PURSER

Volume 2:

10

Hydrology and Hydrogeology

10.0 Hydrology and Hydrogeology

10.1 Introduction

This chapter of the EIAR provides a description of the hydrology and hydrogeology (water) environment within and immediately surrounding the site of the Proposed Development and an assessment of the potential effects of the Proposed Development on hydrology and hydrogeology and sets out any required mitigation measures where appropriate.

The principal objectives of this chapter are to identify:

- Hydrological and hydrogeological characteristics of the receiving environment at the site of the Proposed Development.
- Potential effects that the Proposed Development may have on the receiving water environment.
- Potential constraints that the environmental attributes may place on the Proposed Development.
- Required mitigation measures which may be necessary to minimise any adverse effects related to the Proposed Development.
- Evaluate the significance of any residual effects.

This chapter of the EIAR should be read in conjunction with **Chapter 7** Population and Human Health, **Chapter 8** Biodiversity, **Chapter 9** Land, Soils and Geology and **Chapter 16** Material Assets: Utilities of the EIAR and other information provided by the Applicant pertaining to the design proposals for the Proposed Development.

10.2 Quality Assurance and Competency of Experts

This chapter of the EIAR has been prepared by Warren Vokes Ba MSc MCIWEM C.WEM a Senior Consultant of Enviroguide. Warren holds a MSc River Environments and their Management and is a Chartered Water and Environmental Manager with over 8 years' experience as an Environmental Consultant. Warren has carried out environmental assessments for a range of project types and geological and hydrogeological site settings.

This chapter of the EIAR has been reviewed by Gareth Carroll BA, BAI, MIEnvSc, CEnv a Principal Consultant of Enviroguide. Gareth is a Chartered Environmentalist with over 11 years' experience in preparing environmental assessments for a range of project types and geological and hydrogeological site settings.

10.3 Study Methodology

10.3.1 Relevant Legislation & Guidance

The methodology adopted for the assessment has regard to the relevant guidelines and legislation including:

- Council Directive 2006/118/EEC, 2006. On the protection of groundwater against pollution and deterioration. European Parliament and the Council of European Communities.
- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy with amendments 2455/2001/EC, 2008/32/EC and 2008/105/EC (Water Framework Directive (WFD)).
- European Commission, 2022. WFD Reporting Guidance 2022. Final Draft V4.
- Local Government, October 2021. No. 1.1977. Local Government (Water Pollution (Amendment) Act.
- Local Government, October 2007. No. 30.2007. Water Services Act 2007.
- Local Government, July 1990. No. 21.1990. Local Government (Water Pollution) (Amendment) Act, 1990.
- Local Government, March 1977. No. 01/1977. Local Government (Water Pollution) Act, 1977 with amendments.
- S.I. No. 722/2003 – European Communities (Water Policy) with amendment S.I. No. 413/2005.
- S.I. No. 489/2011 – European communities (Technical Specifications for the Chemical Analysis and Monitoring of Water Status) Regulations, 2011.
- S.I. No. 122/2010 – European Communities (Assessment and Management of flood Risks) Regulations 2010 including amendment S.I. No. 495/2015.
- S.I. No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009 including amendments S.I. No. 327/2012, S.I. No. 386/2015 and S.I. No. 77/2019.
- S.I. No. 9 of 2010 - European Communities Environmental Objectives (Groundwater) Regulations 2010 including amendments S.I. No. 149 of 2012 and S.I. No. 366 of 201.
- WFD Working Group, 2005. Guidance on the Assessment of the Effect of Groundwater Abstractions (WFD, 2005).
- Tipperary County Council, 2022. Tipperary County Development Plan 2022- 2028.

Other guidance used in the assessment of potential effects on the receiving water environment include:

- Construction Industry Research and Information Association, 2001. Control of Water Pollution from Construction Sites (CIRIA – C532).
- Construction Industry Research and Information Association, 2015. Environmental Good Practice on Site Guide (CIRIA – C741).
- Construction Industry Research and Information Association, 2016. Groundwater Control: Design and Practice (CIRIA – C750).
- Department of the Environment, Heritage and Local Government, Environmental Protection Agency and Geological Survey of Ireland, 1999. Groundwater Protection Schemes (DEHLG/EPA/GSI, 1999).
- Department of the Environment, Heritage and Local Government, 2009. Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities (DEHLG, 2009).
- Department of Housing, Planning and Local Government, August 2018. Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Effect Assessment (DHPLG, 2018).
- Environmental Protection Agency, 2014. Guidance on the Authorisation of Direct Discharges to Groundwater.

- Environmental Protection Agency, 2013. Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites.
- Environmental Protection Agency, 2013. Storage and Transfer of Materials for Scheduled Activities.
- Environmental Protection Agency, May 2022. Guidelines on the information to be contained in Environmental Effect Assessment Reports (EPA, 2022).

10.3.2 Phased Approach

A phased approach was adopted for this EIAR in accordance with Environmental Protection Agency (EPA) and Institute of Geologists of Ireland (IGI) guidelines as set out above and is described in the following sections.

Element 1: An initial assessment and effect determination stage was carried out by Enviroguide to establish the project location, type and scale of the Proposed Development, the baseline conditions, and the type of hydrological and hydrogeological environment, to establish the activities associated with the Proposed Development and to undertake an initial assessment and effect determination. This element of the assessment also included developing the Conceptual Site Model (CSM) for the Site and receiving environment.

This stage of the assessment included a desktop study that comprised a review of published environmental information for the Site. The study area, for the purposes of assessing the baseline conditions for this chapter of the EIAR, extends beyond the site boundaries and includes a 2.0km radius of the site and Proposed Development and potential receptors outside of this radius that are potentially hydraulically connected with the Site were also considered. The extent of the wider study area was based on the Institute of Geologists of Ireland (IGI) Guidelines (IGI, 2013) that recommends a minimum distance of 2.0km radius from the Site. This broader area is necessary to identify and evaluate all potential receptors that could be affected by the Proposed Development, either directly or indirectly. The distinction between the application site and the study area is crucial. The site of the Proposed Development is the focal point of the Proposed Development, while the study area includes any potential hydrogeological / hydrological connections to sensitive receptors including habitats that might experience secondary effects.

The desk study involved collecting all the relevant data for the Proposed Development site and surrounding area including published information and details pertaining to the Proposed Development provided by the applicant and design team.

A site walkover survey to establish the environmental site setting and baseline conditions at the site of the Proposed Development relevant to the hydrological and hydrogeological environment was undertaken by Enviroguide on 25 June 2024.

The Element 1 stage of the assessment was completed by Enviroguide and included the review of the following sources of information:

- Environmental Protection Agency (EPA) webmapping (EPA, 2024).

- Geological Survey Ireland (GSI) Datasets Public Viewer and Groundwater webmapping (GSI, 2024).
- National Parks and Wildlife Services (NPWS) webmapping (NPWS, 2024).
- Ordnance Survey Ireland (OSI) webmapping (OSI, 2024).
- Water Framework Directive Ireland (WFD) webmapping (WFD, 2024).
- Teagasc webmapping (Teagasc, 2024).
- Office of Public Works (OPW) database on historic flooding and the Catchment Flood Risk Assessment and Management (CFRAM) maps (OPW, 2024).
- Information provided by the Applicant pertaining to the design proposals for the Proposed Development.

Element 2: Involves direct and indirect site investigation and studies stage where necessary to refine the CSM developed as part of Element 1 and evaluate the potential effects associated with the Proposed Development. Minerex Geophysics Ltd. (MGX) carried out a geophysical survey (Minerex, 2024) between August 2024 and September 2024 consisting of an EM31 Ground Conductivity Survey, a 2D-Resistivity (ERT) Survey and a Seismic Refraction survey of the site. Intrusive ground investigations (including trial pitting, borehole drilling, and soil sampling) was undertaken by IGSL Ltd. (IGSL) in July 2024 and August 2024 (IGSL, 2024). Post completion of the intrusive ground investigation works IGSL requested O'Callaghan Moran & Associates (OCM) to undertake a waste characterisation assessment of eighteen (18 No.) samples of made and natural ground collected from eleven (11 No.) trial pits and six (6 No.) cable percussion boreholes (OCM, 2024). The results of the site investigations were used to identify and assess the existing ground conditions and geological environment at the site. The site investigation reports (Minerex, 2024, IGSL, 2024 and OCM, 2024) are included in **Volume 3: Appendix 10.1**.

Element 3: Evaluation of Mitigation Measures, Residual Effects and Final Effect Assessment were based on the outcome of the information gathered in Element 1 of the assessment. Mitigation measures to address all identified adverse effects that were identified in Element 1 of the assessment were considered in relation to the Construction Phase and Operational Phase of the Proposed Development. These mitigation measures were then considered in the effect assessment to identify any residual effects.

Element 4: Completion of Chapter 10 Hydrology and Hydrogeology of the EIAR which includes all the associated figures and documents.

10.3.3 Description of Importance of the Receiving Environment

The National Roads Authority (NRA) criteria for estimation of the importance of hydrological and hydrogeological features at the site of the Proposed Development during the Environmental Effect Assessment (EIA) stage, as documented by IGI (IGI, 2013) are summarised in **Table 10-1**.

Importance	Criteria	Typical Example
Extremely High	Attribute has a high quality or value on an international scale.	Groundwater supports river, wetland or surface water body ecosystem protected by European Union (EU) legislation e.g., SAC or SPA status.

Importance	Criteria	Typical Example
Very High	Attribute has a high quality or value on a regional or national scale.	Regionally Important Aquifer with multiple wellfields. Groundwater supports river, wetland, or surface water body. ecosystem protected by national legislation – e.g., NHA status. Regionally important potable water source supplying >2500 homes Inner source protection area for regionally important water source. Quality Class A (Biotic Index Q4, Q5). Flood plain protecting more than 50 residential or commercial properties from flooding.
High	Attribute has a high quality or value on a local scale.	Regionally Important Aquifer. Groundwater provides large proportion of baseflow to local rivers. Locally important potable water source supplying >1000 homes. Outer source protection area for regionally important water source. Inner source protection area for locally important water source. Quality Class B (Biotic Index Q3-4). Flood plain protecting between 5 and 50 residential or commercial properties from flooding. Locally important amenity site for wide range of leisure activities.
Medium	Attribute has a medium quality or value on a local scale.	Locally Important Aquifer Potable water source supplying >50 homes. Outer source protection area for locally important water source. Quality Class C (Biotic Index Q3, Q2- 3). Flood plain protecting between 1 and 5 residential or commercial properties from flooding.
Low	Attribute has a low quality or value on a local scale.	Poor Bedrock Aquifer. Potable water source supplying <50 homes. Locally important amenity site for small range of leisure activities. Local potable water source supplying <50 homes. Quality Class D (Biotic Index Q2, Q1). Flood plain protecting 1 residential or commercial property from flooding.

Table 10-1. Criteria for Rating Site Importance of Hydrogeological Features

10.3.4 Description and Assessment of Potential Effects

Effects will vary in quality from negative, to neutral or positive. The effects of effects will vary in significance on the receiving environment. Effects will also vary in duration. The terminology and methodology used for assessing the

'effect' significance and the corresponding 'effect' throughout this chapter of the EIAR are described in **Table 10-2**.

Quality of Effects/Effects	Definition
Negative	A change which reduces the quality of the environment
Neutral	No effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error.
Positive	A change that improves the quality of the environment
Significance of Effects / Effects	**Definition**
Imperceptible	An effect capable of measurement but without significant consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight Effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate Effects	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant Effects	An effect which, by its character, magnitude, duration, or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration, or intensity significantly alters a sensitive aspect of the environment.
Profound Effects	An effect which obliterates sensitive characteristics.
Extend and Context of Effects	**Definition**
Extend	Describe the size of the area, the number of sites and the proportion of a population affected by an effect.
Context	Describe weather the extent, duration or frequency will conform or contrast with established (baseline) conditions
Probability of Effects	**Definition**
Likely Effects	The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
Unlikely	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Duration of Effects / Effects	**Definition**
Momentary	Effects lasting from seconds to minutes
Brief	Effects lasting less than a day
Temporary	Effects lasting one year or less
Short-term	Effects lasting one to seven years

Medium-term	Effects lasting seven to fifteen years
Long-term	Effects lasting fifteen to sixty years
Permanent	Effects lasting over sixty years
Reversible	Effects that can be undone, for example through remediation or restoration
Types of Effects	**Definition**
Indirect Effects	Effects on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway
Cumulative Effects	he addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects.
"Do-nothing" Effects	The environment as it would be in the future should the subject project not be carried out
"Worst-case" Effects	he effects arising from a project in the case where mitigation measures substantially fail.
Indeterminable Effects	When the full consequences of a change in the environment cannot be described.
Irreversible Effects	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost
Residual Effects	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.

Table 10-2. Criteria for Assessment of Potential Effects Terminology and Methodology

10.4 The Existing and Receiving Environment (Baseline Situation)

10.4.1 Site Location and Description

The site is located at the former Lisheen Mine Site, Killoran, Moyne, Thurles, Co. Tipperary. The site is accessed from the existing entrance off the L5612 local road. It covers approximately 5.5 hectares and consists of undeveloped brownfield lands. The site is currently vacant following the closure of the Lisheen Mine in 2015. The implementation of the "Closure, Restoration & Aftercare Management Plan – C.R.A.M.P" (The Lisheen Mine, 2016) involved detailed strategies to ensure the site's safe and sustainable closure. These reports provided comprehensive guidelines for decommissioning activities, restoration of the land, and long-term aftercare measures to mitigate environmental effects and promote ecological recovery.

The site is accessed from the existing entrance off the L5612 local road, which was used by the former Lisheen Mine Site. The egress joins with the R502 regional road and wider road network.

The site is currently undeveloped and consists of infill from aggregate materials (soil, stone, and rock) extracted from a permitted borrow area within the wider Lisheen Mine site (TCC Planning Reg. Ref. 14600480) for the purpose of restoring the Lisheen Mine. Additionally, surplus suitable material generated during the

decommissioning process has been used. The historic mine entrance, now backfilled with concrete, is located in the southern portion of the site.

The site of the proposed development is within a rural area and is surrounded by agricultural land. There are a small number of residential properties in proximity to the application site located in a linear fashion along the surrounding roads. The closest residential neighbour to the site being 750m away. To the north of the site is former industrial boglands which are owned by Bord na Mona. Industrial peat continues to be harvested within the locality, but a number of wind turbines have been installed, some in close proximity to the site on the former Lisheen mine site. The Lisheen Wind Farm became operational in August of 2009, with eighteen (18 no.) wind turbines erected across the former Lisheen Mine complex, with another 24 wind turbines neighbouring the site, all of which connect into the onsite sub-station. The lands are leased from Lisheen Mine on which the turbines and other infrastructure necessary for the operation of the Wind Farm are located. To the east of the site is the permitted national BioEconomy Foundation R&D Unit (Planning Ref. 211128) which is housed in a former maintenance shed associated with the Lisheen mine. To the west of the site is a former office/laboratory building which was used as part of former mining operations. This building is now vacant.

The Cooleeny Stream is located approximately 0.02km south of the site. During a site walkover undertaken by Enviroguide on the 25th of June 2024, some standing water was identified in the southern portion of the site. However, there was no direct hydrological connection identified between the site and the Cooleeny Stream. It is anticipated that surface water runoff from the existing site will either discharge to the ground or runoff towards the Cooleeny Stream at greenfield runoff rates.

The site location is presented in **Figure 10-1** and the existing site layout is presented in **Figure 10-2**. Further details regarding the site location and surrounding land use are detailed in **Chapter 3** of this volume.

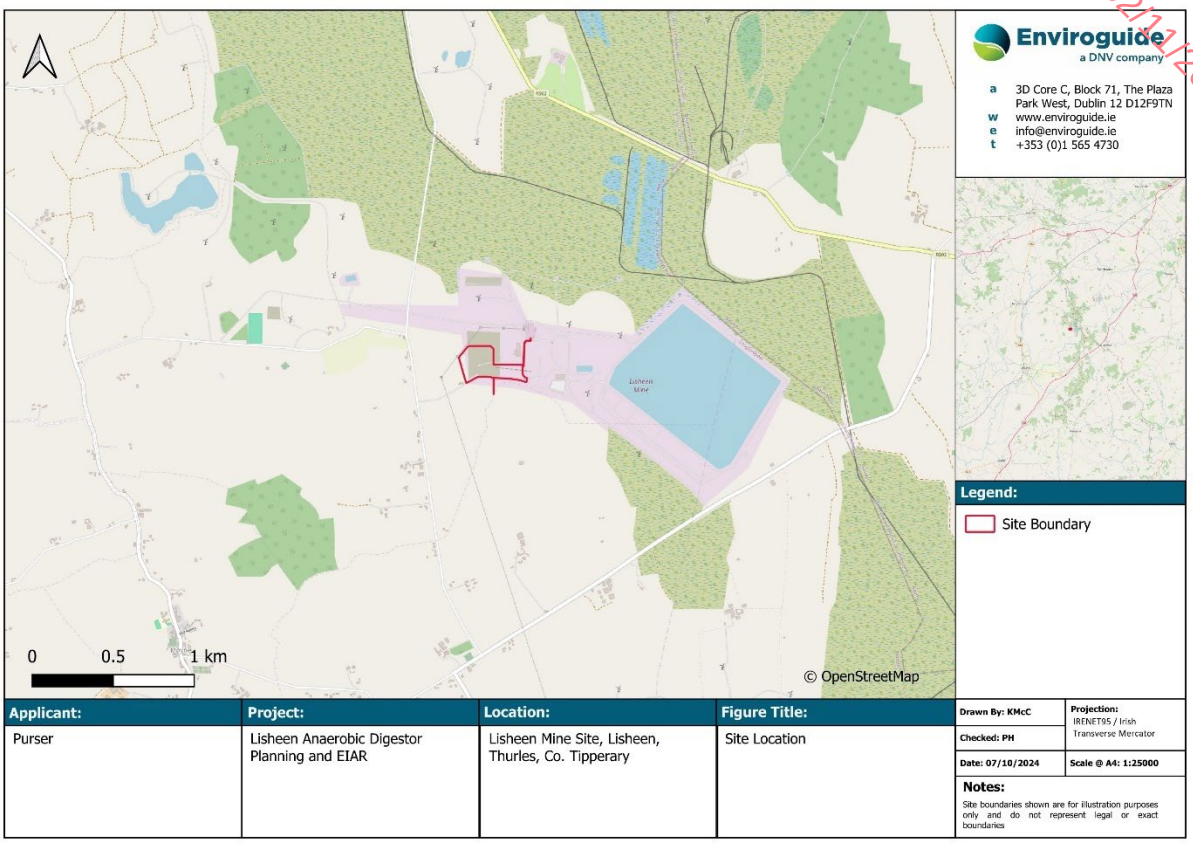


Figure 10-1. Site Location

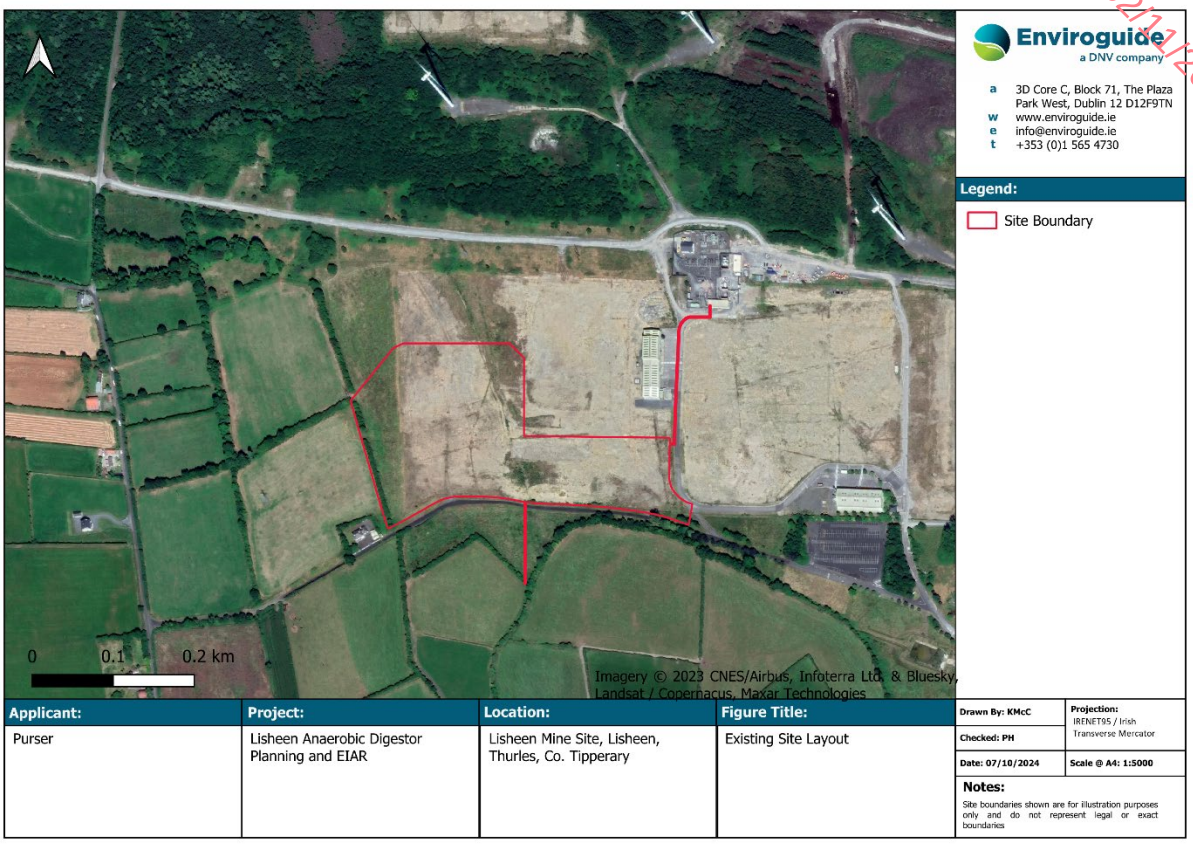


Figure 10-2. Current Site Layout

10.4.2 Historical Land Use

The Lisheen Mine was a significant zinc and lead mine that operated from 1999 until its closure in 2015. It was one of the largest producers of zinc concentrate in Europe. The mine was accessed via a 1.5-kilometre-long decline and utilised underground drilling rigs and explosives to extract ore. Over its operational life, the mine produced approximately 22.4 million tonnes of ore, with an average grade of 11.63% zinc and 1.96% lead.

The infrastructure at Lisheen Mine was demolished in accordance with the "Closure, Restoration & Aftercare Management Plan – C.R.A.M.P" (The Lisheen Mine, 2016) as part of the site's decommissioning process, which began in 2016 following the cessation of mining operations in December 2015. The active closure phase continued until February 2018. The decommissioning included the removal of all surface and underground plant and equipment.

Historical mapping and aerial photography available from the Ordnance Survey of Ireland website (OSI, 2024) and Google Earth (Google Earth, 2024) were reviewed and key observations on-site and off-site are summarised in **Table 10-3**.

Date	Information Source	Site Description
1837-1842	OSI Map 6 inch	Onsite: The site is comprised of greenfield agricultural land to the south of a large area of bog. Offsite: The surrounding lands are predominantly open fields divided by field boundaries. There is a cluster of dwellings 0.3 km west of the site
1888-1913	OSI 25 Inch	Onsite: No significant changes. Offsite: No significant changes.
1995	OSI Aerial Photograph	Onsite: No significant changes. Offsite: Access tracks are developed throughout the area of bog to the north. A new dwelling is built 0.39 km southwest of the site.
2001-2005	OSI Aerial Photograph	Onsite: The Lisheen mines site is established comprising a car park, warehouses, silos and broken ground. Offsite: A large artificial pond is established 0.5km to the east of the site.
2013-2018	OSI Aerial Photograph	Onsite: No significant changes. Offsite: A second smaller pond is established 0.69 km northeast of the site, and the previously identified large pond is partially drained. Four wind turbines are erected 0.3 km north of the site.
2024	Google Earth	On site: All onsite buildings relating to the mine are demolished. Off site: Both previously identified ponds are drained and backfilled.

Table 10-3. Historical Land Use

The following table outlines the planning history of the Lisheen Mine site, detailing key milestones and decisions that have shaped its development and current status.

Planning Ref. / ABP Ref.	Status	Description of Development
51/17763	Granted	Zin/Lead mine with ore processing and related facilities
5124572	Granted	Extraction of Borrow material
04511667	Granted	Extension of existing mine and construction of three no. ventilation shafts, two of which have evases and the third a hoist house. An EIS has been submitted with this application.
8510773	Granted	Wind turbine farm consisting of 22 no. wind turbine generators, access roads, carnage ponds, and associated infrastructure. An EIS will be submitted to the Planning Authority with this application.
9510142	Granted	Erect one no. permanent meteorological mast of 95m height with internal access road to be utilised for the limited purpose of monitoring wind and climate conditions for the development in North Tipperary County Council Pl Ref. 06510773 and APB PL 22.222.142.
12510034	Granted	Develop the Derryville Island Ore Deposit underground workings as an extension to the existing Lisheen Mine and the construction of one no.

Planning Ref. / ABP Ref.	Status	Description of Development
		ventilation shaft. The Lisheen Mine is subject to the conditions of IPPCL No. P0099-03. The development will include underground mine workings, as an extension to the existing Lisheen Mine and the construction of one no. ventilation shaft and associated building. An EIS shall be submitted to the Planning Authority with the application The Major Accident Regulations apply to the proposed development
13510275	Granted	Consisting of modification of the permitted water impoundment facility (permitted under An Bord Pleanála Ref No. PL22. 100093 (North Tipperary County Council Reg Ref PLC17663) including use of the facility to provide for the storage and management of mine tailing within the same structure (for the purposes of extending life of the mine) and associated capping and reinstatement activities. The proposed development also includes: the installation of spigots and reclaim pumps; and all other ancillary site development works. An EIS and Natura Effect Statement (NIS) have been prepared and will be submitted to the Planning Authority with the planning application. The application relates to development which comprises, or is for the purposes of an activity requiring an integrated Pollution Prevention and Control Licence (IPPC) under the EPA Acts. 1992 to 2013 (EPA Licence Reg. No. P0069-03).
14600396	Granted	An increase in height of the existing Tailings Management Fact (TWF) Previously permitted under Reg. No. 13/510275, granted in 2013 (small adjoining facility to the main TMP). The raise in height of this adjoining cell from c.131.5 mod up to a maximum of c.136.5 mod, will provide additional storage for the management of mine tailings for the purposes of extending the life of the mine, and will result in an increase in the footprint of the TMF of c. 2.25 hectares. The development also includes all related ancillary development works. This application is accompanied by an EIS and NIS and relates activity requiring an EPA Licence.

Table 10-4. Planning History

10.4.3 Topography

The site is relatively level, with a gentle slope to the southeast toward the Cooleney Stream. Ground elevations at the site range from a high point of approximately 131.10 meters above Ordnance Datum (mOD) along the northwest boundary to approximately 125.8mOD along the Cooleney Stream at the southernmost extent of the site (refer to DOBA, 2024. Topographical Survey).

10.4.4 Soil, Subsoil and Geology

The soils and geology at the site of the Proposed Development and surrounding area are described and assessed in Chapter 9 of this EIAR and summarised as follows:

- The soils beneath the majority of the site have been mapped by the GSI (GSI, 2024) as deep, well-drained mineral soils (mainly basic) classified as Grey Brown Podzolic and Brown Earths with medium to high base status, derived from mainly calcareous parent materials (IFS Soil Code: BminDW). A narrow band of soils beneath the eastern boundary of the site, crossing the southern portion, has been mapped by the GSI (GSI, 2024) as mineral alluvium (IFS Soil Code: AlluvMIN). Additionally, another narrow band of soils along the southern boundary of the site has been mapped by the GSI (GSI, 2024) as mineral, poorly drained soils (mainly basic) classified as Surface Water Gleys and Ground Water Gleys, derived from mainly calcareous parent materials (IFS Soil Code: BminPD).
- The subsoil or Quaternary sediments beneath the majority of the site of the Proposed Development are mapped by the GSI (GSI, 2024) as till derived from limestone. The narrow band of alluvium underlying the eastern boundary of the site and crossing the southern portion indicates historic drainage pathways (GSI, 2024).
- The bedrock beneath the site is mapped by the GSI (GSI, 2024) as the Waulsortian Limestones (New Code: CDWAULdo), described as dolomitised massive fine-grained limestone. A fault is identified beneath the southwest portion of the site.
- There are no karst features mapped by the GSI (GSI, 2024) at the site or within a 2km radius of the site. However, it is noted that the results of the intrusive site investigation (IGSL, 2024) and the geophysical survey (Minerex, 2024) confirmed the presence of karstified limestone within the dolomitised limestone of the Waulsortian Formation beneath the site.

10.4.5 Site Investigation Results

10.4.5.1 Intrusive Ground Investigation

The site investigation undertaken across the site by IGSL in July 2024 and August 2024 (included in **Volume 3: Appendix 10.1**) comprised of the following:

- Excavation of 11 No. trial pits with dynamic probes.
- Drilling of 8 No. boreholes (cable percussive and follow-on rotary core drilling methods)
- Completion of 5 No. soakaway tests.
- Groundwater Monitoring and Installation of Data Loggers in 5 No. boreholes.
- Laboratory analysis of eighteen (18 No.) samples of made and natural ground collected from eleven (11 No.) trial pits and six (6 No.) cable percussion boreholes for waste classification assessment.

The ground conditions encountered are summarised as follows:

- Made Ground comprising re-worked sandy gravelly / cobbly clay with organics or roots was encountered from ground level to depths of up to 1.1 meters below ground level (mbGL). The matrix is described as firm and the material is thought to have originated from excavations associated with the mine development (IGSL, 2024).
- The Made Ground was underlain by grey brown and reddish brown sandy gravelly CLAY with low to high cobble content and clayey / silty gravelly SAND with cobbles and boulders (proportions vary greatly) to depths ranging from 2.4mbGL to 8.0mbGL.
- Lenses or horizons of sandy GRAVEL or gravelly SAND occur within the glacial deposits.
- Standard Penetration Tests (SPT's) were conducted in both the cable percussive boreholes and IGSL rotary drillholes to establish stiffness or shear strength. The SPT's show quite a data scatter with an increase in strength apparent from approximately 3m, thereafter the majority of the N-Values fall within the 25 to 50 envelope and suggest the soils are high strength with shear strengths of the order of 120 to 150 kPa (stiff and very stiff) (IGSL, 2024).
- Bedrock described as light grey/blue slightly dolomitized LIMESTONE with solution weathering and dark grey / black argillaceous / muddy LIMESTONE was encountered at depths ranging from 2.4mbGL to 8.0mbGL. Weathering grades vary within the sequence and the light grey / blue limestone (which belongs to the Waulsortian Formation) exhibits solution or karst weathering.
- The point load strength index (PLSI) tests suggests the intact core specimens vary from weak (5 to 12.5 MPa) to very strong (100 to 200 MPa) (IGSL, 2024.

10.4.5.2 Geophysical Survey

Minerex Geophysics Ltd. (Minerex) carried out a geophysical survey (Minerex, 2024 included in **Volume 3: Appendix 10.1**) consisting of 2D-Resistivity (ERT), seismic refraction (p-wave) and MASW (s-wave) surveying for the site. The findings of the geophysical survey are summarised as follows:

- The data was modelled with 3 layers based on seismic velocities and all of the layers were divided using the electrical resistivities. Layer 4 is the backfilled mine entrance:
  - **Layer 1:** Consists of soft or loose materials like alluvium and soil/fill, with thicknesses ranging from 0.8m to 3m.
  - **Layer 2:** Interpreted as weathered or karstified rock or overburden with very stiff to hard or very dense stiffness or compaction, and varying thicknesses from 2m to 17m.
  - **Layer 3:** Consists of good to very good limestone rock, showing seismic velocities of over 4000 m/s, with top depths varying from 3m to 19m.
  - **Layer 4:** Represents disturbed geophysical data corresponding to the backfilled mine entrance.
- A geological fault is interpreted between these two limestone types. The Waulsortian dolomitised limestone is to the north of the fault, the argillaceous/muddy limestone seems to be uplifted by the fault as it could be expected to come from the Ballysteen formation under the Waulsortian limestone.
- The surveys indicated the presence of karstified limestone within the dolomitised limestone of the Waulsortian Formation.

- An alluvium band of shallow deposits crosses the site, generally corresponding with the subsoil or Quaternary sediments mapped beneath the site by the GSI (GSI, 2024).
- The mine entrance has been appropriately backfilled and matches the location on previous reports for the entrance.

10.4.6 Rainfall

Monthly rainfall data available for 1km x 1km grids (for the period 1991 to 2020) was sourced from Met Éireann (Met Éireann, 2023) and is presented in **Table 10-5**.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
92.6	73.6	69.3	63.0	62.0	72.2	70.8	80.4	74.4	100.9	95.8	100.3	955.3
Note: 1km x 1km Irish Grid Coordinated selected for the Site =X (Easting): 221000, Y (Northing): 167000												

Table 10-5. Long Term Mean Monthly Rainfall Data

The closest the synoptic meteorological station to the site is at Gurteen which is located approximately 39km northwest of the Proposed Development Site. The average potential evapotranspiration (PE) from the Gurteen for the period 2021 to 2024 (Met Éireann, 2024) is presented in **Table 10-6**.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
10.18	19.25	35.90	56.30	76.68	85.15	83.98	73.18	42.70	27.13	12.57	10.07	520.63

Table 10-6. Average Potential Evapotranspiration

Effective Rainfall (ER) is calculated as the difference between total rainfall and actual evapotranspiration. For the site of the proposed development, an average annual rainfall of 955.3 mm/year and an average potential evapotranspiration (PE) of 520.63 mm/year result in an ER value of 434.67 mm/year. The Geological Survey Ireland (GSI) has calculated ER values ranging from 437.10 mm/year to 464.10 mm/year across the site, which aligns closely with the calculated value.

10.4.7 Hydrogeology

10.4.7.1 Site Hydrogeology and Groundwater Levels

An assessment of groundwater and surface water responses to the closure of the Lisheen Mine in 2015 was undertaken by Piteau Associates UK Ltd. (Piteau Associates UK Ltd., 2019. The Lisheen Mine Analysis Of Groundwater And Surface Water Response Following Completion Of Mining). The assessment identified pre-mining groundwater levels generally between 123-127 meters above Ordnance Datum (mOD). The groundwater

table typically occurred 3 to 8 meters below ground level (mbGL), within glacial soils and peat deposits overlying limestone units. Seasonal fluctuations in the water table were observed, with levels rising close to the surface in winter and dropping in summer due to evapotranspiration.

The district-scale groundwater gradient in the Lisheen area was south and southwest towards the Drish River and regionally towards the River Suir, with a pre-mining head difference of about 5 meters. Local groundwater discharge to drainage ditches feeding the Rossestown River was about 0.35 millions of litres per day (MLD) in winter. North and northwest of Lisheen, the Rossestown received minimal groundwater discharge from limestone units, with summer flows sustained by peat discharge (Piteau Associates UK Ltd., 2019).

Full recovery of groundwater levels was confirmed in early 2018, reaching 123.6-125.3 mOD, similar to pre-mining levels. Subsequent reductions indicated the re-establishment of natural seasonal variations. Regional data showed a hydraulic gradient to the south and southwest, with a flattened gradient near the mine due to increased groundwater system connectivity. Away from the mine, baseline and post-recovery contours were nearly identical, within typical seasonal variations of 2 to 5 meters (Piteau Associates UK Ltd., 2019).

The post closure regional groundwater flow direction is presented in **Figure 10-3**.

During the site investigation undertaken across the site by IGSL in July 2024 and August 2024 (refer to **Volume 3: Appendix 10.1**), groundwater strikes or inflows were encountered in two of the eleven trial pits (i.e. TP 2 and TP9). Standpipes were installed in the 5 No. of the 8 No. rotary drillholes. The measured groundwater levels for groundwater levels recorded between April 2023 and May 2023 are presented in **Table 10-7**. The groundwater monitoring locations are presented in **Figure 10-4**.

Borehole I.D.	Date (dd/mm/yyyy)	Depth to Ground Water (mbGL)	Groundwater Elevation (mOD)
RC02	16/10/2024	6.22	123.5
RC03		3.17	124.22
RC05		3.76	123.95
RC06		3.38	124.08
RC08		1.37	125.16

Table 10-7. Measured Groundwater Levels (IGSL, 2024)

A groundwater elevation contour map was prepared using the groundwater level data recorded by IGSL on the 16th of October 2024 (IGSL, 2024) and is presented in **Figure 10-4**.

Based on the measured groundwater elevations, the groundwater flow in the underlying aquifer is inferred to be generally to the west toward the Rossestown River.

Soakaway tests were conducted to evaluate the infiltration characteristics for potential dispersion of storm water through a soakaway system. The tests demonstrated significant variability with no movement or dissipation

recorded in some instances (SA02 & SA04) while the other tests determined infiltration rates (f) of 1.4 to 6.4x 10-6 m/s.

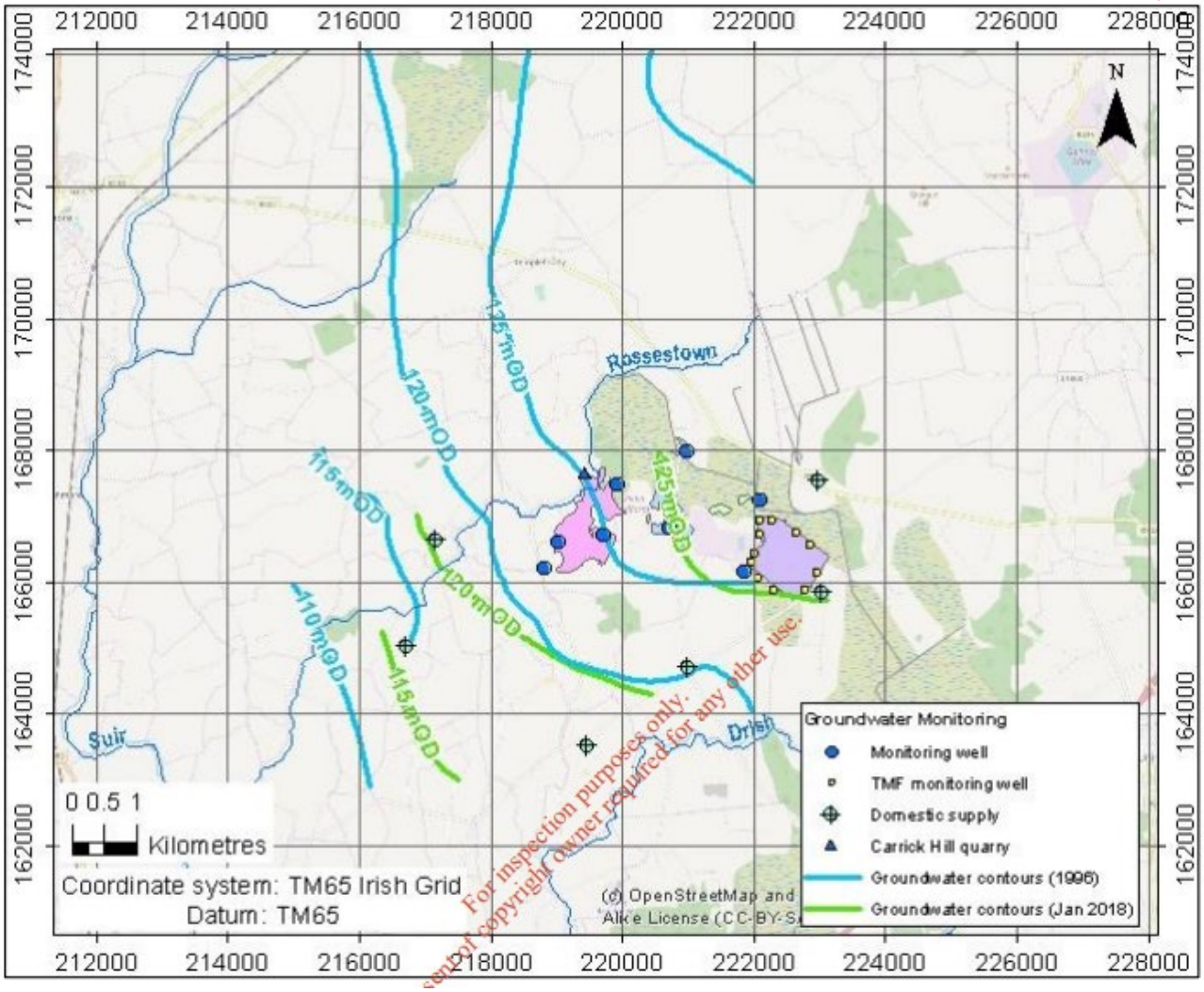


Figure 10-3. Post Closure Regional Groundwater Flow Direction

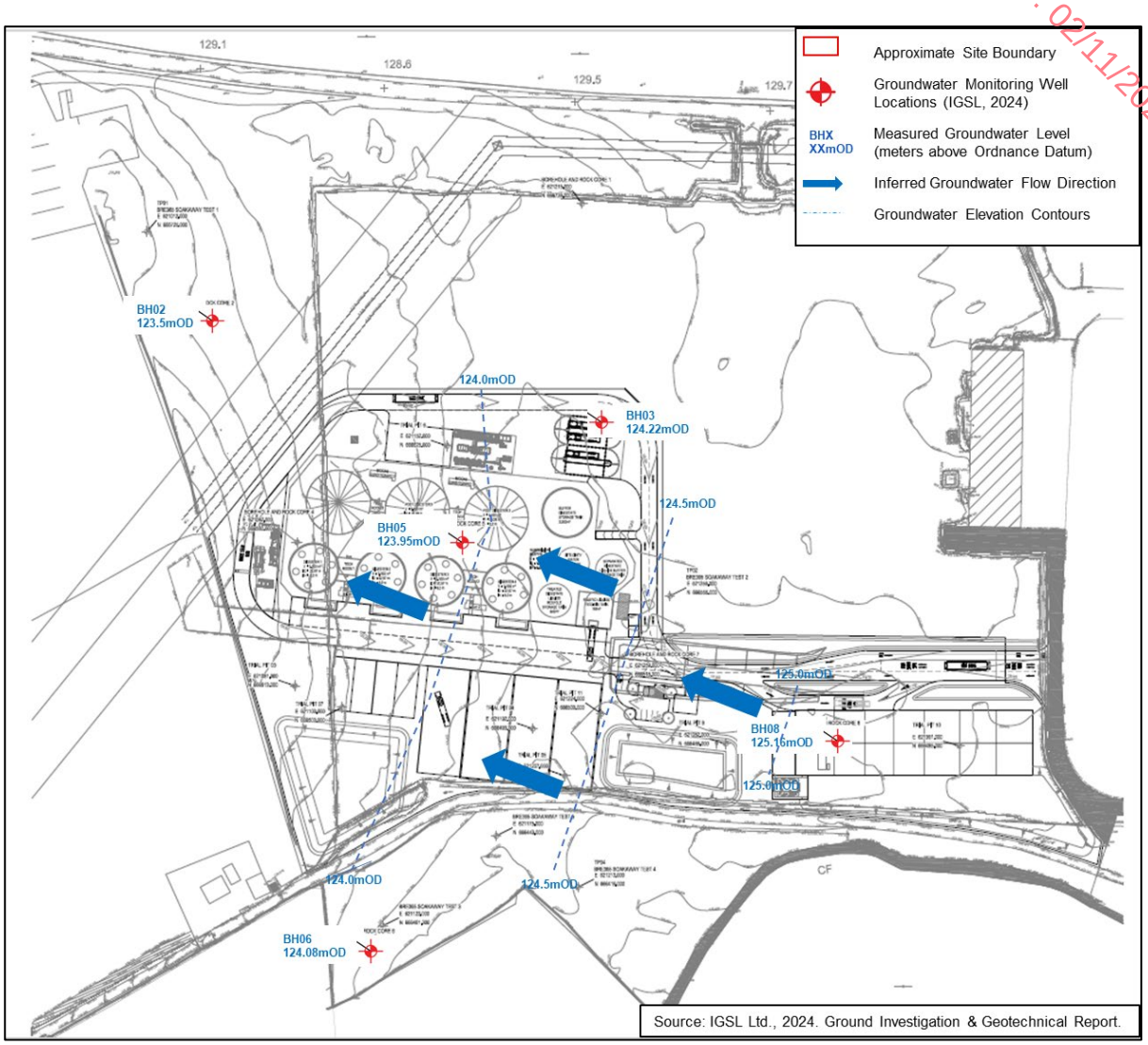


Figure 10-4. Inferred Groundwater Flow Direction (16th October 2024)

10.4.7.2 Groundwater Body and Flow Regimes

The bedrock aquifer beneath the site is within the Thurles GWB (EU Code: IE_EA_G_158). The Thurles GWB covers approximately 90 km^2 and spans areas across Co. Dublin, Co. Kildare, and Co. Meath (GSI, 2024). This groundwater body is located northeast of Thurles. The area is exceptionally flat, with very few rivers.

Along the eastern boundary of the groundwater body, there is slightly higher ground (160 m OD) compared to the flat area (120 m OD). The dominant drainage direction is west. Limestone-derived tills are the dominant till type in this area, varying from light-brown/grey to dark brown/black in colour, depending on the parent material and weathering processes.

Recharge in the Thurles GWB primarily occurs where rock is close to the surface and in elevated areas to the east. The region's low drainage density indicates high infiltration rates of effective rainfall directly into the aquifer, contributing significantly to groundwater replenishment.

Groundwater discharge mainly happens through springs located in the southwest near Thurles. Additionally, local groundwater discharge feeds into drainage ditches and rivers, such as the Rossestown River, particularly during the wetter months. The Cooleeny Stream also receives local groundwater flow, especially from the vicinity of the Lisheen Mine site. At the extremities of the water-bearing layers, groundwater discharges in a series of large springs: Creamery Well (Spring - Thurles WS) (1400), Lady's Well (Spring - Thurles WS) (600), Tobernaloo (Spring – Thurles WS) (900), and Ballyduff GWS.

Groundwater flow in the Thurles GWB predominantly follows an east-to-west direction, driven by the regional topography. The hydraulic gradient generally trends towards the southwest, aligning with the natural slope of the land. Flow paths are complex due to the presence of fractures and conduits that have been enlarged by karstification and dolomitization. The overall district-scale groundwater gradient in the Lisheen area is towards the Drish River and regionally towards the River Suir.

The aquifer is characterized by significant karstification, leading to uneven permeability and the development of solutionally-enlarged fissures and conduits. These karst features create complex and variable groundwater flow patterns, contributing to the unique hydrogeological characteristics of the Thurles GWB.

The historic Lisheen Mine site and surrounding area are situated within a complex geological setting characterized by significant faulting. The primary faults in the area are normal faults, which developed during the Lower Carboniferous period due to north-south rifting (Society of Economic Geologists, 2018a). These faults have played a crucial role in the formation and localization of zinc and lead mineralization at the site (Society of Economic Geologists, 2018b). The faults typically exhibit displacements of up to 50 meters, although most have displacements of less than 10 meters. These faults act as major conduits for groundwater flow and have influenced the hydrogeology of the site (International Mine Water Association, 2021).

10.4.7.3 Recharge

The GSI groundwater recharge map provides an estimate of the average amount of rainwater that percolates down through the subsoils to the water table over a year. The map accounts for rainfall that percolates diffusely through soils and subsoils but does not take into account water that enters aquifers at points (e.g., at sinkholes) or along linear features (e.g., along sinking streams/rivers). Groundwater recharge amounts are estimated by considering soil drainage, subsoil permeability, thickness and type, the ability of the aquifer to accept the recharge, and rainfall.

As detailed in **Section 10.4.8**, an ER value of 434.67 mm/year has been calculated for the site of the proposed development. The GSI (GSI, 2024) has identified a recharge coefficient for the aquifer beneath the majority of the

site as 60% of effective rainfall, resulting in a calculated average recharge of 260.802 mm/year, compared to the GSI recorded value of 278.48 mm/year. Additionally, a small section in the central portion of the site has been identified by the GSI (GSI, 2024) to have a recharge coefficient of 22% of ER, resulting in a calculated average recharge of 95.63 mm/year, compared to the GSI recorded value of 98.35 mm/year.

10.4.7.4 Aquifer Classification

The GSI provides a methodology for aquifer classification based on resource value (regionally important, locally important and poor) and vulnerability (extreme, high, moderate or low). Resource value refers to the scale and production potential of the aquifer whilst vulnerability refers to the ease with which groundwater may be contaminated by human activities (vulnerability classification primarily based on the permeability and thickness of subsoils).

The GSI (GSI, 2024) has classified the bedrock of the Waulsortian Limestones beneath the site as a Regionally Important Aquifer - Karstified (diffuse) (Rkd).

Regionally important aquifers are capable of supplying regionally important abstractions (e.g. large public water supplies), or 'excellent' yields (>400 m3/d). 'Karstification' is the process whereby limestone is slowly dissolved away by percolating waters. Karstification frequently results in the uneven distribution of permeability through the rock, and the development of distinctive karst landforms at the surface (e.g. swallow holes, caves, dry valleys), some of which provide direct access for recharge/surface water to enter the aquifer.

There are no gravel aquifers mapped at the site or within a 2km radius of the site (GSI, 2024).

The bedrock aquifer map is presented in **Figure 10-5**.

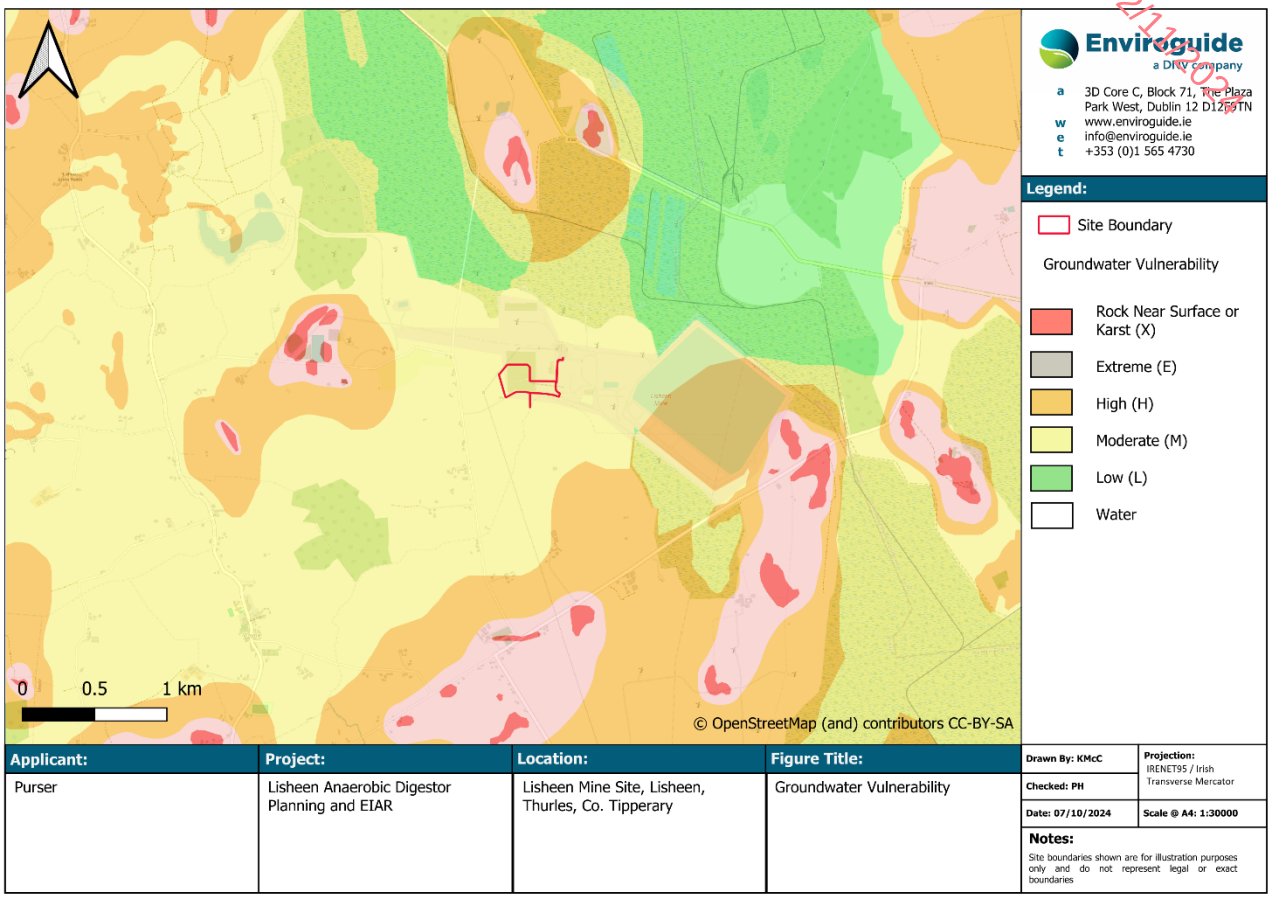


Figure 10-5. Bedrock Aquifer

10.4.7.5 Groundwater Vulnerability

The vulnerability categories, and methods for determination, are presented in the Groundwater Protection Schemes publication (DEHLG/EPA/GSI, 1999) and summarised in **Table 10-8**. The publications state that 'as all groundwater is hydrologically connected to the land surface, it is the effectiveness of this connection that determines the relative vulnerability to contamination. Groundwater that readily and quickly receives water (and contaminants) from the land surface is considered to be more vulnerable than groundwater that receives water (and contaminants) more slowly and in lower quantities. The travel time, attenuation capacity and quantity of contaminants are a function of the following natural geological and hydrogeological attributes of any area.

Subsoil Thickness	Hydrogeological Requirements Diffuse Recharge Subsoil Permeability and Type High Permeability (Sand and Gravel)	Moderate Permeability (Sandy Subsoil)	Low Permeability (Clayey Subsoil, Clay, Peat)	Point Recharge (Swallow Holes, Losing Streams)	Unsaturated Zone (Sand and Gravel Aquifers Only)
0-3m	Extreme	Extreme	Extreme	Extreme (30m radius)	Extreme
3-5m	High	High	High	N/A	High
5-10m	High	High	Moderate	N/A	High
>10m	High	Moderate	Low	N/A	High
Notes: (i) N/A = not applicable (ii) Permeability classifications relate to the material characteristics as described by the subsoil description and classification method.					

Table 10-8. Vulnerability Mapping Criteria

The GSI has assigned a groundwater vulnerability rating of 'Moderate' (M) for the groundwater beneath the site (GSI, 2024). The subsoil permeability classification beneath the site is also 'Moderate' (GSI, 2024). Based on the 'Moderate' permeability and 'Moderate' vulnerability rating, the depth to bedrock beneath the site is anticipated to be greater than 10.0 meters below ground level (mbGL).

However, it is noted that bedrock was encountered during intrusive site investigations undertaken at the site (IGSL, 2024) at depths ranging from 2.4mbGL to 8.0mbGL. Therefore, a groundwater vulnerability rating of 'High' to 'Extreme' may be more applicable to the site.

The groundwater vulnerability map is presented in **Figure 10-6**.

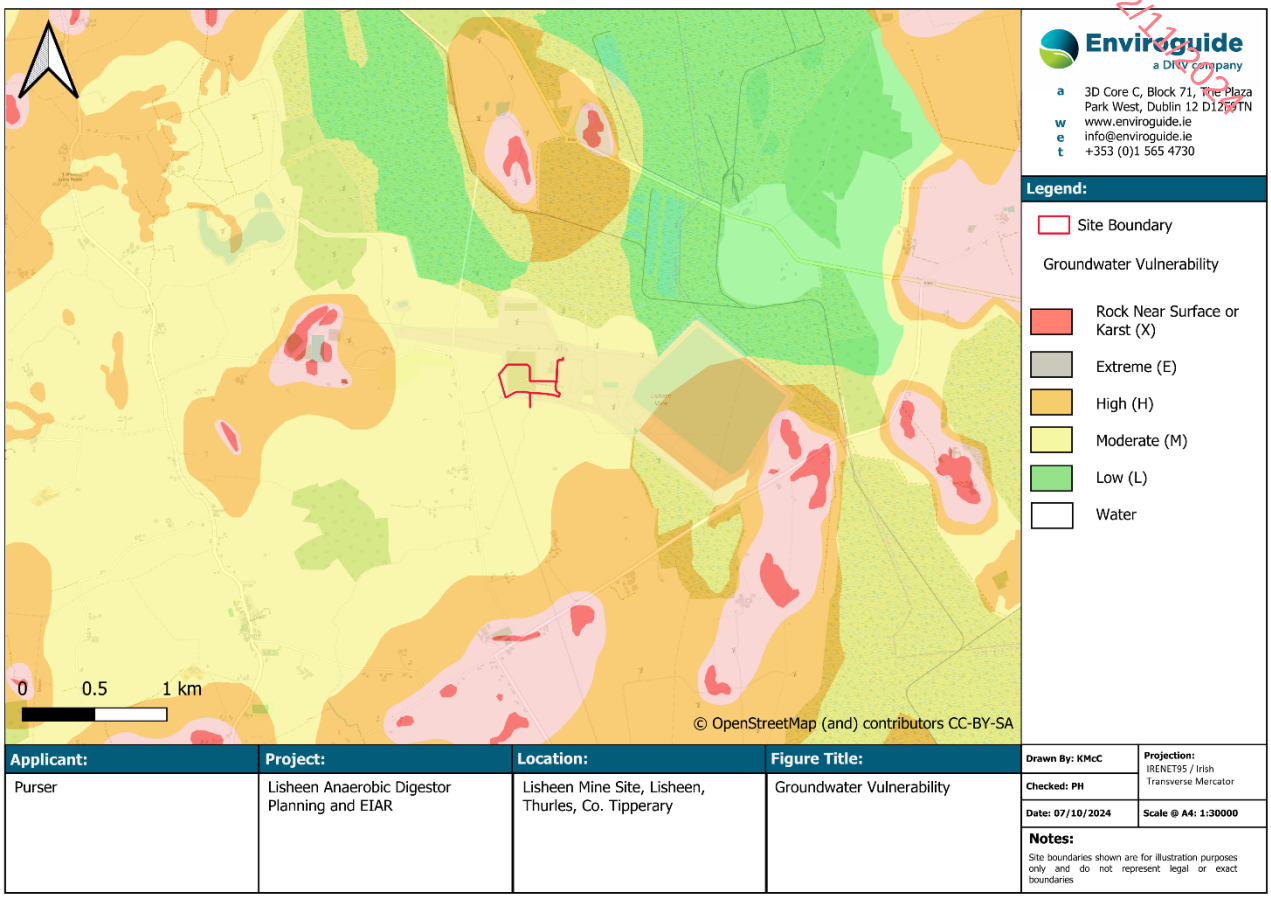


Figure 10-6. Groundwater Vulnerability

10.4.8 Hydrology

10.4.8.1 Catchment and Surface Water Features

The site is mapped by the EPA (EPA, 2024) to be within the Suir Water Framework Directive (WFD) Catchment (Catchment I.D.: 16) and the Suir_SC_040 WFD Sub-Catchment (Sub-Catchment ID: 16_21). This catchment includes the area drained by the River Suir and all streams entering tidal water between Drumdowney and Cheekpoint, Co. Waterford, draining a total area of 3,542km^2.

The Site is mapped by the EPA (EPA, 2024) to be within the Drish_040 WFD Sub-basin (EU Code: IE_SE_16D020100).

The closest surface water feature is recorded on the EPA database (EPA, 2024) as the Cooleeny Stream (River Waterbody Code: IE_SE_16D020100; WFD Name: Drish_40) located approximately 0.02km south of the site. The Cooleeny Stream is mapped by the EPA (EPA, 2024) as rising approximately 0.61km east/southeast of the site. It

is noted that the Cooleeny Stream was observed to be dry during the site walkover undertaken by Enviroguide on the 25th of June 2024.

The Cooleeny Stream is a first order watercourse within the Suir catchment and is approximately 105km upstream of the Suir tidal boundary at Carrick on Suir and approximately 160km upstream of the mouth of the estuary at Hook head.

The Cooleeny Stream flows in a southerly direction before discharging the Drish 16 River (River Waterbody Code: IE_SE_16D020100) approximately 3.64km downstream of the site. Drish 16 River flows a further approximately 12.89km southwest before discharging to the River Suir (River Waterbody Code: IE_SE_16S020900).

Historical 6" and 25" mapping available from the Ordnance Survey of Ireland website (OSI, 2024) indicates that the Cooleeny Stream historically drained a portion of the neighbouring Lisheen Bog. During the operational phase of Lisheen Mine the Cooleeny Stream received runoff from the mine site, dewatering from the mine tunnels and the runoff from the tailings management facility (TMF). Dewatering ceased following the closure of the Lisheen Mine at the end of 2015 (Piteau Associates UK Ltd., 2019). The TMF was an engineered structure, with a footprint area of 88 hectares and capacity of 6 million m^3, designed to store the tailings generated from the ore processing. Tailings discharge into the TMF ceased in early 2016, and the capping works for the Main TMF and the Adjoining Cell were completed by February 2018. Construction of all surface water conveyance channels and ponds was also completed in early 2018 (Golder, 2020. Lisheen TMF Annual Review 2019). Currently surface water runoff from the decommissioned TMF is treated in a constructed wetland. After treatment, the water is directed to an attenuation pond before being discharged into the Cooleeny Stream.

Other surface water course identified within a 2km radius of the site include:

- The Rossestown River (River Waterbody Code: IE_SE_16R010150) located approximately 1.79km northwest of the site at its closest point. The Rossestown River flows southwest before discharging the River Suir approximately 8.72km southwest of the site.
- The Derryfadda Stream (River Waterbody Code: IE_SE_16D020070; WFD Naem: Drish_030) located approximately 1.28km northeast of the site at its closest point. The Derryfadda Stream flows south before discharging the Drish 16 River approximately 3.20km southeast of the site.

The surface water features mapped by the EPA (EPA, 2024) within a 2km radius of the site are presented in **Figure 10-7**.

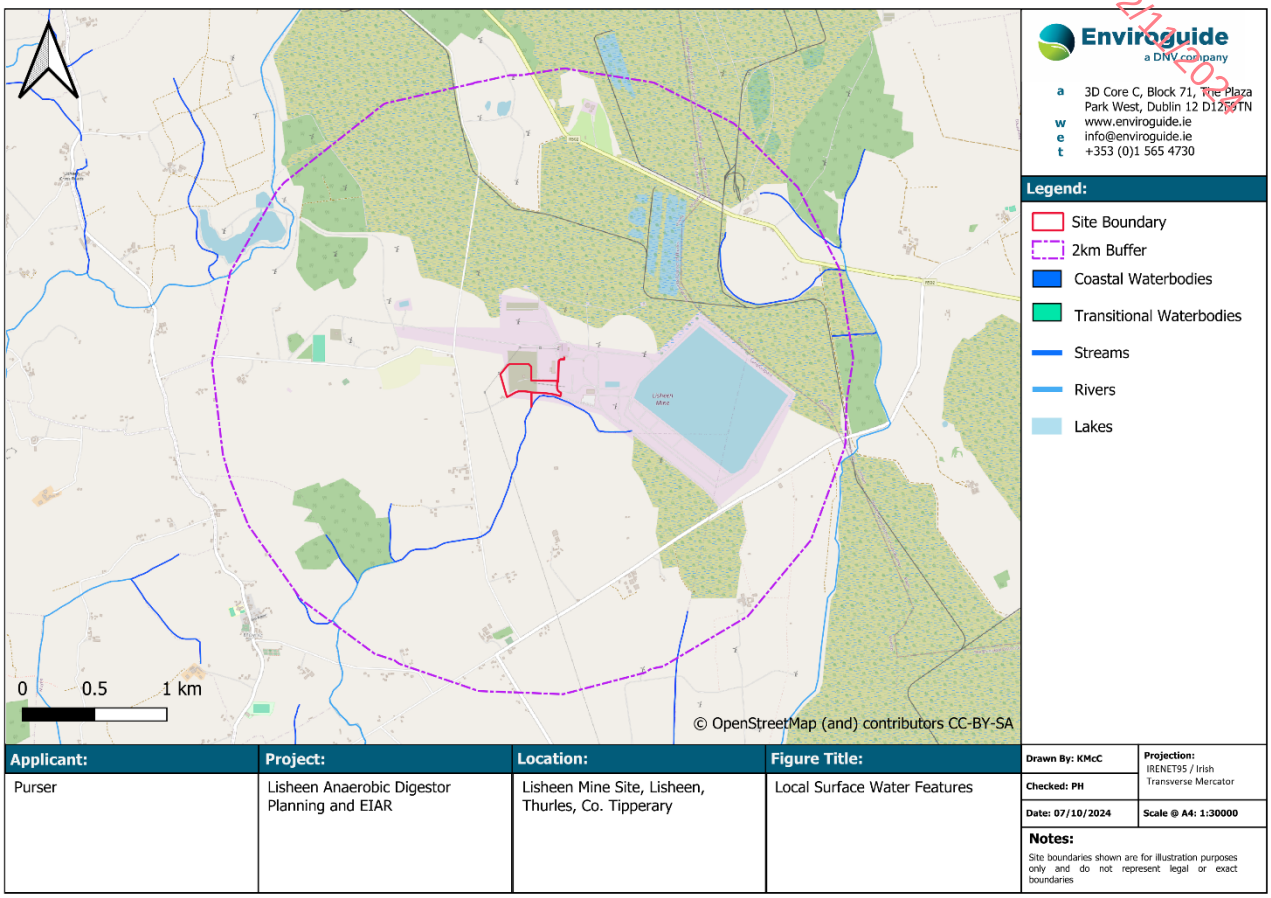


Figure 10-7. Local Surface Water Features

10.4.8.2 Existing Surface Water Drainage Infrastructure

According to the Donnachadh O'Brien & Associates (DOBA) Engineering Infrastructure Report (DOBA 2024a), there is no formal public surface water network at or in near proximity to the site. Currently, the existing lands are drained via infiltration into the underlying aquifer and by overland flow discharging at unrestricted flow rates into the Cooleeny Stream, located approximately 0.02 km south of the site.

10.4.8.3 Existing Foul Drainage

As documented in the Engineering Infrastructure Report (DOBA 2024a), there is no existing wastewater infrastructure at or in near proximity to the site.

10.4.8.4 Flood Risk

A site-specific flood risk assessment (SSFRA) (DOBA, 2024b) was conducted for the site and Proposed Development in accordance with the Department of the Environment, Heritage and Local Government (DoEHLG) guidelines, specifically "The Planning System and Flood Risk Management Guidelines for Planning Authorities" (DoEHLG, 2009). This assessment involved a thorough flood risk identification process to determine if there were any potential flooding or surface water management issues that might affect the site or the Proposed Development. The results of the flood risk identification indicated that there is no significant flood risk to the site. Consequently, the Proposed Development is deemed appropriate for the site, which is classified as Flood Zone C, indicating a low probability of flooding.

10.4.9 Water Supply and Drinking Water Source Protection

A search of the GSI groundwater well database (GSI, 2024) was conducted to identify registered wells and groundwater sources in the surrounding area. There are 78No. groundwater sources recorded at the site or within a 2km radius of the site (refer to **Table 10-9** and **Figure 10-8**).

GSI Name	Type	Drill Date	Depth (mbGL)	Townland	Source Use	Yield Class	GSI Name
2015NEW103	Dug well	10/12/1971	2.9	222730	167680	Agri use only	Unknown
2015NEW219	Borehole	01/05/1985	50.3	223170	164920	Agri & domestic use	Poor
2015NEW249	Borehole	01/06/1992	210	219480	166360	Unknown	Excellent
2015NEW250	Borehole	01/06/1992	201	219600	166780	Unknown	Excellent
2015NEW251	Borehole	01/04/1992	161.5	219270	166180	Unknown	Poor
2015NEW252	Borehole	01/04/1992	185	219250	166190	Unknown	Poor
2015NEW253	Borehole	01/04/1992	210	219550	166500	Unknown	Good
2015NEW254	Borehole	01/02/1992	50	220720	167150	Unknown	Good
2015NEW255	Borehole	01/02/1993	98.5	220720	167180	Unknown	Good
2015NEW256	Borehole	01/03/1993	210	219430	166330	Unknown	Excellent
2015NEW257	Borehole	01/02/1993	192	219440	166340	Unknown	Excellent
2015NEW258	Borehole	01/02/1993	75	219390	166630	Unknown	Excellent
2015NEW259	Borehole	01/02/1993	42	219390	166630	Unknown	Excellent
2015NEW301	Borehole	15/06/1905	13.8	222360	165510	Unknown	Unknown
2015NEW302	Borehole	17/02/1993	16.8	222360	165980	Unknown	Unknown
2015NEW303	Borehole	18/02/1993	10	222420	166560	Unknown	Unknown
2015NEW304	Borehole	23/02/1993	5.9	222700	165760	Unknown	Unknown
2015NEW305	Borehole	24/02/1993	19.6	222750	166170	Unknown	Unknown

GSI Name	Type	Drill Date	Depth (mbGL)	Townland	Source Use	Yield Class	GSI Name
2015NEW306	Borehole	15/06/1905	32	222790	166590	Unknown	Unknown
2015NEW307	Borehole	02/03/1993	4.8	223070	166300	Unknown	Unknown
2015NEW308	Borehole	19/03/1993	1.8	221990	165830	Unknown	Unknown
2015NEW309	Borehole	22/03/1993	19.1	222060	165710	Unknown	Unknown
2015NEW310	Borehole	15/06/1905	20.5	222160	166580	Unknown	Unknown
2015NEW311	Borehole	07/04/1993	10.7	222000	166430	Unknown	Unknown
2015NEW312	Borehole	09/04/1993	1.6	221880	166250	Unknown	Unknown
2015NEW313	Borehole	08/04/1993	21.3	221880	166190	Unknown	Unknown
2015NEW314	Borehole	27/04/1993	21.5	222730	165960	Unknown	Unknown
2015NEW315	Borehole	27/04/1993	20.5	222770	166380	Unknown	Unknown
2015NEW316	Borehole	28/04/1993	20.2	222330	165740	Unknown	Unknown
2015NEW317	Borehole	30/04/1993	30.5	222390	166270	Unknown	Unknown
2015NEW318	Borehole	05/05/1993	51	222300	166620	Unknown	Unknown
2015NEW319	Borehole	07/05/1993	50.5	222580	166720	Unknown	Unknown
2015NEW320	Borehole	12/05/1993	59.6	222540	166700	Unknown	Unknown
2015NEW321	Borehole	14/05/1993	52.5	222490	166680	Unknown	Unknown
2015NEW322	Borehole	19/05/1993	51.4	222400	166640	Unknown	Unknown
2015NEW323	Borehole	20/05/1993	37.8	222350	166620	Unknown	Unknown
2015NEW324	Borehole	24/05/1993	52.9	222340	166530	Unknown	Unknown
2015NEW325	Borehole	26/05/1993	52.7	222260	166580	Unknown	Unknown
2015NEW326	Borehole	28/05/1993	54.2	222280	166680	Unknown	Unknown
2015NEW327	Borehole	01/06/1993	73.5	222100	165810	Unknown	Unknown
2015NEW328	Borehole	19/02/1993	106.3	222580	165780	Unknown	Unknown
2015NEW329	Borehole	25/02/1993	52	223060	166300	Unknown	Unknown
2015NEW330	Borehole	04/03/1993	77.2	222360	166720	Unknown	Unknown
2015NEW331	Borehole	07/11/1991	81.5	222390	166200	Unknown	Unknown
2015NEW332	Borehole	21/11/1995	1	222160	166560	Unknown	Unknown
2015NEW333	Borehole	22/11/1995	3.6	222320	166560	Unknown	Unknown
2015NEW334	Borehole	16/11/1995	6.6	222550	166430	Unknown	Unknown
2015NEW335	Borehole	22/11/1995	5.4	222670	166600	Unknown	Unknown
2015NEW336	Borehole	23/11/1995	6.4	222900	166450	Unknown	Unknown
2015NEW337	Borehole	14/11/1995	6.2	222750	166270	Unknown	Unknown

GSI Name	Type	Drill Date	Depth (mbGL)	Townland	Source Use	Yield Class	GSI Name
2015NEW338	Borehole	24/11/1995	4.2	222870	166170	Unknown	Unknown
2015NEW339	Borehole	13/11/1995	4.2	222740	166030	Unknown	Unknown
2015NEW340	Borehole	17/11/1995	5.9	222590	166160	Unknown	Unknown
2015NEW341	Borehole	20/11/1995	6.1	222470	166000	Unknown	Unknown
2015NEW342	Borehole	10/11/1995	5.5	222630	165880	Unknown	Unknown
2015NEW343	Borehole	21/11/1995	4.6	222310	166120	Unknown	Unknown
2015NEW344	Borehole	15/11/1995	5.8	222480	166800	Unknown	Unknown
2015NEW345	Borehole	17/11/1995	3.7	222390	166300	Unknown	Unknown
2015NEW346	Borehole	01/12/1995	10	222140	166130	Unknown	Unknown
2015NEW347	Borehole	30/11/1995	58	222210	166430	Agri & domestic use	Unknown
2015NEW348	Borehole	22/11/1995	48.5	222770	166600	Unknown	Unknown
2015NEW349	Borehole	27/11/1995	79.5	222630	166030	Unknown	Unknown
2015NEW350	Borehole	17/11/1995	37.3	222870	166310	Unknown	Unknown
2015NEW351	Borehole	28/11/1995	28	222580	166920	Unknown	Unknown
2015NEW364	Borehole	23/09/1993	10.1	219240	167280	Unknown	Unknown
2015NEW365	Borehole	28/09/1993	7.6	219300	167340	Unknown	Unknown
2015NEW368	Borehole	19/04/1993	17.5	219430	167530	Unknown	Unknown
2015NEW370	Borehole	15/06/1905	Unknown	219380	167120	Unknown	Unknown
2015NEW371	Borehole	30/12/1899	Unknown	219680	167180	Unknown	Unknown
2015NEW372	Borehole	30/12/1899	Unknown	219440	167320	Unknown	Unknown
2015NEW373	Borehole	30/12/1899	Unknown	219440	167190	Unknown	Unknown
2015NEW374	Borehole	30/12/1899	Unknown	219550	167070	Unknown	Unknown
2015NEW375	Borehole	30/12/1899	Unknown	219430	167070	Unknown	Unknown
2015NEW376	Borehole	30/12/1899	Unknown	219430	166950	Unknown	Unknown
2015NEW377	Borehole	30/12/1899	Unknown	219130	166950	Unknown	Unknown
2015NEW379	Borehole	30/12/1899	Unknown	219310	167010	Unknown	Unknown
2015NEW380	Borehole	30/12/1899	Unknown	219220	167020	Unknown	Unknown
2015NEW381	Borehole	30/12/1899	Unknown	219310	167190	Unknown	Unknown

Table 10-9. GSI Springs and Wells within 2km of Site

There are no public groundwater supplies (PWS) identified by the GSI (GSI, 2024) at the site or within a 2km radius of the site.

As documented in the Engineering Infrastructure Report (DOBA, 2024a), there is a 75mm watermain located in the private access road along the southern boundary of the site. It is understood that this water supply is a private main managed by the Moyne Group Water Scheme (GWS) located approximately 3.94km south of the site (note that the Moyne GWS is mapped by the GSI (refer to **Figure 10-8**) as a PWS Source Protection Area). Other local area GWSs surrounding the site are the Baunmore GWS, the Fennor Inchorourke GWS and the Rahealty GWS located approximately 3.14km east, 5.94km southeast and 6.03km west of the site respectively (refer to **Figure 10-8**).

There are no surface water drinking water sources, under Article 7 of the Water Framework Directive, identified by the EPA (EPA, 2024) at the Site or within a 2km radius of the site.

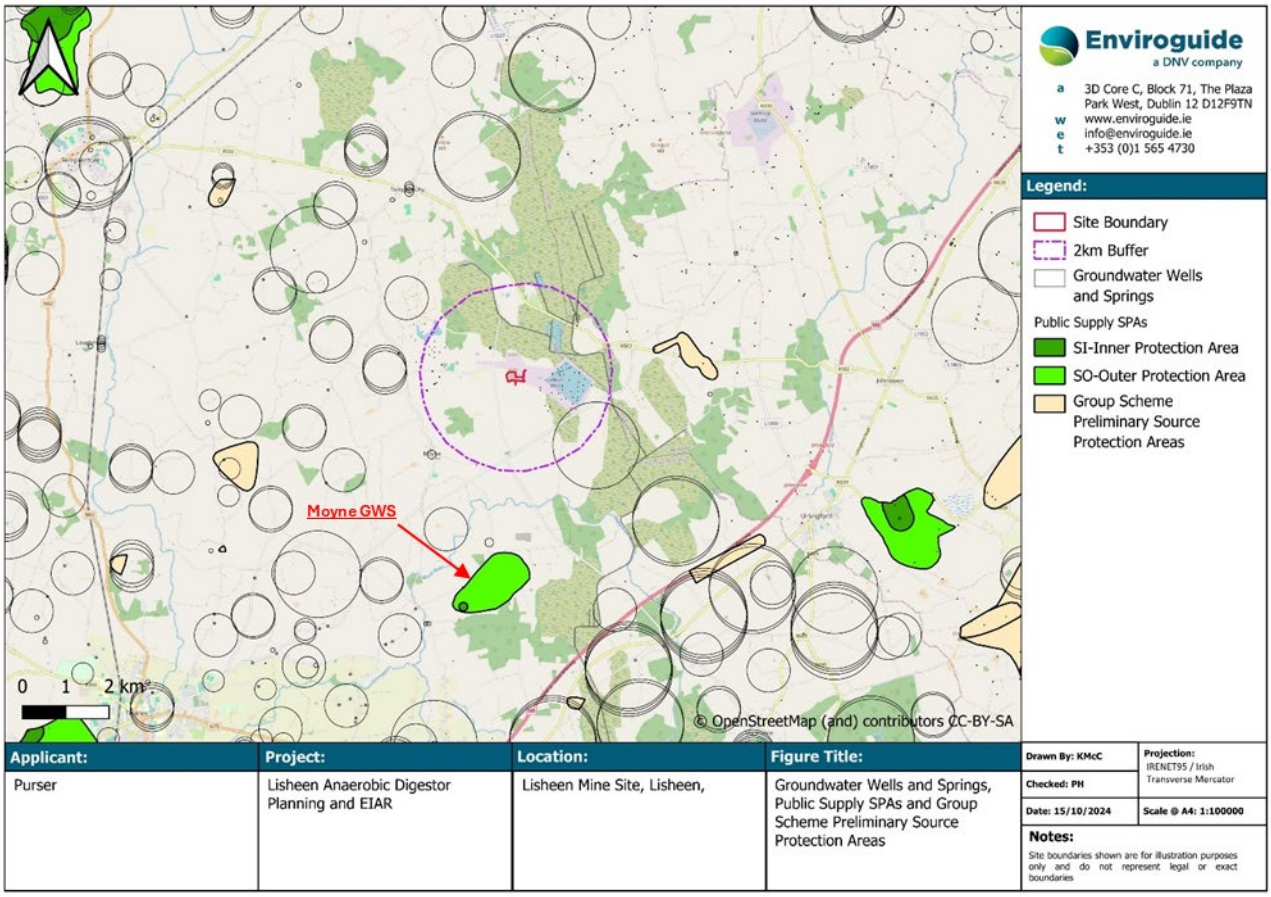


Figure 10-8. Groundwater Wells, Springs and Public Supply SPA's

10.4.10 Water Quality Data

10.4.10.1 Published Regional Surface Water Quality

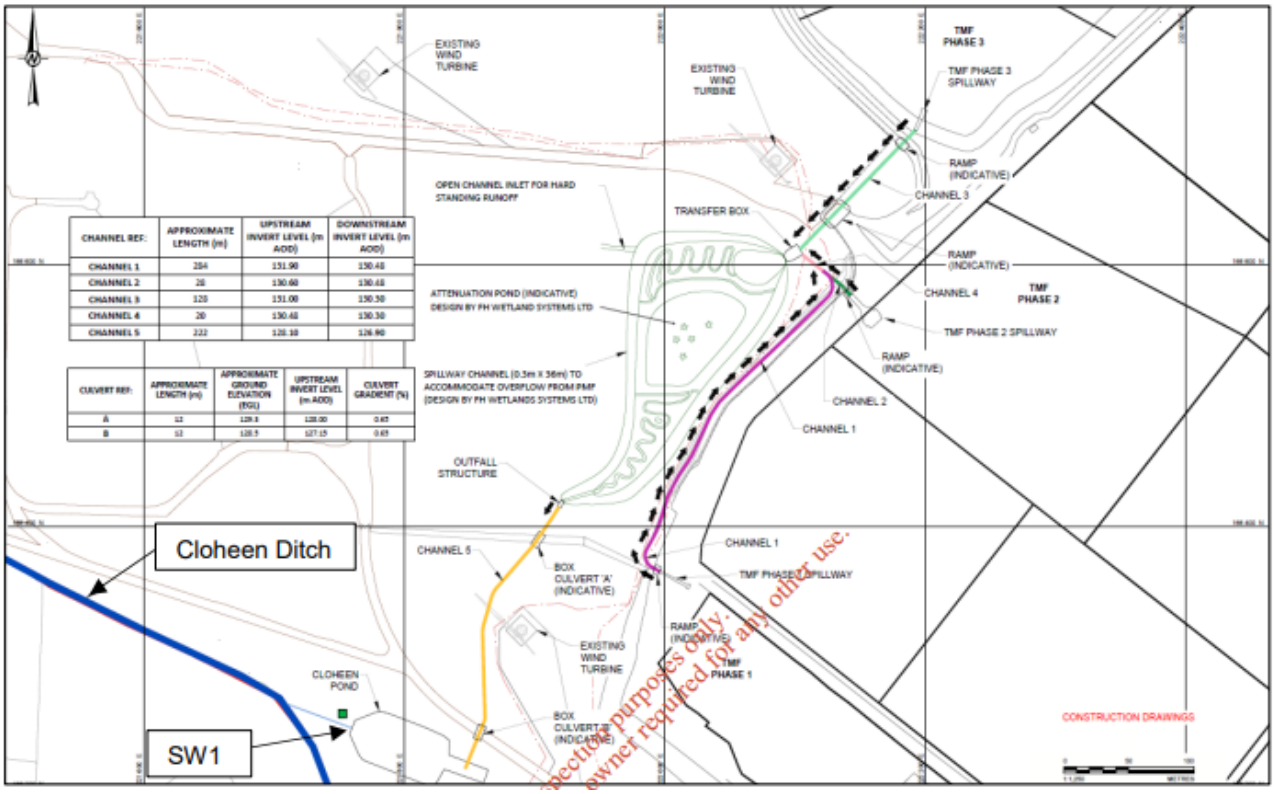
The EPA surface water quality monitoring database (EPA, 2024) was consulted. A summary of the most recent published EPA water quality monitoring data (EPA, 2024) for waterbodies hydraulically connected and up to ~20km downstream of the site is presented in **Table 10-10**.

WFD Waterbody Name	EPA WFD Parameter Quality & Trend Analysis				
	Parameter	Period	Indicative Quality	Trend	Baseline Conc. (2017)
DRISH_040	Ammonia-Total (as N)	Annual	High	Downwards	0.036mg/l
	Dissolved Inorganic Nitrogen (as N)	Annual	Moderate	Downwards	2.653mg/l
	ortho-Phosphate (as P)-unspecified	Annual	High	Downwards	0.010mg/l
DRISH_050 (Br South of Athlummon)	Ammonia-Total (as N)	Annual	High	Downwards	0.029mg/l
	Dissolved Inorganic Nitrogen (as N)	Annual	Moderate	Downwards	2.769mg/l
	ortho-Phosphate (as P)-unspecified	Annual	High	Downwards	0.020mg/l
DRISH_60 (Br u/s Suir R confl)	Ammonia-Total (as N)	Annual	High	Downwards	0.019mg/l
	Dissolved Inorganic Nitrogen (as N)	Annual	Moderate	Upwards	3.193mg/l
	ortho-Phosphate (as P)-unspecified	Annual	High	Downwards	0.020mg/l
SUIR_70 (Cabragh Br)	Ammonia-Total (as N)	Annual	Good	Upwards	0.042mg/l
	Dissolved Inorganic Nitrogen (as N)	Annual	Moderate	Upwards	2.373mg/l
	ortho-Phosphate (as P)-unspecified	Annual	Good	Upwards	0.035mg/l
ROSSESTOWN_020*	Ammonia-Total (as N)	Annual	Moderate	Downwards	0.076mg/l
	Dissolved Inorganic Nitrogen (as N)	Annual	Moderate	Upwards	2.327mg/l
	ortho-Phosphate (as P)-unspecified	Annual	High	Upwards	0.013mg/l
ROSSESTOWN_030*	Ammonia-Total (as N)	Annual	High	Downwards	0.039mg/l
	Dissolved Inorganic Nitrogen (as N)	Annual	Moderate	Upwards	2.337mg/l
	ortho-Phosphate (as P)-unspecified	Annual	High	Upwards	0.019mg/l
*Waterbodies are not directly downstream of connected surface waterbodies but potentially connected though underlying aquifer.					

Table 10-10. Surface Water Quality

10.4.10.2 Lisheen Mine Surface Water Quality

As documented in the Piteau Associates UK Ltd. report (Piteau Associates UK Ltd., 2019), during the operational period, Lisheen had four licensed surface water discharge points: two to the Drish (PWE1 pipeline and SW1 Cloheen Pond) and two to the Rossestown (PWE2 pipeline and SW2 Carrick Hill wetland). The discharges from PWE1, PWE2, and SW2 have ceased. Currently, the SW1 discharge from the Cloheen Pond is the only active discharge point from the site. It receives runoff from the TMF and locally to the pond, as well as a small amount of treated wastewater via the storm water attenuation basin. Surface water from the Cloheen Pond ultimately discharges to the Cooleeny Stream, approximately 0.61 km east/southeast of the site. The location of discharge point SW1 is presented in **Figure 10-9**.



CHANNEL REF:	APPROXIMATE LENGTH (m)	UPSTREAM INVERT LEVEL (m AOD)	DOWNSTREAM INVERT LEVEL (m AOD)
CHANNEL 1	284	131.90	130.48
CHANNEL 2	28	130.60	130.48
CHANNEL 3	120	131.00	130.30
CHANNEL 4	20	130.48	130.30
CHANNEL 5	222	128.10	126.90

CULVERT REF:	APPROXIMATE LENGTH (m)	APPROXIMATE GROUND ELEVATION (EGL)	UPSTREAM INVERT LEVEL (m AOD)	CULVERT GRADIENT (%)
A	12	129.3	128.00	0.65
B	12	128.5	127.15	0.65

Figure 10-9. Discharge Location SW1 (Piteau Associates UK Ltd., 2019)

Post closure monitoring undertaken by Piteau Associates UK Ltd. (Piteau Associates UK Ltd., 2019) indicated that the SW1 discharge (Cloheen pond) was generally compliant with the Integrated Pollution Control (IPC) Emission Limit Values (ELVs) for the Lisheen Mine, with the exception of nickel, zinc, and lead. Elevated concentrations of sulphate and ammonia were also reported in late 2017 (and ammonia in early 2018); however, these levels reduced following the completion of the TMF decommissioning works. It is noted that the post-closure concentrations of nickel, zinc, and lead were higher compared to baseline monitoring data collected prior to the commencement of mining activities, suggesting residual contamination from mining activities (Piteau Associates UK Ltd., 2019). However, in comparison to the operational phase, the report also highlights that the surface water

quality in the Cooleeny Stream showed improvements post-mining, with reduced concentrations of contaminants previously associated with mining activities.

Based on the results of the post-closure monitoring, water quality in the Drish River, both upstream (Castletown) and downstream (Boolabeha) of the Cooleeny Stream discharge, was generally below the IPC ELVs for the Lisheen Mine. Where exceedances were reported, they were associated with upstream water quality rather than the SW1/Cooleeny Stream discharge (Piteau Associates UK Ltd., 2019).

The 2023 AER for the site (EPA,2024) recorded continued non-compliances of COD, Zinc, Suspended Solids & Ammonia. The AER summarises that although there have been non-compliances at SW1 overall there is a general reduction in emission and improvement in compliance for 2023 compared to previous years. There is also a significant reduction in several parameter emissions compared to the 2019/2020 results. The two metals that have been previous sources of non-compliance, zinc and nickel, have both shown improvement in 2023. There were no non-compliances for nickel, and the compliance for zinc has much improved.

10.4.10.3 Published Regional Groundwater Quality

The EPA (EPA, 2024) groundwater monitoring data was reviewed and there are no groundwater quality monitoring stations within a 2km radius of the site or that are hydraulically connected to the site.

10.4.10.4 Lisheen Mine Groundwater Quality

As documented in the Piteau Associates UK Ltd. report (Piteau Associates UK Ltd., 2019), post closure groundwater monitoring was undertaken at compliance wells (CW1 (TMF) and CW2 (flooded workings)), wells close to the flooded workings (Fogarty, MW15, DW14, MW9, MW21 and LK1955), TMF (MW6, MW14, MW32, MW35 and MW42A) and regional (domestic) wells (J Maher, S Hennessy, M Moore, F Cleere, P Fogarty and P Healy). The post closure groundwater monitoring locations are presented in **Figure 10-10**.

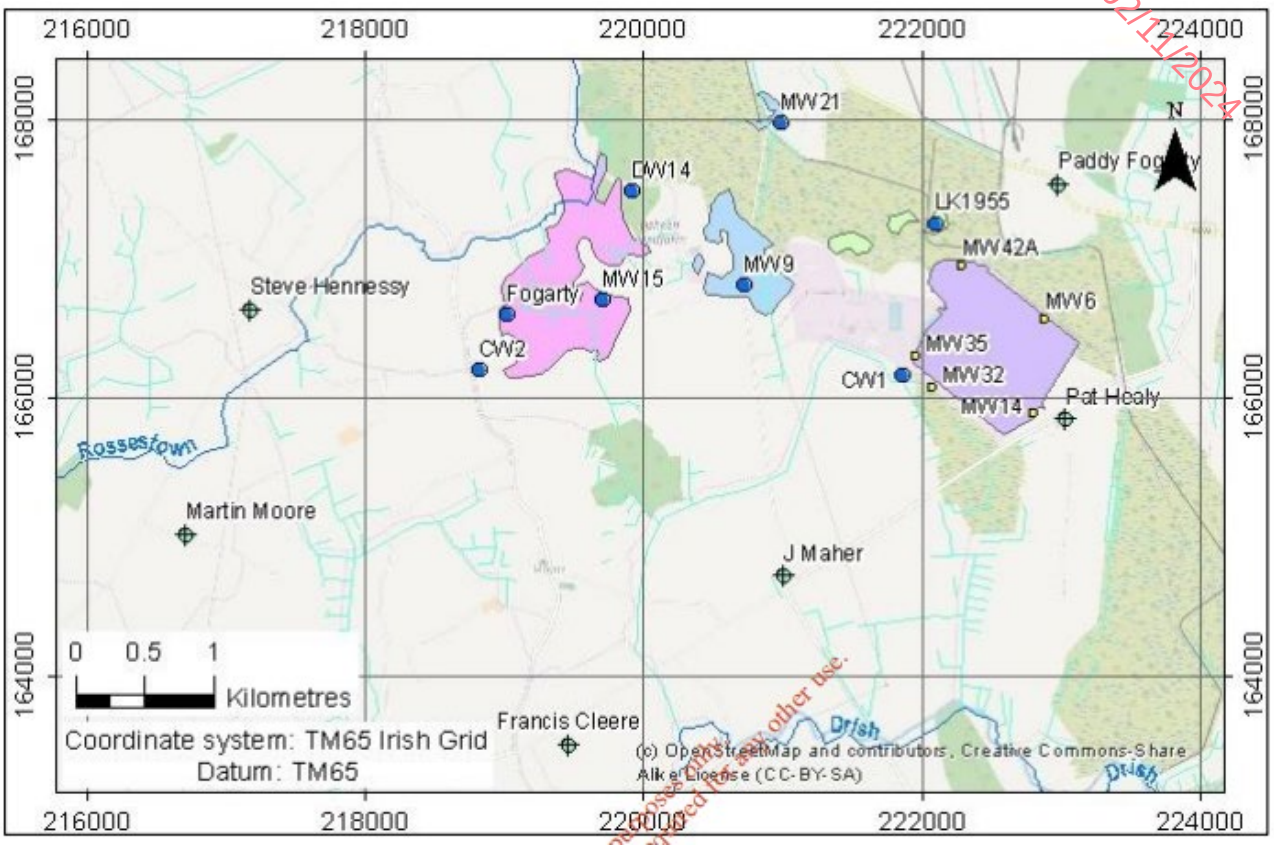


Figure 10-10. Post Closure Groundwater Monitoring Well Locations (Piteau Associates UK Ltd., 2019)

Post closure monitoring undertaken by Piteau Associates UK Ltd. (Piteau Associates UK Ltd., 2019) indicated that, with the exception of ammonia, water quality data from monitoring wells close to the mine workings and the downgradient compliance well (CW2) are generally compliant with the groundwater regulations and below the COPC general compliance values for the IPC Licence for the Lisheen Mine. It is noted that baseline concentrations of ammonia were elevated pre-mining due to the extensive cover of bog (Piteau Associates UK Ltd., 2019).

The results of post closure monitoring for regional (domestic) wells are also reported to be generally compliant with groundwater regulations and COPC general compliance values for the IPC Licence for the Lisheen Mine with the exception of ammonia and nitrate. It is reported that these locations had elevated values even during mining when the workings formed a groundwater sink (so no contamination could migrate into the regional groundwater system). As mentioned above, baseline concentrations of ammonia were elevated pre-mining due to the extensive cover of bog and it is reported that nitrate concentrations are attributed to agriculture in the surrounding lands (Piteau Associates UK Ltd., 2019). Elevated concentrations of arsenic, nickel (associated with high iron) and mercury were report at monitoring locations for P Healy and J Maher. Again, baseline concentrations for these parameters were elevated prior to the mine closure and therefore reported to be due to naturally occurring sources close to the two wells (Piteau Associates UK Ltd., 2019).

As documented in the Lisheen TMF Annual Review 2019 report (Golder, 2020), the Lisheen Mine TMF monitoring programme comprised the collection of water quality samples from piezometers (P1 to P9) and monitoring wells (MW1 to MW4, MW6, MW7, MW9, MW10, MW12, MW14, MW16, MW23, MW30, MW33, MW35, MW37, MW40A, MW41A, and MW42A) installed around the perimeter of the TMF facility (refer to **Figure 10-10**). Potential seepage through the TMF was monitored using the reported concentrations of sulphate in groundwater. Additional samples were also collected from spillways (1 to 3) and final discharge (SW1) flows to which groundwater was pumped during the ongoing seepage remediation works undertaken in 2019 (refer to **Figure 10-11**).

Elevated sulphate levels were observed in several piezometer and groundwater monitoring locations, indicating ongoing leaching from the tailings material. However, there was a general trend of decreasing sulphate concentrations over time, which is considered to be due to the throttling by tailings of known historic seepage locations (Golder, 2020). Furthermore, elevated concentrations of sulphate in Spillway 1, which have been elevated since the discharge commenced in 2017, were reported to be showing a downward trend year on year. Despite the ongoing pumping from the seepage remediation works, it was reported that only four exceedances of the IPC ELVs were recorded during 2019 (Golder, 2020). Overall, a decreasing trend was observed in the water quality at Spillway 1 in 2019. The water quality at Spillway 2 and Spillway 3 also showed a decreasing trend in 2019, with an average sulphate concentration of approximately 100 mg/l below the IPC ELV of 400 mg/l.

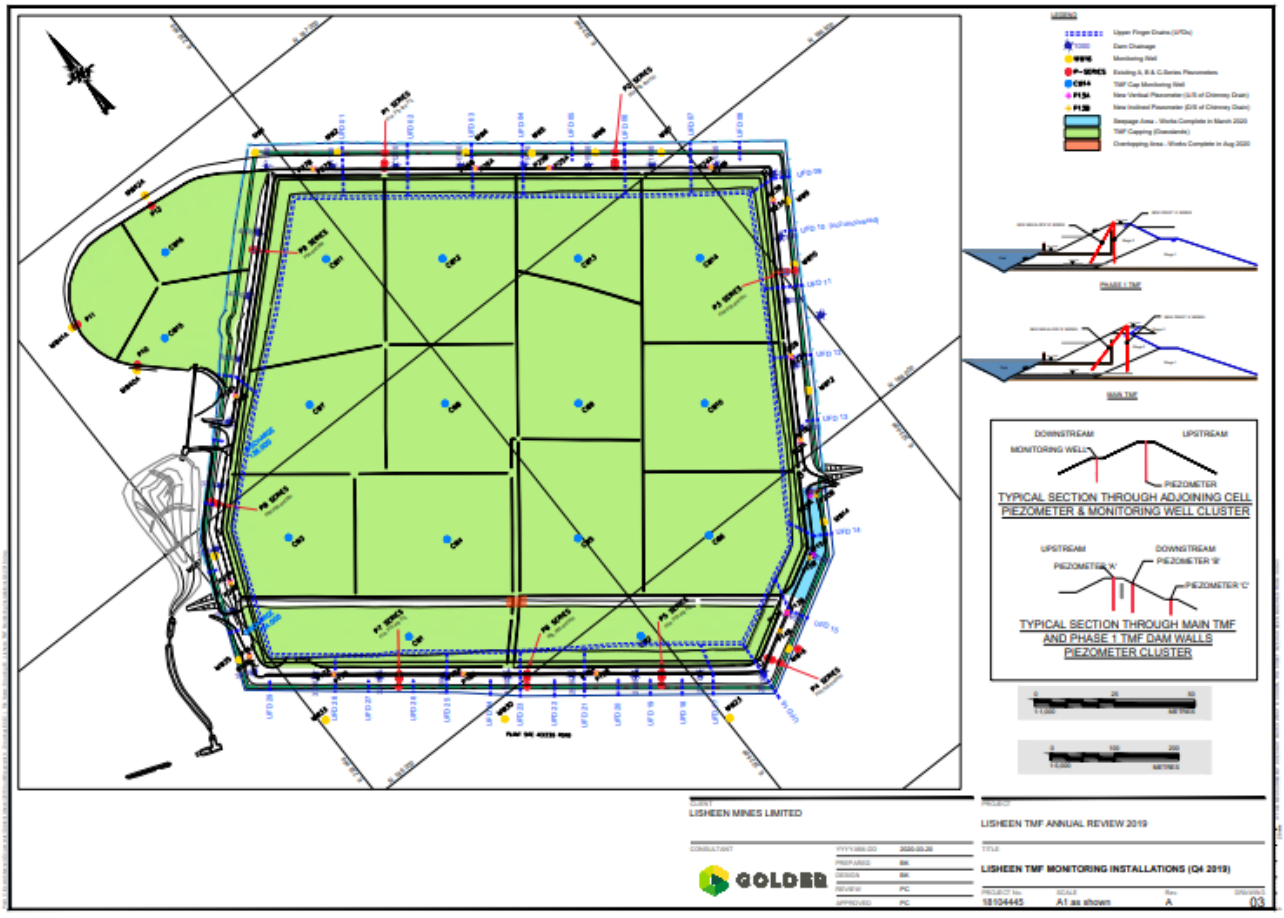


Figure 10-11. Post Closure Groundwater Monitoring Well Locations (Golder, 2020)

As set out in the 2023 Annual Environmental Report (AER) (EPA, 2024), it is considered that there is no significant groundwater pollution at the Lisheen Mine site and that the ongoing effects of the TMF are minimal, with negligible effect on groundwater quality. Ongoing monitoring identified elevated levels of nickel at monitoring well CW1. An assessment was undertaken in 2020 to determine the cause of the elevated nickel levels. This assessment concluded that the elevated levels were likely due to a combination of analytical error and/or seepage from the TMF. The available evidence suggests that nickel is naturally present in the groundwater due to local mineralisation. Data from 2023 shows that nickel levels are improving at monitoring location CW1.

10.4.11 Water Framework Directive

The WFD status for river, lake, groundwater, transitional and/or coastal water bodies that have a potential hydraulic connection to the subject site as recorded by the EPA (EPA, 2024) in accordance with European Communities (Water Policy) Regulations 2003 (SI no. 722/2003) are provided in **Table 10-11** and shown in **Figure 10-12**.

Waterbody Name	Waterbody EU Code	Location from Site	Distance Downstream of the Site (km)	WFD Status (2016-2021)	WFD Risk	Hydraulic Connection to the Site
River Waterbodies						
Drish_040	IE_SE_16D020100	Within site/ Southwest	0.00	Poor	At Risk	Yes, downstream of the Site
Drish_050	IE_SE_16D020200	Southwest	6.73	Poor	At Risk	
Drish_060	IE_SE_16D030400	Southwest	10.4	Moderate	At Risk	
Suir_070	IE_SE_16S020900	Southwest	15.57	Moderate	At Risk	Downstream of the site though spatially remote with significant dilution potential.
Suir_080	IE_SE_16S021100	Southwest	20.19	Moderate	At Risk	
Suir_090	IE_SE_16S021300	Southwest	22.68	Moderate	At Risk	
Suir_100	IE_SE_16S021400	Southwest	34.35	Moderate	At Risk	
Suir_110	IE_SE_16S021500	Southwest	37.49	Good	Not at Risk	
Suir_120	IE_SE_16S021600	Southwest	45.52	Moderate	At Risk	
Suir_130	IE_SE_16S021700	Southwest	50.58	Moderate	At Risk	
Suir_140	IE_SE_16S021930	Southwest	63.41	Good	Review	
Suir_150	IE_SE_16S022000	Southwest	69.01	Good	Review	

Suir_160	IE_SE_16S022200	Southwest	74.49	Good	Not at Risk	
Suir_170	IE_SE_16S022300	Southwest	81.59	High	Not at Risk	
Suir_180	IE_SE_16S022400	Southwest	90.91	Good	Not at Risk	
Suir_190	IE_SE_16S022600	Southwest	94.75	Good	Not at Risk	
Suir_200	IE_SE_16S022700	South	101.67	Moderate	At Risk	
Suir_210	IE_SE_16S022750	South	106.86	Moderate	At Risk	
Suir_220	IE_SE_16S022850	Southeast	113.7	Moderate	At Risk	
Rossestown _020	IE_SE_16R010150	West	3.60	Poor	At Risk	Potential connection through underlying karstic ground waterbody
Rossestown _030	IE_SE_16R010300	West	4.40	Poor	At Risk	
Transitional Waterbodies						
Upper Suir Estuary	IE_SE_100_0600	Southeast	116.42	Bad	At Risk	Downstream of the site though spatially remote with significant dilution potential.
Middle Suir Estuary	IE_SE_100_0550	Southeast	139.02	Moderate	At Risk	
Lower Suir Estuary	IE_SE_100_0500	Southeast	151.54	Moderate	At Risk	
Barrow Suir Nore Estuary	IE_SE_100_0100	Southeast	158.77	Moderate	At Risk	
Coastal Waterbodies						
Waterford Harbour	IE_SE_100_0000	Southeast	170.91	Moderate	At Risk	Downstream of the site though spatially remote with significant dilution potential.
Eastern Celtic Sea	IE_SE_050_0000	Southeast	177.35	High	Not at Risk	
Groundwater Bodies						
Thurles GWB	IE_SE_G_158	Underlying	0.0	Good	Not at Risk	Yes, underlying the site

Table 10-11. Water Framework Directive Status

The Water Action Plan 2024 (River Basin Management Plan 3rd Cyle) Programme of Measures outlines comprehensive measures to protect and improve water quality across various sectors. Measures are proposed for key pressures including agriculture, hydromorphology, forestry, urban runoff, wastewater, peatlands, industry,

mines & quarries, drinking water source protection, invasive alien species, hazardous chemicals in the aquatic environment, aquaculture, land-use planning and protecting and restoring estuarine and coastal water.

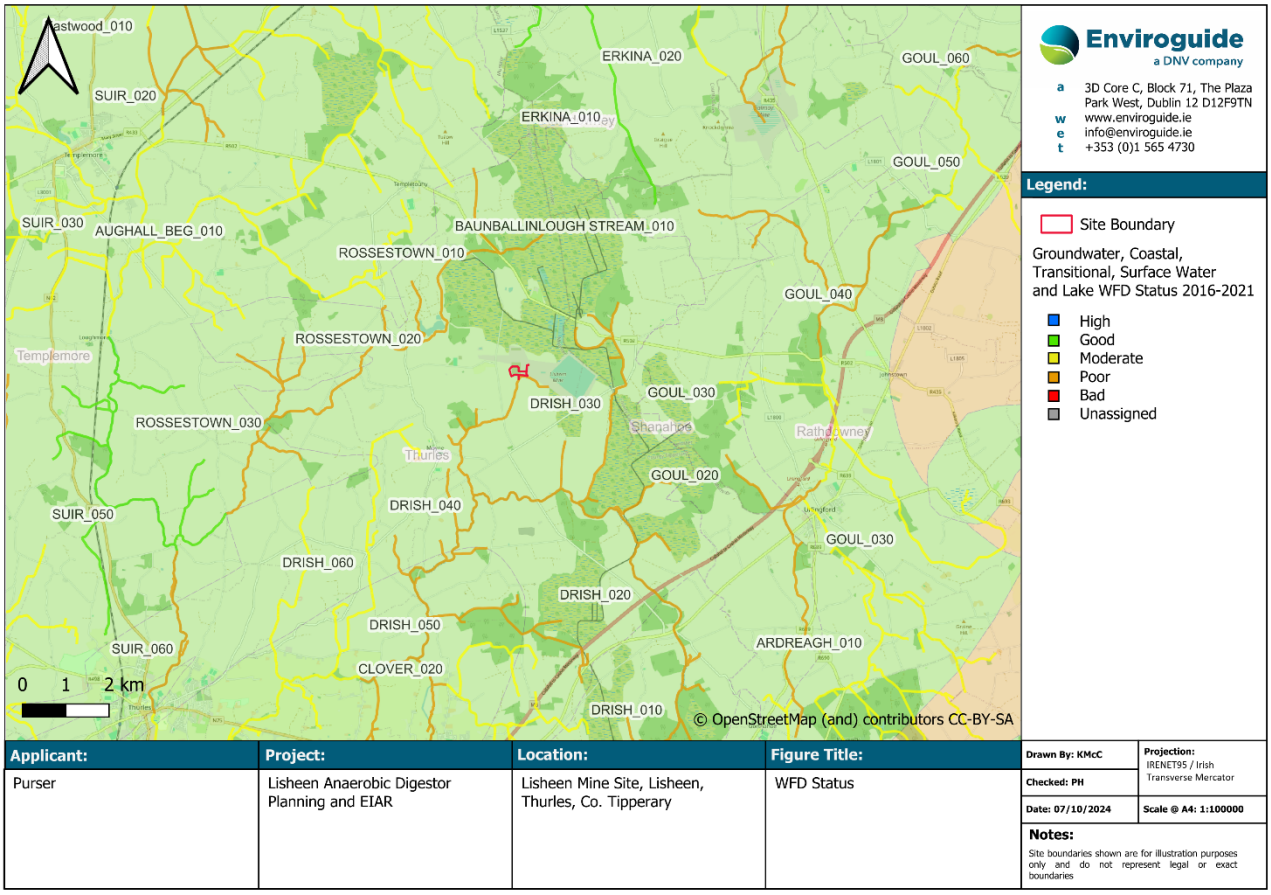


Figure 10-12. Water Framework Directive Status 2016-2021

10.4.11.1 Nature Conservation

The Habitats Directive (92/43/EEC) seeks to conserve natural habitats and wild fauna and flora by the designation of Special Areas of Conservation (SACs) and the Birds Directive (2009/147/EC) seeks to protect birds of special importance by the designation of Special Protection Areas (SPAs). SACs and SPAs are collectively known as Natura 2000 or European sites (referred to hereafter as Natura 2000 site).

National Heritage Areas (NHAs) are designations under the Wildlife Acts to protect habitats, species, or geology of national importance. The boundaries of many of the NHAs in Ireland overlap with SAC and/or SPA Sites. Although many NHA designations are not yet fully in force under this legislation (referred to as 'proposed NHAs' or pNHAs), they are offered protection in the meantime under planning policy which normally requires that planning authorities give recognition to their ecological value.

There are 3No. Natura 2000 sites that are identified with a potential hydraulic connection to the site and Proposed Development. There are also 14No. pNHAs identified with a potential hydraulic connection to the site and Proposed Development. The Natura 2000 sites and other protected and designated sites or areas with a potential hydraulic connection to the site are summarised in **Table 10-12** and presented in **Figure 10-13**.

The Natura 2000 sites are assessed and described in further detail in **Chapter 8** of this volume

Designated Site	Site Code	Distance from Site (km)	Direction	Potential Risk
Special Area of Conservation (SAC)				
Lower River Suir SAC	002137	14.31	Southwest	Yes, downstream of the Site
River Barrow and River Nore SAC	002162	70.01	Southeast	
Hook Head SAC	000764	85.12	Southeast	
Proposed Natural Heritage Area (pNHA)				
Cabragh Wetlands	001934	14.88	Southwest	Yes, downstream of the Site
Ardmayle Pond	000945	27.56	Southwest	Yes, downstream of the Site.
Cahir Park Woodland	000947	45.56	Southwest	
River Suir Below Carrick-On-Suir	00645	49.37	Southeast	
Tibberaghny Marshes	000411	50.93	Southeast	
Fiddown Island	000402	52.95	Southeast	
Lower River Suir (Coolfinn, Portlaw)	000399	56.59	Southeast	
King's Channel	001702	68.75	Southeast	
Barrow River Estuary	000698	62.96	Southeast	
Ballyhack	000695	74.16	Southeast	

Designated Site	Site Code	Distance from Site (km)	Direction	Potential Risk
Waterford Harbour	000787	74.44	Southeast	
Duncannon Sandhills	001738	77.98	Southeast	
Dunmore East Cliffs	000664	81.11	Southeast	
Hook Head	000764	84.15	Southeast	
Note: '*' = Distance is measured as closest point to the Site				

Table 10-12. Designated and Protected Sites

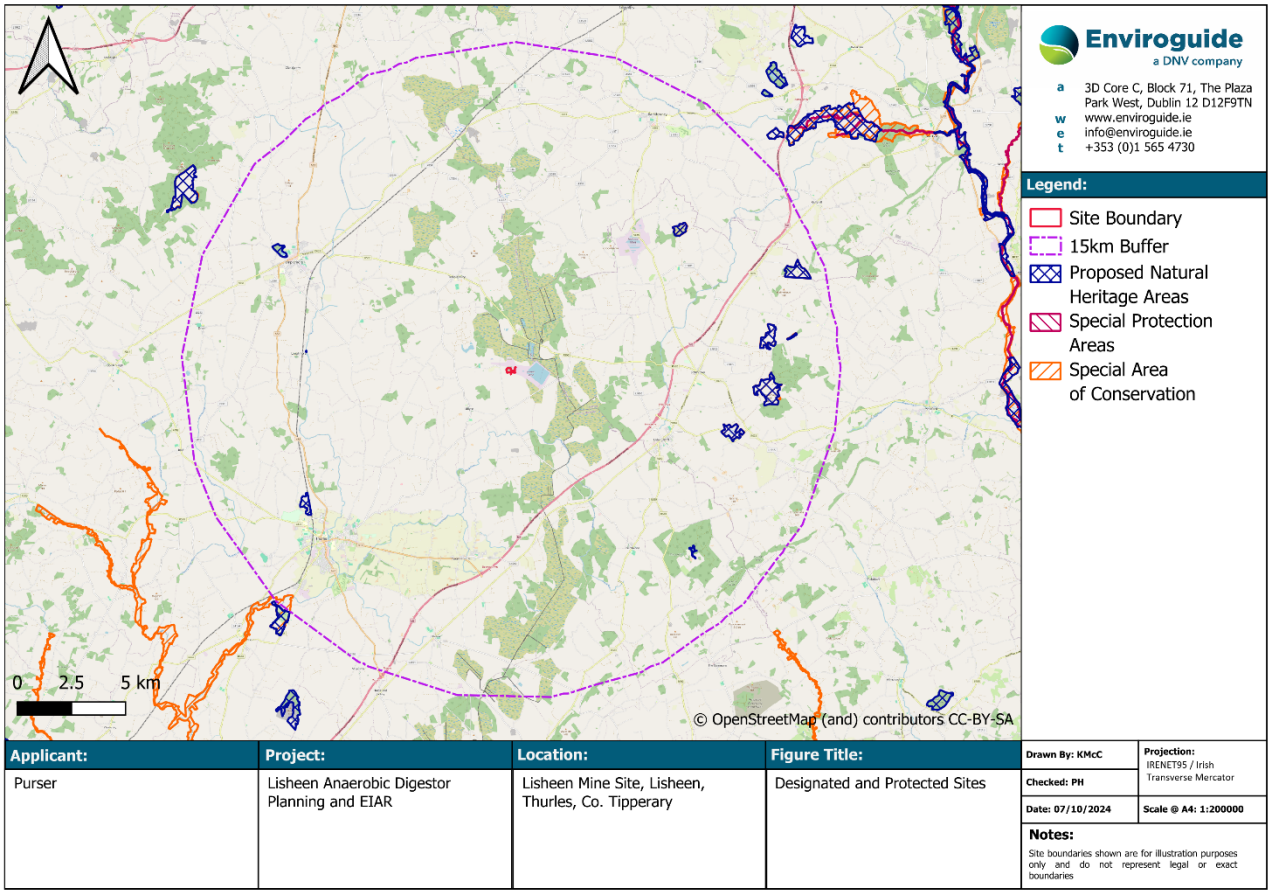


Figure 10-3. Designated and Protected Nature Conservation Sites

10.4.11.2 Drinking Water

The river drinking water protected areas (DWPA) are represented by the full extent of the WFD river waterbodies from which there is a known qualifying abstraction of water for human consumption as defined under Article 7 of the WFD.

There are no surface water drinking water sources, under Article 7 of the Water Framework Directive, identified by the EPA (EPA, 2024) within a 2km radius. There are 3no. surface water drinking water source waterbodies downstream of the site, these are listed in **Table 10-13** below.

Waterbody	Distance Downstream from Site (km)
Suir_140	53.0
Suir_190	83.0
Suir_210	94.0

Table 10-13. Drinking Water Protected Areas Hydraulicly Linked to Site

10.4.11.3 Shellfish Areas

Although the Shellfish Waters Directive (SWD) has been repealed, areas used for the production of shellfish that were designated under the SWD, are protected under the WFD as 'areas designated for the protection of economically significant aquatic species'.

The requirement from a WFD perspective is to ensure that water quality does not effect on the quality of shellfish produced for human consumption. In Ireland, 64 areas have been designated as shellfish waters (S.I. No. 268 of 2006, S.I. No. 55 of 2009, S.I. 464 of 2009).

The closest designated Shellfish Area location is at Waterford Harbour approximately 140km downstream of the site.

10.4.11.4 Nutrient Sensitive Areas

EU member states are required under the Urban Wastewater Treatment Directive (91/271/EEC) to identify nutrient-sensitive areas. These have been defined as "natural freshwater lakes, other freshwater bodies, estuaries and coastal waters which are found to be eutrophic or which in the near future may become eutrophic if protective action is not taken".

Two sections of the River Suir downstream of the site are designated as nutrient sensitive. The designated sections of surface water are immediately downstream of water treatment agglomerations including Thurles and Clonmel.

Bathing Waters

Bathing waters are designated under Regulation 5 of Directive 2006/7/EC. Designated Bathing Waters exist under S.I. No. 79/2008 and S.I. No. 351/2011 Bathing Water Quality (Amendment) Regulations 2011. EC Bathing Water Profiles - Best Practice and Guidance 2009.

The closest designated bathing water location is Duncannon beach in Waterford Harbour located approximately 150km downstream of the site.

10.4.12 Importance of Receiving Environment

The receiving water bodies have been assigned a WFD Status of 'good' for groundwater, and 'poor' for the closest surface water bodies hydraulically connected to site of the Proposed Development (EPA, 2024). The bedrock aquifer beneath the site is a Regionally Important Aquifer - Karstified (diffuse) (Rkd). The site is not mapped within a groundwater SPA or in the vicinity of a significant water supply source.

Overall, taking account of the receiving hydrological environment, in accordance with the criteria set out in **Table 10-1**, the site is considered to be of 'high' importance.

10.5 Characteristics of the Proposed Development

The Proposed Development will comprise the construction of a biomethane and bio-based fertiliser production facility, with an annual intake of up to 98,000 tonnes of feedstock per annum, at this site of c. 5.5 hectares at lands located at the former Lisheen Mine Site, Killoran, Moyne, Thurles, Co. Tipperary.

The Proposed Development will consist of the construction of an anaerobic digestion plant comprising: 4 No. primary digester tanks (each measuring c. 7.6 m in height); 3 No. secondary digester tanks (each measuring c. 14.5 m in height); 4 No. feed hoppers; 4 No. technical rooms (ranging in size from c. 35 sq m to c. 95 sq m GFA); 2 No. biogas conditioning units; process, storage and buffer tanks (comprising: 1 No. buffer digestate storage tank (c. 7.5 m in height), 1 No. suspension buffer tank (c. 8 m in height), 1 No. process area runoff storage tank (c. 4.5 m in height); 1 No. buffer digestate process tank (c. 4.5 m in height), 1 No. treated digestate liquids recycle storage tank (c. 4.5 m in height); 1 No. roofed liquids feed-mix tank (c. 3 m in height)); these components will be located within a containment bund constructed c. 3 m meters below ground level.

The Proposed Development will also consist of: feedstock storage (comprising 3 No. storage clamps (c. 1,050 sq m in area each) and 2 No. storage sheds (c. 500 sq m GFA each)); a biomethane upgrading plant (including natural gas compression unit); a biomethane loading facility (comprising a 4 No. loading bays with associated gates and safety features measuring c. 490 sq m in area); a biomass boiler with its associated pellet storage silo (c. 12.5 m in height);Combined Heat and Power (CHP) plant and associated heat exchanger; a single storey bio-based fertiliser processing and storage unit (c. 3,890 sq m GFA) (including digestate dewatering plant, fertiliser pasteurisation plant and bio-based fertiliser loading facilities); a single storey office building (c. 105 sq m GFA) (including offices, meeting room, control room, laboratory, welfare facilities, storeroom and a first-aid facility); bin storage; 9 No. car parking spaces (including 5 No. standard parking spaces, 2 No. electric vehicle (EV) spaces and 1 No. accessible car parking space); electric vehicle (EV) charging infrastructure; 10 No. bicycle parking spaces; vehicular, cyclist and pedestrian access / egress and associated circulation routes; 2 No. weighbridges; a vehicle steam wash area; fuel storage tank and associated bund; an emergency flare (c. 7.6 m in height); a process area runoff lagoon; an attenuation pond; an ESB sub-station; boundary treatments [including gates, piers and fencing]; site lighting; all hard and soft landscaping; provision of sustainable urban drainage systems (SUDS); and all other associated site excavation, infrastructural and site development works above and below ground, including changes in level and associated retaining features, and associated site servicing (water and electricity supply).

A full description of the Proposed Development is outlined in **Chapter 6** of this volume. The layout of the Proposed Development is presented in **Figure 10-14**.

The components of particular relevance with respect to hydrology and hydrogeology are discussed in **Section 10.5.1 and Section 10.5.2** below.

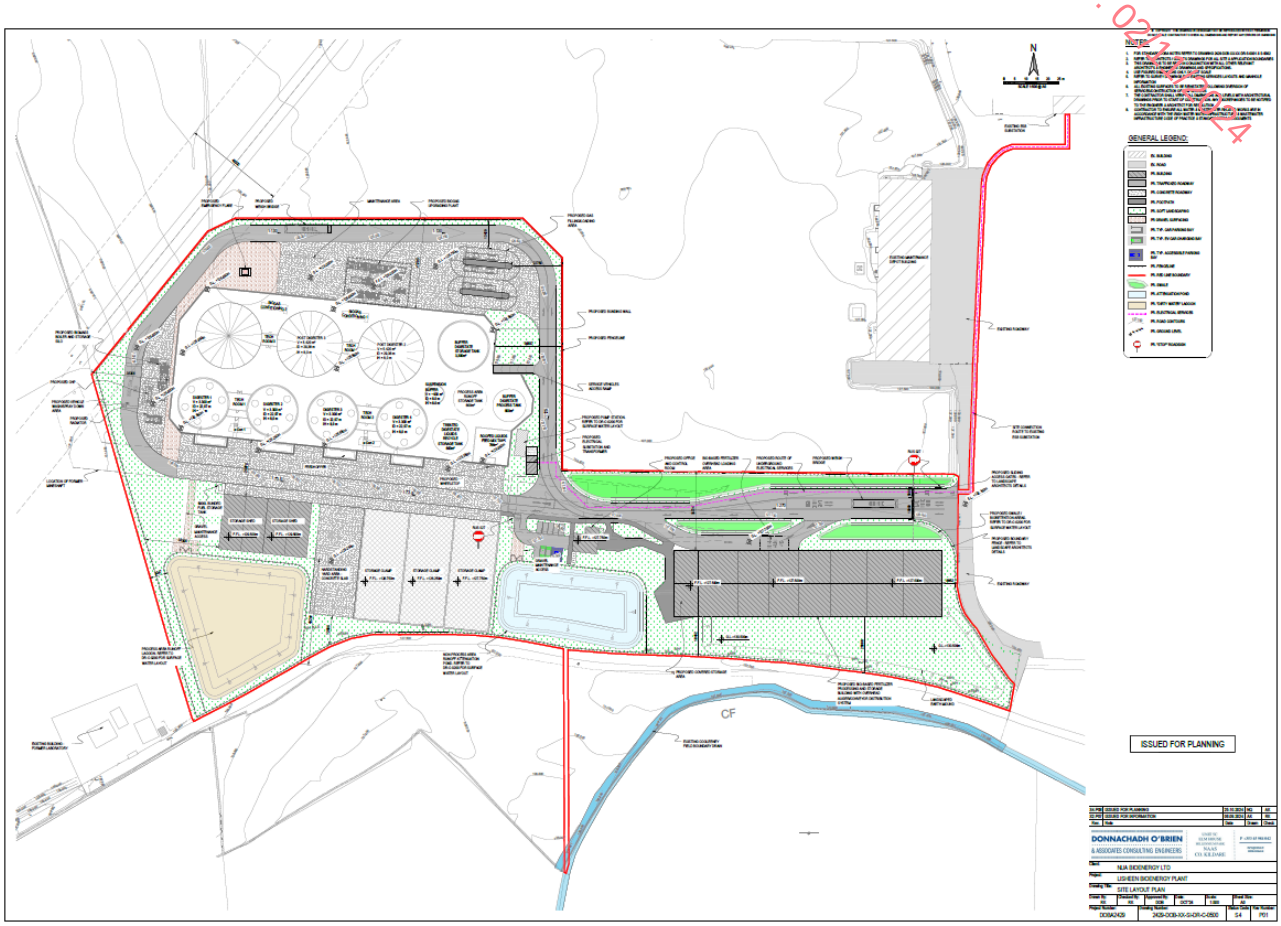


Figure 10-14. Proposed Development Site Layout

10.5.1 Construction Phase

The construction phase of the Proposed Development will include:

- The foundations for the main digestor yard area will be on traditional pad and strip foundations with no requirement for piling.
- The Proposed Development will involve the excavation of approximately 26,800 m^3 of soil and subsoil. Excavation depths will extend to 3.1 mbGL for the construction of the anaerobic digestion plant. Additionally, excavation depths will range between 1.2 mbGL and 4.0 mbGL for the construction of drainage systems, utilities, and roads.
- It is anticipated that there will be no requirement for the excavation of bedrock during the construction phase of the Proposed Development.
- It is intended to retain all excavated soil onsite and incorporate it into the landscape design for the Proposed Development. This will be subject to an assessment of its suitability for use, in accordance with engineering and environmental specifications that will be determined during the detailed design

phase. However, where required, surplus materials will require removal offsite in accordance with all statutory legislation.

- Temporary stockpiling of excavated material will be required pending re-use onsite or export offsite.
- The importation of 10,000 m^3 of selected structural stone / material will be required for placement under roads and building platforms.
- It is anticipated that localised groundwater dewatering during the construction of anaerobic digestion plant foundations and other infrastructure is anticipated to enable 'dry excavation' during excavation.
- Construction of new mains water connections to the Moyne GWS.
- Construction of new surface water drainage designed in accordance with the principles and objectives of Sustainable Drainage Systems (SuDS) and the requirements of Tipperary County Council.

10.5.2 Operational Phase

The Operational Phase of the Proposed Development will comprise an anaerobic digestion facility to produce renewable biomethane and bio-based fertiliser, with an annual intake of up to 98,000 tonnes of feedstock.

Feedstocks will be transported to the proposed development using HGVs, enclosed trailers, and sealed vacuum tankers. Only feedstocks that meet strict acceptance procedures and comply with EPA and DAFM licence conditions will be accepted. All suppliers must complete a Feedstock Acceptance Agreement (FAA) and notify the weighbridge operator 24 hours before delivery. Upon arrival, deliveries will be weighed and logged at the site entrance weighbridge. Haulier drivers will then proceed to the office to submit commercial documentation. Visual inspections will ensure conformity with the FAA. Once confirmed, delivery vehicles will be directed to the reception hall for further processing.

Anaerobic Digestion (AD) is a natural process where micro-organisms break down organic matter in an oxygen-free environment. This process produces biogas, which mainly consists of 55-70% methane (CH_4) and 30-45% carbon dioxide (CO_2), along with traces of other gases such as nitrogen (N_2), hydrogen (H_2), hydrogen sulphide (H_2S), ammonia (NH_3), and water vapour. Based on the feedstock composition and design capacity, the facility is projected to produce 1,140 Nm^3 of biomethane per hour.

The Proposed Development will have a total storage capacity of 36,360m^3, including 4 No. primary digesters with a capacity of 3,300m^3 each, 3 No. secondary digesters with a capacity of 5,420 each, 1 No. digestate storage tank with capacity of 3,700m^3 and 2 No. separated digestate liquid tanks with a capacity of 1,600m^3, 1 No. yard water tank with a capacity of 800m3 and 1 No. feed mix tank with a capacity of 768m^3. All separated liquid digestate produced on-site is recycled into the anaerobic digestion process. Separated digestate solids are pasteurised on-site in compliance with DAFM Animal By-products legislation and composted to produce bio-fertiliser.

Solid digestate fibre will be stored in a dedicated Digestate Storage Building, which is vented to an Odour Treatment System to manage and treat odours. Since land spreading is not allowed during the closed period, the storage building has sufficient capacity to store solid digestate for over 20 weeks. At full capacity, the Proposed Development will also produce digestate fibre for off-site transportation as bio-based fertiliser to local receivers.

The digestate produced will meet the quality and end-of-waste requirements of an agreed quality standard, such as Article 28 End of Waste, PAS110, or a standard agreed with the regulator. It will comply with DAFM transformation parameters and testing requirements as per CN 11: Approval and Operation of Biogas Plants Transforming Animal By-Products and Derived Products in Ireland (DAFM, 2014). Digestate liquid and fibre will be classified as bio-based fertilisers for use on agricultural lands, serving as direct replacements for chemical/mineral fertilisers. These digestates will primarily be returned to lands associated with feedstock supplies of crops and/or slurry, thereby promoting a local circular bioeconomy. Digestate receivers will manage the storage and application of bio-based fertilisers on their lands, subject to controls set out in S.I. No. 113 of the 2022 European Union (Good Agricultural Practice for Protection of Waters) Regulations 2022.

Methane, the combustible component of biogas, is classified as a P2 flammable gas under Regulation (EC) No. 1272/2008 on the classification, labelling, and packaging of substances and mixtures. According to the Control of Major Accident Hazards (COMAH) regulations, P2 flammable gases are subject to a threshold quantity of 10 tonnes. This means that any biogas facility storing less than 10 tonnes of methane is not subject to COMAH regulations. At full operation, the proposed facility will store less than 4.1 tonnes of flammable gas and is therefore not classified as a COMAH regulated site.

The Proposed Development will be subject to an Industrial Emissions (IE) licence under the provisions of the Environmental Protection Agency Act 1992, as amended. An application for this licence will be made to the EPA. The operator will comply with the environmental control and mitigation requirements as per the conditions of the IE licence to ensure there will be no effect on the receiving hydrological and hydrogeological environment.

An Environmental Management System (EMS) will be put in place for the facility, as will be required by the IE licence. The operator shall develop the EMS in accordance with ISO14001:2015, applying for accreditation when operational. This EMS will include but not be limited to the following:

- Measures to comply with the IE licence and other relevant environmental legislation.
- Waste Acceptance Procedures.
- Standard Operating Procedures.
- Measures to comply with the corporate sustainability goals (e.g., reducing water and energy consumption).
- Accident prevention and emergency response procedures.

The procedures set out in the EMS and conditions of the IE Licence will be strictly adhered to for the duration of the Operational Phase. Further details are provided in **Chapter 6** of this volume.

All feedstocks accepted at the anaerobic digestion facility during the Operational Phase of the Proposed Development will be in accordance with approved acceptance procedures developed in compliance with the conditions of the IE licence (once issued). Quality control procedures will be in place to check and verify that all feedstocks are acceptable.

The land spreading and management of digestate will be carried out by the receiver in compliance with the European Union (Good Agricultural Practice for Protection of Waters) Regulations 2017. These regulations cover various aspects such as the rate and timing of application, minimum distances from watercourses, and conditions under which organic fertiliser cannot be applied (e.g., on land prone to flooding or steeply sloping ground). Additionally, the regulations mandate thorough record keeping to ensure proper management practices are followed. It is important to note that the responsibility for these activities lies with the receiver, not the producer.

Refuelling and the storage and handling of deleterious materials such as (fuel, lubricants, oils, etc.) will be undertaken in accordance with the procedures set out in the EMS and conditions of the IE licence (following grant of licence by the EPA). Further details are provided in **Chapter 6** of this volume.

10.5.2.1 Surface Water Drainage

As detailed in the Engineering Infrastructure Report (DOBA, 2024a), the proposed surface water strategy for the site has been subdivided into 2 No. overall catchment areas for attenuation purposes as follows:

- Surface water runoff originating from all areas not directly relating to the biomethane process (Non-Process Area Runoff) such as roofs and entrance roads.
- Surface water runoff originating from areas directly relating to the biomethane production process (Process Area Runoff), such as the bund, yard areas and certain internal roads used by process equipment might consist of excess material.

Non-Process Area Runoff

Surface water from Non-Process Areas of the Proposed Development (i.e., roofs, car parking areas, entrance roads and yards that are located outside of the primary process areas) will be managed in accordance with the principals and objectives of Sustainable Drainage Systems (SuDS), the policies and guidelines outlined in the Greater Dublin Drainage Strategic Study (GDSDS) and the requirements of Tipperary County Council to treat and attenuate water prior to discharging to the Cooleeny Stream located approximately 0.02km south of the site. All surface water runoff originating from Non-Process Areas of the Proposed Development will be free of any process wastewater. Furthermore, when vehicles enter these areas from the processing yard, they will undergo a wash to ensure they are clean and free from debris (DOBA, 2024a).

The surface water drainage for the Proposed Development has been designed to adequately accommodate the 1 in 100year rainfall event plus 20% to account for the effects of climate change (DOBA, 2024a). The following attenuation and SuDS measures will be incorporated into the surface water drainage design for the Non-Process Areas of the Proposed Development as detailed in the Infrastructure Report (DOBA, 2024a):

- Bioretention Swales as a SUDS measure to collect rainwater from internal roadways and hardstanding areas where possible.

- Onsite storage using a aboveground lagoon/basin in conjunction with a flow control device to detain excess runoff on site during rainfall events.
- The inclusion of a rainwater harvesting lagoon to collect surface water runoff from hardstanding areas for use in the biomethane process.
- A class 1 bypass petrol interceptor is proposed before outfalling into the surface water basin.

The proposed surface water drainage design for non-process areas of the Proposed Development is presented in **Figure 10-15**.

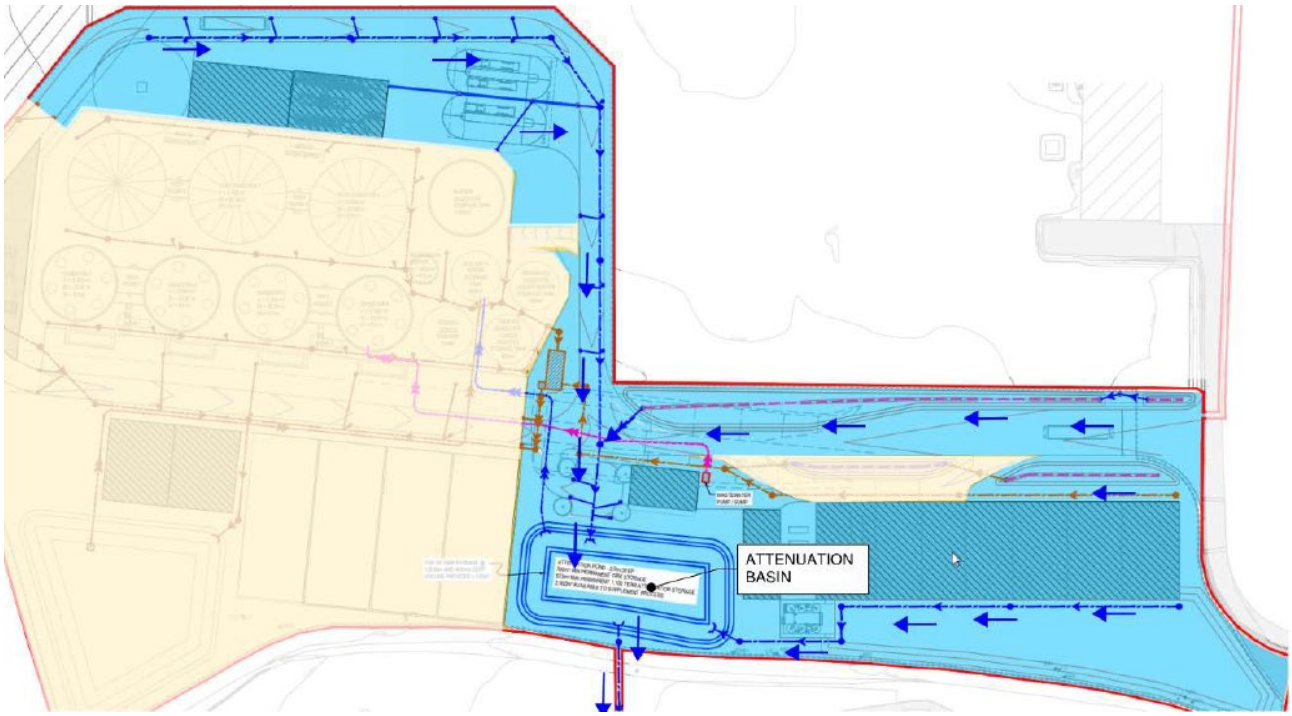


Figure 10-15. Proposed Surface Water Drainage for Non-process Areas (DOBA, 2024a)

Process Area Runoff

The Process Area Runoff is typical runoff from the biomethane production process areas, such as the bund, the delivery and storage yard areas and certain internal roads used by process equipment that might contain some waste material such as feedstock that is washed into the drainage network from rainfall. There will be no discharge of surface water runoff from the Process Areas to the proposed surface water drainage network or receiving Cooleeny Stream.

The proposed surface water drainage strategy involves constructing a new internal network with gully drains to collect runoff from hardstanding areas. The site will drain to an above-ground storage lagoon in the western corner, where the water will be reused within the biomethane process. Surface water will flow through gravity networks to the lagoon, be temporarily stored, and then pumped back to the process usage tank.

The digesters, feed hoppers, and storage tanks are designed within a bund 1.5m below ground level. Runoff from this area will be routed via an underground pipe network to a pump station in the eastern corner of the bund, then pumped to the nearest Process Area Runoff manhole and flow by gravity to the storage lagoon. The bund storage requirement is therefore sufficient to cater for 110% of the largest tank size in case of failure. In this event, the bund can be emptied out by means of pumping the spillage to one of the buffer storage tanks located within the bund itself and recycled back into the process (DOBA, 2024a).

The proposed storage lagoon of 5,153m^3 has been designed to adequately accommodate the 1 in 100year rainfall event plus 20% to account for the effects of climate change (DOBA, 2024a). In addition to this lagoon, 2 No. emergency 800m^3 storage tanks have been provided within the bund, as well as a buffer tank with a capacity of 3,300m^3. If a high-flow storm event is experienced, the water will be pumped into these emergency storage tanks first to ensure sufficient capacity is always available within the lagoon. In summary, the total available Process Area Runoff storage is 10,053m^3 (DOBA, 2024a).

The proposed surface water drainage design for process areas of the Proposed Development is presented in **Figure 10-16**.

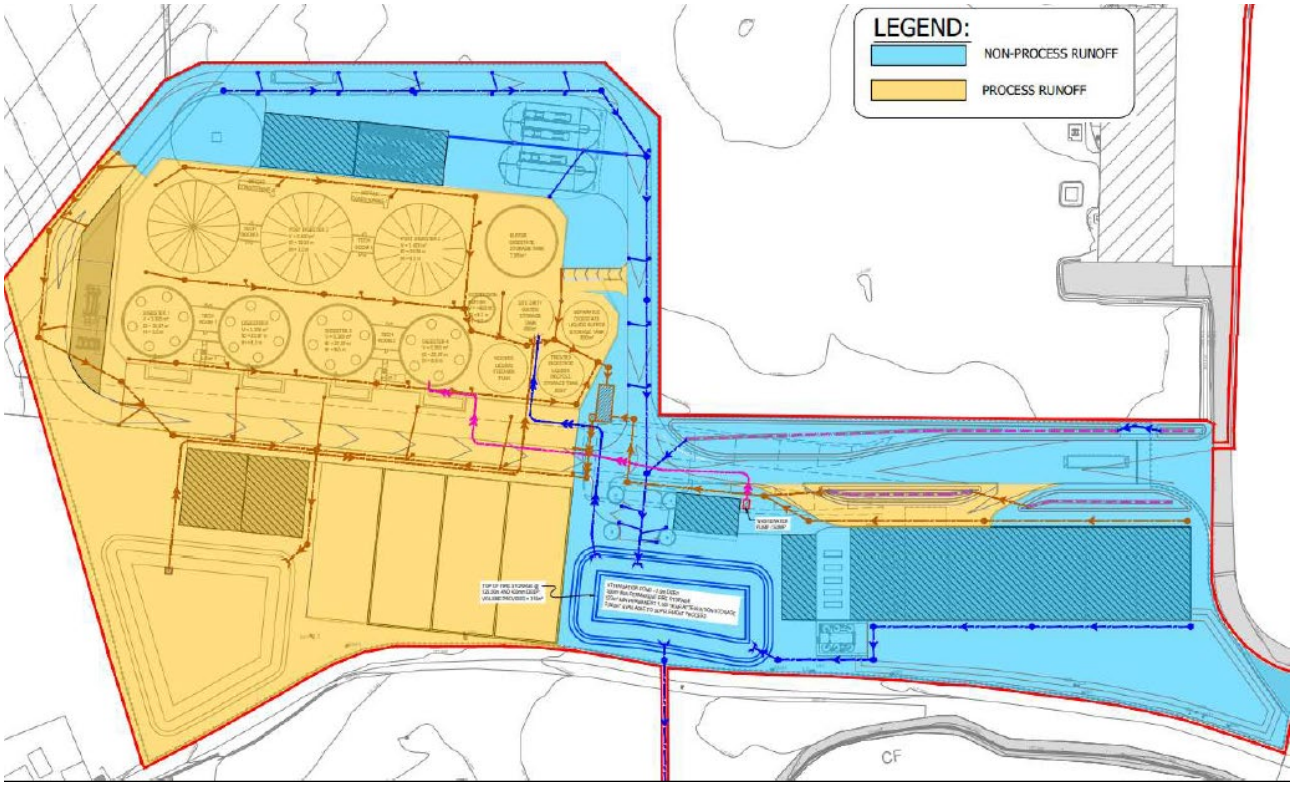


Figure 10-16. Proposed Surface Water Drainage for Process Areas (DOBA, 2024a)

10.5.2.2 Foul Water Drainage

According to the Engineering Infrastructure Report (DOBA, 2024), the wastewater generated by the office and administrative building is the only source of wastewater at the site. It is proposed that this wastewater be routed to a single domestic pump station located to the east of the office building. From there, the wastewater will be pumped via a rising main to the primary digester within the bund. This outfall system will be fully enclosed to ensure containment and efficiency. The proposed pump station will include a sump/tank with sufficient capacity to accommodate 0.36 cubic meters of wastewater, providing 24-hour emergency storage. The biomethane process will utilize all the wastewater generated by the office and administrative building as part of a circular usage procedure, eliminating the need for any wastewater outfall.

10.5.2.3 Water Supply

The water supply requirements for the Proposed Development are summarised as follows:

- Proposed Water Supply (Office): According to the Engineering Infrastructure Report (DOBA, 2024a), it is proposed that a 50mm water supply line be connected to the site office and administration building from the Group Water Scheme's 75mm main located to the south of the site. A letter of consent has been received from the Moyne GWS (dated 6 August 2024). The site will have a maximum of six permanent staff, with an estimated daily water usage of 60 liters per person, totalling 360 liters per day. This usage has been agreed upon with the GWS. Separate provisions for firefighting will be made through rainwater harvesting and storage.
- Proposed Water Supply (Biomethane Process): As outlined in the Engineering Infrastructure Report (DOBA, 2024a), the proposed process water usage for the biomethane production is 60 cubic meters per day. This water will be entirely supplied through rainwater harvesting and storage. The site has defined drainage catchment areas for attenuation purposes, including Non-Process Area Runoff and Process Area Runoff, which will collect runoff from roofs, hardstanding areas, and yards. The primary water source will be the Process Area Runoff lagoon, with the Non-Process Area Runoff storage basin sized to provide permanent storage of water that can supplement the process during drought conditions. In such cases, 2,200 cubic meters of storage (sufficient for 36 days) is available. The local weather station in Cullahill provided daily rainfall data to ensure the lagoon's capacity is adequate for both drought and critical storm scenarios (DOBA, 2024a).
- Proposed Fire Fighting Requirements: The Engineering Infrastructure Report (DOBA, 2024a) specifies that the site must meet fire flow requirements by providing a constant flow of 35 l/s for a total of 120 minutes. Since the site is not served by public water supply infrastructure or hydrants, this will be achieved using the surface water attenuation storage, which will maintain a permanent water level from harvested rainwater runoff. To meet these requirements, 252m^3 of water must be available at all times. The site attenuation strategy includes a permanent water storage volume of 310m^3, which satisfies this requirement. In the event of a firefighting emergency, the attenuation basin can be used directly as a draw-down location.

10.6 Potential Effect of the Proposed Development

The procedure for determination of potential effects on the receiving water environment is to identify potential receptors within the Proposed Development site boundary and surrounding environment and use the information gathered during the desk study and site walkover to assess the degree to which these receptors will be effected upon in the absence of mitigation.

The potential effects associated with the construction phase and operational phase of the Proposed Development are summarised below. Effects are described in terms of quality, significance, duration and type as detailed in **Table 10-2**.

10.6.1 Construction Phase

In the absence of appropriate mitigation measures during the Construction Phase of the Proposed Development there could be an effect on the receiving water environment including the following receptors:

- Underlying regionally Important Karstified (diffuse) Aquifer (RKd) which is part of the Thurles GWB.
- Groundwater flow beneath the site is inferred to be to the west toward the Rossestown River (refer to **Figure 10-4**).
- Downstream receiving waterbodies including the Cooleeny Stream, the Drish River, the Rossestown River and the River Suir.
- The GSI (GSI, 2024) have identified 79No. groundwater sources within a 2km radius of the site, 3No. of which have been recorded as agricultural and/or domestic use.
- There are 3No. Natura 2000 Sites and 14No. pNHAs. The Natura 2000 sites are assessed and described in further detail in **Chapter 8** of this volume.

10.6.1.1 Hydrological and Hydrogeological Flow Regime

During the construction phase there will be no direct discharges to or abstractions from surface water or groundwater at the Proposed Development with the exception of rainfall which will infiltrate to ground over a limited portion of the site during the construction phase.

There will be no requirement for an onsite groundwater supply for the construction phase. Where required, water supply for the Construction Phase will be from the Moyne GWS's 75mm main located to the south of the site. This usage will be agreed upon with the Moyne GWS and the available capacity confirmed prior to construction works commencing. However, it is noted that other than for dust suppression this requirement will be minimal. Therefore, given the minimal water supply demand during the Construction Phase of the Proposed Development, it is considered that there will be a 'negative', and 'imperceptible' and 'temporary' effect on the water supply from the Moyne GWS to the site.

It is anticipated that groundwater may be encountered during excavations for the construction of Proposed Development. Therefore, there may be a requirement for localised dewatering or sump pumping on a temporary basis during the excavations. Appropriate construction measures to enable working in the dry during excavations, and methods to minimise the volume of dewatering water generated that will require management will be considered in the detailed design and the contractors construction methods. Where water must be pumped from the excavations, it is considered that there will be a temporary drawdown of local groundwater levels during the dewatering operations. However, the extent of the effect is considered to be localised to the immediate area surrounding the excavations. Therefore, the potential effect on the groundwater levels and flow regime associated with the works will be 'negative', 'slight' and 'temporary'.

10.6.1.2 Water Quality

During the construction phase of the Proposed Development, there will be a temporary reduction in impermeable surfaces across the site and the groundwater vulnerability is expected to temporarily increase. In karstified limestone areas like the Thurles GWB, there's a high degree of interconnection between groundwater and surface water. This close interaction is reflected in their linked water quality, meaning any contamination of surface water can rapidly affect groundwater, and vice versa. Furthermore, groundwater storage in karstified bedrock is low, limiting the potential for contaminant attenuation in such aquifers. There will be no storage or handling of deleterious materials such as lubricants, oils etc. and any refuelling will be controlled to minimise the potential for release to ground. There may be the requirement for use of portable generators or similar fuel containing equipment during the construction phase of the Proposed Development, which will be placed on suitable drip trays. In the absence of standard and appropriate construction management and mitigation measures, if the accidental release of hazardous material including fuels and oils being used onsite, through the failure of secondary containment or a materials handling accident, were to occur over open ground then these materials could infiltrate to the underlying groundwater and rapidly migrate to the receiving Cooleeny Stream, the Drish River and/or the Rossestown River and downstream waterbodies. In the event of such scenarios, it is considered that this could result in 'negative', 'significant' and 'medium-term' effect on the underlying aquifer environment and the and the WFD status of the receiving Cooleeny Stream, the Drish River and/or the Rossestown River and downstream waterbodies depending on the nature of the incident.

Groundwater flow beneath the site is expected to be to the west toward the Rossestown River. Regionally groundwater within the Thurles GWB will flow to the west toward the Rossestown River and River Suir. The GSI (GSI, 2024) have identified 79No. groundwater sources within a 2km radius of the site, 3No. of which have been recorded as agricultural and/or domestic use. The closest local area and public groundwater supplies include the Baunmore GWS, the Fennor Inchorourke GWS, the Rahealty GWS and the Moyne Groundwater Supply located approximately 3.14km east, 5.94km southeast, 6.03km west and 3.94km south of the site respectively. Therefore, this is also a potential risk of contaminants which enter the groundwater to flow laterally towards the receiving water supplies. In a worst-case scenario, and the absence of mitigation, it is considered that this could result in a 'negative', 'moderate to significant' and 'medium-term' effect on the receiving water supplies and drinking water users depending on the nature of the incident. It is noted that groundwater at the site will not be used for drinking

water and therefore there will be no associated human health issues for workers at the associated with groundwater use.

There is also potential risk associated with the cementitious materials used during the construction of deeper infrastructure where groundwater may be encountered that could result in a 'negative', 'significant' and 'medium-term' effect on the underlying groundwater quality and the WFD status of the receiving Cooleeny Stream, the Drish River and/or the Rossestown River and downstream waterbodies.

There is a risk of runoff with entrained sediment or other contaminants from groundworks areas and stockpiled soils entering Cooleeny Stream located 0.02km south of the site. The appointed contractor will ensure that any run-off from the site will be managed for the duration of the construction phase to ensure that surface water runoff is contained, attenuated and treated onsite prior to discharge to surface water / groundwater. However, in the absence of mitigation measures, there is a potential 'negative', 'moderate', 'medium-term' effect on the receiving waterbodies including the Cooleeny Stream and downstream waterbodies. Based on the dilution which will occur within the Cooleeny Stream and downstream Drish River, it is considered that there is no perceived risk to the River Suir.

Where dewatering of excavations is required or where water must be pumped from the excavations, water will be discharged by the contractor, following appropriate treatment (e.g., settlement or hydrocarbon interceptor), to sewer, watercourses or groundwater in accordance with the necessary discharge licences issued by UE under Section 16 of the Local Government (Water Pollution) Acts and Regulations for any water discharges to sewer or from Kildare County Council under Section 4 of the Local Government (Water Pollution) Act 1977, as amended in 1990 for discharges to surface water / groundwater. There will be no unauthorised discharge of water (groundwater / surface water runoff) to sewer, watercourses or groundwater during the construction phase of the proposed development. Therefore, the potential effects will have been adequately assessed and mitigated as part of the statutory consent and there will be a 'neutral', 'imperceptible' and 'temporary' effect on the receiving water environment.

Foul water during the Construction Phase of the Proposed Development will be removed by tanker in accordance with waste management legislation and managed accordingly. Therefore, the Proposed Development will not cause a potential effect at any receiving waterbody or Natura 2000 sites associated with foul water from the site. It is considered that any effect on the relating to wastewater during the construction phase will be 'neutral', 'imperceptible' and 'temporary'.

10.6.2 Operational Phase

The assessment of the potential effects on the receiving environment during the Operation Phase of the Proposed Development will take account of the embedded design avoidance measures (i.e., SUDS design,) to manage the potential for effects to the receiving water environment.

10.6.2.1 Hydrological and Hydrogeological Regime

Based on the results of the site investigation, the existing capacity for infiltration and recharge to the aquifer beneath the site is low due to the presence of well compacted soils as a result of the historic mining activity. The change in cover from undeveloped brownfield land to paved areas within the Proposed Development will result in an unavoidable, albeit minor, reduced infiltration potential within a localised portion of the Thurles GWB. Therefore, it is considered that here will be little to no change to the overall recharge potential to the aquifer at the site. Taking account of the baseline hydrogeological setting and nature of the Proposed Development there will be a 'neutral', 'imperceptible' and 'long-term' effect on the hydrogeological flow regime within a very localised zone of the aquifer.

As documented in the Engineering Infrastructure Report (DOBA, 2024), it is proposed that the water supply to the Proposed Development will be from the Group Water Scheme's 75mm main located to the south of the site. A letter of consent (dated 6 August 2024) has been received from the Moyne GWS. Therefore, given that the Moyne GWS has confirmed the available capacity to provide the proposed supply of 360l/day to the Proposed Development, it is considered that the likely effect on the water supply will be 'negative', 'imperceptible' and 'permanent'.

During the operational phase there will be no discharges to groundwater at the Proposed Development. Surface water runoff from the Proposed Development, which will be managed in accordance with the principles and objectives of SuDS, will be treated and attenuated prior to discharge from the site. The inclusion of SuDS is likely to increase volumes lost to evapotranspiration and reduce flashy peak discharge rates associated with traditional drainage currently on site. Therefore, potential effects to the hydrological flow regime will likely be 'neutral', 'imperceptible' and 'permanent'.

10.6.2.2 Water Quality

As per the Engineering Infrastructure Report (DOBA, 2024), surface water runoff from the main digester yard area (process area runoff), within the AD intake building (i.e., the bund, the delivery and storage yard), and from surface water runoff surrounding the AD intake building including certain internal roads used by process equipment will be kept completely separate and routed by a network of underground pipes to a separate above-ground storage lagoon. The runoff will be recirculated into the process to be reused. There will be no discharge of surface water runoff from the Process Areas will be collected, contained and recirculated in the closed loop system within the AD Plant as part of the operational processes. Therefore, there will be no effect to water quality of the underlying aquifer and the WFD status of the receiving Cooleeny Stream, the Drish River and/or the Rossestown River and downstream waterbodies.

Surface water runoff from roads and the impermeable areas of the Proposed Development may contain potentially contaminating compounds (petroleum hydrocarbons, metals, and suspended sediments). Therefore, in the absence of appropriate source control measures (i.e., attenuation, petrol interceptors etc.) there is a potential risk of discharge of untreated surface water effecting on the receiving surface water quality and WFD status of the Cooleeny Stream, Drish River, the Rossestown River and downstream waterbodies. It is noted that surface water from the Proposed Development will be managed in accordance with the principles and objectives

of SuDS. Water will be treated and attenuated via and petrol interceptor and an appropriately sized attenuation tank prior to outfalling to the Cooleeny Stream in accordance with the discharge requirements of the IE Licence. The design of the nature-based SUDS, where possible, will be in accordance with the recently published document "Nature-based Solutions to the Management of Rainwater and Surface Water Runoff in Urban Areas - Water Sensitive Urban Design- Best Practice Interim Guidance Document". Therefore, there will be an overall 'neutral', 'slight' and 'long-term' effect on the water quality of the receiving downstream surface water receptors. However, In the worst-case scenario of accidental spillage from a vehicle engine and failure of SuDS there is a potential risk to water quality in the receiving environment. In the absence of mitigation measures, there is a potential 'negative', 'moderate and 'medium-term' effect on the quality of the receiving water environment depending on the nature of the' incident.

In the event of an emergency or incident at the site a sluice valve at the outlet of the surface water drainage will be automatically shut to prevent any discharge of potentially contaminated water from the site. Similarly, a sluice valve at the outlet of the bund will also be shut to contain potentially contaminated water. Water from remaining process areas of the site will be contained within the above ground storage lagoon. Fire water retention and storage capacity for the Proposed Development has been designed in accordance with the EPA Guidance on Retention Requirements for Firewater Run-off (EPA, 2019). Therefore, there will be no effect on the receiving groundwater or surface water quality in the event of an emergency or fire at the Proposed Development.

As documented in the Engineering Infrastructure Report (DOBA, 2024), foul water from the Proposed Development will be utilised in the biomethane process as part of a circular usage procedure, eliminating the need for any wastewater outfall from the Proposed Development. Therefore, no effect on the underlying groundwater and receiving surface water bodies in the vicinity of the site is expected to arise from the management of wastewater at the Proposed Development.

10.6.2.3 Flood Risk

The SSFRA report has assessed the potential flood risk associated with fluvial, groundwater, coastal and pluvial flooding for the site and Proposed Development. The SSFRA has determined there is no Flood Risk to the site and the proposed development is appropriate to the site (Flood Zone C) as per the OPW Guidelines. Therefore, there are no identified potential effects associated with flooding and the site and Proposed Development.

10.6.3 Potential Cumulative Effects Assessment

The consideration of potential cumulative effects is an important stage in the EIA process. Although the proposed development may not result in significant residual effects in isolation, when the proposed development is considered cumulatively with other projects, significant residual effects may occur. The potential cumulative effects to hydrology and hydrogeology have been assessed as per the methodology detailed in **Chapter 21** of this volume.

Stage 1: Cumulative Effects Assessment (CEA) Long List

A long list of "other existing and/or approved projects" deemed potentially relevant to the Proposed Development is presented in **Chapter 3** and **Chapter 21** of this volume. This has taken into account any existing environmental issues relating to areas of particular importance likely to be affected or the use of natural resources.

Stage 2: Screening of the Long List of 'Other Projects'

A screening exercise of the long list of "other existing and/or approved projects" was carried out in order to determine whether any projects have the potential to give rise to likely direct or indirect significant cumulative effects with the Proposed Development from a hydrology and hydrogeology perspective.

Stage 3: Cumulative Effects Assessment

Following Stage 2, those projects which were "screened in" have been carried forward for assessment. The results of the Stage 3 CEA are presented below.

10.6.3.1 Screening

A key differentiator with regard to hydrology and hydrogeology is the potential for hydraulic connectivity between the sites. Sites that are seen to be hydraulicly connected to the site have been screened in. This includes projects upstream, downstream, connected via groundwater flow paths and sites within the same WFD waterbody. The majority of the sites are within the Suir catchment and as such there is potential for cumulative effects. Two long listed projects within Kilkenny were seen to have no potential for hydraulic connectivity and were screened out.

10.6.3.2 Cumulative Effects Assessment

Construction Phase

During the construction phase of the Proposed Development, in a worst-case scenario there is potential for negative cumulative effects to hydraulicly connected waterbodies. These include effects to water quality of surface and groundwater bodies due to accumulation of excess sedimentation and mobilisation of contaminants from multiple source projects. In the absence of mitigation measures, there is a potential 'negative', 'moderate', 'medium-term' effect on the receiving waterbodies including the Cooleeny Stream, River Drish, Thurles GWB and downstream waterbodies.

Operational Phase

Water Resources - Water supply to the Proposed Development will be from the existing Moyne GWS. Correspondence dated 6 August 2024 states that the proposed water supply connection is feasible. The Moyne

GWS water supply will be operated in accordance with relevant approvals therefore there will be no cumulative effects associated with the Proposed Development on the supply network and water resources. The associated cumulative effect on the hydrological and hydrogeological receiving environment will be 'neutral', 'imperceptible' and 'permanent'.

Water Quality - Foul water from the Proposed Development will be input into the anaerobic digestion process. There will be no discharge of foul water from the site during the operational phase and therefore no other potential cumulative effects associated with the Proposed Development. The associated cumulative effect on the hydrological and hydrogeological receiving environment will be 'neutral', 'imperceptible' and 'permanent'.

Surface water from the Proposed Development will be treated and attenuated prior to discharging to the Cooleeny Stream located approximately 0.02km south of the site. The 2023 AER for the Lisheen Mine (EPA,2024) recorded continued non-compliances of COD, Zinc, Suspended Solids and Ammonia at the SW1 discharge from the Cloheen Pond to the Cooleeny Stream. Based on the dilution which will occur within the Cooleeny Stream, it is considered that the discharge of treated, clean surface water runoff from the Proposed Development will reduce the overall pollutant load in the stream and there will be a cumulative 'positive', 'slight', and 'long term' effect of the receiving water quality.

10.6.3.3 Mitigation Measures

During the construction phase of the Proposed Development there is the potential for cumulative effect on the receiving hydrological and hydrological environment. However, appropriate mitigation measures to prevent the worst-case scenario occurring will be implemented during the Construction Phase. The measures outlined in the scheme Construction Management Plan and **Section 10.7** of this report will ensure that there will be no significant cumulative effect on the receiving groundwater and surface water environment and associated receptors (e.g., Natura 2000 sites). The implementation of these measures will ensure that cumulative effects associated with the Proposed Development will not have any effect on compliance with the EU Water Framework Directive, European Communities (Environmental Objectives) Surface Water Regulations (S.I. 272 of 2009 and as amended) and the European Communities Environmental Objectives (Groundwater) Regulations (S.I. No. 9 of 2010 and as amended).

During the operational phase of the Proposed Development there is no identified potential for any cumulative effect on the receiving hydrological and hydrogeological environment and therefore there is no mitigation required in regard to the Proposed Development.

10.6.3.4 Overall Cumulative Residual Effects

The proposed mitigation measures will ensure that the residual risk of cumulative effects to hydrology and hydrogeology during the construction phase will be 'negative', 'imperceptible', 'medium-term' effect

Residual effects were not identified as a result of the Operational Phase of the Proposed Development.

10.6.4 "Do Nothing" Effect

In the 'Do Nothing' scenario the current brownfield environment would remain with associated drainage patterns and hydrological regime. In the 'Do Nothing' scenario potential negative effects during the construction phase in terms of introduction and mobilisation of contaminants in surface water and groundwater would be negated.

The Proposed Development is likely to lead to improvements to the water quality of surface water runoff and receiving waterbodies with the formalisation of the surface water drainage network and implementation of SuDS. In a 'Do Nothing' scenario surface water treatment and discharge volumes would remain unchanged with potential for increased negative effects in response to climate change pressures.

10.7 Avoidance, Remedial and Mitigation Measures

The measures outlined in this section of the report will ensure that there will be no significant effect on the receiving groundwater and surface water environment and associated receptors (e.g., Natura 2000 sites). The effective implementation of these measures will ensure that the Proposed Development will not have any effect on compliance with the EU Water Framework Directive, European Communities (Environmental Objectives) Surface Water Regulations (S.I. 272 of 2009 and as amended) and the European Communities Environmental Objectives (Groundwater) Regulations (S.I. No. 9 of 2010 and as amended) individually or in combination.

10.7.1 Construction Phase

During the Construction Phase, all works will be undertaken in accordance with the Construction Management Plan (CMP) (DOBA, 2024). Following appointment, the contractor will be required to further develop the CMP to provide detailed construction phasing and methods to manage and prevent any potential emissions to ground and surface water with regard to the relevant industry standards (e.g., C532 Control of Water Pollution from Construction Sites, C692 Environmental Good Practice on Site, ICE Earthworks and TII Specification for Road Works Series 600 - Earthworks). The CMP will be implemented for the duration of the Construction Phase, covering construction and waste management activities that will take place during the Construction Phase of the Proposed Development.

Mitigation works will be adopted as part of the construction works for the Proposed Development. These measures will address the main activities of potential effect which include:

- Control and Management of surface water runoff.
- Control and management of shallow groundwater during excavation and dewatering.
- Management and control of soil and materials.
- Appropriate fuel and chemical handling, transport and storage.
- Management of accidental release of contaminants at the site.

- Control and handling of cementitious materials.

The construction works will be managed in accordance with all statutory obligations and regulations and with standard international best practice. Good construction management practices will minimise the risk of pollution from construction activities at the Site including but not limited to:

- Construction Industry Research and Information Association (CIRIA), 2001. Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors.
- CIRIA, 2015. Environmental Good Practice on Site (C741).
- Enterprise Ireland Oil Storage Guidelines (BPGCS005).
- Environmental Protection Agency (EPA), 2013. IPC Guidance Note on Storage and Transfer of Materials for Scheduled Activities.
- CIRIA, 2007. The SuDS Manual (C697.
- UK Environment Agency, 2004. UK Pollution Prevention Guidelines (PPG).
- CIRIA, 2006. Control of Water Pollution from Linear Construction Projects: Technical Guidance (C648).
- National Roads Authority (now Transport Infrastructure Ireland), 2016. Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes.
- Inland Fisheries Ireland (IFI, 2016). Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters.

10.7.1.1 Control and Management of Water and Surface Water Runoff

There will be no direct discharge to groundwater or surface water during the Construction Phase of the Proposed Development.

There may be a temporary increase in the exposure of the underlying shallow groundwater during excavation works. Surface water runoff will be prevented from entering open excavations with sandbags or other approved methods proposed by the appointed contractor. Furthermore, the appointed contractor will ensure that machinery does not enter the groundwater if encountered during construction.

All run-off from the Site or any areas of exposed soil will be managed as required with temporary pumping and following appropriate treatment as required. Surface water runoff from areas stripped of topsoil and surface water collected in excavations will be directed to onsite settlement ponds where measures will be implemented to capture and treat sediment laden runoff prior to discharge at a controlled rate.

Given the vulnerability of the underlying groundwater at the site, the shallow groundwater table, and the potential presence of karst landforms, the construction methodology will adhere to the 'Guidance on Pollution Prevention' (EA, 2001) or similar best practices. This approach aims to minimize the risk of creating temporary conduits between potential surface contamination sources and the underlying groundwater. The construction method will include procedures to prevent any potential effect on water quality. This includes measures to stop surface runoff or other piling/drilling fluids from entering open excavations and the surrounding formation. When lubricants,

drilling fluids, or additives are required, the contractor will use water-based, biodegradable, and non-hazardous compounds under controlled conditions.

Trenched double silt fencing will be installed along the southern boundary of the site. The silt fencing will act as a temporary sediment control device to protect the Cooleeny Stream from sediment and potential surface water run-off from the site. The fencing will be inspected twice daily based onsite and weather conditions for any signs of contamination or excessive silt deposits and records of these checks will be maintained. Silt laden water within the trenches will be routed to an appropriately sized settlement facility before discharging to the Cooleeny Stream. A buffer zone of 10m will be maintained between the silt trap and the watercourse with natural vegetation left intact.

Where dewatering of shallow groundwater is required or where surface water runoff must be pumped from the excavations, water will be managed in accordance with best practice standards (i.e., CIRIA C750), the CMP, the CEMP and regulatory consents to minimise the potential effect on the local groundwater flow regime of the underlying aquifer.

Where required, standard design and construction measures (i.e., groundwater drainage around impermeable subsurface structures) will ensure that groundwater flow across the site is maintained and that there will be no effect on groundwater levels.

All water leaving the Site during the construction phase will be desilted in onsite settlement ponds to include geotextile liners and riprapped inlets and outlets to prevent scour and erosion. The location of the settlement ponds will be reviewed and moved regularly as required. Additional measures will be implemented as required to capture and treat sediment laden surface water runoff (e.g., sediment retention ponds / tanks, surface water inlet protection, fencing and signage around specific exclusion zones and earth bunding adjacent to open drainage ditches). Where required, the water will also be directed through a hydrocarbon interceptor prior to discharge from the Site

Unauthorised discharge of water (groundwater / surface water runoff) to ground, drains or watercourses will not be permitted. Where required, all public sewers will be protected to ensure that any untreated wastewater generated onsite does not enter the public sewers. The appointed Contractor will ensure that the discharge of water to ground, drains or watercourses will be in accordance with the necessary discharge licences issued by Tipperary County Council under Section 4 of the Local Government (Water Pollution) Act 1977, as amended in 1990.

A regular review of weather forecast will take place, insofar as possible, ground excavation works will be scheduled during period of dry weather to minimise potential for silt laden runoff.

10.7.1.2 Control and Management of Stockpiles

Where required, stockpiles of loose materials pending re-use onsite will be protected for the duration of the works and not located in areas where sediment laden runoff may enter existing surface water drains. To help shed rainwater and prevent ponding and infiltration, the sides and top of the stockpiles will be regraded to form a smooth gradient with compacted sides reducing infiltration and silt runoff. Where required, silt fences will be erected at the toe of stockpiles to prevent run-off. The silt fences will be monitored daily by the appointed contractor and silt will be removed as required. In accordance with Inland Fisheries Ireland guidelines, stockpiles will not be allowed within 30m of the open watercourses or drainage.

10.7.1.3 Concrete Works

The cementitious grout and other concrete works during the Construction Phase, will avoid any contamination of ground through the use of appropriate design and methods implemented by the Contractor and in accordance with the CMP (Enviroguide Consulting, 2024a) and relevant industry standards.

Pre-cast concrete will be used where technically feasible to meet the design requirements for the Proposed Development. Where cast-in-place concrete is required (i.e., building foundations), all work must be carried out in dry conditions and be effectively isolated from any groundwater.

All ready-mixed concrete will be delivered to the Site by truck. Concrete batching will take place offsite, wash down and wash out of concrete trucks will take place into a container located within a controlled bunded area which will then be emptied into a skip for appropriate compliant removal offsite in accordance with all relevant waste management legislation. Any excess concrete is not to be disposed of onsite.

A suitable risk assessment for wet concreting shall be completed prior to works being carried out. Pumped concrete will be monitored to ensure there is no accidental.

10.7.1.4 Handling of Fuels, Chemicals and Materials

The Contractor's construction compound will be located on site for the duration of the project and shall primarily consist of site offices & associated welfare facilities, car parking facilities, materials drop-off and storage areas and set down areas for HGVs.

Fuel will be transported to the site in dedicated mobile units based on supply requirements. Fuelling and lubrication of equipment will be conducted in accordance with the procedures outlined in the CMP (DOBA, 2024), within a designated area of the compound, clearly marked and situated away from any watercourses and drains. A dedicated fuel filling point will be established onsite within the compound, where all equipment will be brought for refuelling.

Fuel storage areas and refuelling points will be bunded and located away from surface water drainage and features. The bunds will comply with the Environmental Protection Agency guidelines 'Amendment to IPC Guidance Note on Storage and Transfer of Materials for Scheduled Activities' (EPA, 2013). All tank and drum storage areas will be bunded to a volume not less than the greater of the following:

- 110% of the capacity of the largest tank or drum within the bunded area; or
- 25% of the total volume of substance that could be stored within the bunded area.

As documented in the CMP, the appointed contractor will maintain an emergency response action plan and emergency procedures will be developed by the appointed contractor in advance of any works commencing. Construction staff will be familiar with the emergency response plan.

Strict supervision of contractors will be adhered to in order to ensure that all plant and equipment utilised on-site is in good working condition. Any equipment not meeting the required standard will not be permitted for use within the Proposed Development Site. Only emergency breakdown maintenance will be carried out on-site. Drip trays and spill kits will be available on-site to ensure that any spills from vehicles are contained and removed off-site.

Spill kits will be made available onsite and identified with signage for use in the event of an environmental spill or leak. A spill kit will be kept in close proximity to the fuel storage area for use in the event of any incident during refuelling or maintenance works. Heavy machinery used on the Site will also be equipped with its own spill kit.

There may also be the requirement for use of portable generators or similar fuel containing equipment during the construction phase of the Proposed Development, which will be placed on suitable drip trays. Regular monitoring of drip tray content will be undertaken to ensure sufficient capacity is maintained at all times

As documented in the CMP (DOBA, 2024), good housekeeping (e.g., site clean-ups, use of disposal bins, etc.) will be implemented on the site.

10.7.1.5 Emergency Procedures

As documented in the CMP, in advance of works commencing the emergency response action plan will be developed by the appointed contractor in accordance with the site emergency plan which will cover all foreseeable risks (i.e., fire, spill, flood, etc.). Appropriate site personnel will be trained as first aiders and fire marshals and be trained in environmental issues and spill response procedures. Spillage kits will be available on-site including in vehicles operating onsite. Construction staff will be familiar with emergency procedures in the event of accidental fuel spillages. Remedial action will be immediately implemented to address any potential effects in accordance with industry standards and legislative requirements.

- Any required emergency vehicle or equipment maintenance work will take place in a designated impermeable area within the site.

- Emergency response procedures will be put in place, in the unlikely event of spillages of fuels or lubricants. Such procedures will include:
  - Containment measures.
  - Emergency discharge routes.
  - List of appropriate equipment and clean-up materials.
  - Maintenance schedule for equipment.
  - Details of trained staff, location, and provision for 24-hour cover.
  - Details of staff responsibilities.
  - Notification procedures to inform the EPA or Environmental Department of Tipperary County Council.
  - Audit and review schedule.
  - Telephone numbers of statutory water consultees.
  - List of specialist pollution clean-up companies and their telephone numbers.
- Spill kits including oil absorbent material will be provided so that any spillage of fuels, lubricants or hydraulic oils will be immediately contained.
- In the event of a leak or spill from equipment in the instance of a mechanical breakdown during operation, any contaminated soil will be removed from the site and compliantly disposed of off-site. Residual soil will be tested to validate that all potentially contaminated material has been removed. This procedure will be undertaken in accordance with industry best practice procedures and standards.
- All construction works staff will be familiar with emergency procedures in the event of accidental fuel spillages.
- All construction works staff on-site will be fully trained on the use of equipment.

These procedures will be undertaken in accordance with industry best practice procedures and standards. These measures will ensure that there is minimal risk to the receiving land, soil and geological environment associated with the construction phase of the Proposed Development.

10.7.1.6 Welfare Facilities

Welfare facilities have the potential, if not managed appropriately, to release organic and other contaminants to ground or surface water courses. Foul drainage from temporary welfare facilities during the construction phase of the Proposed Development will be discharged to temporary holding tank(s) the contents of which will periodically be tankered off site to a licensed facility. All waste from welfare facilities will be managed in accordance with the relevant statutory obligations by tankering of waste offsite by an appropriately authorised contractor.

10.7.2 Operational Phase

Based on the design of the proposed development, there are limited potential sources of contamination during the operational phase. Additionally, the proposed attenuation design does not allow for infiltration to the ground.

Surface water will be managed in accordance with the principles and objectives of SuDS and the GDSDS to treat and attenuate water before discharging offsite. Regular operational monitoring and maintenance of drainage and SuDS measures will be incorporated into the overall management strategy for the proposed development. This will ensure that there are no effects on water quality and quantity (flow regime) during the operational phase.

The proposed bund system will ensure any contaminated water is prevented from discharging from Process Areas of the Proposed Development into the surface water drainage network.

The procedures outlined in the EMS and the conditions of the IE Licence will be strictly adhered to throughout the operational phase of the Proposed Development.

Emergency procedures, developed in accordance with the conditions of the IE Licence and detailed in the EMS, will be strictly implemented during the operational phase. Spillage kits will be available on-site, including in vehicles operating on-site. All staff will be trained and familiar with emergency procedures in the event of accidental fuel spillages.

10.8 "Worst Case" Scenario

During the Construction Phase and Operational Phase of the Proposed Development, in a worst-case scenario, such as a fuel spill, fire or accidental unmitigated release of other hazardous compounds occurring, and in the absence of any mitigation measures it is considered that there would be a potential 'negative', 'significant', 'medium term' effect on the quality of the underlying aquifer. The groundwater within the Thurles GWB would also likely be effected and taking account of the limited attenuation within the aquifer, it is considered that there is an indirect risk to the downstream receiving waterbodies (i.e., Cooleeny Stream, the Drish River, the Rossestown River and downstream waterbodies (i.e., the River Suir) and Natura 2000 sites). However, this worst-case scenario is deemed to be unlikely scenario taking account of the embedded design avoidance measures and mitigation measures.

10.9 Water Framework Directive

The findings of the risk-based assessment identified that in the absence of any mitigation and avoidance measures there could be a potential effect on the water quality within receiving water bodies associated with the Proposed Development, specifically within the Thurles GWB, the Cooleeny Stream, the Drish River, the Rossestown River and the River Suir and downstream waterbodies. There is no identified potential effect to transitional or coastal waterbodies attributed to the separation distances and anticipated assimilation capacity of the receiving water bodies taking account of the existing baseline conditions and WFD Status.

The mitigation measures as outline above, including the implementation of a robust CMP during the construction phase and the incorporation of SuDS in the design of the Proposed Development, will prevent any effect on the receiving groundwater and surface water environment. Hence, the Proposed Development will not have any effect

on compliance with the EU Water Framework Directive, European Communities (Environmental Objectives) Surface Water Regulations, 2009 (SI 272 of 2009, as amended 2012 (SI No 327 of 2012), and the European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010), as amended 2012 (SI 149 of 2012) and 2016 (S.I. No. 366 of 2016).

The Proposed Development will not cause a deterioration in the status of waterbodies hydraulically connected with the Proposed Development, taking account of design avoidance and mitigation measures that will be implemented. The Proposed Development will not jeopardise objective to achieve 'good' surface water status or good ecological potential.

There will be no effect to the existing WFD status of water bodies associated with the Proposed Development including the waterbodies comprising the Cooleeny Stream, the Drish River, the Rossestown River and the River Suir, downstream waterbodies, or the Thurles GWB as a result of the Proposed Development taking account of embedded design avoidance and mitigation measures.

The Proposed Development will not hinder implementation of measures outlined in the 3rd Cycle RBMP and will progress and promote some measures. Implementing Sustainable Urban Drainage Systems (SuDS) and nature-based solutions, as recommended in the Water Action Plan 2024, will be crucial to manage this runoff and prevent flooding and water pollution. The inclusion of SuDS in the development supports the Water Action Plan's goals of integrating green infrastructure to enhance biodiversity and manage stormwater. Overall, careful planning and adherence to the Water Action Plan's measures will be necessary to mitigate any potential negative effects of the proposed development on water quality and management.

10.10 Residual Effects

Residual Effects are defined as 'effects that are predicted to remain after all assessments and mitigation measures. They are the remaining 'environmental costs' of a project and are the final or intended effects of a development after mitigation measures have been applied to avoid or reduce adverse effects.

The predicted effects of the Construction and Operational Phases are described in **Table 10-14** in terms of quality, significance, extent, likelihood, and duration. The relevant mitigation measures are detailed, and the residual effects are determined which take account of the avoidance, remedial and mitigation measures.

There will be no significant adverse residual effects on the receiving hydrological and hydrogeological environment associated with the Proposed Development.

There will be no effect to the existing WFD Status of water bodies associated with the Proposed Development including the Cooleeny stream, River Drish, River Suir, other downstream waterbodies and the Thurles GWB as a result of the Proposed Development taking account of design avoidance and mitigation measures where required.

Activity	Attribute	Predicted Effect	Quality	Significance	Duration	Type	Mitigation	Residual Effect
Construction Phase								
Potential risk of contaminants which enter the groundwater to flow laterally towards the receiving water supplies.	Water quality / WFD Status	Potential for effect on Thurles GWB and associated ground water supplies	Negative	Moderate to Significant	Medium Term	Direct / Worst Case	Appropriate mitigation measures to prevent the worst-case scenario occurring will be implemented during the Construction Phase.	Imperceptible
Introduction of contaminants to karstic flow paths	Water quality / WFD Status	Potential for effect on Thurles GWB exacerbated by potential karstic flow pathways within aquifer, affecting the receiving River Drish, River Suir and downstream waterbodies	Negative	Significant	Medium Term	Direct / Worst Case	Surface water runoff management will be required to prevent runoff entering excavations during construction.	Imperceptible
Contamination of surface waters and ground waters with cementitious runoff	Water quality / WFD Status	underlying groundwater quality and the WFD status of the receiving Cooleeny Stream, the Drish River and/or the Rossestown River and downstream waterbodies.	Negative	Significant	Medium Term	Direct / Worst Case	Appropriate mitigation measures to prevent the worst-case scenario occurring will be implemented during the Construction Phase.	Imperceptible
Accidental release of deleterious materials including fuel, sediment and other materials	Water quality / WFD Status	Potential for effect on Thurles GWB exacerbated by potential karstic flow pathways within aquifer, affecting the receiving River Drish, River Suir and downstream waterbodies	Negative	Significant	Medium Term	Direct / Worst Case	Appropriate mitigation measures to prevent the worst-case scenario occurring will be implemented during the Construction Phase.	Imperceptible

Activity	Attribute	Predicted Effect	Quality	Significance	Duration	Type	Mitigation	Residual Effect
being used on-site.								
Operational Phase								
There will be no direct or indirect effect on the receiving hydrological and hydrogeological environment associated with the operational phase of the Proposed Development.								

Table 10-14. Summary of Residual Effects

10.11 Monitoring

10.1.1. Construction Phase

During the Construction Phase of the Proposed Development the following monitoring measures will be considered:

- Inspections will be undertaken during excavations and other groundworks to ensure that measures that are protective of water quality outlined in this EIAR and the CEMP (DOBA, 2024a) are fully implemented and effective.
- In advance of construction works commencing the appointed contractor will updated with CEMP to include detailed methodologies for the construction of silt management systems (e.g., settlement ponds, silt traps, silt fences) and detailed procedures for pumping water from excavations. The surface water control measures will be inspected twice daily based onsite and weather conditions for any signs of contamination or excessive silt deposits and records of these checks will be maintained.
- Visual inspections of the Cooleeny Stream will be undertaken for siltation and hydrocarbon sheen will also be undertaken twice daily.
- Discharges to groundwater or surface water will be monitored where required in accordance with statutory consents (i.e., discharge licence).
- Routine monitoring and inspections during refuelling, concrete works to ensure no effects and compliance with avoidance, remedial and mitigation measures.

10.1.2. Operational Phase

The Proposed Development will be subject to an IE Licence from the EPA. The operator will comply with any monitoring requirements, including monitoring of the surface water discharge, in accordance with the conditions of the IE Licence.

Ongoing regular operational monitoring and maintenance of drainage and the SuDS measures will be undertaken throughout the lifetime of the operational phase of the Proposed Development.

There are no additional monitoring requirements specifically in relation to hydrology and hydrogeology during the Operational Phase of the Proposed Development.

10.12 Interactions

10.12.1 Population and Human Health

No public health issues associated with the water (hydrology and hydrogeology) conditions at the Proposed Development Site have been identified for the Construction Phase or Operational Phase of the Proposed Development.

Appropriate industry standard and health and safety legislative requirements will be implemented during the construction phase that will be protective of site workers.

It is noted that specific issues relating to Public Heath associated with the Proposed Development are set out in **Chapter 7** of this volume.

10.12.2 Land, Soil, Geology and Hydrogeology

An assessment of the potential effect of the Proposed Development on the existing land, soils and geological environment during the Operational Phase of the Proposed Development is set out in **Chapter 9** of this volume.

10.12.3 Biodiversity

An assessment of the potential effects of the Proposed Development on the Biodiversity of the Site, with emphasis on habitats, flora and fauna which may be effected a result of the Proposed Development are included in **Chapter 8** of this volume. It also provides an assessment of the effects of the Proposed Development on habitats and species, particularly those protected by national and international legislation or considered to be of particular conservation importance and proposes measures for the mitigation of these effects.

10.12.4 Material Assets

An assessment of the potential effect on the Proposed Development on the material assets – Utilities including built services and infrastructure has been set out in **Chapter 16** of this volume. Potabile water use will be in accordance with the volumes and rates set out in the Moyne Group Water Scheme Supply Agreement.

10.13 Difficulties Encountered When Compiling

There were no difficulties were encountered in the preparation of this chapter of the EIAR.

10.14 References

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