AtkinsRéalis

Environmental Impact Assessment Report (EIAR) Volume 2 – Chapter 9 – Land, Soils and Geology

Uisce Éireann

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BALLINA AND LOUGH TALT WATER SUPPLY UPGRADE

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Abbreviations

Abbreviation	Term
ACM	Asbestos Containing Materials
AOD	Above Ordnance Datum
BPS	Booster Pumping Station
BPT	Break Pressure Tank
BTEX	Toluene, Ethylbenzene and Xylenes
CEMP	Construction Environment Management Plan
CIRIA	Construction Industry Research and Information Association
CP	Cable Percussion
CSM	Conceptual Site Model
C4SLs	Category 4 Screening Levels
DCP	Dynamic Cone Penetration
DEM	Digital Elevation Model
EA	Environment Agency
ECoW	Environmental Clerk of Works
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
GAC	Generic Assessment Criteria
GI	Ground Investigation
GPR	Ground Penetrating Radar
GSI	Geological Survey Ireland
GWB	Groundwater Body
HDD	Horizontal Directional Drilling
HDPE	High-Density Polyethylene
IDL	Irish Drilling Limited
IEL	Industrial Emissions Licence
IFS	Irish Forest Soils
IGI	Institute of Geologists of Ireland
IPC	Integrated Pollution Control
IPPC	Integrated Pollution Prevention Control
ISRM	Institute of Strategic Risk Management

Abbreviation	Term
LCRM	Land Contamination: Risk Management
m bgl	Metres Below Ground Level
OD	Ordnance Datum
OSI	Ordnance Survey of Ireland
O&M	Operation and Maintenance
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
PPE	Personal Protective Equipment
NPF	National Planning Framework
RAMS	Risk Assessment Method Statement
RC	Rotary Core
RWPS	Raw Water Pumping Station
SAC	Special Area of Conservation
SEPA	Scottish Environment Protection Agency
SID	Strategic Infrastructure Development
SPT	Standard Penetration Test
SSVs	Soil Screening Values
ST	Silt Trench
S4ULs	Suitable 4 Use Levels
TP	Trial Pit
TPH	Total Petroleum Hydrocarbon
UV	Ultraviolet
WFD	Water Framework Directive
WSZ	Water Supply Zone
WTP	Water Treatment Plant

Glossary

Term	Meaning
Alluvium	Alluvium is loose, unconsolidated sediment that has been eroded, transported, and deposited by flowing water in a non-marine setting. It typically consists of a mix of clay, silt, sand, and gravel, and it accumulates along rivers, in floodplains, and at the base of mountains.
Aquifer	A body of permeable rock which can contain or transmit groundwater.
Argillaceous	Composed of, containing, or of the nature of clay or clay-sized particles; specifically applied to sedimentary rocks (like shale or marl) and deposits consisting of very fine-grained material.

Term	Meaning
Bedrock	The relatively hard, solid rock beneath surface materials such as soil and gravel.
Berm	A raised strip or mound of land, often made of soil, gravel, or rock, used to control water, prevent erosion, provide barriers, or enhance landscaping.
Borehole	A narrow, deep hole drilled into the ground to allow for measurements and analysis of various physical, chemical, and structural properties of the subsurface, typically utilizing specialized instruments for logging and geophysical investigations.
Environmental Impact Assessment	A systematic means of assessing the likely significant effects of a proposed project, undertaken in accordance with the EIA Directive and the relevant Irish legislation.
Floodplain	A flat area of land next to a river or stream that is prone to flooding during periods of high-water flow.
Geological heritage site	Site or place with features of geology that have important scientific, educational, cultural, or visual value.
Geophysical survey	Methods used to detect changes in subsurface physical properties such as gravity, magnetic fields, electromagnetic responses, resistivity, and seismic wave velocity that are associated with variations in geological conditions.
Groundwater	Water that occurs below the surface of Earth, where it occupies all or part of the void spaces in soils or geologic strata.
Groundwater vulnerability	The susceptibility of underground water sources to pollution from surface activities and natural processes.
Ground collapse	The subsidence or downward movement of the Earth's surface, which can occur due to various factors such as groundwater withdrawal, mining, or natural processes like dissolution of underlying rock.
Ground contamination	Occurs when soil, ground or surface water has been polluted by hazardous substances or contaminants.
Hydrogeology	The study of the movement of water through the subsurface geologic environment.
Hydrogeological conditions	The characteristics and behaviour of groundwater formation, movement, and availability in a given region. These are influenced by geology, soil, and hydrological factors.
Karst	Terrain usually characterized by barren, rocky ground, caves, sinkholes, underground rivers, and the absence of surface streams and lakes. It results from the excavating effects of underground water on massive soluble limestone.
Karst conduits	The underground pathways that facilitate the flow of groundwater within karst aquifers.
Limestone	A sedimentary rock composed primarily of calcite, formed from the accumulation of shell, coral, algal, faecal, and other organic debris. It usually forms in clear, calm, warm, shallow marine waters.
Lithology	The study of the general physical characteristics of rocks.
Metamorphic rocks	These originate from pre-existing rocks which undergo physical or chemical changes due to extreme heat, pressure, or mineral-rich fluids. They represent one of the three major classes of rocks.
Moor	Moorland generally refers to open upland landscapes dominated by heather and maintained through human management.

Term	Meaning
Natural Heritage Areas	An area considered important for the habitats present, or which holds species of plants and animals whose habitat needs protection.
Peatlands	Waterlogged ecosystems where dead plant material accumulates faster than it decomposes, building up thick layers of organic soil called peat over thousands of years.
Permeability	The ability of a substance to allow gases or liquids to flow through it.
Plateau	An area of level high ground.
Quarry	A place, typically a large, deep pit, from which stone or other materials are or have been extracted.
Quaternary sediments	Unconsolidated deposits from the last 2.6 million years, formed by glacial, fluvial, and other processes, and are key to understanding recent Earth history.
Resistivity	Resistivity is an intrinsic electrical property of a given material, defining how it resists the flow of electrical current.
Schist	A type of metamorphic rock characterized by its foliated texture, which means it possesses distinct layers or bands of minerals that have undergone significant physical and chemical changes due to heat, pressure, and other geological processes.
Seismic refraction	A geophysical method used to study subsurface structures by analysing the refraction of seismic waves. It is commonly used for investigating earth layers, locating buried objects, and exploring for mineral deposits.
Seismic refraction lines	These lines are formed by the travel time of seismic waves that have been refracted at interfaces between different layers of the Earth.
Silt trenches	Generally, long narrow trenches. They are commonly excavated in urban environments and on roadways to determine the position of existing underground services and the soil profile prior to carrying out planned developments.
Special Areas of Conservation	Prime wildlife conservation areas in the country, considered to be important on a European as well as an Irish level.
Till	The sediment left behind by glaciers or ice sheets as they advance and retreat.
Topography	The physical appearance of the natural features of an area of land, especially the shape of its surface.
Trial pit	An excavation dug to examine subsurface ground conditions, typically used in construction and site investigations to assess soil, rock, and groundwater before construction begins.

9. Land, Soils and Geology

9.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) addresses the likely significant effects of the Ballina and Lough Talt Water Supply Upgrade (herein referred to as 'the Proposed Development') on land, soils and geological receptors.

This chapter also summarises the related regulatory and policy framework, describes the methods used to assess the identified effects, the existing baseline conditions, the proposed mitigation measures required to prevent, reduce or offset any significant adverse effects and the anticipated likely residual effects after mitigation measures have been applied.

9.1.1 The Proposed Development

The Proposed Development site is located in the townlands of: Wherrew, Lisglennon, Ballinteean, Rathglass East, Derreens, Broadlands, Coonealmore, Rosserk, Coonealcauraun, Rathroeen, Culleens, Laghtadawannagh, Farrannoo, Garrankeel, Quignamanger, Quignalegan, Rathmeel, Quignashee, Ballyholan, Behy More, Corrimbla South, Carrownlabaun, Bonniconlon West, Bonniconlon East, and Drumsheen, Co. Mayo; and Knockasliggaun, Glennawoo, Largan, and Gortersluin, Co. Sligo; and Lough Conn, Co. Mayo, and Lough Talt, Co. Sligo.

The Proposed Development, subject to detailed design, will consist of seven "key locations" and five discrete sections of pipeline, highlighted in bold text, as follows:

- Upgrade to the existing **Wherrew Raw Water Intake & Pumping Station (RWI&PS)**, Wherrew, Ballina, Co. Mayo;
- Upgrade to the existing **Lisglennon Raw Water Storage and Pumping Station (RWS&PS)**, Lisglennon, Ballina, Co. Mayo;
- **Proposed Pipeline A** – Lisglennon RWS&PS to Lisglennon WTP;
- Upgrade to the existing **Lisglennon Water Treatment Plant (WTP)**, Lisglennon, Ballina, Co. Mayo;
- **Proposed Pipeline B** – Lisglennon WTP to River Moy Crossing;
- **Proposed Pipeline C** – Existing River Moy Crossing to Bonniconlon BPS;
- **Proposed Pipeline D** – Bonniconlon BPS to Windy Gap BPT;
- **Proposed Pipeline E** – Windy Gap BPT to Lough Talt WTP;
- Proposed **Bonniconlon Booster Pumping Station (BPS)** located at Bonniconlon, Ballina, Co. Mayo;
- Proposed **Windy Gap Break Pressure Tank (BPT)** located at the Windy Gap, Ballina, Co. Mayo;
- Repurposing the existing **Lough Talt Water Treatment Plant (WTP),** Co. Sligo;
- Proposed Treated Water Reservoir at the existing **Bonniconlon Reservoir** site, Ballina, Co. Mayo; and,
- All permanent and temporary works, including construction compounds, access routes, pipeline corridors, and trenchless crossings.

Refer to Chapter 3 – Project Description for further detail on proposed works and construction methodologies at each location.

9.2 Legislation and Policy Context

This assessment has been undertaken in accordance with the following key legislative and policy documents:

- Planning and Development Regulations 2001 (as amended);
- Planning and Development Act, 2000 (as amended);
- European Union (EU) Environmental Impact Assessment (EIA) Directive 2011/92/EU as amended by Directive 2014/52/EU (hereafter referred to as the "EIA Directive"); and
- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (hereafter referred to as the "EIA Regulations").

A summary of the planning policy, legislation, technical guidance and standards relevant to land, soils and geology is provided below in Table 9-1.

Table 9-1 — Planning policy, legislation, technical guidance and standards

Document Title	Description / Relevance
Policy	
National Planning Framework (NPF), April 2025	The National Planning Framework (NPF) is the long-term strategy for strategic planning and sustainable development up to 2040. The NPF was originally published in February 2018, and the first revision was adopted in April 2025. The revised NPF seeks to plan for population growth which is expected to grow by one million between 2022 and 2040. **National Policy Objective 66**: The planning system will be responsive to our national environmental challenges and ensure that development occurs within environmental limits, having regard to the medium and longer-term requirements of all relevant environmental and climate legislation and the sustainable management of our natural capital.
Project Ireland 2040: The National Development Plan 2021-2030	This plan sets out the Government's over-arching investment strategy and budget for the period 2021-2030. Included in this is the Government's strategy for Climate strategy and the environment.
Mayo County Development Plan 2022-2028	This plan sets out the development strategy for County Mayo between 2022-2028. **NEO 18**: As part of the implementation of Climate Ready Mayo, Climate Adaptation Strategy, to develop and implement a Peatland Management Strategy for County Mayo that will: To initiate conservation and management of Mayo's peatlands, particularly those sites nominated for designation as Special Areas of Conservation and Natural Heritage Areas, to preserve the habitat and their unique ecosystems, managing flood risk and other environmental benefits **NEP 12:** To seek to protect and expand the green infrastructure network within the county, where possible, and to encourage green infrastructure to be spatially connected to facilitate the extension or establishment of ecological corridors. **NEP 13:** To promote and enhance green and blue infrastructure and seek to integrate the provision of green infrastructure with infrastructure provision and replacement, including walking and cycling routes, as appropriate, while protecting and enhancing natural heritage and improving ecological corridors.

9.2.1 Best Practice Guidance

The following guidance documents have been used to provide a basis for the assessment methodology specific to land, soils and geology.

- Guidelines on the information to be contained in Environmental Impact Assessment Reports, Environmental Protection Agency (EPA, 2022);
- Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements (IGI, 2013).

9.2.2 Consultations

As part of the EIAR assessment process, consultation was undertaken with statutory organisations at various stages of the pre-planning process. A summary of all relevant feedback in relation to the Proposed Development is presented in Chapter 5 – Consultations. No specific issues were raised in relation to land, soils and geology.

9.3 Study Assessment and Methodology

A desk-based study was undertaken by AtkinsRéalis in order to complete the land, soils and geology assessment and included a review of available historical and relevant ground investigation information.

The Study Area for the purpose of this assessment is defined as all lands denoted by the red line boundary and those within a 2 km buffer of it. The Proposed Development refers to the development in its entirety, including all aspects denoted by the red line boundary as presented in Chapter 3 – Project Description of this EIAR.

This assessment was completed in accordance with relevant best practice guidance from the Institute of Geologists of Ireland (IGI), '*Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements*' (IGI, 2013). The IGI guidance document is an updated version of the 2002 guidelines, 'Geology in Environmental Impact Statements, A Guide' (IGI, 2002), which was revised to take account of legislative changes, and operational experience developed by geoscientists in the production of relevant Environmental Protection Agency (EPA, 2022) guidance, '*Guidelines on the information to be contained in Environmental Impact Assessment Reports'* published in May 2022.

The desk-based study involved reviewing information from the following sources:

- GSI Datasets Public Viewer and Groundwater web-mapping (consulted 22/09/2026);
- Ordnance Survey web-mapping to assess the surface topography and landforms (consulted 22/09/2026);
- EPA Public Viewer and web-mapping (consulted 22/09/2026);
- Google Maps Aerial Photography (consulted 22/09/2026); and

A ground investigation was conducted by Irish Drilling Limited (Appendix 9-1, Volume 3 of the EIAR) in 2025, which comprises the following sections:

- Appendix 1 – Borehole Records (Cable Percussive)
- Appendix 2 – Boreholes Records (Rotary Core)
- Appendix 3 – Trial Pit Records
- Appendix 4 – Silt Trench Records
- Appendix 5 – Dynamic Probe Records
- Appendix 6 – Dynamic Sampling Records
- Appendix 7 – DCP Test Records

- Appendix 8 – Groundwater Readings
- Appendix 9 - Archaeological Monitoring Survey
- Appendix 10 – Geophysical Survey
- Appendix 11 – Asbestos Refurbishment Survey
- Appendix 12 – GPR Utility Survey
- Appendix 13 – Topographical Survey
- Appendix 14 – Laboratory Test Results
- Appendix 15 – Photographs (Trial Pits)
- Appendix 16 – Photographs (Rotary Core)
- Appendix 17 – 'As-Built' Drawings
- Appendix 18 – Digital Data (AGS/Autocad)

The scope and extent of the investigation provides a representative understanding of baseline ground conditions for the purposes of this assessment. As with any ground investigation, an iterative approach is standard practice. Therefore, while the information provided (via site specific geophysical surveys and ground investigation works) provides a robust understanding of the geotechnical setting, given the inherently heterogenous nature of karst geology supplementary ground investigations will be required at detailed design and pre-commencement stages. The number of soil samples and proposed environmental testing requirements are considered to be suitably representative and robust for this EIAR, taking account of the current baseline setting, and nature of the Proposed Development .

The geophysical survey, Appendix 10 of the Draft Factual GI Report (Irish Drilling Limited, 2026) was reviewed as part of this assessment and is presented within Appendix 9-1. During the geophysical survey, only areas within the vicinity of Lough Conn, Lisglennon WTP, Lough Talt and the road immediately west of Lough Talt were surveyed. Each of these areas were surveyed using 2D-Resistivity lines and seismic refraction lines. During the investigation, numerous areas of low resistivity were encountered at Lisglennon – indicating potential muddy or argillaceous limestone or karstified limestone. However, no void spaces such as karst conduits were identified which could potentially pose risk to the foundation designs and impact reliability of geotechnical parameters.

To determine ground conditions at the Proposed Development, eight dynamic window samples, 45 cable percussion boreholes, 61 rotary boreholes, 119 trial pits and 168 silt trenches were completed. The results are found within Appendices 1-6 of the Ground Investigation Report (Appendix 9-1, Volume 3 of the EIAR). Chemical testing was undertaken by Envirolab and rock test schedules were undertaken by Structural Soils Ltd, both of which are accredited to ISO/IEC 17025:2017 (UKAS). The soil and rock descriptions as noted on the borehole, dynamic sampling, slit trench and trial pit logs were logged in accordance with IS EN 1997-2 and BS5930:2015+A1:2020 Code of Practice for Site Investigations.

9.3.1 Impact Assessment Criteria and Significance of Effects

This assessment has been completed in accordance with relevant best practice guidance from the Institute of Geologists of Ireland (IGI), 'Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements' (IGI, 2013). A given receptor is assigned an importance rating based on qualifying criteria in line with IGI guidance as per Table 9-3. Any potential effect to receptors is assigned a magnitude of effect rating in line with IGI guidance recorded in Table 9-4. Based on these ratings, a rating of significant environmental effects is assigned (as per Table 9-5) which indicates if the effect on the given receptor is significant in EIA terms.

This assessment has also been prepared in accordance with, and is fully compliant with the relevant Environmental Protection Agency (EPA) guidance, 'Guidelines on the information to be contained in Environmental Impact Assessment Reports' published in May 2022, specifically with regard to the significance of effects (as per 'Table 3.4 Descriptions of Effects' of these Guidelines) of the Proposed Development on the receiving land, soils and geology environment (Table 9-2).

The Significance of any effect should be determined based on:

- The Importance of the feature to be protected and
- The Magnitude of the impact on the receiving environment

Table 9-2 — Impact Classification Terminology (EPA, 2022)

Impact Characteristic	Term	Description
Quality	Positive	A change which improves the quality of the environment.
	Neutral	A change which does not affect the quality of the environment.
	Negative	A change which reduces the quality of the environment.
Significance	Imperceptible	An impact capable of measurement but without noticeable consequences.
	Slight	An impact which causes noticeable changes in the character of the environment without affecting its sensitivities.
	Moderate	An impact that alters the character of the environment in a manner consistent with existing and emerging trends.
	Significant	An impact, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
	Profound	An impact which obliterates sensitive characteristics.
Duration	Short-term	Impact lasting one to seven years.
	Medium-term	Impact lasting seven to fifteen years.
	Long-term	Impact lasting fifteen to sixty years.
	Permanent	Impact lasting over sixty years.
	Temporary	Impact lasting for one year or less.
Type	Cumulative	The addition of many small impacts to create one larger, more significant impact.
	'Do Nothing'	The environment as it would be in the future should no development of any kind be carried out.
	Indeterminable	When the full consequences of a change in the environment cannot be described.
	Irreversible	When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost.
	Residual	Degree of environmental change that will occur after the proposed mitigation measures have taken effect.
	Synergistic	Where the resultant impact is of greater significance than the sum of its constituents.
	'Worst Case'	The impacts arising from a development in the case where the mitigation measures may substantially fail.

Table 9-3 — Criteria for Rating Site Importance of Geological Features (IGI, 2013)

Importance	Criteria	Typical Example
Very High	Attribute has a high quality, significance or value on a regional or national scale. Degree or extent of soil contamination is significant on a national or regional scale. Volume of peat and/or soft organic soil underlying route is significant on a national or regional scale.	Geological feature rare on a regional or national scale (NHA). Large existing quarry or pit. Proven economically extractable mineral resource.
High	Attribute has a high quality, significance or value on a local scale. Degree or extent of soil contamination is significant on a local scale. Volume of peat and/or soft organic soil underlying route is significant on a local scale.	Contaminated soil on site with previous heavy industrial usage. Large recent landfill site for mixed wastes. Geological feature of high value on a local scale (County Geological Site). Well drained and/or high fertility soils. Moderately sized existing quarry or pit. Marginally economic extractable mineral resource.
Medium	Attribute has a medium quality, significance or value on a local scale. Degree or extent of soil contamination is moderate on a local scale. Volume of peat and/or soft organic soil underlying route is moderate on a local scale.	Contaminated soil on site with previous light industrial usage. Small recent landfill site for mixed wastes. Moderately drained and/or moderate fertility soils Small existing quarry or pit. Sub-economic extractable mineral resource.
Low	Attribute has a low quality, significance or value on a local scale. Degree or extent of soil contamination is minor on a local scale. Volume of peat and/or soft organic soil underlying route is small on a local scale.	Large historical and/or recent site for construction and demolition wastes. Small historical and/or recent landfill site for construction and demolition wastes. Poorly drained and/or low fertility soils. Uneconomically extractable mineral resource.

Table 9-4 — Criteria for Rating Impact Significance at EIAR Stage - Estimation of Magnitude of Impact on Geological Attribute (IGI, 2013).

Magnitude of Impact	Criteria	Typical Example
Large Adverse	Results in loss of attribute.	▪ Loss of high proportion of future quarry or pit reserves. ▪ Irreversible loss of high proportion of local high fertility soils. ▪ Removal of entirety of geological heritage feature. ▪ Requirement to excavate / remediate entire waste site. ▪ Requirement to excavate and replace high proportion of peat, organic soils and/or soft mineral soils beneath alignment.
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute.	▪ Loss of moderate proportion of future quarry or pit reserves. ▪ Removal of part of geological heritage feature.

		▪ Irreversible loss of moderate proportion of local high fertility soils. ▪ Requirement to excavate / remediate significant proportion of waste site. ▪ Requirement to excavate and replace moderate proportion of peat, organic soils and/or soft mineral soils beneath alignment.
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute.	▪ Loss of small proportion of future quarry or pit reserves. ▪ Removal of small part of geological heritage feature. ▪ Irreversible loss of small proportion of local high fertility soils and/or high proportion of local low fertility soils. ▪ Requirement to excavate / remediate small proportion of waste site. ▪ Requirement to excavate and replace small proportion of peat, organic soils and/or soft mineral soils beneath alignment.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity.	No measurable changes in attributes.
Minor Beneficial	Results in minor improvement of attribute quality.	Minor enhancement of geological heritage feature.
Moderate Beneficial	Results in moderate improvement of attribute quality.	Moderate enhancement of geological heritage feature.
Major Beneficial	Results in major improvement of attribute quality.	Major enhancement of geological heritage feature.

Table 9-5 — Rating of Significant Environmental Impacts at EIAR Stage (IGI, 2013)

Importance of Attribute	**Magnitude of Impact**			
	Negligible	**Small Adverse**	**Moderate Adverse**	**Large Adverse**
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant/Moderate	Profound/Significant	Profound
High	Imperceptible	Moderate/Slight	Significant/Moderate	Profound/Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/Moderate

9.3.2 Limitations and Difficulties Encountered

This technical assessment has been prepared with no identified significant limitations or difficulties that would impact on the findings of this assessment.

9.4 Receiving Environment

9.4.1 Study Area

A desk-based assessment has been completed with regard to relevant best practice guidance from the Institute of Geologists of Ireland (IGI) (2013) 'Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements'.

This section provides a description of the land, soils and geology in the Study Area of the Proposed Development and also takes into account the current and historical land uses within the Study Area.

The Study Area for the assessment has been defined with regard to the extent of potential direct and indirect impacts on soils, geology and hydrogeological receptors which includes all lands denoted by the Proposed Development boundary and within a 2 km buffer. This is considered to be a sufficient area to provide a comprehensive baseline assessment. Where appropriate, information obtained from outside the study area will be considered if doing so allows for an improved understanding of the receiving environment. The Proposed Development refers to the development in its entirety, including all aspects denoted by the Project boundary as per below.

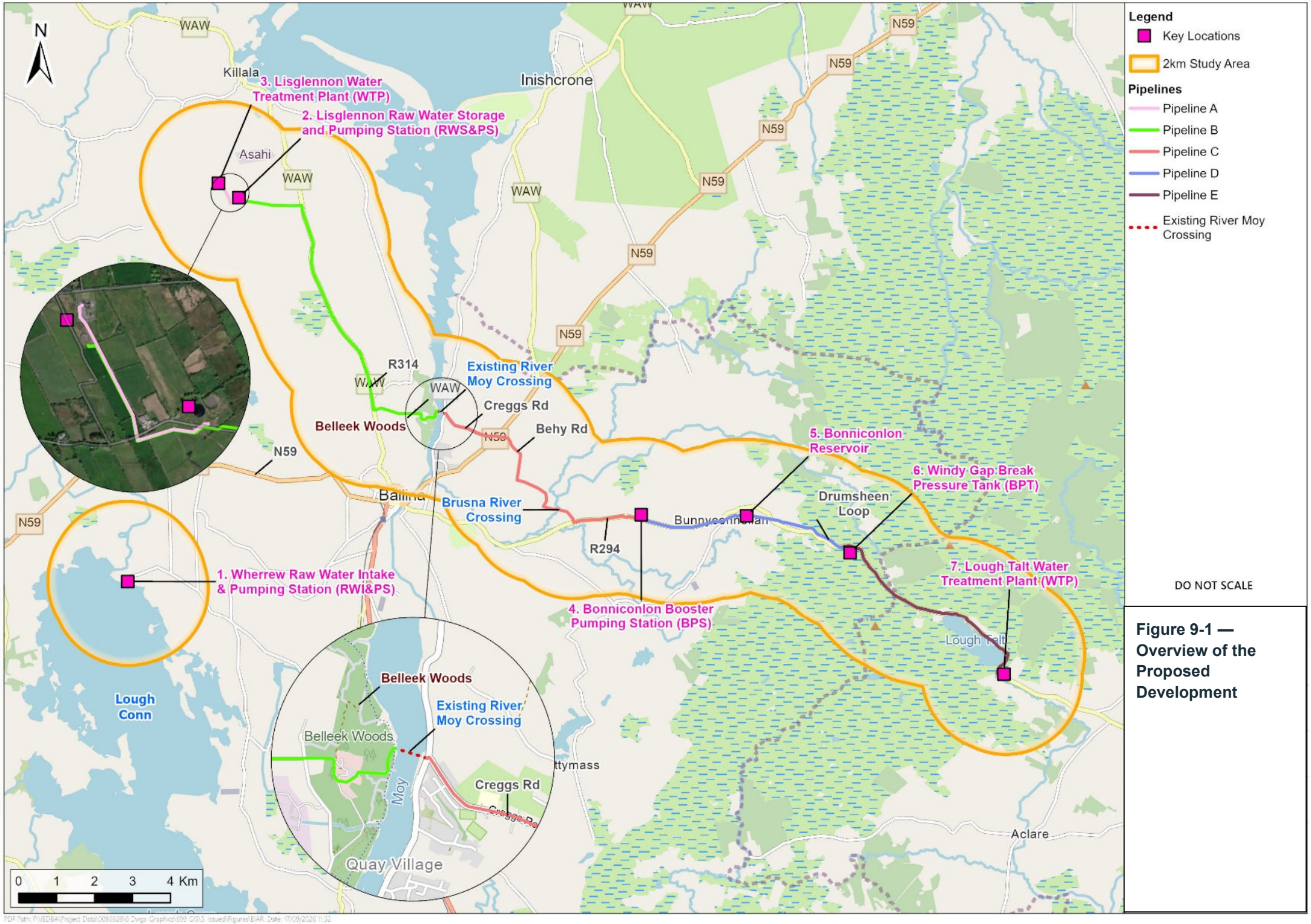


Figure 9-1 — Overview of the Proposed Development

9.4.2 Future Baseline

In the absence of the Proposed Development, provided there are no significant changes to the baseline environment as a result of development in the surrounding area, the continued abstraction at Lough Talt is unlikely to affect receptors related to land, soils and geology as the activity is not considered to place environmental pressures on geological receptors.

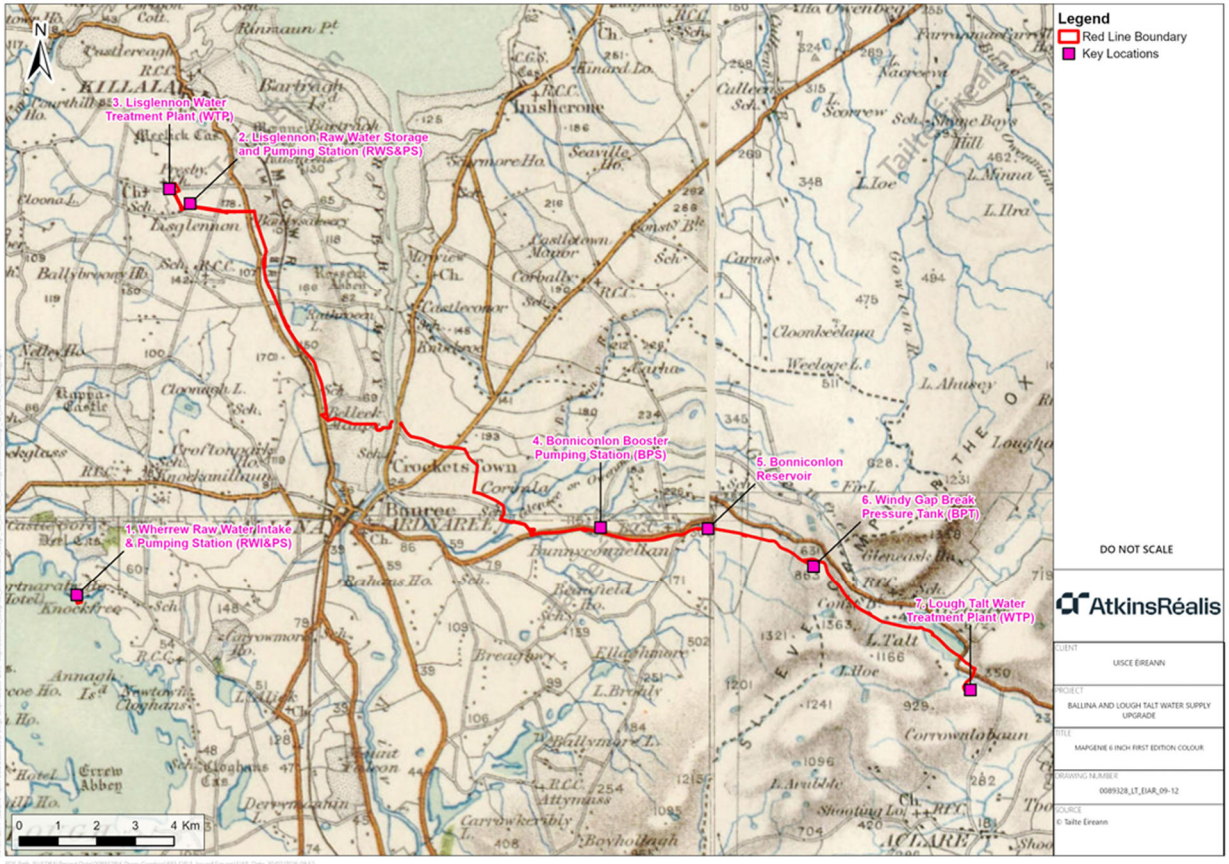
9.4.3 Site Development

Historical maps (including available 6-inch historical maps and aerial photographs (1995 to 2018) from Tailte Éireann (Tailte Éireann, 2026) have been used to ascertain the current and historical land use (Table 9-6). The land within the Proposed Development generally crosses existing roadways with small sections identified to be greenfield (including the BPS, BPT and small sections (approx. 2.5 km) of the treated water pipeline). The existing Wherrew Raw Water Intake and Pumping Station, the existing Lisglennon Raw Water Storage and Pumping Station, the existing Lisglennon Water Treatment Plant, existing Bonniconlon Reservoir and existing Lough Talt Water Treatment Plant are brownfield (developed land).

The proposed treated water pipeline route corridor between Lisglennon WTP and Lough Talt WTP extends for approximately 30.2 km. The route corridor has been developed to follow existing public roads, existing utility corridors and existing pipeline alignments where practicable, with sections across private lands.

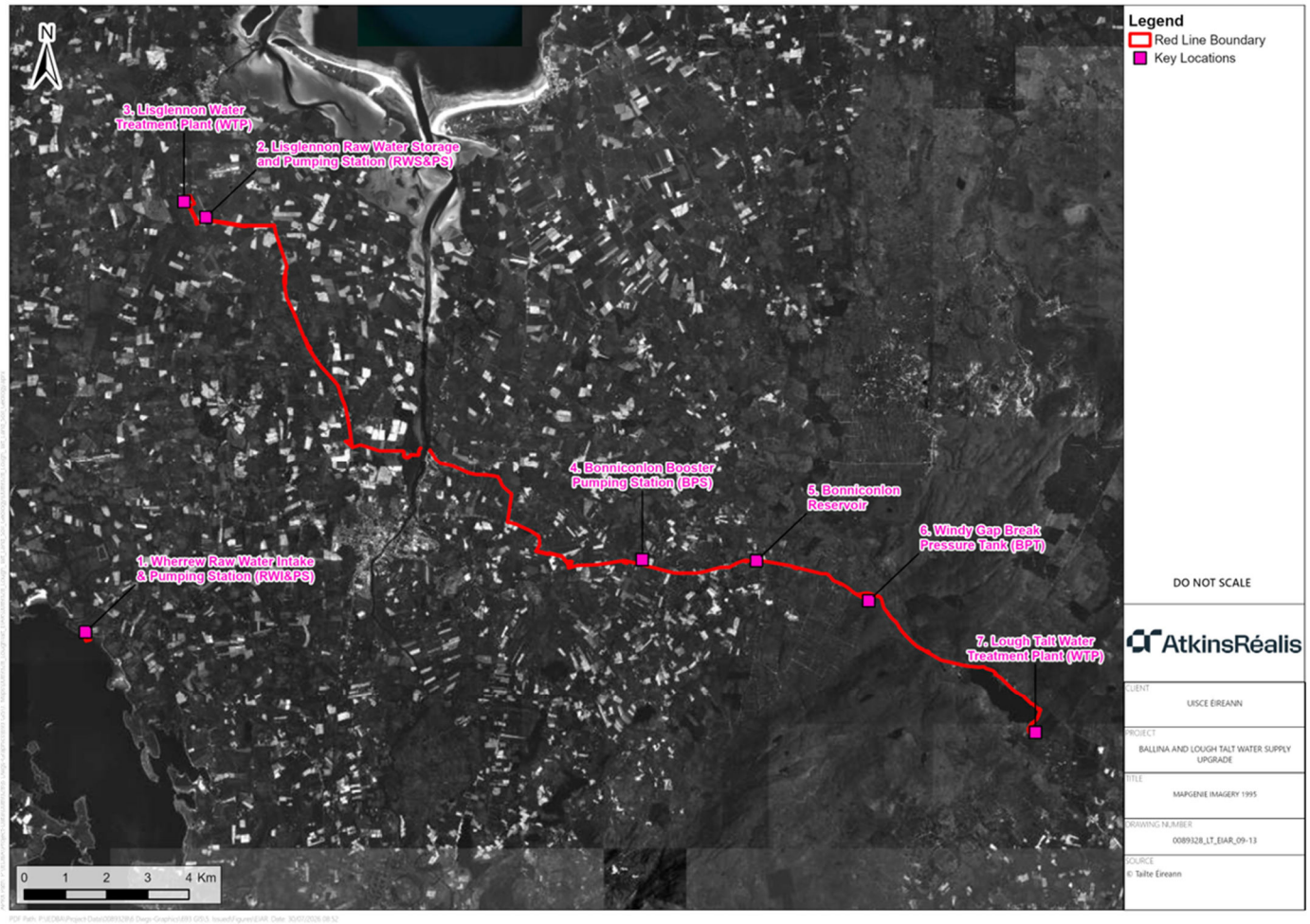
While the surrounding lands have developed slowly since the late twentieth century, agriculture remains the primary land use.

Table 9-6 — Historical mapping of the Proposed Development – Historical Land Use

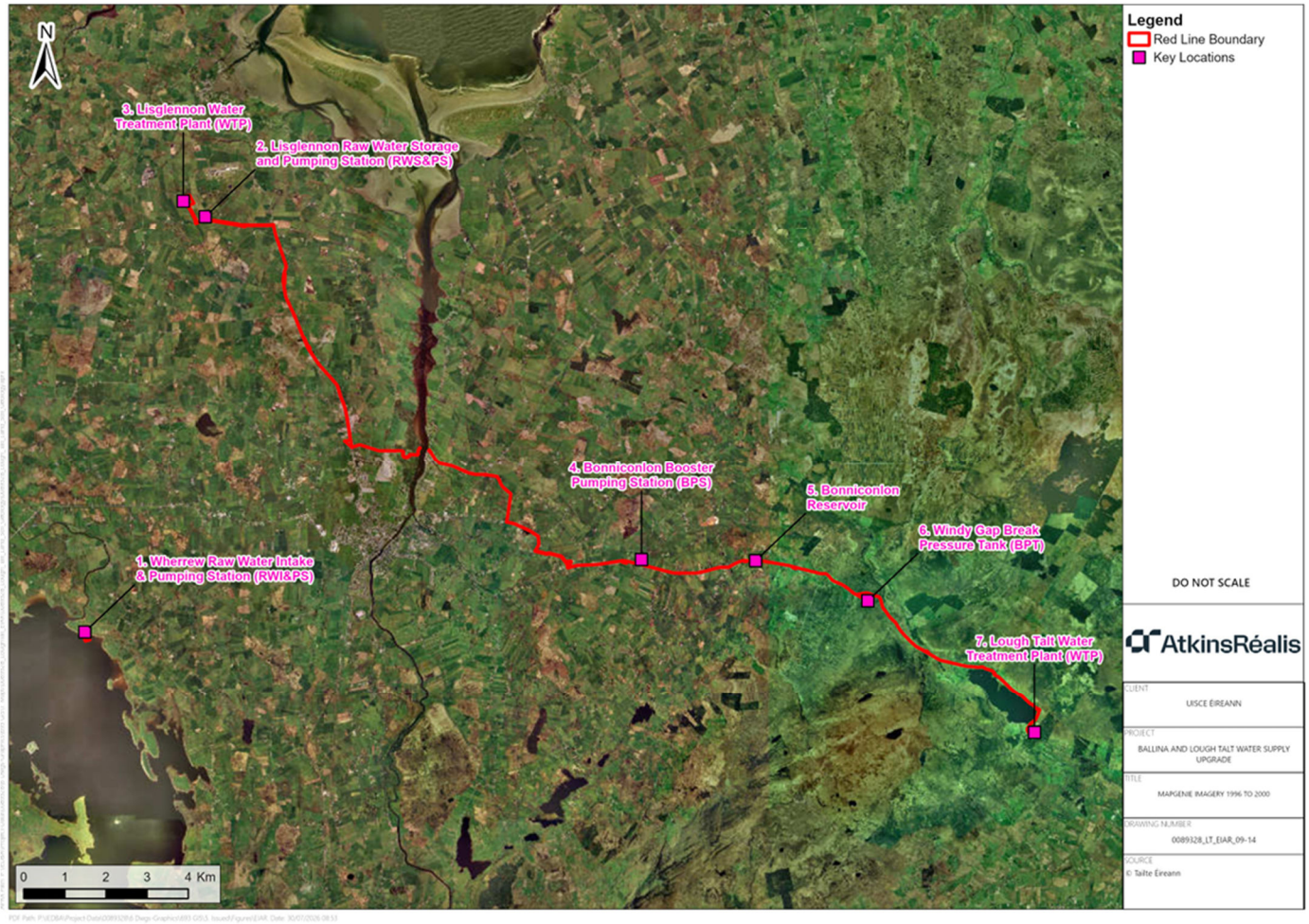
Description	
Map Genie 6 Inch First Edition 1829-1841 (Tailte Éireann, 2026) - The Proposed Development, and its surrounds is dominated by agricultural greenfield. The Proposed Pipeline Route predominantly follows the existing road network constructed prior to the mid 1800's with only small sections crossed by private agricultural / greenfield lands.	

Map Genie 1995 (Tailte Éireann, 2026) – Development of Wherrew Raw Water Pumping Station, Lisglennon Water Treatment Plant, Mayo Renewable Power - Killala and Lough Talt Water Treatment Plant.

The Proposed Pipeline Route follows predominantly existing road network with only small sections crossed by private agricultural / greenfield lands.

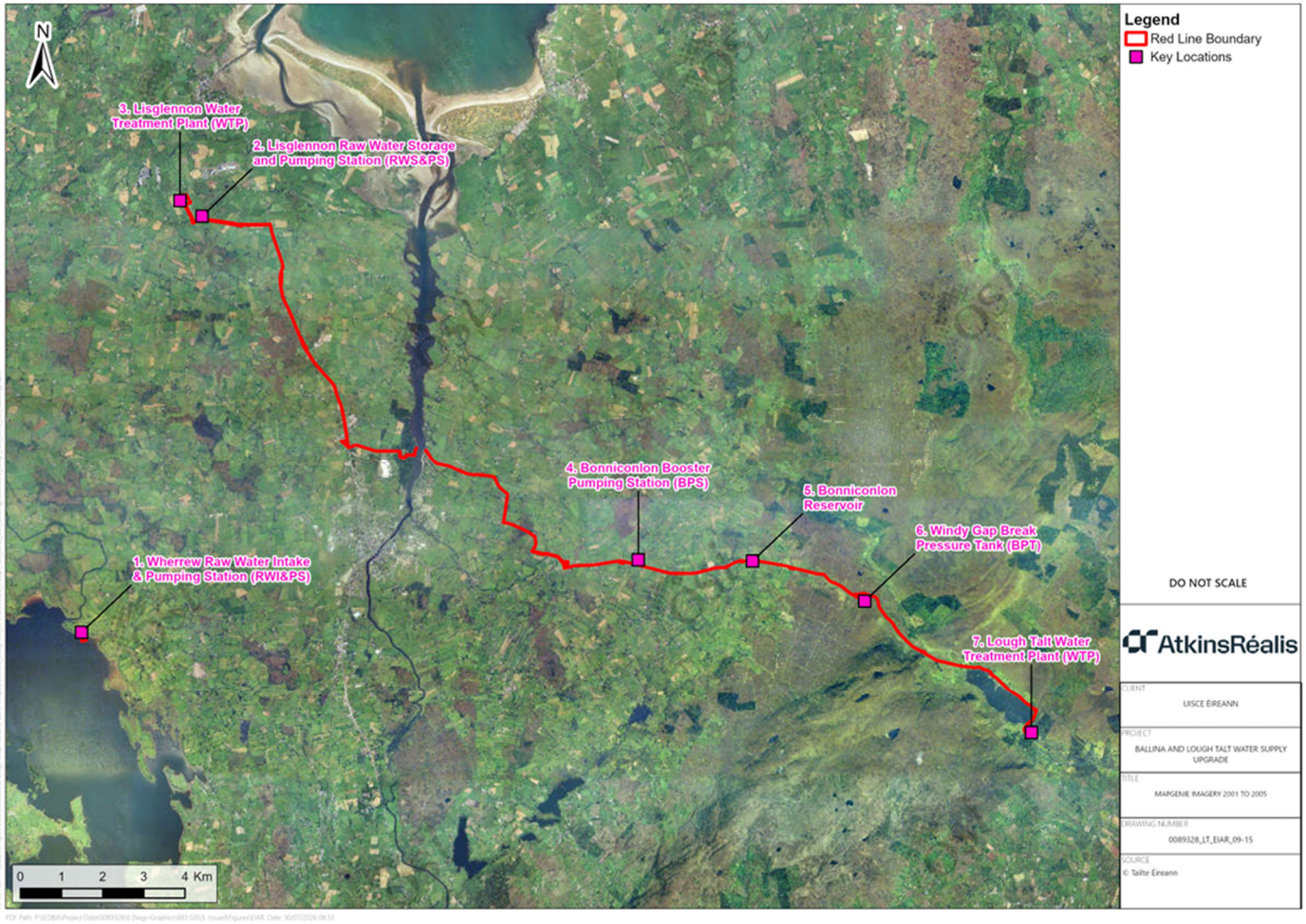


Map Genie 1996 to 2000 (Tailte Éireann, 2026) – No significant changes noted.

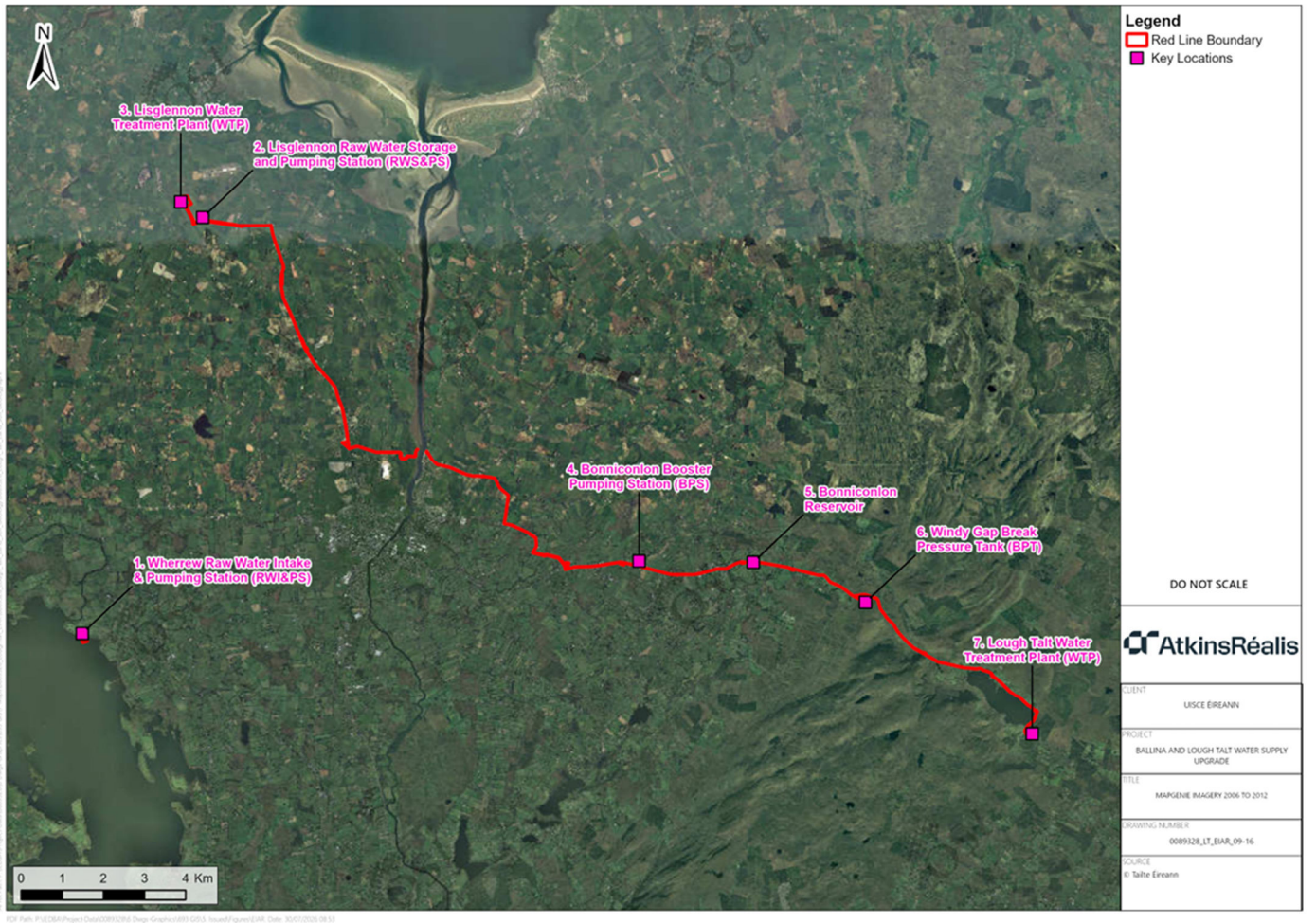


Map Genie 2001-2005 (Tailte Éireann, 2026) – Minor changes noted.

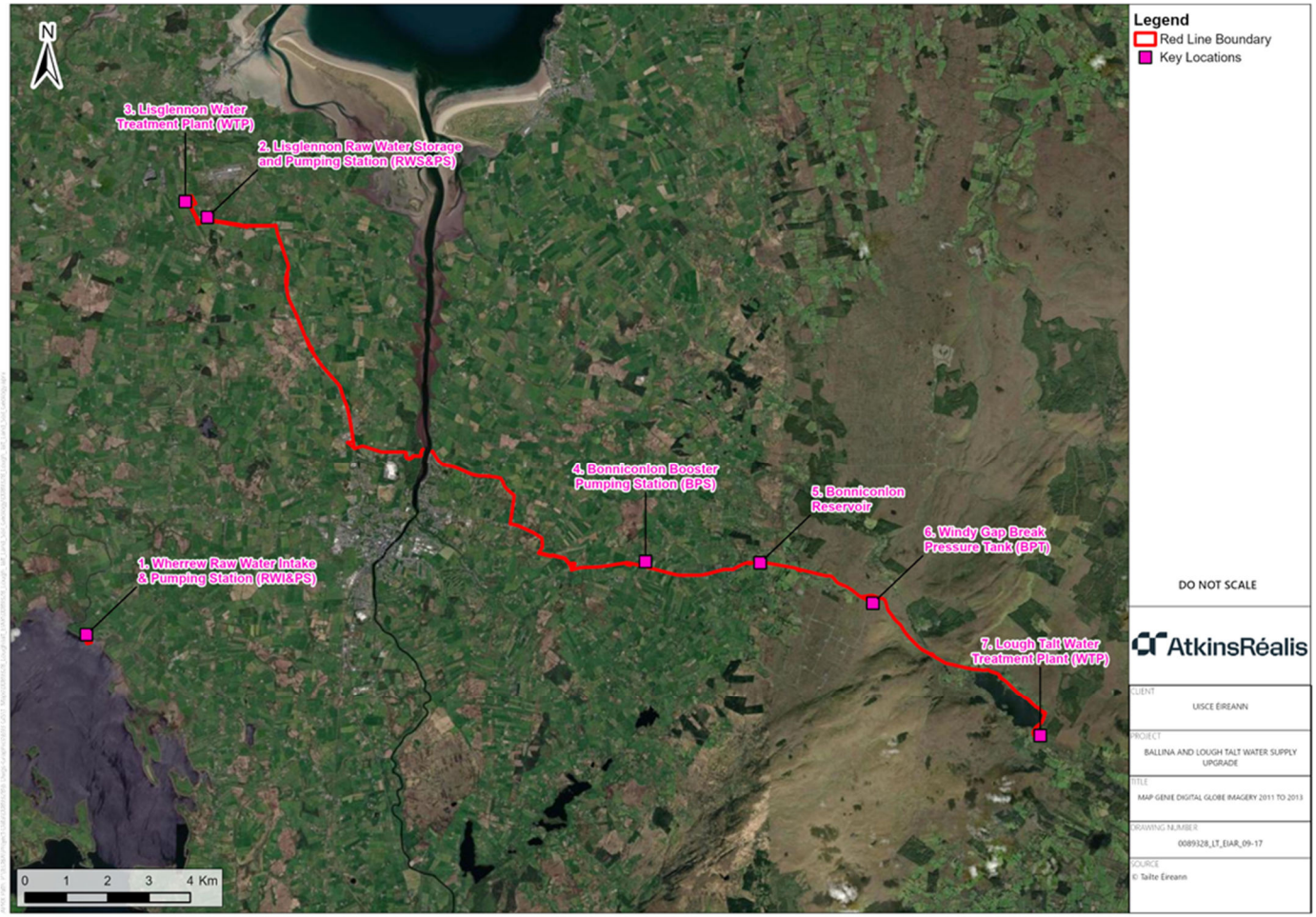
Residential Development is present to the west of Lough Talt Water Treatment Plant, in Bonniconlon Village and within Ballina Town. Additional quarry located ca. 640 m northwest of Lisglennon WTP (Killala Rock Quarry).



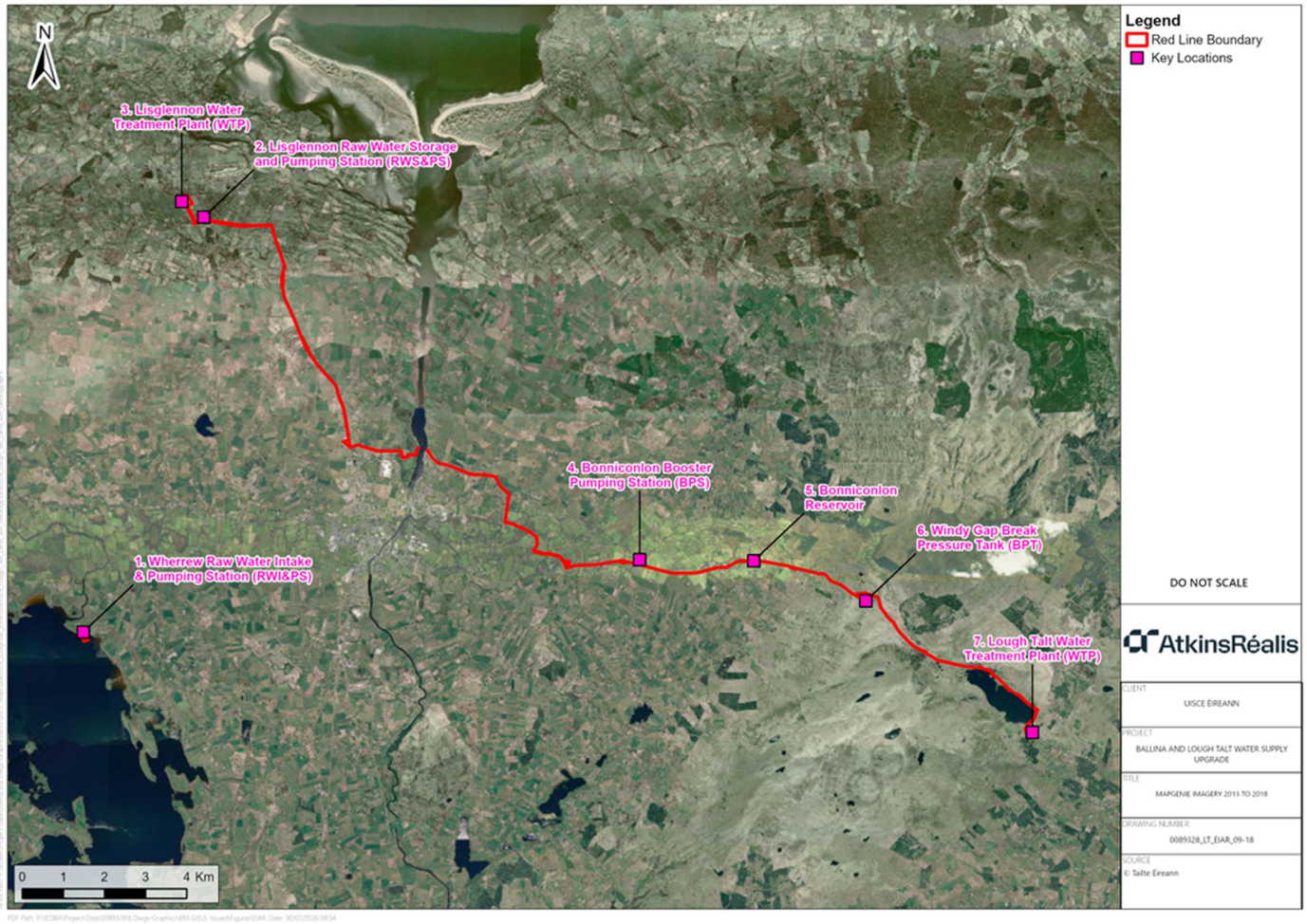
Map Genie 2006-2012 (Tailte Éireann, 2026) – No significant changes noted



Map Genie 2011-2013 (Tailte Éireann, 2026) – No significant changes noted.



Map Genie 2013-2018 **(Tailte Éireann, 2026)** – No significant changes noted.



9.4.4 Current Site Setting

9.4.4.1 Wherrew Raw Water Intake & Pumping Station (RWI&PS) and existing transfer mains to Lisglennon RWPS

The existing site at Wherrew, Cloghans, Ballina, Co. Mayo is located at the top of small bay known as Kent's Pool, on the north-eastern shoreline of Lough Conn. The shoreline is comprised of rock/gravel coverage and grass brush land. The site is adjacent to the mouth of the River Deel, which enters Lough Conn to the north around a headland.

The existing development consists of a raw water intake channel, a raw water intake structure, raw water pumping station and transfer pipelines.

Refer to Chapter 3 – Project Description, Volume 2 of the EIAR for further details on site setting.

9.4.4.2 Lisglennon Raw Water Storage & Pumping Station

The existing Lisglennon RWS&PS site at Lisglennon, Ballina, Co. Mayo, is bounded to the northwest and northeast by a wire fence in addition to hedgerow and mature trees. Access to the site is from the L11109.

Refer to Chapter 3 – Project Description, Volume 2 of the EIAR for further details on site setting.

9.4.4.3 Pipeline A – Lisglennon RWS&PS to Lisglennon WTP

The existing 300 mm internal diameter raw water pipeline leaves Lisglennon RWS&PS, follows the L11109 for approximately 150 m, then continues off-road through private agricultural lands in the Lisglennon area before crossing beneath the L11109 and extending northwards to the Lisglennon WTP inlet chamber. The total length of the existing pipeline corridor is approximately 1 km.

9.4.4.4 Lisglennon Water Treatment Plant

Lisglennon WTP is an existing operational water treatment plant located at Lisglennon, Killala, Co. Mayo. The site comprises a part single-storey and part two-storey treatment building, associated treatment infrastructure, treated water storage, access roads, hardstanding and ancillary operational areas. The WTP is set back from the adjoining L1111 road and is contained within a defined operational site boundary.

The front of the site is bounded by an approximately 1.5 m high stone wall, with fencing along the side boundaries and approximately 2 m high fencing and gates enclosing the rear of the site. Access is provided via an existing splayed entrance from the L1111 road, which connects to internal access roads and operational hardstanding areas within the site. A landscaped lawn area is located to the front of the main treatment building, while the treated water storage reservoir is located in the south-western portion of the site.

The site is situated within a predominantly rural and agricultural setting. Agricultural lands adjoin the site to the west, east and south. The wider surrounding area includes rural residential properties, agricultural lands, quarrying activity approximately 800 m to the west, and Killala Business Park, including Tawnaghmore Power Station, to the northwest. The nearest residential receptors are located to the north of the WTP site. Mullafarry Presbyterian Church is also located to the north of the site and is listed on the National Inventory of Architectural Heritage as being of regional significance due to its architectural, artistic, historical and social interest.

Refer to Chapter 3 – Project Description, Volume 2 of the EIAR for further details on site setting and existing infrastructure.

9.4.4.5 Treated Water Pipelines B, C D and E: Lisglennon WTP to Lough Talt WTP

The existing treated water pipeline from Lisglennon WTP is located parallel to the proposed treated water pipeline corridor. The breakdown of the treated water pipeline is as below:

Pipeline B – Lisglennon WTP to River Moy Crossing;

Pipeline C – River Moy Crossing to Bonniconlon BPS;

Pipeline D – Bonniconlon BPS to Windy Gap BPT; and

Pipeline E – Windy Gap BPT to Lough Talt WTP.

9.4.4.6 Bonniconlon Booster Pumping Station (BPS)

The proposed Bonniconlon BPS site is situated at Carralavin, Bonniconlon, Ballina, Co. Mayo. It is a greenfield site located at the junction of the R294 Ballina Road and L5135 Carrownlabaun, approx. 1.8 km west of Bonniconlon. The site is bounded to the east and south by a sod ditch with areas of hedgerows further along the eastern boundary, and on the northern and western boundaries. There is an agricultural gate on the eastern boundary of the site. The River Srafaungal runs through the field on the other side of the L5135 before continuing under the R294.

Refer to Chapter 3 – Project Description, Volume 2 of the EIAR for further details on site setting.

9.4.4.7 Windy Gap Break Pressure Tank (BPT)

The proposed site is located in the vicinity of the Bunnyconnellan Wind Farm granted planning permission in 2013 under Planning Application Ref. 10/514 and Appeal Ref. PL16.241506 and which comprises twelve 2.3 MW wind turbines. The wind farm site was fully commissioned in 2020 and is therefore considered part of the baseline environment. The proposed site utilises the existing access road of the wind farm.

The site is located off the R294 which connects Bonniconlon to the west with Lough Talt to the east. The wider area is rural in nature, comprising areas of heavy overgrowth and areas of bogland. The topography of the area varies across the landscape significantly, the areas to the north of the site are generally flat, with the landscape rising to a peak to the north of the site along the Mayo and Sligo border.

The site itself is located above the level of the road, but it is generally flat and is not visible from the public road. It is accessed via a private road / commonage which also provides vehicular access to the wind farm. The access road to the site is gated.

Refer to Chapter 3 – Project Description, Volume 2 of the EIAR for further details on site setting.

9.4.4.8 Lough Talt WTP

The site comprises the existing Lough Talt Water Treatment Plant (WTP) which consists of a Control building, a disused Microstrainer building, chemical storage tanks, Chlorine contact tank and other associated process units and infrastructure.

The site is accessed via a shared vehicular entrance on the east of the site, which also provides access to the Coillte lands to the north. There is an existing gated access to the south of the site boundary however this is no longer in use. The site runs parallel to the R294 which bounds the site to the south. The site is separated from the roadway by an approx. 2 m high wire fence which runs along the perimeter of the entire WTP site. The overall site is topographically flat in nature; however, the site sits above the level of the road, with the site falling towards the road along the boundary. The lands to the north of the site rise north along the ridge line which travels northeast. The site is located approx. 250 m southeast of Lough Talt.

Refer to Chapter 3 – Project Description, Volume 2 of the EIAR for further details on site setting and existing infrastructure.

9.4.4.9 New Bonniconlon Reservoir

The site is located off the L51172 at Bonniconlon West, in the vicinity of a junction with a private access road, east of the L5117. The surrounding area is predominantly rural and agricultural in character, with a number of residential properties located in the wider vicinity.

Refer to Chapter 3 – Project Description, Volume 2 of the EIAR for further details on site setting.

9.4.4.10 Topography

A Stage 1 Flood Risk Assessment (accompanies this report as Appendix 10-2, Volume 3 of the EIAR) was prepared by AtkinsRéalis (2026) which summarises the topography at each of the principal infrastructure sites as follows:

Wherrew Raw Water Intake & Pumping Station (RWI&PS) – *'According to detailed digital elevation models (DEM) and topographic survey data, site elevations range from approximately 7 m above Ordnance Datum (OD) at the lakeshore and intake, to around 18 m OD at the upper edge of the site, near the internal access road*.'

Lisglennon Water Treatment Plant (WTP) – '*The Lisglennon WTP is sited on a gently undulating plateau at elevations between approximately 48.0 m and 53.6 m OD.'*

Lisglennon RWPS Upgrade – *'The topography of the Lisglennon RWPS site ranges predominantly between approximately 42.5 m and 53.6 m above Ordnance Datum (OD).'*

Bonniconlon Booster Pumping Station (BPS) – *'Ground elevations across the operational footprint range from approximately 36.0 m OD at the lower yard boundary to just above 40.0 m OD at the highest point towards the northwest of the compound.'*

Bonniconlon Reservoir – *'site elevations range from approximately 90 m OD at the road frontage, gently rising to above 98 m OD at the western and southern margins of the compound.'*

Lough Talt – Windy Gap Break Pressure Tank (BPT) – *'The finished platform, berm, and all critical assets are set between 199 m and 214 m OD.'*

Lough Talt WTP – *'ground levels within the operational site generally range from approximately 119 m OD near the lake's edge, rising to over 125 m OD at the southern boundary of the compound.'*

Ballina-Lough Talt Water Supply Zone (WSZ) Trunk main – *'The topographic profile along the trunk main's alignment is diverse:*

- Lisglennon to Ballina (West): *The route begins on low, gently undulating agricultural plains, with elevations generally below 60 metres above Ordnance Datum (OD).*
- Ballina Fringe and Moy Valley: *Approaching and entering Ballina, the land flattens further into the wide, low-lying floodplain of the River Moy, with elevations dropping to the 20–30 metre OD range.*
- Ballina to Ox Mountains (East*): As the main advances toward the Ox Mountains and Lough Talt, elevations rise steadily, ultimately reaching over 200 metres OD near the eastern terminus.*
- *Overall, the main trunk pipeline and associated offtakes traverse a full gradient from lowland pasture through expansive river valley to upland moor, with the alignment continuously optimized to follow the most advantageous topographic and engineering corridor. The varied local topography is directly addressed in the siting of all infrastructure nodes, with each site benefitting from suitable elevation, surface stability, and long-term accessibility.'*

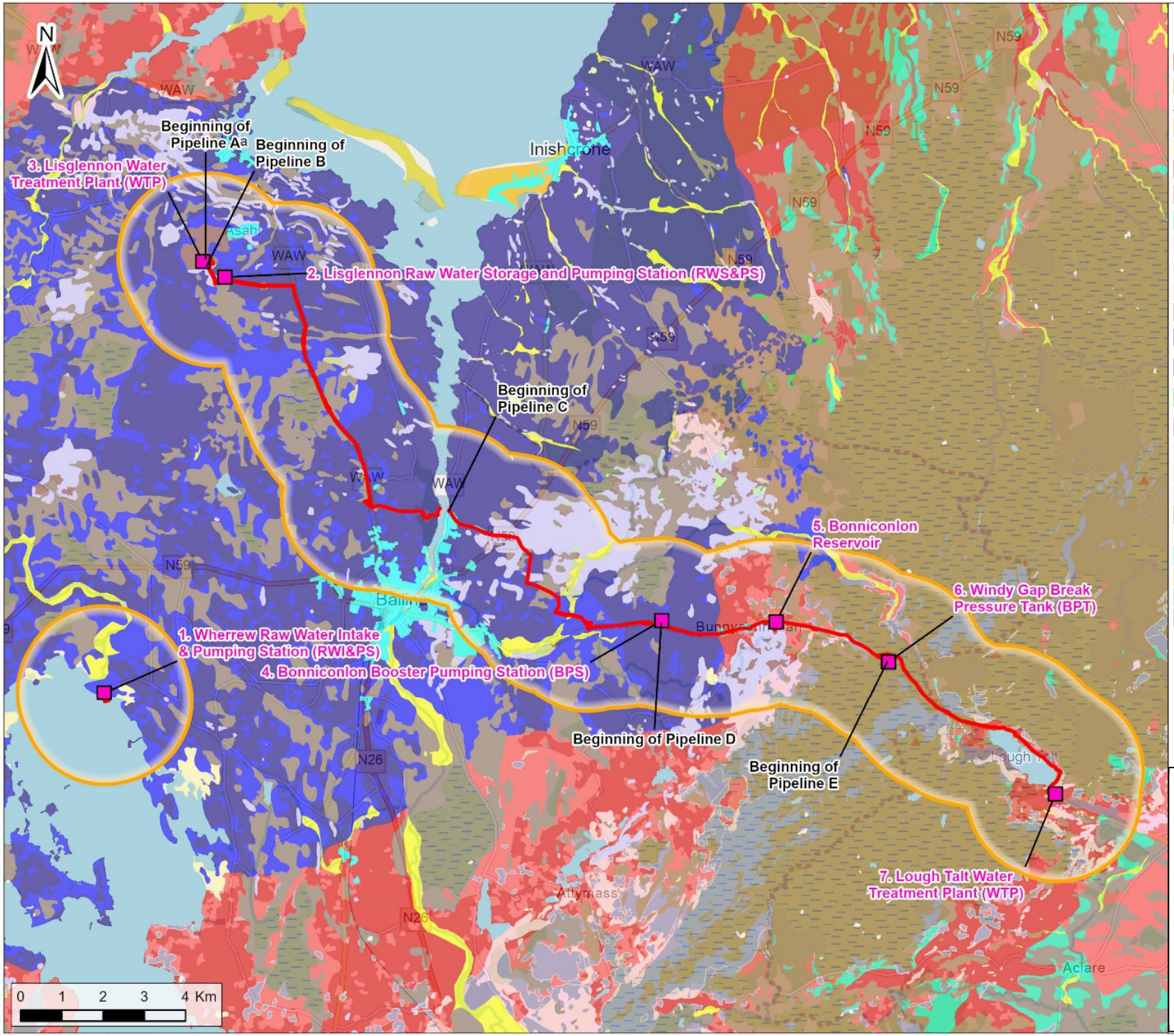
9.4.5 Soils

The Teagasc soils map (GSI, 2026) was consulted to identify the soils recorded to underlie the Proposed Development. Large sections of the Proposed Development between Lisglennon WTP and Bonniconlon Booster Pumping Station (BPS) are underlain by soils derived from limestone with some outcrops and bedrock. The eastern most portion of the Proposed Development surrounding Bonniconlon Reservoir, Windy Gap Break Pressure Tank (BPT) and Lough Talt WTP are largely underlain by metamorphic rocks. Bonniconlon Reservoir, Pipeline D, Windy Gap BPT, Pipeline B, Pipeline C and Pipeline E are underlain by Peat.

The identified soils and their corresponding locations within the Proposed Development are summarized in Table 9-7 and presented on Figure 9-2.

Table 9-7 — Teagasc Soils Underlying the Proposed Development (GSI, 2026)

Parent Material Name and Code	Soil Group	Irish Forest Soils (IFS) Code	Location Identified within Proposed Development
Till derived chiefly from limestone (TLs)	Grey Brown Podzolics, Brown Earths (medium-high base status)	BminDW	Wherrew RWI&PS, Pipeline A, Pipeline B, Pipeline C, Bonniconlon BPS, Pipeline D
Till derived chiefly from limestone (TLs)	Surface water Gleys, Ground water Gleys	BminPD	Wherrew RWI&PS, Pipeline B, Pipeline C, Bonniconlon BPS, Pipeline D
Bedrock at surface-Calcareous (RckCa)	Surface water Gleys (Shallow), Ground water Gleys (Shallow)	BminSP	Lisglennon WTP, Pipeline A, Pipeline B
Bedrock at surface-Non calcareous (RckNCa)	Lithosols, Regosols	AminSW	Pipeline E, Lough Talt WTP
Made Ground (Made)	Made/Built land	Made	Lisglennon RWS&PS, Pipeline A, Pipeline C, Pipeline D
Till derived from metamorphic rocks (TMp)	Acid Brown Earths, Brown Podzolics	AminDW	Bonniconlon Reservoir, Pipeline D, Pipeline E, Lough Talt WTP
Till derived from metamorphic rocks (TMp)	Surface water Gleys, Ground water Gleys	AminPD	Bonniconlon Reservoir, Pipeline D, Pipeline E
Till derived from metamorphic rocks (TMp)	Podzols (Peaty), Lithosols, Peats	AminSRPT	Pipeline D, Pipeline E
Glaciofluvial sands and gravels (GLs)	Surface water Gleys (Shallow), Ground water Gleys (Shallow)	BminSP	Pipeline C, Bonniconlon Reservoir, Pipeline D
Glaciofluvial sands and gravels (GLs)	Renzinas, Lithosols	BminSW	Pipeline C, Bonniconlon reservoir, Pipeline D
Glaciofluvial sands and gravels (GMp)	Surface water Gleys (Shallow), Ground water Gleys (Shallow)	AminSP	Pipeline D
Peat	Basin Peats, Blanket Peats (some)	Cut	Pipeline B, Pipeline C
Peat	Blanket Peats	BktPt	Bonniconlon Reservoir, Pipeline D, Windy Gap BPT, Pipeline E
Alluvium	Alluvium undifferentiated	AlluvMIN	Pipeline C



Legend

- Key Locations
- Red Line Boundary
- 2km Study Area

Soil Type

- AeoUND - Aeolian Undifferentiated
- AlluvMIN - Mineral Alluvium
- AminDW - Acid Brown Earths / Brown Podzolics
- AminPD - Surface Water Gleys / Ground Water Gleys Acidic
- AminPDPT - Peaty Gleys Acidic
- AminSP - Surface Water Gleys / Ground Water Gleys Shallow
- AminSRPT - Podzols Peaty
- AminSW - Lithosols / Regosols
- BktPt - Blanket Peat
- BminDW - Grey Brown Podzolics / Brown Earths Basic
- BminPD - Surface Water Gleys / Ground Water Gleys Basic
- BminPDPT - Peaty Gleys Basic Parent Materials Basic
- BminSP - Surface Water Gleys / Ground Water Gleys Shallow
- BminSPPT - Peaty Gleys Shallow
- BminSRPT - Lithosols Peats
- BminSW - Renzinas / Lithosols
- Cut - Raised Bog Cutaway/Cutover
- Lac
- Made
- MarSands
- MarSed
- Scree

DO NOT SCALE

Figure 9-2 — Teagasc Soil Maps (GSI, 2026)

9.4.5.1 Subsoil Permeability

The published Subsoil Permeability map (GSI, 2026) records the permeability of the subsoils in Ireland. The map shows the subsoil permeability category at any point on the land surface as long as the subsoil is greater than 3 m thick. There are three categories: 'High', 'Moderate' or 'Low'. Refer to Table 9-8 for a breakdown of subsoil permeability underlying the Proposed Development components.

Table 9-8 — Subsoil Permeability underlying the Proposed Development (GSI, 2026)

Subsoil Permeability Description	Subsoil Permeability Code	Location Identified within Proposed Development
High	H	Pipeline C, Pipeline D, Windy Gap BPT
Moderate	M	Wherrew RWI&PS, Lisglennon RWS&PS, Pipeline A, Pipeline B, Pipeline C, Bonniconlon BPS, Pipeline D, Windy Gap BPT, Pipeline E
Low	L	Pipeline D, Windy Gap BPT
Not Mapped[1]	Not Mapped	Lisglennon WTP, Lisglennon RWS&PS, Pipeline A, Pipeline B, Pipeline C, Pipeline D, Pipeline E, Lough Talt WTP
Water	Water	Wherrew RWI&PS

9.4.5.2 Quaternary Sediments

The primary superficial / quaternary sediments map (GSI, 2026) was consulted to identify the sediments underlying the Proposed Development. The sediments and their corresponding locations within the Proposed Development are summarized in Table 9-9 and presented on Figure 9-3.

Table 9-9 — Quaternary Sediments underlying the Proposed Development

Sediment Name and Code	Location Identified within Proposed Development
Till derived from limestone (TLs)	Wherrew RWI&PS, Pipeline A, Lisglennon RWS&PS, Pipeline B, Pipeline C, Pipeline D, Bonniconlon BPS
Bedrock outcrop or subcrop (Rck)	Lisglennon WTP, Pipeline A, Pipeline B, Pipeline E, Lough Talt WTP
Gravels derived from limestone (GLs)	Pipeline C, Pipeline D, Bonniconlon Reservoir
Gravels derived from granite (GGr)	Pipeline D
Till derived from granites (TGr)	Pipeline D
Blanket Peat (BktPt)	Pipeline D, Windy Gap BPT, Pipeline E
Till derived from metamorphic rocks (TMp)	Pipeline E, Lough Talt WTP
Cut over raised peat (Cut)	Pipeline B, Pipeline C
Alluvium (A)	Pipeline C
Urban	Pipeline C

[1] Data not mapped by the GSI

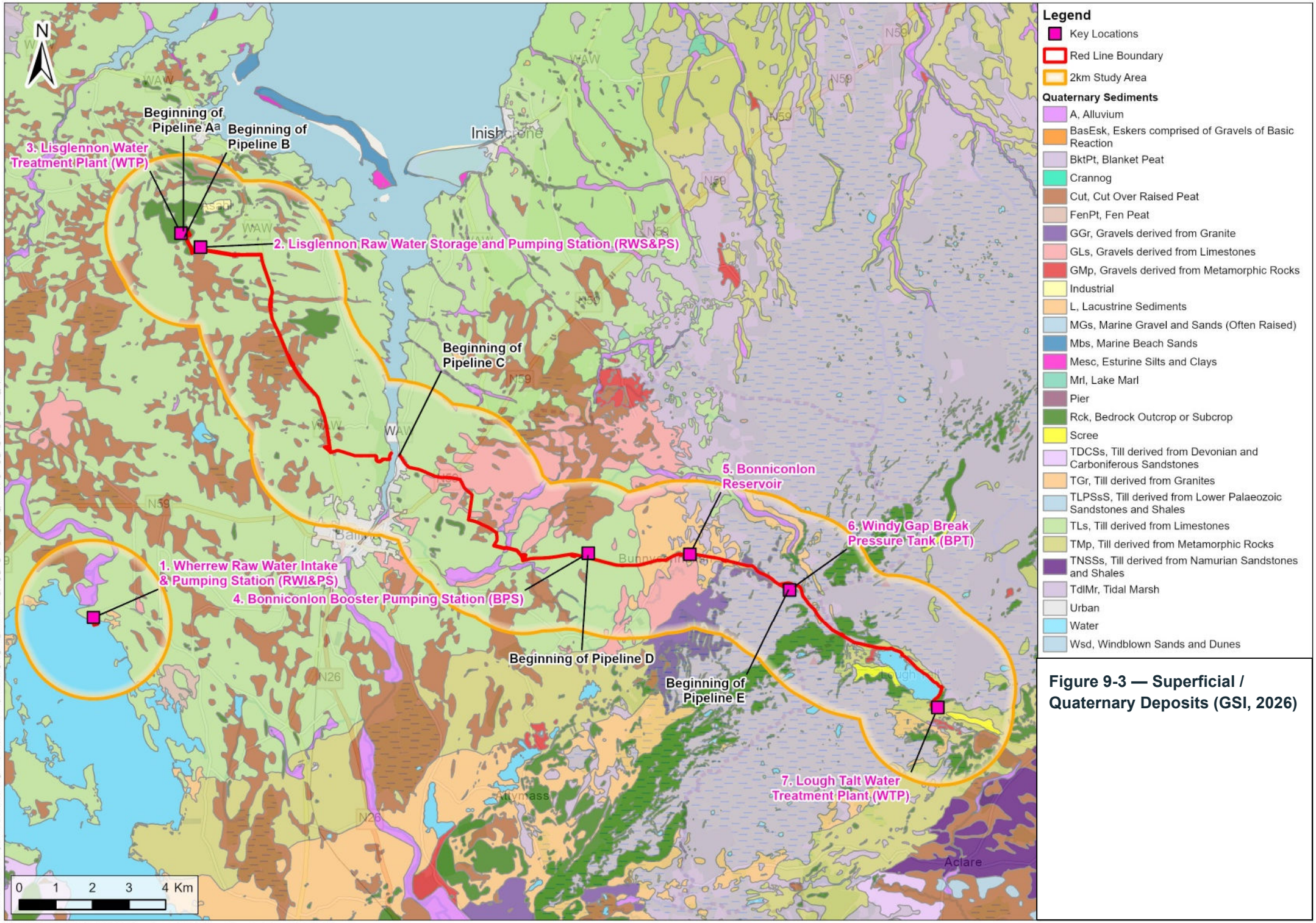


Figure 9-3 — Superficial / Quaternary Deposits (GSI, 2026)

9.4.6 Bedrock Geology

The GSI bedrock geology 100k map (GSI, 2026) was consulted to identify the formations underlying the Proposed Development. Limestone bedrock is the predominant geological unit underlying the Proposed Development as far as Bonniconlon Reservoir. In contrast, sections of the Proposed Development, including Pipeline D, Windy Gap, Pipeline E, and the route extending to the Lough Talt WTP, are underlain predominantly by metamorphic bedrock, comprising schist and aluminous schist formations.

The identified formations and their corresponding locations within the Proposed Development are summarized in Table 9-10 and presented on Figure 9-4.

Table 9-10 — Bedrock geology 100k formations underlying the Proposed Development (GSI, 2026)

Formation Name and Code	Description	Location Identified within Proposed Development
Ballina Limestone Formation (Upper) (BU)	Grey limestone and thin shale	Wherrew RWI&PS, Pipeline B, Bonniconlon BPS, Pipeline C, Pipeline D, Bonniconlon Reservoir
Ballina Limestone Formation (Lower) (BL)	Dark fine-grained limestone and shale	Lisglennon RWS&PS, Lisglennon WTP, Pipeline A, Pipeline B
Upper Attymass Formation (UA)	Schist and aluminous schist	Windy Gap BPT
Carrick O'Hara Formation (CO)	Semi-pelitic, minor psammitic, schist	Windy Gap BPT, Pipeline E
Meelick Member (UMme)	Schist, aluminous schist and pebble beds	Lough Talt WTP
Corradrishy Formation (CD)	Schist, thin marble and metavolanics	Pipeline E
Leckee Quartzitic Formation (LQ)	Pale psammite and quartzite	Pipeline E
Slieve Gamph Igneous Complex, equigranular	Equigranular granodiorite (Group 1)	Pipeline E
Slieve Gamph Igneous Complex, Muscovite Granite	Muscovite syenogranite, foliated	Pipeline E
Slievenagark Member	Semi-pelitic schist	Pipeline E

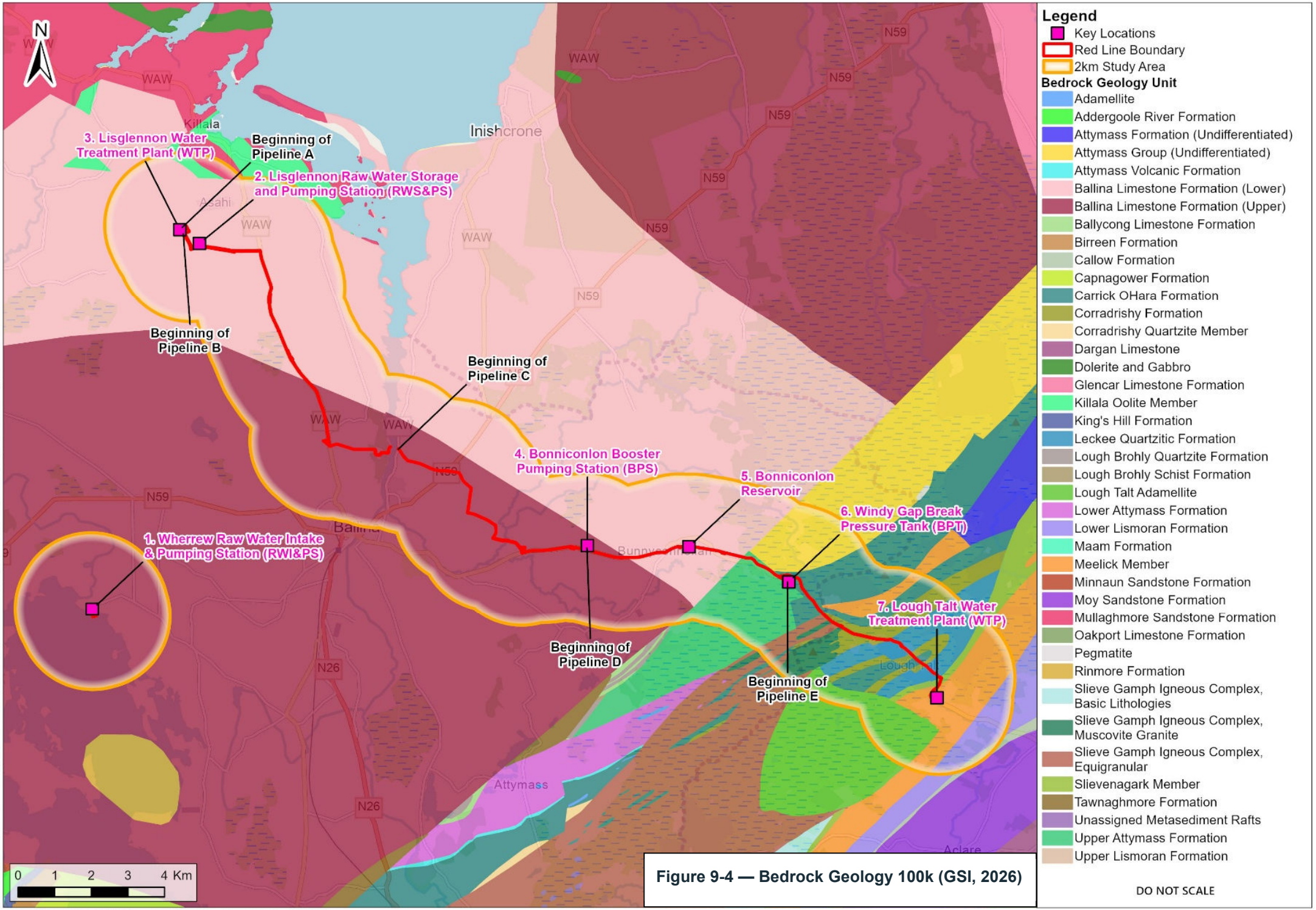


Figure 9-4 — Bedrock Geology 100k (GSI, 2026)

The Bedrock Geology 500k map (GSI, 2026) was consulted to identify the lithology underlying the Proposed Development. The identified lithology and its corresponding locations within the Proposed Development are summarized in Table 9-11 and presented in Figure 9-5.

Table 9-11 — Bedrock Geology 500k formations underlying the Proposed Development (GSI, 2026)

Name and Code	Description	Location Identified within Proposed Development
Marine shelf facies (64)	Limestone and calcareous shale	Wherrew RWI&PS, Lisglennon RWS&PS, Pipeline A, Pipeline B, Pipeline C, Bonniconlon BPS, Pipeline D, Bonniconlon Reservoir
Argyll Group (27)	Psammitic and pelitic schist, amphiboblite and diamictite	Pipeline D, Windy Gap BPT, Pipeline E, Lough Talt WTP
Argyll Group (26)	Quartzite	Pipeline E
Granite (8)	Granodiorite	Pipeline E

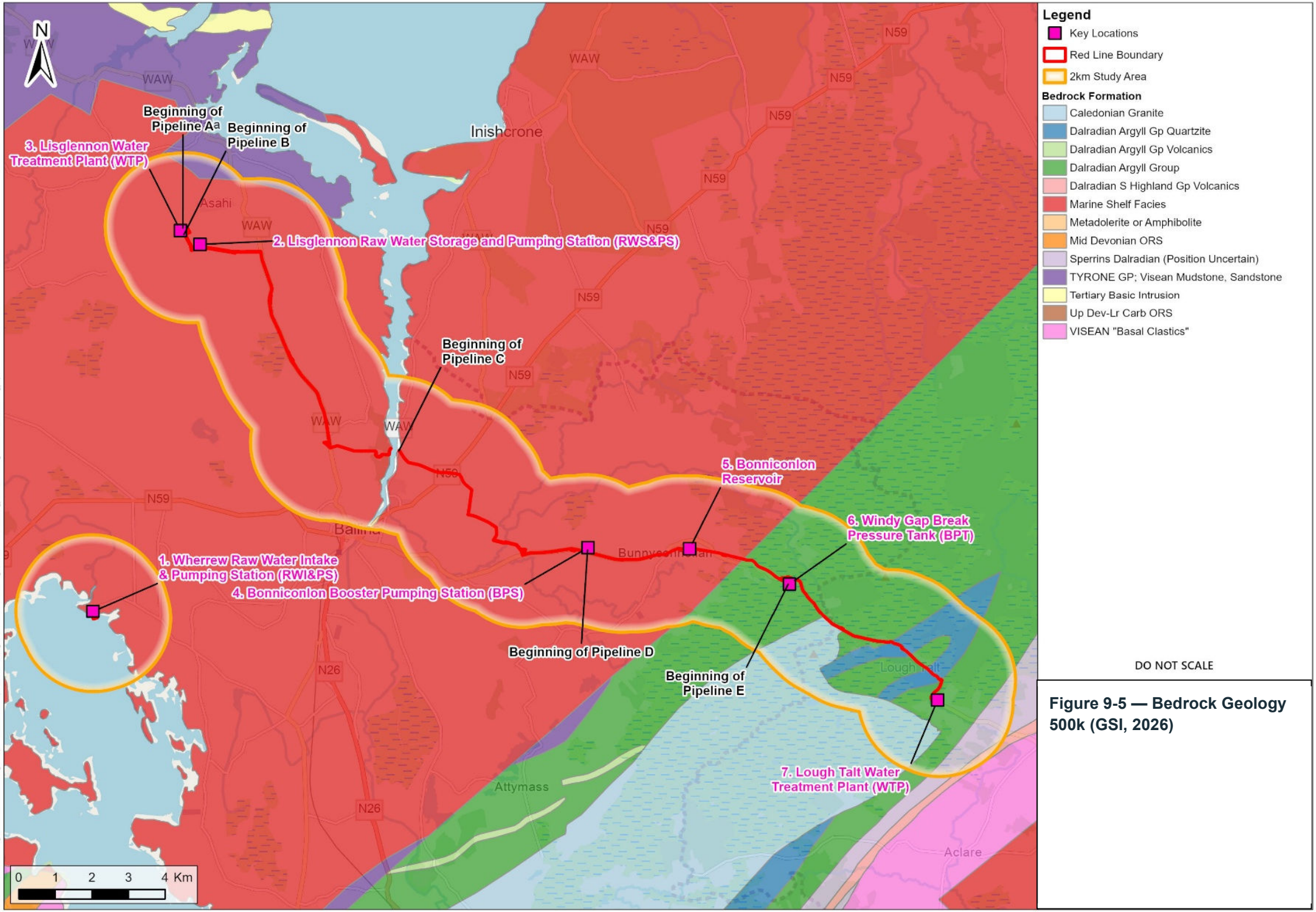


Figure 9-5 — Bedrock Geology 500k (GSI, 2026)

9.4.6.1 Karst Features

A map presenting known karst features shown on GSI web viewer (2026) is presented in Figure 9-6.

Based on regional mapping, there are no known recorded karst features located within the 2 km Study Area of the Proposed Development. The closest karst feature is located approximately 3 km west of Wherrew RWI&PS. This feature is recorded as a spring (IE_GSI_Karst_40K_1393) and is recorded to a locational accuracy of 20 m.

Karst landscapes are formed in areas underlain by carbonate and evaporite rocks, in this instance the Ballina Limestone Formation, as a result of dissolution of soluble rocks. Karst landscapes are typically characterised as having tertiary permeability in which high volumes of water can flow through a network of fractures or through larger conduits. As a result, there is the potential for cavities to exist in the limestone bedrock, either as void spaces or filled (water or sediment). Groundwater recharge can be high due to the presence of fast pathways, although this can also indicate a high vulnerability to contamination. The Proposed Development is underlain by the Ballina Limestone Formation (Upper and Lower) which forms the Ballina Aquifer, Bellacorick-Kilala aquifer and Foxford aquifer. These are designated respectively as a regionally important karstified aquifer (Rkc), a locally important aquifer (Ll) which is moderately productive only in local zones and a poor aquifer (Pl) which is generally unproductive except for local zones. Refer to Chapter 10 – Water (Hydrology and Hydrogeology), Volume 2 of the EIAR for more information on karst aquifer profile.

Areas of high aquifer vulnerability are observed at numerous key locations along the Proposed Development and at various points along the treated pipeline corridor. Refer to Chapter 10 – Water (Hydrology and Hydrogeology), Volume 2 of the EIAR for details on Groundwater Vulnerability and permeability underlying the Proposed Development.

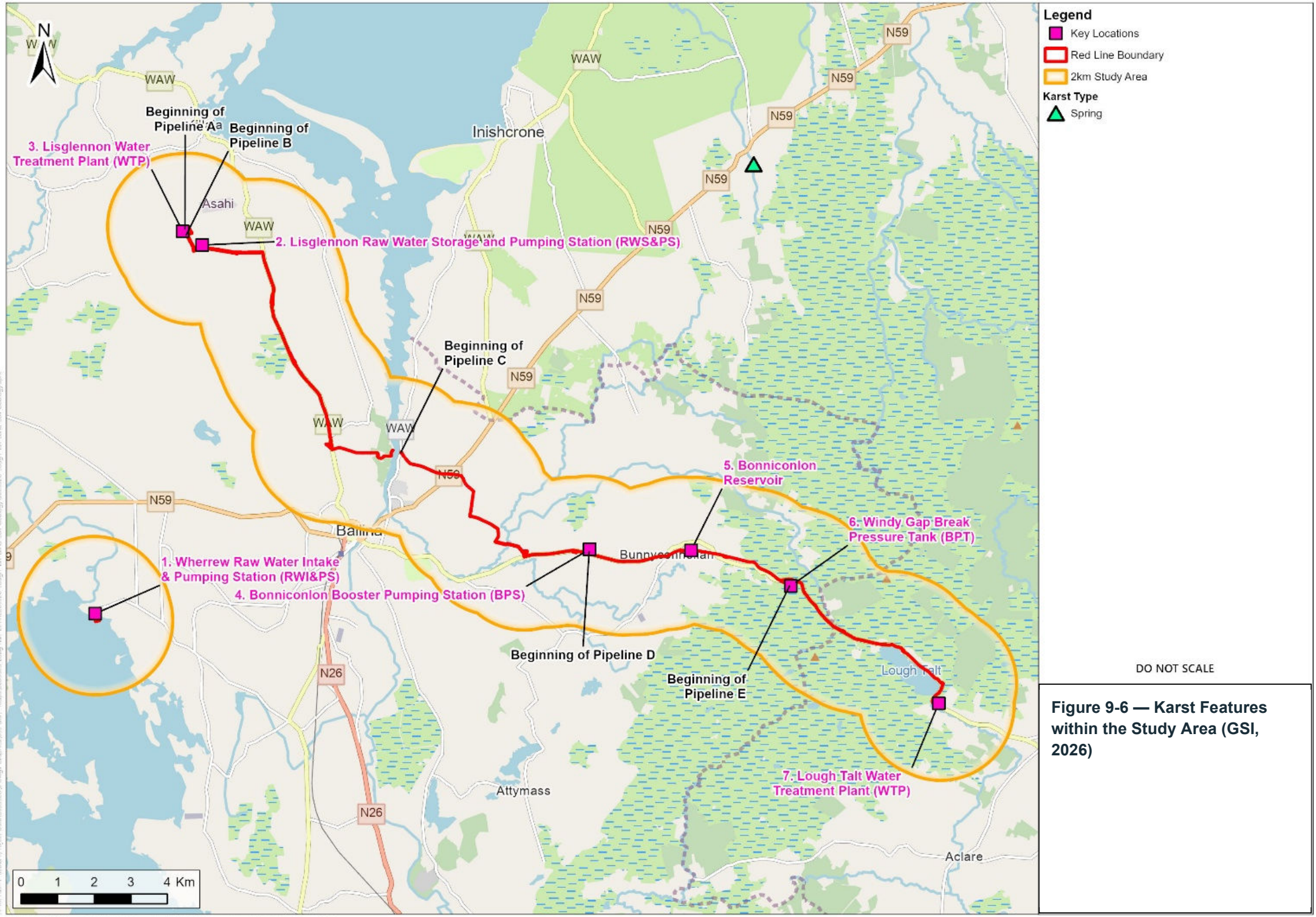


Figure 9-6 — Karst Features within the Study Area (GSI, 2026)

9.4.6.1.1 Ground Investigation Findings

The IDL ground investigation report (Irish Drilling Limited, 2026) (Appendix 9-1) includes the results of a geophysical survey carried out at Wherrew RWI&PS, Lisglennon WTP, Lough Talt WTP and approx. 580 m of the R294 road west of Lough Talt. The report did not identify anomalies which could be interpreted as void spaces or karst features such as water or sediment filled conduits. A risk rating was assigned based on the likelihood of encountering karst features, and subsequent potential engineering and structural issues.

Low resistivity indicates a higher risk of karst features being present such as voids or cavities, either air filled or air filled with overburden. At Lisglennon WTP, low resistivities (<700 Ωm) were recorded and have been interpreted as argillaceous or muddy limestone but could also indicate karstification within a clean limestone.

Based on the results of the desk-based review of GSI geology datasets (2026), the site-specific geophysical survey and site-specific borehole/trial pit records (Appendix 9-1, Volume 3 of the EIAR), there is potential for subsurface karst features beneath the proposed Lisglennon WTP. Potential karst features, if present, have implications with respect to the foundations of built structures. With the implementation of the mitigation measures, significant effects on karst features are unlikely to occur.

9.4.7 Ground Investigation

9.4.7.1 Regional Setting

Information on the site geology was obtained from the Geological Survey of Ireland (GSI, 2025). There are no known existing boreholes from historical geotechnical studies within the Study Area of the Proposed Development. The closest historical boreholes and associated Geotechnical Site Investigation Reports (Report Names: Market Square Commercial and The Ridgepool respectively (GSI, 2026)) are located approximately 2.1 km north of the existing mains line crossing at Belleek Woods; locations of the boreholes are seen in Figure 9-7. The depth of the existing boreholes ranged from 2.6-8.5 m, with limestone bedrock identified at depths between 3.6 m to 5.1 m below ground level (bgl) where encountered.



Figure 9-7 — Existing Boreholes (GSI, 2026)

9.4.7.2 2025 Ground Investigation (Irish Drilling Limited)

The scope of the ground investigation was designed by AtkinsRéalis to ensure that suitable geo-environmental and engineering data was obtained for the Proposed Development at the preliminary design stage. The scope takes into account the receiving environment, proposed initial engineering design, and baseline monitoring and environmental data requirements.

As introduced in Section 9.3, an intrusive ground investigation was undertaken by Irish Drilling Limited (IDL) in 2025 (Appendix 9-1, Volume 3 of the EIAR). The ground investigation included the following assessments:

- 45 cable percussion (CP) boreholes (several with rotary follow-on);
- 61 rotary core (RC) boreholes;
- 8 dynamic (window) sample (WS) boreholes;
- 145 dynamic probes;
- 119 trial pits (TP);
- 168 slit trenches (ST);
- Geotechnical in-situ testing: dynamic cone penetration (DCP) and hand shear vane tests, and standard penetration tests (SPT) in overburden at borehole locations;
- Geotechnical laboratory testing;
- Geo-environmental testing (summarised further in Section 9.4.7.3);
- Installation of five 50 mm diameter standpipes at BH-LG05, BH-LR01, BH-R01, BH-T02, and BH-WH01;
- Geophysical survey;
- Ground penetrating radar (GPR) utility survey; and
- Topographical survey.

Refer to (Appendix A) of the factual ground investigation report (Appendix 9-1, Volume 3 of the EIAR) for all ‘as built’ ground investigation locations. Refer to Appendix 9-1 – Ground Investigation Report (IDL, 2025), Volume 3 of the EIAR, for maps showing location of each borehole.

The location and depths of boreholes, trial pits and silt trenches are shown in Table 9-12.

Table 9-12 — Summary of Ground Investigation Locations (IDL 2025)

Type	Locations List	No. of Locations	Final Depth Range (m bgl)	Strata Investigated
CP	BH-LG03	1	2.2 (terminated on possible rock obstruction)	Superficial silt deposits
	BH-M13A	1	0.8 (terminated on possible rock obstruction)	Superficial gravel
	BH-M17 – BH M17A	2	7.1 – 7.9 (terminated on possible boulder obstructions)	Superficial sand deposits
	BH-M20B	1	7.0	Superficial sand, silt and gravel
	BH-M24 – BH-M25	2	6.8 – 7.9	Superficial peat, sand, silt and gravel.

Type	Locations List	No. of Locations	Final Depth Range (m bgl)	Strata Investigated
	BH-WH02A	1	2.7 (terminated on possible rock obstruction)	Gravel deposits.
CP + RC	BH-FR01 – BH-FR02	2	7.9 – 8.2	Superficial gravel, weathered rock and limestone bedrock
	BH-LG02	1	15.4	Superficial gravel, weathered rock and limestone bedrock
	BH-LG04 – BH-LG06	3	12.1 – 15.5	Superficial gravel, weathered rock and limestone bedrock
	BH-LR01 – BH-LR02	2	12.1 – 12.4	Made ground, silt, gravel, clay, weathered rock and limestone bedrock.
	BH-M01 – BH-M13	14	8.5 – 13.5	Made ground, gravel, silt and limestone.
	BH-M14 – BH-M16	3	12.5 – 20.0	Superficial silt, sand and gravel
	BH-M20 – BH-M20A	2	8.1 – 12.5	Superficial silt, gravel and boulders
	BH-M22 – BH-M23	2	15.5 – 17.0	Made ground, gravel, metasandstone, quartzite, mica schist
	BH-M26 – BH-M27	2	12.4 – 18.6	Superficial sand, gravel & boulders, quartz mica schist.
	BH-R1 – BH-R2	2	13.6 – 15.41	Superficial gravel and quartz mica schist.
	BH-T01 – BH-T02	2	12.1 – 14.0	Superficial gravel, silt and limestone bedrock
	BH-WH01 – BH-WH02	2	8.9 – 12.1	Superficial gravel, silt and limestone bedrock
RC	BH-LG01	1	7.1	Superficial gravel and limestone bedrock.
	BH-LG03A	1	12.5	Superficial gravel and limestone bedrock.
	BH-LG07	1	6.3	Superficial gravel and limestone bedrock.
	BH-M19	1	7.5	Made ground, gravel deposits. Superficial gravel deposits
	BH-M21	1	8.0	Made ground, gravel deposits. Superficial gravel deposits
	BH-M28 – BH-M43	16	5.7 – 9.5	Made ground, superficial sand, gravel, clay deposits, quartz mica schist, limestone.

Type	Locations List	No. of Locations	Final Depth Range (m bgl)	Strata Investigated
	BH-R3	1	12.5	Superficial gravel and quartz mica schist.
	BH-T03 – BH-T04	2	10.1 – 15.0	Made ground, gravel, quartz mica schist.
TP	TP-LG01 – TP-LG10	10	0.6 – 3.0	Made ground, topsoil, gravel and silt
	TP-LR01 – TP-LR06	6	1.2 – 4.2	Topsoil and silt
	TP-M01 – TP-M103	94	0.6 – 3.8	Made ground, topsoil, peat, gravel, sand and silt
	TP-R01 – TP-R04	4	1.8 – 3.1	Peat, sand and silt.
	TP-T01 – TP-T04	4	1.0 – 4.5	Made ground, gravel and sand.
	TP-WH01	1	2.0	Silt deposits.
ST	ST-WM01 – ST-WM100A	67	0.8 – 2.5	Made ground, peat, silt, gravel, limestone cobbles and rock
	ST-FW01 – ST-FW01A	2	1.8 – 2.0	Silt and limestone cobbles
	ST-WC01 – ST-WC10	8	1.2 – 3.0	Made ground, peat, silt and cobbles
	ST-TEL01 – ST-TEL4	15	0.25 – 2.0	Made ground, silt, peat, sand and cobbles
WS	WS-M01 – WS-M08	8	0.5 – 2.9	Clay, sand, peat and gravel.

9.4.7.3 2025 Ground Investigation Geo-Environmental Analysis Summary

As part of the 2025 IDL ground investigation, the following geo-environmental soils analyses were undertaken and set out in Table 9-13. Refer to Appendix 9-1 - Ground Investigation Report (IDL, 2025) for location details. Soil samples were collected at depths ranging from 0.3 to 1.7 m bgl corresponding with made ground, topsoil, till derived from limestones, tills derived from metamorphic rock, blanket peat, cut over raised peat and silt.

Table 9-13 — Geo-Environmental Chemical Testing Summary

Analysis Suite	No. Samples Analysed	Depth Range (m bgl)
General soils suite: pH, cyanide, phenols, total organic carbon (TOC), sulphide/sulphur, heavy metals and metalloids (antimony, arsenic, barium, boron, cadmium, copper, total chromium, hexavalent chromium, trivalent chromium, lead, mercury, molybdenum, nickel, selenium, zinc), asbestos, speciated polyaromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), banded total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene, xylenes (BTEX), methyl tertiary butyl ether (MTBE)	64	0.3 – 1.7
Acrylonitrile[1]	23	0.4 – 1.7
Methyl Acrylate[1]	53	0.3 – 1.7

Analysis Suite	No. Samples Analysed	Depth Range (m bgl)
Mineral Oil	58	0.3 – 1.7
Waste Acceptance Criteria (WAC) test	64	0.3 – 1.7

[1] Chemicals associated with acrylic fibre manufacture. The former Ashai Synthetic Fibres plant at Killala is located 820 m from the Proposed Development.

9.4.7.4 Human Health Generic Risk Assessment/Screening

In order to provide an assessment of the potential risks to human health related to contaminants present within the soils at the site, a generic human health risk assessment has been undertaken by AtkinsRéalis for this assessment based on the GI data as summarised in previous sections. The risk assessment comprises comparing determinant concentrations recorded within soil samples collected during the ground investigation with appropriate generic assessment criteria (GAC). This forms Tier 2 of the *Land contamination: risk management (LCRM): Stage 1 risk assessment* (Environment Agency, 2025) for assessing risks from land contamination; this is accepted best practice for contaminated land assessment in Ireland. A table presenting the chemical results screened against the human health GAC is provided in Appendix 9-3, Volume 3 of the EIAR.

The GAC applied to the risk assessment include the following criteria in order of preference – should a GAC for a specific determinant not be available in the first criteria set, the second or third set has been applied:

- CLAIRE Category 4 Screening Levels (C4SLs);
- LQM/CIEH Suitable 4 Use Levels (S4ULs); then
- AtkinsRéalis Soil Screening Values (SSVs).

The most appropriate land use selected for the site is public open space (POS) (Parks). This was deemed the most comparable land use to that of the Proposed Development which is situated largely in areas of agricultural land with smaller areas of developed land. The use of public open spaces GACs is a conservative approach given the largely agricultural surrounding areas.

No exceedances of the GAC related to this land use were identified in any of the soil samples collected and analysed from the 2025 IDL ground investigation.

TPH concentrations in TP-M78, BH-M06, and BH-M08 were identified to be higher than the majority of samples by an order of magnitude, although remained below the GACs, and are discussed below:

TP-M78 (located adjacent to pipeline E) was sampled within the peat stratum which can lead to unrepresentative TPH concentrations being reported by the laboratory due to the humic substances which can cause false positive detections of TPH should a chemical clean-up not be undertaken by the laboratory. For this sample, only a mathematical clean-up was undertaken which indicates that the higher TPH concentrations are a result of humic substances, as opposed to TPH contamination.

BH-M06 and BH-M08 (located adjacent to pipeline B) both indicated “tar” (in this case meaning asphalt) within the borehole logs at the sampling depth. The sample from BH-M08 at 0.5 m bgl also exceeded the solubility limit for TPH aliphatic C12-C16 with a concentration of 41 mg/kg compared to the solubility limit of 24 mg/kg. No free product was encountered at this location and no other exceedances of the solubility limits for other TPH fractions were identified. Therefore, the concentrations of TPH in these samples are likely the result of being taken in made ground, as opposed to hydrocarbon contamination.

No asbestos was detected in any of the soil samples collected and screened from the 2025 IDL ground investigation.

9.4.8 Geo-hazards

Landslide Susceptibility maps help to locate where a landslide is likely to occur. The likelihood is measured from Low to High. A landslide is more likely to happen on steep slopes. A steep slope would be mapped as high landslide susceptibility. Topography surrounding Windy Gap BPT and Pipeline E ranges from 180 m – 202 m.

GSI landslide susceptibility classification across the Study Area is described as ‘low’ and ‘low inferred’ risk in the western regions, while the eastern regions surrounding Windy Gap, the existing Lough Talt WTP and Pipeline E are described as ‘High’, ‘Moderately High’, ‘Moderately Low’ and ‘Low’ (GSI, 2026) (Figure 9-8). There are nine historic landslide events recorded within the Study Area, as listed in Table 9-14.

Any past landslide events noted were localised in nature with no events covering large extents of the region surrounding the red line boundary (GSI, 2026). Landslide event records (GSI, 2026) indicate the trigger cause of the events is unknown. Due to the nature of the Proposed Works, significant effects on land, soils and geology relating to geo-hazards are not anticipated.

Table 9-14 — Landslide Events within 2 km of the Proposed Development

Landslide Event ID	Distance from Proposed Development
GSI_LS13-0410	213 m east of Pipeline E
GSI_LS13-0411	474 m east of Pipeline E
GSI_LS13-0409	508 m north of Pipeline E
GSI_LS13-1354	288 m southwest of Pipeline E
GSI_LS13-0405	526 m southwest of Pipeline E
GSI_LS13-0404	885 m southwest of Pipeline E
GSI_LS13-0406	187 m south of Pipeline E
GSI_LS13-0408	1.34 km north of Pipeline E
GSI_LS13-0407	1.8 km south of Pipeline E

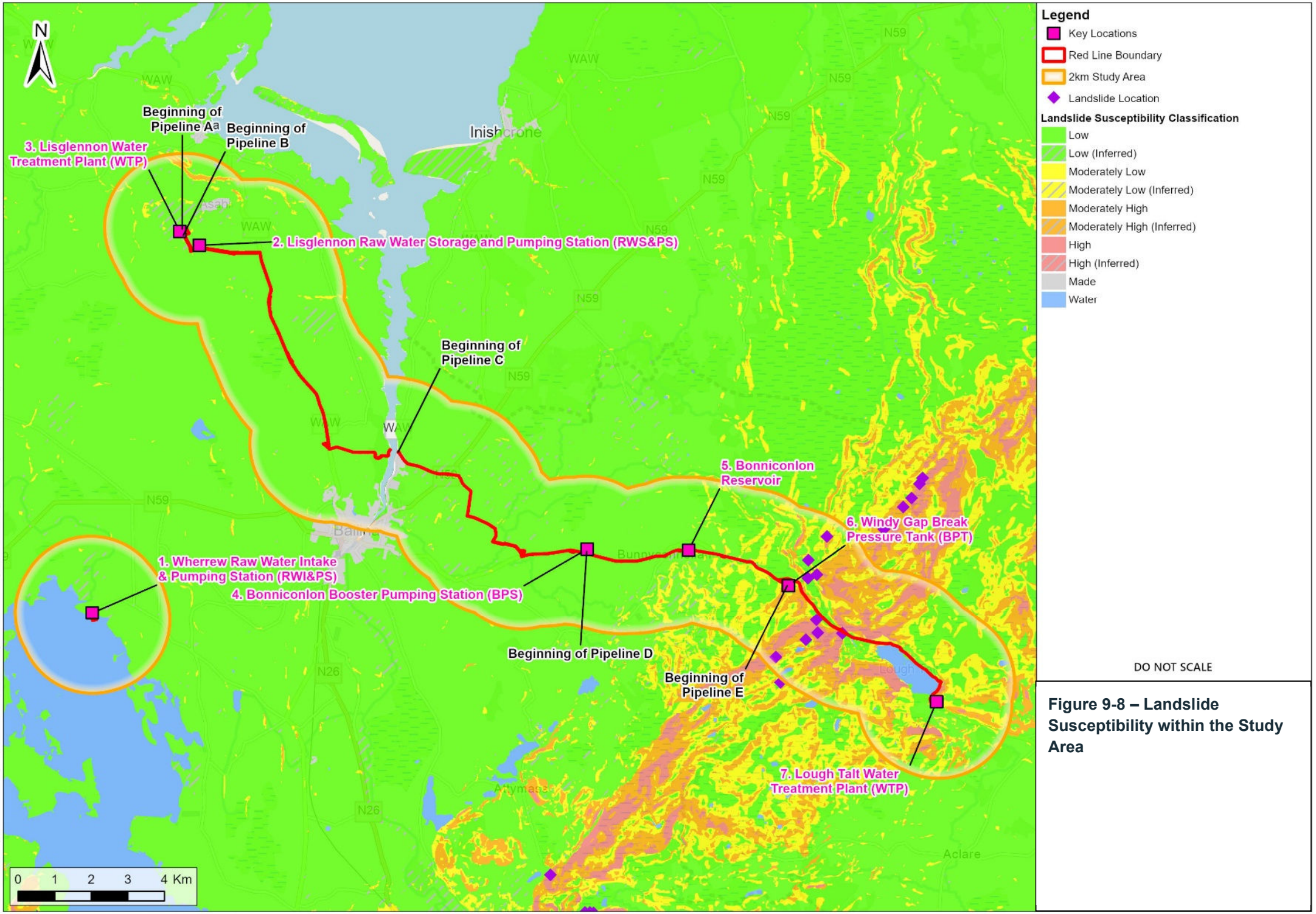


Figure 9-8 – Landslide Susceptibility within the Study Area

9.4.9 Geological Heritage Sites within the Proposed Development

The Proposed Development crosses three geological heritage sites as shown on the GSI public data viewer (GSI, 2026) and there are a further three geological heritage sites within 2 km. The identified sites are summarised in Table 9-15 and presented in Figure 9-9.

Given the nature of the Proposed Works, most of which will be undertaken along existing roadways, significant effects on geological heritage features are not anticipated as a result of the Proposed Development.

Table 9-15 — Geological Heritage Sites within the Proposed Development

Site Name and Code	Description of Site	Qualifying Feature	Distance from Proposed Development
Killala Area (MO068)	An extensive area of ridges on the west side of the Moy Estuary at Killala	Geological feature – glaciotectonic ridges	Overlaps Lisglennon RWS&PS, Lisglennon WTP, Pipeline A, Pipeline B
River Moy (MO089)	A 100 km long river flowing into the Moy River Estuary at Ballina.	Geomorphological feature – meandering U-shaped river channel	Crossed by the Proposed Development at the existing river crossing
The Gap (NW of Lough Talt) (SO023)	A valley	Geological / geomorphological landscape - Example of meltwater channel	Crossed by Pipeline E

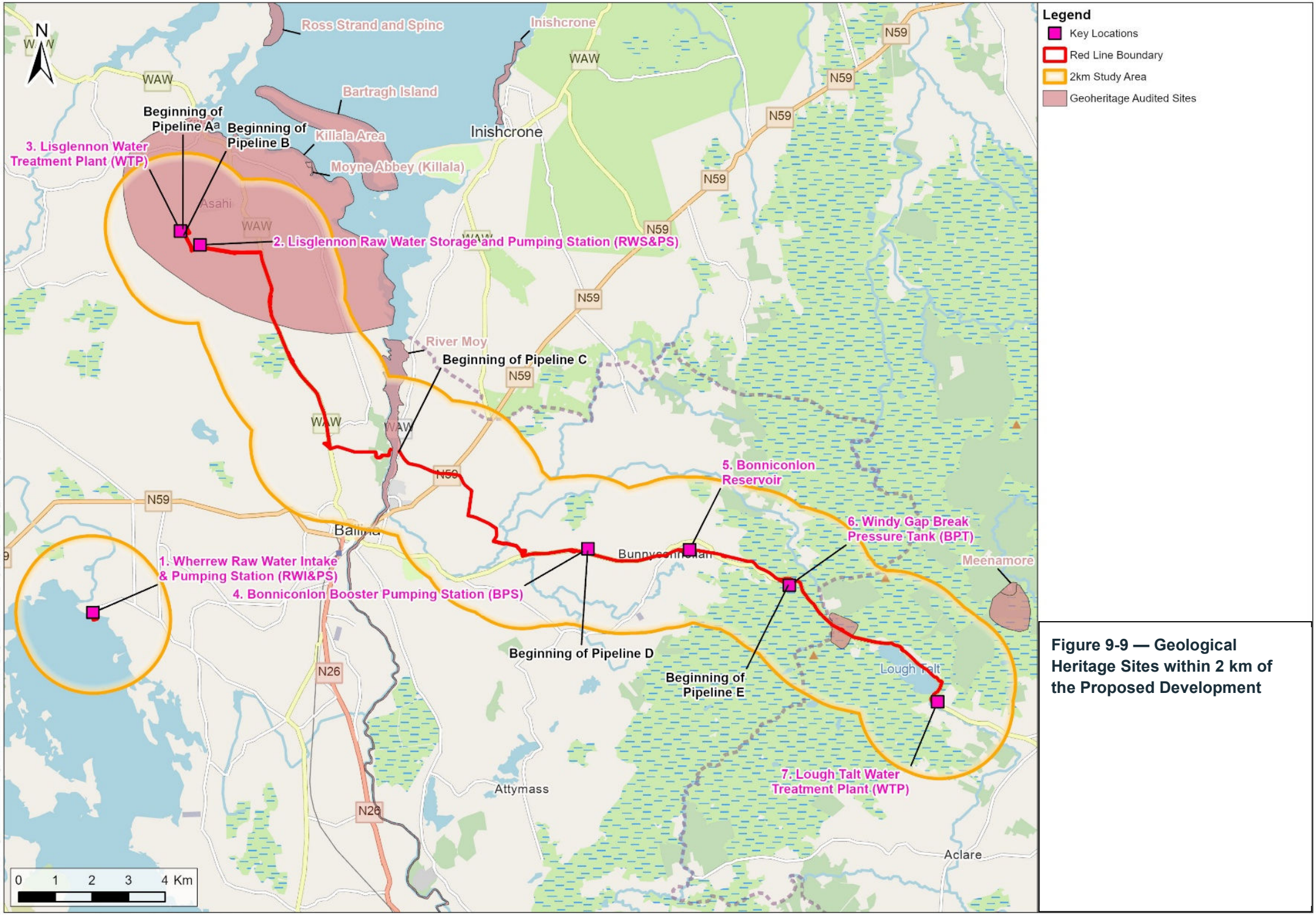


Figure 9-9 — Geological Heritage Sites within 2 km of the Proposed Development

9.4.10 Mineral Occurrences

There are no mineral localities located within the Proposed Development. There are eleven mineral localities recorded within the 2 km Study Area as summarised in Table 9-16 and shown in Figure 9-11. The closest mineral locality is located 62 m south of the Proposed Development. Given the distance from the Proposed Works and the nature of the activities involved, significant effects on mineral localities are not anticipated.

Table 9-16 — Mineral Localities showing distance from the Proposed Development

Mineral Localities	Reference No.	Distance from Proposed Development (km)
Non-metallic – Active Quarry, Limestone	1227	ca. 1 km northwest of Lisglennon WTP
Non-metallic – Sand and Gravel	1216	ca. 889 m south of Bonniconlon BPS
Non-metallic – Sand and Gravel	1215	ca. 1.3 km south of Bonniconlon BPS
Non-metallic – Limestone	1356	Ca. 1.66 km northwest of Pipeline B
Non-metallic – Gold	2855	ca. 62 m south of Pipeline D
Non-metallic – Sand and Gravel	2458	ca. 568 m north of Pipeline D
Non-metallic – Marble	2684	ca. 390 m north of Pipeline E
Non-metallic – Marble	2686	ca. 100 m south of Pipeline E
Non-metallic – Granite	4053	ca. 253 m from Pipeline E
Non-metallic – Clay	2685	ca. 514 m from Windy Gap BPT
Non-metallic – Granite	4054	ca. 698 m from Lough Talt WTP

9.4.11 Radon

Radon is a radioactive gas. It is formed in the ground by the radioactive decay of uranium, which is naturally present in all rocks and soils, albeit levels will vary depending on geological conditions. The EPA radon map for the Study Area is presented in Figure 9-10 and indicates radon levels are predominantly of ‘about 1 in 5 homes in this area is likely to have high radon levels’, specifically underlying Wherrew WTP, Lisglennon WTP and Lisglennon RWS&PS and sections of the existing Lough Talt WTP. There are also areas of ‘about 1 in 10 homes in this area is likely to have high radon levels’ and ‘about 1 in 20 homes in this area is likely to have high radon levels’ underlying the Proposed Development. A High Radon Area is an area where it is predicted that more than 10% of homes will exceed the national reference level (EPA, 2026).

During the ground investigation carried out by IDL (2026) (Appendix 9-1, Volume 3 of the EIAR), no ground gas monitoring was carried out for the Proposed Development. No areas of contaminated land were encountered which have the potential to give rise to pockets of ground vapours. Peat is present onsite which has the potential to generate ground gas as a result of the organic material. Where the ground is unsurfaced, potential ground gas is anticipated to likely dissipate to atmosphere. However, there is potential for ground gas to build up under low permeability surfaces.

Given the open and largely unconfined nature of the works, the risk of encountering ground gas during the construction and O&M phase is considered low.

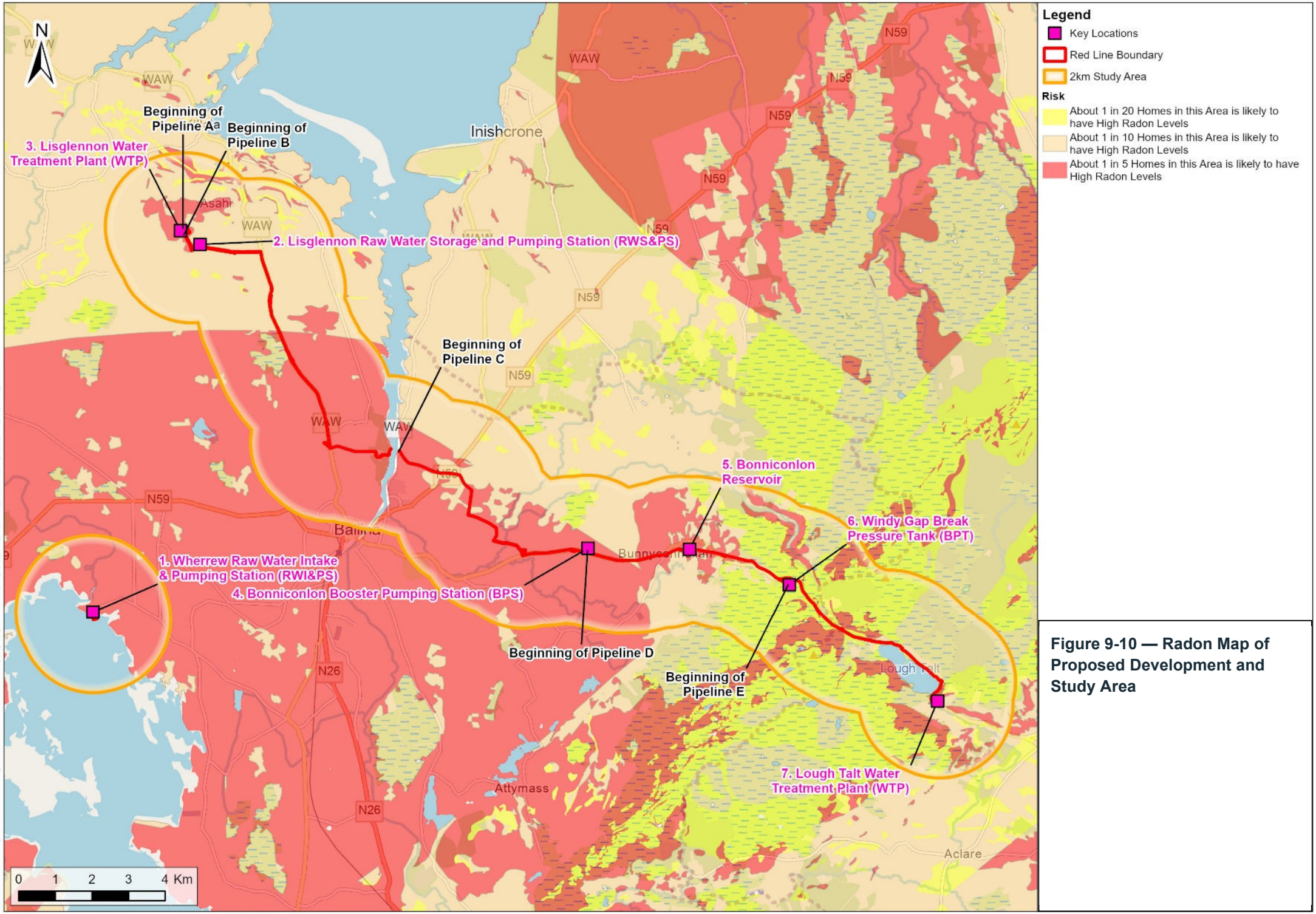


Figure 9-10 — Radon Map of Proposed Development and Study Area

9.4.11.1 Contaminated Land Risk – Industrial Sources

A review has been undertaken of the potential industrial sources of contamination present within the Proposed Development or in the surrounding area with potential to migrate to the Proposed Development. The potential sources screened include EPA licences, industrial emissions licences (IEL), Integrated Pollution Control (IPC) and integrated pollution prevention control (IPPC) facilities.

On a regional scale there are five Industrial Emissions Licence (IEL), Integrated Pollution Control (IPC) and Integrated Pollution Prevention Control (IPPC) licenced facilities within 2 km of the Project:

- Asahi Synthetic Fibres (Ireland) Limited (site code: P0232), located approx. 820 m northeast of Lisglennon WTP;
- SSE Generation Ireland Limited (Killala) (site code: P0566), located approx. 820 m northeast of Lisglennon WTP;
- Mayo Renewable Power Limited (site code: P0958), located 833 m northeast of Lisglennon WTP;
- Mayo Renewable Limited (site code: P1077), located 880 m northeast of Lisglennon WTP; and
- Thomas Archer (Ballina) Limited (site code: P0360), located approx. 2 km south of Pipeline B at Belleek Woods (Surrendered Licence).

On a regional scale there is one Section 4 discharge licenced facility within 2 km of the Proposed Development:

- B.P. Mitchell Haulage & Plant Hire Limited (site code: WP(W)116), located 739 m northwest of Lisglennon WTP;

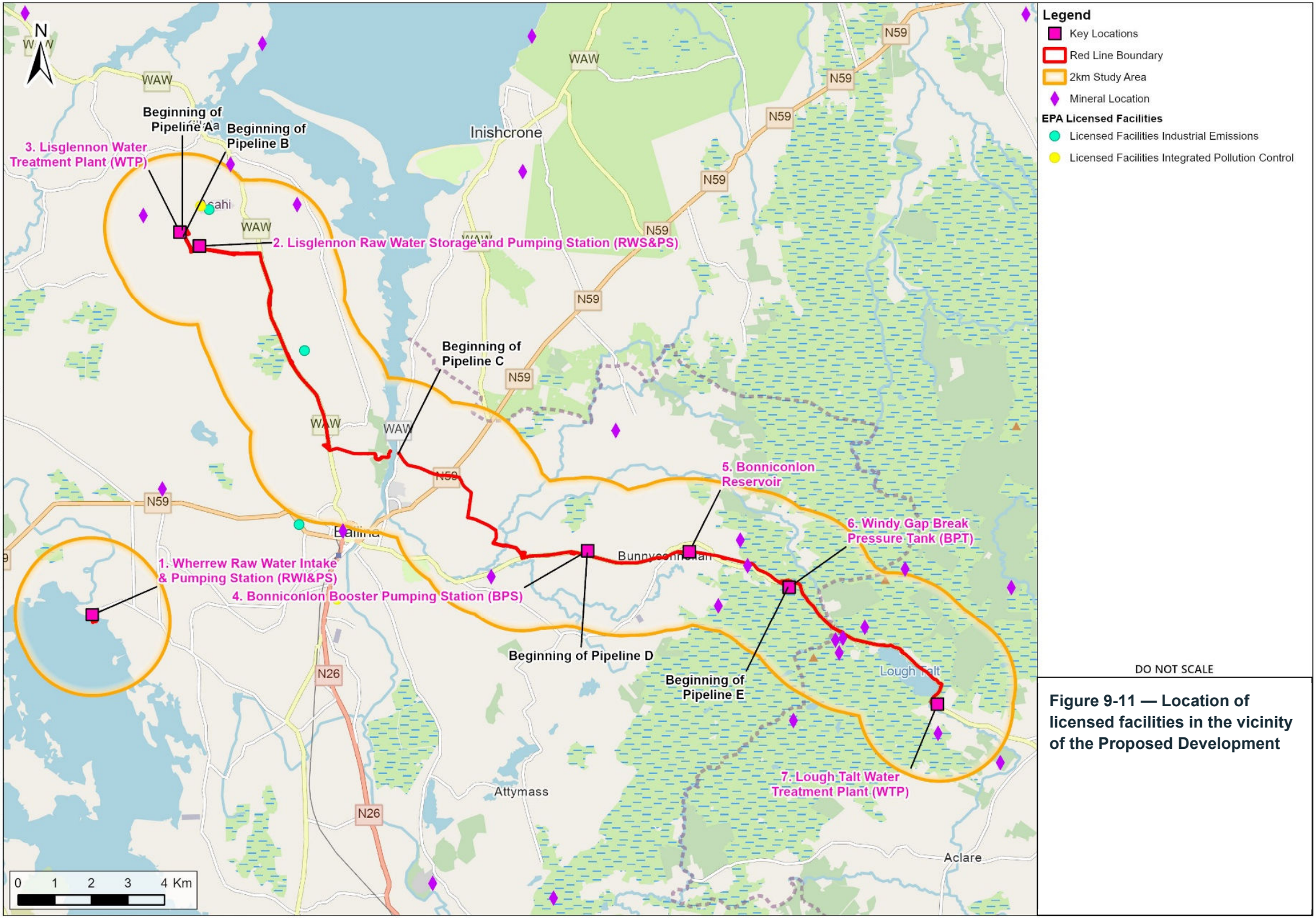
On a regional scale, there is one waste facility within 2 km of the Proposed Development:

- Rathroeen Landfill (reg: W0067-02), located approx. 348 m east of the Pipeline B along the R-314.

There is one Seveso Establishment identified within the 2 km Study Area:

- Ballina Beverages (European Refreshments) (Upper Tier), located approximately 300 m from Pipeline B.

Due to the considerable distance between the licensed facilities and the Proposed Development, no likely significant effects on land, soils, or geological receptors are predicted. Licenced facilities are summarised in this section and presented in Figure 9-11.



DO NOT SCALE

Figure 9-11 — Location of licensed facilities in the vicinity of the Proposed Development

9.4.12 Initial Conceptual Site Model

An initial conceptual site model (CSM) has been prepared for the Proposed Development. While the GAC screening carried out in Section 9.4.7.4 indicates that no substances analysed in soils as part of the ground investigation were recorded to exceed GACs, the CSM identifies the potential sources of contamination associated with the specified land use types, receptors and the plausible pathways between the two. Where all three are present or are considered likely to be present (source-pathway-receptor linkage), a potential contaminant linkage (PCL) is identified and is taken forward for further consideration. The CSM is based on a review of the baseline presented within this chapter.

Table 9-17 — Potential Contamination Sources

Location	Potential Source of Contamination	Potential Contaminants of Concern
On-site	Made Ground beneath existing road infrastructure.	Organic compounds: PAH, TPH, BTEX. Inorganic compounds: ammonium, nitrite, nitrate, cyanide. Heavy metals. Asbestos fibres and asbestos containing materials (ACM)
	Agricultural farming practices potentially leading to spills / leaks.	Organic compounds: PAH, TPH, BTEX. Inorganic compounds: ammonium, sulphate, nitrite, nitrate, cyanide. Heavy metals. Pesticides
	Made Ground associated with existing infrastructure such as Wherrew RWI&PS, Lisglennon RWS&PS, Lisglennon WTP and Lough Talt WTP.	Organic compounds: PAH, TPH, BTEX. Inorganic compounds: ammonium, sulphate, nitrite, nitrate, cyanide. Heavy metals. PCBs
Off-site	Made Ground associated with the construction and operation of existing road infrastructure.	Organic compounds: PAH, TPH, BTEX. Inorganic compounds: ammonium, sulphate, nitrite, nitrate, cyanide. Heavy metals. ACM.
	Agricultural farming practices within 250 m[1] of the Proposed Development.	Organic compounds: PAH, TPH, BTEX. Inorganic compounds: ammonium, sulphate, nitrite, nitrate, cyanide. Heavy metals. Pesticides
	Made Ground associated with the construction and operation of residential and commercial land uses within the study area.	Organic compounds: PAH, TPH, BTEX. Inorganic compounds: ammonium, sulphate, nitrite, nitrate, cyanide. Heavy metals. ACM.

[1]250 m considered an appropriate zone of influence for assessing risk of contaminant migration from off-site sources.

Table 9-18 — Potential Receptors and Pathways

Receptor Group	Receptors	Pathways
On-site	Farmers on agricultural land	Direct contact, ingestion and inhalation of soil-derived dust and fibres; and Inhalation of soil-derived gases and vapours.
	Future road users including pedestrians	
	Future Ballina and Lough Talt Water Supply Upgrade workers	
	Geological Heritage Sites: Killala Area (MO068) River Moy (MO089) The Gap (SO023)	Direct contact or plant uptake of contaminants which may be present in soils.
	Infrastructure overlying potential contamination	Direct contact with contaminants causing degradation of materials.
Off-site	Farmers on agricultural land within the study area.	Dermal contact with and ingestion of contaminants in soil-derived dusts and water that may have migrated off-site; Inhalation of soil-derived dust and fibres; and Inhalation of soil-derived gas and vapours which may have migrated off-site.
	Residents in residential properties within the study area.	

9.5 Potential Effects

A summary of the relevant parameters used to assess potential effects to land, soils and geology is provided below.

9.5.1 Summary of potential effects

Based on a review of the receiving environment data and review of the construction methodology, potential effects specific to land, soils and geology are discussed below. This includes potential effects throughout the construction and operation and maintenance phases. However, potential effects relating to decommissioning activities are not discussed as the Proposed Development will not be decommissioned.

Table 9-19 discusses impacts that are likely to have effects on land, soils and geology and therefore will be discussed within the impact assessment.

Table 9-20 shows potential effects that were considered but based on a review of the baseline information, are not likely to be significant and are therefore not included within the impact assessment.

Table 9-19 — Potential effects scoped into the assessment

Effect	Rationale
Construction	
Effect 1: Direct damage or loss of topsoil or subsoil	During the construction phase, soils are expected to be stripped as part of ground excavation.
Effect 2:	During the construction phase, glacial deposits and bedrock are expected to be encountered in areas where deeper excavation is planned.

Effect	Rationale
Direct damage or loss of bedrock geology	Geological heritage sites have been recorded within the Proposed Development.
Effect 3: Risk of leaks or spills impacting on land and soils	Activities carried out during the construction phase have the potential to result in spillages/leaks of hydrocarbons (fuels and oils) and cement. Spillage of water treatment chemicals and leakage of chlorinated water from existing pipelines has been considered but will not be included as a factor of this effect as these are effects of the existing site and therefore, there will be no change from baseline. This also includes leakages from other operational activities such as sludge dewatering and storage at existing water treatment plant locations. This has the potential to affect soils and geology including underlying geological heritage site.
Operation and Maintenance (O&M)	
Effect 4: Risk of leaks or spills impacting on land and soils	Activities carried out during the O&M phase have the potential to result in spillages/leaks of hydrocarbons (fuels and oils) and cement. The Proposed new treated water main also has the potential to create new leakage sources resulting in the release of chlorinated water Spillage of water treatment chemicals and leakage of chlorinated water from pipelines has been considered but will not be included as a factor of this effect as these are effects of the existing site and therefore, there will be no change from baseline. This also applies to other ongoing activities such as potential leakages from sludge dewatering and storage, which forms part of the baseline environment.

Based on a review of baseline information, a number of the potential impacts were considered unlikely to arise as a result of the Proposed Development. These potential impacts and the reasons they were scoped out are discussed in Table 9-20 and will not be carried forward into the impacts assessment. Those potential impacts taken forward for further assessment are discussed in Section 9.5.2.

Table 9-20 — Potential impacts scoped out of the assessment

Impact	Rationale for scoping out
Construction	
Impact 1: Change of land use	Much of the construction activities during the construction phase of the Proposed Development are included to upgrade existing infrastructure of the same purpose or are located along the existing road network and are not considered to alter the land use in the region. Where new infrastructure is proposed on greenfield land it will comprise of approx. 4 km of the treated water pipeline which will be buried in agricultural fields on completion. Other infrastructure proposed on greenfield land includes Bonniconlon BPS, Bonniconlon Reservoir and Windy Gap BPT. Wherrew RWI&PS, Lisglennon RWS&PS and WTP, Lough Talt WTP are all existing structures which will be upgraded for the Proposed Development. The treated water supply pipeline that does not occupy greenfield land will be buried in the existing road network. The land use in the area is predominantly agricultural, interspersed with rural areas. The infrastructure proposed as part of this development minimises land use changes by upgrading existing structures with only Bonniconlon BPS and Windy Gap BPT occupying previously undeveloped land. Therefore, the Proposed Development is unlikely to change land use significantly in the region.

Impact	Rationale for scoping out
Impact 2: Excavation of existing contaminated land	Soil testing carried out as part of the ground investigation did not show that any parameters exceed the GACs; C4SLs, S4ULs and SSVs, as discussed in Section 9.4.7.4. There were not shown to be any onsite contamination risks from external developments. Therefore, contamination may be encountered in areas not investigated, however based on the ground investigation results which did not encounter contamination and the current land uses, land contamination is not expected.
Impact 3: Cross contamination between soils and bedrock due to excavation of material with existing contamination	Soil testing carried out as part of the ground investigation did not show that any parameters exceed GACs (C4SLs, S4ULs and SSVs). Therefore, as contamination is unlikely to be encountered during the construction of the Proposed Development, the risk of mobilising contaminants between soils and bedrock during excavation is not expected to be likely and is scoped out of further assessment.
Impact 4: Release of ground gas	During the ground investigation carried out by IDL (2026) (Appendix 9-1, Volume 3 of the EIAR), no ground gas monitoring was carried out for the Proposed Development. No areas of contaminated land were encountered which have the potential to give rise to pockets of ground vapours. Peat is present onsite which has the potential to generate ground gas as a result of the organic material. Where the ground is unsurfaced, potential ground gas is anticipated to likely dissipate to atmosphere. However, there is potential for ground gas to build up under low permeability surfaces. Given the open and largely unconfined nature of the works, the risk of encountering ground gas during the construction phase is considered low.
Impact 5: Risk of peat instability and landslides	As shown on Figure 9-8, all key locations apart from Windy Gap BPT and Lough Talt are underlain by areas of low landslide susceptibility. Pipelines A, B, C and D are also underlain by areas of low susceptibility and are not shown to be underlain by significant volumes of peat and therefore, peat stability and landslide risk in these areas is considered negligible. Windy Gap BPT, Pipeline E and Lough Talt WTP are underlain by areas of low to high landslide susceptibility. Pipeline E will be installed within the existing road network sub base materials and, as such, there is unlikely to be a risk of peat instability. Lough Talt WTP has previously undergone development and the ground investigation (Appendix 9-1, Volume 3 of the EIAR) did not identify peat deposits at this location. Areas underlying Windy Gap BPT are shown as being classified as moderately low to moderately high. Based on ground investigation information, the ground conditions underlying Windy Gap BPT comprise shallow peat, approximately 0.5 m depth, overlying silty sand / gravel. Given the small thickness of peat, there is a relatively low risk of peat instability and peat slides at this location.
Operation and Maintenance (O&M)	
Impact 4: Release of ground gas	During the O&M phase, no earthwork activities are expected to take place. On completion of the construction phase, trenches dug for the laying of pipelines and any ditches excavated for pollution prevention measures will be backfilled. Given the open and largely unconfined nature of the works, the risk of encountering ground gas (e.g. Radon) during the O&M phase is considered low.
Impact 5: Alteration of the geological setting.	While the geological setting will be permanently altered during the construction phase as a result of excavation and earthworks, no further groundworks are proposed as part of the O&M phase and no operational activities are expected to alter the geological setting.

Impact	Rationale for scoping out
	Therefore, the risk of altering the geological setting surrounding contaminated land is not expected to be significant and is scoped out of further assessment.

9.5.2 Assessment parameters

The parameters relevant to this chapter upon which this assessment is based are set out in Table 9-21. This table includes all infrastructure proposed as part of the Proposed Development that has the potential to result in impacts to land, soils and geology and provides the dimensions of the infrastructure. The purpose of this is to provide an indication of the construction activities proposed as part of the Proposed Development and the scale of groundworks that may be necessary to facilitate the construction of the infrastructure.

Table 9-21 — Parameters of the Assessment

Effect	Infrastructure Details	Infrastructure Dimensions	Notes / Assumptions
Effect 1: Direct damage or loss of topsoil or subsoil	Lisglennon RWS&PS: Upgrade of existing infrastructure: Replacement of decommissioned pumps Replacement of pipework and installation of pressure monitoring equipment. Installation of flow meter and flow chamber.	Majority of works is a replacement of existing infrastructure.	
	Lisglennon WTP: Upgrade and repurposing of existing infrastructure. New building including pumps, electrical equipment and chemical dosing. Provision of UV treatment building, ESB substation Rapid gravity filter GAC filter Soda ash dewatering building New sludge dewatering building Solar PV infrastructure Ancillary works	New pump station and UV building footprint: 180 m^2 ESB MV substation footprint: 35 m^2 Rapid gravity building footprint: gallery 103 m^2, viewing gallery 93 m^2 GAC filter footprint: gallery 112 m^2. Viewing gallery 112 m^2 Soda ash dosing building footprint: entrance 91 m^2, lower level 62 m^2 Sludge dewatering building footprint: ground floor 153 m^2, first floor 175 m^2 Works are anticipated to take 18 months to complete Total volume of excavation approximately 12,774 m^3	Maximum excavation depth assumed to be 3 to 4 m bgl. Bedrock is encountered 1 – 2 m bgl.
	Mains pipeline: Lisglennon WTP to Lough Talt Replacement of existing pipeline and installation of new pipeline	Pipeline A – Lisglennon RWS&PS to Lisglennon WTP, approximately 1 km. Pipeline B – Lisglennon WTP to River Moy Crossing, approximately 10.4 km	The installation/replacement of pipeline will involve excavating a trench to lay the pipeline. The exceptions to this are the

Effect	Infrastructure Details	Infrastructure Dimensions	Notes / Assumptions
		Pipeline C – River Moy Crossing to Bonniconlon BPS, approximately 7.2 km Pipeline D – Bonniconlon BPS to Windy Gap BPT, approximately 6 km Pipeline E – Windy Gap BPT to Lough Talt WTP, approximately 6.6 km Total volume of excavation approximately 79,095 m^3 with an anticipated reuse/recover volume of 29,993 m^3.	River Moy crossing which will connect to the existing pipeline running under the river and the River Brusna crossing which will utilise trenchless techniques, specifically HDD. Approx. 85% of the pipeline will be sited in the basement materials of the existing road network. Assumed works area width of 20 m. Re-use of soils and geology where sited in agricultural fields. Assumed installation depth 1-2 m bgl. Bedrock potentially encountered in small areas of Pipeline A & B.
	Bonniconlon BPS: 320 kW booster pumping station ESB substation Permanent stand-by generator Two surge vessels Ancillary site development works	Total site area: 2545.5 m^2 Pumpstation building footprint: 150 m^2 ESB substation footprint: 35 m^2 Surge vessel footprint: 20 m^2 each Works are anticipated to take 6 months to complete. Total volume of excavation approximately 318 m^3	Excavation works are required to facilitate installation of infrastructure at this site. Excavation depths are expected to be between 0.5 and 1.0 m bgl. Landscaping will partially re-use excavated soils.
	Bonniconlon reservoir: New treated water reservoir Dechlorination chamber Relocation of EB pole Ancillary site development works	Reservoir volume: 185 m^3 Works are anticipated to take 100 days to complete. Total volume of excavation approximately 102 m^3	Excavated soils to be used for landscaping purposes. Maximum excavation depth anticipated to be approximately 2 m bgl.
	Windy Gap BPT: New break pressure tank, scour extraction and control kiosks, associated flowmeter chambers, valve chambers and interconnecting pipework.	Break pressure tank volume: 80 m^3 Total volume of excavation approximately 151 m^3	BPT will be built entirely below ground given the high sensitivity of the surrounding area. The new BPT will be installed 2.3 m bgl. Excavation works to install chambers and pipework will be confirmed in the final layout but are

Effect	Infrastructure Details	Infrastructure Dimensions	Notes / Assumptions
			expected shallower than the BPT.
	Lough Talt WTP: New treated water reservoir Repurposing of existing chlorine contact tank Removal of microstrainer building, rapid gravity filtration units, raw water feed container and balance tank, UV unit and settlement tanks and sludge holding tanks. Installation of solar panels Ancillary site development works	New water storage reservoir volume: 3300 m^3 Chlorine contact tank volume: 330 m^3 Total volume of excavation approximately 1,957 m^3	The average excavation depth for this site is approx. 2 m bgl. Topsoil will be stripped and stockpiled in designated stockpile located within the red line boundary.
Effect 2: Direct damage or loss of geology	Refer to Impact 1 for details.		During the construction phase, glacial deposits and bedrock are expected to be encountered in areas where deeper excavation is planned or where superficial deposits are shallow.
Effect 3: Risk of leaks or spills impacting on land and soils	Refer to Impact 1 for details. Additional design parameters where impact 4 is expected are noted below. Construction vehicles will be utilised to facilitate the Proposed Development which also present potential sources for leaks and spillages of oils and fuels.		Construction activities have the potential to result in spills and leaks of hydrocarbons including fuels and oils, or cement.
	Wherrew RWPS: Intake pipeline Areas of hardstanding Ancillary site development works	Infrastructure footprint: New intake pipe measuring 165 m x 1.75 m x 1.75 m Works are anticipated to take 200 days to complete. Total volume of excavation approximately 178 m^3	There are no dredging operations proposed during the installation of the intake pipeline. The pipeline will be laid on lake bed and covered with a geotextile membrane.
Operation and Maintenance (O&M)			
Effect 4: Risk of leaks or spills impacting on land and soils	Potential leaks and spillages are a risk at all operated aspects of the Proposed Development during the operation and maintenance phase. This includes all locations operated by personnel as well, locations where chemicals and fuel are stored and where operational vehicles are anticipated to operate. This also includes leaks from the proposed new treated water mains pipeline.		Operation and maintenance activities have the potential to result in spills and leaks of hydrocarbons including fuels and oils. Approximately 25 – 50 daily vehicle movements and 2 –

Effect	Infrastructure Details	Infrastructure Dimensions	Notes / Assumptions
			3 HGV trips per week anticipated for removal of sludge and chemicals to Lisglennon WTP.

9.6 Potential Effects of the Proposed Development

9.6.1 Construction

9.6.1.1 Effect 1: Loss or direct damage of topsoil or subsoil

Potential effects to land and soil during construction activities are related to the disturbance of soil resources and loss of fertile land through temporary and long-term land take associated with the construction of the Proposed Development as detailed in Chapter 3.

The key activities which are likely to result in the excavation of ground and stripping of topsoil and subsoil include:

- Initial site clearance and site-preparation activities.
- Trenching activities to facilitate the installation of the transfer mains between Lisglennon RWPS and Lisglennon WTP, and the treated water mains pipeline between Lisglennon WTP and Lough Talt WTP.
- Excavation of land to construct new buildings and facilities including Lisglennon RWPS, Lisglennon WTP, Bonniconlon BPS, Bonniconlon reservoir, Windy Gap BPT and Lough Talt WTP.
- Construction of temporary features such as construction compounds and access tracks.
- Excavation to allow new treated water mains pipeline to connect to existing pipeline running under the River Moy.
- Watercourse crossings including open cut methods and HDD works to allow for trenchless construction.
- Construction of site drainage features and pollution prevention features including bunding and drainage ditches.

Made Ground is present across the Proposed Development,specifically at existing Lisglennon sites, Wherrew RWI&PS and along 85% of the new treated water mains pipeline route which follows the existing road network for the majority of the route.

Till, derived from limestone (TLs) including Grey Brown Podzolics, Brown Earths(medium-high base status), Surface water Gleys and Ground water Gleys, were identified at Wherrew RWPS as well as Bonniconlon reservoir and along discrete sections of the new treated water mains pipeline. Till derived from metamorphic rock (TMp) including Acid Brown Earths, Brown Podzolics, surface water Gleys and ground water Gleys were encountered at Bonniconlon reservoir and along sections of the new treated water mains route. Also encountered at these locations were glaciofluvial sands and gravels (GLs) including surface water Gleys (Shallow), ground water Gleys (Shallow) Renzinas and Lithosols.

Alluvium was identified along the proposed treated water mains pipeline.

Blanket peats were only identified at the proposed Windy Gap BPT and nearby treated water mains pipeline.

9.6.1.1.1 Value and sensitivity

The receptors are the underlying soil resources which can be lost as a result of stripping or excavation, or damaged through erosion and weathering of exposed soil.

Excavation/stripping of well drained organic soils is expected throughout the construction phase, alongside areas of blanket peat. The proposed Windy Gap BPT and a section of the pipeline between this location and Lough Talt is partially underlain by blanket peat. The proposed construction activities will involve excavation of a relatively small

portion of the peat in comparison with the extent of peat coverage in the area. Given the comparatively small nature of the earthworks, the extent of soil loss is likely to be no more than moderate on a local scale. The sensitivity of the receptor at this location is likely to be medium.

Elsewhere, a portion of the Proposed Development footprint is underlain by a mixture of moderate fertility, poorly drained and well drained soils, the majority of which is well drained. Given this, the importance of the soils across the Proposed Development is classified as Medium.

9.6.1.1.2 Magnitude

Although the type of soils varies across the Proposed Development, the overall magnitude of effect is considered to be small adverse, as per the assessment criteria set out in Table 9-4. This takes into account where areas of the Proposed Development are stripped of topsoil and where there are more extensive excavations.

Based on the assessment criteria set out in Section 9.3.1, the potential effects prior to the implementation of mitigation are anticipated to be:

- Negative: A change which reduces the quality of the environment.
- Small adverse: Results in minor impact on integrity of attribute or loss of small part of attribute.
- Permanent: impact lasting over sixty years
- Irreversible: When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost

9.6.1.1.3 Significance of effect

The importance of the soil receptors across the Proposed Development is considered to be Medium. In line with the criteria for rating the impact significance (detailed in Table 9-5), while localised moderate impacts may occur in areas of sensitive soils (e.g. peat), the significance of the impact to soil resources across the Proposed Development is “Slight” which is not considered significant.

9.6.1.1.4 Mitigation

The excavation of material will be minimised as much as possible to reduce the impact on land, soils and geology. Where possible, and if suitable with certainty for use, excavated material will be re-used as part of earthworks and as backfill. Topsoil and subsoil that has been stripped as part of the construction works will be reinstated as part of landscaping works, where possible.

Where soils are unsuitable for use or where excess soil is generated with no certainty for use, soils (including Made Ground) will be appropriately sampled and tested prior to off-site removal. Soils will be classified in accordance with the EPA Guidance Document ‘Waste Classification, List of Waste & Determining if Waste is Hazardous or Non-Hazardous’ (2018). It will be the contractors responsibility to ensure that all waste soils are classified correctly and managed, transported and disposed of offsite in accordance with the requirements of the Waste Management Act 1996, as amended, the Waste Framework Directive 2008/98/EC of the European Parliament and Council on waste and any relevant subsequent waste management legislation. The appropriate handling and storage of soils will be detailed within a soils management plan to be included in the Preliminary Construction Environmental Management Plan (CEMP) provided as Appendix 3-3, Volume 3 of the EIAR.

All waste products (general waste, plastic, timber, etc.) arising during the construction phase will be managed and disposed of under the provisions of the Waste Management Act 1996 and associated amendments and regulations. All waste material will be disposed of at a fully licensed disposal / recovery facility.

It will be the contractors responsibility to ensure that a project specific Detailed Resource and Waste Management Plan (developed in accordance with 2021 EPA Guidance: Best Practice Guidelines for the preparation of resource & waste management plans for construction & demolition projects) is fully implemented onsite for the duration of the project.

A suitably experienced and qualified Environmental Clerk of Works will be present onsite during the construction phase.

9.6.1.1.5 Residual significance of effect

With the mitigation above implemented across the Proposed Development, the residual magnitude of impact is anticipated to be “small adverse”. Therefore, the residual significance of effect is anticipated to be “Slight” which is not significant.

9.6.1.2 Effect 2: Loss or direct damage of geology

Potential impacts to geology during the construction phase are related to excavation activities required to facilitate the infrastructure of the Proposed Development as detailed in Chapter 3.

The activities which are anticipated to result in a potential loss or damage of geology include:

- Excavation activities at Lisglennon WTP which identified areas of shallow bedrock which may be encountered.
- Excavation activities for the construction of the new reservoir at Lough Talt WTP.
- HDD works to allow for trenchless construction of the watercourse crossing at the River Brusna.
- Excavation activities at Lisglennon RWPS, Bonniconlon BPS and reservoir, and Windy Gap BPT.
- Excavation works along the treated water main pipeline.

Ground investigation (GI) data indicates that bedrock geology is not likely to be encountered during the construction of the treated water mains pipeline between Lisglennon WTP and Lough Talt WTP, aside from localised areas. However, glacial deposits are likely to be commonly encountered during excavation works.

The geophysical survey indicates that areas of low resistivity were encountered in areas underlying Lisglennon WTP which may indicate a higher risk of karst features being present such as voids or cavities, either air filled or air filled with overburden. This may also represent karstification of the underlying limestone.

In areas where the treated water pipeline is situated, Made Ground was recorded during the GI at depths between 0.1 and 2.2 m bgl. Glacial Tills comprising slightly sandy, slightly gravelly silt/clay with cobbles and boulders and/or silty sands and/or gravels with cobbles and boulder were encountered at varying depths up to 17 m bgl before encountering bedrock.

At Lisglennon WTP, shallow bedrock was recorded at TP-LG03, TP-LG04 (2.6 m bgl), BH-LG04 (2.6 m bgl), BH-LG03A (1.6 m bgl), BH-LG05 (2.6 m bgl), TP-LG06 (0.9 m bgl), TP-LG07 (1.5 m bgl), BH-LG01 (1.6 m bgl). Additionally, potential karstified limestone was recorded during the geophysical survey and may be present at shallow depths.

At Lough Talt WTP, shallow bedrock was encountered at BH-T03 at 1.3 m bgl. Given the expected excavation depths proposed to facilitate the installation of this infrastructure, bedrock is likely to be encountered during excavation.

9.6.1.2.1 Value and sensitivity

The receptor is the bedrock geology and glacial deposits which have the potential to be directly impacted by excavation activities which can result in geology being lost or damaged by erosion and weathering when left exposed.

The bedrock geology varies across the Proposed Development. Where bedrock geology is likely to be encountered it has been recorded as Limestone or Mica schist. Three geological heritage sites are present underlying the Proposed Development. Killala area (Geological heritage site number – Reference:MO068), which has been designated due to the presence of proglacial tectonic ridges, River Moy (Geological heritage site number - Reference:MO089), which

has been designated as an excellent example of a u-shaped meandering river and The Gap (NW of Lough Talt) (Geological heritage site number - Reference:SO023), which is a valley designated as a quaternary meltwater drainage landscape feature. Given the presence of geological heritage sites, the geology is classified as High importance; all other geology underlying the site footprint is classified as Low importance.

9.6.1.2.2 Magnitude

It is anticipated that parts of the geological heritage features, soils and geology present will be required to be removed to facilitate the Proposed Development. The excavation is expected to be relatively small in comparison to the extent of the geological features as a whole. Therefore, the overall magnitude of effect is considered to be small adverse, as per the assessment criteria set out in Table 9-4. This takes into account areas of the Proposed Development which are likely to comprise glacial deposits and bedrock geology.

Regarding geological heritage sites, the River Moy has been designated for its U-shaped meandering river. The Proposed Development will connect to the existing pipeline crossing at the River Moy with the only works taking place at this location being minor excavations to connect to the existing pipeline; therefore, the likelihood of compromising the qualifying feature and magnitude of effect is negligible.

The Gap, is located in the area underlying Pipeline E. The works planned for this area will be to install the treated water pipeline within the existing road basement materials which is unlikely to compromise the qualifying feature of the site, being the meltwater drainage channel (valley). Therefore, the magnitude of effect is likely to be negligible.

The geological heritage site, Killala Area, covers a substantial area underlying Lisglennon sites, Pipeline A and B and has been designated for its tectonic ridge landscape. In comparison to the relatively large area of the geological heritage site, the footprint of the Proposed Development is considered to be relatively small and therefore the loss of geology in this small area is considered to be limited, resulting in a small adverse magnitude of effect.

9.6.1.2.3 Significance of effect

The importance of the geological heritage sites across the Proposed Development is considered to be “High”, whilst the geology underlying all other aspects of the sites is classified as Low. In line with the criteria for rating the impact significance (detailed in Table 9-5), the significance of the impact to geological heritage sites River Moy and The Gap is “Imperceptible” and the impact to the geological heritage site Killala Area is “Slight” which is considered not significant in EIA terms. Significance of impact to all other geology receptors across the Proposed Development is “Imperceptible” which is considered not significant.

9.6.1.2.4 Mitigation

The mitigation for reducing impacts to geological heritage sites is predominantly addressed through development design.

While geophysical surveys have indicated the potential for karst features to be present in the areas underlying Lisglennon WTP, no karst features have been confirmed at present. In the event that subsurface karst features (caverns, caves etc.) are identified during the construction phase, the on-site Environmental Clerk of Works will be notified and will ensure a karst protocol is implemented, in consultation with the Engineer, Site Manager and Client.

At the River Brusna crossing, impacts to the geological feature will be minimised through the use of horizontal directional drilling (HDD). The following mitigation measures will be undertaken specifically with regard to HDD:

- A geotechnical assessment shall be carried out prior to horizontal directional drilling and drilling shall only be carried out at locations where conditions are suitable for the control of drilling materials.
- All works will be supervised by a qualified environmental engineer.
- No works will be undertaken near the river corridor or river banks. Reception and launch pits for the directional drilling process shall be excavated a minimum of 20 m from the stream banks.

- No construction activity will take place in riparian areas. Stockpiling of construction materials, refuelling of machinery and overnight parking will take place in designated compound areas. Concrete truck chute cleaning will take place in a separate appropriate onsite location.
- The area around the concrete/bentonite batching, pumping, and recycling plants shall be bunded using a geotextile membrane and sandbags in order to contain any spillages.
- Silt fencing will be erected 5m from the reception and launch pits used for directional drilling.
- Horizontal directional drilling works shall not take place at periods of high rainfall and shall be scaled back or suspended if heavy rain is forecast.

9.6.1.2.5 Residual significance of effect

With the mitigation above implemented across the Proposed Development, the residual magnitude of impact is anticipated to be “small adverse”. Therefore, the residual significance of effect at geological heritage sites is anticipated to be “Slight” and “Imperceptible” for all other geology underlying the site which is not significant in EIA terms.

9.6.1.3 Effect 3: Risk of leaks or spills impacting on land and soils

This impact relates to the accidental release of contaminants such as hydrocarbons (i.e. fuels and oils), cement or bentonite slurry that may be used during construction activities. The receptors at risk from this impact are the underlying soils and geology. This includes the geological heritage sites present across the site.

Various activities have the potential to result in accidental release of these contaminants such as cement pouring to facilitate the construction of buildings at Lisglennon WTP, Bonniconlon BPS and reservoir, Windy Gap BPT and Lough Talt WTP. Additionally, machinery required to transport site material or those required for excavation have the potential to leak fuels or hydraulic fluid. The risk of impacts to soils and geology is higher in areas where ground is exposed i.e. excavation or HDD. Storage of onsite chemicals also has the potential to impact land and soils.

9.6.1.3.1 Value and sensitivity

Due to the scale of the Proposed Development, the underlying soils and geology vary across the site as discussed in Sections 9.4.5 and 9.4.6.

The soils underlying the site are moderately fertile and well drained, or comprise peat in localised areas. No mineral occurrences are recorded within the Proposed Development indicating the geology underlying the site is unlikely to be a mineral resource.

There are three geological heritage sites that have been recorded within the Proposed development: Killala Area (Reference:MO068), River Moy (Reference:MO089) and The Gap (NW of Lough Talt) (Reference:SO023). Therefore, the soils are classified as Medium importance and the geological heritage sites underlying the site is classified as High importance. Geology such as glacial deposits and bedrock not classified as a geological heritage site is considered to be of Low importance.

9.6.1.3.2 Magnitude

The risk of spills and leaks of contaminants has the potential to take place throughout the construction phase of the Proposed Development. The extent of the spill/leak will determine the likely impact on the underlying soils and geology. Although the importance of soils and geology differs, the overall magnitude of effect is considered to be small adverse, as per the assessment criteria set out in Table 9-4.

Based on the assessment criteria set out in Section 9.3.1, the potential effects prior to the implementation of mitigation are anticipated to be:

- Negative: A change which reduces the quality of the environment.

- Small adverse: Results in minor impact on integrity of attribute or loss of small part of attribute.
- Long-term: Impact lasting fifteen to sixty years.
- Irreversible: When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost.

9.6.1.3.3 Significance of effect

The importance of the geology receptors across the Proposed Development is considered to be “High” for geological heritage sites and “Low” for geology not classified as a geological heritage site. Soil receptors are considered to be of “Medium” importance.

In line with the criteria for rating the impact significance (detailed in Table 9-5), the significance of the impact to soils across the Proposed Development is “Slight” which is not considered significant.

Significance of effect to geological heritage sites is considered to be “Slight/Moderate” which is considered to be not significant.

Significance of effect to geology not classified as a geological heritage site is considered to be “Imperceptible” which is considered to be not significant.

9.6.1.3.4 Mitigation

Mitigation measures for the prevention of soil / bedrock contamination during construction, as outlined below, will be implemented by the contractor who will be responsible for ensuring these measures are fully implemented. Mitigation measures outlined in Chapter 10- Water are also applicable to the protection of soils and geology during the construction phase.

The employment of good construction management practices will serve to minimise the risk of pollution from construction activities at the Proposed Development in line with the Construction Industry Research and Information Association (CIRIA) publication entitled, Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors, CIRIA - C532 (2001).

Strict supervision of contractors will be adhered to in order to ensure that all plant and equipment utilised on-site is in good working condition. Any equipment not meeting the required standard will not be permitted for use within the site. This will minimise the risk of soils and bedrock becoming contaminated through site activities.

The highest standards of site management will be maintained and utmost care and vigilance followed to prevent accidental contamination or unnecessary disturbance to the site and surrounding environment during construction. An Environmental Clerk of Works (ECoW) will be given the task of overseeing the pollution prevention measures agreed for the site to ensure that they are operating safely and effectively.

In the event that ground contamination is encountered during the construction works, all works will cease. Advice will be sought from an experienced contaminated land specialist and a phased environmental risk assessment (specifically to assess any associated potential environmental and/ or human health risks) will be undertaken in accordance with relevant EPA guidance ‘Guidance On The Management Of Contaminated Land And Groundwater At EPA Licensed Sites’ (EPA, 2013) and UK Environment Agency Guidance ‘Land contamination risk management (LCRM)’ (UK EA, 2025);

Mitigation will comprise the following:

- Temporary onsite groundwater monitoring wells will be either suitably protected for the duration of the works and / or appropriately decommissioned in accordance with best practice guidance (SEPA guidance document “Good Practice for Decommissioning Redundant Boreholes and Wells“).

- Earthworks / piling plant and vehicles delivering construction materials to site will be confined to predetermined haul routes around the site for each phase of the Proposed Development;
- The need for vehicle wheel wash facilities will be assessed by the Contractor depending on the phasing of works and onsite activity and will be installed as needed, near any site entrances and road sweeping implemented as necessary to maintain the road network in the immediate vicinity of the site;
- Dust suppression measures (e.g., dampening down) will be implemented as necessary during dry periods;
- All excavated materials will be stored away from the excavations / immediate works area, in an appropriate manner at a safe and stable location. The maximum height of temporary stockpiles will be 3 m;
- A comprehensive monitoring and supervisory regime including monitoring of all excavations and stability assessments as required will be put in place to ensure that the proposed construction works do not constitute a risk to the stability of the site;
- All fill material imported to the site for the Proposed Development will be clean, uncontaminated, suitable engineering grade fill material;

Specifically, regarding pollution control measures, the following mitigation will be implemented:

- Fuels, lubricants and hydraulic fluids for equipment used on the construction site, and solvents, oils, and paints, will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best codes of practice;
- Waste oils and hydraulic fluids to be managed in accordance with best practice requirements and pollution measures as detailed in the Preliminary Construction Environmental Management Plan (CEMP).

The mitigation measures will be incorporated (as required) during Detailed Design Stage and will form part of a site-specific CEMP which will be implemented during the Construction Stage (including initial Site preparatory / enabling works).

9.6.1.3.5 Residual significance of effect

With mitigation implemented, the residual magnitude of effect is anticipated to be “negligible”. Therefore, the residual significance of effect is anticipated to be “Imperceptible” which is not significant.

9.6.2 Operation and Maintenance

9.6.2.1 Effect 4: Risk of leaks or spills impacting on land and soils

The Proposed Development will require ongoing maintenance during the operational phase at all site locations. As such, depending on the maintenance required, a risk of accidental spills and leaks of fuels, oils and chemicals is present. Additionally, there are risks associated with the operational activities which may involve leaks from machinery, leakage of water from the untreated and treated water pipelines. Chemicals stored onsite also have the potential to be spilled. In the event of a fire, any wash water from the fire suppression system poses a risk to the underlying land and soils.

9.6.2.1.1 Value and sensitivity

Provided there are no significant changes to the baseline environment during the operational phase, the importance of the receptors remains the same as established during the construction phase. Therefore, the soils are classified as Medium importance, geological heritage sites are considered to be of High Importance and the geology not classified as a geological heritage site is classified as Low importance.

9.6.2.1.2 Magnitude

The risk of spills and leaks of contaminants has the potential to take place throughout the Operational phase of the Proposed Development. The extent of the spill/leak will determine the likely effect on the underlying soils and geology.

Given that the activities likely to result in the accidental release of contaminants to ground are reduced compared to the construction phase, the overall magnitude of effect is considered to be negligible, as per the assessment criteria set out in Table 9-4.

Based on the assessment criteria set out in Section 9.3.1 the potential effects prior to the implementation of mitigation are anticipated to be:

- Negative: A change which reduces the quality of the environment.
- Negligible: No measurable changes in attributes.
- Long-term: Impact lasting fifteen to sixty years.
- Irreversible: When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost.

9.6.2.1.3 Significance of effect

The importance of the geology receptors across the Proposed Development is considered to be “High” for geological heritage sites and “Low” non-designated geology, whilst soil receptors are considered to be “Medium” importance. In line with the criteria for rating the impact significance (detailed in Table 9-5), the significance of the effect to soils and geology across the Proposed Development is “Imperceptible” which is not considered significant.

9.6.2.1.4 Mitigation

The Proposed Development will be operated in accordance with the relevant regulations and best practice guidance in applying Best Available Techniques and pollution prevention.

The proposed design, from concept through to design has been developed to ensure that any potential risk of contamination to the receiving land soils and geology environmental, and water (groundwater) environment is negligible. Pollution prevention measures, such as engineered drainage, double bunded tanks, hardstanding and designated waste storage will be incorporated within the design where appropriate to mitigate the risk of ground contamination. Further details of design mitigation measures are provided in Chapter 3: Project Description.

9.6.2.1.5 Residual significance of effect

With the mitigation above implemented across the Proposed Development, the residual magnitude of effect is anticipated to be “negligible”. Therefore, the residual significance of effect is anticipated to be “Imperceptible” which is not significant.

9.7 Mitigation Measures

Table 9-22 — Summary of mitigation measures proposed to address potential effects to receptors within and surrounding the Proposed Development.

Impact	Receptor	Summary of Mitigation Proposed
Construction		
Impact 1: Direct damage or loss of topsoil or subsoil	Underlying soils	The excavation of material will be minimised as much as possible to reduce the impact on land, soils and geology. Where possible, and if suitable with certainty for use, excavated material will be re-used as part of earthworks and as backfill. Topsoil and subsoil that has been stripped as part of the construction works will be reinstated as part of landscaping works, where possible. The appointed contractor will ensure that a project specific Detailed Resource and Waste Management Plan (developed in accordance with 2021 EPA guidance: Best Practice Guidelines for the preparation of resource & waste management plans for construction

Impact	Receptor	Summary of Mitigation Proposed
		& demolition projects) is provided and implemented for the duration of the construction of the Proposed Development. Full details of the mitigation proposed are recorded in Section 9.6.1.1.4 and in the Preliminary Construction Environmental Management Plan (CEMP) provided as Appendix 3-3, Volume 3 of the EIAR.
Impact 2: Direct damage or loss of geology	Underlying geology and geological heritage sites	In the event that subsurface karst features (caverns, caves etc.) are identified during the construction phase, the onsite Environmental Clerk of Works will be notified immediately and will ensure a karst protocol is implemented, in consultation with the Engineer, Site Manager and Client. A geotechnical assessment shall be carried out prior to horizontal directional drilling and drilling shall only be carried out at locations where conditions are suitable for the control of drilling materials. Pollution prevention measures will be implemented to minimise impacts. Full details of the mitigation proposed are recorded in Section 9.6.1.2.4 and in the Preliminary Construction Environmental Management Plan (CEMP) provided as Appendix 3-3, Volume 3 of the EIAR.
Impact 3: Risk of leaks or spills impacting on land and soils	Underlying soils, geology, geological heritage sites and construction workers	A comprehensive monitoring and supervisory programme of monitoring for all excavations will be implemented. In the event that ground contamination is encountered beneath the site during the construction works, all works will cease. Advice will be sought from an experienced contaminated land specialist and a phased environmental risk assessment (specifically to assess any associated potential environmental and/ or human health risks) will be undertaken in accordance with relevant EPA guidance 'Guidance On The Management Of Contaminated Land And Groundwater At EPA Licensed Sites' (EPA, 2013) and UK Environment Agency Guidance 'Land contamination risk management (LCRM)' (UK EA, 2025); The employment of good construction management practices will serve to minimise the risk of pollution from construction activities at the Proposed Development in line with the Construction Industry Research and Information Association (CIRIA) publication entitled, Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors, CIRIA - C532 (2001) which are also detailed in Chapter 10– Water and Hydrology; The highest standards of site management will be maintained and utmost care and vigilance followed to prevent accidental contamination or unnecessary disturbance to the site and surrounding environment during construction. An ECoW will be given the task of overseeing the pollution prevention measures agreed for the site to ensure that they are operating safely and effectively. The mitigation measures will be incorporated (as required) during Detailed Design Stage and will form part of a site-specific CEMP

Impact	Receptor	Summary of Mitigation Proposed
		which will be implemented during the Construction Stage (including initial Site preparatory / enabling works). Full details of the mitigation proposed are recorded in Section 9.6.1.3.4 and in the Preliminary Construction Environmental Management Plan (CEMP) provided as Appendix 3-3, Volume 3 of the EIAR.
Operation and Maintenance		
Impact 4: Risk of leaks or spills impacting on land and soils	Underlying soils, geology, geological heritage sites and construction workers	The Proposed Development will be operated in accordance with the relevant regulations and best practice guidance including CIRIA guidance documents. This may include CIRIA C741 Environmental Good Practice on Site, alongside other relevant measures taken from CIRIA C532, C648 and C753 which outline good practice and pollution control measures during construction. Pollution prevention measures, such as engineered drainage, double bunded tanks, hardstanding and designated waste storage shall be incorporated within the design to mitigate the risk of ground contamination through leakage.

9.8 Cumulative and Interactive Effects

9.8.1 Cumulative Impact Assessment

In conjunction with Chapter 20 - Cumulative Impacts and Interactions, this chapter considers the residual effects presented in Section 9.6 and the potential for cumulative effects arising from other proposed developments within the Study Area. This chapter considers the potential effects through construction and operational phases.

A 250 m radius of the Proposed Development site boundary is considered to be a suitable study area for the cumulative assessment. A 250 m radius will account for mobilisation of potential contaminants as a result of ground disturbance in surrounding areas that have not been included in ground investigations. Other impacts are likely limited to direct loss or damage of soils, superficial deposits and bedrock geology, as well as accidental spills and leaks of contaminants. With regard to direct loss of soils and geology, the nature of the impact is one that limits the effects to the footprint of the Proposed Development infrastructure. Accidental spills and leaks of fuels and oils are, in most circumstances, likely to be relatively small in volume but may have the potential to affect a larger area. However as a result of the mitigation included in Section 9.6 and the CEMP (Appendix 3-3, Volume 3 of the EIAR), the impacts will likely be limited to the Proposed Development site boundary. Potential leakages of chlorinated water from the treated water main are likely to be contained in the low permeability road basement materials.

9.8.2 Anticipated Impacts

To assess likely cumulative effects arising from the Proposed Development, the residual effects established in Section 9.6 have been screened. Table 9-23 summarises which of the residual effects have the potential to result in cumulative effects. As Uisce Éireann is committed to maintaining and repairing infrastructure of the Proposed Development into the future and there are no plans for decommissioning the Proposed Development, no residual effects are anticipated as a result of decommissioning activities. As such, there is no potential for cumulative effects to arise from decommissioning activities and will therefore not be taken forward for assessment.

Table 9-23 — Screening of residual impacts for potential cumulative effects

Impact	Potential for cumulative effects	Rationale
Construction		
Impact 1: Direct damage or loss of topsoil or subsoil	Yes	As the residual effects of this impact were assessed as “Slight” there is potential for cumulative impacts, should the construction period of external developments overlap with the construction period and site boundary of the Proposed Development.
Impact 2: Direct damage or loss of geology	Yes	As the residual effects of this impact were assessed as “Slight” there is potential for cumulative impacts, should the construction period of external developments overlap with the construction period Proposed Development. Cumulative effects are anticipated in areas where the Proposed Development and external developments overlap spatially within geological heritage sites. For areas not within geological heritage sites, the residual effect was assessed as “imperceptible” which is not anticipated to give rise to cumulative effects due to the anticipated low significance of impact.
Impact 3: Risk of leaks or spills impacting on land and soils	No	The residual effects of this impact were assessed as being “Imperceptible”. This indicates that the impact is unlikely to result in cumulative effects due to the anticipated low significance of impact.
Operation and Maintenance		
Impact 4: Risk of leaks or spills impacting on land and soils	No	The residual effects of this impact were assessed as being “Imperceptible”. This indicates that the impact is unlikely to result in cumulative effects due to the anticipated low significance of impact.

9.8.3 External Development Screening

The full list of external developments screened as part of the cumulative impact assessment can be found in Chapter 20 - Cumulative Impacts and Interactions. For the purposes of the cumulative impact assessment relative to land, soils and geology, a zone of influence of 250 m will be employed to provide an initial screening on the full list of external developments. This screening distance was chosen to account for mobilisation of potential contaminants that may arise as a result of ground disturbance. The screening distance will be used to assess cumulative effects associated with land, soils and geology considering the close proximity between developments and overlap of construction periods.

Table 9-24 provides an assessment of the external developments within 250 m of the Proposed Development and the likelihood for cumulative impacts to arise as a result of activities throughout construction and operational phases.

Table 9-24 — Assessment of external developments for potential cumulative effects.

Development	Distance to Proposed Development	Potential for cumulative effects	Rationale
211063 (Carrowcrin, Crossmolina, Co Mayo)	Intersects with existing raw water mains	No	The planning application for this development indicates that the only spatial overlap with the Proposed Development is with the existing raw water main. No works are planned for this aspect of the infrastructure. Therefore, there is no potential for cumulative impacts to occur.
21708 (mullafarry td, Killala)	Approx. 250 m northwest of Lisglennon WTP	No	This planning application relates to the continued use of a limestone quarry with the implementation of a wastewater treatment system. As the use of the quarry is continued, this is considered part of baseline conditions. An Appropriate Assessment Screening Report was completed for this application and accepted by the planning authority which concluded that there were no pathways for this development to result in cumulative effects. Therefore, there are unlikely to be any cumulative impacts associated with this development.
2560595 (Culleens Rathroeen, Ballin, Co. Mayo)	Alongside the proposed treated water trunk main	No	The planning application indicates that the development will occupy an area adjacent to the Proposed Development mains pipeline. However, there will be no overlap of development boundaries. The development involves the raising of ground, to be filled with inert material. This would indicate limited/no impacts to soils and geology as a result of direct excavation or damage. No EIA or associated impact assessment of land, soils and geology was provided alongside the planning application and therefore an assessment of cumulative effects was not provided with the planning application. Due to the nature of the development and lack of spatial overlap, cumulative effects are unlikely.
22652 (Culleens/Rathroeen, Ballina, co. Mayo)	Alongside the proposed treated water trunk main	No	The planning application relates to a small replacement access road. The development is small in nature and therefore, no EIA or associated impact assessment was provided to supplement the planning application. Therefore, an assessment of cumulative effects was not provided with the planning application. However, due to the nature of the development, lack of spatial overlap and considering the minimal works required to

Development	Distance to Proposed Development	Potential for cumulative effects	Rationale
			install the treated water pipeline in the road basement materials, cumulative effects are considered unlikely.
2560027 (Killala Road Culleens, Ballina, Co. Mayo)	75 m west of the proposed treated water trunk main	No	The planning application for this development indicates that there is no spatial overlap between this development and the Proposed Development. Additionally, installation of the treated water main will involve minimal ground disturbance and no loss of soils and geology. Therefore, on the basis that the residual impacts of the Proposed Development are limited to the site boundary, there are unlikely to be any cumulative impacts associated with this development.
2560391 (Old French Road, Farrannoo Td., Ballina Co. Mayo)	Alongside the proposed treated water trunk main	No	The planning application relates to a two storey detached dwelling and access road. The development is small in nature and therefore, no EIA or associated impact assessment was provided to supplement the planning application. Therefore, an assessment of cumulative effects was not provided with the planning application. However, installation of the treated water main will involve minimal ground disturbance and no loss of soils and geology. Due to this and the nature of the development and lack of spatial overlap cumulative effects are unlikely.
19393 (Belleek castle, Ballina)	Alongside the proposed treated water trunk main	No	The planning application relates to a single storey building extension. No EIA or land, soils and geology specific or cumulative assessments were carried out. On the basis that there is no spatial overlap with the Proposed Development, no cumulative effects are anticipated.
2253 (Heffernan Park, Creggs Road, Ballina)	Alongside the proposed treated water trunk main	No	The planning application relates to an extension to an existing carpark. The development is small in nature and therefore, no EIA or associated impact assessment was provided to supplement the planning application. Therefore, an assessment of cumulative effects was not provided with the planning application. However, installation of the treated water main will involve minimal ground disturbance and no loss of soils and geology. Due to this and the nature of the development and lack of spatial overlap cumulative effects are unlikely.

Development	Distance to Proposed Development	Potential for cumulative effects	Rationale
211376 (Quignashee, Ballina)	Alongside the proposed treated water trunk main	No	The planning application relates to the construction of a relatively small access road junction. No EIA or land, soils and geology specific assessments or cumulative assessment was provided. This development is not located within any geological heritage sites. Therefore, on the basis that the residual works of the Proposed Development at this location are limited to installation of the treated water mains in the road basement materials, there are unlikely to be any cumulative impacts associated with this development.
20646 (Ballyholan, Ballina)	Alongside the proposed treated water trunk main	No	The planning application relates to the infilling of land with inert material. No EIA or land, soils and geology specific assessments or cumulative assessment was conducted. On the basis that there is no spatial overlap with the Proposed Development, no cumulative effects are anticipated.
2460315 (Ballyholan Td., Ballina, Co. Mayo)	Approx. 100 m south of the proposed treated water trunk main	No	The planning application for this development indicates the development involves the filling of land with inert materials. Therefore, there will be no loss of soils and geology. At this location, the Proposed Development is limited to installation of the treated water mains in the road basement materials which will also result in no loss to soils and geology and minimal ground disturbance. Therefore, there are unlikely to be any cumulative impacts associated with this development.
2360261 (Townlands of Gorteen Ardoughan Kilemoremoy Belleek Ballina Quignalecka Quignashee Ballyholan Behy More Corimla South Carrownlabaun Bunnyconnellan West Rathreedaun Drumsheen and Bunnyconnellan East Co. Mayo, County, Mayo)	Intersects the proposed treated water trunk main	No	The planning application relates to the replacement of an overhead line circuit, including polesets, wiring and other associated works. Only a small section of the development overlaps with the Proposed Development. The development supplied an environmental impact assessment screening report, planning and environmental consideration report and construction environmental management plan to supplement the planning application. The PECR stated that impacts as a result of accidental emissions are possible but residual impacts will be minimal due to the mitigation measures proposed within the CEMP. Therefore, on the basis that the residual impacts of the Proposed Development are

Development	Distance to Proposed Development	Potential for cumulative effects	Rationale
			minimal due to the nature of the works at this location, there are unlikely to be any cumulative impacts associated with this development.
2460330 (Bunnyconnellan West Td., Bonniconlon, Ballina)	Alongside the proposed treated water trunk main	No	The planning application relates to an extension of an existing school building. The development is small in nature and therefore, no EIA or associated impact assessment was provided to supplement the planning application. However, installation of the treated water main will involve minimal ground disturbance and no loss of soils and geology. Due to this and the nature of the development and lack of spatial overlap cumulative effects are unlikely.
2460631 (Bunnyconnellan West Td, Bonniconlon, Ballina)	Alongside the proposed treated water trunk main	No	The planning application relates to the construction of an astro turf pitch and associated walking path. The development is small in nature and therefore, no EIA or associated impact assessment specific to soils and geology was provided to supplement the planning application. Therefore, an assessment of cumulative effects was not provided with the planning application. However, installation of the treated water main will involve minimal ground disturbance and no loss of soils and geology. Due to this and the nature of the development and lack of spatial overlap cumulative effects are unlikely.
21581 (Glenree 110kV Substation, Bunnyconnellan, Co. Mayo)	200 m south of the proposed treated water trunk main	No	The planning application for this development indicates that there is no spatial overlap between this development and the Proposed Development. The development is small in nature and therefore, no EIA or associated impact assessment specific to soils and geology was provided to supplement the planning application. Therefore, an assessment of cumulative effects was not provided with the planning application. However, installation of the treated water main will involve minimal ground disturbance and no loss of soils and geology. Due to this and the nature of the development and lack of spatial overlap cumulative effects are unlikely.
22364	Alongside the proposed treated water trunk main	No	The planning application relates to construction of a new dwelling, garage and discharge system. The development is

Development	Distance to Proposed Development	Potential for cumulative effects	Rationale
(Gortersluin Td, Aclare, Co. Sligo)			relatively small in nature and as such, an EIAR was not required and no soils and geology specific assessment was provided. However, installation of the treated water main will involve minimal ground disturbance and no loss of soils and geology. Due to this and the nature of the development and lack of spatial overlap cumulative effects are unlikely.
2460015 (Gortersluin Td, Aclare, Co. Sligo)	Alongside the proposed treated water trunk main	No	The planning application relates the decommissioning of a percolation area and moving of three tertiary treatment systems. The development is relatively small in nature and as such, an EIAR was not required and no soils and geology specific assessment was provided However, installation of the treated water main will involve minimal ground disturbance and no loss of soils and geology. Due to this and the nature of the development and lack of spatial overlap cumulative effects are unlikely.

The construction period of the Proposed Development is anticipated to take place over approximately 35 months. The development has the potential to cause direct impacts to soils and geology including the loss and damage of resources. Additionally, the Proposed Development has the potential to cause impacts to soils and geology as a result of accidental release of contaminants throughout construction and operational phases. Section 9.6 has assessed these impacts and found that significant impacts are unlikely with the addition of mitigation measures identified.

Based on the location, nature and scale of the developments presented in Table 9-24 and taking the residual effects of the Proposed Development into account, no significant cumulative effects are anticipated with respect to land, soils and geology. Therefore, cumulative effects to land, soils and geology are considered to have an imperceptible impact and are considered to be not significant.

9.8.4 Interactions

The interaction of land, soils and geology with other environmental attributes are summarised below in Table 9-25.

Table 9-25 — Interactions between Environmental Aspects of the Proposed Development

Interaction	Description
Population and Human Health	Potential impacts on the receiving land, soils and geology environment could impact on human health. Potential risk to human health receptors may be affected through direct contact, ingestion or inhalation with soils which may potentially contain contamination from site activities (including potential minor leaks and spills of fuels, oils and paint). However, this risk is anticipated to be appropriately controlled by implementation of the mitigation measures outlined in this chapter. Considering the baseline environmental setting and the proposed mitigation measures during the construction phase presented in Section 9.6.1, and those relevant in Chapter 6 –

Interaction	Description
	Population and Human Health, human health risks associated with exposure to contaminants (via. direct contact, ingestion or inhalation) resulting from the Proposed Development are considered as unlikely.
Agronomy	Potential impacts to land, soils and geology include the loss and disturbance of soils. A small proportion of the soil loss takes place on agricultural land. However, the mitigation measures described in Section 9.6.1 and 9.7 and those relevant in Chapter 8 – Agronomy are anticipated to manage the potential risks so as to be unlikely to affect receptors.
Biodiversity	Potential impacts on the receiving land, soils and geology environment could impact on biodiversity conditions present. The mitigation measures described in Section 9.6.1 and 9.7 and those relevant in Chapter 7 – Biodiversity are anticipated to manage the potential risks so as to be unlikely to affect receptors.
Air Quality & Climate	Potential impacts on the receiving land, soils and geology environment could also impact on air quality conditions present. However, the mitigation measures described in Section 9.7 and those relevant in Chapter 11 - Air Quality, and Chapter 12 - Climate are anticipated to manage the potential risks so as to be unlikely to affect receptors.
Water (Hydrology and Hydrogeology)	Potential impacts on the receiving land, soils and geology environment could also impact on surface water and groundwater conditions present. However, the mitigation measures described in Section 9.7 and those relevant in Chapter 10 – Water (Hydrology and Hydrogeology) are anticipated to manage the potential risks so as to be unlikely to affect receptors.
Material Assets	Potential impacts on the receiving land, soils and geology environment could also impact on material assets. However, the mitigation measures described in Section 9.7 and those relevant in Chapter 16 – Material Assets are anticipated to manage the potential risks so as to be unlikely to affect receptors.

9.9 Residual Effects

9.9.1 Construction Phase

Residual effects throughout the construction phase are fully assessed in Section 9.6.1. The impact of land loss (direct loss of soils and geology) is likely to have a permanent negative slight impact on the environment as there is no mitigation for long-term land take of fertile soils or underlying geology. As a result, there will be a residual impact, however due to this being a slight impact, no significant effects are anticipated to land during the construction phase as a result of the Proposed Development.

With respect to geological heritage sites, the inclusion of best practice mitigation results in an imperceptible effect at two sites: The Gap and the River Moy. There will inevitably be a minor loss of soils and geology at the geological heritage site, Killala Area, as such with the inclusion of best practice mitigation, there will be a slight effect.

The residual effect associated with contamination of land due to accidental spills or leakages on soils and geology is likely to have a negative imperceptible impact resulting in no significant effects during the construction phase.

9.9.2 Operational Phase

Residual effects throughout the operational phase are fully assessed in Section 9.6.2. The impact to land contamination is likely to have a negative imperceptible impact resulting in no significant effects during the operational phase.

9.10 Monitoring Requirements

9.10.1 Construction Phase

Monitoring requirements to address each effect throughout the construction phase are included in Section 9.6.1 as part of the impact assessment. A comprehensive monitoring and supervisory regime including monitoring of all excavations and stability assessments as required will be put in place by the contractor to ensure that the proposed construction works are unlikely to constitute a risk to the stability of the site. This will include supervision by an onsite ECoW throughout the construction phase to ensure onsite staff adhere to best practice measures and install suitable pollution prevention measures.

Where HDD is used, drilling fluids will be managed through a site-specific drilling fluid management procedure. Only suitable drilling fluids will be used, and measures will be implemented to minimise the risk of drilling fluid loss to ground or surface water. These measures may include monitoring of drilling pressures, inspection of the ground surface and watercourse banks, provision of spill response materials, and implementation of contingency measures in the event of drilling fluid breakout.

Prior to construction the contractor will provide plans for routine inspections, including frequencies, to be carried out throughout construction. This should include soil stockpile monitoring at Wind Gap BPT due to the sensitivity of the location, routine checks of chemical storage areas and emergency spill response inspections. The contractor will also provide a procedure for pollution incident reporting.

9.10.2 Operational Phase

Monitoring requirements to address each effect throughout the operation and maintenance phase are included in Section 9.6.2 as part of the impact assessment. Routine monitoring in relation to land, soils and geology will not be required once the plant is operational, unless specific conditions arise or unless requested by the EPA. This will also include a procedure for reporting pollution incidents.

9.11 Conclusion and Summary tables

The potential effects of the Proposed Development on land, soils and geology have been assessed for the construction, and operational phases of the site and for potential cumulative effects.

With the addition of mitigation measures identified in Sections 9.6 and 9.7, it is not anticipated that the Proposed Development will result in significant effects to land, soils and geology.

Table 9-26 summarises the potential impacts and residual effects of the Proposed Development.

Table 9-26 — Summary of potential impacts and residual effects.

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of Impact	Significance	Residual effect
Construction					

Potential Impact	Receptor	Receptor Sensitivity	Magnitude of Impact	Significance	Residual effect
Impact 1: Direct damage or loss of topsoil or subsoil	Underlying soils	Medium	Small Adverse	Slight (not significant)	Slight (not significant)
Impact 2: Direct damage or loss of geology	Underlying geology and geological heritage sites	Geology – Low Geological Heritage sites - High	Small Adverse	Imperceptible except areas underlain by geological heritage sites: The Gap and River Moy (Imperceptible – not significant) Killala Area (Slight – not significant)	Imperceptible except areas underlain by geological heritage sites: The Gap and River Moy (Imperceptible – not significant) Killala Area (Slight – not significant)
Impact 3: Risk of leaks or spills impacting on land and soils	Underlying soils, geology, geological heritage sites and construction workers	Soils – Medium Geology – Low Geological Heritage sites - High	Small adverse	Slight (not significant)	Imperceptible (not significant)
Operation and Maintenance					
Impact 4: Risk of leaks or spills impacting on land and soils	Underlying soils, geology, geological heritage sites and construction workers	Soils – Medium Geology – Low Geological Heritage sites - High	Negligible	Imperceptible (not significant)	Imperceptible (not significant)
Decommissioning					
Uisce Éireann is committed to maintaining and repairing infrastructure of the Proposed Development into the future and there are no plans for decommissioning the Proposed Development. Therefore, there will be no decommissioning activities that could give rise to impacts.					

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