Limerick WWTP Upgrade and Regional Bioresource Centre

EIAR Chapter 3 – The Proposed Development

June 2026

Formerly JB Barry Partners who became part of Egis in 2023

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3 THE PROPOSED DEVELOPMENT

3.1 Introduction

This Chapter describes the Proposed Development for which Uisce Éireann is seeking consent. Specifically, this Chapter describes the design and operational elements of the Proposed Development whilst the Construction Strategy is described separately in Chapter 4. This Chapter of the EIAR has been prepared in accordance with Part 1 of Annex IV of the EIA Directive and describes the following:

- The strategy for procurement of the Proposed Development and how it will influence the detailed design;
- The design requirements;
- The design of the Proposed Development; and
- The operation of the Proposed Development.

The Proposed Development pertains to the construction of upgrades to the wastewater treatment plant and regional bioresource centre, as well as the addition of a new stormwater storage tank. These upgrades will be implemented across the existing Limerick Wastewater Treatment Plant (WWTP) site and Corcanree PS site.

3.2 Site Description

The proposed development comprises works at Limerick Wastewater Treatment Plant (WWTP) and Corcanree Pumping Station (PS), both located within an established industrial area along Dock Road, approximately 3 km south-west of Limerick City Centre. The sites are situated on the southern banks of Limerick Dock, at the transitional zone where the River Shannon flows into the Shannon Estuary. The location of both sites in relation to the receiving waters is illustrated on Figure 3-1.

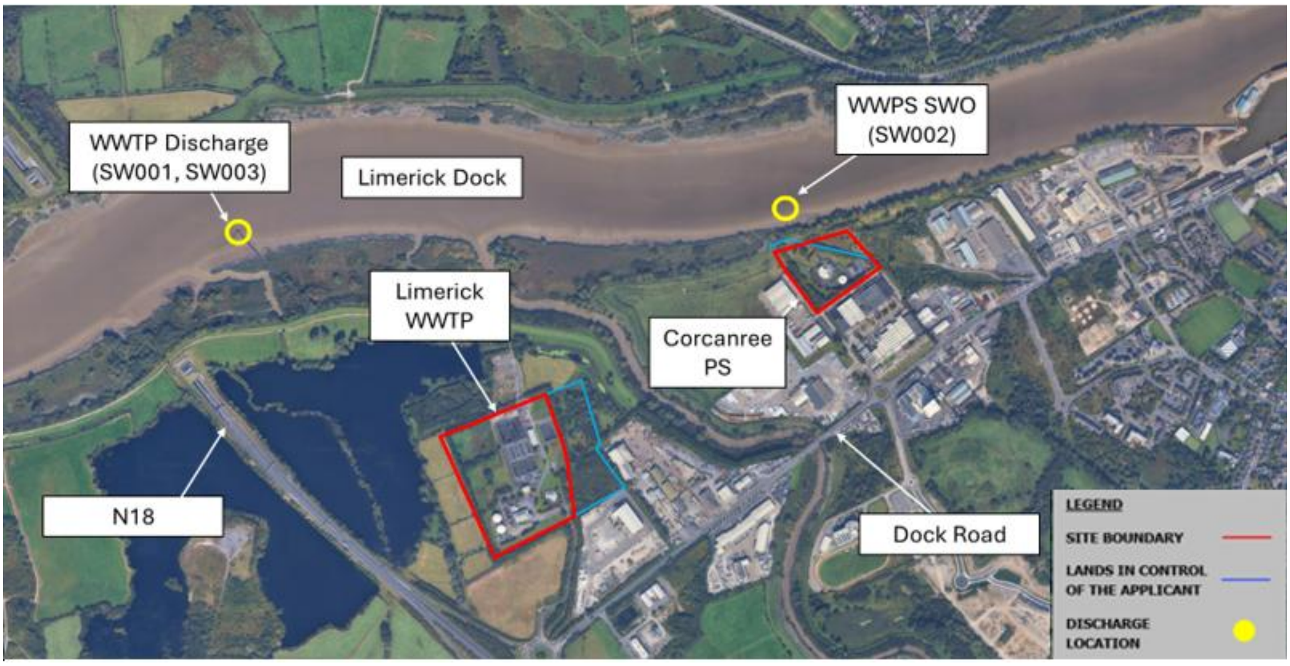


FIGURE 3-1 - SITE LOCATION DIAGRAM

The immediate surrounding land use is predominantly industrial and port-related, consistent with the long-established character of the Dock Road corridor. Adjacent and nearby land uses include port infrastructure, warehousing and storage facilities, light and heavy industrial units, and other utility installations. A concrete batching plant is located in close proximity, alongside other industrial and commercial operations.

Beyond the Dock Road industrial area, the surrounding landscape comprises predominantly agricultural lands. These lands are physically separated from the sites by established industrial plots and transport infrastructure, thereby limiting direct connectivity and interaction with the proposed development.

Both sites are accessible via Dock Road (R510), which connects to Limerick City Centre and provides onward access to the N18 and N69 national and regional routes. This road network accommodates the operational traffic associated with industrial and port-related activities in the area.

Approximately 90% of the Limerick Main Drainage network flows to Corcanree Pumping Station, where it is conveyed onward to the Limerick WWTP via two 900 mm diameter rising mains. The remaining influent enters the WWTP via Mungret Pumping Station (located on the WWTP site). Following treatment, the final effluent is discharged to the Shannon Estuary through a 1.2 km long outfall pipeline.

The sites are adjacent to the River Shannon / Shannon Estuary, which forms part of the Lower Shannon Estuary Special Area of Conservation (SAC, Site Code: 002165). This SAC extends from Killaloe to Loop Head / Kerry Head (approximately 120 km) and is designated for estuarine, intertidal, and riverine habitats, supporting Annex II species including Atlantic salmon (Salmo salar), lamprey species (Lampetra spp.), otter (Lutra lutra), and waterbirds.

3.3 EPA Discharge Licence

The Environmental Protection Agency (EPA) issued a Wastewater Discharge Licence (WWDL), Register No. D0013-01, for the Limerick agglomeration on 13 August 2009, in accordance with the Wastewater Discharge (Authorisation) Regulations 2007 (as amended). The licence authorises the discharge of treated effluent from Limerick Wastewater Treatment Plant (WWTP) to the Shannon Estuary and specifies emission limit values (ELVs), monitoring requirements and operational conditions applicable to the agglomeration.

At the time of licence grant, the Licensee was Limerick City Council. In accordance with national water services reform, responsibility for public water and wastewater services subsequently transferred to Irish Water in 2014. The licence was amended in December 2016 to reflect this change of Licensee and to update certain administrative and monitoring provisions.

Under the Water Services (Amendment) Act 2022, Irish Water was reconstituted as Uisce Éireann in 2023. Uisce Éireann is now the statutory water services authority and the current Licensee responsible for compliance with the WWDL for the Limerick agglomeration.

The Emission Limit Values (ELVs) applicable to the primary discharge are set out in Schedule A of the licence and are presented in Table 3-1.

TABLE 3-1 EMISSION LIMIT VALUES (ELVS) APPLICABLE TO THE PRIMARY DISCHARGE

Parameter	Emission Limit Value	
pH	6 - 9	
	mg/l	kg/day
BOD	25	750
COD	125	-
Suspended Solids	35	-
Orthophosphates(as P)	6.5	-

3.4 Proposed Works Description

The capacity upgrade of Limerick WWTP will cater for the +10-year growth projections (285,000 PE including the 27,500 PE IDA allowance) with provision to meet the +25-year year growth projections of 325,000 PE.

The upgrade of Limerick sludge hub to a Regional Bioresource Centre (RBC) will cater for the 10+ year growth projections (637,000 PE including 352,500 PE imported sludge load).

The upgrade works related to each element of the project are summarised in the following sections, please also see Proposed Layout Drawings in Volume 3 Figures in this EIAR for reference.

3.4.1 Stormwater Storage (Corcanree Pumping Station (PS))

- New 12,500m^3 storm tank at Corcanree PS (30-40m diameter, 10-15m depth with 3m above ground for tidal variations).
- Storm tank is designed for (Formula A –Flow to Full Treatment (FFT))* 2 hrs. It also complies with rUWWTD requirement <4% Dry Weather Flow (DWF).
- 2 no. storm pumps will be intercepted and divert to new storm tank (max. flow 2,400 l/s).
- There will be a gravity overflow from the new tank to the existing Corcanree outfall chamber.
- The tank return is a variable speed pump with a maximum pump rate of 670l/s.
- The pump rate from Corcanree foul wet well no. 2 will be increased to 879l/s. The Rising Main (RM) will be diverted to a new process stream at the WWTP with no overflow.
- The total pump rate from Corcanree PS wet well no. 1 will increase to 1,110l/s. FFT will continue through the existing process stream and excess will spill to the WWTP storm tank.
- The variable sluice from Corcanree PS Inlet to foul wet well 2 will be opened so both wet wells will fill during normal operation.
- Control philosophy will be developed between the 2 no. storm tanks to balance spill rates.

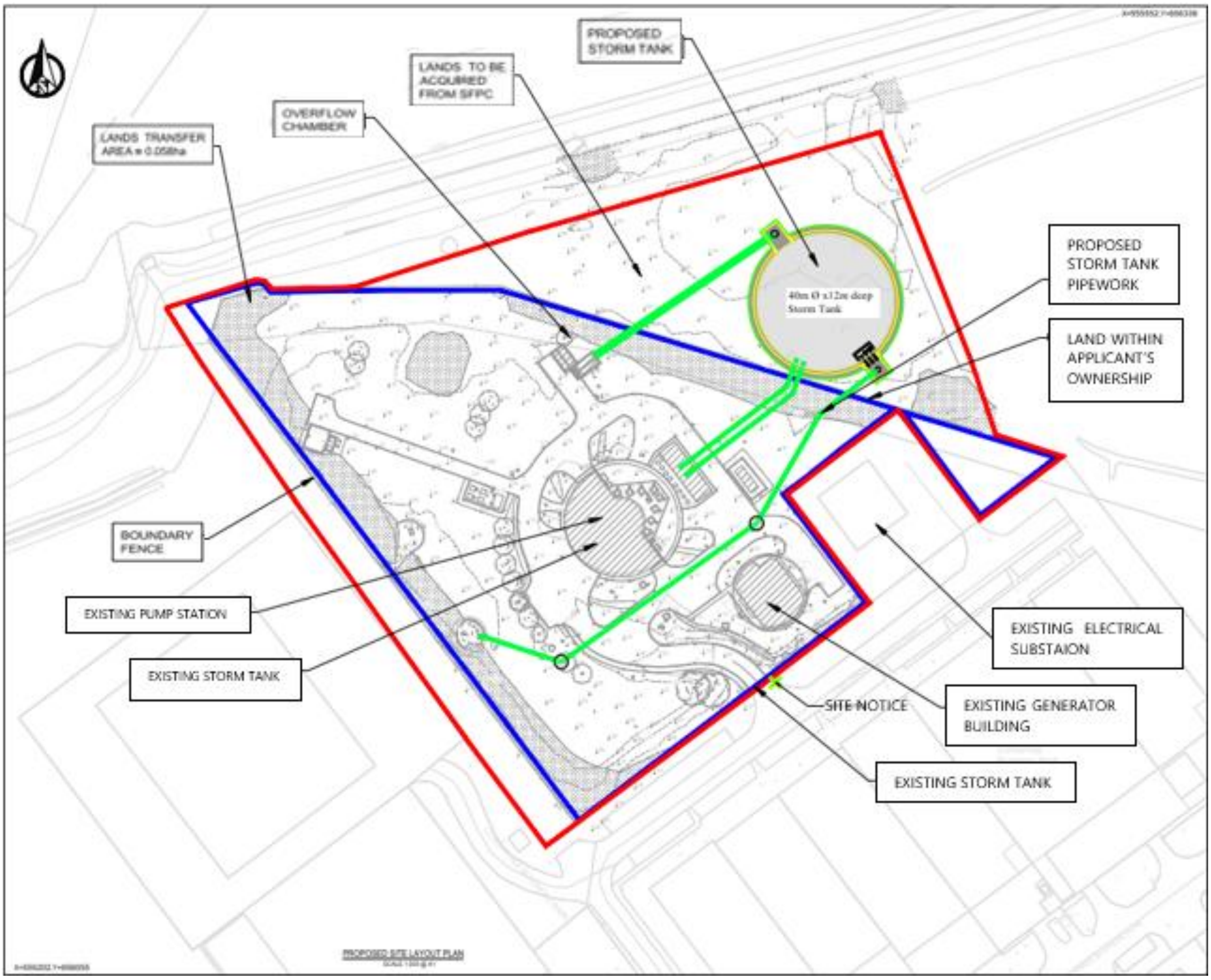


FIGURE 3-2: CORCANREE PS PROPOSED SITE LAYOUT

3.4.2 Wastewater Treatment Capacity Upgrade

- Retain existing inlet works and construct 2nd new inlet works, designed for flows up to 1,110l/s.
- New inlet works to include screening complete with screenings removal, washing and compaction, grit trap, grit classification and inlet flow measurement.
- Install new odour control unit for the inlet works.

- Retain existing Conventional Activated Sludge (CAS) process stream (primary settling, aeration, secondary settlement) and construct new parallel 157,000PE Aerobic Granular Sludge (AGS) process stream.
- New AGS process stream to include 2 no. AGS tanks each with 5 No. compartments and 1 No. central WLC/Sludge Buffer Tank.
- Upgrades to existing final effluent pumps.
- Connect new final effluent outfall pipe from AGS process to the existing (upgraded) configuration.

3.4.3 Regional Bioresource Centre (RBC)

- Retain/ replace existing imported sludge reception tank.
- Installation of new dewatered sludge cake reception facility.
- New mechanical thickening for Waste Activated Sludge (WAS).
- New polymer dosing system for WAS thickening.
- Retain & refurbish existing 2. No digester feed tanks as pre-Thermal Hydrolysis Process (THP) dewatering feed tanks.
- Upgrade mixing system & transfer pumps for pre-THP dewatering blend tank.
- New odour control system to cater for overall sludge hub installation.
- New dewatering centrifuge installation for pre-THP dewatering.
- New dewatered sludge cake silo for blending and storage of cake imports and pre-THP dewatered sludge cake.
- New Thermal Hydrolysis plant (THP).
- New/additional Anaerobic Digestion (AD) tank to allow operational flexibility.
- Biogas production and storage.
- Combined Heat and Power (CHP) and Biomethane production options.
- New digested sludge tank adjacent to existing digesters – to be covered and connected to biogas headspace.
- New digested sludge dewatering installation to cater for full digested sludge load.
- New centrate return PS located adjacent to digested sludge dewatering installation.
- Treated cake export storage silo sizing for silo and pumps.
- Upgraded wash water system with added UV treatment.

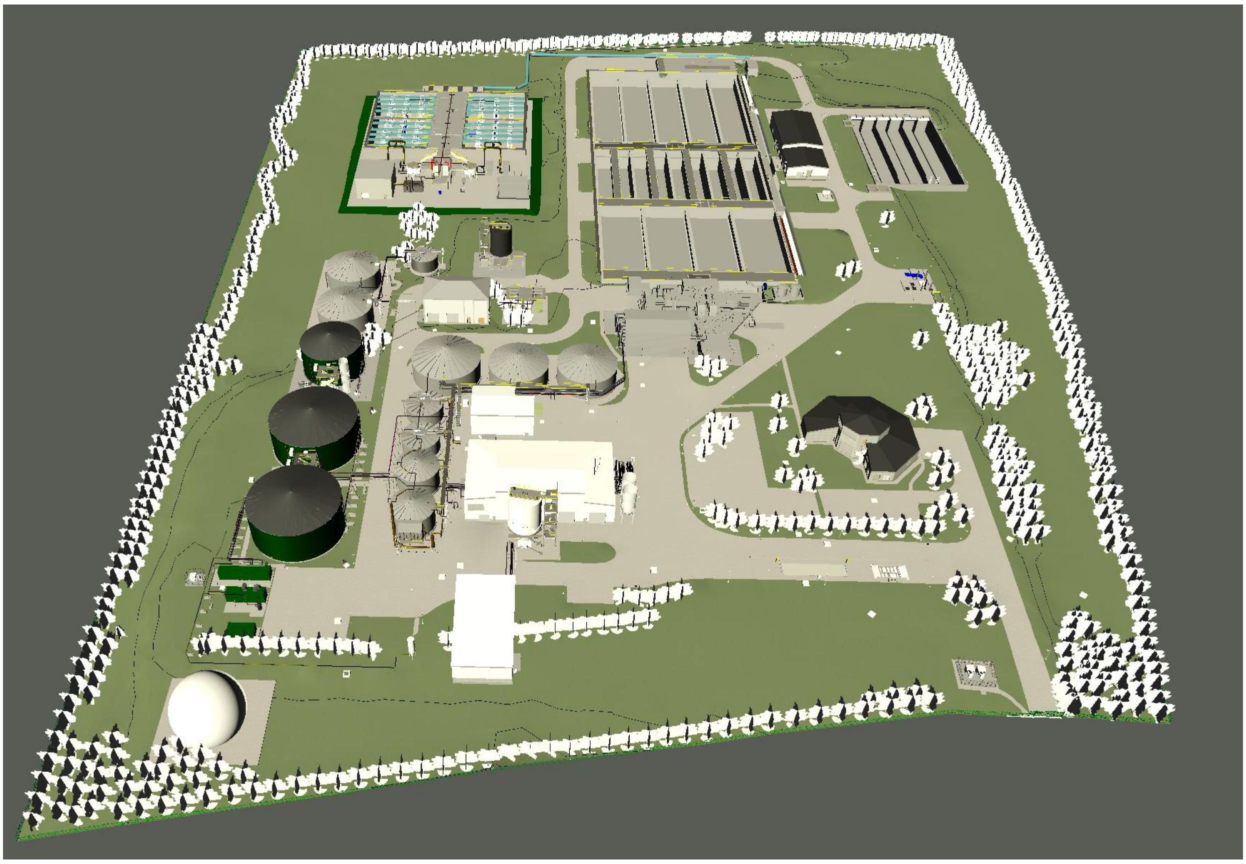
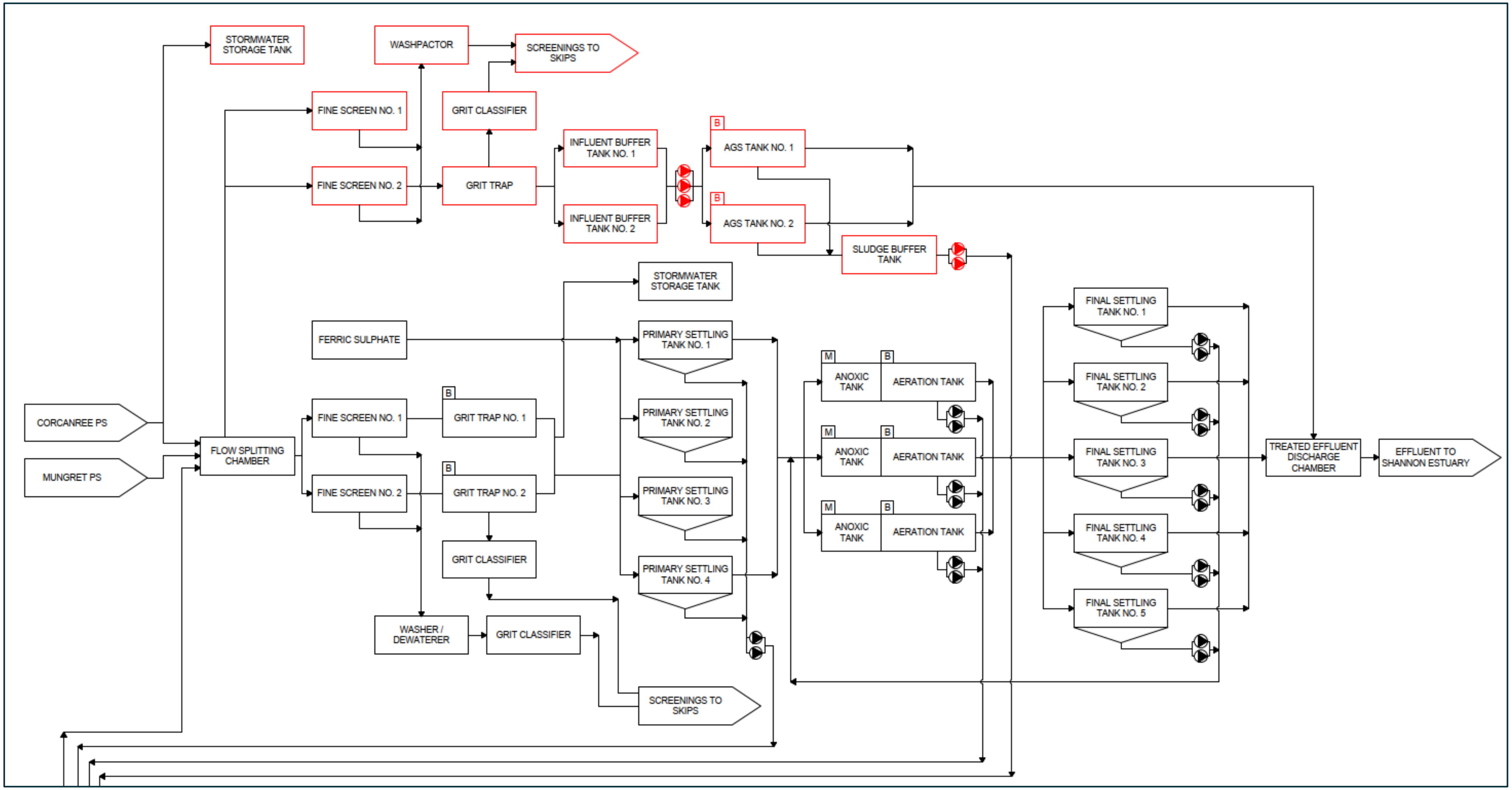


FIGURE 3-3: LIMERICK WWTP PROPOSED SITE LAYOUT (3D MODEL IMAGE)

3.4.4 Process Flow Diagram

Process flow diagram for the proposed WWTP Capacity Upgrade and Regional Bioresource centre is shown in Figure 3-4 below.



STORMWATER STORAGE TANK
WASHPACTOR
SCREENINGS TO SKIPS
FINE SCREEN NO. 1
GRIT CLASSIFIER
INFLUENT BUFFER TANK NO. 1
B
AGS TANK NO. 1
FINE SCREEN NO. 2
GRIT TRAP
INFLUENT BUFFER TANK NO. 2
AGS TANK NO. 2
SLUDGE BUFFER TANK
STORMWATER STORAGE TANK
FERRIC SULPHATE
PRIMARY SETTLING TANK NO. 1
FINAL SETTLING TANK NO. 1
M
ANOXIC TANK
AERATION TANK
FINAL SETTLING TANK NO. 2
GRIT TRAP NO. 1
CORCANREE PS
PRIMARY SETTLING TANK NO. 2
FLOW SPLITTING CHAMBER
MUNGRET PS
FINAL SETTLING TANK NO. 3
TREATED EFFLUENT DISCHARGE CHAMBER
EFFLUENT TO SHANNON ESTUARY
GRIT TRAP NO. 2
PRIMARY SETTLING TANK NO. 3
FINAL SETTLING TANK NO. 4
PRIMARY SETTLING TANK NO. 4
FINAL SETTLING TANK NO. 5
WASHER / DEWATERER
SCREENINGS TO SKIPS

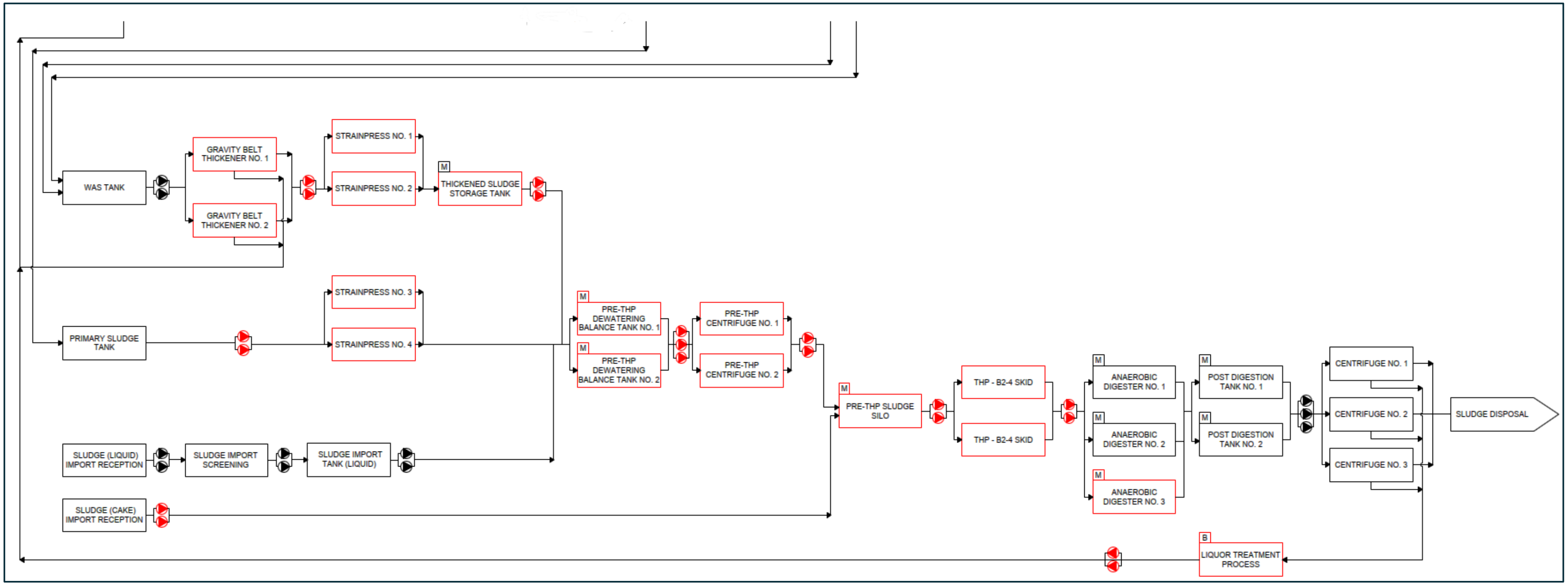


FIGURE 3-4 PROPOSED DEVELOPMENT PROCESS FLOW DIAGRAM

3.5 Emerging Procurement Strategy

A Procurement and Contract Strategy Report will be developed to manage the procurement process and mitigate any associated risks. The primary objective from the procurement and contracting perspective is to ensure the following:

- Greater cost certainty at contract award stage.
- Better value for money at all stages.
- More efficient end user delivery.
- Appropriate risk allocation: so that there is optimal transfer of risk to the Contractor.
- The project is delivered in compliance with all relevant procurement legislation.

3.5.1.1 Procurement Route

The expected procurement of Client Representative, Suppliers and Contractors will be managed through UÉ Supply Chain department utilising established Frameworks (where appropriate) with the experienced and competent supply chain.

Delivery options available include established frameworks for Engineering Service Providers and MEICA / Civils Works. It is suggested the project may be split into separate contracts 1-3 below to harness their capabilities and expertise.

1. WWTP Capacity Upgrade.
2. Regional Bioresource Centre Upgrade.
3. Stormwater Storage Tank at Corcanree PS.

Nereda® AGS is a specialist proprietary technology it requires specialist skills to design, install and commission the system in order to achieve the required treatment standards to deliver the project objective. There are confidentiality issues relating to the circulation of proprietary information. Therefore, the procurement strategy for the Nereda® Internals will need to be investigated best value for money and to protect the proprietary design information.

Further market engagement will be carried out to determine the most efficient market appropriate procurement route for all contracts. A clear Delivery Strategy will also need to be developed in terms of packaging the Contracts.

3.5.1.2 Interfaces with WWTP Operations

It is envisaged that Ward and Burke will continue to operate the plant while construction and upgrade works are being undertaken. A very clear Interface Plan will be required, with interface meetings to take place between the Contractor’s personnel and Uisce Éireann operators each week which will be required under the Contract. Any interface works which risk Emission Limit Value (ELV) failure or any other WWTP operations must be clearly planned with associated Risk Assessment and Method Statement (RAMS) and EPA notifications where necessary. PSDP and PSCS responsibilities will be clearly defined and communicated prior to Contract commitment. Sectional takeover may be facilitated as part of the Contract(s).

3.6 Design Standards

The design has been completed using, but not limited to, the following design codes and guidance documents:

- Water Industry Mechanical and Electrical Specifications (WIMES);
- Civil Engineering Specification for the Water Industry (CESWI), 7th Edition;
- Uisce Éireann Technical Standard – General Civil Engineering Specification – Document No.: UÉ-TEC-300-01;

- Uisce Éireann Technical Standard – General Civil Engineering Specification Notes for Guidance– Document No.: UÉ-TEC-300-02;
- Uisce Éireann Technical Standards – Water Infrastructure Standard Details – Document No.: UÉ-CDS -5020-01;
- Uisce Éireann Technical Standards – Wastewater Infrastructure Standard Details – Document No.: UÉ-CDS -5030-01;
- Uisce Éireann Technical Standards – Physical Site Security Policy – Document No.: UÉ-TEC-5000-01;
- Uisce Éireann Technical Standards – Inlet Works & Stormwater Treatment (wastewater) – Document No.: UÉ-TEC-700-99-02;
- Uisce Éireann Technical Standard: Wastewater Pumping Stations & Rising Mains - Document No.: UÉ-TEC-800-02;
- Uisce Éireann Technical Standard: Storm Water Overflows – Document No.: UÉ-TEC-800-03;
- Uisce Éireann Technical Standards – Primary Treatment (Wastewater) – Document No.: UÉ-TEC-700-02;
- Uisce Éireann Technical Standards - Wash Water (Waste Water) – Document No.: UÉ-TEC-700-99-03.

3.7 Demand Analysis - Capacity Upgrade and Storm Storage

3.7.1 Organic PE Loading

Wastewater agglomeration loadings and proposed design PE's have been assessed in accordance with the National Development Plan, National Planning Framework and relevant UÉ policies. A detailed population assessment was carried out as part of a Feasibility Study in 2018 to establish the domestic, non-domestic and industrial contributions to the WWTP. This included a detailed review of load sources to the WWTP, annual growth rates, and headroom for future WWTP inflows. The population estimates were established using information from UÉ Asset Planning Team, Census results (2016), Limerick Local Area Development Plan (2009 to 2015), Geo-directory (2017) and UÉ Technical Guidance Notes (TGN).

Findings were presented in the Feasibility Study Report and subsequently went through a series of reviews and workshop discussions. A further iteration of the future loading assessment was carried out by UÉ Asset Planning Team as part of the "Limerick (Limerick) WWTP Asset Planning Assessment and sign off on Feasibility Study Report (FSR) WWAG1723". Future loading scenarios were agreed and the sign off document was issued in May 2019.

To reaffirm the validity of the FSR and 2016 baseline figures, a review was carried out of the domestic population data from 2022, the updated National Development Plan (NDP) 2021-2030, the National Planning Framework and the updated Limerick Development Plan 2022 – 2028. Limerick City's domestic population is reported to have grown by 9% over the 6-year period (2016 - 2022). In order to reach the objective of 50% growth between 2016 and 2040, each census period should achieve c. 12.5% growth increase. The 2016 – 2022 period did not fulfil this requirement, it is expected that the development of critical new housing infrastructure and associated services (transport and water/wastewater treatment), will accelerate growth rates in line with the National Planning Framework.

3.7.1.1 Population (PE) Assessment

- Domestic / Residential Population

Historical census data, in combination with Geo-directory data relating to the Limerick WWTP agglomeration, were examined as part of a detailed PE assessment. The population growth rate in Limerick City averaged 0.6% per annum between 1996 and 2016 census periods. The Geo-directory database provided numbers of connected and unconnected dwellings. The assessment produced a PE figure of 92,964 which was agreed with UÉ asset planning as the 2018 baseline for future domestic projections.

- Commercial

Limerick has a large diversity of commercial businesses contributing to the wastewater catchment. As specified in the Uisce Éireann population estimate guidance document, the commercial contribution has been estimated as 16% of the domestic population loading. The estimated baseline PE for commercial load is 14,874 PE.

- Institutional

The Institutional load for Limerick WWTP includes 14 Secondary Schools, 41 Primary Schools and two major 3rd level Institutions. The institutional estimates were carried out using current national and secondary school enrolment figures (2017/2018) from the Department of Education website. As per the UÉ Agglomeration Loading Technical Guidance Note – An estimate for school aged residents (4-17yrs), less student numbers, is used to estimate the number of students attending school from outside the agglomeration. This amounted to approximately 19%. The staff to student ratio of 1:28.1 is applied for schools and a ratio of 1:10.5 is applied for 3rd level & PLC institutions. Third level and PLC enrolment figures were received from the corresponding institution websites.

The wastewater loading rates are based on the EPA Wastewater Treatment Manual recommendations and the UÉ agglomeration loading guidance. The estimated baseline PE for institutional load is 2,158 PE using EPA guidance.

- Hospitals, Nursing Homes & Prisons

The Hospital and Nursing Home loads along with Limerick Prison were reviewed in line with the UÉ Technical Guidance Document. Hospital Load PE = No. of Patient Places x 1.1465. University Hospital Limerick currently accounts for almost half of the generated load from this category, which is estimated as 1,564 PE.

- Tourism

The tourism loading estimate has been established following assessment of the occupancy rate and gauged water usage of 16 hotels listed in the agglomeration. The national occupancy rate for Q1 of 2018 was 72%, and in combination with gauged water usage, there was an estimated Population Equivalent of 1.3 per room over 365 days. The baseline PE estimate for Tourism is 1,871 PE.

- Industrial

Industrial loading figures have been confirmed by UÉ Asset Planning. An allowance has been included for future committed industrial load as detailed in Table 3-2. Increased industrial loading would be a result of increased industrial activity. UÉ are notified of any significant changes as part of the licencing and reporting procedure.

IPC licensees in the agglomeration include Regeneron, Howmedica and IMAG Optical Storage. Total existing licensed industrial allowances in the agglomeration amounts to 50,063 PE. However, licensees are not currently utilizing the allowable permitted licensed limits. The industrial discharge to the WWTP reported by UÉ Asset Planning is c. 35,302 PE, this is c. 70% of the existing license allowance.

3.7.1.2 PE Assessment Summary

A summary of PE loadings, from the various sectors and the total baseline PE, are provided in Table 3-2.

TABLE 3-2: SUMMARY OF PE LOADINGS, FROM THE VARIOUS SECTORS AND THE TOTAL BASELINE PE

Sector	PE Contribution
Total Domestic Population	92,964
Commercial Load (16% of Domestic)	14,874
Institutional – Schools & Colleges	2,158
Hospitals, Nursing Homes & Prison	1,564
Tourism – Hotels	1,871
Industrial	35,302

Total Loading	148,733

3.7.2 Projected PE Growth

3.7.2.1 Urban PE Growth

Uisce Éireann has projected an increase in urban average annual percentage growth for the Limerick metropolitan area of 2.21% up to 2043, reducing to .63% thereafter. Projections are in accordance with objectives of the National Development Plan and National Planning Framework. It assumes that the non-domestic PE (commercial and institutional) will grow at the same rate as the domestic PE.

A headroom allowance is also applied in the assessment of future PEs, in accordance with the Water Services Strategic Plan (WSSP). The WSSP outlines the long-term objective to provide for and maintain headroom capacity based on the size of the settlement served and the likely growth potential in line with the settlement hierarchy. It provides a requirement for large urban settlements (such as Limerick) to have 20% headroom under SG2d of the WSSP.

The headroom factor is particularly necessary in wastewater planning, where peak loads can reach multiples of the average daily load. This has been applied to the calculations for the domestic, commercial, and institutional related agglomeration growth projections, in accordance with the WSSP.

Details of urban growth rate and headroom projections are further outlined in the UÉ Wastewater Asset Planning Growth and Headroom Technical Guidance Notes (TGN).

3.7.2.2 Industrial PE Growth

Industrial growth and new industrial connections are assessed under a separate licencing process. As outlined previously, total existing licensed industrial allowances in the agglomeration amounts to 50,063 PE. There is also a commitment to provide an additional 27,500 PE for future industrial expansions. Total existing and future industrial PE requirements are summarised in Table 3-3.

TABLE 3-3: SUMMARY OF THE TOTAL EXISTING AND FUTURE INDUSTRIAL PE REQUIREMENTS

Facility	Licensed PE
Regeneron Ireland	30,000
Howmedica	20,000
IMAG Optical Storage Ltd	63
Future Industrial Commitment	27,500
Total Industrial	**77,563 PE1**

3.7.2.3 PE Projection Summary

A summary of PE figures according to baseline and projected design periods of 1,10 and 25 years are provided in Table 3-4.

Points to note in the calculated growth PEs are as follows;

- Capacity to accept 50% industrial licence allowance and future industrial commitment is included from construction commencement (2028) and increased to 100% after construction.
- Headroom allowance is included from project completion project (2031).
- 2.21% growth rate is predicted up to year 2040, and growth rate reduces to .63% thereafter.

[1] *For calculations the industrial PE has been rounded to the nearest 500, so total PE brought forward is 77,500.*

TABLE 3-4: SUMMARY OF PE PROJECTION FIGURES

Design Year	Baseline	Current	Year 1	Year 10	Year 25
Domestic PE Growth @ 2.21% /.63%	92,964	105,992	115,677	140,828	166,777
Non-Domestic PE Growth @ 2.21% /.63%	20,467	23,336	25,468	31,005	37,325
Incl. 20% Headroom	_		-	206,199	244,923
Industrial PE -Existing	35,302	35,302	25,000	50,000	50,000
Industrial PE - Future	_	_	13,750	27,500	27,500
Toal PE	**148,733**	**164,630**	**179,895**	**285,000**	**<325,000**

3.7.3 Hydraulic Loading

Hydraulic and organic loading parameters for the agglomeration, given the projections recommended by UÉ, are listed below in Table 3-5. The calculations have been based on a combination of standard design parameters (60g BOD /PE and 175l/pp) and factors unique to the WWTP such as high network infiltration and measured/ licenced industrial flow contributions.

90% of the flows to the WWTP are pumped forward from Corcanree PS and 10% remaining flows are from Mungret PS. PE split differs at 70%:30% as more industrial flow enters the WWTP via Mungret PS.

TABLE 3-5: HYDRAULIC AND ORGANIC LOADING PARAMETERS FOR THE AGGLOMERATION

Scenario	PE	DWF		FFT		Formula A	
		(m^3/day)	l/s	(m^3/day)	l/s	(m^3/day)	l/s
PE Assessment 2018	148,733	42,104	487	84,629	980	199,195	2,305
Year 10	285,000	66,109	765	152,386	1,764	389,834	4,512
Year <25	325,000	67,709	784	157,186	1,819	394,634	4,568

3.8 Demand Analysis - Regional Bioresource Centre

3.8.1.1 Introduction

A feasibility study report was conducted by Jacobs and Tobin Consulting Engineers in 2020. The study included a detailed review of potential sludge load sources, considering growth rates and headroom. This section explains the analysis carried out and provides details on how the loads have been further revised since the publication of the FSR (2020).

3.8.1.2 Current and Future Sludge Loading Figures

The plant is currently treating ~14 TDS/day which includes indigenous and imported liquid/cake sludges, as outlined in Table 3-6 The proposed RBC will accommodate a design load of 41 TDS/day, with the capacity to treat 50 TDS/day in the future based on the 10-year design horizon.

TABLE 3-6: CURRENT SLUDGE LOADING FIGURES

WWTP FLOW AND LOAD SUMMARY	VALUE	UNITS	SOURCE
Indigenous Load Based on Current PE	8,500	KgDS/day	AER Report 2023
Current Imports	5,500	KgDS/day	PMS Reports 2023

Most future loading will be from municipal wastewater sources, with a small proportion of sludge coming from water treatment plants and industrial customers. See future sludge loading projections in Table 3-7 below.

TABLE 3-7: SLUDGE LOADING PROJECTIONS

DESCRIPTION +10-YEAR SLUDGE LOADINGS	VALUE	UNITS
Imported Sludge – Clare	2,437	TDS/year
Imported Sludge – Tipperary	2,890	TDS/year
Imported Sludge – Limerick County	1,204	TDS/year
Total Imported Sludge Load (Clare, Tipperary and Limerick County)	6,531	TDS/year
Castletroy WWTP (77,500 PE) – Imported Sludge Cake	1,465	TDS/year
Limerick WWTP (285,000 PE) – Indigenous Sludge	7,175	TDS/year
Subtotal of above:	**Value**	**Units**
Sludge Load to Bioresource Centre (Annual - Peak) (Sum of Imported Sludge load peak, Castletroy & Limerick)	15,171	TDS/year
Sludge Load to Bioresource Centre (Annual- Average) (Exc. 20% peak)	12,534	TDS/year
Sludge Load to Bioresource Centre (Daily- Peak over 365 days)[2]	41.2	TDS/day
Summary of above:	**Value**	**Units**
Imported Sludge Load to Bioresource Centre – Over Weekdays	30.3	TDS/day
Indigenous Sludge	19.7	TDS/day
Total (Daily peak – Imports + Indigenous)3	50	TDS/day

3.9 Design of the Proposed Development

3.9.1 Stormwater Storage Design

The required stormwater storage volume of Formula A – FFT for two hours for the projected 10-year design load of 285,000 PE and future expansion to 325,000 PE is 19,787 m^3 as per Table 3-8 below. The existing

[2] *Figure used for design of Pre-THP centrifuges, THP unit, buffer storage, AD, general sludge treatment.*

[3] *Figure used for design of Import facilities, buffer storage. Imported sludge infrastructure to be designed for peak imported sludge.*

stormwater holding tank at the WWTP can accommodate 7,500 m^3 which leaves an additional design storage volume of approximately 12,500 m^3 to be accommodated as part of the upgrade works.

TABLE 3-8: STORMWATER STORAGE REQUIREMENTS

Design Horizon	PE	Formula A (m3/hour)	FFT (m3/hour)	Storm Storage (m3)	Existing Storage	Additional Storage Required
+10 Year	285,000	16,243	6,349	19,787	7,500	12,287
+25 Year	325,000	16,443	6,549	19,787	7,500	12,287

It is proposed to construct a 12,500m^3 at Corcanree Pumping Station (PS) to provide the required additional stormwater storage capacity for the agglomeration. The tank will have an approximate diameter of 30–40 metres and a depth of 10–15 metres, with 3 metres above ground to accommodate tidal variations at the site. The tank is designed to provide a storage volume equivalent to (Formula A – Flow to Full Treatment) × 2 hours, and also to achieve compliance with the recast requirement of less than 4% of Dry Weather Flow (DWF).

Two existing storm pumps will be intercepted and diverted to the new storm tank, with a maximum inflow capacity of approximately 2,400 L/s. A gravity overflow will be provided from the new tank to the existing Corcanree outfall chamber, ensuring controlled discharge during extreme storm events. The tank return will be managed via a variable-speed pump with a maximum return rate of 670 L/s, allowing flexible operation depending on network and treatment plant conditions.

The pump rate from Corcanree foul wet well No. 2 will be increased to 879 L/s, and the associated rising main will be diverted to the new process stream at the wastewater treatment plant (WWTP), with no overflow provision required. The total pump rate from wet well No. 1 will be increased to 1,110 L/s, allowing the Flow to Full Treatment (FFT) to continue through the existing process stream, while excess flow will spill to the WWTP storm tank when required. A variable sluice from the Corcanree PS inlet to foul wet well No. 2 will be opened to enable both wet wells to fill during normal operation, optimising hydraulic balance across the system.

A dedicated control philosophy will be developed to coordinate operation between the two storm tanks at Corcanree PS and the WWTP. This will ensure effective balancing of spill rates, operational flexibility during wet weather events, and overall optimisation of system performance and compliance with discharge requirements.

3.9.1.1 Model Assessments

A Time Series Rainfall (TSR) assessment was undertaken by EGIS using the future hydraulic model configuration to evaluate the potential frequency and volume of stormwater spills under the proposed development scenario. The assessment was based on the preferred option, which includes additional stormwater storage at Corcanree Pumping Station (PS) and an increased Pass Forward Flow (PFF) to the Limerick WWTP.

The current baseline scenario was derived from Stage 3 Drainage Area Plan (DAP) modelling developed by Uisce Éireann and verified through the TSR simulations, which showed comparable spill frequency and volume under existing conditions.

The TSR model incorporated the proposed 12,500 m^3 stormwater storage tank at Corcanree PS, existing storage capacity at the WWTP, and upgraded pumping arrangements designed to optimise hydraulic performance and manage flows efficiently during extreme rainfall events. Simulations used a projected future loading of 325,000 population equivalent (PE) to represent the long-term operational design of the system.

The assessment indicates that inclusion of the Corcanree stormwater storage tank will substantially reduce overall stormwater overflow frequency and volume across the network. The additional storage capacity and improved hydraulic control between Corcanree PS and the WWTP will enhance system resilience during peak storm events and reduce the potential for untreated discharges to the Shannon Estuary.

Stage 4 DAP modelling, which applied the same WWTP upgrade configuration with additional upstream network improvements, demonstrates a further reduction in overflow frequency. Total network spills are projected to decrease from approximately 213 per year under current conditions to fewer than 20 per year.

Minor differences between the TSR and DAP future predictions are evident. Although spill frequency at Corcanree PS is broadly similar, the TSR simulations indicate a slightly higher frequency at the WWTP, though with a relatively low annual spill volume. These differences are considered to arise from minor hydraulic instabilities in the dynamic model simulations, including sensitivity to timestep resolution, control logic, and storm sequencing. Notwithstanding these variations, both modelling approaches demonstrate a significant overall reduction in spill frequency and volume relative to the baseline. Spill frequencies according to current baseline, TSR and DAP models are detailed in Table 3-9.

TABLE 3-9 CURRENT AND FUTURES SPILL RATES

Model Scenario	WWTP Annual Average Spill Frequency	WWTP Annual Spill Vol. (m3)	Corcanree Annual Spill Frequency	Corcanree Annual Spill Vol. (m3)	Total No. Spills	Total Spill Vol. (m3)
Current Baseline	145	1,730,913	68	725,637	213	3,200,239
Future Scenario TSR	6.6	8,166	14.4	240,635	21	248,801
Future Scenario DAP	0	0	16	295,725	16	295,725

Overall, the combined measures, including the new stormwater storage tank, enhanced pumping capacity, and improved flow management, will result in a marked reduction in both the frequency and volume of stormwater overflows. This represents a significant environmental benefit for the Shannon Estuary and supports compliance with the objectives of Council Directive 91/271/EEC concerning urban wastewater treatment (Urban Wastewater Treatment Directive).

3.9.1.2 Stormwater Storage Tank Cleaning

It is proposed to implement a vacuum flush cleaning system in the storm tank. Once the water level in a tank reaches a certain level, a vacuum pump switches on automatically and fills the flushing chamber up with water. When the tank is empty, water in the flushing chamber is surged back through the tank. The surge rinses the floor clean, without any moving parts in the tank. Two or more flush chambers can be installed in a storage tank as needed, they can be operated by just one vacuum pump but will flush separately.

Selected advantages of the system are noted as follows:

- Requires no power, water supply or controls.
- Flushes even after partial fillings.
- Fully self-priming and flushing operation.
- No moving parts.
- Utilises storm water for the flushing process.
- Retains total volume of storm tank.
- Final flush polishing stage utilizes settled storm water.

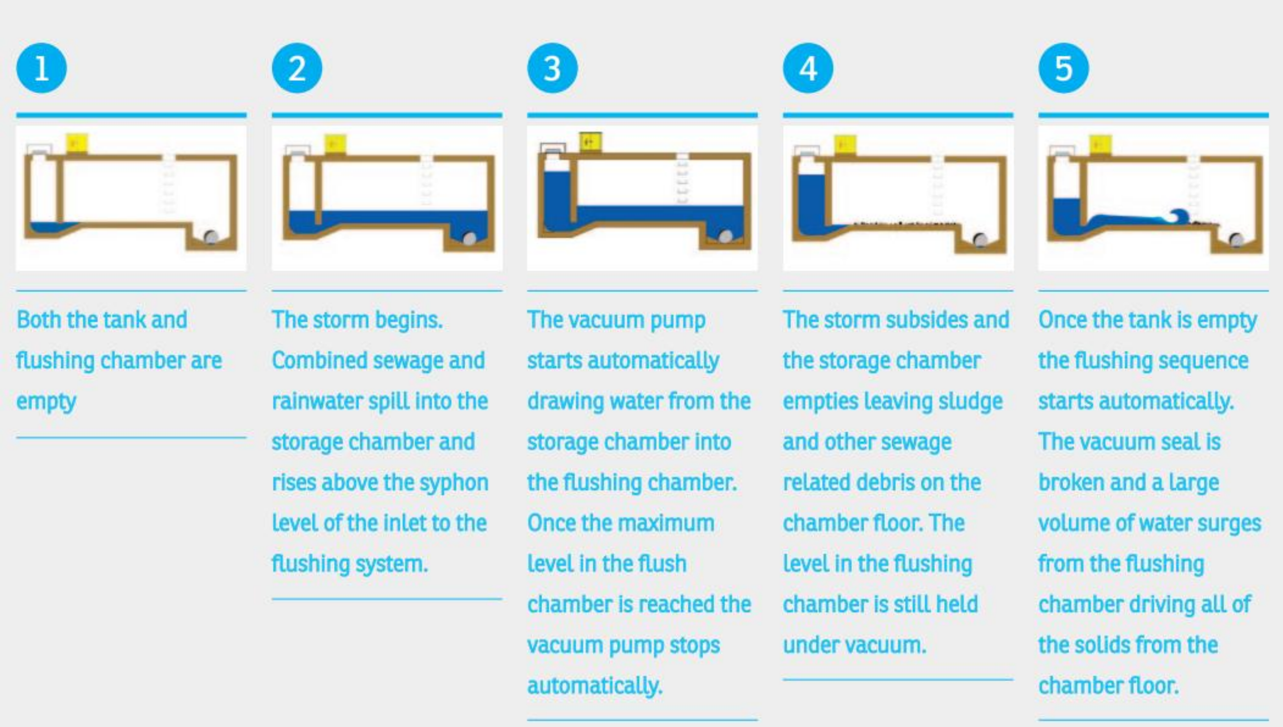


FIGURE 3-5: OPERATING PRINCIPLE (COURTESY OF HYDROK)

3.9.1.3 Storm Tank Overflow & Storm Return

When the storm tank reaches its design storage capacity, excess flows will discharge via the emergency overflow within the tank and pass by gravity to the existing outfall chamber and outfall culvert, which discharges to the Shannon Estuary.

A mechanical storm screen, similar to the Huber Storm Screen ROTAMAT® RoK2, will be installed along the length of the high-level overflow weir. The screen will ensure that gross solids are retained within the storm tank during overflow events. Screenings will remain within the tank and will be removed as part of the agreed storm tank cleaning system.

Following cessation of storm conditions and as flows in the network reduce, dedicated storm return pumps will gradually transfer retained storm flows back to the wet well at a controlled rate of approximately one times Dry Weather Flow (DWF), equivalent to approximately 705 l/s. From the wet well, flows will be conveyed through the pumping station and pumped forward to the WWTP for full treatment.

3.9.2 WWTP Capacity Upgrade Overview

The biological capacity of the existing plant is estimated at 168,424 PE, and the hydraulic capacity of the plant is estimated to be 865 l/s. Optimisation of the current assets will allow the hydraulic and biological capacities to be increased. The "Asset Planning Assessment and sign off on FSR" recommended retaining the existing WWTP and the construction of a new AGS Process in order to upgrade the existing WWTP to meet the demands as set out in the FSR and WWAG. The document states:

'The works associated with the upgrade of Limerick WWTP using the AGS process to cater for the projected 10 year design load of 285,000 PE including 27,500 PE IDA Connection with allowance for future expansion to 325,000 PE.'

Project phasing is required to upgrade the WWTP from 130,000 PE to 325,000 as follows:

Phase 1 (285,000 PE)

- Construct new Inlet Works and 157,000 PE AGS Process Stream.

- Construct new stormwater storage tank at Corcanree PS site.
- Divert South 900mm RM from Corcanree to new process stream.
- Split WWTP flows 50:50 between existing and new process streams.
- Retain Mungret pumping arrangement through existing CAS process stream.
- Retain existing storm overflow arrangement.

Phase 2 (325,000 PE)

- Increase capacity of existing process stream from a hydraulic capacity of 130,000PE to 168,000 PE.
- Return all Sludge Hub centrate to existing process stream (i.e. high strength, low flow).

3.9.3 New Inlet Works

3.9.3.1 Flow Split Arrangement

The required 50:50 split of the incoming flow will be achieved by diverting one of the twin 900mm RMs from Corcanree PS (i.e. RM South). The process flow split and the pipe diversion works are shown in Figure 3-6.

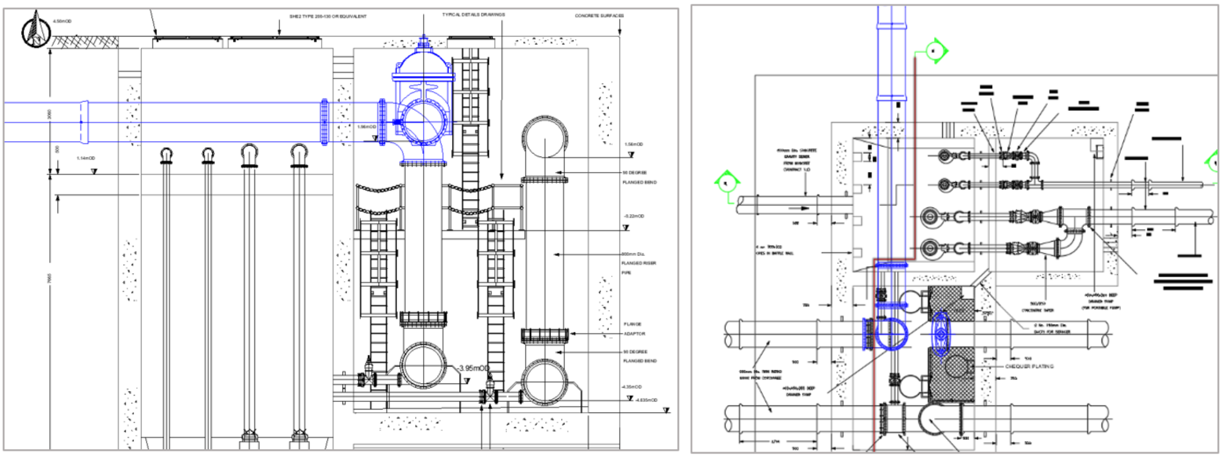


FIGURE 3-6: PROCESS FLOW SPLIT AND PIPE DIVERSION WORKS

The new rising main will be diverted at Mungret PS to a new inlet works at the head of the AGS process stream, which will be constructed in an area adjacent to the existing CAS arrangement. The diverted rising main will be laid through the gallery of the existing infrastructure to reduce disruption to the site and underground services. Figure 3-7 displays the 2 no. 900mm rising main arrangement and the connection for the diversion of the new rising main.

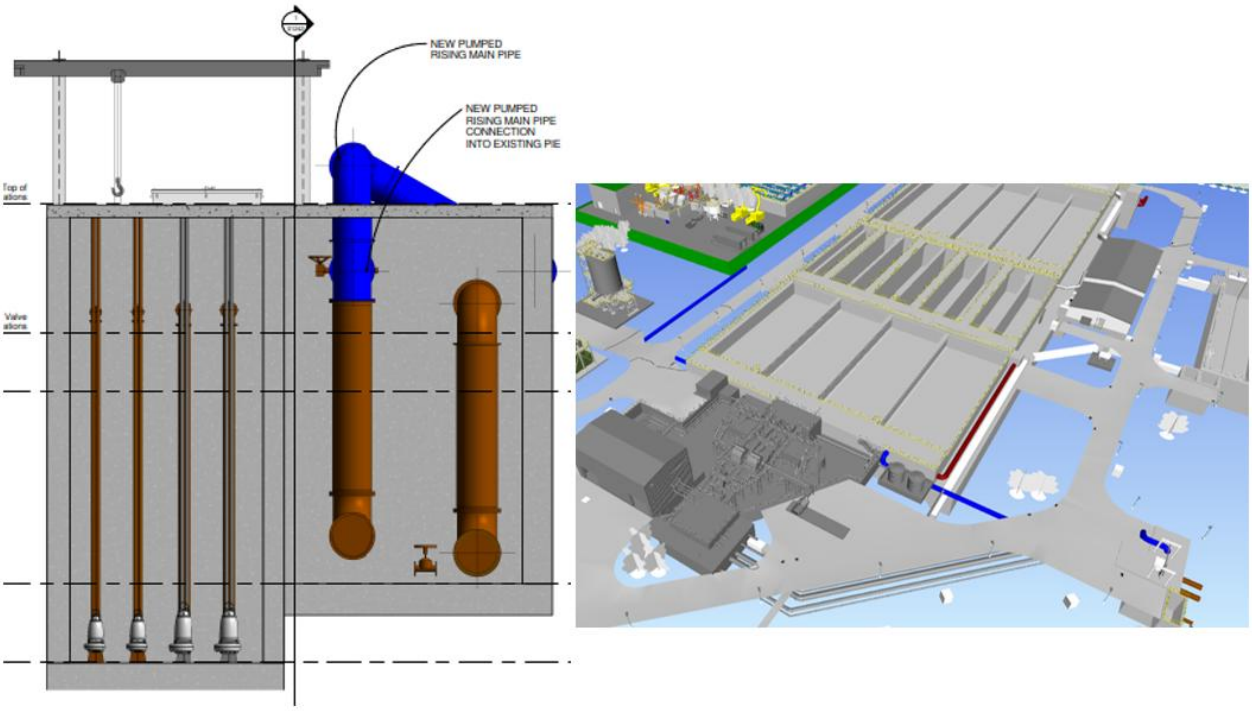


FIGURE 3-7 CONNECTION FOR THE DIVERSION OF THE NEW RISING MAIN

3.9.3.2 Inlet Works

The inlet works have been designed to receive flows from the incoming rising main, screen incoming flows, remove grit, measure flows and sample wastewater concentrations. The inlet works will be covered, and odours will be treated by an adjacent odour unit.

The new inlet works will be constructed above ground on a reinforced / piled plinth and will form part of the new AGS infrastructure. The plinth will be designed to accommodate equipment associated with the inlet works and AGS process, as seen in Figure 3-8.

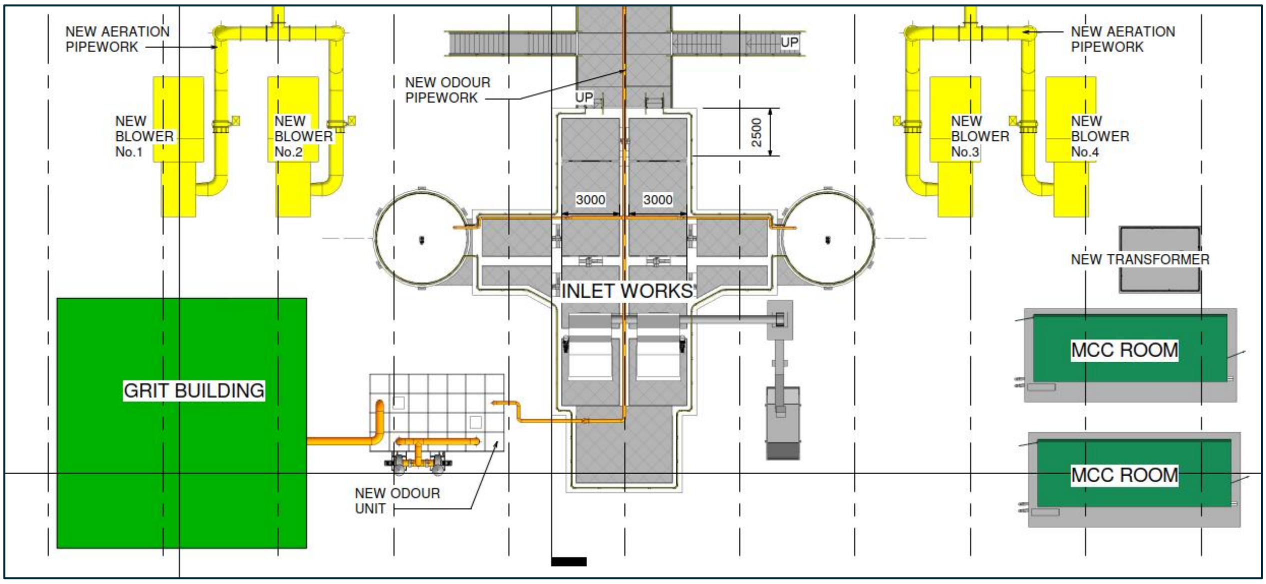


FIGURE 3-8: INLET WORKS

3.9.3.3 Inlet Chamber

The rising main will discharge through a 90° bend and bell mouth arrangement to allow the rising main to discharge vertically within the chamber. An access hatch will be provided to allow for visual inspection of the chamber.

The inlet chamber will be designed to meet the following requirements;

- Accept flows from the new 900m rising main;
- Maintain minimum approach velocity to the inlet works; and
- Prevent solid deposition.

The inlet chamber will be benched and incorporate baffling arrangements to achieve the above requirements.

Flows received in the inlet chamber will be monitored via inlet flowmeters, a level transmitter and a level switch installed in the inlet chamber. The level units in the inlet chamber will notify the operator of potential accumulation of solids within the inlet chamber or approach to the inlet screens. Flows will be directed from the inlet chamber to the inlet screens via 2 No. main channels. An additional bypass channel will also be available when necessary.

3.9.3.4 Inlet Screens

Two high-capacity band type screens (6mm in 2D) with automatic compaction will be located downstream of the inlet chamber, operating as duty/standby and alternating as needed. A manual screen will be in the bypass channel (see example screen presented in Figure 3-9).

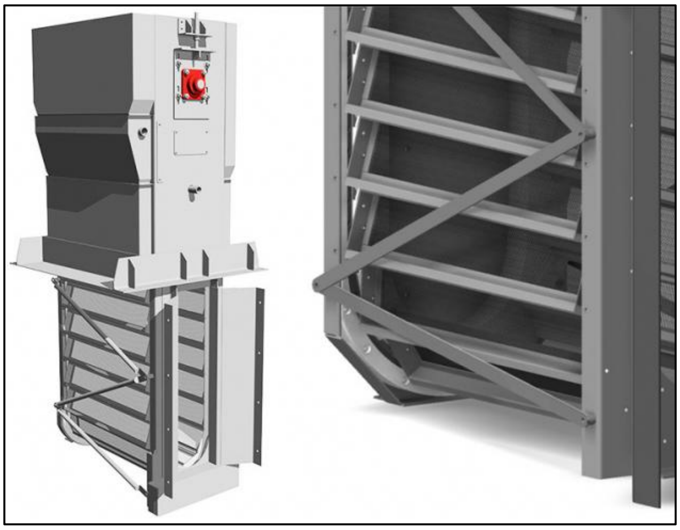


FIGURE 3-9: SPIRAC BAND SCREEN EXAMPLE

The screens will operate on differential level control, activating when the inlet chamber level reaches a setpoint and stopping when it drops below the stop level. They are sized for a maximum flow rate of 1,000l/s (2 x 500l/s), accounting for a 50% blinding factor. The maximum daily screening volume, per UÉ design standards for the proposed +10-year PE, is calculated as 14.72m^3, however, due to industrial contributions and network infiltration, a consistent 7m^3 daily volume is adopted as the appropriate design parameter.

The inlet screens will include brushes and a screw conveyor to remove and wash screened solids, allowing for disposal to landfill. The existing final effluent wash water system will be extended to supply the new screens. Reverse functionality will be built in for screen unloading, and screened solids will be disposed of in a screening bin for off-site removal. In case of blockage or capacity exceedance, flow will overflow into bypass channels with a manual screen. A facility is available to manually remove screenings from this screen into the screenings screw conveyor.

Actuated penstocks will be installed to isolate the fine screens' inlet and outlet channels for maintenance, with electric actuators providing signals to the PLC. An automatic sampler will be installed downstream of the screens to take wastewater samples from a non-pressurised point.

3.9.3.5 Grit Removal

After larger solids are screened out of the effluent, raw sewage flows into the grit chamber. Removing grit is crucial to protect downstream mechanical equipment and reduce pipeline deposits. To ensure optimal performance in the AGS tanks, the inlet flow must meet these criteria:

- Minimum 90% removal of all grit particles with a specific gravity of 2.65 t/m^3 and a size of 0.3 mm diameter or larger.
- FOG content must be less than 60 mg/l (average composite sample) and 90 mg/l (grab sample).

The recommended setup for design loadings exceeding 25,001 PE is 2 No. cross-flow grit chambers in duty/standby mode. Aerated chambers will be considered for their high removal efficiency and smaller footprint compared to traditional sedimentation-based grit chambers.

In this system, effluent enters horizontally, flows around the tank and exits parallel to the inlet. The impeller creates radial forces that allow the grit to fall into the collection hopper. Grit settles within the lower hopper, then transferred to the washing, classification and dewatering plant. Standard design allows for the use in construction of the Jeta® chamber of pre-cast concrete rings and site formed civil structure. See grit removal process diagram in Figure 3-10.

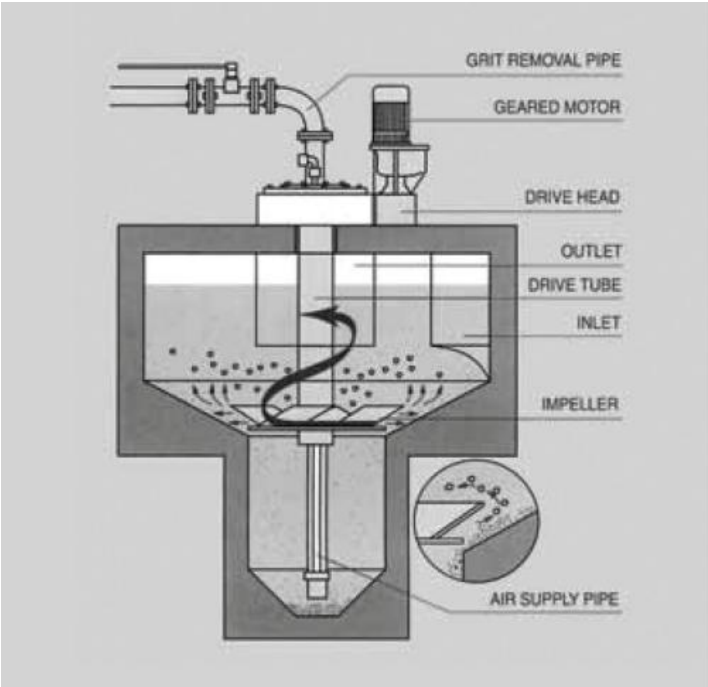


FIGURE 3-10: GRIT REMOVAL PROCESS DIAGRAM

3.9.4 Nereda ®Aerobic Granular Sludge (AGS) Design

Nereda® is an advanced biological wastewater treatment technology that purifies wastewater using the unique features of aerobic granular biomass. The following sequential steps and processes occur in the Nereda ® system.

- **Simultaneous fill and draw.** During the fill phase, influent wastewater is fed to the bottom of the reactor and flows under near-plug flow conditions through the settled granular biomass. As a result of the plug flow there is no contact between the purified effluent at the top of the reactor and the raw influent wastewater at the bottom, enabling wastewater treated in the previous cycle to be displaced or "pushed" out of the reactor as well-treated effluent, whilst the reactor is simultaneously being fed. Unlike SBR systems, Nereda does not require a separate time consuming decant phase. More importantly, static fixed overflow weirs are used instead of the moving and maintenance intensive decanters typically applied in SBR systems.

- **Aeration.** During the aerated reaction phase all biological processes take place. Fine bubble aeration generates an oxygen gradient in the compact structure of the granular biomass. At the aerobic outer layer of the granule organic pollutants are efficiently oxidized. Nitrifying bacteria also accumulate in the outer layer of the granules and convert ammonium to nitrate. The produced nitrate diffuses into the anoxic core of the granule where it is simultaneously denitrified. In addition enhanced and extensive biological phosphate fixation takes place.
- **Fast settling.** In this phase the biomass is separated from the treated effluent. As result of the excellent characteristics of the biomass, the required duration for settling is short and this phase is also used to discharge excess biomass formed as a result of growth and accumulation during the aeration phase.

Some of the process steps are also envisaged as part of the process cycle:

- **Water level correction** – The water level is dropped just before the biological phases are initiated. The purpose of this step is to ensure that there are no suspended solids discharged over the effluent decanter weirs due to the bulking of the mixed liquor that occurs during aeration.
- **Sludge discharge** – Once the biological phase is completed the sludge starts to settle. After a set settling period, the sludge wasting valve is opened and excess sludge is discharged into the sludge buffer tank.

3.9.5 Final Effluent Outfall

The upgraded WWTP will comprise of two treatment process streams: the existing process stream with a hydraulic capacity of 865 l/s and the proposed new process stream with a hydraulic capacity of 1,100 l/s, providing a combined hydraulic treatment capacity of 1,965 l/s. Flows from Corcanree Pumping Station will be distributed evenly between the two streams. The new process stream will receive flows up to its design capacity and does not include a storm overflow. The existing process stream will operate at its current capacity and excess flows will be diverted to the existing stormwater storage tank.

Flows from Mungret Pumping Station, up to 220 l/s, can be directed to either the new or existing treatment stream, or alternatively sent solely to the existing stream, depending on available capacity and flow conditions.

Treated effluent travels 1.1 km from the main plant to the outfall point via a 1,200 mm diameter HDPE pipe, conveyed by gravity during low tide and pumped during high tide. The existing outfall pumps, located in the WWTP final effluent chamber, will require upgrading to transfer the combined flows up to 2,420 l/s. At maximum design flow, the velocity in the pipe will increase to approximately 2.4 m/s, which remains below the Uisce Éireann maximum allowable design velocity of 2.5 m/s. Details of the pipework from the final effluent chamber, including the two existing outfall pipes and the AGS tie-in, are illustrated in Figure 3-11.

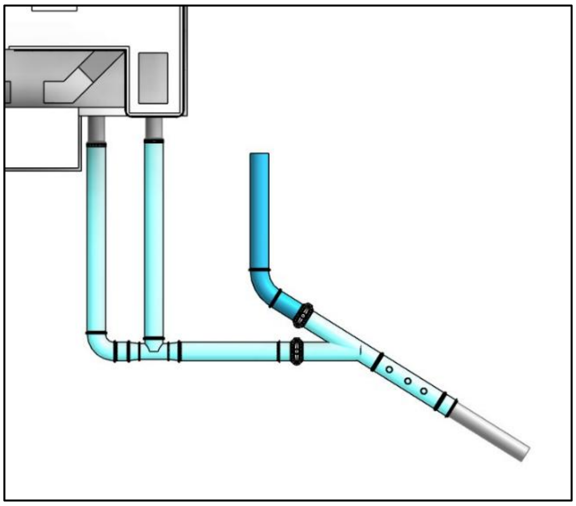


FIGURE 3-11: FINAL EFFLUENT OUTFALL PIPE CONFIGURATION

The discharge is released via a submerged diffuser chamber located at the headwall of the outfall structure and flows along a gabion mattress that extends a further 20 m into the main river channel. No upgrades are proposed to the outfall pipe, outfall chamber or associated downstream structures. Details of the diffuser chamber and outlet structure are illustrated in Figure 3-12 and Figure 3-13.

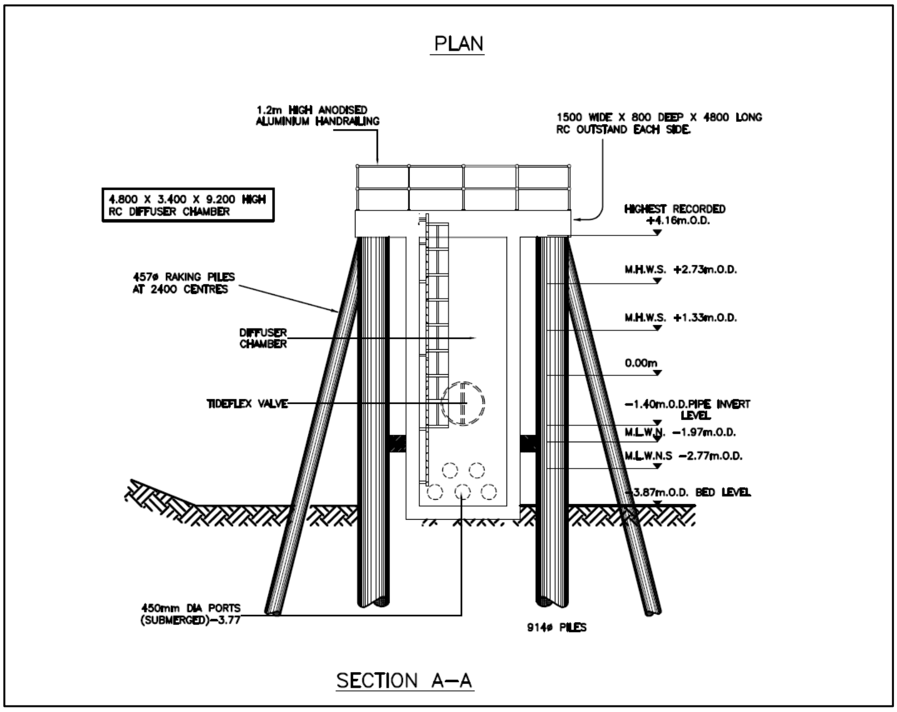


FIGURE 3-12: OUTFALL DIFFUSER CHAMBER

FIGURE 3-13: OVERVIEW OF OUTFALL STRUCTURE

3.9.6 Regional Bioresource Centre

3.9.6.1 Indigenous Sludge

INDIGENOUS PRIMARY SLUDGE

There are currently 2 no. Primary Sludge Balancing Tanks at the Limerick Wastewater Treatment Plant (WWTP). Both tanks are currently undergoing upgrades as part of required capital maintenance works, namely the Interim Sludge Project. The tanks are glass-lined steel (GLS) structures with internal HDPE linings and new GRP roofs, see Figure 3-14.

It is proposed that one of the existing Primary Sludge Balancing Tanks will be retained for use exclusively for primary sludge storage and the other will be used for sludge imports (liquids & rewetted cake). This will provide approximately seven days of storage capacity for future primary sludge production.

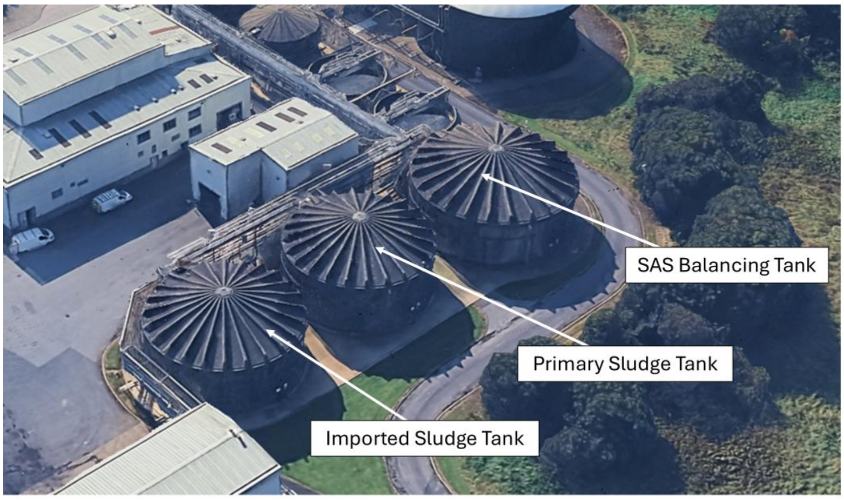


FIGURE 3-14: EXISTING SLUDGE HOLDING TANKS

INDIGENOUS WASTE ACTIVATED SLUDGE (WAS)

As part of the proposed capacity upgrade, the Limerick WWTP will include a new Aerobic Granular Sludge (AGS) treatment process (Nereda® system). In the future design, half of the indigenous wastewater load will be directed to this process. This system does not include a primary treatment stage, meaning that the proportion of Waste Activated Sludge (WAS) will increase. It is estimated that approximately 4,675 tonnes of WAS will be produced each year from the combined systems (existing & new).

Waste Activated Sludge (WAS) generated from both the existing Conventional Activated Sludge (CAS) system and the proposed Aerobic Granular Sludge (AGS) process will be blended in the existing WAS tank prior to thickening. Two new Gravity Belt Thickeners (GBTs) will be installed to replace the existing DEWA units, which have reached the end of their service life.

The new GBTs will be designed to operate continuously, providing a thickened sludge product of approximately 4–5% dry solids (DS). Filtrate generated during the thickening process will be returned to the head of the works for treatment. Thickened sludge will be transferred to a new 700 m^3 Thickened Sludge Tank, which will provide a minimum of 24 hours of operational storage capacity.

INDIGENOUS SLUDGE SCREENING

Screening of sludge prior to the Thermal Hydrolysis Process (THP) is essential to ensure reliable operation and prevent blockages. Both primary and Waste Activated Sludge will pass through a fine screening system to remove coarse materials.

A strain press with a small perforation size is proposed to be installed after the thickening and primary sludge storage stages. This will ensure that only suitably screened sludge is fed forward to the THP, improving process performance and protecting downstream equipment.

3.9.6.2 Imported Sludge

LIQUID IMPORTS

Liquid sludge imports (<8 % DS content) will be received through a new screening unit, being installed as part of the Interim Sludge Project. The sludge will be transferred to the Imported Sludge Tank, where it will be blended with rewetted cake sludge from the existing reception sump. 'Watery' sludges under 3% DS will be redirected to the inlet works and will undergo the wastewater treatment process.

CAKE SLUDGE RECEPTION

The new imported cake reception facility has been designed such that imported dewatered (cake) sludge will undergo screening at satellite dewatering centres (a separate project) prior to delivery to the site. Consequently, no new screening equipment is proposed within the design of the reception area for cake imports.

A new reception bunker is proposed for screened cake sludge imports. This facility will provide direct offloading and storage of pre-screened cake prior to direct transfer to the sludge silos and the Thermal Hydrolysis Process (THP). The new bunker will be designed to ensure safe vehicle access, efficient materials handling, and containment of potential spillage or odour emissions in accordance with best environmental practice.

Unscreened imported sludge cake will continue to be received at the existing reception bunker where it is screened, diluted, and stored in the imported sludge tank with liquid imports.

The facility receives approximately 1,000 or more deliveries of dewatered cake sludge per year (around 19 per week). This is projected to increase to approximately 55 deliveries per week over the next decade. There will be a corresponding reduction in liquid sludge imports and therefore a neutral effect on transport movement on site, see a breakdown of transportation figures in Chapter 6.

3.9.6.3 Thermal Hydrolysis Process

PRE-THP BALANCING AND DEWATERING

Thickened Waste Activated Sludge (WAS) will be combined with primary sludge and imported liquid sludges (excluding pre-screened cake imports) in a Sludge Balancing Tank. This stage serves to homogenise all sludge streams and ensure a consistent feed quality prior to dewatering. The existing pre-digester tanks will be refurbished and repurposed for this function, providing a total storage capacity of approximately 1,042 m^3 (2 × 521 m^3), equivalent to around 19 hours of storage under design flow conditions.

The sludge mix will be directed to the pre-THP dewatering centrifuges. Each pre-THP centrifuge is designed to process approximately 55 m^3 of mixed sludge per hour, increasing the solids concentration from around 4.5% DS to the 16–20% DS.

PRE-THP SILO

The Pre-THP Sludge Silo blends screened imported cake sludge with the balanced and dewatered sludge from the process stream. It acts as an intermediate buffer, smoothing out variations in upstream flows and maintaining a steady, regulated feed to the THP reactors. Its conical base and multiple inlets promote reliable discharge and even mixing, preventing segregation of sludge types.

Transfer to the THP reactors is achieved via progressive cavity pumps operating in a duty/standby arrangement, capable of delivering 6.7–18.9 m^3/h of sludge at the target consistency (design point: 16.1 m^3/h at 16.5% DS). This arrangement provides a controlled and continuous feed, supporting stable hydrolysis and maximising biogas recovery in the downstream digestion process.

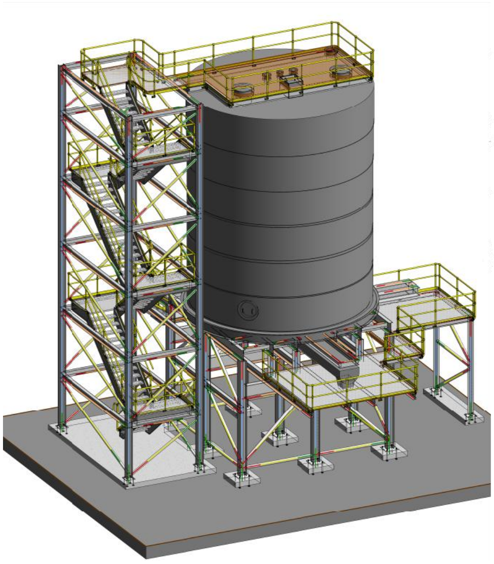


FIGURE 3-15: PRE-THP SILO

THP REACTORS & COOLING SYSTEM

In the THP system, mixed sludge is first homogenised and pre-heated in a pulper to around 100 °C using recovered steam, improving process efficiency. From the pulper, the sludge is fed sequentially into a bank of batch reactors where the sludge is exposed to steam, or 'flashed' at 160–180°C and approximately 6 bar pressure for 20–30 minutes. The hydrolysed sludge is then discharged to a post-flash tank, where rapid depressurisation causes further cell rupture and cooling to c. 40°C. The steam released during this stage is reused in the pulper, improving overall energy efficiency and reducing process emissions.

The installation will include two parallel THP trains (B2-4 type systems), each designed to handle over 25 tonnes of dry solids per day. These skid-mounted units only require a flat slab for installation, allowing them to be accommodated within the existing dryer building, which minimises the need for new structures and associated environmental impact. See an example of the Cambi® THP reactor configuration in Figure 3-16 below.

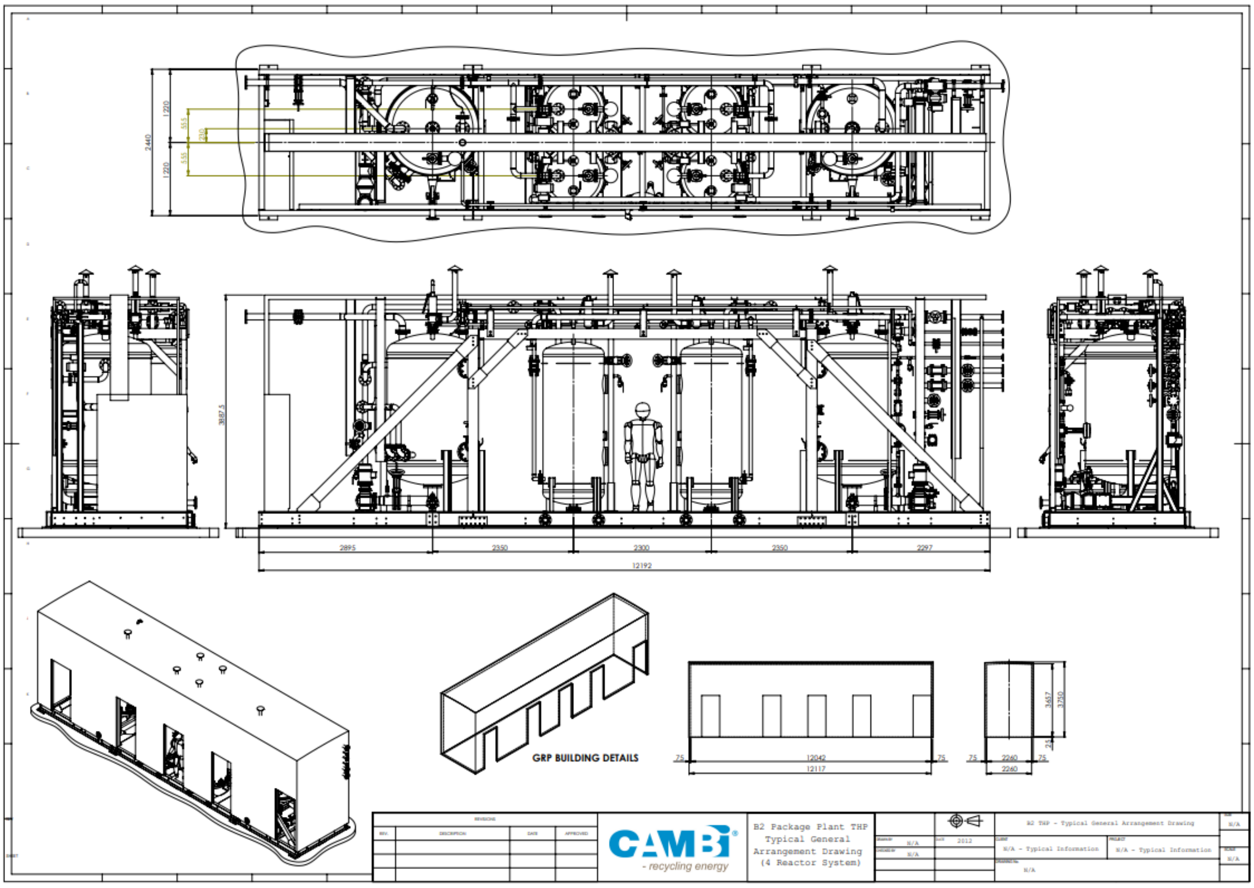


FIGURE 3-16: THP B2 X 4 SYSTEM (COURTESY CAMBI®)

3.9.6.4 Anaerobic Digestion & Biogas Production

The existing AD tanks are Permastore Model No. 76.35 with a gross volume of 4,049m^3 and a working volume of 3,667m^3. The tanks are suitable for operation with Anaerobic Digestion for operating temperatures of up to 55°C and so they are suitable for retention for the new Regional Bioresource Centre. The addition of a third digester will improve operational flexibility, support commissioning and process management, and provide volumetric capacity beyond the current design horizon. It will also enhance redundancy during maintenance periods and increase overall biogas headspace through the inclusion of an additional membrane roof.

The new AD installation has been designed to operate at an optimum mesophilic temperature of 38°C. The design figures for the process are presented in Table 3-10 below, detailing process performance for future loading for the THP + AD option based on an 18.6 day Sludge Retention Time (SRT).

The existing digesters are equipped with integrated roof-mounted gas storage, each providing a capacity of 750 m^3. This volume equates to approximately 2-4 hours of biogas production under projected future loading conditions.

TABLE 3-10: AD + THP PROCESS PERFORMANCE AND BIOGAS PRODUCTION

Description	Units	2030
Operating Temperature	°C	38
Organic load	kg ODS /m3 /d	3.6
Organic Dry Solids Reduction	%	53
% Dry Solids Reduction	%	38
Biogas production	m^3/day	12,961
Biogas methane (CH4) content	%	60

Description	Units	2030
Methane (CH4) production	m^3/day	7,777
Estimated Electrical kW/TDS	kW	284

3.9.6.5 Biogas Reuse

Biogas generated from the anaerobic digestion (AD) of thermally hydrolysed sludge will be captured and utilised on-site as a renewable energy source. This biogas, composed primarily of methane and carbon dioxide, will be used to fuel Combined Heat and Power (CHP) engines, providing both electricity and heat for the operation of the Regional Bioresource Centre.

The CHP units enable efficient energy recovery by simultaneously producing electrical power and usable heat from the same fuel source. Electricity generated by the CHPs will supply the on-site demand of the sludge treatment process, with any surplus potentially exported to the grid, contributing to local renewable energy generation. The heat recovered will be used to maintain the operating temperature of the digesters and to support the Thermal Hydrolysis Process (THP) through steam generation and sludge pre-heating, significantly reducing reliance on external energy inputs.

Based on the design projections, the total electrical output from the CHP installation will be up to 1,200 kW, comprising a new 800 kW CHP engine supplementing the existing 400 kW unit. Approximately 50% of the biogas energy content will be converted to heat, providing between 117,000 and 139,000 MJ/day of thermal energy. Of this, a surplus of 10,000–21,000 MJ/day is anticipated, demonstrating the energy-positive nature of the process.

No additional natural gas supplementation is expected to be required under normal operating conditions, indicating that the system can operate entirely on renewable biogas. This self-sustaining energy loop significantly reduces the facility's carbon footprint, aligns with circular economy principles, and enhances overall process resilience and energy independence.

3.9.6.6 Digested Sludge Dewatering & Storage

The digested sludge (digestate) will be transferred to the digested sludge storage tanks at a concentration of approximately 6.7% dry solids (DS). The existing digested sludge storage tanks provide a total working volume of 620 m^3 (2 × 310 m^3), which is generally sufficient for one day of storage under normal operations. To accommodate future sludge loadings, increased solids concentrations, and operational flexibility, the storage will be upgraded to two 6 m high tanks with a 10.2 m diameter, maintaining the existing footprint while increasing the total storage capacity to 900 m^3, equivalent to over two days' storage.

Digested sludge will be pumped to the new digested sludge dewatering facility, where it will be concentrated to >25% DS before removal off-site. The dewatered digestate produced by this process is Class A biosolid, fully stabilised and pathogen-free, meeting the standards required for safe land application or other beneficial reuse. This ensures that the output from the Regional Bioresource Centre is environmentally safe, nutrient-rich, and compliant with regulatory standards for biosolids management.

3.9.6.7 New Liquor Treatment Process Solution

Dewatering of digested sludge at the Regional Bioresource Centre will generate liquors with elevated organic and nitrogen content that require treatment before being returned to the wastewater stream. Liquors from upstream thickening processes are comparatively low in BOD and COD, so the focus is on the higher-strength liquors from digestate dewatering.

The existing wastewater treatment plant is assumed to be unable to fully manage the increased ammonia load from THP-treated sludge. A dedicated side-stream liquor treatment process (LTP) is therefore proposed, using anammox bacteria to remove approximately 85% of ammonia before the treated liquor is returned to the main process. During return to the activated sludge process, nitrate formed in the LTP is removed through denitrification, producing nitrogen gas (N_2) and carbon dioxide (CO_2) in oxygen-depleted zones of the plant.

The proposed LTP system includes a buffer tank and a reactor tank operating as a sequencing batch process at 30–33°C with aeration. Where possible, waste heat from the THP and dewatering processes may be used to improve the energy efficiency of liquor treatment.

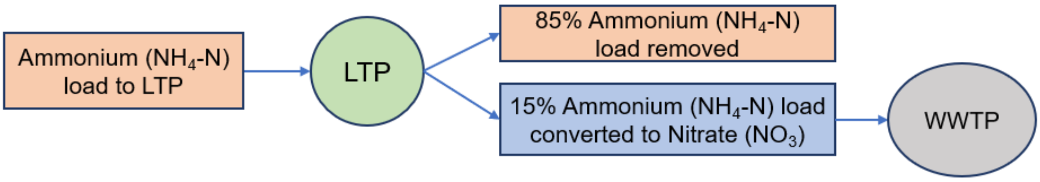


FIGURE 3-17: LIQUOR TREATMENT PROCESS

3.9.6.8 Odour Control

The proposed Regional Bioresource Centre will include active odour control for all sludge and liquor storage tanks, sludge silos, and sludge thickening and dewatering equipment. Odour control is already installed on imported and primary sludge storage tanks, as well as the WAS balancing tank, as part of the ongoing interim sludge project.

The existing biofilter does not have sufficient capacity to manage odours from the remaining upgraded sludge handling infrastructure, and there are no plans to reactivate the Regenerative Thermal Oxidiser (RTO). A new odour control unit (OCU) is included in the planning layout at the former RTO location, which will be decommissioned and demolished. The associated exhaust stack will be replaced with a structure of equivalent height, maintaining the current visual profile while providing upgraded odour management.

The new odour control installation will operate at 8–10 air changes per hour (subject to ATEX compliance) to minimise potential odour emissions. The system is designed to achieve a worst-case odour impact of 3 OUE at the site boundary, in line with industry best practice and planning guidance.

3.9.7 Surface Run-off and SuDS Strategy

A Technical Note has been prepared to set out the Sustainable Urban Drainage (SuDS) strategy for surface water management at the Limerick (Bunlicky) WWTP and Regional Bioresource Centre. The strategy has been informed by a site visit and topographical survey and has been developed in accordance with the principles of the The SuDS Manual (C753) published by CIRIA, as well as the Limerick Development Plan 2022–2028.

The site is generally flat and located within an established industrial/commercial area, with ground levels falling gently towards the north-western boundary. It lies in proximity to the Shannon Estuary and is hydraulically connected to Bunlicky Lake via existing land drains. Soakaway testing undertaken in accordance with BRE Digest 365 confirmed that infiltration rates are insufficient to support infiltration-based SuDS features. Accordingly, a surface water management strategy based on attenuation and treatment, rather than infiltration, has been adopted.

Surface water runoff will be managed through a treatment system as follows:

- Permeable paving to hardstanding areas surrounding the new tanks and access routes, providing source control and initial treatment.
- Petrol interceptor to remove hydrocarbons from runoff prior to further conveyance.
- Dry swale to provide attenuation, filtration and additional water quality treatment before discharge to the pump sump.

Treated surface water will discharge to the final effluent chamber, prior to final discharge to the Shannon Estuary. Detailed drainage design information, including SuDS performance and hydraulic calculations, is provided in Appendix 3.1 in Volume 4 of this EIAR.

3.9.8 Landscaping and Planting

See detailed Landscape Masterplan & Planting Plan in Appendix 15.1 in Volume 4 of this EIAR.

3.10 Operation of the Proposed Development

3.10.1 Overview

This section describes the likely operational activities of relevance to this EIAR. It should be noted that as outlined previously, the contractor will be responsible for operating the WWTP for an agreed period at the outset of the Proposed Development.

3.10.2 General Management

3.10.2.1 Employment

When completed and fully operational, the Proposed Development will employ a small number of on-site personnel, including process operators, maintenance staff, and administrative staff. Some personnel will work in shifts to ensure continuous 24-hour operation of the wastewater treatment processes and the Regional Bioresource Centre. Overall staffing levels are expected to remain relatively low due to the automated and controlled nature of the facility.

3.10.2.2 Maintenance and Monitoring

Maintenance activities will typically include the following:

- General maintenance on a daily basis;
- Preventative maintenance as scheduled by the operator;
- Inspections of equipment including the Stormwater Overflows (SWO) on a weekly basis;
- Inspection of chambers on pipelines on an annual basis; and
- Inspection of diffusers via dive survey on an annual basis.

Monitoring activities will be undertaken in accordance with the WWDL and will typically include:

- Quality and quantities of influent and treated effluent discharge;
- Individual elements of the treatment processes in the WWTP;
- Individual elements of the pumping station;
- SWO's; and
- Air, noise and odour emissions.

3.10.3 Site Access and Deliveries

The Proposed Development comprises two sites: the existing Limerick WWTP and Corcanree Pumping Station. Both sites are secured by perimeter fencing and controlled access gates, with appropriate security measures to ensure that only authorised personnel can access the facilities during operation.

The development of the Regional Bioresource Centre will result in a slight increase in vehicle movements associated with the transportation of dewatered sludge cake, from approximately 25 HGV movements per day to 32 HGV movements per day over the 10-year operational period. The proposed development is consistent with the objectives of the National Wastewater Sludge Management Plan (NWSMP), which promotes the consolidation of sludge treatment at regional centres. By streamlining sludge transport across the wider region, the hub is expected to improve overall transport efficiency and reduce CO_2 emissions, delivering a net positive effect on regional sludge movements, despite small increases in site-level activity. These changes are anticipated to have a minimal impact on local traffic levels (see Chapter 6, Traffic and Transportation, for further details).

3.10.4 Environmental, Health and Safety

In accordance with the Uisce Éireann procurement procedures, the operator will be required to have certified health and safety (OHWAS 18001) and environmental (ISO 14001) management systems. The management systems provide for the monitoring of environmental and safety performance and implementation of continuous improvement through associated action programmes. These programmes are frequently and routinely monitored by Uisce Éireann and will continue to be developed over the operating life of the Proposed Development.

In accordance with the typical requirements of a WWDA, existing procedures to notify the EPA of emergencies, exceedance of licence conditions and/or environmental pollution occurrences, will be updated based on the requirements of the new license.

3.10.5 Decommissioning

Decommissioning of Limerick WWTP and Corcanree PS is not envisaged at this time. Given the scale of the existing infrastructure, it is anticipated that Uisce Éireann will continue phased development to salvage and re-use as much of the installed infrastructure as possible as the demand in Limerick grows. Clustering additional infrastructure in this strategic location is viewed as favourable and will assist in reducing future capital expenditure. Proposed layouts will be cognisant of land take and aim to maintain land on-site to facilitate future expansion. Having regard to the foregoing, the decommissioning of the Proposed Development has been screened out.

3.11 Difficulties Encountered in Compiling Information

No difficulties were encountered during the preparation of this Chapter of the EIAR.

3.12 References

Central Statistics Office (CSO), 2016. *Census of Population 2016,* Ireland: Central Statistics Office.

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