AtkinsRéalis

## SID Engineering Report

Uisce Éireann

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# BALLINA AND LOUGH TALT WATER SUPPLY UPGRADE

AtkinsRéalis - Sensitive / Sensible (FR)

# Notice

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# Abbreviations

| | |
|---|---|
| AA | Appropriate Assessment |
| AC | Asbestos Cement |
| ACP | An Coimisiún Pleanála |
| AR | AtkinsRéalis |
| BPS | Booster Pumping Station |
| BPT | Break Pressure Tank |
| CFC | Coagulation, Flocculation and Clarification |
| DWSP | Drinking Water Safety Plan |
| EIAR | Environmental Impact Assessment Report |
| EPA | Environmental Protection Agency |
| ESP | Engineering Services Provider |
| FRA | Flood Risk Assessment |
| GAC | Granular Activated Carbon |
| HGL | Hydraulic Grade Line |
| HMI | Human Machine Interface |
| IROPI | Imperative Reasons of Overriding Public Importance |
| LR | Larson Ratio |
| LSI | Langelier Saturation Index |
| MCC | Mayo County Council |
| NIS | Natura Impact Statements |
| NWRP | National Water Resources Plan |
| OD | Ordnance Datum |
| PAC | Powder Activated Carbon |
| PFT | Picket Fence Thickener |
| PS | Pumping Station |
| RAL | Remedial Action List |
| RI | Ryznar Index |
| RTW | Run to Waste |
| RWI | Raw Water Intake |
| RWS&PS | Raw Water Storage & Pumping Station |
| RWSS | Regional Water Supply Scheme |
| SAC | Special Area of Conservation |
| SCC | Sligo County Council |
| SDB | Supply Demand Balance |

| | |
|---|---|
| SI | Site Investigation |
| SID | Strategic Infrastructure Development |
| THM | Trihalomethanes |
| THMFP | Trihalomethanes Formation Potential |
| TOC | Total Organic Carbon |
| TWL | Top Water Level |
| UÉ | Uisce Éireann |
| UKWIR | United Kingdom Water Industry Research |
| UV | Ultraviolet |
| UWWET | Used Washwater Equalisation Tank |
| UWWEST | Used Washwater Equalisation and Settlement Tank |
| UWWST | Used Washwater Settlement Tank |
| WAO | Water Abstraction Order |
| WSZ | Water Supply Zone |
| WTP | Water Treatment Plant |

# 1. Introduction

## 1.1 Introduction

This SID Engineering Report has been prepared by AtkinsRéalis Ireland Limited on behalf of Uisce Éireann to support the Strategic Infrastructure Development planning application for the Ballina and Lough Talt Water Supply Upgrade. The report provides the planning-level engineering description, design basis and technical context for the infrastructure proposed as part of the planning application. For consistency with the Environmental Impact Assessment Report, the "Proposed Development" described in this report corresponds to the "Proposed Development" assessed in the EIAR.

The Proposed Development will provide a long-term, sustainable and resilient treated water supply to the area currently served by the Lough Talt Regional Water Supply Scheme, while also increasing capacity, operational flexibility and security of supply within the Ballina Regional Water Supply Scheme.

The principal objective of the Proposed Development is to enable the cessation of abstraction from Lough Talt and to replace that source with treated water supplied from Lough Conn via the upgraded Ballina Regional Water Supply Scheme. This responds to the long-term sustainability and environmental constraints associated with the existing Lough Talt source, while maintaining a safe, secure and compliant drinking water supply for the communities currently dependent on that supply.

The Proposed Development extends across County Mayo and County Sligo and includes works at existing and proposed infrastructure sites. The upgraded system will operate by abstracting raw water from Lough Conn at the existing Wherrew RWI&PS, transferring it to the existing Lisglennon RWS&PS and onwards to Lisglennon WTP for treatment, and conveying treated water through Proposed Pipelines B to E. Treated water will gravitate from Lisglennon WTP towards Ballina and Bonniconlon, be pumped onwards from the proposed Bonniconlon BPS to the proposed Windy Gap BPT, and then gravitate to the existing Lough Talt WTP site, which will be repurposed for treated water storage, control and network integration functions.

## 1.2 Objectives of the Report

The objectives of this Engineering Report are to:

- describe the need for and purpose of the Ballina and Lough Talt Water Supply Upgrade;
- set out the principal components of the Proposed Development, including the seven key locations, five discrete pipeline sections and proposed treated water reservoir, and explain how they operate as an integrated water supply system;
- summarise the engineering basis for the proposed abstraction, treatment, conveyance, storage, pumping and pressure control infrastructure;
- identify the key existing infrastructure interfaces, project constraints, land and wayleave requirements, and consent considerations relevant to the Proposed Development;
- support the Strategic Infrastructure Development planning application by providing a clear engineering description of the proposed development; and
- provide a technical reference document to be read alongside the EIAR, NIS, planning drawings and other supporting application documentation.

The report focuses on the engineering design and planning-level description of the principal infrastructure required to deliver the Proposed Development. It explains the design rationale, the relationship between existing and proposed assets, and the functional requirements of the upgraded regional water supply system.

Construction methodology, environmental mitigation, traffic management, ecological assessment, landowner engagement and statutory consent matters are addressed in the relevant supporting planning application documents and are cross-referenced in this report where required.

## 1.3 Structure of the Report

The report is structured to first explain the purpose, extent and SID context for the Proposed Project, before setting out the existing regional water supply context and the need for the scheme. Subsequent sections then describe the principal project components using an asset-led structure, addressing purpose, design, construction, testing and commissioning, and operation and maintenance where relevant.

The report should be read in conjunction with the EIAR, NIS, planning drawings, land and wayleave information, traffic management information, design risk material and other supporting documentation submitted as part of the SID planning application.

## 1.4 Strategic Infrastructure Development Context

The Proposed Development is being advanced as a Strategic Infrastructure Development planning application because the proposed increased surface water abstraction from Lough Conn exceeds the relevant statutory threshold. The Water Environment (Abstractions and Associated Impoundments) Act 2022 expanded the classes of development within Part 3 (Environmental Infrastructure) of the Seventh Schedule of the Planning and Development Act 2000, as amended, to include surface water abstractions where the annual volume of water abstracted is equivalent to or exceeds 2 million cubic metres. The proposed increased abstraction from Lough Conn at the existing Wherrew Raw Water Intake Site exceeds this threshold and therefore qualifies to be considered as Strategic Infrastructure Development.

The planning application will be submitted to An Coimisiún Pleanála and will be supported by this SID Engineering Report, the Environmental Impact Assessment Report, Natura Impact Statement, planning drawings, land and wayleave documentation and other technical reports required to describe and assess the Proposed Project. An application for a water abstraction licence will also be required under the Water Environment (Abstractions and Associated Impoundments) Act 2022 and will be made by Uisce Éireann to the Environmental Protection Agency as the licensing authority for abstraction licensing.

## 1.5 Project Constraints, Restrictions and Obligations

The Proposed Development is subject to a range of engineering, environmental, land, access, operational and statutory constraints. These include the need to maintain existing water supply during delivery, interfaces with existing Uisce Éireann and third-party assets, works within public roads and private lands, watercourse and designated-site constraints, land acquisition and wayleave requirements, construction access and traffic management, health and safety obligations, and environmental mitigation commitments.

These constraints have informed the development of the proposed sites, pipeline corridors, asset layouts, construction approach and operational philosophy. They are addressed at an appropriate level in this SID Engineering Report and in greater detail, where required, in the EIAR, NIS, planning drawings, land and wayleave material, design risk assessment, preliminary safety and health information and traffic management documentation.

## 1.6 Relationship with SID Application Documentation

This Engineering Report provides the planning-level engineering description of the infrastructure proposed for permission. It does not replace the environmental assessments, planning statement, land documentation, construction environmental management information or statutory consent material submitted as part of the application.

Those documents provide the detailed assessment, mitigation and consenting information, while this report provides the engineering context, technical description and operational basis for the Proposed Project.

# 2. Proposed Development Need and Strategic Rationale

## 2.1 Strategic Drivers

The need for the Proposed Development has been considered in the context of Uisce Éireann's National Water Resources Plan (NWRP), the Regional Water Resources Plan – North West (RWRP-NW), and the associated Supply Demand Balance (SDB) framework. These establish the strategic requirement to improve water supply resilience through increased treatment capacity, network reinforcement, leakage reduction, regional interconnection and the rationalisation of smaller or environmentally constrained supplies where appropriate.

Water Resource Zones (WRZs) are geographic areas served by a distinct water supply system, including sources, treatment, and distribution. The RWRP-NW preferred approach merges supply systems to form larger, interconnected WRZs, reducing fragmentation and improving resilience, as listed below:

- The North West region will see WRZs reduced from 119 to 81, with 15 larger interconnected WRZs developed.
- This involves constructing trunk mains, upgrading and decommissioning WTPs, and discontinuing unsustainable abstractions.
- The alignment ensures that supply zones are connected to more robust, sustainable sources, with improved operational flexibility and risk management.

Study Area C is one of the seven distinct planning units defined in RWRP-NW, and it encompasses several Water Resource Zones (WRZs), including key Regional Water Supply Schemes (RWSS's) such as Ballina, Lough Easkey, and Lough Talt. This is shown in Figure 2-1 below.

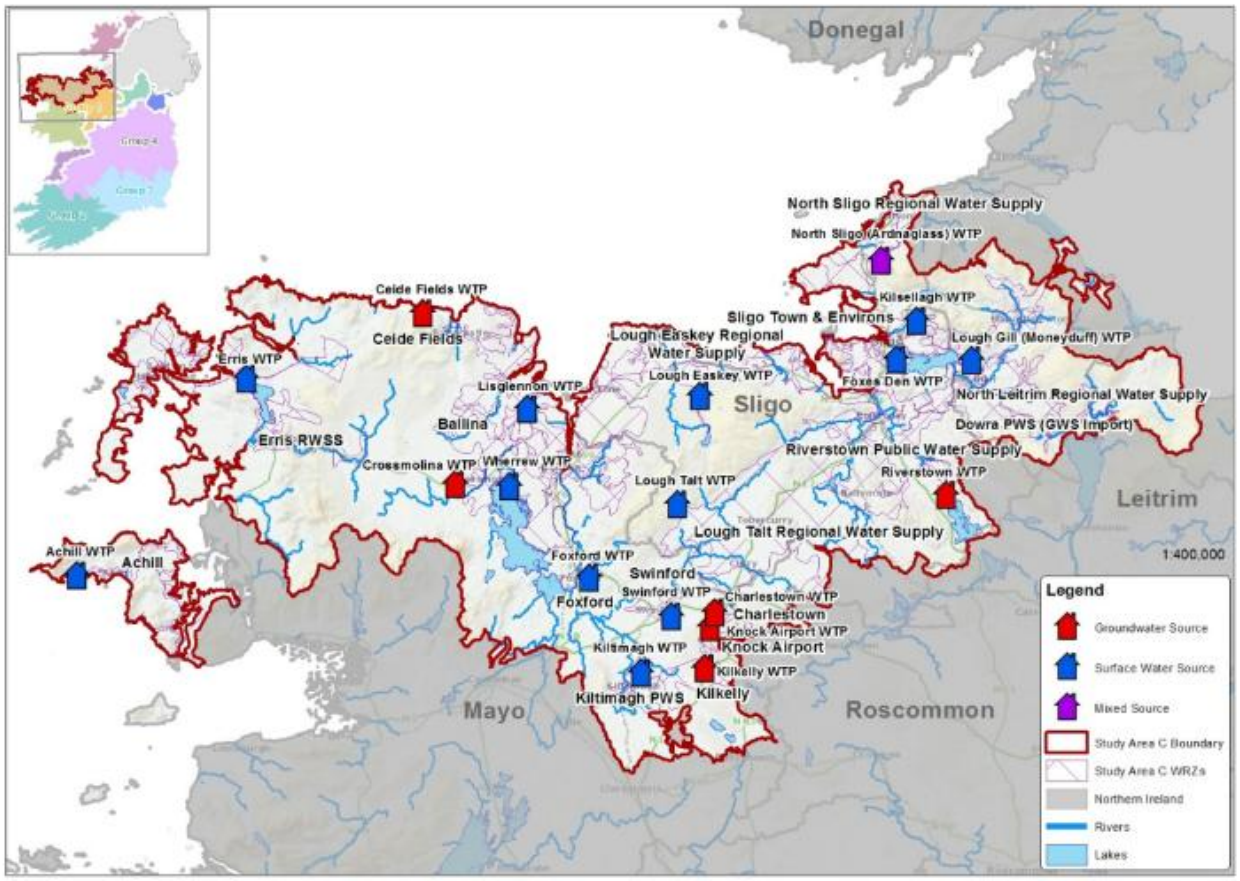



**Figure 2-1 - Regional Water Resources Plan – North West; SA-C Water Supply Study Area**

## 2.2 Supply Demand Balance (SDB)

The NWRP SDB calculations are used to assess the amount of Water Available For Use (WAFU) in UÉ's WRZs and to compare that with the forecast demand for water. The baseline SDB (based on 2016 Census Data, projected forward for 2019) and 25-year forecasts of supply and demand (to 2044) were estimated for each WRZ and are summarised in Table 2-1 below:

**Table 2-1 – Supply Demand Balance**

| | Total WAFU 2019 (m3/day) | Total WAFU 2044 if not upgraded ($m^3$/day) | Total Projected Demand 2044 ($m^3$/day) | Deficit in 2044 ($m^3$/day) |
|---|---|---|---|---|
| **Lough Talt RWSS** | 10,000 | 0 | 9,890 | 9,890 |
| **Ballina RWSS** | 14,380 | 13,182 | 17,012 | 3,830 |
| **Lough Easkey RWSS** | 4,400 | 4,033 | 4,538 | 505 |
| **Total** | **28,780** | **17,215** | **31,440** | **14,225** |

## 2.3 Need for the Proposed Development

The Proposed Development is required to address two linked but distinct strategic needs:

- the need to provide a sustainable long-term alternative to the existing Lough Talt raw water abstraction source, and

- the need to increase capacity, resilience and operational flexibility to address the projected water supply deficit forecast across Ballina, Lough Easkey and Lough Talt RWSS.

The existing Lough Talt source is not considered a sustainable long-term public water supply source because of environmental constraints, historic water quality issues and limitations in the existing treatment and storage arrangements. Furthermore, the existing Lough Talt abstraction will cease in 2029 because the current abstraction and upgraded WTP operation were only permitted as an interim solution. Planning permission was granted in 2019 under the Habitats Directive IROPI process because over 13,000 people rely on the supply, but continued abstraction from Lough Talt was recognised as environmentally unsustainable due to impacts on the Lough Hoe Bog SAC and the protected Geyer's whorl snail habitat during low water conditions. The permission therefore allowed the upgraded plant to operate for 10 years while Uisce Éireann developed an alternative long-term public water source.

At the same time, future demand growth within the Ballina RWSS requires additional treatment capacity, strengthened trunk main infrastructure and improved operational resilience. The NWRP and SDB framework identify future deficits across the wider supply area, including Ballina, Lough Talt and Lough Easkey WRZ's.

## 2.4 Preferred Solution and Strategic Rationale

Following feasibility and preliminary design assessment, the preferred solution is to upgrade Lisglennon WTP and associated regional infrastructure as the central treatment and transfer node for the Proposed Development. This approach uses Lough Conn as the long-term source, with raw water abstracted at Wherrew, transferred to Lisglennon for treatment, and conveyed as treated water through the regional trunk main system towards Ballina, Bonniconlon, Windy Gap and the existing Lough Talt WTP site. One offtake will be provided to facilitate future transfer of treated water to Lough Easkey RWSS.

The preferred solution is consistent with the objectives of the NWRP and the Regional Water Resources Plan – North West. It supports the transition from fragmented local supply arrangements towards a more resilient, sustainable and interconnected regional water supply system, while retaining flexibility for potential future rationalisation or integration of Easkey subject to separate assessment and consent.

It should be noted the Ballina RWSS includes smaller operational areas that are supplied by Lisglennon, Wherrew, and Crossmolina WTP's. As Wherrew and Crossmolina WTP's will not be affected by the proposed development they are not considered further.

## 2.5 Proposed Development Objectives

The objectives of the Proposed Development are to:

- enable the cessation of abstraction from Lough Talt;
- provide a sustainable long-term supply to the area currently served by the Ballina, Lough Easkey and Lough Talt RWSS's;
- maintain safe, secure and compliant drinking water supply;
- increase treatment capacity at Lisglennon WTP;
- provide strategic interconnection between the supply areas;

- support future growth and potential regional rationalisation; and
- reduce long-term environmental pressure on Lough Talt and associated sensitive habitats.

# 3. Proposed Development Overview

## 3.1 Principal Components

The Proposed Development, subject to detailed design, will consist of seven key locations, five discrete sections of pipeline as follows:

- An upgrade to the existing Wherrew Raw Water Intake & Pumping Station (RWI&PS), Wherrew, Ballina, Co. Mayo;
- An upgrade to the existing Lisglennon Raw Water Storage and Pumping Station (RWS&PS), Lisglennon, Ballina, Co. Mayo;
- An upgrade to the existing Lisglennon Water Treatment Plant (WTP), Lisglennon, Ballina, Co. Mayo;
- A proposed Pipeline A – Lisglennon RWPS to Lisglennon WTP;
- A proposed Pipeline B – Lisglennon WTP to River Moy Pipeline Crossing;
- A proposed Pipeline C – River Moy Pipeline Crossing to Bonniconlon BPS;
- A proposed Pipeline D – Bonniconlon BPS to Windy Gap BPT;
- A proposed Pipeline E – Windy Gap BPT to Lough WTP;
- A proposed Bonniconlon Booster Pumping Station (BPS) to be located at Bonniconlon, Ballina, Co. Mayo;
- A proposed Treated Water Reservoir at the existing Bonniconlon Reservoir site, Ballina, Co. Mayo;
- A proposed Windy Gap Break Pressure Tank (BPT) to be located at the Windy Gap, Ballina, Co. Mayo;
- The repurposing of the existing Lough Talt Water Treatment Plant (WTP), Co. Sligo; and
- All permanent and temporary works, including construction compounds, access routes, pipeline corridors, trenchless crossings, and all ancillary works above and below ground to facilitate the proposed development.

A schematic overview of the Proposed Development is shown in **Figure 3-1** below.
The overall Site location of the Proposed Development is shown in **Figure 3-2** below.

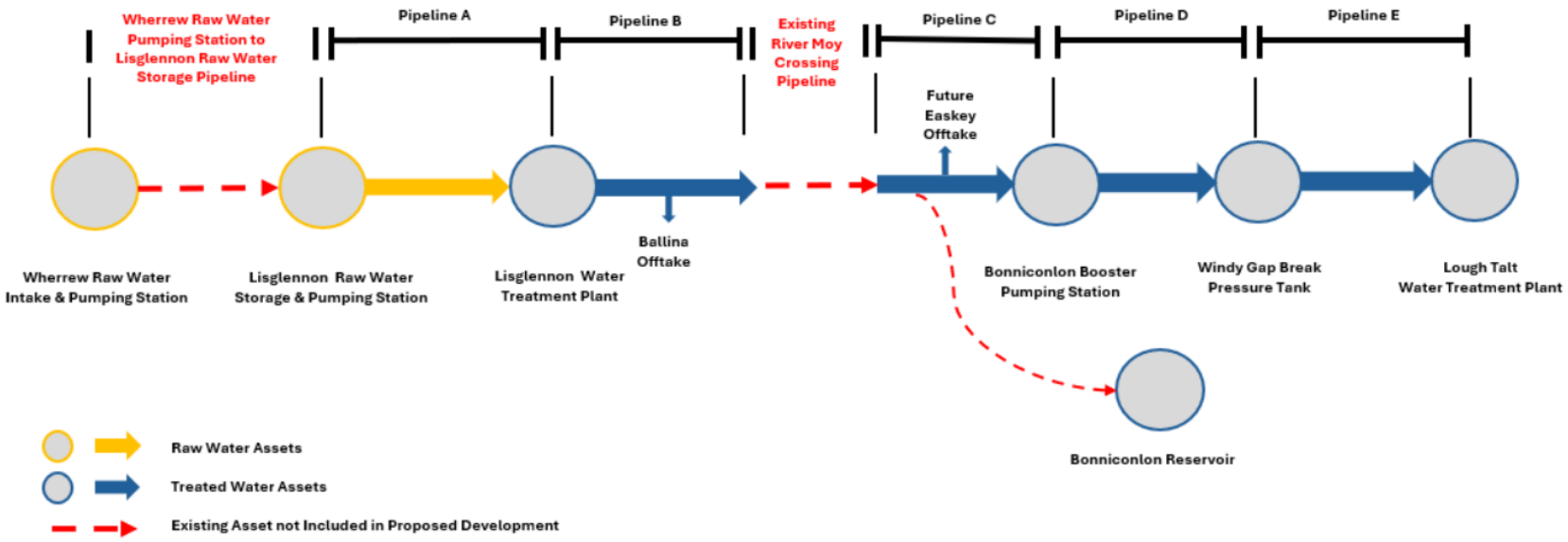



**Figure 3-1 - Schematic Overview of the Proposed Development**

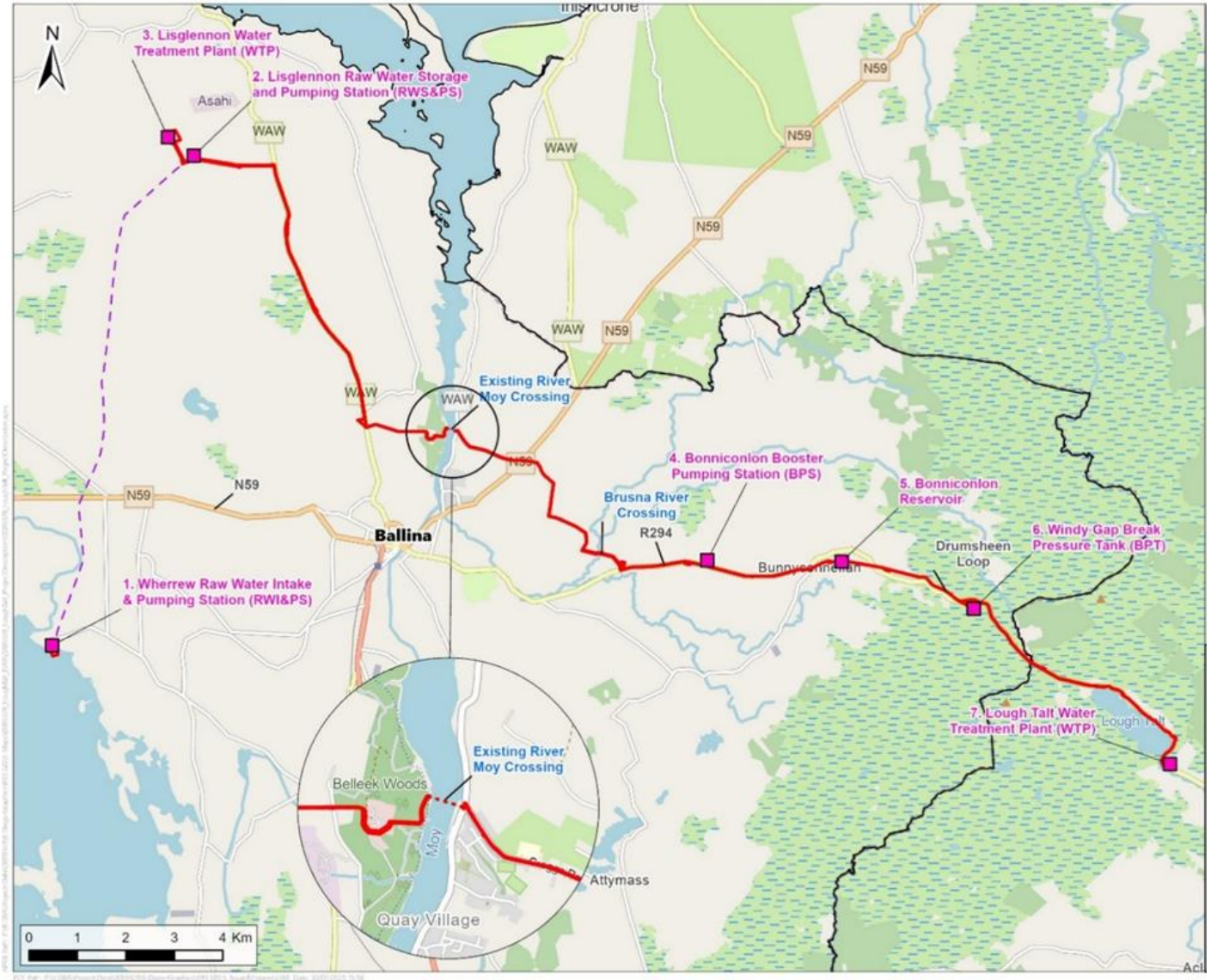



**Figure 3-2 – Site Location of the Proposed Development**

The project components are functionally linked as a single integrated water supply system. The Wherrew Intake provides the raw water source from Lough Conn. The raw water transfer infrastructure conveys this water to Lisglennon, where storage, pumping and treatment processes will provide the required treated water capacity for the upgraded regional supply system.

Lisglennon Water Treatment Plant is the central treatment asset within the Proposed Development. Its upgrade provides the additional treatment capacity required to supply both the existing Ballina RWSS demand and the area currently served by the Lough Talt RWSS. The treated water trunk main then provides the strategic conveyance link from Lisglennon to Ballina, Bonniconlon, Windy Gap and Lough Talt via Pipelines B to E.

The Bonniconlon Booster Pumping Station and Windy Gap Break Pressure Tank provide the hydraulic and operational control required to transfer water through the varying topography between Ballina and Lough Talt. The booster pumping station provides the required lift, and the break pressure tank manages pressures and enables downstream gravity transfer.

The Bonniconlon treated water reservoir is a related local supply resilience asset, providing additional storage security for the Bonniconlon supply zone, independent of the primary treated water transfer network to Lough Talt.

The repurposed Lough Talt WTP site forms the downstream integration point with the existing Lough Talt RWSS. Once the Proposed Developments are commissioned, treated water supplied from Lisglennon will enter the existing Lough Talt distribution system through the repurposed site, allowing abstraction from Lough Talt to cease.

Below provides a summary of the Proposed Development elements:

- **Upgrade to the Existing Wherrew Raw Water Intake & Pumping Station (RWI&PS)**
    - The existing Wherrew raw water intake at Lough Conn will be upgraded to support increased abstraction and improved operational performance, including a fish return system. The works will include intake, screening, instrumentation and associated ancillary infrastructure required to support the upgraded regional supply arrangement.
- **Upgrade to the Existing Lisglennon Raw Water Storage and Pumping Station (RWS&PS)**
    - The existing raw water transfer arrangement between Wherrew and Lisglennon will be retained. Upgrading works will be undertaken at Lisglennon Raw Water Storage and Pumping Station
- **Proposed Pipeline A**
    - The proposed raw water rising main (Pipeline A) will be provided between Lisglennon RWS&PS and Lisglennon Water Treatment Plant to convey raw water from the Lisglennon RWS&PS to Lisglennon WTP.
- **Upgrade to the Existing Lisglennon Water Treatment Plant (WTP)**
    - The Lisglennon Water Treatment Plant will be upgraded and expanded to increase treatment capacity and provide the treatment processes, residuals management, chemical storage, treated water storage, power, control and ancillary infrastructure required to supply the upgraded Ballina and Lough Talt RWSS.
- **Proposed Pipelines B to E**
    - The proposed treated water pipeline from Lisglennon WTP to Lough Talt WTP of approx. 30km will be provided as listed below.

- Proposed Pipeline B – Lisglennon WTP to Existing River Moy Pipeline Crossing;
- Proposed Pipeline C – Existing River Moy Pipeline Crossing to Bonniconlon BPS;
- Proposed Pipeline D – Bonniconlon BPS to Windy Gap BPT; and
- Proposed Pipeline E – Windy Gap BPT to Lough Talt WTP.

These pipelines will provide the treated water conveyance links required to connect the upgraded and proposed assets as well as providing future resilience to the Lough Easkey WRZ.

- **Proposed Bonniconlon Booster Pumping Station (BPS)**
  - A new booster pumping station will be constructed near Bonniconlon to enable treated water to be pumped to the break pressure tank at Windy Gap and conveyed onwards to the Lough Talt supply area.
- **Proposed Windy Gap Break Pressure Tank (BPT)**
  - A new break pressure tank will be constructed near Windy Gap to manage hydraulic pressures within the treated water transfer system and provide hydraulic separation between the pumped and gravity sections of the treated water pipeline network.
- **Repurposing the Existing Lough Talt Water Treatment Plant (WTP)**
  - The existing Lough Talt Water Treatment Plant site will be modified and repurposed to allow abstraction from Lough Talt to cease. The works will include decommissioning or modification of redundant treatment infrastructure and repurposing of the site for treated water storage, dosing and network integration functions.
- **Proposed Treated Water Reservoir at the Existing Bonniconlon Reservoir Site**
  - A new treated water reservoir will be constructed at Bonniconlon to provide additional local treated water storage, improve security of supply and enhance operational resilience for the Bonniconlon supply zone.
- **Ancillary and Enabling Works**
  - Associated ancillary and enabling works will be provided, including access arrangements, site security, drainage, power supply, standby generation, telemetry, SCADA, temporary working areas, construction compounds, utility diversions, landscaping and biodiversity enhancement measures where required.

# 4. Wherrew Raw Water Intake & Pumping Station (RWI&PS)

## 4.1 Purpose

The purpose of the existing Wherrew Raw Water Intake & Pumping Station (RWI&PS) is to abstract raw water from Lough Conn and transfer it to the existing Lisglennon Raw Water Storage and Pumping Station (RWS&PS). From Lisglennon RWS&PS, raw water will be conveyed to the Lisglennon Water Treatment Plant (WTP), where treatment is undertaken prior to distribution.

Within the Proposed Development, Wherrew RWI&PS will continue to perform its existing abstraction and raw water transfer to supply both the Lisglennon WTP and Wherrew WTP. Although Wherrew WTP will benefit from enhanced quality and reliability of raw water abstraction from Lough Conn, operation of this facility does not form part of the Proposed Development and is therefore not considered further.

The proposed works at Wherrew RWI&PS are required to support increased abstraction from Lough Conn, improve the reliability and resilience of raw water intake operations, reduce operational risks associated with silt deposition and debris accumulation, and provide improved fish protection and monitoring arrangements. The existing pumping station and raw water conveyance will be retained, with targeted upgrades to the intake, screening, instrumentation, control and ancillary infrastructure.

## 4.2 Existing Site

The existing Wherrew RWI works are located on the northern shore of Lough Conn, adjacent to the existing Wherrew Water Treatment Plant and raw water pumping station. The existing inlet channel was excavated from the original lakeshore and extends from Lough Conn to the intake structure. The channel is formed in natural soils and rock, with natural stone rock armour along the side banks.

The intake structure includes two sumps, with intake channels and screens arranged to allow flow from the lake into the pumping station. Sluice gates allow individual sumps to be isolated for maintenance.

Raw water is pumped from Wherrew RWPS through twin 700 mm pre-stressed concrete rising mains to the Lisglennon RWS&PS. The pumping station includes three pumps operating in a duty/standby/standby arrangement, together with associated pipework, valves, surge vessels, electrical equipment and control systems. The existing pumps will be retained as part of the Proposed Development.

The existing intake is subject to periodic accumulation of sand, silt and debris at the inlet channel and intake structure, which can restrict flow into the intake, particularly during periods of low water levels in lake, and requires maintenance intervention. Fish have also been observed downstream within the system, indicating the need for improved screening and fish protection at the intake. Continuous flow measurement is not currently provided on the twin rising mains between Wherrew RWPS and Lisglennon RWS.

## 4.3 Proposed Development

The site layout of the proposed development at Wherrew RWI&PS is shown in Figure 4-1 below.

The proposed upgrade to the Wherrew RWI&PS will consist of the following:

- A new intake pipe (approx. 165 m long, approx. 1,200 mm internal diameter) and intake screen on a precast concrete base
- The existing intake channel will be infilled with suitable material to restore the original lakeshore profile;
- Three new cardinal markers;
- Upgrade and extension to the intake structure
- Proposed fish return system with acoustic hoods
- Proposed pressure and flow monitoring instrumentation and associated works
- Upgrade of the existing MCC, including provision of an Human-Machine Interface (HMI) panel and associated Programmable Logic Controller (PLC) modification, located within the pumping station
- Facility to connect a temporary generator, by providing a connection point and change over switch between existing electrical supply and temporary generator, and a concrete slab for temporary generator set down and,
- Ancillary site development works, including access arrangements, engineered landform, hardstanding, security/fencing, surface water (stormwater) management, site lighting, landscaping.

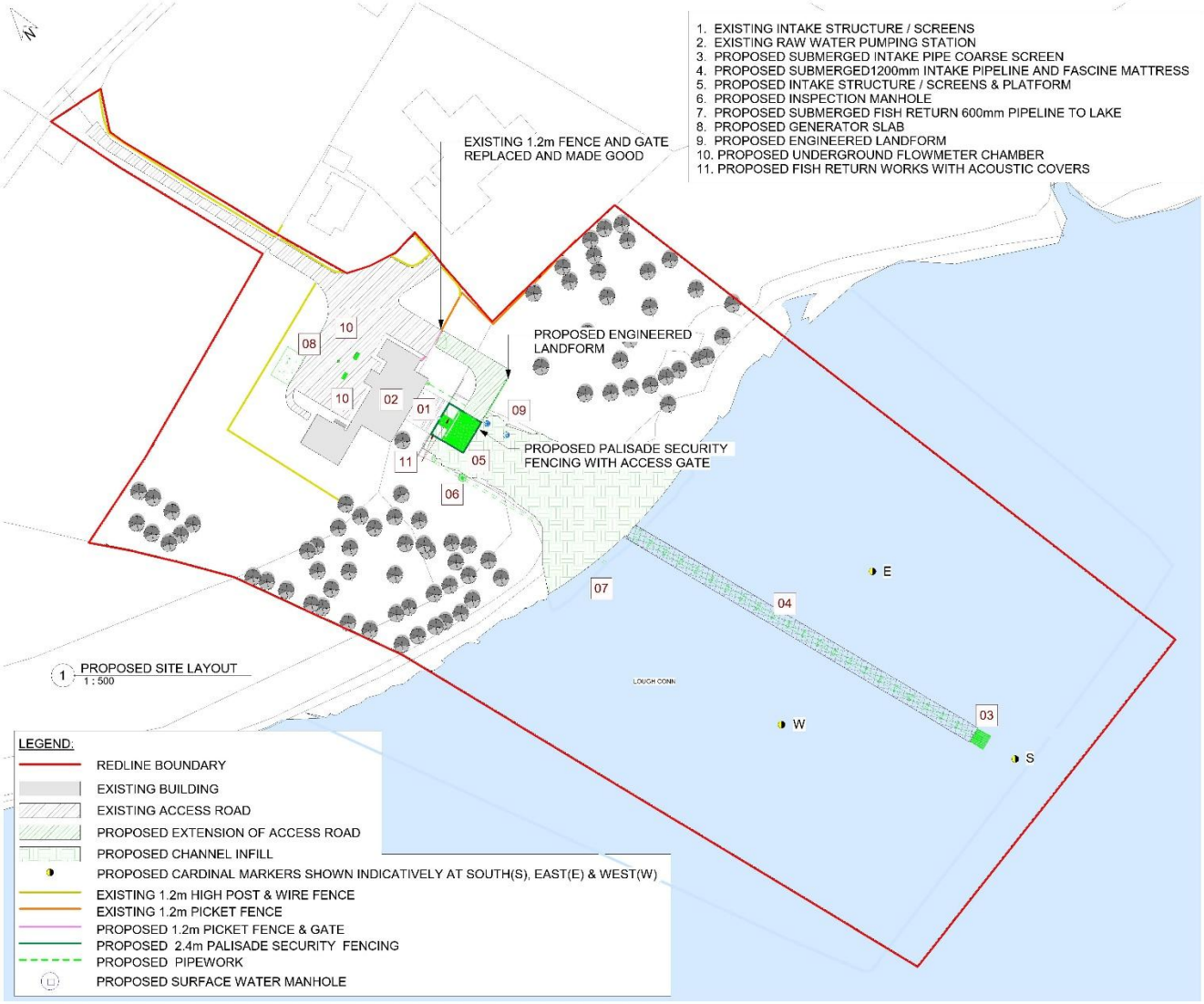



**Figure 4-1 –Proposed Development - Wherrew RWI&PS**

## 4.4 Design

The design retains and optimises the existing pumping station and conveyance infrastructure, with targeted upgrades to the intake arrangement, monitoring, control systems and operational resilience.

### 4.4.1 Basis of Design

Key performance parameters and design characteristics for the Wherrew Raw Water Pumping Station are summarised in **Table 4-1** below.

**Table 4-1 – Wherrew RWI&PS Basis of Design**

| Description | Unit | Future Demand | Maximum Future Demand |
|---|---|---|---|
| **Flow per day** | Ml/d | 31.05 | 35.65 |
| **Operating hours per day** | h | 17.25 | 9.5 |
| **Design Flow** | l/s | 500 | 1050 |
| **Static head** | m | 42.6 | 42.6 |
| **Differential head** | m | 64 | 66.2 |
| **Pump Operating configuration** | | D/S/S | D/A/S |
| **Twin Rising main operating configuration** | | D/S | D/A |

### 4.4.2 Raw Water Intake Pipeline and Intake Structure

The Proposed Development includes installation of a new raw water intake pipeline extending from the existing intake structure into Lough Conn. The intake will abstract water from an offshore location at a greater depth than the existing shoreline intake, improving abstraction reliability and reducing constraints associated with sediment accumulation at the existing intake channel.

The existing intake structure will be modified and extended to integrate:

- the new intake pipeline, including associated inlet chambers, screening arrangements and flow distribution measures to convey raw water to the existing pump sumps; and
- a fish return system, integrated with the proposed fine screens within the upgraded intake works, including a dedicated return pipeline to convey fish safely back to Lough Conn

The existing intake channel will be decommissioned and infilled as part of the proposed development.

All new and upgraded structures, equipment, and essential electrical/mechanical services within the Flood Zone A/B areas at the site will be designed and constructed to withstand flood conditions. Flood resilient design measures incorporated into the design are as follows:

- Intake structure designed to be fully submersible during flood events.
- Structural elements designed to withstand anticipated flood loading.

- Sensitive electrical and control equipment to be located either above design flood levels or outside the floodplain where practicable.
- Access, maintenance and operational procedures to be developed with consideration of flood conditions and residual risk.

### 4.4.3 Pumping and Conveyance

The existing raw water pumping station at Wherrew will be retained as part of the Proposed Development.

The facility will continue to abstract raw water from Lough Conn and convey it via the existing twin rising mains to the Lisglennon Raw Water Storage and Pumping Station. The available design information confirms that these rising mains have sufficient hydraulic capacity and are not subject to upgrade works as part of the Proposed Development.

The pumping station will meet demand through operational control of pump duty and run time, rather than increases in instantaneous pumping capacity.

### 4.4.4 Mechanical, Electrical and Control Systems

The Proposed Development includes upgrades to mechanical, electrical and control systems to enhance monitoring, operational control and system resilience.

These works will include:

- Installation of flow and pressure monitoring instrumentation;
- Inclusion of an HMI panel, with readouts/trendlines for levels, flows, pressures, energy consumption and efficiencies.
- Upgrade of the PLC to include for new instrumentation feeds and data processing.
- Additional pump protections due to new instrumentation (No flow protection, low/high pressure protection)
- Provision of facilities for connection of temporary generating equipment to maintain operation during power outages.

### 4.4.5 Power Supply and Resilience

The Wherrew RWI&PS is a critical component of the regional water supply system. A generator slab for temporary generator set down will be provided. Provision will be made for connection of mobile generating equipment to maintain abstraction in the event of a power outage.

### 4.4.6 Ancillary Works

#### 4.4.6.1 Access

Access and egress to site will be through the existing paved access road off the L5111, the main Wherrew access road. Within the site, the existing hardstanding areas will be retained and a new extension of the access road (up to 191 $m^2$) will be constructed adjacent to the upgraded intake structure to enable access for construction and long-term operation and maintenance. The proposed access road will be raised locally using engineered fill to achieve the required road level while minimising encroachment into the adjacent channel area. The lakeward edge of the raised road will be supported by an appropriately designed earthworks and retaining system, which may comprise a reinforced earth embankment, gabions, a retaining wall, or a combination of these measures. The final form will be

determined during detailed design, having regard to ground conditions, structural stability, hydraulic requirements and landscape integration.

#### 4.4.6.2 Fencing / Boundary

The existing timber picket type fence and gate on the eastern side of the site will be realigned with continued pedestrian access. A new 2.4 m high palisade security fence with access gates is proposed around the new intake structure.

#### 4.4.6.3 Storm Water Management

A linear slotted drain will be installed at the interface between the proposed and existing access roads to manage surface water runoff from the existing hardstanding area. This will be connected into the existing local on-site drainage network.

Surface water runoff from the proposed access road will be managed through a new surface water management system. This will comprise a linear drain, at the interface between the extended access road and the new intake structure, stormwater manholes, a petrol interceptor and a proposed soakaway. The proposed soakaway will be located within the channel infill area and will consist of free draining stones to allow faster percolation.

#### 4.4.6.4 Site Lighting

Portable lighting will be provided along the proposed access road and paths to allow for safe access to site. Wall mounted luminaires will be provided above the proposed acoustic hood enclosures.

#### 4.4.6.5 Landscaping

It is proposed to include soft landscaping measures such as amenity grassland, wildflower and woodland mix planting, and to salvage and reinstate disturbed areas. Additional biodiversity measures include introduction of bat boxes, bird boxes, insect boxes and hibernaculum.

The existing intake is currently located within an inlet channel which was cut into the rock. It is proposed that this channel will be filled, enabling restoration of the original lakeshore. Proposed landscaping will be matched to the existing habitat where possible, i.e. existing willow and alder scrub or woodland. The area above the buried pipes will be grassed rather than trees to maintain the integrity of the buried pipes. The shoreline will be restored as rocky shore aligned with the existing character

### 4.4.7 Geotechnical Considerations

Draft engineers logs are available for BH-WH01, BH-WH02, BH-WH02A and TP-WH01 which are located nearest to the proposed works.

Key risks likely to be encountered during construction are listed below:

- Side walls collapsing inward where open excavations are unsupported in soft or loose material.
- A high, water table indicates that groundwater ingress will be an issue and will need to be controlled.
- Control of groundwater ingress will only be an issue if over-excavation to denser granular material is undertaken.
- Cobbles and boulders were reported in all exploratory holes which could affect excavation.

The following construction recommendations will be implemented:

- Soft material encountered will be removed when excavating the design formation level and therefore no issues with soft ground are identified.
- However, trench boxes will be required to support the walls of the open excavation and to mitigate the risk of loose granular material unravelling and falling into an open excavation.
- Where excavations are undertaken, groundwater will be controlled by means of a sump and a water pump.

## 4.5 Construction, Testing and Commissioning

Construction of the Proposed Development at Wherrew RWI&PS will be undertaken using standard civil, mechanical and electrical engineering techniques appropriate to a live operational water abstraction and pumping facility.

The works will be planned and sequenced to maintain continuity of raw water abstraction from Lough Conn throughout the construction period, insofar as practicable. The existing intake and pumping station will remain operational during the majority of the works, with temporary measures implemented where required to ensure uninterrupted supply to Wherrew Water Treatment Plant and Lisglennon Water Treatment Plant.

Construction activities will include site establishment, provision of temporary working areas, protection of existing operational infrastructure, and implementation of environmental protection measures. All works will be carried out within the project design parameters and environmental assessment envelope defined in the EIAR.

The principal construction activities will comprise:

- Installation of the new intake pipeline within Lough Conn;
- Modification and extension of the existing intake structure;
- Installation of screening and fish protection infrastructure;
- Installation of flow and pressure monitoring equipment;
- Upgrades to electrical, control and associated systems; and
- Completion of associated civil and ancillary works.

Construction methodology, environmental protection measures and site management procedures will be defined in detail within a Construction Environmental Management Plan (CEMP), which will be prepared and implemented for the duration of the works.

The general construction techniques and the construction is described in Chapter 3 (Project Description) of the EIAR.

Testing and commissioning of the upgraded intake and pumping systems will be undertaken progressively as elements of the works are completed. Commissioning activities will include verification of hydraulic performance, testing of mechanical and electrical systems, integration of instrumentation and control systems, and confirmation that the upgraded facility operates as part of the wider raw water abstraction and conveyance system.

On completion of the works, temporary facilities will be removed and disturbed areas will be reinstated and landscaped.

## 4.6 Operation and Maintenance

Following commissioning, the upgraded Wherrew RWI&PS will continue to operate as the primary raw water abstraction and transfer asset supplying Lisglennon WTP. The upgraded intake arrangement will support more reliable abstraction from Lough Conn, reduce the operational impact of silt deposition at the existing inlet channel, and improve protection of the downstream treatment process through enhanced screening and fish return systems.

Routine operation and maintenance activities will include inspection and maintenance of the intake pipeline, inlet chambers, screens, fish return systems, penstocks, pumps, valves, surge vessels, flowmeters, pressure instrumentation, power systems, telemetry and control equipment. The improved monitoring arrangements will assist operations staff in assessing pumping performance, identifying abnormal conditions and planning maintenance interventions.

Maintenance access to the intake and pumping station will continue to be provided from the existing site access arrangements. Maintenance activities will be undertaken in accordance with Uisce Éireann operational procedures, health and safety requirements, environmental protection commitments and any conditions attached to the SID permission.

# 5. Lisglennon Raw Water Storage and Pumping Station (RWS&PS)

## 5.1 Purpose

The purpose of Lisglennon RWS&PS is to receive raw water transferred from Wherrew RWI&PS and pump it onwards to Lisglennon WTP for treatment. The pumping station forms a key intermediate raw water transfer asset between the Lough Conn abstraction point and the upgraded treatment facilities at Lisglennon WTP.

Within the Proposed Project, the Lisglennon Raw Water Pumping Station will be upgraded to increase raw water transfer capacity, improve hydraulic efficiency, replace redundant equipment, and provide the pumping capacity required to support the upgraded Lisglennon Water Treatment Plant and the wider regional supply arrangement.

The proposed works at the Lisglennon Raw Water Pumping Station are required to support increased treatment capacity at Lisglennon WTP, improve operational resilience, reduce hydraulic losses within the pumping station pipework, and integrate the existing raw water storage and pumping infrastructure with the new raw water rising main to the WTP.

## 5.2 Existing Infrastructure

The Lisglennon RWS&PS site receives raw water from Wherrew Raw Water Pumping Station through twin 700 mm raw water rising mains. These rising mains discharge to an inlet chamber / break pressure tank before gravitating to the raw water storage tank.

The raw water storage tank provides intermediate storage between the Wherrew abstraction system and the Lisglennon pumping system. The reservoir is approximately 54 m in diameter and 7 m in height, with a storage capacity of approximately 16,550 m³. Raw water from the reservoir is supplied to the pumping station pumphouse via a DN450 ductile iron gravity main.

The existing Lisglennon raw water pumping station includes two decommissioned end suction pumps and two operational vertically mounted KSB Omega axial split case pumps installed in 2019. The active pumps currently operate in a duty/standby configuration. Existing pipework, valves, surge protection, flow measurement, electrical equipment and control systems are also present within the pumping station.

Much of the existing pipework and valve arrangement is original, except for the pump legs associated with the more recent pumps. The existing pumping station is capable of supporting the current Ballina RWSS transfer requirements, but the increased future raw water transfer requirement means the existing hydraulic arrangement requires upgrade to improve capacity, reduce energy losses and comply with applicable flow velocity requirements.

## 5.3 Proposed Development

The site layout of the proposed development at Lisglennon RWS&PS is shown in Figure 5-1 below.

The proposed upgrade to the Lisglennon RWS&PS will consist of the following:

- Replacement of the existing, decommissioned pumps with two new pump sets;
- Replacement of the pipework and valves within the pumping station to accommodate increased future flows;

- Installation of pressure measuring instrumentation including pressure gauges and pressure transducers within the pumping station; and,
- Installation of new flowmeter and ancillary works on Pipeline A such as flow meter chamber, located in the car park of the pumping station;
- Ancillary works such as landscaping.

No changes are proposed to the power supply, site lighting and stormwater management.

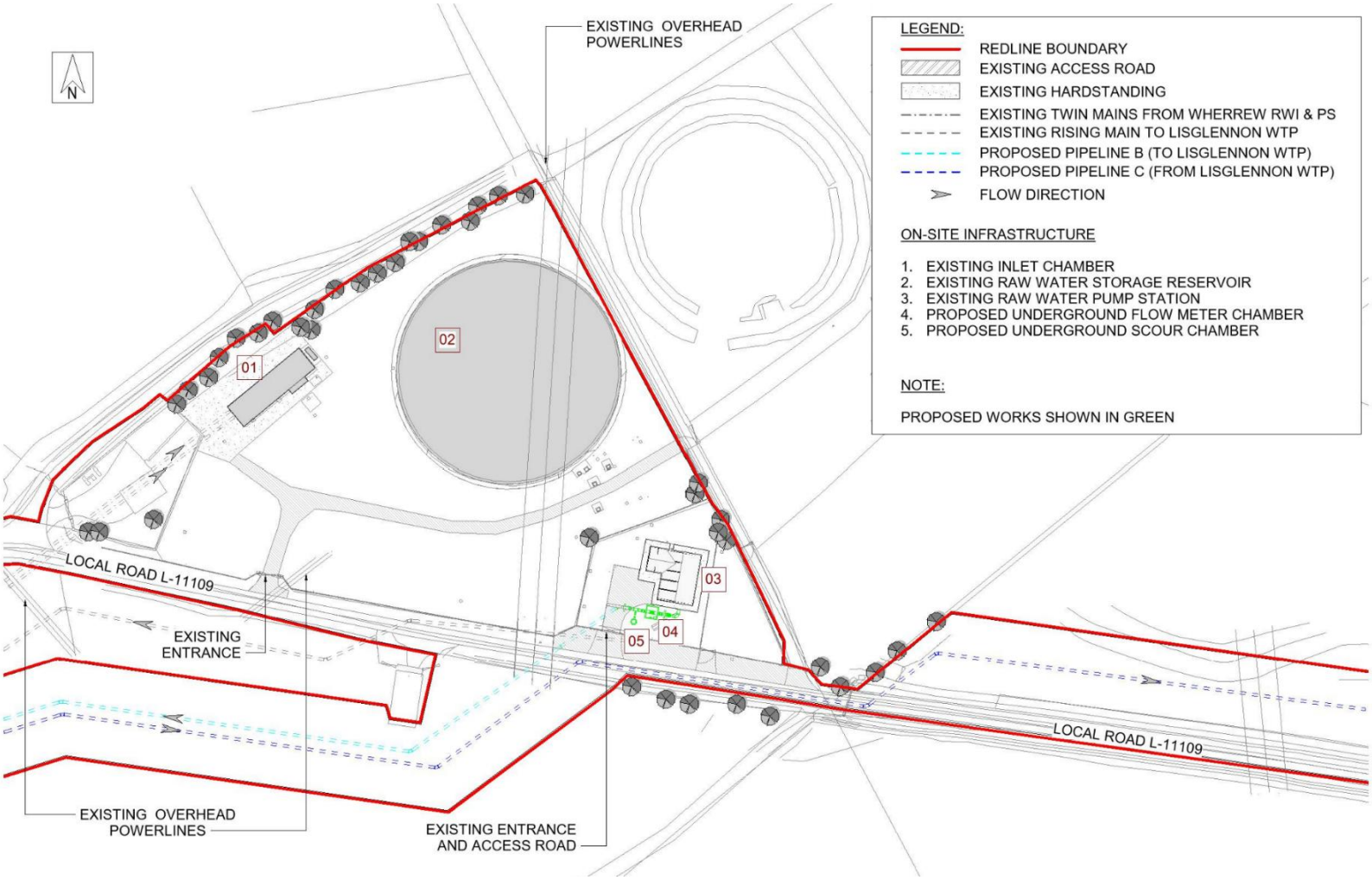



**Figure 5-1 – Proposed Development - Lisglennon RWS&PS**

## 5.4 Design

### 5.4.1 Basis of Design

The Table 5-1 below provides key performance parameters and design characteristics for the upgraded Lisglennon RWS&PS site.

**Table 5-1 - Lisglennon RWS&PS - Expected Performance at Upgraded State**

| Description | Unit | Future Demand | Maximum Future Demand[1] |
|---|---|---|---|
| **Flow per day** | MLD | 24.15 | 29 |
| **Operating hours per day** | h | 22 | 22 |
| **Design Flow** | l/s | 305 | 366 |
| **Static head** | m | 18.5 – 24.5 | 18.5 – 24.5 |
| **Differential head** | m | 25.5 | 27.5 |
| **Operating configuration** | | D/D/S/S | D/D/S/S |

1- Includes for Easkey plant flows

The upgraded pumping station is required to accommodate the future demand flow and maximum future demand flow scenarios identified during project development. The proposed arrangement provides a duty/duty/standby/standby operating configuration, allowing two pumps to operate in parallel while retaining standby resilience.

The design has been developed to retain the existing raw water reservoir, retain the existing operational axial split case pumps where practicable, replace decommissioned pump assets, upgrade high-loss pipework and provide improved hydraulic performance, monitoring and operational control.

### 5.4.2 Raw Water Reservoir and Inlet Arrangement

The existing inlet chamber / break pressure tank arrangement will also be retained.

The existing Lisglennon raw water storage will also be retained. It will continue to receive raw water transferred from Wherrew RWI&PS and provide intermediate storage before raw water is pumped onwards to Lisglennon WTP.

The retained reservoir and inlet infrastructure provide operational buffering between Wherrew RWI&PS and Lisglennon WTP, supporting continuity of supply and providing flexibility in the operation of the raw water transfer system.

### 5.4.3 Pumping Arrangement

The two existing decommissioned end-suction pumps will be replaced with vertically mounted axial split case pumps of similar size and capacity to the existing operational units. The upgraded pumping station will therefore comprise four axial split case pumps operating in a duty/duty/standby/standby configuration, with the two existing operational pumps retained.

The upgraded arrangement is designed to meet the future demand and maximum future demand scenarios of 24.15 MLD and 29 MLD respectively, based on operation over a 22-hour period. Variable speed drives will be used to control

pump output, allowing the station to operate efficiently at normal future demand and to increase output, where required, to meet the maximum future demand scenario.

Pipework and valves within the pumping station will be upgraded to accommodate increased flows and to reduce energy losses associated with the existing configuration.

The pump selection and operating philosophy are intended to provide the required future capacity while maintaining operational flexibility, energy efficiency and resilience during maintenance or pump outage events.

### 5.4.4 Pipework and Valves

The existing pipework arrangement within the pumping station requires upgrade to accommodate the increased flow requirement and reduce hydraulic losses. The existing suction and discharge pipework, discharge manifold, rising main connection pipework and associated valves will be replaced or upsized where required.

Hydraulic assessment of the pumping station arrangement identified that the existing pipework would result in excessive head loss and flow velocities under the upgraded flow scenario. The proposed pipework upgrades are therefore required to reduce energy losses, improve hydraulic performance, and comply with applicable Uisce Éireann flow velocity criteria for suction pipework, discharge pipework and rising mains.

The upgraded arrangement will include replacement isolation valves, non-return valves, fittings, thrust restraint and connections required to provide safe operation, isolation, maintenance and integration with the new raw water rising main to Lisglennon WTP.

### 5.4.5 Flow and Pressure Instrumentation

New flow and pressure instrumentation will be provided to improve monitoring and operational control of the Lisglennon Raw Water Storage and Pumping Station. This will include pressure gauges, pressure transducers and flow measurement instrumentation at appropriate locations on the suction and discharge arrangements.

The instrumentation will allow operators to monitor pump output, pumped flow, pressure boost, system performance and energy efficiency. It will also support fault diagnosis, operational optimisation, performance verification and maintenance planning.

Improved flow and pressure monitoring will be particularly important where two pumps operate in parallel, as it will allow the actual station performance to be assessed against the design assumptions and control philosophy.

### 5.4.6 Power, Control and Telemetry

The existing electrical, control and telemetry systems will be modified or upgraded as required to support the proposed pumping arrangement, instrumentation and operating philosophy. The upgraded system will provide control of the duty/duty/standby/standby pump configuration, variable speed drive operation, alarm monitoring and telemetry reporting.

The control arrangement will be integrated with the wider raw water transfer and Lisglennon WTP control philosophy. Pump operation will be based on raw water storage levels, WTP demand, system pressure, flow requirements and operational constraints.

The final control philosophy will be developed to support reliable, efficient and resilient raw water transfer while protecting pumps, pipework, valves and downstream treatment processes.

### 5.4.7 Ancillary Works

#### 5.4.7.1 Site Lighting

Existing low level pole mounted luminaires will achieve the required lux levels for the access road, pumping station and inlet chamber. Therefore, no additional site lighting is therefore proposed.

#### 5.4.7.2 Landscaping

The existing treeline comprising of mature ash and beech trees will be retained and unaltered. Areas of amenity grassland around the raw water storage tank will be subject to a reduced mowing regime to encourage the establishment of a wildflower area which will help attract pollinator species. New hedgerow, consisting of native species, will be planted along the southern boundary fenceline. Additional biodiversity enhancement measures include the installation of insect boxes for pollinator species and hibernacula. No bat or bird boxes are proposed due to the potential for contamination of the open raw water storage reservoir.

### 5.4.8 Geotechnical Considerations

Draft engineers logs have been issued for TP-LR03, TP-LR05 and ST-WC01A which are located nearest to the proposed structure Key risks likely to be encountered during construction are listed below:

- Side walls collapsing inward where open excavations are unsupported in soft or loose material.
- Cobbles were recorded in all exploratory holes below 0.2m bgl which could affect the excavation.

The following construction recommendations will be implemented:

- Trench boxes will be installed to support the walls of the open excavation and to mitigate the risk of loose granular material unravelling and falling into an open excavation.

## 5.5 Construction, Testing and Commissioning

The construction works at Lisglennon Raw Water Pumping Station will be planned and sequenced to maintain the existing raw water transfer function as far as practicable during the works. The Contractor will develop detailed method statements, temporary works designs, isolation plans, commissioning plans and contingency arrangements to protect continuity of supply.

Construction activities are expected to include site setup, temporary works, isolation and removal of redundant pump assets, installation of new pumps, replacement and upsizing of pipework and valves, installation of flow and pressure instrumentation, electrical and control modifications, integration with the new raw water rising main, testing, commissioning and reinstatement.

The works will be undertaken within and adjacent to an operational water supply site. Construction sequencing will therefore need to manage interfaces with existing raw water storage, existing pumping assets, retained pipework, electrical systems, control systems and access requirements. Temporary pumping, staged isolations or short-duration shutdowns may be required for specific tie-ins, subject to operational agreement with Uisce Éireann.

Environmental and safety controls will be implemented during construction to manage excavation, lifting operations, confined space risks, working near live assets, temporary power and control arrangements, surface water management, fuel and chemical storage, and general construction impacts.

The general construction techniques and the construction is described in Chapter 3 (Project Description) of the EIAR.

Testing and commissioning of the upgraded Lisglennon Raw Water Pumping Station will be undertaken in a controlled sequence to demonstrate that the new pumps, retained pumps, pipework, valves, instrumentation, control systems and telemetry operate as intended.

Testing will include inspection and verification of mechanical installation, pipework pressure testing where required, valve operation, pump alignment, electrical testing, instrumentation calibration, control logic testing and telemetry verification. Flow and pressure instrumentation will be checked to confirm reliable monitoring of station performance.

Commissioning will include staged operation of the upgraded pumping station under controlled conditions, including individual pump testing, duty/duty operation, standby changeover, variable speed drive operation, alarm testing and integration with the new rising main and downstream Lisglennon WTP control requirements.

The commissioning process will confirm that raw water can be transferred from the Lisglennon raw water reservoir to Lisglennon WTP at the required rates, while maintaining operational safety, hydraulic stability, energy efficiency and resilience.

## 5.6 Operation and Maintenance

Following commissioning, the upgraded Lisglennon Raw Water Pumping Station will continue operation as the principal raw water transfer asset between the Lisglennon raw water storage and Lisglennon WTP. The station will support the increased raw water transfer requirements associated with the upgraded treatment plant and the wider regional supply arrangement.

The upgraded duty/duty/standby/standby configuration will provide increased capacity and resilience compared with the existing arrangement. Variable speed operation and improved instrumentation will allow the station to respond to WTP demand, raw water storage levels and operational constraints while supporting efficient pumping.

Routine operation and maintenance activities will include inspection and maintenance of pumps, motors, variable speed drives, pipework, valves, non-return valves, surge protection, flowmeters, pressure instrumentation, electrical equipment, telemetry and control systems. The improved monitoring arrangements will support performance assessment, early identification of abnormal operating conditions and proactive maintenance planning.

Maintenance access will be provided through the existing site access arrangements and within the upgraded pumphouse layout. Maintenance activities will be undertaken in accordance with Uisce Éireann operational procedures, health and safety requirements, environmental commitments and any conditions attached to the SID permission.

# 6. Pipeline A

## 6.1 Purpose

The purpose of the proposed raw water rising main (Pipeline A) is to transfer raw water from the Lisglennon RWS&PS site to Lisglennon WTP for treatment. The rising main forms the final raw water conveyance link between the Lough Conn abstraction system and the treatment process at Lisglennon.

Within the Proposed Project, this rising main is required to provide the increased raw water transfer capacity needed to support the upgraded Lisglennon WTP. It will operate in conjunction with the upgraded Lisglennon Raw Water Pumping Station and will provide a reliable hydraulic connection between the retained raw water reservoir and the upgraded treatment plant inlet.

The proposed rising main is therefore a key enabling asset for the increased treatment capacity at Lisglennon WTP and the wider regional supply arrangement serving Ballina, Bonniconlon and the existing Lough Talt RWSS area.

## 6.2 Existing Infrastructure

The existing rising main has supported the current Ballina RWSS treatment demand but does not provide sufficient capacity for the increased future flow requirements associated with the Proposed Project.

Increased transfer rates would result in excessive head losses and flow velocities if the existing rising main alone were relied upon for the future operating condition.

The existing rising main will therefore be retained for operational flexibility and as a maintenance bypass, but a new larger-diameter rising main is required to provide the primary raw water transfer route between the RWPS and the WTP.

## 6.3 Proposed Development

The new rising main (Pipeline A) will be approximately 1km m in length and will provide increased hydraulic capacity between the two sites. An Overview of Pipeline A is shown in **Figure 6-1** below.

The principal proposed works include installation of approximately 1km of new approx. 630 mm diameter raw water rising main; construction of a new flowmeter complex downstream of Lisglennon RWS&PS; connection of the new rising main to the upgraded Lisglennon RWS&PS discharge arrangement; connection of the new rising main to the inlet works at Lisglennon WTP; retention of the existing 300 mm outside diameter rising main as a maintenance bypass; provision of isolation valves and ancillary items required for operation, maintenance and sectional isolation; open-cut installation through fields, access roads and site roads between the raw water storage site and the WTP; reinstatement of affected ground, roads, hardstanding and working areas; and temporary working areas and construction compounds associated with the Lisglennon sites.

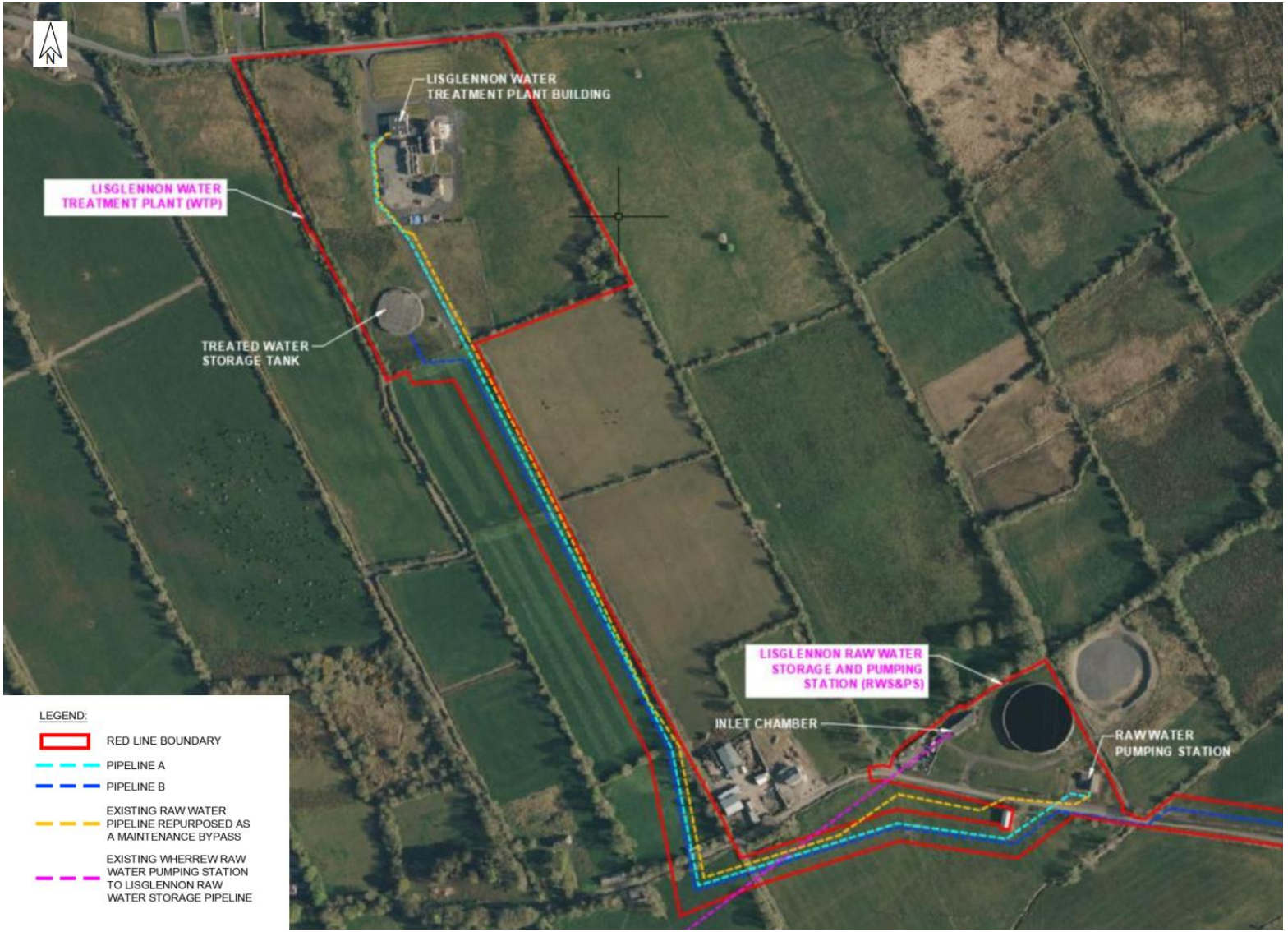



**Figure 6-1 – Pipeline A Overview**

## 6.4 Design

### 6.4.1 Basis of Design

The design basis for the new raw water rising main is to provide sufficient hydraulic capacity to convey raw water at the future design flows identified for the Proposed Project.

The rising main has been sized to operate with the upgraded pumping arrangement at Lisglennon RWPS and to meet both future demand and maximum future demand operating scenarios. The hydraulic design has been developed to reduce head losses, manage flow velocities and improve energy efficiency compared with reliance on the existing smaller-diameter rising main.

The existing rising main will be retained as a maintenance bypass, providing operational flexibility and allowing the new rising main or associated fittings to be isolated for inspection, maintenance or repair.

### 6.4.2 Route and Alignment

The proposed rising main will be routed between the Lisglennon raw water storage and pumping site and the Lisglennon WTP. The alignment will generally follow the corridor between the two existing operational sites, crossing fields and then continuing through the WTP site road network to reach the treatment plant inlet works.

The proposed route has been selected to provide a direct and practical connection between the RWPS and WTP while minimising land take, construction complexity, environmental disturbance and interfaces with existing utilities. Where practicable, the rising main will be installed in parallel with other proposed pipeline infrastructure between the Lisglennon sites to reduce construction disruption and consolidate temporary working areas.

### 6.4.3 Ancillary Works

#### 6.4.3.1 Fittings and Marker Posts

Fittings will be positioned as required to ensure safe operation of the water network, in accordance with UÉ design standards and site-specific issues. Watermain fittings will be located and provided as ‘offline’ where practicable, where a suitably wide verge/hardstanding is available to accommodate the fitting and fitting chamber..

Indicator plates will clearly identify hydrant, air valve, scour valve, washout hydrant, meter, pressure reducing/sustaining valve and sluice valve locations. Marker plates will be installed in accordance with IW-CDS-5020-01 STD-W-27.

#### 6.4.3.2 Sluice Valves

Sluice Valves will be provided at a target spacing of approx. 1.0km (rationalised in a number of locations to improve SV placement), enabling sectional isolation of the mains in case of future maintenance requirements. Sluice valves will be installed as per UÉ Standards Details STD-LD-01 to STD-LD-05 and project specific details.

#### 6.4.3.3 Scour Valves & Washout Hydrants

Scour valves will be installed at low points on the water pipeline and at locations of culvert/bridge crossings where the main is diverted under watercourses. Where it is not possible to install a scour valve, washout hydrants will be provided. Installation will be completed as per UÉ Standard Details STD-LD-06 and STD-LD-07.

#### 6.4.3.4 Air Valves

Air valves will be installed at high-points on the water pipeline and at a maximum distance of 1km from scour valves/washout hydrants or adjacent air valves. Air valves will be installed as per UÉ Standard Details STD-LD-13 to STD-LD-16. Air valve final location design and type selection will be carried out in conjunction with an appropriate supplier.

#### 6.4.3.5 Pipework and Materials

The proposed new rising main will comprise approximately 1 km of approx. 630 mm diameter pipework. The appointed Contractor's detailed design shall select appropriate material option for the rising main considering its suitability for buried pressure pipeline applications, corrosion resistance, jointing characteristics and constructability in the proposed route corridor.

The pipework will be designed and installed in accordance with applicable Uisce Éireann water pipeline standards, large-diameter standard details and the Code of Practice for Water Infrastructure. Pipe bedding, surround, backfill, marker tape, marker posts and surface reinstatement will be provided in accordance with relevant Uisce Éireann standard details and site-specific requirements.

The pipeline will be designed to accommodate the required working pressures, transient conditions, ground conditions, construction loads and operational maintenance requirements.

#### 6.4.3.6 Connections and Bypass Arrangement

The new rising main will connect to the upgraded discharge arrangement at Lisglennon RWPS and to the inlet works at Lisglennon WTP. The connections will be designed to allow safe isolation, maintenance and integration with the retained existing infrastructure.

The existing 300 mm outside diameter rising main between the Lisglennon RWS&PS and Lisglennon WTP will be retained as a maintenance bypass. The bypass arrangement will include isolation valves and appropriate connection details to allow controlled use when required.

Tie-ins to existing and proposed infrastructure will be planned and sequenced to minimise disruption to raw water transfer and WTP operation.

### 6.4.4 Geotechnical Considerations

Refer to section 8.4.7.

## 6.5 Construction, Testing and Commissioning

The raw water rising main will generally be installed using open-cut construction techniques. Open-cut installation is considered appropriate for the route between Lisglennon RWS&PS and Lisglennon WTP, having regard to the available working corridor, expected ground conditions, utility interfaces and the absence of identified constraints requiring trenchless construction.

Construction works will include site setup, temporary working areas, service location and protection, trench excavation, pipe bedding, pipe laying, jointing, installation of valves and chambers, connection works, backfilling, reinstatement, testing and commissioning.

Where the rising main is installed in parallel with other proposed pipeline infrastructure, construction sequencing will be coordinated to reduce repeated excavation, minimise disruption, reduce temporary land take and manage safety

and environmental risks. Works within operational sites will be coordinated with Uisce Éireann to maintain raw water transfer and treatment plant operation as far as practicable.

Temporary working areas and compounds are expected to be shared with the wider Lisglennon RWS&PS and Lisglennon WTP works where practicable. Final construction arrangements will be confirmed through the Contractor's method statements, construction environmental management documentation, traffic and access planning.

The general construction techniques and the construction is described in Chapter 3 (Project Description) of the EIAR.

Testing and commissioning of the rising main will be undertaken to demonstrate that the pipeline, valves, flowmeter, chambers, connections and bypass arrangement operate as intended.

Testing will include inspection, pressure testing, cleaning, flushing, disinfection where required, flowmeter calibration, valve operation checks and verification of isolation and bypass functionality. The testing requirements will be agreed with Uisce Éireann and implemented in accordance with relevant pipeline standards and commissioning procedures.

Commissioning will be coordinated with the upgraded Lisglennon RWS&PS and Lisglennon WTP. The process will confirm that raw water can be transferred from the raw water storage site to the WTP at the required design flows, and that the new rising main integrates correctly with the pumping station controls, treatment plant inlet works and retained bypass arrangement.

## 6.6 Operation and Maintenance

Following commissioning, the new rising main will operate as the primary raw water transfer main between Lisglennon RWS&PS and Lisglennon WTP. It will convey raw water from the raw water reservoir and pumping station to the treatment plant inlet at the flows required by the upgraded treatment process.

The retained existing rising main will provide a maintenance bypass and operational fallback arrangement. This will allow greater flexibility during planned maintenance, inspection or repair of the new rising main, subject to operational constraints and available capacity.

Routine operation and maintenance activities will include inspection and maintenance of isolation valves, air valves, scour or washout facilities, chambers, marker posts, thrust restraint, flowmeter equipment and telemetry interfaces. The flowmeter will support monitoring of raw water transfer rates, pump performance and treatment plant feed flow.

Operation and maintenance will be undertaken in accordance with Uisce Éireann procedures, health and safety requirements, environmental commitments and any conditions attached to the SID permission.

# 7. Lisglennon WTP

## 7.1 Purpose

The purpose of Lisglennon Water Treatment Plant (WTP) is to treat raw water abstracted from Lough Conn and transferred via the Wherrew and Lisglennon raw water infrastructure, prior to distribution within the Ballina Regional Water Supply Scheme and onward transfer to the area currently served by the Lough Talt Regional Water Supply Scheme.

Within the Proposed Development, Lisglennon WTP will be upgraded and expanded to provide the additional treatment capacity required to support the integrated regional supply arrangement. The upgraded WTP will form the principal treatment asset for the Proposed Development, enabling treated water from Lough Conn to replace the existing Lough Talt source and provide a resilient long-term supply to Ballina, Bonniconlon, Windy Gap and the Lough Talt supply area.

The proposed works at Lisglennon WTP are required to increase treatment capacity, improve process resilience, address water quality risks, provide enhanced treated water storage and residuals management, and integrate the plant with the new treated water transfer infrastructure.

## 7.2 Existing Site

Lisglennon WTP is located at Lisglennon, Ballina, Co. Mayo and currently forms a key treatment asset within the Ballina Regional Water Supply Scheme. The plant receives raw water from Lough Conn via the existing Wherrew Raw Water Intake & Pumping Station and Lisglennon Raw Water Storage and Pumping Station.

The existing treatment process comprises coagulation, flocculation, clarification, rapid gravity filtration, primary disinfection by chlorination, fluoridation, treated water storage and treatment of water treatment plant residuals. Existing ancillary infrastructure includes chemical storage and dosing systems, process pipework, pumping systems, electrical equipment, control systems, access roads, hardstanding, drainage and site security infrastructure.

The existing WTP has supported the current Ballina RWSS demand; however, it does not have sufficient treatment capacity to meet the future regional supply requirement associated with the Proposed Development. The existing process configuration also requires enhancement to provide improved resilience, increased treatment capacity and more robust management of water quality risks, including disinfection performance, natural organic matter removal, trihalomethane formation potential and residuals handling.

The existing treatment process is illustrated in Figure 7-1.

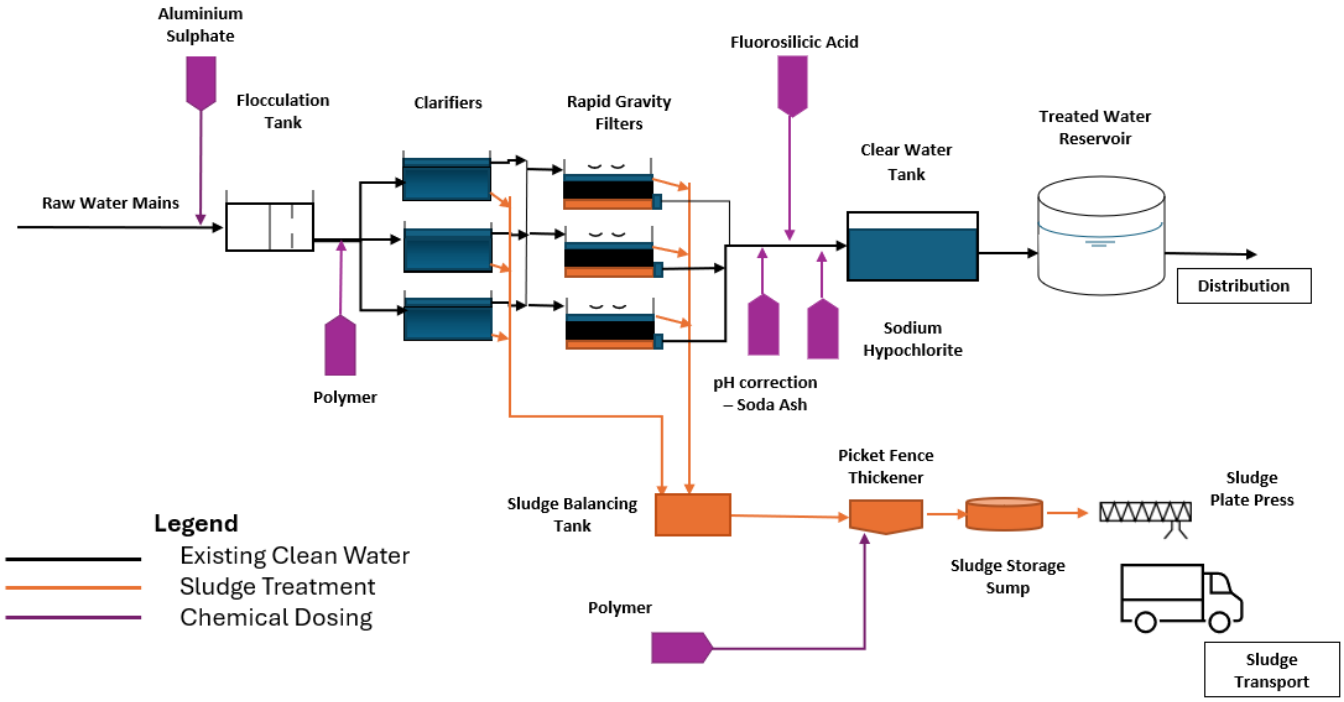



**Figure 7-1 — Flow chart of existing water treatment process**

# 7.3 Proposed Development

Lisglennon WTP will be upgraded to provide increased treatment capacity, improved process resilience and enhanced operational control within the existing WTP site. The proposed upgrades will integrate retained existing assets with new treatment, storage, chemical dosing, residuals management, mechanical, electrical, instrumentation, control and automation infrastructure. The upgraded WTP will support the transfer of treated water to the wider Ballina and Lough Talt supply areas and will be operated in accordance with Uisce Éireann requirements for drinking water quality, asset resilience, health and safety, environmental protection and maintainability.

The proposed upgrades have been developed to provide a robust treatment process for the raw water supply from Lough Conn, with additional treatment stages, increased process redundancy, enhanced treated water storage and upgraded residuals handling.

A flow diagram setting out the upgraded treatment process is provided in Figure 7-2 below .

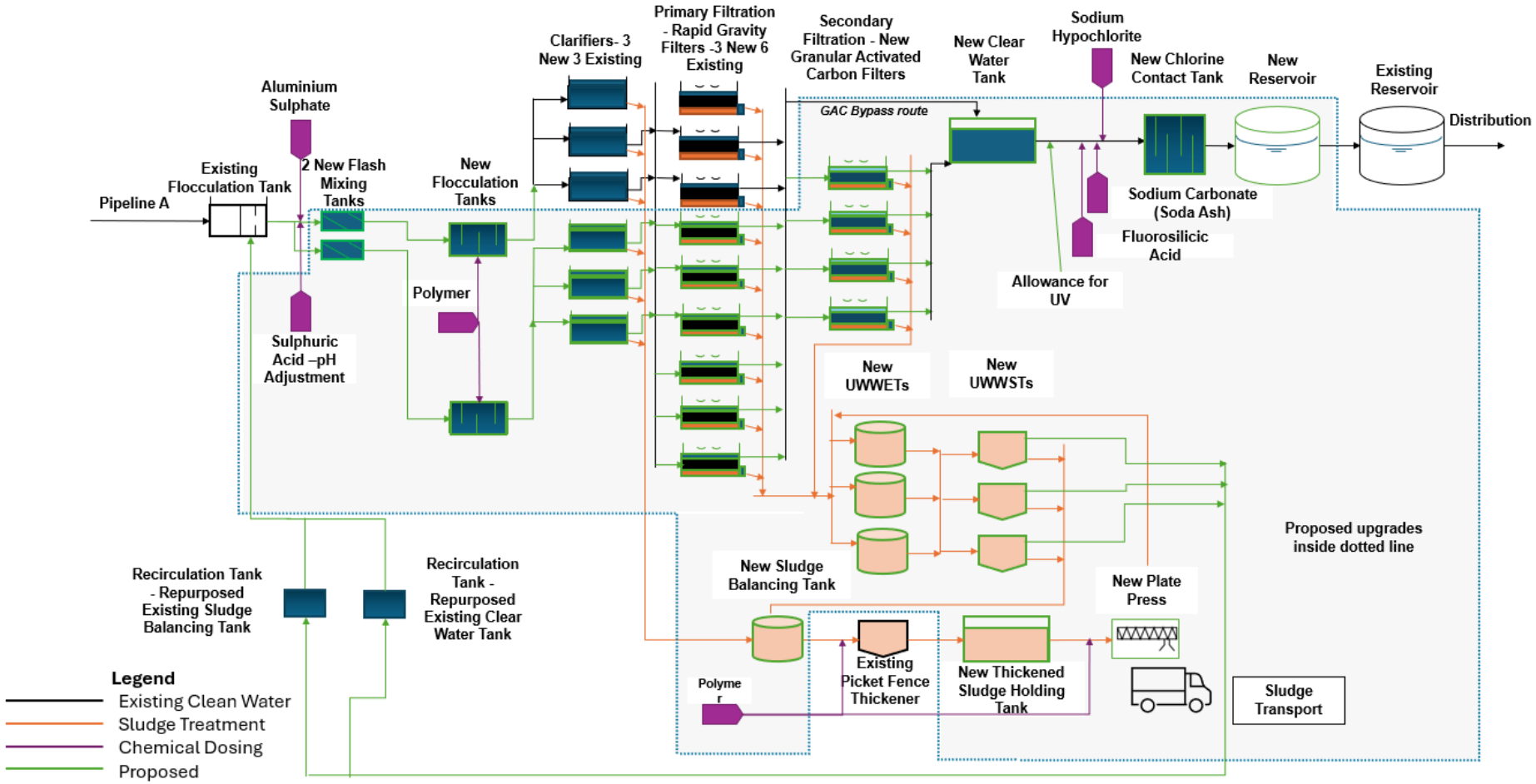



**Figure 7-2 — Lisglennon Water Treatment Plant Process Flow Diagram, with all inside the blue dotted line indicating the proposed upgrades.**

The site layout of the proposed development at Lisglennon WTP is shown in **Figure 7-3** below.

The proposed upgrade to the existing Lisglennon WTP will consist of:

- Construction of new and upgraded coagulation, flocculation and clarification infrastructure;
- Provision of additional rapid gravity filtration capacity;
- Introduction of granular activated carbon filtration as a secondary filtration stage;
- Construction of a new treated water storage reservoir, to operate in conjunction with the retained existing treated water reservoir;
- Construction of new residuals management infrastructure, including washwater equalisation, washwater settlement, sludge balancing, sludge holding and dewatering facilities;
- Provision of new process buildings, including filter gallery buildings, soda ash dosing building, pump station and UV building, and sludge dewatering building;
- Provision of new electrical infrastructure, including an ESB medium voltage substation, control systems, telemetry and associated ducting;
- Provision of solar PV infrastructure to supplement site power demand;
- Ancillary works, including:
    - upgrades to internal access roads, hardstanding, drainage, fencing, lighting and site security;
    - decommission of the existing septic tank and its replacement with new wastewater treatment system with percolation area; and,
    - landscaping




**Figure 7-3 – Proposed Development – Lisglennon WTP**

## 7.4 Design

### 7.4.1 Basis of Design

The design of the Lisglennon WTP upgrade is based on increasing the capacity and resilience of the existing treatment plant while making use of suitable existing infrastructure where practicable. The proposed arrangement will provide additional process streams and supporting infrastructure to allow the plant to meet future regional demand requirements and to support the replacement of the Lough Talt source.

The upgraded plant will provide a multi-barrier treatment process comprising coagulation, flocculation, clarification, filtration, granular activated carbon treatment, disinfection, final water conditioning and treated water storage. The process has been developed to address the anticipated raw water quality from Lough Conn, the required treated water quality standards, and the operational needs of the expanded regional supply system.

The proposed design also provides for improved management of treatment residuals, enhanced monitoring and control, and integration with the wider raw water and treated water transfer infrastructure.

Key design flow parameters for the upgraded Lisglennon WTP are summarised in Table 7-1 below.

**Table 7-1 – Lisglennon WTP Basis of Design**

| Parameter | Unit | Value |
|---|---|---|
| **Current Capacity (prior to 2024 upgrades)** | $m^3$/day | 8,342 |
| **Current Maximum Hourly Output** | $m^3$/h | 440 |
| **Current Maximum Instantaneous Output** | L/s | 122 |
| **Proposed Additional Capacity** | $m^3$/day | 14,225 |
| **Proposed Additional Capacity (new stream only)** | $m^3$/h | 586 |
| **Proposed Additional Capacity (new stream only)** | L/s | 163 |
| **Total Proposed Upgraded WTP Capacity (22-hour operation)** | $m^3$/day | 22,567 |
| **Total Proposed Upgraded WTP Capacity** | $m^3$/h | 1,026 |
| **Total Proposed Upgraded WTP Capacity** | L/s | 285 |

This increase in capacity will be achieved through modification of the existing process and addition of a further treatment stream.

### 7.4.2 Treatment Process Infrastructure

To accommodate the additional capacity required at Lisglennon Water Treatment Plant and manage residual risks identified with the existing WTP, the following interventions are planned:

#### 7.4.2.1 Enhanced Coagulation

The incoming raw water will be adjusted to an optimum target pH, using a new sulphuric acid dosing facility, with new storage facilities to allow for an optimal floc forming chemical reaction to take place. Aluminium sulphate and polymer will be dosed to achieve optimal coagulation and flocculation. Coagulant and pH adjustment dosing will be via dedicated flash mixing tanks upstream of the flocculation process. New storage and dosing arrangements for these chemicals will be provided to increase capacity. This is expected to enhance and optimise clarification and improve filtration performance.

#### 7.4.2.2 New Flocculation

Two new flocculation tanks will be provided to increase capacity and replace the existing non-compliant flocculation tank. The existing flocculation tank has a working capacity of 34m$^3$ and is undersized and not fit for purpose. One flocculation tank will be dedicated to the existing process stream and one to the future process stream. Cross linkage will be provided to enable one tank to be taken out of service for maintenance and cleaning without the need to shut down an entire stream.

#### 7.4.2.3 Additional Clarification Capacity

Three new additional settlement-type clarifiers fitted with tube settlers will be provided to provide additional capacity.

#### 7.4.2.4 Additional Rapid Gravity Filter Capacity with Dual Media

Six new additional Rapid Gravity Filters will be provided with backwash and run-to-waste facilities, to accommodate additional capacity. The new filters will be installed with dual-media and the mono-media in the existing 3 no. filters will also be replaced with dual-media.

#### 7.4.2.5 Granular Activated Carbon(GAC) Adsorbers

A new rapid gravity filter-type GAC Absorber process will be provided to remove excess disinfection by-product precursors (primarily, dissolved organic carbon) to limit the formation of trihalomethanes post disinfection. 4 no. RGF type GAC adsorber units will be provided to allow 60 to 88% of the design throughput to be GAC treated with one unit out of service. The footprint for 2no. additional GAC adsorber units has been provided should additional future throughput and redundancy be required. A process bypass is included in the design to allow for a maximum of 100% of the design throughput to flow directly from the primary filtration process to the clearwater tank without GAC treatment.

#### 7.4.2.6 Additional Backwash Facilities

A new clearwater backwash tank will be provided to allow for RGF and GAC filter backwashing.

#### 7.4.2.7 Disinfection

A new dedicated chlorine contact tank will be provided to achieve a target Ct target of 20.93 mg.min/L according to the Uisce Éireann primary chlorination verification, dose and storage calculations spreadsheet *UÉ-TEC-900-05-FM-01*. Sodium hypochlorite storage and dosing facilities will be upsized to increase storage capacity to 10m$^3$.

#### 7.4.2.8 Replacement Final Water Conditioning

New soda ash make-up, dosing and storage facilities will be provided for pH and alkalinity post-contact to increase capacity and replace the existing non-compliant system.

All water will be dosed with hydrofluorosilicic acid (using existing facilities) prior to entering the onsite Lisglennon water storage reservoirs. It is understood that orthophosphate dosing is to be undertaken in the Ballina network under

a separate project and is therefore excluded from this scheme, but support will be provided from this scheme to the relevant designers in assessing the needs in light of upstream chemistry changes due to enhanced coagulation at Lisglennon WTP.

Further conditioning will be retained at Lough Talt WTP site for the purposes of chloramination, including the existing chlorination (for trim dosing to improve Chloramination control), ammonia and orthophosphate dosing and storage facilities.

#### 7.4.2.9 Additional Treated Water Storage

At Lisglennon WTP, an additional treated water storage tank will be provided, and the existing treated water storage tank retained to provide sufficient storage for the Ballina network only.

#### 7.4.2.10 New Residuals Management

New used wash water equalisation and settlement tanks (UWWET and UWWST) will be provided to manage the increased filter wash water and residuals returns, replacing the existing non-compliant provision.

The sludge from the new UWWST will blend with the sludge from the tube settler clarifiers in a new sludge balancing tank.

The blended sludge will then be directed to the existing sludge thickener.

A new thickened sludge holding tank will be provided to manage the increased thickened sludge load, replacing the existing provision.

A new dewatering unit will be provided to manage the increased thickened sludge load, replacing the existing life-limited provision, and to allow the sludge cake to be collected by lorry.

Polymer dosing make-up, storage and dosing systems will be installed and new polymer dosing points will be replaced to suit the new system.

The filtrate from the new dewatering unit and supernatant from the picket fence thickener will flow into new wash water equalisation tanks, where it shall will equalised with the dirty backwash water and run-to-waste, prior to settlement in the used wash water settlement tanks.

Settled backwash water shall be returned to the inlet of the works via a supernatant balance tank comprising the repurposed existing wash water and clean backwash tanks, with additional controls (e.g. limiting turbidity & flowrate) in line with section 8.3.2 of *IW-TEC-900-07.*

#### 7.4.2.11 Wash Water Tank (Process Draindown Tank)

A tank will be provided, sized to allow the largest process tank to be fully drained down in the event of maintenance of cleaning, this process water will be returned to the head of the works for treatment.

#### 7.4.2.12 Future Facilities Allowed for in Planning Layouts

An allowance has been made for future installation of duty/assist/ standby UV (ultraviolet) disinfection units downstream of rapid gravity filtration and upstream of chlorination, in case of future elevated cryptosporidium risk.

As described earlier under GAC, the design has allowed for 4 no. GAC filter units but allowance has been made for 2 no. additional GAC filter units should they be required in the future.

### 7.4.3 Mechanical, Electrical and Control Systems

The proposed development includes new and upgraded mechanical, electrical, instrumentation, control and automation systems to support operation of the expanded treatment plant. These systems will include modifications to control panels and SCADA as new process elements are brought into service.

### 7.4.4 Power Supply & Renewable Energy

There is existing electricity supply to the site. A new ESB medium voltage (MV) substation transformer of 300 kVA will be provided to meet anticipated additional electricity demands. The new substation will be maintained and operated by the ESB.

The diversion of the existing overhead ESB in the west of the site, will be required for the Proposed Development. An ESB application has been submitted for this line diversion.

Roof- mounted or ground mounted Solar PV will be provided for at the site, provisional areas are allocated to the south of the site. Energy generated from the solar farm will supply the WTP. There will be no export of power to the Grid.

A back-up power supply in the form of a connection for a standby diesel generator, is provided in the event of a power outage.

Refer to Section 13.1 for details on renewable energy design.

### 7.4.5 Ancillary works

#### 7.4.5.1 Access

Access and egress to site will be through the existing WTP entrance gate, on the L1111. No major alterations to the current access road are proposed. There is an existing security gate north of the building.

A new security fenceline and gate is proposed all around the operational area of the proposed works. The new ESB substation is located near the main entrance with dedicated security fencing and gate.

Additional access road extents (up to 1,100 $m^2$) will be laid to serve most of the proposed works such as new GAC filter gallery, new dewatering building, clean backwash tank, washwater treatment facilities, at the east of the current plant. The new road will be of asphalt and new pavements will be of permeable gravel. There is concrete hardstanding around all proposed works.

#### 7.4.5.2 Fencing / Boundary

There is existing timber and post fencing all around the site perimeter and along the existing internal access road at the south. There is an access gate at the entrance and a post and wire mesh fence (approx. 1.8 m high) and another access gate near the existing building. A new 2.4m high palisade fence and security gate is proposed all around the operational area of the site.

#### 7.4.5.3 Stormwater Management

The existing surface water management system consists of a conventional system of gullies and drains across the road, running towards soakpits along existing roads. Additional stormwater run-off from proposed buildings, hardstanding and roads, will be conveyed by a new pipe network to petrol interceptors and flow into ponds and

soakaways proposed at different locations within the site. Some of the existing soakaways will be abandoned with surface water captured and redirected to the new ponds and soakaways.

#### 7.4.5.4 Wastewater management

The existing septic tank is to be decommissioned and a new wastewater treatment system with percolation area is proposed at the northern side of the site. It will collect wastewater from existing toilets and proposed eye wash and handwash facilities. The new wastewater treatment system will be installed in accordance with a site suitability assessment to ensure it meets EPA requirements.

#### 7.4.5.5 Site Lighting

Access roads will be lit by proposed post mounted luminaires. Working areas between buildings/structures will be lit by wall mounted luminaires.

#### 7.4.5.6 Landscaping

In terms of landscaping, the Lisglennon WTP site will be subject to landscaping and biodiversity enhancement measures, which will include but are not limited to:

- Planting of native hedgerows;
- Planting of trees;
- Installation of bird and bat boxes;
- Scrub planting as an understory comprised of native Irish species, areas of wildflower mixes, all of which will be suitable for native pollinator species;
- It is proposed to repurpose non-used parts of the site to promote the growth of wildflowers, native trees and hedgerows.
- Where appropriate, additional topsoil will be spread and graded between 1-2 m to avoid impact to the existing trees and will be completed in advance of any planting. Placement of berms and bunding will concentrate in the north and northwest of the site. Care will be taken not to dwarf the wall at the entrance and along the road. This will then be planted with new woodland mix.

### 7.4.6 Geotechnical Considerations

Draft engineers logs are available for TP-LG03, BH-LG04, BH-LG02, TP-LG05, BH-LG03, BH-LG03A, TP-LG01, BH-LG05, BH-LG06, TP-LG06, TP-LG07, BH-LG07, TP-LG04.

Key risks likely to be encountered during construction are listed below:

- Side walls collapsing inward where open excavations are unsupported in soft or loose material.
- Occasional cobbles were recorded which could affect the excavation.
- Shallow bedrock was identified which could affect the excavation.
- Shallow weathered rock and intact bedrock will likely be encountered when excavating to formation level.
- Hydraulic uplift of empty tanks where a high, water table is recorded.
- A high, water table indicates that groundwater ingress will be an issue and will need to be controlled

The following construction recommendations will be implemented:

- The Made Ground or soft material will be excavated and replaced with acceptable engineered material. This will require over-excavation, and replacement with engineered fill up to formation level if encountered
- Trench boxes will be installed to support the walls of the open excavation and to mitigate the risk of loose granular material unravelling and falling into an open excavation.
- Shallow bedrock will likely be encountered and require removal via rock breaking and excavation.
- In the event that shallow groundwater ingress is encountered during construction, it will be controlled by excavation of a sump and installation of a water pump
- If required, sheet piles will be driven into the weathered rock to temporarily address the risk of hydraulic uplift of empty tank during construction. Groundwater control will be by means of excavating of a sump and installing a water pump.
- The following three options have been identified to mitigate the risk of hydraulic uplift of empty tanks during and after construction:
    - Thicken the base of the tank in order to weigh down the tank;
    - Anchor the tank, whereby the base of the tank is made wider than the walls of the tank, so that the weight of the soil above and around the tank will act as a weight or an anchor;
    - Incorporate wings (<1m width) in the tank design, to secure the tank in the ground.

## 7.5 Construction, Testing and Commissioning

Construction of the Lisglennon WTP upgrades will be undertaken in a planned and phased manner, with the objective of maintaining water treatment operations, insofar as practicable. The existing treatment stream will remain operational while new treatment units, tanks, pipework and associated systems are constructed offline. Where shutdowns or tie-ins are required, these will be planned in advance with Uisce Éireann Operations.

The principal construction activities will comprise earthworks, construction of new treatment and storage infrastructure, installation of pipework and associated systems, construction of residuals management infrastructure and completion of ancillary works. The EIAR Project Description states that testing and commissioning will be undertaken progressively, with individual process units brought into service in stages.

The general construction techniques and the construction is described in Chapter 3 (Project Description) of the EIAR.

## 7.6 Operation and Maintenance

Operation of the upgraded plant will be controlled through automated monitoring and control systems supported by routine operator oversight. The principal treatment processes will comprise coagulation, flocculation, clarification, filtration, disinfection, final treated water conditioning, treated water storage and residuals management.

Routine operation and maintenance will include inspection and maintenance of treatment units, pumps, valves, chemical dosing systems, residuals management infrastructure, instrumentation, control systems, drainage and access infrastructure.

# 8. Pipelines B, C, D & E

## 8.1 Purpose

Pipelines B, C, D and E form the treated water conveyance network linking the upgraded Lisglennon Water Treatment Plant to the downstream storage, pumping and distribution infrastructure within the Ballina and Lough Talt Regional Water Supply Scheme.

The pipelines are required to transport treated water from Lisglennon WTP through the Bonniconlon Booster Pumping Station and Windy Gap Break Pressure Tank to the Lough Talt system, enabling the integration of the regional supply network and the redistribution of treated water to areas currently served by existing sources.

In doing so, the pipelines facilitate the replacement of legacy infrastructure, improve hydraulic performance and provide increased capacity, operational flexibility and resilience, supporting the long-term, sustainable supply of potable water across the study area.

## 8.2 Existing Site

The existing treated water conveyance infrastructure between Lisglennon Water Treatment Plant (WTP) and the Lough Talt supply area comprises a network of trunk mains connecting Lisglennon WTP to Ballina town and onward to the wider distribution network.

The current system includes Asbestos Cement (AC) and Ductile Iron (DI) mains, primarily routed along the R314 corridor and through Ballina town, together with associated distribution connections and infrastructure. These pipelines provide the principal means of transferring treated water from Lisglennon WTP to the Ballina Regional Water Supply Scheme (RWSS) and onward to downstream networks.

In addition, an existing treated water pipeline extends from Lisglennon WTP towards the Lough Talt supply area, generally following a similar corridor to the proposed pipeline route. The existing infrastructure is characterised by varying pipe materials, diameters and conditions, reflecting its staged historical development.

The existing network has limited hydraulic capacity and operational flexibility, and is not sufficient to accommodate projected future demand or support the integration of the Ballina and Lough Talt supply systems.

## 8.3 Proposed Development

The proposed treated water pipeline route corridor between Lisglennon WTP and Lough Talt WTP (proposed Pipeline B-E) extends to c. 30.2 km, principally along public roads, existing utility corridors and existing pipeline alignments where practicable, with remaining sections through private lands.

The proposed route corridor from Lisglennon WTP to Lough Talt WTP is illustrated in Figure 8-1 below . It is divided into four discrete sections:

- The proposed Pipeline B – Lisglennon WTP to River Moy Pipeline Crossing will consist of:
    - the installation of a new approx. 710 mm diameter pipeline, total length approx. 8.4km, from Lisglennon WTP to Junction R314 and Belleek Rd;
    - the installation of a new approx. 560 mm diameter pipeline, total length approx. 2km, from Junction R314 and Belleek Rd to River Moy Crossing;

- a tie in with the existing watermain to the east of the existing River Moy crossing;
- all ancillary pipeline infrastructure.

- The proposed Pipeline C – River Moy Pipeline Crossing to Bonniconlon BPS will consist of:
  - a tie in with the existing watermain to the west of the existing River Moy crossing;
  - The installation of a new approx. 500 mm to 560 mm diameter pipeline, total length approx. 7.2km, from River Moy Crossing to Bonniconlon BPS;
  - all ancillary pipeline infrastructure.

- The proposed Pipeline D – Bonniconlon BPS to Windy Gap BPT will consist of:
  - The installation of a new approx. 500 mm to 560 mm diameter pipeline, total length approx. 6km, from the new Bonniconlon BPS to Windy Gap Break Pressure Tank on the R294;
  - all ancillary pipeline infrastructure.

- The proposed Pipeline E – Windy Gap BPT to Lough WTP will consist of:
  - The installation of a new approx. 450 mm diameter pipeline, total length approx. 6.6km, from Windy Gap Break Pressure Tank to the existing Lough Talt WTP on the R294;
  - all ancillary pipeline infrastructure

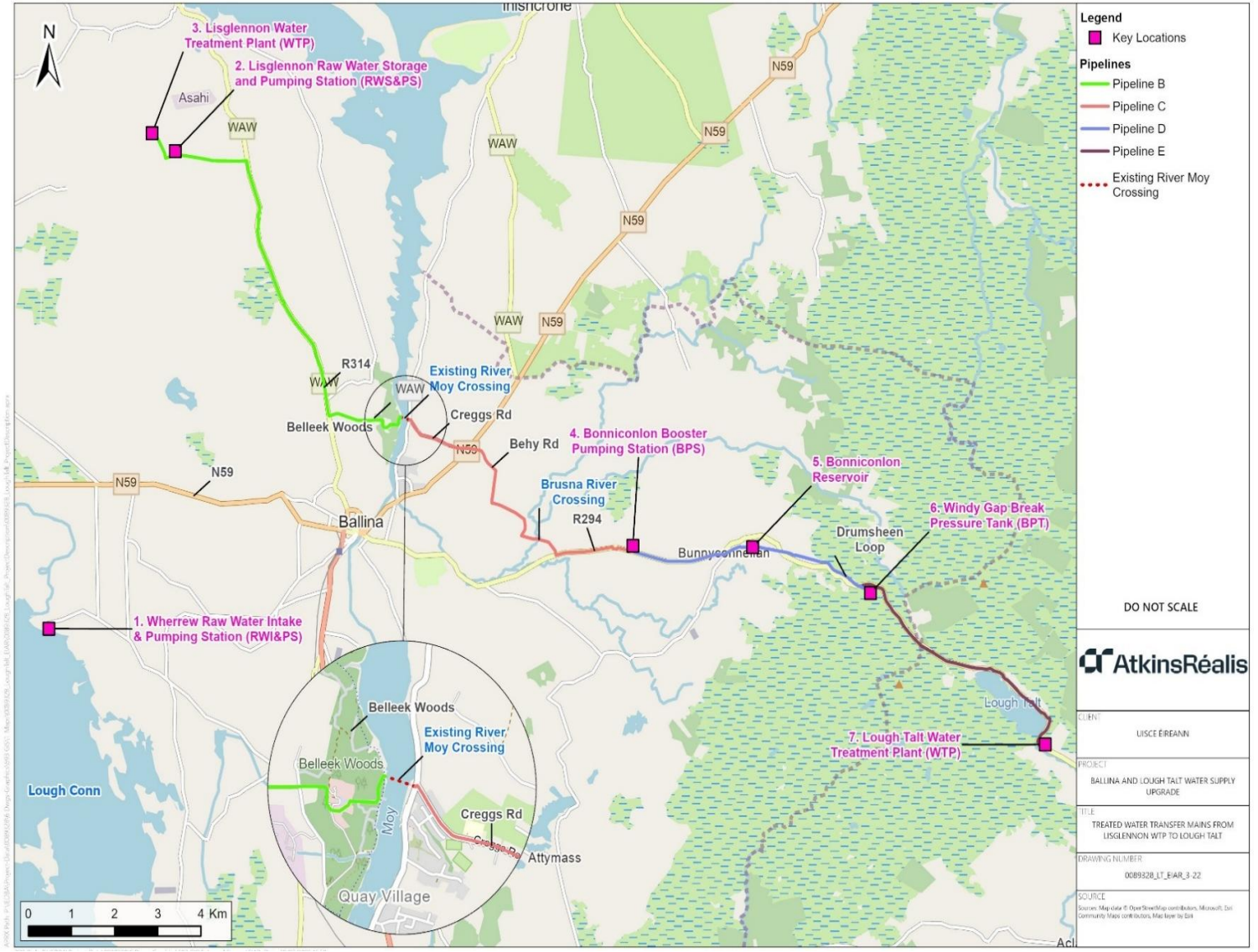



**Figure 8-1 – Proposed Development – Pipeline B, C, D & E Route Corridor**

## 8.4 Design

The design includes both the upgrade and extension of the existing treated water network. In particular, sections of the existing trunk main network between Lisglennon WTP and Ballina town will be replaced where they comprise ageing Asbestos Cement (AC) pipework, typically in the 400 mm to 500 mm diameter range, and are no longer suitable to meet future hydraulic and operational requirements.

These replacement works will primarily follow the existing corridor along the R314 and through Ballina town, allowing for the retention of established wayleaves and minimising land take, while providing improved hydraulic performance, durability and maintainability. The upgraded sections will form part of a continuous trunk main system, integrated with retained infrastructure where appropriate, including strategic elements such as the existing River Moy crossing.

Beyond Ballina, the design provides for the extension of the network through new pipeline sections connecting to the Bonniconlon Booster Pumping Station and onward to the Windy Gap Break Pressure Tank and Lough Talt system. The overall route corridor extends approximately 30.2 km, predominantly along existing roads and access tracks, with some sections through agricultural land where required.

The pipelines are designed as a fully integrated hydraulic conveyance system, with intermediate pressure management and control provided by the Bonniconlon BPS and Windy Gap BPT. This arrangement allows treated water to be conveyed efficiently across varying topography while maintaining system stability and operational flexibility.

Overall, the design enables the modernisation of the existing network through targeted replacement of legacy AC mains, combined with strategic extensions, thereby delivering increased capacity, improved reliability and full integration of the Ballina and Lough Talt supply networks into a single, resilient regional system.

### 8.4.1 Basis of Design

The basis of design for Pipelines B, C, D and E is to provide a continuous treated water trunk main from Lisglennon WTP to the existing Lough Talt WTP site via Ballina, Bonniconlon BPS and Windy Gap BPT. The trunk main has been designed to convey the forecast future regional demand, including existing Lisglennon/Ballina demand, the Lough Talt WSZ transfer requirement, local Ballina offtakes and allowance for a future Lough Easkey connection.

The hydraulic design has been developed using a steady-state network model of the full transfer system. The model considers forecast demand, pipe internal diameters, pipe roughness, route longitudinal profile, static head, friction losses, residual pressures, flow velocities, operational water levels at Lisglennon WTP and Windy Gap BPT, and the hydraulic interaction with Bonniconlon BPS. The proposed arrangement comprises gravity conveyance from Lisglennon WTP to the Bonniconlon area, pumped transfer from Bonniconlon BPS to Windy Gap BPT, and onward gravity transfer to the Lough Talt WTP site.

The selected pipe sizes reflect the hydraulic capacity required along each section of the route. The trunk main generally comprises approx. 710 mm diameter wastermains between Lisglennon WTP and the Ballina offtake, reducing to approx. 560 mm, 500 mm and 450 mm diameter watermains downstream as transfer flows reduce. The existing River Moy crossing is retained, with modelling confirming that the retained crossing can convey the proposed Lough Talt transfer flows without excessive headloss under the current design scenario. A future additional crossing or parallel capacity may be required if the Lough Easkey WSZ is rationalised into the Ballina/Lough Talt supply arrangement.

The hydraulic model confirms that the proposed arrangement maintains acceptable flow velocities, limits headloss and provides positive operating pressures throughout the modelled transfer route. The location of Bonniconlon BPS has been selected to provide the required hydraulic lift across the higher ground towards Windy Gap, while the Windy

Gap BPT provides hydraulic separation, flow balancing and pressure control between the pumped and downstream gravity sections.

A transient / surge assessment has also been undertaken for the proposed transfer system. The assessment considered steady-state maximum flow, pump power failure, pump start-up and normal variable-flow operation. Unsuppressed simulations identified the potential for sub-atmospheric pressures and air valve opening during pump trip and start-up events, which would present an unacceptable operational and contamination risk. Surge mitigation has therefore been incorporated into the design.

The transient assessment indicates that surge protection is required at Bonniconlon BPS, including suction-side and discharge-side surge vessels, together with appropriate pump control, non-return valve selection and pressure management arrangements. 20 m³ surge vessels have been provisionally provided on both the suction and discharge sides of the booster pumps. The final vessel volumes, pressure ratings and control settings will be confirmed during final design based on the final pipeline profile, selected pipe materials, pump selection, operational levels at Lisglennon WTP and Windy Gap BPT, and the agreed control philosophy.

The resulting basis of design provides a hydraulically robust treated water transfer system that maintains positive pressures, manages surge risk, limits headloss, supports future operational flexibility and integrates the Lisglennon WTP, Bonniconlon BPS, Windy Gap BPT and Lough Talt WTP assets into a single regional supply arrangement.

### 8.4.2 Route And Alignment

The proposed treated water trunk main route extends from Lisglennon WTP to the existing Lough Talt WTP site via Ballina, the existing River Moy crossing, Bonniconlon BPS and Windy Gap BPT. The route has been developed to provide a continuous hydraulic connection between the upgraded Lisglennon WTP and the Lough Talt supply area, while making use of existing road corridors, utility corridors and established pipeline alignments where practicable.

The alignment generally follows the existing corridor between Lisglennon WTP and Ballina, including sections along the R314 and local roads, where replacement of existing ageing trunk main infrastructure is required to provide the future hydraulic capacity. From Ballina, the route connects to and retains the existing River Moy crossing before continuing westwards towards Bonniconlon, generally following public roads, local roads, private tracks and short sections of agricultural land where required.

Between Bonniconlon BPS and Windy Gap BPT, the alignment follows the R294 corridor and associated local/private access routes, with the pipeline profile rising towards the higher ground at Windy Gap. Downstream of Windy Gap BPT, the route continues generally along the R294 and adjacent lands towards the existing Lough Talt WTP site, where the treated water main will connect into the repurposed downstream storage and network integration arrangements.

The route and vertical alignment have been developed with reference to the hydraulic model, topographic survey, existing services information, environmental constraints, land ownership, constructability, traffic management, access requirements and the need to maintain existing water supply operations. The longitudinal profile has informed the location of air valves, scour valves, washout facilities, isolation valves, pressure management arrangements and other pipeline appurtenances.

The route has also been coordinated with the transient / surge assessment, particularly in relation to local high points, pressure envelopes, air valve locations and the interface with Bonniconlon BPS and Windy Gap BPT. This ensures that the final alignment supports positive operating pressures, controlled filling and emptying, safe commissioning and appropriate surge mitigation during normal and abnormal operating scenarios.

Watercourse crossings, service crossings and constrained urban sections have been identified along the route and are addressed in the relevant design drawings and supporting sections of this report. Open-cut construction is proposed as the primary installation method, with trenchless techniques adopted or preferred at significant

watercourse crossings and other constrained locations where this reduces environmental, constructability or operational risks.

### 8.4.3 Proposed Connections

A number of connections will be provided between Lisglennon WTP and Ballina town to allow transfer of supply from the existing 400mm - 500mm AC main (to be abandoned) to the new trunk main. Additionally, strategic offtakes will be provided at Ballina and Creggs Road to connect to existing watermains. A new offtake at N59 junction will be provided to allow for future connection to Lough Easkey WSZ. These connections are listed in Table 8-1 below. Pipe connections shall be in accordance with IW-CDS-5020 STD-W-04 to STD-W-10.

**Table 8-1 - Proposed Connections**

| New Trunk Main Chainage | No of connections proposed | Distribution Pipe Diameter & Material |
|---|---|---|
| Pipeline B - connections | 10 | • 50mm HDPE & 250mm AC<br>• 80mm HDPE<br>• 80mm HDPE<br>• 200mm DI / 100mm DI / 50mm DI & 50mm DI<br>• Existing Pipe, dia unknown<br>• 100mm uPVC<br>• 250mm AC & 200mm uPVC |
| Pipeline B - Ballina Offtake | 1 | • 400mm AC |
| Pipeline C - Creggs Road Offtake | 1 | • 350mm DI |
| Pipeline C – future Lough Easky Offtake | 1 | • N/A (provision for future offtake connection) |

### 8.4.4 Watercourse Crossings

There are approx. thirty number of surface water feature crossings which have been identified along the pipeline route, comprising of approx. eighteen number of EPA-identified watercourses and twelve number of field drains. The locations of these surface water features were validated during site surveys and site investigations and assessed for potential impacts to ecology. Where a risk of impact to the watercourse (e.g. aquatic life or habitats) has been identified, the watercourse will be crossed using trenchless techniques, such as pipe jacking or directional drilling, or via existing crossing infrastructure.

### 8.4.5 Pipe Bedding and Surround

Where the pipe is installed in an open cut excavation, bedding, surround and backfill will be in accordance with IW-CDS-5020-01 STD-W-13 and IW-STD-LD-001 STD-LD-21.

Furthermore, selected excavated material will be used as trench backfill above the granular pipe surround material in accordance with IW-CDS-5020-03. Where the pipeline is installed in public roads, the backfill material will comprise of cement bound granular material (CBGM), Category B, in accordance with the NRA “Specification for Road Works”, Series 800. Site Investigation (SI) to confirm suitability of excavated material as backfill.

## 8.4.6 Ancillary Works

### 8.4.6.1 Fittings and Marker Posts

Fittings will be positioned as required to ensure safe operation of the water network, in accordance with UÉ design standards and site-specific issues. Watermain fittings will be located and provided as 'offline' where practicable, where a suitably wide verge/hardstanding is available to accommodate the fitting and fitting chamber.

Indicator plates will clearly identify hydrant, air valve, scour valve, washout hydrant, meter, pressure reducing/sustaining valve and sluice valve locations. Marker plates will be installed in accordance with IW-CDS-5020-01 STD-W-27.

### 8.4.6.2 Sluice Valves

Sluice Valves will be provided at a target spacing of approx. 1.0km (rationalised in a number of locations to improve SV placement), enabling sectional isolation of the mains in case of future maintenance requirements. Sluice valves will be installed as per UÉ Standards Details STD-LD-01 to STD-LD-05 and scheme specific details.

### 8.4.6.3 Hydrants

There are 4 no. hydrants installed on the existing 400mm – 500mm AC trunk main along the R314 Killala to Ballina road and one at the Quay Road and Creggs Road junction. All 5 no. hydrants will be replaced in accordance with UÉ Standards Details STD-W-16 to STD-W-19.

### 8.4.6.4 Scour Valves & Washout Hydrants

Scour valves will be installed at low points on the water pipeline and at locations of culvert/bridge crossings where the main is diverted under watercourses. Where it is not possible to install a scour valve, washout hydrants will be provided. Installation will be completed as per UÉ Standard Details STD-LD-06 and STD-LD-07.

### 8.4.6.5 Air Valves

Air valves will be installed at high-points on the water pipeline and at a maximum distance of 1km from scour valves/washout hydrants or adjacent air valves. Air valves will be installed as per UÉ Standard Details STD-LD-13 to STD-LD-16. Air valve final location design and type selection should be carried out in conjunction with an appropriate supplier.

### 8.4.6.6 Flowmeters

Flowmeter arrangements will be installed along the trunk main in accordance with UÉ Standard Details STD-LD-11 at the following locations:

- At Ballina offtake and Creggs Road offtake
- Upgraded Lisglennon WTP.
- New Booster Pumping Station in Bonniconlon.
- New break pressure tank at the Windy Gap.
- New treated water storage tank at Lough Talt WTP.

### 8.4.6.7 Pressure Reducing Valves (PRVs)

No PRVs have been identified on the existing AC trunk main along the R314 Killala/Ballina Road. PRVs on branches off the trunk main will be retained.

A pressure reducing, or pressure sustaining valve and chamber will be provided at the Lough Talt WTP site to maintain a positive upstream pressure from the high point. This is to prevent the following:

- Air valves from opening and entraining air into the pipeline;
- Potential siphoning effects;
- Water entering the inlet structures at high pressures and velocities;
- Potential negative transient pressure waves from occurring in the gravity section of the pipeline.

#### 8.4.6.8 Thrust Blocks

Thrust blocks will be provided where required, this includes locations where connections are required to the existing rigid, unrestrained pipework. Block dimensions are based on IW-CDS-5020-01 STD-W-28.

### 8.4.7 Geotechnical Considerations

The Ground conditions encountered during the completion of the fieldwork were typical and as expected for this region and predominantly consisted mainly of Topsoil and /or Made Ground (tarmacadam / road fill) overlying peat, silt, clay, sand or gravel (Glacial Till) overlying bedrock.

The proposed pipeline route will be constructed mainly within sediments typically described as follows:

• Firm to very stiff, brown or grey, slightly sandy, gravelly CLAY with low to high cobble content, and low to high boulder content.

• Firm to very stiff, brown or grey, slightly sandy, gravelly SILT with low to high cobble content, and low to high boulder content.

• Medium dense, brown or grey, clayey, gravelly SAND with cobbles and or boulders.

• Medium dense to dense, brown or grey, clayey, sandy GRAVEL with cobbles and or boulders.

• Medium dense, brown or grey, very silty SAND and GRAVEL.

• Locally within, MADE GROUND described as road fill (Clause 804 material) and/or silty sandy GRAVEL with cobbles along with traces of construction rubble (brick, timber, plastic).

• Locally within weathered to intact strong or very strong grey, thinly bedded LIMESTONE.

Onerous ground conditions which the proposed pipeline route will encounter are typically described as follows:

• Soft dark, brown, or grey slightly gravelly CLAY.

• Soft, brown or grey, peaty, slightly gravelly, sandy SILT.

• Soft to very soft, dark brown / black PEAT.

• Very soft, cream white, calcareous SILT/MARL.

Key risks are listed below:

- Unstable walls in open excavations within soft strata. There is a high risk of unsupported excavations collapsing during construction especially where a high water table is encountered.

- It is anticipated that soft deposits encountered will have insufficient bearing capacity to support both dead and live loads associated with the wastewater pipe network.

- Groundwater ingress is expected to affect construction operations therefore de-watering by means of submersible pumps installed below trench invert level are recommended for this site.

- Bedrock was encountered between in twenty-nine of the forty-three rotary boreholes drilled along the proposed pipeline route. Bedrock was not encountered in fourteen of the forty-three boreholes.

- Along the 30km pipeline scheme, bedrock is typically deeper than the invert level of the pipeline and at these locations is not expected to cause any significant issues.

    - However, shallow bedrock identified as weathered to intact strong or very strong laminated LIMESTONE will require excavation within the northern section of the pipeline route near Lisglennon, in the Belleek Castle area, Creggs Road and east / southeast of Creggs Road, Windy Gap and towards Lough Talt WTP.

    - Bedrock described as intact strong or very strong LIMESTONE was recorded and will be difficult to excavate with heavy plant.

The following construction recommendations will be implemented:

- Sheetpiles and trench box techniques will be installed to stabilise the trench walls.

- Shallow soft material will be excavated and replaced with suitable material using traditional open cut and replace methodologies. However deeper soft deposits will require further consideration to safely engineer any risks associated with excavating and constructing in deep soft ground.

- De-watering by means of submersible pumps installed below trench invert level will be implemented.

- Ground investigation indicates that competent rock may occur at relatively shallow depth along parts of the alignment, which may restrict the depth of conventional open cut excavation and require directional drilling, breaking and rock removal methods. In these conditions, trench excavation for the pipeline would typically be undertaken down to formation level at or immediately above the rock surface. A suitable engineered bedding layer would be placed to provide uniform support and excavated material would be replaced with engineered fill as per specified.

## 8.5 Construction, Testing and Commissioning

The construction methodology for Treated Water Pipelines B, C, D and E has been developed based on the current stage of design and the supporting technical assessments. The final construction methodology, phasing, temporary works arrangements and crossing techniques will be confirmed by the Appointed Contractor during detailed design and construction planning. Any refinements will remain within the planning application design parameters and will be implemented in accordance with the Construction Environmental Management Plan, Traffic Management Plan, Construction Resource and Waste Management Plan and other relevant construction management plans.

Pipeline construction will be undertaken progressively in discrete sections along the route corridor. Multiple sections may be constructed concurrently, subject to programme requirements, traffic management arrangements, environmental constraints, land access and construction logistics. The works may therefore be phased and will not necessarily proceed sequentially from one end of the route to the other.

Temporary working areas and site compounds will be established to support the works. The pipeline route will predominantly follow existing public roads, with sections in private lands where required. Traffic management measures may include stop/go systems, temporary traffic signals, lane closures, short-duration road closures and signed diversions, as agreed with the relevant roads authority.

The proposed development will include indicative site compounds at Wherrew RWI&PS, Lisglennon RWS&PS and Lisglennon WTP, Bonniconlon BPS, Windy Gap BPT, Lough Talt Reservoir and Bonniconlon Reservoir. One further site compound has been identified on the R314, adjacent to Laughtadawannagh. These will be to support construction at these sites and along the pipeline route, as well as for storage of construction materials along with stockpiling of spoil. Temporary Working Areas within sites such as Lisglennon WTP will also be utilised as compound areas for equipment and materials storage as well as installation of temporary office and welfare facilities during construction of pipelines.

Where the pipeline is installed within private lands, the typical construction working width will generally be approximately 20m, unless otherwise agreed with the relevant landowner or reduced locally in response to environmental, cultural heritage, access, topographical or constructability constraints.

Before construction commences, the Appointed Contractor will undertake pre-construction surveys and confirmatory investigations to verify ground conditions, buried services, existing drainage, watercourse crossing locations, road constraints, access arrangements, ecological constraints, invasive species constraints and cultural heritage constraints.. Existing utilities and services will be identified, protected, diverted or supported as required in agreement with the utility/service providers.

Where works have the potential to affect access to private lands, dwellings, farms, businesses or community facilities, access arrangements will be agreed in advance with affected landowners and occupiers. Construction activities will be managed to minimise disruption where practicable, with advance notification provided in accordance with the project communication procedures.

The pipeline will primarily be installed using conventional open-cut techniques. Trenchless techniques will be used where required to avoid or minimise disturbance to sensitive watercourses, existing infrastructure, constrained locations or other environmental or engineering constraints. Final crossing methodologies will be confirmed by the Appointed Contractor following confirmatory surveys and will remain within the assessed design parameters.

The start of Pipeline B and the majority of Pipeline A will be installed in parallel within the same trench between the treated water storage reservoir at Lisglennon WTP and the site access to Lisglennon RWS&PS on the L11109. This approach will reduce the extent of excavation and minimise repeated disturbance within this section of the route corridor.

Excavated material will be managed in accordance with the Construction Resource and Waste Management Plan. Suitable excavated material will be reused as trench backfill above the pipe surround where practicable, subject to geotechnical suitability and environmental testing. Surplus or unsuitable material will be removed from the working area and managed in accordance with the Construction Resource and Waste Management Plan.

Existing field drains, roadside drains and agricultural drainage systems that intersect the construction working width will be surveyed and recorded before works commence. Existing drainage will be maintained during construction through temporary diversions, temporary culverting or other suitable measures. Drains affected by the works will be reinstated following pipe installation to maintain existing drainage function, unless otherwise agreed with the relevant landowner and drainage authority. Where required, pre-construction field drainage measures will be installed to maintain existing drainage patterns during construction.

Following installation, pressure testing, disinfection, flushing and commissioning of the treated water pipelines will be undertaken in accordance with Uisce Éireann requirements and relevant operational procedures. Water generated during testing, flushing or disinfection activities will be managed in accordance with the Construction Environmental

Management Plan and the project scour management proposals. Discharge locations, rates and controls will be confirmed prior to commissioning and will be subject to appropriate environmental protection measures.

On completion of pipeline installation and commissioning, trenches will be backfilled. Public roads, private tracks, agricultural lands, field boundaries, drains, verges, hedgerows and other affected features will be reinstated, as appropriate, in accordance with the Construction Environmental Management Plan, landowner agreements, road opening licence requirements, tree protection measures and the project landscape and biodiversity proposals. Temporary working areas, compounds, temporary access tracks and redundant temporary works will be removed.

Where the proposed pipeline route is laid in areas where peat is present, an appropriate trench reinstatement approach will be developed, which may include a proprietary trench support system and careful groundwater management. The trench build-up will depend on the soil strata and will be confirmed during final design by the Contractor. It is envisaged that the trench will be backfilled with imported granular fill material and carefully compacted to avoid punching into the existing strata. Once backfilled, road surface reinstatement in these sections will be completed in accordance with the requirements of the relevant roads authority. Road surfaces will be protected using road plates or bog mats, where required. All works in peat will be managed in accordance with the Construction Environmental Management Plan and other relevant construction management plans.

The general construction techniques and the construction is described in Chapter 3 (Project Description) of the EIAR.

#### 8.5.1.1 Open-Cut techniques

Open-cut installation will be the primary construction technique for the treated water pipelines, except where trenchless techniques are required due to environmental, engineering, traffic, access or constructability constraints. Open-cut installation will generally involve excavation of a trench, placement of pipe bedding, installation and jointing of the pipe, placement of pipe surround material, backfilling and reinstatement.

Based on the current design and ground investigation information, for single pipelaying, trench widths are anticipated to be in the range of 1 to 1.5 m along much of the route and trench depths are anticipated to be approximately in the range of 2m to 4 m for the majority with a few locations up to 6 m deep. However, the depths will vary locally depending on pipe diameter, existing ground levels, required cover, road construction, ground conditions, existing services, watercourse / culvert crossings and hydraulic design requirements.

Marker tape, tracer wire, marker posts, valves, fittings, chambers, air valves, scour arrangements and other ancillary pipeline infrastructure will be installed as required.

Where open-cut installation is used to cross minor field drains or low-sensitivity drainage features, flows will be maintained using temporary over-pumping, temporary fluming, damming and pumping, temporary culverting or other suitable measures. Sediment prevention and pollution control measures will be implemented in accordance with the CEMP. Affected drains will be reinstated following pipeline installation to maintain existing drainage function.

#### 8.5.1.2 Trenchless Methods

Trenchless installation techniques will be used where required to avoid or minimise disturbance to sensitive watercourses, existing infrastructure, roads, embankments, constrained locations or other environmental or engineering constraints. The selection of the final trenchless technique will be confirmed by the Appointed Contractor based on ground conditions, crossing length, alignment, depth, available working area, environmental sensitivity and constructability. Trenchless techniques may include horizontal directional drilling (HDD), pipe jacking, auger boring, pipe ramming or other equivalent methods.

For trenchless crossings, launch and reception pits will be established outside the watercourse channel and outside sensitive riparian areas where practicable. The pipeline or casing will then be installed beneath the obstacle without open excavation through the watercourse bed. The final locations and dimensions of launch and reception pits will be

confirmed during detailed design and will remain within the assessed development footprint and environmental assessment envelope.

#### 8.5.1.3 Surface Water Feature / Watercourse Crossings

There are approx. 30 surface water feature crossings which have been identified along the pipeline route, comprising of approx. 18 EPA-identified watercourses and 12 field drains. These are described in Chapter 7 - Biodiversity and Chapter 10 – Water and Hydrology within Volume 2 of the EIAR. The locations of these surface water features were validated during site surveys and site investigations and assessed for ecological potential. Where a risk of impact to the watercourse (e.g. aquatic life or habitats) has been identified, the watercourse will be crossed using trenchless techniques, such as pipe jacking or directional drilling, or via existing crossing infrastructure.

There are no works proposed within or under the River Moy, instead the Proposed Development will tie-in to an existing 450 mm diameter pipeline crossing the River Moy.

The Glenree/Brusna River will be crossed via trenchless techniques, most likely Horizontal Directional Drilling (HDD).

For other small order watercourses, the trenchless technique ‘pipe jacking’ is a preferred methodology for crossing subject to geotechnical considerations. Open cut methodology is the preferred option for crossing field drains, many of which were observed as dry.

#### 8.5.1.4 Belleek Castle and Woodland

Belleek Castle and Woodland is a site of cultural heritage value set within an extensive woodland estate. In this location, the proposed pipeline route corridor follows an existing private track through the grounds to minimise interaction with mature trees, woodland habitat, built heritage features and estate infrastructure.

Construction works through Belleek Castle and Woodland will be planned and managed in accordance a the Tree Protection Plan, together with the CEMP and any site-specific ecological and arboricultural requirements. Works in this area will be supervised by a suitably qualified ECoW and/or arborist. The objective will be to maintain the pipeline within the defined working corridor, minimise disturbance to retained trees and woodland habitat, and avoid unnecessary encroachment into Root Protection Areas.

The limits of the working area will be clearly demarcated prior to construction. Temporary protective fencing, ground protection or other physical demarcation measures will be installed where required to define the construction corridor, protect retained trees and Root Protection Areas, and control the movement of plant, materials and personnel. Construction traffic will be directed along the existing track or other agreed access routes, insofar as practicable.

Excavated material and construction materials, including pipe sections, will not be stored within Root Protection Areas. Where excavation arisings are generated within the woodland area, they will be removed from sensitive areas as soon as practicable and transferred to an appropriate designated holding or stockpile area outside Root Protection Areas, subject to the requirements of the CEMP and the CRWMP.

The pipeline alignment has been developed to reduce the potential for interaction with tree root systems. However, localised areas have been identified where trenching works may encounter roots associated with retained trees. Where works are required in proximity to retained trees, excavation will be undertaken using low-impact techniques, such as hand excavation or vacuum excavation, where required by the Tree Protection Plan or arboricultural supervision. Where roots are encountered, works will be undertaken in accordance with arboricultural guidance to avoid unnecessary severance or damage. Root barrier membrane may be installed where required to protect retained roots and prevent future conflict between root systems and the installed pipeline.

Plant selection and construction methods will be adapted to the sensitivity of the woodland setting. Smaller plant and low-ground-pressure equipment will be used where practicable within constrained or sensitive areas. Where heavier

plant is unavoidable, appropriate ground protection measures will be implemented to reduce the risk of soil compaction within or adjacent to Root Protection Areas. Where compaction risk or localised compaction is identified, remedial measures such as soil aeration will be undertaken in accordance with arboricultural advice.

On completion of pipeline installation, disturbed areas within Belleek Castle and Woodland will be reinstated in accordance with the Tree Protection Plan, CEMP, landowner requirements and the landscaping and biodiversity proposals included in the EIAR.

## 8.6 Operation and Maintenance

Following commissioning, Pipelines B, C, D and E will operate as treated water transfer mains within the integrated regional supply system. As treated water pipelines, they are expected to operate for long periods with limited routine maintenance requirements. Regular cleaning is not anticipated under normal operation, as the pipeline convey treated water.

Routine operation and maintenance will primarily relate to inspection, exercising and maintenance of associated fittings and chambers, including line valves, air valves, scour valves, washout hydrants, hydrants, flowmeters, pressure control arrangements, marker posts and telemetry interfaces. These assets will support safe isolation, air management, controlled filling and emptying, pressure management, flow monitoring and emergency response.

Where planned maintenance or repair requires a section of pipeline to be taken out of service, partial draindown may be required. Such events are expected to be infrequent and will be planned in advance to minimise disruption to water supply, traffic, landowners and the surrounding environment. Any draindown, flushing or discharge activities will be managed in accordance with the scour management proposals and Uisce Éireann operational procedures.

Sluice valves along the pipelines will allow discrete sections to be isolated, reducing the need to drain the full pipeline length during planned maintenance, inspection or repair. The isolation lengths will vary along the route, reflecting the hydraulic profile, valve spacing, access arrangements and operational requirements.

Access for maintenance will generally be via public roads, private tracks, operational sites and agreed wayleaves. Maintenance activities within private lands will be undertaken in accordance with land access agreements, wayleave provisions and Uisce Éireann operational procedures. Intrusive maintenance works will be planned to manage traffic, environmental, landowner, health and safety and water quality requirements.

# 9. Bonniconlon Booster Pumping Station (BPS)

## 9.1 Purpose

The proposed Bonniconlon BPS is required to supply the maximum future demand for the Ballina and Lough Talt Regional Water Supply Area. The BPS will provide the necessary head to convey design flows from Lisgennon WTP to Lough Talt WTP. The Bonniconlon BPS will receive treated water from the Lisglennon WTP via gravity and pump it over a local high point to the proposed Windy Gap Break Pressure Tank.

## 9.2 Existing Site

The proposed Bonniconlon BPS site is located 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 kilometres 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. This site emerged as the preferred option from the site selection assessment carried out as per UÉ's guidance note "IW-AD-PD-GL-008 A guide to route and site selection".

## 9.3 Proposed Development

A site layout of the proposed Bonniconlon BPS is shown in Figure 9-1 below.

The proposed Bonniconlon BPS will consist of:

- A new 320 kW booster pumping station, with pumping area, control room, welfare facilities, with roof mounted solar panels;
- ESB substation, with security fencing and gate;
- A new permanent standby generator;
- 2no. surge vessels;
- Installation of new flowmeter and associated works;
- Ancillary site development works, including a new access off the L5135, hardstanding, stormwater management, wastewater management, site security including fencing and gates, landscaping and biodiversity enhancement works.

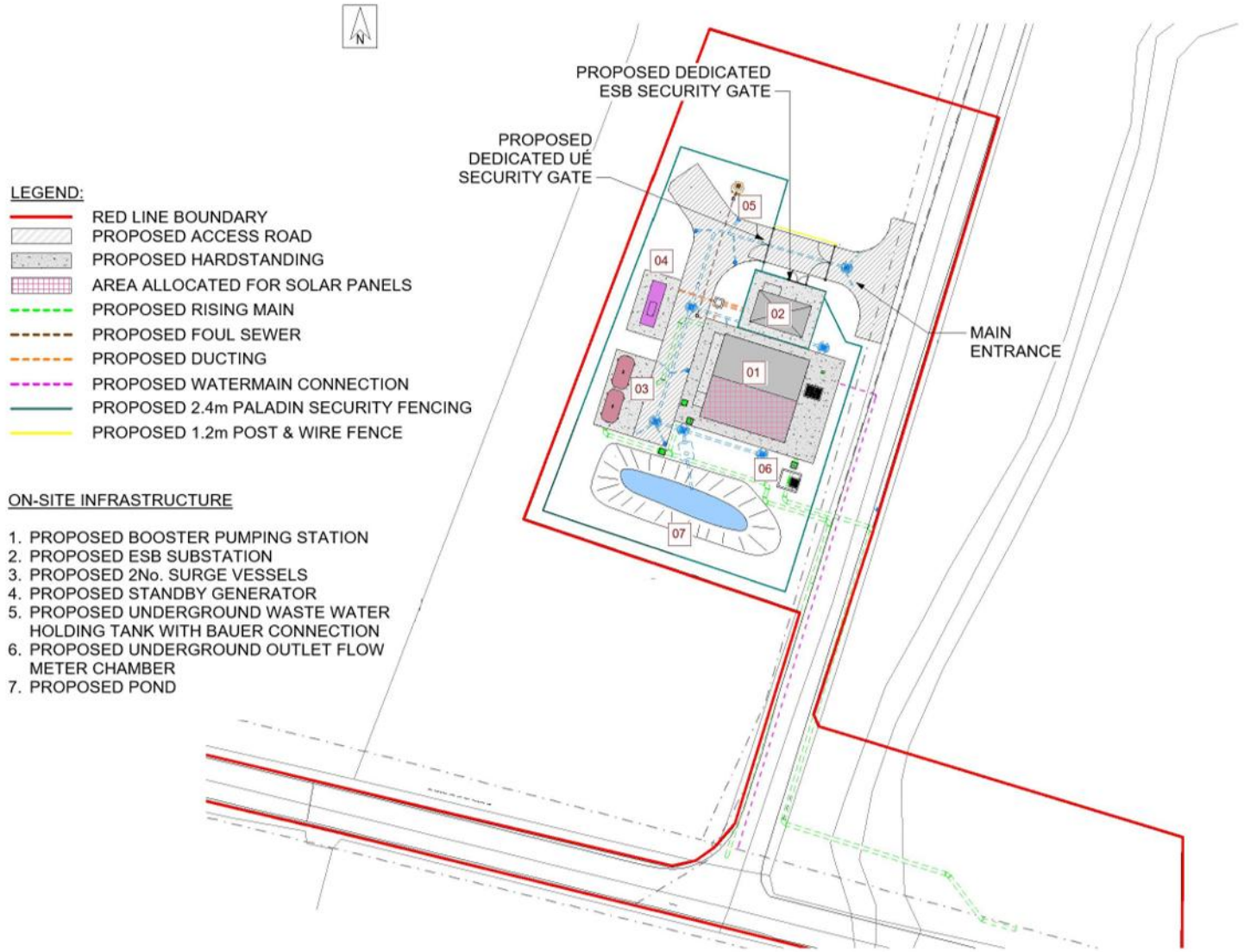



**Figure 9-1 – Proposed Development – Bonniconlon BPS**

## 9.4 Design

### 9.4.1 Basis of Design

The Table 9-1 below provides key design information for the Bonniconlon BPS.

**Table 9-1 – Bonniconlon BPS Basis of Design**

| Description | Unit | Value |
|---|---|---|
| **Flow per day** | Ml/d | 10 |
| **Operating hours per day** | h | 22 |
| **Design Flow** | l/s | 126 |
| **Static head** | m | 161.2 |
| **Differential head** | m | 165.5 |
| **Maximum surge pressure** | m | 250.0 |
| **Operating configuration** | | D/A/S/S |

### 9.4.2 Booster Pumping Station Building

The single storey Bonniconlon Booster Pumping Station building will be designed to accommodate the key operational and support functions required for the pumping station.

The building includes:

- Four pump bays
- Control room
- Welfare facilities (toilet and washbasin)
- Internal loading/set-down area

### 9.4.3 Mechanical, Electrical and Control Systems

The control system will periodically top-up the proposed Windy Gap Break Pressure Tank (BPT). If the Windy Gap BPT's level sensor registers a full level, the pumps at Bonniconlon BPS will stop. If the Windy Gap BPT level sensor registers a low level, the pumps at Bonniconlon BPS will start.

The BPS will be equipped with a telemetry in/outstation which can receive signals relating to control functions, as well as broadcast data to the SCADA system.

A new SCADA system will be provided for the Lough Talt RWSS to replace the existing Lough Talt WTP SCADA. The SCADA system will include a representation of the Lisglennon WTP (view only) and full control functions and representations for the Bonniconlon BPS, Windy Gap BPT, and Lough Talt WTP.

A local mimic of the system will be present at the Bonniconlon BPS.

The BPS will actively monitor, record and transmit telemetry data via to the new Lough Talt RWSS SCADA System.

### 9.4.4 Surge Vessels

Surge protection measures will be provided on both the inlet and outlet sides of the pumping station. On the inlet side, the surge protection system will help maintain stable operating conditions within the pipeline and prevent sudden pressure changes from affecting the wider water supply network.

On the outlet side, surge protection equipment will control pressure fluctuations that may occur during events such as a pump shutdown or power outage. This will protect the pipeline infrastructure, improve operational reliability, and help ensure a consistent and secure water supply to customers.

### 9.4.5 Power Supply & Renewables

An ESB MV substation will provide a dedicated feed for the Bonniconlon BPS. A substation and a transformer of 400kVA will provide sufficient power to the Bonniconlon BPS. The Substation will be constructed and installed in accordance with ESB standards.

The Bonniconlon Booster Pumping Station is critical infrastructure for potable water supply to the Lough Talt RWSS. As such, a back-up power supply, in the form of a permanent standby diesel generator, will be provided to prevent the interruption of potable water supply to the Lough Talt RWSS during power outages.

The backup power supply will be sized to keep 2 pumps operational and maintain the full 10MLD supply. A 400 kVA generator is will be provided, to align with the proposed substation size for the BPS. The proposed generator has a built-in fuel storage tank capable of powering the generator for 6 hours.

Roof mounted solar panels will be installed on the BPS building, which will be used to supplement the power requirements of the BPS. Refer to Section 13.1 for details on renewable energy design.

### 9.4.6 Ancillary Works

#### 9.4.6.1 Access

Access and egress to the Bonniconlon BPS site will be through a proposed access road off the L5135 local road. The proposed main entrance will be situated approximately 100 m North off the R294 onto the L5135, in accordance with the Mayo County Development Plan 2022-2028.

The ESB substation will have its own dedicated entrance gate and access for ESB personnel. The main entrance of the BPS is shared with ESB personnel. The rest of the site will be accessed by authorised personnel only.

#### 9.4.6.2 Fencing / Boundary

A 2.4 m high paladin security fencing and security gates will be provided around the operational area. There will be a dedicated 2.4 m high paladin fencing and security gate for ESB substation. A short section of 1.2 m high post and wire mesh fence will be provided along the shared access road.

The entire site will be bound by hedgerows with trees and woodland mix.

#### 9.4.6.1 Stormwater Management

The proposed storm water management system will consist of a conventional system of gullies and drains along the access road. Stormwater run-off from buildings, hardstanding and roads, will be collected by this new storm water network, conveyed by the proposed storm water pipe network to a petrol interceptor before draining into a proposed pond located at the southern boundary of the Bonniconlon BPS site.

#### 9.4.6.2 Wastewater Management

Wastewater from welfare facilities will be collected by proposed wastewater network within site, into an underground wastewater holding tank, tankered away periodically and disposed off site to an appropriate treatment facility. The site will not require operative personnel on a daily basis and hence the wastewater generated will be minimal.

#### 9.4.6.3 Potable Water Supply

A potable water connection for the BPS site's water supply will be taken from the existing 100mm diameter watermain along the R294 road.

#### 9.4.6.4 Site Lighting

Low level bollards type lighting will be provided along the access road and paths to allow for a safe access to site. Centrally located Wall mounted luminaires will be provided at substation and Pumping station building.

#### 9.4.6.5 Landscaping

The proposed site is situated in an agricultural grassland area and will require minimal plant removal. The site has no record of invasive species and may require some removal of hedgerow within the roadside verge for the new access road and sightlines.

The site is located along a designated scenic route in the Mayo County Development Plan and will therefore be screened from view of the road and neighbouring properties.

Proposed landscape includes planting and seeding of the following:

- Wet grassland mix in the pond area.
- Woodland mix for screening to the north of the site.
- 5m strip of Woodland mix Screen planting to the south of the site.
- Hedgerow mix with standard trees (approx. 5 to 10 m spacing) to line the perimeter of the site to the south, east and west.

Evergreen trees and/or shrubs native to the area will be instated as a hedgerow between the road and site boundary fence to screen off the site infrastructure. The hedgerow will be allowed to rewild and grow unrestricted to provide biodiversity enhancement to the agricultural grassland site in line with UÉ policy of biodiversity net gain.

### 9.4.7 Geotechnical Considerations

Due to access constraints, the proposed ground investigation for this site could not be completed. As a result assumptions have been made regarding the ground conditions based on the desk study information, and the engineers logs for the slit trenches which were completed along the R294 road and are the nearest to the site. To confirm the ground conditions and any potential risks associated with the site, boreholes and trial pits will be undertaken when access to the site has been granted.

Draft engineers logs are available for ST-WM91 and ST-WM92 which are located nearest to the proposed works, south of the proposed site.

Key risks are listed below:

- Side walls collapsing inward where open excavations are unsupported in soft or loose material.
- Cobbles were recorded in both ST-WM91 and ST-WM92 which could affect the excavation.

The following construction recommendations will be implemented:

- Trench boxes will be installed to support the walls of the open excavation and to mitigate the risk of loose granular material unravelling and falling into an open excavation.

## 9.5 Construction, Testing and Commissioning

Construction of the Bonniconlon Booster Pumping Station will be undertaken using standard civil, mechanical and electrical engineering techniques appropriate to a new greenfield water infrastructure site.

The works will include site clearance, earthworks, construction of foundations and structural elements for the pumping station building, ESB substation and associated infrastructure, installation of surge vessels, pipework, valves and mechanical equipment, and completion of electrical, control and telemetry systems.

Temporary working areas and construction compounds will be established to facilitate plant movement, material storage and construction activities. Construction access will be provided via the proposed site entrance off the L5135, with appropriate traffic management measures implemented to ensure safety for road users and the construction workforce.

Construction activities will also include installation of drainage, hardstanding, wastewater holding facilities, security fencing, access roads and landscaping works..

All construction works will be undertaken in accordance with the Construction Environmental Management Plan (CEMP) and relevant environmental and safety controls, including measures to manage surface water runoff, dust, noise, and protection of the surrounding environment.

The general construction techniques and the construction is described in Chapter 3 (Project Description) of the EIAR.

Testing and commissioning of the Bonniconlon Booster Pumping Station will be undertaken in a controlled and phased manner to demonstrate that all mechanical, electrical, instrumentation, control and ancillary systems operate in accordance with the design intent.

The testing phase will include inspection and verification of installed equipment, pressure testing of pipework, functional testing of valves and surge vessels, and electrical testing of power supply systems, standby generation and control panels. Instrumentation, including flow, pressure and energy monitoring devices, will be calibrated to ensure accurate and reliable operation.

Commissioning will involve staged operation of the pumping station, including individual pump testing, duty/assist changeover, and validation of the control philosophy linked to the downstream Windy Gap Break Pressure Tank. Integration with the telemetry and SCADA system will be verified to confirm reliable communication, monitoring and control across the wider network.

Final commissioning will be coordinated with the completion of upstream and downstream infrastructure, including the Lisglennon WTP and Windy Gap BPT, to ensure that the overall system is tested under representative operational conditions prior to full service operation.

## 9.6 Operation and Maintenance

The Proposed Bonniconlon BPS will operate for 22 hours per day. The BPS is designed to be operated with minimal operator input. The controlled start up and running of the plant will be fully automatic.

The BPS will be operated as a critical transfer asset within the regional water supply network, ensuring reliable conveyance of flows from the upstream treatment works to the downstream system. Operation will be automated through a control system that will manage the automated rotation of the pump duty, assist, and standby arrangement.

The integration of surge vessels will be actively managed to mitigate transient pressures and safeguard the pipeline system.

Routine inspection and preventative maintenance will be implemented in accordance with Uisce Éireann's standard operating procedures for all mechanical and electrical components, including pumps, valves, surge vessels, generator, and electrical systems, with particular emphasis on maintaining standby equipment readiness.

The ESB substation and backup generator will be regularly tested to ensure continuity of supply in the event of power failure, while the solar PV system will be monitored to optimise energy efficiency.

Site security, lighting, and access arrangements will be maintained to ensure safe and controlled operation.

Operational staff will be trained in both normal and emergency procedures, including response to pump failure, power outages, and system alarms. Comprehensive records of operation, maintenance, and performance will be maintained to support asset management, regulatory compliance, and long-term optimisation of the pumping station.

# 10. Windy Gap Break Pressure Tank (BPT)

## 10.1 Purpose

The proposed Windy Gap BPT is required to provide operational and transient suppression benefits (i.e. to regulate water pressure) and serve as a storage tank for the Lough Talt network. Water pressure regulation prevents surges which can result in damage to the network (e.g. a burst pipeline) by creating a hydraulic break between pumped water and conveyance under gravity. The location is driven by the hydraulic requirement to be located at or beyond the highest point of the pumped section of the treated water pipeline

## 10.2 Existing Site

The site is located in a remote upland area near the Windy Gap along the access road to the windy farm in Bonniconlon East. The site is approximately 260 m from the regional road R294, with access provided by the existing access road. The wider area is rural in nature, comprising of 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 south of the site along the Mayo and Sligo border. This site emerged as the preferred option from the site selection assessment carried out as per UÉ's guidance note "IW-AD-PD-GL-008 A guide to route and site selection".

## 10.3 Proposed Development

The proposed site layout is shown in Figure 10-1 below. The proposed Windy Gap Break Pressure Tank (BPT) will consist of:

- 1no. underground Break Pressure Tank
- The construction of 1no. scour line extraction kiosk and 1no. control kiosk, and all ancillary infrastructure;
- Inlet pipe (Pipeline D), outlet pipe (Pipeline E), overflow pipe, scour line and associated works
- A new Precast Cement Concrete inspection/collection chamber approx. 900 mm diameter, flow meter chamber, valve chambers and associated works
- Ancillary site development works, including an extension to the existing layby, drainage, security fencing and gate, and landscaping.

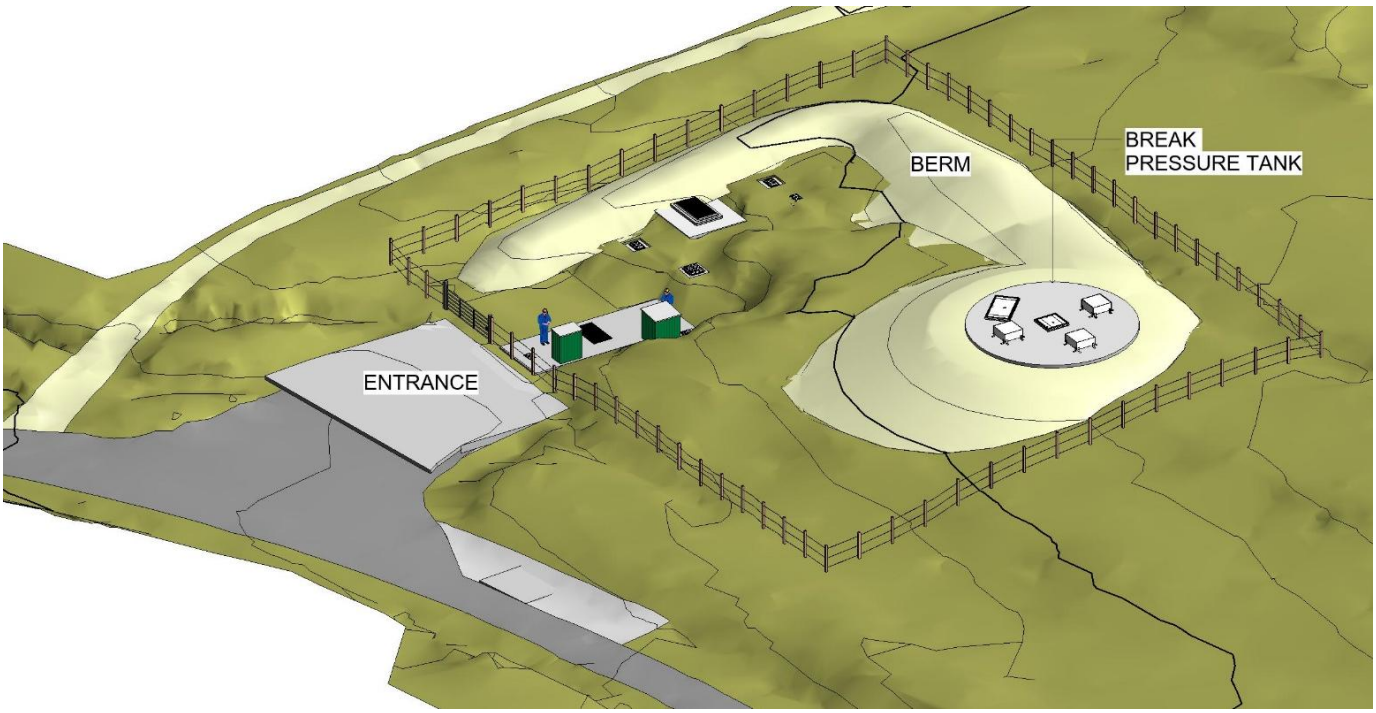



**Figure 10-1 – Proposed Development – Windy Gap BPT**

# 10.4 Design

The proposed BPT will comprise a fully below-ground structure with a minimum working volume of 80 m³. The tank floor level will be set at 199.4 mOD, with a minimum top water level of 201.2 mOD. Given the high landscape sensitivity of the receiving environment, the structure has been designed to minimise visual impact through below-ground construction, use of excavated material for reinstatement where suitable, and the formation of a gradual embankment using infill material around the tank. The BPT will include a scour chamber and high-level overflow arrangement, both discharging to the outlet pipe.

## 10.4.1 Basis of Design

The key design parameters of the break pressure tank are shown in Table 10-1 below.

**Table 10-1 – Break Pressure Tank - Design Criteria**

| Parameters | Approx. Value |
|---|---|
| **Total Volume ($m^3$)** | 165 |
| **Minimum Working Volume ($m^3$)** | 80 |
| **Total Depth (including freeboard) (m)** | 2.3 |
| **Water Depth (m)** | 1.8 |
| **Total Area ($m^2$)** | 44.2 |
| **Diameter (m)** | 7.5 |

### 10.4.2 Habitat-specific design considerations

The proposed BPT is located in bogland. Bog is acidic, therefore proposed mitigation measures include using specific concrete mix that is robust to construction. To manage and monitor any leaks, an impermeable membrane will be installed within the pipe surround / pipe bedding, within the trenches of all underground pipelines within the site. A geomembrane or liner wrapped approx. 80 mm diameter perforated drains will be installed within the pipe surround / pipe bedding to collect any leaks from the underground treated water pipelines. These perforated drains will collect any leaks and convey into a 900 mm diameter Precast Cement Concrete inspection/collection chamber. The operations personnel will inspect the chamber periodically for any leaks and any collected treated water will be disposed of appropriately.

The BPT will be a precast concrete tank and will be installed by standard methods. The BPT will have appropriate protective / resistant coatings suitable for the bog ground.

### 10.4.3 Mechanical, Electrical and Control Systems

The BPT site will have a control kiosk and the following instrumentation will be provided :

a Level sensor – to provide real time level data on the reservoir and serve as a primary control function Bonniconlon BPS to maintain a constant water level in the tank.

b Level switch – to provide a secondary, hardwired control function to stop the Bonniconlon BPS in the event that the tank is full and the primary control function has failed to stop the pumps.

c Flowmeter on tank outlet – to provide flow data for flow balancing purposes, such as leak detection.

d Chlorine monitoring – to provide free chlorine residual data.

The data will be broadcast back to the Bonniconlon BPS and the Lough Talt WSZ SCADA via telemetry.

### 10.4.4 Power Supply / Renewable Energy

A new ESB connection will be provided at this site to power instruments, telemetry outstation and site lighting. Given the visual and ecological sensitivity of the area, renewable energy will not be provided at this site. An ESB application has been submitted for the site.

### 10.4.5 Ancillary Works

#### 10.4.5.1 Access

Access to the site will be via an existing access road / commonage off the regional road R294 which leads to the Bunneyconnellan Wind Farm, south of the proposed BPT. The distance between the site and the regional road R294 is approximately 260 m. The existing access road will not require upgrading. An existing lay-by located in front of the site will be upgraded using asphalt to accommodate vehicles during construction, operation and maintenance.

#### 10.4.5.2 Fencing / Boundary

Minimum physical site security will be provided due to the sensitive landscape. A 1.2 m high stock fence and a pedestrian gate will be provided in accordance with TEC-600-01 to keep livestock from entering the site. A farm gate is proposed at the entrance to the site. There will be no security fencing.

#### 10.4.5.3 Stormwater Management

The bog habitat at this site is groundwater-dependent and, to a lesser extent, reliant on rainfall. No site drainage is proposed, allowing rainfall to continue infiltrating the ground as occurs at present. Runoff from impermeable surfaces, i.e. the reservoir tank roof, hardstanding areas, roof of kiosks, will be minimal and can dissipate into the surrounding peat.. The BPT will be a precast concrete tank. To manage tank roof runoff and ensure it is directed into the surrounding peat rather than flowing down the tank sides, an impermeable membrane will be installed around the tank at an approximate depth of 500 mm below ground level. This will be overlain by an approx. 50 mm layer of sand, followed by an approx. 450 mm layer of salvaged peat. Rainfall within the Windy Gap BPT site will continue to infiltrate and drain into the bog habitat, as occurs under existing conditions.

#### 10.4.5.4 Site Lighting

Low level bollard will be provided on the plinth to allow for a safe access to kiosks. Internal ceiling mounted luminaire will be provided in the kiosk.

#### 10.4.5.5 Landscaping

Given the high landscape sensitivity of the area, the proposed BPT will be entirely below ground with a gradual embankment built up around the tank. Excavated materials will be salvaged for re-instatement in order to offset potential visual and ecological constraints. Every effort will be made to create berm screening from bog material excavated from the site.

### 10.4.6 Geotechnical Considerations

Draft engineers logs are available for BH-R1, TP-R02 and TP-R03 which are located nearest to the proposed works.

Key risks likely to be encountered during construction are listed below:

- Side walls collapsing inward where open excavations are unsupported in soft or loose material.
- Cobbles and boulders were recorded in all exploratory holes which could affect excavation.
- Large boulders (199.2m OD in BHR1) or shallow bedrock (199.8m OD in BHR2) encountered above the formation level.

The following construction recommendations will be implemented:

- Spongy low bearing peat will be removed when excavating to a design formation level and therefore no issues with soft ground are identified. However, the depth of peat may vary across the site and is still considered a risk.

- Trench boxes or sheet piling will be installed to support the walls of the open excavation and to mitigate the risk of loose granular material unravelling and falling into an open excavation.

- In the event that shallow groundwater ingress is encountered during construction, it will be controlled by excavation of a sump and installation of a water pump.

## 10.5 Construction, Testing and Commissioning

Construction within the bog habitat will be undertaken using appropriate low-impact methods. Bog mats, temporary ground protection and low-ground-pressure plant will be used where practicable to reduce rutting, compaction and disturbance. Fuels, oils, cementitious materials, concrete washout, chemicals and other potentially polluting materials will be managed in accordance with the pollution prevention measures set out in the CEMP. Concrete washout will not be permitted on unprotected ground.

Initial works will include site set-up, installation of temporary ground protection, demarcation of the construction footprint and implementation of ecological and pollution prevention controls. Plant movements, material storage and temporary works will be confined to designated working areas to minimise disturbance to the surrounding bog habitat.

Peat and underlying mineral soils will be stripped and stored separately within designated areas. Peat turves and surface vegetation will be lifted intact where practicable and retained for reinstatement. Peat will be stored to maintain moisture content and preserve its suitability for reuse. Suitable excavated material, including peat and mineral soils, will be reused on site where practicable for backfilling, grading, formation of the landscaped embankment and habitat reinstatement. Surplus or unsuitable material will be managed in accordance with the Construction Resource and Waste Management Plan and removed to an appropriately authorised facility where required.

The BPT will comprise a below-ground precast concrete structure or equivalent tank system suitable for the ground conditions, hydraulic requirements and operational function of the site. The inlet, outlet, overflow and scour pipework will be installed in excavated trenches between the BPT and the site boundary / connection points. Trenches will be backfilled using suitable material and reinstated to avoid creating preferential drainage pathways through the bog. Impermeable wraps or equivalent hydraulic control measures will be installed where required to maintain existing hydrological conditions and prevent preferential flow paths along pipe trenches. Flowmeter chambers, valve chambers, the inspection / collection chamber and associated ducting will be installed in parallel with the pipework works.

Site-specific ecological supervision will be provided where required by the CEMP and biodiversity mitigation measures. A suitably qualified Ecological Clerk of Works will oversee sensitive works, including peat stripping, habitat protection, reinstatement and any works with potential to affect bog hydrology or ecological receptors. The Appointed Contractor will implement measures to prevent sediment runoff, uncontrolled drainage, fuel or chemical spillages and damage to retained bog habitat.

The general construction techniques and the construction is described in Chapter 3 (Project Description) of the EIAR.

Following completion of the structural, pipework, kiosk, power and telemetry works, the BPT and associated infrastructure will be tested and commissioned. Commissioning will include hydraulic testing, pressure testing where applicable, verification of flowmeter and valve operation, telemetry and alarm testing, testing of scour extraction arrangements and confirmation that the BPT can operate as part of the treated water transfer system between Bonniconlon BPS and Lough Talt WTP.

On completion of construction and commissioning, temporary working areas will be removed and disturbed areas will be reinstated. Salvaged peat turves and peat will be reinstated, where practicable, to match surrounding levels and support natural recolonisation by bog vegetation. Reinstated peat surfaces will be lightly consolidated and wetted where required to support vegetation recovery.

## 10.6 Operation and Maintenance

Operation of the BPT will be largely passive, with monitoring provided through flow, level and pressure instrumentation connected to the site control and telemetry systems. The control and telemetry systems will support remote monitoring of tank levels, flow rates, valve status, alarms and abnormal operating conditions. The BPT will form part of the wider treated water network control strategy and will support continuity of supply to the Lough Talt supply area.

Routine operation and maintenance will include operator attendance, visual inspections, functional checks and planned preventative maintenance of the BPT, inlet and outlet pipework, overflow and scour arrangements, flowmeter chamber, valve chambers, inspection / collection chamber, scour extraction kiosk, control kiosk, telemetry equipment, power supply, fencing, access arrangements and hardstanding.

Given the bog habitat setting, operational maintenance will also include inspection of reinstated peat surfaces, local ground conditions, access arrangements and any areas where settlement, erosion, rutting, compaction, ponding or preferential drainage could occur. Any remedial works will be undertaken in a manner that maintains the surrounding bog hydrology and avoids unnecessary disturbance to retained peat and vegetation.

# 11. Lough Talt Water Treatment Plant

## 11.1 Purpose

Based on UÉ GIS records, there is approximately 8,400m$^3$ storage volume currently in the Lough Talt network. It is estimated that the additional storage volume required to ensure supply at offtakes downstream of Lough Talt WTP up to the existing storage tank at Castleoye is 3,700m$^3$.

The existing Lough Talt WTP will be decommissioned following construction of the new trunk main, and the site will be repurposed to house the new treated water storage tank. The existing 330m$^3$ chlorine contact tank will be repurposed and reused as storage tank and a new tank storage tank with a volume capacity of 3,290m$^3$ will be provided. The remaining 80m$^3$ storage will be provided at the Windy Gap BPT.

The existing chlorination and ammonia dosing facilities at the Lough Talt WTP site will be retained. These moderate the chlorine residual received from Lisglennon and stabilise chloramination.

Orthophosphate dosing is currently being performed as a corrosion inhibitor to mitigate against metal residual exceedances in the Lough Talt RWSS. The existing orthophosphate dosing system, treated water pH correction system and chemical plant building will be retained at Lough Talt WTP.

## 11.2 Existing Site

The existing Lough Talt Water Treatment Plant (WTP) is located in a rural upland setting in Co. Sligo, adjacent to Lough Talt, and currently operates as the primary treatment facility for the Lough Talt Regional Water Supply Scheme.

The site comprises a conventional surface water treatment facility, including raw water intake and treatment processes, chemical dosing systems, treated water storage and associated operational infrastructure.

The existing infrastructure provides potable water supply to a dispersed rural population; however, the plant is constrained in terms of long-term sustainability due to environmental sensitivities associated with the Lough Talt source, as well as limitations in treatment capacity and operational resilience.

The site also includes recently upgraded treatment and storage infrastructure, including a chlorine contact tank, which remains in good condition and is suitable for repurposing as part of the Proposed Development.

No works are proposed to the existing abstraction point from Lough Talt, which is not located within the Lough Talt WTP site or the Red Line Boundary. The cessation of abstraction from Lough Talt will be achieved by closing a control valve within the abstraction arrangement located adjacent to the carpark at Lough Talt.

## 11.3 Proposed Development

The proposed repurposing of the existing Lough Talt Water Treatment Plant (WTP), Co. Sligo will consist of new infrastructure, repurposing of existing infrastructure, retention of existing infrastructure, removal and decommissioning of existing redundant infrastructure and ancillary works, as follows:

- New infrastructure:

- A new treated water reservoir of approx. 3,300 $m^3$ capacity and associated works; and,
- Installation of roof mounted solar panels.

- Repurposed existing infrastructure:
  - Repurposing of existing approx. 330 $m^3$ chlorine contact tank as reservoir.

- Retained existing infrastructure:
  - Control building;
  - Chemical storage container, tanks and associated works; and,
  - Disinfection (chlorination and ammonia) and orthophosphate dosing infrastructure.

- Ancillary site development works, including alterations to access road, hardstanding, surface water management, wastewater management, site lighting, fencing and landscaping.

  The proposed site layout is shown in Figure 11-1 below.

- Removal / demolition works

  As part of site repurposing, the following existing infrastructure (items, surfaces) will be decommissioned, removed / demolished off site:
  - Section of existing access road overlapping the footprint of the proposed new treated water storage tank;
  - Containerised filtered water pumps
  - Two filter banks
  - Backwash holding tank
  - Containerised backwash pumps
  - Micro-strainer building
  - Inlet valve chamber
  - Three Kiosks
  - Chemical tank
  - Containerised UV unit
  - Raw water feed container
  - Raw water balance tank
  - UWWEST tank
  - Settlement tank
  - Sludge holding tank
  - Associated works with removal and demolition of the above; and
  - Existing fenceline

  The proposed removal / demolition layout is shown in Figure 11-2 below.

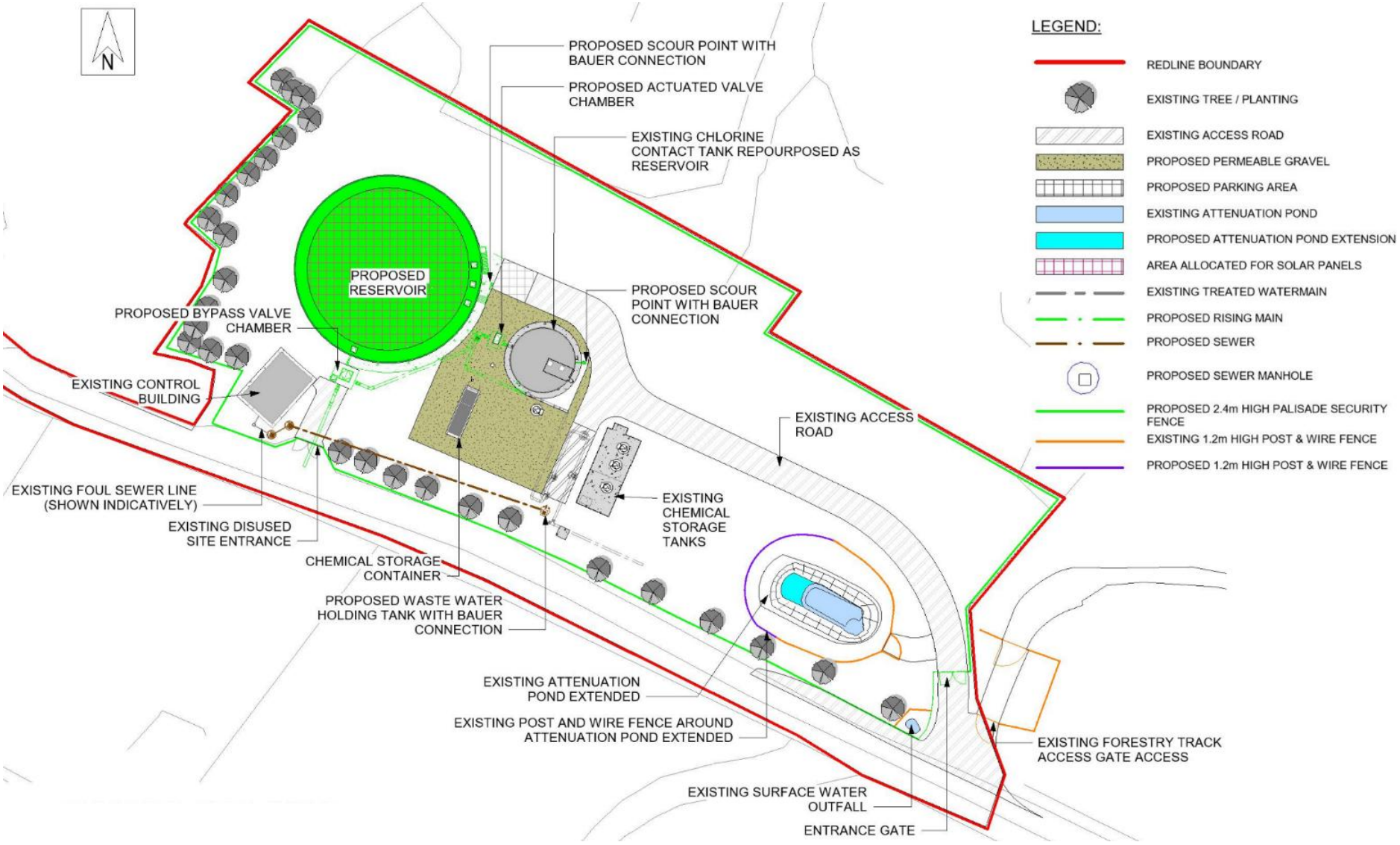



**Figure 11-1 – Proposed Development – Repurposed Lough Talt WTP**

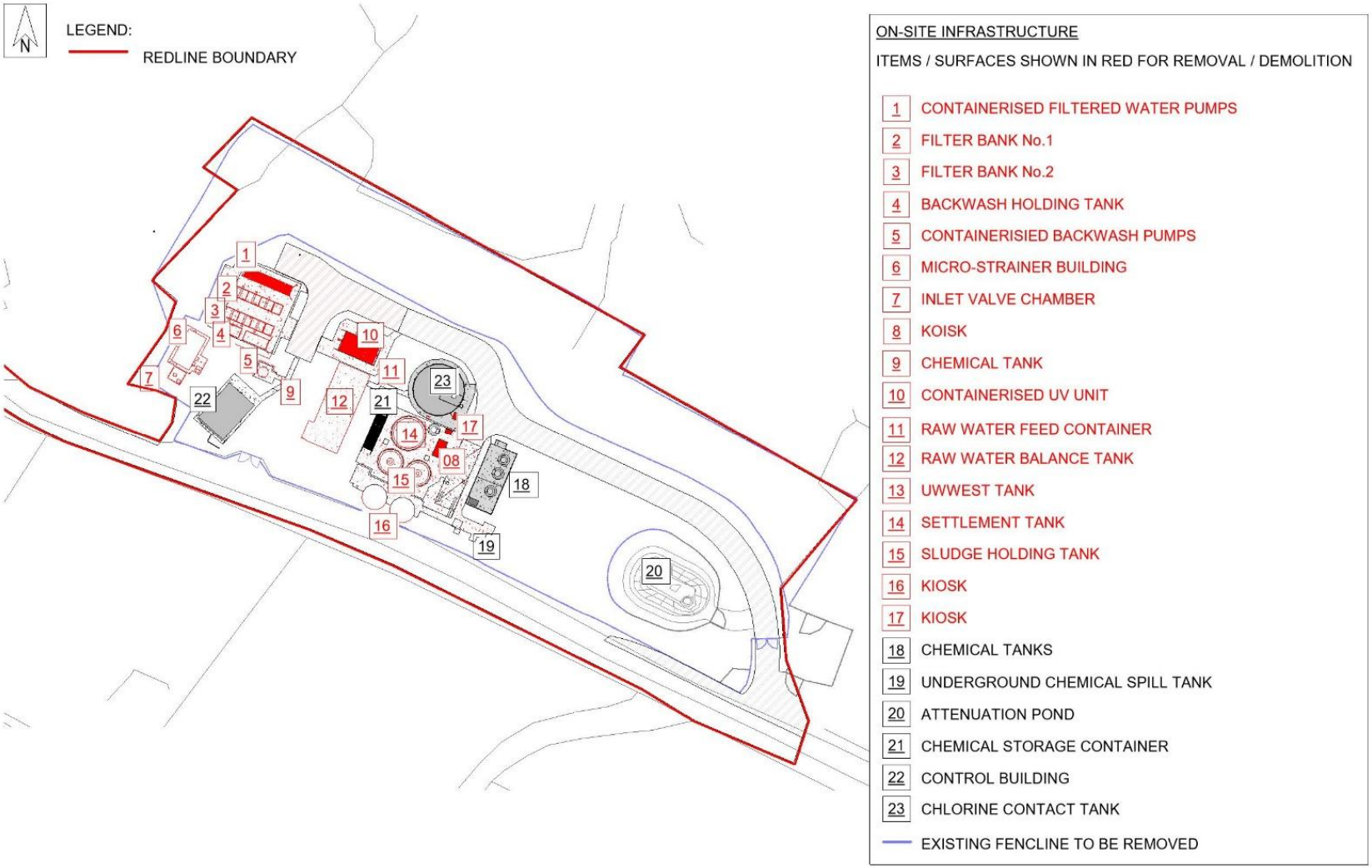



**Figure 11-2 — Proposed Layout showing removal and decommissioning of existing redundant infrastructure at Lough Talt WTP**

## 11.4 Design

The proposed design for the Lough Talt Water Treatment Plant (WTP) involves the reconfiguration and repurposing of the existing treatment facility to operate as a treated water storage and conditioning site, integrated within the wider Ballina and Lough Talt Regional Water Supply Scheme.

Under the proposed design, abstraction and conventional treatment processes at Lough Talt will be decommissioned following commissioning of the upstream infrastructure, including the Lisglennon WTP, Bonniconlon BPS and associated conveyance pipelines. The site will subsequently receive treated water via Pipeline E and function as a storage and control node within the overall system.

The design includes the construction of a new above-ground treated water storage reservoir, sized to provide operational storage and network balancing, alongside the retention and repurposing of the existing chlorine contact tank as part of the treated water system. These assets will operate in a coordinated arrangement, with appropriate inlet, outlet and bypass pipework provided to enable operational flexibility, maintenance isolation and continuity of supply.

The proposed layout incorporates controlled flow regulation and pressure management, including pressure reducing and control valves, as well as provisions for scour, overflow and bypass of storage tanks. This ensures that treated water can be conveyed reliably to the downstream Lough Talt distribution network under a range of operational conditions.

Existing site infrastructure will be selectively retained and repurposed, including chemical dosing systems for disinfection and water quality adjustment, while redundant treatment assets will be decommissioned and removed. The works will also include modifications to internal pipework, access arrangements, drainage infrastructure and ancillary systems to support the revised operational function of the site.

Overall, the design provides a resilient, flexible and maintainable storage and conditioning facility, enabling integration of the Lough Talt network into the upgraded regional water supply system while maintaining continuity of service and supporting long-term compliance with water quality requirements.

### 11.4.1 Basis of Design

The new storage tank will have a working volume of approx. 3,300m$^3$. The tank will be primarily above ground as preliminary site investigation results indicate the presence of shallow bedrock in the area. The top of the tank will be 133.00m OD, not exceeding the height of the existing micro-strainer building (currently not in use) at c. 134m OD.

The key parameters of the new storage tank and existing contact tank are shown in Table 11-1 below.

**Table 11-1 – Lough Talt WTP reservoir - Design Criteria**

| Parameters | Approx. values for Reservoir at Lough Talt WTP | Approx. values for Existing Chlorine Contact Tank |
|---|---|---|
| **Working Volume (m$^3$)** | 3,300 | 330 |
| **Water Depth (m)** | 3.5 | 3.1 |
| **Internal Area (m$^2$)** | 940.1 | 110.5 |
| **Internal Diameter (m)** | 34.6 | 11.86 |

Treated water enters the site and continues to the storage tanks. Each tank will be fitted with an up and downstream isolation valve to isolate the tank for maintenance purposes, a flow control valve that will close the tank when full or

when the booster pumping station has failed, a scour, and a dedicated overflow. The system is fitted with a bypass arrangement that bypasses both tanks and allows uninterrupted supply to the Lough Talt Water Supply Region directly from the break tank if necessary.

## 11.4.2 Mechanical, Electrical and Control Systems

The repurposed Lough Talt WTP will include the following instrumentation:

1. Level sensors – one for each tank to monitor and transmit level data. Level sensors will be used as primary indication that the storage reservoirs are full.
2. Flowmeter on the final water outlet – existing 400mm diameter flowmeter will be retained to provide flow data for flow balancing purposes, such as leak detection.
3. Chemical measurement instrumentation – Instrumentation will be retained for the chemicals which will continue to be dosed on site, i.e. Ammonia Sulphate, Sodium hypochlorite and Ortho-Phosphate.

The WTP will be equipped with a telemetry in/outstation which can receive signals relating to control functions, as well as broadcast data to the SCADA system.

A new SCADA system will be provided for the site and will include a representation of the Lisglennon WTP (view only) and full control functions and representations for the Bonniconlon BPS, Windy Gap BPT, and Lough Talt WTP.

A local mimic of the system will be present at the WTP.

## 11.4.3 Power Supply / Renewable Energy

The existing power supply is deemed sufficient for the proposed works at the site and hence no alterations to existing power supply is envisaged.

Solar panels will be installed on the roof of the new storage tank and existing infrastructure to be retained/repurposed. Refer to Section 13.1 for details on renewable energy design.

## 11.4.4 Ancillary Works

### 11.4.4.1 Access

The existing access road will be retained, except for a small area to the western end of the site where it overlaps with the footprint of the new storage tank – this section will be demolished. A new asphalt road with an area of approx. 80 $m^2$ will be provided around the existing chlorine contact tank to facilitate vehicle manoeuvring. Hardstanding will be provided at the eastern side of the new treated water reservoir.

The only access to site will be via the existing access road on the eastern side of the Lough Talt WTP site. The access via the south western entrance is no longer used.

### 11.4.4.2 Fencing

New 2.4m high palisade security fencing will be installed all around the site. The existing 1.8m high post and wire mesh fencing will be removed.

#### 11.4.4.3 Stormwater Management

The existing network consists of a conventional drainage network, which includes road gullies, pipe network with manholes for maintenance. The pipe network conveys the surface water to the existing attenuation pond located at the southeast corner of the site. The surface water is collected in an attenuation pond and is discharged from the site to the existing outfall near the eastern corner of the site. The existing flow control device located downstream from the attenuation pond restricts the flow of surface water to pre-development runoff rate. This results in the surface water backing up and gradually filling the attenuation pond to a pre-determined level. The existing attenuation pond is sized to cater for extreme rainfall events.

It is anticipated that the Proposed Development will result in a small increase in surface water entering the system, therefore the attenuation pond will be extended (approx. 8%) to enable the same discharge rate from the site to be maintained. New pipe network and gullies will be installed within the site to collect surface runoff from new impermeable areas.

#### 11.4.4.4 Wastewater Management

An existing septic tank is located near the south-western end of the site. As part of the proposed works, wastewater flows from the retained welfare facilities will be diverted to a new wastewater manhole or holding arrangement fitted with a Bauer connection. Wastewater will be collected and removed from site by tanker for treatment at an appropriately authorised facility. Any redundant wastewater infrastructure affected by the works will be isolated or decommissioned.

#### 11.4.4.5 Site Lighting

Low level bollards will be installed along the access road and paths to allow for a safe access to site. Wall mounted luminaires will be installed on the tank to light the plinth.

#### 11.4.4.6 Landscaping

This site will likely need input of additional soil excavated from elsewhere on the Proposed Development due to poor local soil quality.

Approximately 120 m of hedgerow will be provided along the fence on southern boundary of the site. Areas where tanks and hard surfaces have been removed will be sowed as grassland area and managed with a reduced mowing regime.

The Lough Talt WTP site will be planted with woodland mix where possible. This includes around new and retained tanks, as well as around the attenuation pond.

Additional hedging with standard trees will be planted at the entrance road (avoiding buried pipes), to the southeast and to the west of the expanded attenuation pond.

### 11.4.5 Geotechnical

Draft engineers logs are available for BH-T01, BH-T03, and TP-T01 which are located nearest to the proposed works.

Key risks likely to be encountered during construction are listed below:

- Side walls collapsing inward where open excavations are unsupported in soft or loose material.
- Cobbles and boulders were reported in all exploratory holes which could affect excavation.
- Shallow rock in BH-T03 at 1.3m bgl (128.17m OD) which will be encountered within the excavation.
- A high water table indicates that groundwater ingress will be an issue and will need to be controlled.

- Hydraulic uplift of empty tanks where a high, water table is recorded.

The following construction recommendations will be implemented:

- Trench boxes will be required to support the walls of the open excavation and to mitigate the risk of loose granular material unravelling and falling into an open excavation.
- Groundwater control will be achieved by means of excavating of a sump and installing a water pump.
- The following three options have been identified to mitigate the risk of hydraulic uplift of empty tanks during and after construction:
    - Thicken the base of the tank in order to weigh down the tank;
    - Anchor the tank, whereby the base of the tank is made wider than the walls of the tank, so that the weight of the soil above and around the tank will act as a weight or an anchor;
    - Incorporate wings (<1m width) in the tank design, to secure the tank in the ground.

## 11.5 Construction, Testing and Commissioning

The construction works at Lough Talt WTP will comprise the reconfiguration of the existing WTP site to operate as a treated water storage and conditioning facility following cessation of abstraction from Lough Talt. The works will include connection of Pipeline E to the new reservoir and the repurposed chemical storage tank, retained site infrastructure, construction of a new treated water storage tank, repurposing of retained treatment assets, decommissioning and removal of redundant process equipment, alterations to access roads and site drainage, site lighting, wastewater management and implementation of landscaping and biodiversity enhancement measures.

Initial activities will include site establishment, set-up of temporary working areas, confirmation and protection of existing operational assets, buried services, access routes and drainage infrastructure, and implementation of temporary traffic management measures where required. Retained operational infrastructure, including the existing chlorine contact tank, chemical dosing systems, site control systems, power supply, drainage systems and access arrangements, will be identified and protected prior to intrusive works.

Following availability of the proposed treated water transfer system, Pipeline E will be connected to the retained Lough Talt WTP infrastructure. The existing chlorine contact tank will be retained and repurposed as part of the treated water storage and conditioning arrangement. Treated water received from the new supply will be introduced in a controlled manner, with associated pipework, valving, instrumentation and control systems tested and commissioned. Chemical dosing systems retained at the site, including chlorination, ammonia dosing, orthophosphate dosing and pH correction, will be adjusted as required to suit the incoming treated water quality and operational requirements.

The cessation of abstraction from Lough Talt will be coordinated with commissioning of the proposed treated water transfer system and confirmation that the retained Lough Talt WTP infrastructure can operate as part of the new supply arrangement. Once the supply switchover has been completed, redundant raw water abstraction and treatment processes will be isolated, drained, decommissioned and made safe in accordance with the decommissioning strategy and relevant Uisce Éireann operational procedures.

Redundant treatment process units and associated mechanical, electrical, instrumentation, control and automation equipment will be isolated, made safe and removed where required. Existing assets to be retained will be protected throughout the works. Temporary isolations, tie-ins and modifications to live systems will be planned in advance and undertaken in accordance with method statements, risk assessments, isolation procedures and commissioning plans agreed with Uisce Éireann Operations.

Alterations to the site access road, hardstanding, drainage network and attenuation pond will be undertaken as part of the civil works. The existing wastewater arrangements will be modified as required to reflect the future operational use of the site. Wastewater flows from welfare facilities will be diverted to a new wastewater manhole or holding arrangement with tanker connection. The existing septic tank will be decommissioned or isolated in accordance with relevant environmental and health and safety requirements.

The general construction techniques and the construction is described in Chapter 3 (Project Description) of the EIAR.

Following completion of structural, pipework, drainage, road, MEICA and utility works, the upgraded Lough Talt WTP site will be tested and commissioned. Commissioning will include hydraulic testing, pressure testing where applicable, disinfection, flushing, verification of tank levels and operational controls, flowmeter and valve testing, chemical dosing verification, telemetry and alarm testing, and confirmation that the site can operate as a treated water storage and conditioning facility within the wider supply system.

## 11.6 Operation and Maintenance

The retained chemical dosing systems, including chlorination, ammonia dosing, orthophosphate dosing and pH correction, will be adjusted and operated as required to maintain the required treated water quality, disinfectant residual and network stability.

Routine operation and maintenance will include visual inspections, planned preventative maintenance and functional checks of the treated water storage tanks, retained chlorine contact tank / storage infrastructure, pipework, valves, flowmeters, chemical storage and dosing systems, control panels, instrumentation, telemetry equipment, access arrangements, fencing, lighting, drainage infrastructure and site security systems.

The Lough Talt WTP site will be operated as part of the wider treated water supply system to support continuity of supply, operational resilience, water quality compliance and long-term asset performance.

# 12. Bonniconlon Treated Water Reservoir

## 12.1 Purpose

Water supply to Bonniconlon was identified as a deficiency in the water supply system. This included unreliable water supply and inadequate storage during power outages. A new reservoir will be installed to provide 24 hours supply for the Bonniconlon WSS, a local WSS forming part of the wider Ballina RWSS. The new reservoir will be located in a greenfield site adjacent to the existing reservoir. Both sites are within the same folio (MY81419F) which is in ownership of Uisce Éireann.

## 12.2 Existing Site

Bonniconlon village is located on the regional road R294 approx. 10km east of Ballina town, County Mayo. The village is supplied by Lisglennon WTP via the wider Ballin RWSS. There are two booster pumping stations (BPS) in the network before water reaches the existing reservoir at Bonniconlon which serves a significant portion of the population in the area.

The existing Bonniconlon Reservoir has a storage capacity of approximately 60 m³ and is supplied from the existing treated water network fed from Lisglennon WTP via Behy Road WPS and Rathreedane Pumping Station. An existing inlet pipe tees off the treated water main and discharges to an inlet chamber before entering the reservoir. Flow into the reservoir is controlled by a ball valve arrangement within the inlet chamber. The existing reservoir has a Top Water Level (TWL) of approximately 95.63 m OD. Treated water from the reservoir discharges back to the existing 225 mm watermain. An existing overflow pipe drains to a nearby field drain.

Bulk meters are provided on the inlet and outlet pipework within the existing reservoir site. An existing water quality sampling kiosk, including a sampling pump, is also provided and transmits chlorine residual and turbidity monitoring data to Lisglennon WTP through the existing monitoring and communications system.

## 12.3 Proposed Development

In order to improve the water security of the Bonniconlon area, a new reservoir is required. This reservoir will be fed by the existing network that supplies to Bonniconlon. While Pipeline D will be laid in the L51172 adjacent to the site, the new treated water pipeline will not supply this site.

The proposed works will consist of:

- A new reservoir approx. capacity of 185 m$^3$ and associated works;
- New dechlorination chamber;
- Relocation of ESB pole; and
- Ancillary site development works, including alterations to access arrangements, hardstanding, surface water management, site lighting, fencing, security, landscaping works.

The proposed site layout is shown in Figure 12-1 below.

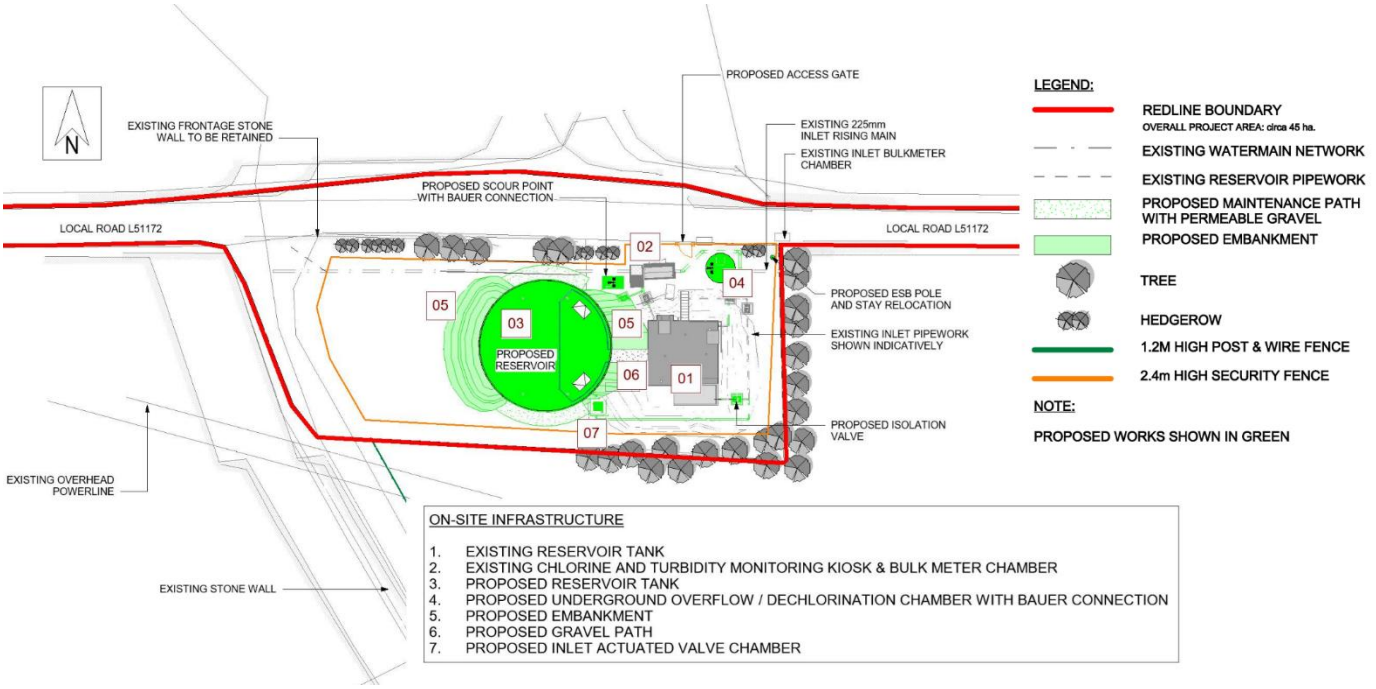



**Figure 12-1 – Proposed Development – Bonniconlon Reservoir**

# 12.4 Basis of Design

The design adopts a twin-cell arrangement, comprising the existing reservoir and a new additional storage tank located within the same site. This configuration provides enhanced operational reliability by allowing one reservoir to be isolated for inspection, maintenance or cleaning, while maintaining supply from the other.

## 12.4.1 Basis of Design

The new reservoir will have a minimum working volume of 185m$^3$. It will operate in conjunction with the existing reservoir to improve operational resilience, flexibility and security of supply within the Bonniconlon WSS.

The new reservoir will have a minimum working volume of 185m$^3$. The top water level (TWL) of the new reservoir will match the TWL of the existing tank (c. 95.63 mOD). The tank will include a scour chamber and high level overflow, both of which will discharge into the existing outlet pipe. The proposed treated water storage reservoir will have a working storage volume of approx. 185 m$^3$, with indicative dimensions of approx. 11 m diameter and 2.5 m height, including freeboard. It will operate in parallel with the existing treated water storage reservoir to provide a twin-cell storage arrangement, improving operational resilience, flexibility and security of supply.

The existing inlet main will be extended to serve the proposed reservoir. The inlet arrangement will be designed to support balanced flow distribution between the existing and proposed reservoir cells under normal operating conditions. The TWL of the proposed reservoir will be hydraulically matched to that of the existing reservoir, approximately 95.63 m OD, to support balanced filling and drawdown and to avoid preferential operation of either cell.

The proposed reservoir will be provided with a dedicated outlet pipe connecting to the existing outlet pipeline via the retained bulk meter chamber. An overflow level sensor will be installed within the proposed reservoir and connected to the existing monitoring and telemetry system. The inlet and outlet pipework will be configured to allow controlled drain-down, isolation and bypass of either reservoir cell for inspection, cleaning or maintenance, while maintaining supply through the other cell where practicable.

The reservoirs will be hydraulically linked, with both tanks operating at a common top water level (TWL) to ensure balanced storage and consistent system pressures. The hydraulic connection between the two tanks will be designed to allow controlled inflow and outflow, ensuring that both reservoirs fill and draw down in a coordinated manner under normal operating conditions.

The hydraulic linkage will incorporate appropriate control infrastructure, including inlet and outlet pipework, level instrumentation and valves, to facilitate operational flexibility. This will allow the reservoirs to operate either as a combined system or independently, as required, supporting maintenance activities and operational contingencies.

A new dechlorination chamber is proposed in the north-eastern part of the site and will connect to the existing reservoir overflow arrangement. The chamber will be accessible for routine inspection, emptying and maintenance, as required.

## 12.4.2 Mechanical, Electrical & Control Systems

The existing and proposed Bonniconlon reservoirs are supplied by the Rathreedane BPS. The proposed reservoir will be fitted with a float control valve, similar to the existing reservoir, to close off receiving flows from the BPS The proposed reservoir will be fitted with a level sensor which will be connected to the existing telemetry system.

The existing control kiosk, inlet and outlet flowmeters will be retained.

## 12.4.3 Power Supply

No upgrade to the existing power supply will be required. An OH pole will be relocated to the western boundary of the site. An ESB application have been submitted for this.

## 12.4.4 Ancillary Works

### 12.4.4.1 Access

Access and egress to site is through the L51172 local road. Temporary site access for construction will be required via the private lane to the south west of the site. A gravel path for pedestrian access will be provided on the top of the berm between the reservoirs.

### 12.4.4.2 Fencing / Boundary

A new 1.2 m high post and wire mesh fence will be installed along the west boundary and a portion of the south boundary of the site. The existing 1.2 m high post and wire mesh will be joined to the new fence. The existing frontage wall will be retained. Stone ditch and corner ditch stone will be retained.

### 12.4.4.3 Stormwater Management

There is minimal surface runoff from the proposed works. Stormwater generated from the new tank roof will be collected into a French drain circling the base of the proposed tank's berm, which will be consist of a shallow trench with single sized free draining stones wrapped in geotextile. Stormwater will percolate into the ground.

### 12.4.4.4 Site Lighting

Low level bollards will be installed along the access path between the reservoirs to allow for a safe access to site. Internal ceiling mounted luminaire will be installed in the existing kiosk. Handrail linear luminaire will be installed to lit the stairs leading to existing reservoir.

#### 12.4.4.5 Landscaping

The existing reservoir site is surrounded by mature trees while the adjacent greenfield site where the new reservoir will be located comprises of overgrown grassland. Some removal of hedgerow will be required for the new access gate between the two sites.

Evergreen trees and/or shrubs native to the area will be instated as a hedgerow along the site boundary fence to screen off the site infrastructure. The hedgerow will be allowed to rewild and grow unrestricted to provide biodiversity enhancement to the agricultural grassland site.

Frontage wall will be retained and restored where necessary, with woodland mix to be planted. It is anticipated that the boundary to the south will need to be removed during construction to facilitate site access and installation of the tank. This will be replanted with woodland mix.

Planting to the north and east will be retained as much as possible. Space between the existing and new tanks has been minimised in the design as much as possible. The ground will be graded and sloped up to the tank.

Some tree removal may be required between the existing and new tanks (west of existing tank). Stone ditch and corner ditch stone will be retained.

### 12.4.5 Geotechnical Considerations

Draft engineers logs are available for BH-M20B, TP-M71 which are located nearest to the proposed works. Water strikes were not recorded in the exploratory holes.

Key risks likely to be encountered during construction are listed below:

- Side walls collapsing inward where open excavations are unsupported in soft or loose material.
- Cobbles were recorded which could affect the excavation work.

The following construction recommendations will be implemented:

- Trench boxes will be installed to support the walls of the open excavation and to mitigate the risk of loose granular material unravelling and falling into an open excavation

## 12.5 Construction, Testing and Commissioning

The existing Bonniconlon Reservoir will remain operational throughout the construction works, insofar as practicable. The works will be planned and sequenced to maintain continuity of supply to the Bonniconlon supply area during construction, testing and commissioning. Where temporary isolations, tie-ins or operational constraints are required, these will be planned in advance and agreed with Uisce Éireann Operations.

The construction works will comprise site establishment, creation of temporary working areas, vegetation clearance, formation of temporary construction access, excavation and ground preparation, construction of the new treated water storage reservoir, installation of associated pipework, chambers, instrumentation and ducting, integration with the existing reservoir and network, construction of the dechlorination chamber, reinstatement of boundary features, and landscaping and biodiversity enhancement works.

The new reservoir will be constructed adjacent to the existing reservoir. The reservoir is anticipated to comprise a precast concrete tank system or equivalent, which may be delivered to site as a complete unit or in sections for assembly on site, subject to final detailed design and transportation requirements. Foundations will be formed to the required level, including blinding and reinforcement or base preparation as required. The tank will then be installed or assembled, with associated inlet, outlet, overflow, scour, washout, access, ventilation, level monitoring and inspection arrangements provided in accordance with the final detailed design.

Associated pipework will be installed in excavated trenches to connect the new reservoir to the existing inlet and outlet arrangements. This will include extension of the existing inlet main, provision of a dedicated outlet pipe, installation of valves, fittings, flowmeter chamber, scour / washout arrangements, overflow connection, level instrumentation and telemetry ducting. The existing bulk meter chamber will be retained and integrated into the revised pipework arrangement, where practicable. Electrical ducting and control / telemetry connections will be installed to the existing kiosk or other appropriate connection point, as confirmed during detailed design.

The general construction techniques and the construction is described in Chapter 3 (Project Description) of the EIAR.

Following completion of the structural, pipework, chamber, ducting and instrumentation works, the new reservoir and associated infrastructure will be tested and commissioned. Commissioning will include hydraulic testing, pressure testing where applicable, disinfection, flushing, verification of inlet and outlet operation, valve testing, level instrumentation and telemetry testing, overflow and scour / washout testing, and confirmation that the new and existing reservoirs can operate together as a twin-cell treated water storage arrangement.

## 12.6 Operation and Maintenance

The new Bonniconlon Reservoir will operate as a treated water storage asset within the Bonniconlon supply area. It will operate in conjunction with the retained existing reservoir to provide increased storage, operational flexibility and improved resilience of supply. The new and existing reservoirs will operate as a twin-cell treated water storage arrangement, with the proposed top water level hydraulically matched to the existing reservoir to support balanced filling and drawdown.

Operation of the reservoir will be largely passive, with inflow, outflow and storage levels governed by upstream supply conditions, downstream network demand and the hydraulic arrangement of the two reservoir cells. Level instrumentation, flow monitoring and overflow alarms will be integrated with the existing telemetry system to support remote monitoring and operational response. The reservoir arrangement will be incorporated into the wider network control strategy for the Bonniconlon WSS.

Operational access will continue from the L51172 local road, with access to the new reservoir provided through the retained and modified site access arrangements. Routine operational traffic will generally comprise operator inspections, sampling visits, maintenance vehicles, specialist contractor attendance and occasional tanker access where required for scour, washout, cleaning or maintenance.

# 13. Energy Efficiency

Uisce Éireann is one of Ireland's largest public sector energy consumers, accounting for approximately 21% of public sector electricity consumption. Energy, primarily in the form of electricity, is consumed in the treatment and pumping of water and wastewater. Uisce Éireann is aware of the energy intensive nature of their activities and their role in sustainable energy management within the communities they serve. Improving energy efficiency is a key sustainability measure for improving their carbon footprint and reducing greenhouse gas emissions. Uisce Éireann is aiming to be 50% more energy efficient by 2030, embedding best practice in new water services infrastructure, minimising energy requirements while still expanding the scale of treatment processes and equipment to continuously improve water services for their customers.

## 13.1 Renewable Energy

Solar panels will be provided at all existing and new sites to supplement the power requirements of each site. Monocrystalline silicon 565W PV panels will be provided, with tempered glass, with an indicative typical panel size of 1.13m x 2.28m. The final size of solar panels will be based on the final detail design by the Appointed Contractor. Key panel data is presented in Table 13-1 Table below.

**Table 13-1 - Key Panel Data**

| Parameter | Indicative Dimension |
|---|---|
| Panel Width (m) | 1.133 |
| Panel Length (m) | 2.278 |
| Panel Surface Area ($m^2$) | 2.581 |
| Assumed Panel Angle | 30° |
| Assumed roof/ground mounted row spacing (m) | 0.6 |
| Wattage rating of Panel (kW) | 0.565 |
| Annual Mayo utilisable sunlight hours (h) | 965 |

Roof mounted panels will be provided for new and existing structures to maximise the available area for the installation of PV panels. Ground mounted panels will be provided at the Lisglennon WTP which has the benefit of sloping south facing topography to maximise use of available sunlight.

The following Table 13-2 shows the proposed solar capacities across the Ballina and Lough Talt Water Supply Upgrade:

**Table 13-2 - Solar Panel Details**

| Description | Unit | Lisglennon WTP | Bonniconlon BPS | Lough Talt WTP |
|---|---|---|---|---|
| **Number of Solar panels** | No. | 344 | 26 | 14 |
| **Area required** | m² | 1271 | 95 | 53 |
| **Solar power generated** | kW | 194 | 13 | 8 |
| **Site power demand** | kW | 177 | 320 | 8 |
| **% of Site power provided by solar energy** | % | 110% | 4% | 100% |
| **Annual solar energy generated** | kWh | 187,210 | 12,981 | 7,720 |
| **Annual site energy demand** | kWh | 733,226 | 2,199,490 | 30,386 |
| **Max. % of Annual site energy provided by solar energy** | % | 11% | 1% | 11% |

# 14. Sustainability

Refer to Chapter 3 - Project Description, Chapter 10 - Water, Chapter 12 - Climate and Chapter 14 - Resource & Waste within Volume 2 of the EIAR.

# 15. Biodiversity

Refer to Chapter 7 within Volume 2 of the EIAR.

# 16. Mitigation and Monitoring Measures

Refer to Chapter 21 within Volume 2 of the EIAR.

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