessary, temporary suspension or modification of high-risk construction activities to maintain effective stormwater management.

Effects on groundwater arising from stormwater management during the construction phase are predicted to be imperceptible. Water quality monitoring will be undertaken throughout construction to determine the suitability of stored water for reuse. Where monitoring identifies contamination or otherwise unsuitable water quality, the affected water will be removed from site by sealed tanker for treatment and disposal at an authorised facility.

Stormwater management therefore represents a key hydrological consideration during the construction phase and will rely on the combined operation of the natural topographic containment, the engineered stormwater lagoon, the drainage treatment train, and associated monitoring and pollution prevention measures to minimise potential effects on groundwater and the wider receiving environment. Active management of accumulated water on site will be undertaken throughout the construction phase in accordance with these measures.

Following the key construction activities outlined above, the principal impacts associated with these works are as follows:

Release of Suspended Solids and Sedimentation

The construction phase of the proposed development will invariably involve earthworks and site clearance including removal of vegetation cover, construction of access roads, temporary stockpiling of subsoils, construction and removal of temporary works e.g. construction compounds. The following are potential impacts due to the sedimentation or release of suspended solids :

- Disturbance of soils, increasing susceptibility to erosion. Standing water in construction phase excavations will contain an increased concentration of suspended solids as a result of the disturbance to the underlying soils.
- Temporary spoil heaps from the excavations and temporary storage of imported materials if left exposed could lead to an increase in silt-laden runoff draining off site.
- Increased vehicle tracking, mobilising fine sediments. Silt carried on the wheels of vehicles leaving the site could be carried onto the public road from where it could enter storm water drains.
- Runoff from vehicle washing facilities during the construction phase could lead to contamination of storm water on site.
- Inappropriate site management of excavations could lead to loss of suspended solids and could overwhelm storm waters.

Storm water will be directed to a sealed storm water lagoon, allowing for settlement of solids. Excess storm water will be transported off site in sealed tankers for treatment or off-site disposal if required. This will avoid the likelihood of any impact on surface water.



The potential impacts on the surface water due to release of suspended solids and sedimentation are considered unlikely.

Hydrocarbon pollution

- During the construction phase of the proposed development, the utilization of plant, equipment and vehicles for excavation, material transport, construction activities and fuel storage introduces the potential for hydrocarbon spillages and leaks which might enter the storm water network and groundwater, especially during regular refuelling procedures. During the construction phase, the proposed drainage system has been designed to intercept and route all potential hydrocarbon spillages to the sealed storm lagoon, thereby preventing uncontrolled releases to the wider environment. However, as no water will be discharged to any watercourse and existing drainage network, even a major spillage would not result in a significant impact to surface water. The spillages collected within the lagoon will be removed off-site in sealed tankers for appropriate treatment and disposal.
- Therefore, the potential impacts on the surface water quality and hydrology due to hydrocarbon pollution are considered unlikely.

Cementitious works

- The proposed development will incorporate cementitious works to construct the different elements as part of the proposed development.
- Wet concrete operations could lead to contamination of storm water on site if not managed appropriately. The construction methodology in Chapter 3, together with an explanation of the nature of the proposed cementitious works in Chapter 12 of this EIAR demonstrate that the risk of contamination from concrete works is unlikely.
- In the absence of the proposed design measure of lining the stormwater lagoon, there would be potential for contaminants associated with cementitious works to infiltrate to groundwater and, indirectly, affect downgradient water receptors. This risk arises because runoff collected by the temporary drainage treatment train, including water containing cementitious residues, will ultimately be directed to and stored within the stormwater lagoon. The provision of a sealed and lined lagoon will prevent infiltration to groundwater and provide a controlled environment for the settlement and management of construction-phase runoff. It is not proposed to install a concrete batching plant on site, as a concrete supplier is located within 1 km of the proposed development site and concrete will be delivered by truck. Concrete washout water will be collected in dedicated tanks and removed from site by a permitted contractor for treatment and disposal at an authorised facility.
- Therefore the potential impacts on the surface water quality and hydrology due to cementitious works are considered unlikely.

13.5.2.2 Proposed Gas Pipeline Route

The development of a proposed gas pipeline from the proposed development to an existing AGI in Clogrennan, Co. Carlow is considered in this EIAR.

It is anticipated that the proposed gas route will cross six watercourses, comprising EPA-mapped streams as well as land and field drains. During the site visit undertaken in October 2025, these watercourse crossings were inspected and the available cover over the culverts was approximated. In addition, where the route intersects existing bridges and other structures, the feasibility of accommodating the gas pipe crossing was assessed to inform the preferred installation approach. Typically, a pipe installation crew will lay c. 100 m of pipe a day, therefore potential impacts are short term.



In general, it was determined that the proposed gas pipe can be routed across some existing culverts and bridges by utilising the grass verge or surfaced road verge, meaning that instream works are not required. However, there are 3 no locations where crossing via the existing culvert or structure is not feasible. These include ID B2, ID B5 and ID B6. At ID B2 River Barrow, the crossing will be completed using Horizontal Directional Drilling (HDD). There are 2 land drains at ID B5 and B6, both of which were dry at time of surveys. It is unknown whether there is sufficient headroom above these land drains to lay the gas pipe atop and therefore an assessment of instream works is considered herein. These are not water framework directive waterbodies.

As GNI will be responsible for delivering the gas pipeline extension, if detailed design identifies that an existing culvert or structure requires replacement, or that a temporary watercourse diversion is necessary, consultation with OPW and IFI will be required, and a Section 50 application must be submitted. As a conservative approach, the assessment of the potential impacts of a culvert replacement and HDD is considered in this section and mitigation measures proposed in Section 13.6.2.

The construction of the proposed gas pipeline will require standard cut and cover construction (i.e. excavate trench, place pipe, cover pipe and reinstate surface finish method of installation).

The excavation of the gas pipeline can have a direct impact on the exposed soils in the form of increased erosion and sediment release that, without mitigation, could have a negative impact on surface water quality at watercourse crossing locations.

The trench will be backfilled immediately following the installation of each section of pipeline. While the trench is open, there will be a potential impact to adjacent roadside drainage and downstream surface waters from an increase in the concentration of suspended solids.

As stated above, the following crossings will be undertaken using Horizontal Directional Drilling (HDD):

Crossing B2 - River Barrow

The proposed gas pipeline crossing at this location will be undertaken using Horizontal Directional Drilling (HDD) beneath the River Barrow.

All HDD Work Areas associated with the River Barrow crossing will remain outside:

- the SAC boundary
- mapped flood extents
- the river corridor

A minimum stand-off distance of 10 m will be maintained between HDD Work Areas and:

- the SAC boundary
- Flood Zone B/extreme flood extents



No direct in-stream works are proposed at this crossing location. Where HDD is required for the crossings above, there is potential for impacts in the absence of mitigation during the construction phase:

- accidental release of drilling fluid (“frac-out”)
- hydrocarbon spillages
- sediment-laden runoff generation
- temporary localised soil disturbance
- accidental contamination of surface water receptors and aquifers

The most sensitive receptor associated with the proposed HDD crossings is the River Barrow and River Nore SAC due to the ecological sensitivity and hydrological connectivity of the receiving environment.

Without mitigation, accidental drilling fluid release or contamination events could result in temporary localised impacts on water quality and aquatic ecological receptors. However, the HDD methodology substantially reduces potential impacts compared to conventional open-cut crossing methods through:

- avoidance of direct in-stream works
- avoidance of channel excavation
- avoidance of riverbank disturbance
- minimisation of floodplain interaction

For the HDD crossing scenario, the potential impacts on surface water quality and hydrology without mitigation are considered likely, negative, slight to moderate and temporary.

Crossing B5 and B6- land drain crossings

The existing land drains will be crossed using HDD. The launch and reception pits will be located in the road. In the absence of mitigation, there is a risk of sediment run off to the land drains during the works. The impact is considered to be low, negative, slight and short term.

Crossing B7- M9 Motorway Crossing

As per Chapter 3, it is proposed to cross the M9 motorway including an option to cross using HDD. Refer to Section 3.6.1. of Chapter 3. The proposed HDD methodology and construction controls are included in Chapter 3.

No direct excavation works are proposed within the motorway carriageway. HDD Work Areas associated with the crossing will be located outside the motorway corridor and managed in accordance with the Construction Environmental Management Plan (CEMP) in Appendix 3.1 of Volume 3 of this EIAR.



The HDD methodology will involve the excavation of temporary HDD Work Areas on either side of the crossing locations to facilitate drilling equipment, pipe installation activities, temporary storage of materials and associated construction plant. HDD Work Areas will incorporate appropriate environmental protection and containment measures, including:

- bunded storage areas
- spill containment facilities
- designated refuelling areas
- temporary drainage management measures
- drilling fluid containment systems.

The HDD bore path will pass beneath the respective obstacle crossings at sufficient depth to avoid direct interaction with the riverbed, streambed, motorway infrastructure or associated drainage systems. Final drilling depths will be confirmed during detailed design and geotechnical investigations.

The HDD process for the above crossings shall utilise a fully degradable drilling fluid to stabilise the bore during drilling operations. Drilling fluids will be managed within a closed-loop containment system, with appropriate containment and recovery measures implemented throughout the construction phase.

Where HDD is required for the crossings above, there is potential for impacts in the absence of mitigation during the construction phase:

- accidental release of drilling fluid (“frac-out”)
- hydrocarbon spillages
- sediment-laden runoff generation
- temporary localised soil disturbance
- accidental contamination of surface water receptors and aquifers

The most sensitive receptor associated with the proposed HDD crossings is the River Barrow and River Nore SAC due to the ecological sensitivity and hydrological connectivity of the receiving environment.

Without mitigation, accidental drilling fluid release or contamination events could result in temporary localised impacts on the motorway drainage network which could indirectly impact water quality and aquatic ecological receptors. However, the HDD methodology substantially reduces potential impacts compared to conventional open-cut crossing methods through:

- avoidance of direct in-stream works
- avoidance of channel excavation
- avoidance of riverbank disturbance
- minimisation of floodplain interaction

For the HDD crossing scenario, the potential impacts on surface water quality and hydrology are considered unlikely.



13.5.3 Operational Phase Impacts

The proposed development includes the installation of a comprehensive, segregated drainage network. The infrastructure consists of collection, control, treatment and storage systems for:

- Storm water
- Rainwater
- Wash water
- Foul water
- Process water

The plant uses more water than it produces or recovers and is therefore a net consumer of water. Any stormwater collected and stored in the lagoon will be reused as process water. Stormwater will be collected from the following areas and managed on site through the drainage system:

- Bunded Tank Farm
- Roof Areas
- Circulation Yard and road areas
- Overland Flow

Additionally, wash water will be collected from the Internal Building Drainage network.

Further details of the proposed drainage infrastructure can be found in Chapter 3 Description of the Existing and Proposed Development and in the drawings as listed in Section 13.1. If the proposed development is constructed and operated in accordance with Chapter 3, impacts on the hydrological environment are considered to be unlikely.

In addition, sediment transported within the drainage system may gradually accumulate within the stormwater lagoon forebay and settlement zone during operation. If routine inspection and maintenance are not undertaken, excessive sediment accumulation could reduce the available storage volume and treatment efficiency of the lagoon, potentially affecting its ability to provide attenuation and water quality treatment. Consequently, impacts associated with sediment accumulation and reduced treatment efficiency are considered unlikely, negative, slight and long-term.

The gas pipeline would not generate meaningful hydrological impacts during operation, as it is a sealed, static underground asset with no emissions, discharges or operational water requirements.

13.5.4 Major Accidents and Natural Disasters

This section considers the potential for major accidents and natural disasters to give rise to significant effects on surface water, groundwater, and the hydrological environment during the operational phase of the proposed development.

Flooding

The site lies lower than surrounding lands for the most part, forming a naturally enclosed basin. While this reduces the likelihood of uncontrolled off-site runoff, it also means that extreme rainfall events could generate localised flooding within the proposed development.



Potential impacts include:

- Overtopping of the storm-water lagoon during extreme rainfall if pumps or controls fail.
- Inundation of operational areas leading to mobilisation of pollutants.
- Contaminated water accumulating on site and requiring emergency pumping.

However, the site is outside OPW Flood Zones A and B and the stormwater lagoon is designed for a 1 in 30 year flood event with freeboard. In addition, there is watercourses immediately adjacent to the proposed development that could be immediately impacted. Stormwater has to be pumped out of the site due to the topography. As per Chapter 3, the design of the stormwater management system has considered storm events to avoid impacts.

Fire and firewater runoff

A fire at the proposed development could generate firewater, containing:

- Hydrocarbons
- Fire fighting foam residues
- High suspended solids
- Combustion by-products

If uncontrolled, firewater could enter the drainage system and ultimately reach the Powerstown Stream.

Key controls include:

- All operational areas drain to segregated networks.
- Firewater would be directed to the lagoon or bunded areas.
- The stormwater lagoon has 0.30 m sedimentation capacity and LLDPE lining.
- Emergency procedures allow isolation of drainage and containment of firewater.
- Water will only be discharged to the Powerstown Stream if clean (as confirmed by continuous emissions monitoring in accordance with IE Licence), and if the storm water lagoon and the process and fire water tanks are full, following a 1 in 30 year storm event.

A Firewater Risk Assessment has been completed, see Appendix 3.2 of Volume 3 of this EIAR.

Emergency Contamination Event

In the event that storm water within the lagoon becomes contaminated (e.g., due to a spill, firewater, or accidental release), contaminated lagoon water could:

- reach the Powerstown Stream
- cause nutrient enrichment
- increase biochemical oxygen demand
- introduce hydrocarbons or chemicals



This is mitigated by the design of the storm water management system which allows:

- isolation of the lagoon
- prevention of discharge to the Powerstown Stream
- pumping of contaminated water to sealed tankers
- off-site treatment at a licensed wastewater treatment plant

Tank Failure

Failure of tank could release liquid manures/digestate. The largest tank on site has capacity of 12,036 m³. Potential impacts without mitigation includes:

- contamination of bunded area
- entry of pollutants into the surface-water system
- risk to the Powerstown Stream

However, this is mitigated by design, all tanks are located within fully bunded, impermeable containment areas, sized to hold 110% of the largest tank volume, or 25% of the total installed tank volumes (whichever is the greatest) with an appropriate freeboard depth in line with best practice. Refer to Section 3.3.7.4 of Chapter 3 for details on the proposed tank farm bund.

Bund Failure

Although unlikely, bund failure could occur due to structural damage, overfilling and lack of maintenance.

Potential impacts include uncontrolled release of stored liquids.

Mitigation by design includes:

- licensed bund integrity testing at required intervals
- impermeable construction materials
- automatic level monitoring
- routine inspection and maintenance

13.5.5 Decommissioning Phase Impacts

It is considered that the potential decommissioning impacts will be similar to those identified in the construction phase.

However, the overall risk of disturbance to underlying soils at the site, during the decommissioning phase will be significantly reduced from that of the construction phase. The areas of hardstand and access roads associated with the proposed development are to remain in-situ. It is proposed to retain these elements of the construction and cover with overburden material to allow for re-vegetation of the development site.

This approach significantly reduces the risk of exposing underlying soils, thereby lowering the potential for sediment mobilisation, erosion, or contaminated runoff compared with the construction phase.



Any remaining risks during decommissioning relate primarily to:

- localised disturbance of ground surfaces during removal of infrastructure
- potential mobilisation of residual contaminants from tanks, bunds, or drainage systems
- temporary increases in sediment in surface water if soils are exposed
- accidental spills during dismantling or cleaning of equipment

These risks are short-term and can be effectively managed through standard decommissioning controls.

The decommissioning (if required) of gas pipeline extension will be under the control of GNI.

There is no potential for significant impacts Because the scale of ground disturbance is much lower than during construction by leaving the hardstands and access roads. The remaining risks are localised and manageable using standard decommissioning controls.

13.5.6 Cumulative Impacts

The assessment of cumulative impacts considers whether the proposed development, in combination with other existing or approved developments in the surrounding area, could give rise to additional or amplified effects on surface water hydrology or water quality. The receiving environment includes the Powerstown Stream and the River Barrow SAC, all of which are sensitive receptors.

The surrounding area contains a mix of agricultural, industrial, infrastructural and extractive activities, including operational quarries, a closed and restored landfill and several surface-water features. These activities have the potential to contribute to cumulative pressures on local hydrology and water quality.

The significance of cumulative effects has been assessed with reference to the EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022) and the objectives of the Water Framework Directive. Given that the proposed development incorporates a sealed drainage system, controlled discharge at greenfield runoff rates, water quality monitoring, and containment measures, it is not expected to result in a measurable deterioration in water quality, hydrological regime, or flood risk when considered in combination with surrounding land uses.

However, with the proposed measures and drainage infrastructure incorporated into the proposed development, including a sealed drainage system, controlled discharge at greenfield runoff rates, water quality monitoring and containment measures, it is not expected to materially increase cumulative hydrological impacts or water quality impacts. Accordingly, any combination effects with surrounding land uses are assessed as Slight or Not Significant, with no potential for significant cumulative effects on the Powerstown Stream and River Barrow.



13.5.7 Summary of Potential Impacts

Table 13-2: Summary of Potential Impacts

Activity/Source of Impact	Potential Impact	Description of Effects.
Construction Phase		
HDD crossing beneath the River Barrow (Crossing IDB2)	Accidental drilling fluid release (“frac-out”), sediment runoff, hydrocarbon spillages and temporary localised disturbance	The River Barrow crossing will be undertaken using Horizontal Directional Drilling (HDD), avoiding direct excavation within the river channel and minimising disturbance to the watercourse. Potential impacts are limited to accidental releases of drilling fluids, construction runoff, or pollution incidents that could temporarily affect water quality and aquatic habitats. With the trenchless construction approach and standard environmental controls, impacts are considered unlikely, negative, slight and temporary.

Activity/Source of Impact	Potential Impact	Description of Effects.
Operational Phase		
Proposed Development	If routine inspection and maintenance are not undertaken, excessive sediment accumulation could reduce the available storage volume and treatment efficiency of the lagoon, potentially affecting its ability to provide attenuation and water quality treatment	impacts associated with sediment accumulation and reduced treatment efficiency are considered unlikely, negative, slight and long-term.

13.6 Mitigation Measures

Mitigation measures for surface water and hydrology have been developed in accordance with the mitigation hierarchy of avoidance, prevention, reduction, and control, as set out in the EPA EIAR Guidelines (2022). A substantial proportion of mitigation is embedded directly within the design of the surface water drainage infrastructure, thereby minimising reliance on procedural or operational controls as per Section 13.1.1.

The drainage strategy has been specifically designed to manage runoff from plant carriageways, industrial roofs, surrounding lands, and quarry cut areas while preventing pollution, attenuating flows, and protecting sensitive downstream receptors within the River Barrow catchment.



13.6.1 Construction Phase Mitigation

During construction, mitigation will focus on controlling sediment mobilisation, managing temporary drainage arrangements, and preventing accidental pollution. Measures will include:

- Implementation of a Construction Environmental Management Plan (CEMP), see Appendix 3.1 of Volume 3 of this EIAR
- Phased construction of drainage infrastructure to ensure that permanent drainage and treatment features are operational at the earliest practicable stage.
- Installation of temporary sediment control measures, including silt fences, settlement areas, and temporary interceptor drains with check dams.
- Protection of the stormwater lagoon from uncontrolled inflows during early construction phases.
- Discharge from the stormwater lagoon to sealed tankers for off-site disposal.
- Water will be treated through a sequence of drainage elements, including the temporary and permanent sediment-control measures listed above. The lagoon will also support particle settlement, as it will be constructed with both a settling zone and a forebay.
- Management of excavations and exposed soils to minimise erosion, including temporary stabilisation where required.
- Storage of fuels, oils, and chemicals in bunded, sealed and designated areas, with refuelling restricted to controlled locations.
- Provision of spill kits and training of construction personnel in spill response procedures.
- Strict control of concrete works to prevent alkaline runoff. All concrete wash out water will be collected in a dedicated tank and transported off Site by a permitted contractor to an authorised private WWTP.
- Protection of watercourse crossings along the gas pipeline route, with works undertaken at existing culverts or bridges in accordance with Inland Fisheries Ireland (IFI) guidance and OPW.

With these measures in place, construction-phase impacts on surface water and hydrology will be temporary, localised, and not significant.

13.6.1.1 *Horizontal Directional Drilling (HDD)*

Specific mitigation measures will also be implemented during Horizontal Directional Drilling (HDD) activities associated with:

- Crossing ID B2-The River Barrow crossing.
- Crossing ID B5 and B6 Land Drains
- Crossing ID B7- M9 Motorway crossing (not a watercourse crossing).

The HDD crossings have been selected as mitigation-by-design measures to avoid direct in-stream works and minimise disturbance to sensitive hydrological and ecological receptors.



The following mitigation measures will be implemented during HDD works:

- All HDD Work Areas associated with the River Barrow crossing will remain outside the River Barrow and River Nore SAC boundary, mapped flood extents and the river corridor itself.
- A minimum stand-off distance of 10 m will be maintained between HDD Work Areas and the SAC boundary and Flood Zone B/extreme flood extents.
- No direct in-stream works will be undertaken within the River Barrow, the other streams or associated drainage channels.
- HDD Work Areas will incorporate bunded storage and containment measures to prevent accidental discharge of contaminants to surrounding lands, drains or watercourses.
- Refuelling activities associated with HDD works will only occur in designated areas with appropriate spill containment measures.
- Spill kits and emergency response equipment will be available at all HDD Work Areas throughout the construction phase.
- Bentonite-based drilling fluids will be managed within a closed-loop containment system to prevent uncontrolled discharge to the environment.
- HDD drilling fluid storage tanks and associated infrastructure will be located within contained areas with secondary containment measures.
- Daily inspections of HDD Work Areas, drilling fluid systems and containment infrastructure will be undertaken during active drilling operations.
- Measures will be implemented to monitor and manage the risk of inadvertent drilling fluid return ("frac-out").
- In the event of an accidental drilling fluid release, works will cease immediately and emergency containment and clean-up procedures will be implemented in accordance with the CEMP.
- Surface water runoff generated within HDD Work Areas will be managed through temporary drainage controls and sediment management measures.
- Excavated materials generated during HDD activities will be stored away from watercourses and protected from rainfall runoff generation.
- Reinstatement works will be undertaken following completion of HDD activities to restore disturbed areas.
- HDD works beneath the River Barrow and the other streams will be undertaken in accordance with relevant Inland Fisheries Ireland guidance documents and best practice measures for works adjacent to watercourses.

With these measures in place, construction-phase impacts on surface water and hydrology will be temporary, localised, and not significant.

13.6.2 Operational Phase Mitigation

Routine inspection and maintenance of the stormwater lagoon will be undertaken throughout the operational life of the development. Sediment accumulated within the forebay and settlement zone will be removed periodically as required to maintain the design storage volume and treatment performance of the lagoon.



13.6.3 Decommissioning Phase Mitigation

In the event of decommissioning, mitigation measures will include:

- Preparation of a Decommissioning Environmental Management Plan, proportionate to the scale and nature of the works.
- Removal of fuels, chemicals, and wastes from the site prior to dismantling activities.
- Continued use of the drainage, lagoon, and treatment systems to manage runoff during decommissioning works.
- Controlled removal of structures to minimise soil disturbance and sediment mobilisation.
- Restoration of site surfaces to prevent long-term erosion or uncontrolled runoff.

No significant adverse impacts on surface water or hydrology are anticipated during the decommissioning phase.

13.7 Residual Impacts

Residual impacts are those effects remaining after the implementation of all mitigation measures.

13.7.1 Summary of Residual Impacts

Following the application of the design, construction methodology and mitigation measures, the residual impacts on surface water hydrology and surface water quality are assessed as not significant.

The proposed development or gas pipeline will not:

- cause deterioration in the ecological or chemical status of surface water bodies;
- increase flood risk on-site or downstream; or
- result in uncontrolled discharges to groundwater.

This conclusion reflects the incorporation of multi-stage drainage treatment, real-time water-quality monitoring, automatic isolation and containment measures, controlled discharge at greenfield runoff rates, and minimum retention times within the lagoon.

The development is therefore compliant with the objectives of the Water Framework Directive, the River Basin Management Plan, and relevant local planning policy.



Table 13-3: Summary of Residual Impacts

Activity/Source of Impact	Potential Impact	Description of Effects (Pre Mitigation)	Description of Effects (Post Mitigation)
Long-term operation of lagoon	Sediment accumulation and reduced treatment efficiency	Accumulated sediment could reduce treatment effectiveness over time.	Routine inspection and maintenance, including sediment removal from the forebay and settling zone, ensure continued performance. Residual impact is not significant.
Overall operation of the development	Deterioration of WFD status or cumulative effects	Combined effects could lead to deterioration of surface water ecological or chemical status.	Design-based mitigation, active monitoring, automatic isolation measures, and controlled discharge ensure no deterioration of WFD status. Residual cumulative impact is not significant.

13.8 Monitoring

A surface water monitoring programme will be implemented to verify the effectiveness of mitigation measures and ensure ongoing protection of the receiving environment. Monitoring will include:

- Monitoring in accordance with the IE licence issued by the EPA.
- Routine inspection of the plant drainage network, roof drainage network, interceptor drainage, penstocks, spillage containment system, and pumping infrastructure.
- Inspection and maintenance of lagoon, including monitoring of sediment accumulation within the forebay and settling zone.
- Continuous monitoring of water quality using automated water-quality sensors installed within:
 - the plant drainage network.
 - bunded areas; and
 - lagoon pump station.
- Verification that exceedance flows discharged from the lagoon are released progressively over a minimum 24-hour period (minimum retention time), in accordance with the design discharge rate and retention requirements. Recording of flow and water quality data is required.
- Confirmation that penstock closure, spill diversion, and pump inhibition functions are triggered automatically in response to adverse water-quality conditions.
- Monitoring of water quality at the lagoon and, where appropriate, at upstream and downstream locations in receiving waters.
- Water-quality parameters to include:
 - pH
 - Electrical Conductivity (EC)
 - Temperature
 - Turbidity
 - Phosphate



- Ammoniacal Nitrogen
- any other parameters to comply with IE licence
- Visual inspections for evidence of pollution, sediment release, or abnormal conditions.
- Review of monitoring results and implementation of corrective actions where required.

Monitoring records will be submitted to the EPAs online licence reporting website LEAP in line with IE licence requirements.



13.9 References

Carlow County Council. 2022. *Carlow County Development Plan 2022-2028* . 2022.

—. **2024.** *Powerstown Landfill Industrial Emissions Licence W0025-04 Surface Water Monitoring Report 2024*. 2024.

CIRIA. 2006. • *CIRIA C648 Control of Water Pollution from Linear Construction Projects, technical guidance*. 2006. C648.

—. **2001.** *Control of Water Pollution from Construction Sites. Guidance for Consultants and Contractors*. 2001. C532.

—. **2015.** *Environmental good practice on site guide (fourth edition) (C741)*. 2015.

—. **2015.** *The SuDS Manual (C753)*. 2015.

Conservation Services on behalf of Carlow County Council. 2022. Powerstown Landfill, County Carlow, Biological Assessment of Surface Water Quality . [Online] 2022. <https://leap.epa.ie/docs/adb3e629-f93b-4f64-9615-68b78de84494.pdf>.

DEHLG & OPW. 2009. *Planning System and Flood Risk Management Guidelines for Planning Authorities* . 2009.

Department of Housing, Local Government and Heritage. 2023. *River Basin Management Plan 2018 - 2021*. 2023.

—. **2024.** *River Basin Management Plan 2022 – 2027*. 2024.

Department of Housing, Planning and Local Government. 2018. *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment*. 2018.

Enterprise Ireland. Best Practice Guide BPGCS005 – Oil Storage Guidelines. BPGCS005.

Environmental Protection Agency. 2026. Catchments Data Waterbody: BARROW_170. [Online] 2026. https://www.catchments.ie/data/#/waterbody/IE_SE_14B012600?_k=tuvgat.

—. **2026.** EPA Catchments. [Online] 2026. https://www.catchments.ie/data/#/?_k=req2gv.

—. **2026.** Leap Online. [Online] 2026. <https://leap.epa.ie/confirm?returnUrl=https%3A%2F%2Fleap.epa.ie%2F>.

EPA. 2022. *Guidelines on the information to be contained in Environmental Impact Assessment Reports*. 2022.

European Union . 2000. Directive 2000/60/EC Of The European Parliament And Of The Council 23 October 2000 establishing a framework for Community action in the field of water policy. 2000.

Government of Ireland. 2003. S.I. No. 722/2003 - European Communities (Water Policy) Regulations 2003. 2003.

Inland Fisheries Ireland. 2020. *Guidelines on Planning for Watercourses in the Urban Environment*. 2020.

—. **2016.** *Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters*. 2016.



Limnos Consultancy on behalf of Carlow County Council. 2025. POWERSTOWN LANDFILL, COUNTY CARLOW, BIOLOGICAL ASSESSMENT OF SURFACE WATER QUALITY. 2025.

Natural Resources Wales (NRW), Northern Ireland Environment Agency (NIEA), the Scottish Environment Protection Agency (SEPA). 2021. Treatment and disposal of wastewater where there is no connection to the public foul sewer. 2021.

—. **2018. Works and maintenance in or near water. 2018.**

Natural Resources Wales (NRW), Northern Ireland Environment Agency (NIEA), the Scottish Environment Protection Agency (SEPA), Energy Institute, Oil Care Campaign. 2021. Above ground oil storage tanks. 2021.

TII Publications. 2008. Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes. s.l. : TII, 2008.

www.catchments.ie. Catchments.ie. *Catchments.ie*. [Online] <https://www.catchments.ie/>.

www.epa.ie/hydronet. www.epa.ie. *www.epa.ie/hydronet*. [Online]

www.floodinfo.ie. OPW Flood Information Portal. *Floodinfo*. [Online] <https://www.floodinfo.ie/>.

www.geohive.ie. GeoHive - Ireland's National Geospatial Data Hub. *GeoHive Map Viewer*. [Online] Tailte Éireann. <https://www.geohive.ie/>.

www.gsi.ie. Geological Survey of Ireland. *Geological Survey of Ireland*. [Online] <https://www.gsi.ie/>.

www.met.ie. [Online]



**DESIGNING AND DELIVERING
A SUSTAINABLE FUTURE**

www.fehilytimoney.ie

 **Cork**

 **Dublin**

 **Carlow**

