January 2026

Cork Wastewater Strategy

(Cork Metropolitan Area)

Optioneering and Solutions Development Report

Safeguarding our water for our future

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List of Acronyms and Abbreviations

Acronyms and Abbreviations	
AA	Appropriate Assessment
AD	Anaerobic Digestion
AGS	Aerobic Granular Sludge
ASP	Activated Sludge Process
BOD	Biochemical Oxygen Demand
DBO	Design Build Operate
DIN	Dissolved Inorganic Oxygen
DWF	Dry Weather Flow
ELV	Emission Limit Value
EPA	Environmental Protection Agency
EQS	Environmental Quality Standards
FBDA	Fine Bubble Diffused Aeration
FeCl	Ferric Chloride
FE	Final Effluent
M&E	Mechanical and Electrical
NIS	Natura Impact Statement
PE	Population Equivalent
PFF	Pass Forward Flow
PST	Primary Settlement Tank
RBC	Rotating Biological Contactors
RTC	Real Time Control(s)
SAC	Special Area of Conservation
SBR	Sequence Batch Reactor
SPA	Special Protection Area
SWO	Storm Water Overflow
TP	Total Phosphorus
UÉ	Uisce Éireann
WFD	Water Framework Directive
WQM	Water Quality Modelling
WW	Wastewater
WWDL	Wastewater Discharge Licence
WWTP	Wastewater Treatment Plant

1 Introduction and Option Development Process

The purpose of the Optioneering and Solutions Development is to identify and document the preferred strategic drainage and treatment solutions for the Cork Metropolitan Area, assessing the full range of potential approaches targeting strategy horizons in 2030, 2055, and 2080. The Strategy identifies a timeline for initiation of projects by considering the individual catchment needs and any interactions with other agglomerations within the CMA. When a project is designated to be initiated by 2055, for example, it does not necessarily mean the project will commence in that year. Instead, it indicates that the necessary steps to initiate the project will be undertaken in the years between 2030 – 2055. Each recommendation set out in this Strategy will be considered in detail and prioritised based on need, feasibility, environmental requirements and available funding. Its inclusion in the Strategy does not guarantee that it will be progressed or delivered. Rather, it indicates that the recommendation merits further examination as part of Uisce Éireann's future planning and investment cycles, where decisions on implementation will be made in line with organisational priorities and regulatory obligations.

The assessment methodology has followed a 5-stage process to ensure the optimum technical approach is selected considering the functionality of the solution, taking into account whole-life cost while balancing sustainability requirement, maximising benefits in the process. Balancing these often-conflicting goals is crucial as these objectives do not always align, requiring careful consideration and strategic compromise to ensure optimal project outcomes. An overview of these 5-stages is included in Figure 1-1.

The options appraisal is a complex process, consisting of addressing and balancing environmental constraints and limitations in receiving waters, process and flow capacity at treatment plants, locations of treatment plants and outfalls, regional sludge management, connection of new developments to existing networks, hydraulic capacity, and occurrences of network flooding and pollution through Combined Sewer Overflows (CSO) and Storm Water Overflows (SWO). There are often interactions and inter dependencies across all the wastewater catchments within the CMA which must also be carefully considered. Additionally, the process must consider interactions and interdependencies across all wastewater catchments within the CMA. Each challenge may present multiple alternative approaches, necessitating a comprehensive evaluation. The final **Recommended Approach** must consider a number of factors including but not limited to whole-life costs (CAPEX and OPEX), energy efficiency, environmental impacts and carbon emissions.

The optioneering process will include a risk assessment for each potential solution to ensure that the selection is evidence-based and transparent, addressing stakeholder interest in the reasons behind the adoption or rejection of certain approaches and technologies.

It is essential that approaches across different strategy horizons are designed to be progressive and integrative, allowing them to fit together seamlessly without requiring redesigns between horizons. This continuity will be captured during the delivery plan step of the CWS process.

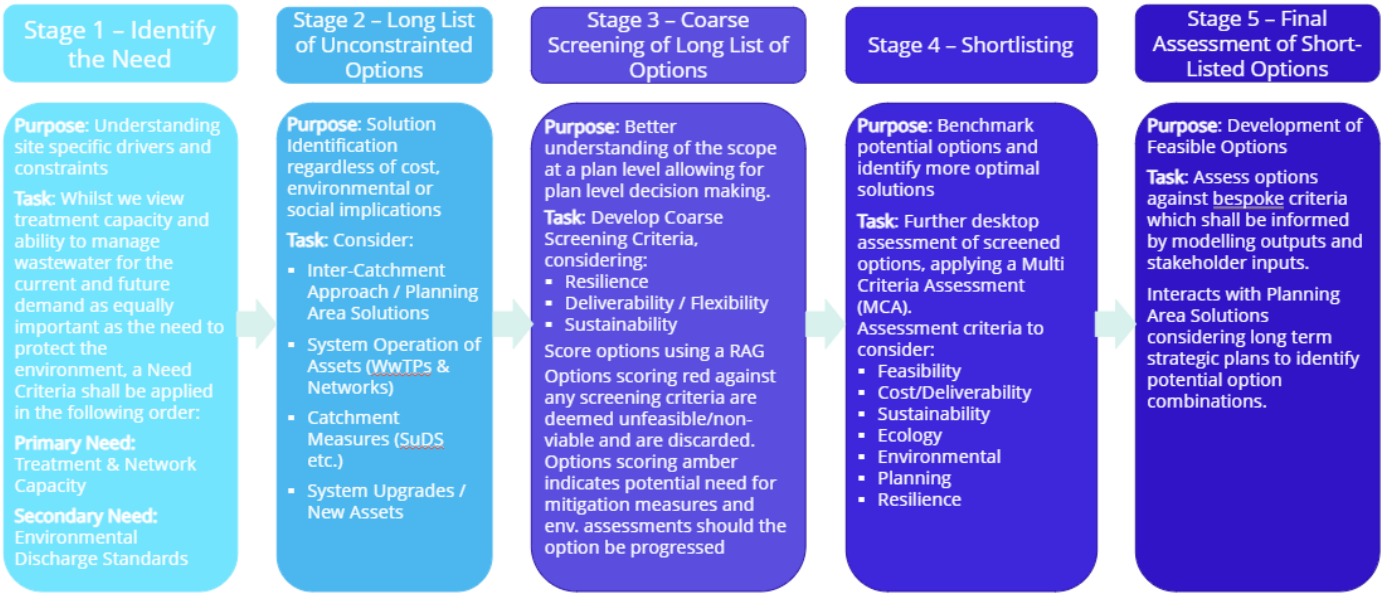


Figure 1-1: Assessment Methodology Overview

It should be noted that approaches are developed at a strategy level. Environmental impacts and costing of projects are further reviewed at project level. Any projects that are progressed following the CWS will require individual environmental assessments, including, where appropriate, Environmental Impact Assessment and Appropriate Assessment, in support of planning applications (where a project requires planning permission) or in support of licencing applications. Any such applications will also be subject to public consultation.

By following this approach, the Optioneering and Solutions Development process aims to deliver sustainable, cost-effective, and environmentally sound drainage solutions for the Cork Metropolitan Area, addressing both current needs and future challenges.

1.1 Stage 1 - Identify the Need

The initial stage of the Optioneering and Solutions Development process for the CMA focuses on comprehending the unique drivers and constraints specific to each wastewater catchment. This step is crucial for developing a strategy that effectively balances current and future wastewater management needs with environmental protection.

A structured Need Criteria is applied to guide the strategy development, as illustrated in Figure 1-2. This approach ensures a balanced consideration of treatment capacity, ability to manage wastewater for current and future demand, and environmental protection. The strategy aims to address treatment capacity (Population Equivalent and hydraulic), network capacity (hydraulic), and environmental discharge standards.

A critical component of this stage involves population projections for three horizon years: 2030, 2055, and 2080. These projections are essential for estimating the level of growth within the Study Area catchments. This forward-looking approach allows for the development of solutions that can accommodate long-term population changes and associated infrastructure demands. Utilising the population projections, flow and loads for each of the study horizon years at each catchment can be estimated.

By adopting this approach to understanding site-specific drivers and constraints, the strategy aims to safeguard the CMA's wastewater management solutions. This involves anticipating future challenges, allowing for flexibility in system design, and ensuring that infrastructure investments remain relevant and effective over the long term.

This first stage sets the foundation for subsequent stages of the Optioneering and Solutions Development process. By thoroughly understanding the drivers and constraints, the strategy can prioritise areas for improvement or expansion, align wastewater management solutions with broader urban development plans, and ensure compliance with evolving environmental regulations.

By thoroughly addressing site-specific drivers and constraints in this initial stage, the Optioneering and Solutions Development process establishes a strong foundation for creating sustainable, efficient, and environmentally responsible wastewater management solutions for the CMA. This approach ensures that the resulting strategy will be well-equipped to meet both current needs and future challenges, supporting the region's growth and environmental goals over the coming decades.

Furthermore, for all strategy horizons we must identify the works necessary for all SWOs to meet DoEHLG criteria (as per WWDL) and limit annual SWO spills from each agglomeration to no more than 2 % of the annual collected urban wastewater load calculated in dry weather conditions (as per rUWWTD).

Further details on the methodology to identify the need can be found in Figure 1-2.

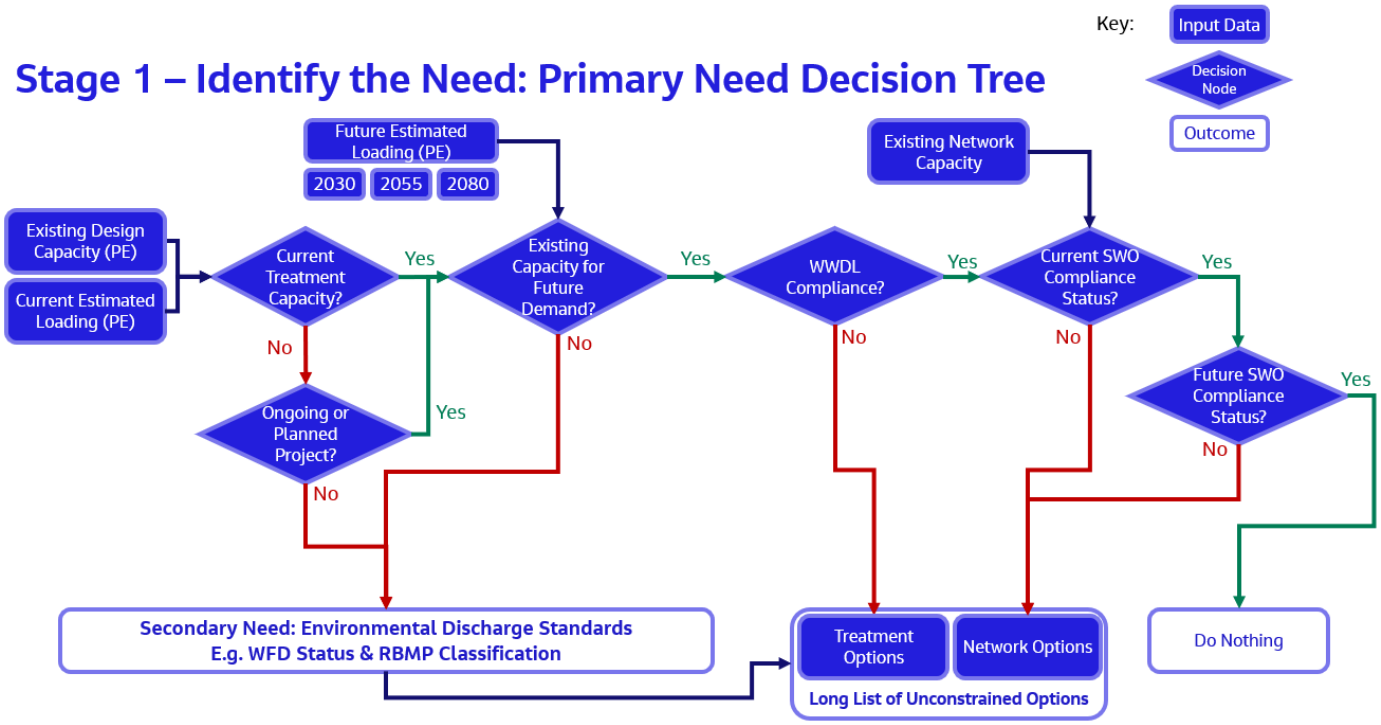


Figure 1-2: Identify the Need – Decision Tree

1.2 Stage 2 – Long List of Unconstrained Options

The second stage of the Optioneering and Solutions Development process for the CMA focuses on identifying all potential solutions, without initial regard for cost, environmental, or social implications. This approach ensures that no viable option is overlooked in the early stages of planning.

The unconstrained options encompass a wide range of potential solutions, including inter-catchment approaches, planning area solutions, system operation of assets, catchment measures, system upgrades, and new asset development. The primary objective of this stage is to generate a list of generic options capable of addressing future network and wastewater treatment constraints. This unconstrained list serves as a foundation for subsequent stages of the decision-making process.

Importantly, the unconstrained options list includes a "Do Nothing" scenario. This serves as a counterfactual, providing a baseline against which other options can be compared. Each agglomeration within the CMA is assessed against this full range of options, creating a robust evidence base for the subsequent Coarse Screening process.

The detailed environmental constraints are assessed during the Coarse Screening (Stage 3) and Fine Screening (Stage 4) stages of the Option Development Process. Note, wastewater load transfer refers to wastewater that is preliminary treated (screened) and transferred to an alternative WwTP.

For the WwTP Assessment, a specific list of unconstrained options has been developed, as outlined in Table 1-1.

Table 1-1: WwTP Unconstrained List of Options

Option	Description
A0 – Do Nothing	Counterfactual used for screening exercise(s)
A1 - Minimal Upgrade – Process Optimisation	Capital Maintenance/Refurbishment of Assets; Alternative Operation Pattern; Identifying Optimisation Solutions
Option A2 - Reuse Existing Plant and Upgrade (Existing Discharge Location)	Capacity Upgrade; Additional Treatment Requirements/Alternative Technologies
Option A3 - Reuse Existing Plant and Upgrade (Alternative Discharge Location)	Capacity Upgrade; Additional Treatment Requirements; Final Effluent Discharge Route to New Outfall
Option A4 – New Treatment Process/Plant Upgrade on Existing Site	Full Capacity Upgrade on Existing Site (where existing assets lifecycle exceeded and requires replacement); May include Additional Treatment Requirements/Alternative Technologies; Existing or New Discharge Location to be identified
Option A5- New Greenfield Site	New WwTP on a new Greenfield Site; May include Additional Treatment Requirements/Alternative Technologies; Existing or New Discharge Location to be identified
Option A6 –Wastewater Load Transfer Solution	Considers the transfer of preliminary treated (screened) wastewater from existing site only i.e. does not include network diversion

Similarly, a separate list of unconstrained options specific to wastewater networks has been compiled and is presented in Table 1-2.

Table 1-2: Networks Unconstrained List of Options

Option	Description
1 – Do Nothing	Counterfactual used for screening exercise(s)
2 – Storm Separation	Impermeable and permeable contributing area separation from foul and combined network
3 – SuDS (including NbS)	Managing runoff to minimise the impacts on the network and local watercourse
4 – Infiltration/Tide Separation	Separating soil store infiltration and tidal ingress from the combined and foul network to reduce the burden on SWO discharge and WwTP treatment.
5 – Conveyance/Network Capacity	Upgrade existing network to increase capacity within the network
6 – System Optimisation	Optimise the existing network and ancillaries with robust RTC arrangements, pump controls and hydrobreaks.

7 – Flow Transfer	Utilize capacity by connecting and transferring flow between catchments and subcatchments.
8 – Online Storage	Upsizing existing network /asset to retain flow back in network and reduce downstream impact.
9 – Offline Storage	Additional storage volume is proposed to temporarily retain flows, allowing for controlled discharge back into the network via gravity, with a limited discharge rate or pump return mechanism.

It should be noted that not all of the agglomerations being assessed within the CWS have a 'verified' Drainage Area Plan (DAP) model. Therefore, some options such as Option 2 – Storm Separation and Option 3 - SuDS cannot be reasonably assessed across all agglomerations. This does not impact the overall strategy and recommendations within the CWS given that these are generally smaller agglomerations. Additionally, recommendations for future studies are given where appropriate. Similarly, this applies to Option 4 – Infiltration/Tide Separation for agglomerations where there is limited long term monitoring data.

The scale of this unconstrained options assessment is significant, with 714 Unconstrained Options identified for WwTPs alone. This large number of options underscores the thorough and exhaustive nature of the process, ensuring that no potential solution is overlooked. As the process moves forward into the Coarse and Fine Screening stages, this list of unconstrained options will be systematically evaluated and refined. The rigorous approach taken in this second stage ensures that the final selected solutions will be drawn from the widest possible range of options, increasing the likelihood of achieving optimal outcomes for the CMA's wastewater management strategy. This approach to option identification sets the stage for a robust and thorough evaluation process, ultimately leading to the selection of the most effective and sustainable solutions for the CMA's wastewater infrastructure needs.

1.3 Stage 3 – Coarse Screening of Long List of Options

The third stage of the Optioneering and Solutions Development process is a crucial phase that focuses on gaining a comprehensive understanding of the required works, enabling informed decision-making at the strategic level. This stage is characterized by a thorough evaluation of options, considering several key factors: resilience, deliverability, flexibility and sustainability.

- Resilience – Refers to the ability of the agglomeration to fulfil it's necessary processes at present and in the future.
- Deliverability – Refers to both the constructability and cost of any intervention. Design complexity, ease of implementation, and feasibility are all considerations made under this factor.
- Flexibility – Refers to the adaptability of any intervention, allowing for future expansion where required. Interventions can be considered within a phased approach to suit growing needs.
- Sustainability – Refers to the environmental impact of any intervention, both during and after construction. This includes both the relevant environmental regulations & standards, and also UÉ's key sustainability targets.

A Red-Amber-Green (RAG) matrix is employed to score the options systematically. This color-coded system provides a clear visual representation of each option's viability:

- Red: Options scored red against any screening criteria are deemed unfeasible or non-viable and are consequently scoped out of further consideration.
- Amber: Options receiving an amber score indicate potential challenges that may require mitigation measures or additional environmental assessments.

- Green: These options are considered the most promising and viable.

Options scored Green or Amber progress to Stage 4 of the process - Fine Screening. This subsequent stage involves a more in-depth desktop assessment, utilising a Multi Criteria Assessment (MCA) approach. The MCA is a structured methodology that allows for the evaluation of options against multiple, often conflicting criteria. This analysis aids in identifying a shortlist of preferred options.

By employing this systematic approach, the Optioneering and Solutions Development process ensures that only the most viable and promising options are carried forward for further consideration. This method not only streamlines the decision-making process but also enhances the overall quality and robustness of the final strategy.

The Coarse Screening Process has been strategically divided into a multi-phase approach, specifically two sub-phases, to enhance the efficiency and progression of the Optioneering process. Phase A and B are summarised below.

Table 1-3: Coarse Screening Process

Phase	
A	Network Coarse Screening Criteria (Technical)
	WwTP Unconstrained Options Criteria (Technical)
	WwTP Unconstrained Options Criteria (Environmental)
B	Screening of remaining options

Phase A: Technical and Environmental Screening

In this initial phase, options are evaluated based on technical and environmental criteria specifically tailored to the agglomeration, network, and/or Wastewater Treatment Plant (WwTP) under consideration. The primary objectives of Phase A are:

- To assess the technical feasibility of each option, considering factors such as engineering viability, technological requirements, and implementation challenges.
- To evaluate the potential environmental impacts and compliance with relevant environmental regulations and standards.

It is anticipated that a significant number of options will successfully pass this phase, as many will likely meet the basic technical and environmental criteria. This inclusive approach ensures that potentially viable solutions are not prematurely eliminated from consideration.

Key aspects of Phase A screening include:

- Compliance with relevant environmental legislation and permits
- Evaluation of capacity to meet current and projected demand
- Analysis of potential environmental impacts on local ecosystems and water bodies

Table 1-4 below outlines the RAG scoring criteria applied to each option during the Coarse Screening Phase A, specifically focusing on the technical aspects of WwTP screening.

Table 1-4: Coarse Screening Process - WwTP Unconstrained Options Criteria (Technical)

Options	Scoring Criteria
A0 – Do Nothing	Red if capacities exceeded or non-compliant; Green if capacities not exceeded and compliant.

A1 – Minimal Upgrade Process Optimisation	Red for significant capacity exceedance or expired asset life; Amber for moderate exceedance or uncertain asset life; Green for minor exceedance and compliant asset life.
A2 – Plant Upgrade Reusing Existing Assets and Existing Discharge Location	Red if capacities not exceeded or insufficient land; Amber if capacities exceeded but land limited; Green if capacities exceeded with sufficient land and manageable discharge limits.
A3 – Plant Upgrade Reusing Existing Assets with Alternative Discharge Location	Similar to A2, but considers stricter future discharge limits for Green rating.
A4 – New Treatment Process/Plant Upgrade on Existing Site	Red if capacities are not exceeded or land unavailable; Amber if capacities exceeded but constraints exist; Green if capacities are exceeded with sufficient land and manageable discharge limits.
A5 – New Greenfield Site	Red if capacities are not exceeded or sufficient land availability at existing site; Amber capacities exceeded but insufficient land availability at existing site; Green if capacities are exceeded and insufficient land availability at existing site.
A6 – Wastewater Load Transfer	Red if population equivalent >5,000 or no nearby network; Amber if <5,000 PE and network within 10km; Green if <5,000 PE and network within 5km.

Table 1-5 below outlines the RAG scoring criteria applied to each option during the Coarse Screening Phase A, specifically focusing on the technical aspects of network screening.

Table 1-5: Coarse Screening Process - Network Coarse Screening Criteria (Technical)

Options	Scoring Criteria
A1 - Do Nothing	Assessed based on network capacity. Red if insufficient, Green if sufficient or no issues.
A2 - Storm Separation	Evaluates watercourse proximity, existing storm network capacity, and separation potential. Red for no nearby watercourse or combined system, Amber for limited capacity or partial separation, Green for nearby watercourse and sufficient capacity.
A3 - SuDS	Considers system separation potential, overflow issues, and available space. Red if already separated or no space, Amber for limited opportunities, Green for partial/combined systems with separation potential and available space.
A4 - Infiltration / Tide Separation	Assesses infiltration source identification and tidal ingression. Red if source not identified or no tidal issues, Amber for limited infiltration, Green for significant infiltration potential or tidal ingression issues.
A5 - Conveyance / Network Capacity	Evaluates upgrade length and downstream capacity. Red for extensive upgrades or no capacity, Amber for limited capacity, Green for available capacity and minor upgrades.
A6 - System Optimisation	Considers local capacity and optimisation potential. Red for no capacity or opportunity, Amber for limited capacity, Green for sufficient local capacity to meet overflow drivers.
A7 - Flow Transfer	Assesses adjoining network capacity and distance. Red for no capacity or distant networks, Amber for limited capacity within 5-10km, Green for sufficient capacity within 5km.

A8 - Online Storage	Evaluates required storage volume, upgrade length, and urban constructability. Red for large storage needs or difficult construction, Amber for moderate storage needs, Green for manageable storage requirements and feasible construction.
A9 - Offline Storage	Considers storage volume, land availability, and downstream capacity. Red for large storage needs or no land, Amber for moderate needs with some constraints, Green for manageable storage with available land and capacity.

Following the technical screening, remaining options undergo environmental evaluation. This phase incorporates both Strategic Environmental Assessment (SEA) and Habitats Directive Appropriate Assessment (AA) considerations, appropriate for this early stage of options assessment.

Table 1-6 below demonstrates the RAG scoring criteria that was applied for each option during Coarse Screening Phase A - Environmental Coarse Screening Scoring. Criteria may include impacts on protected habitats, water quality, biodiversity, and compliance with environmental regulations. This approach ensures that environmental considerations are integrated early in the decision-making process, aligning with SEA and AA principles while efficiently identifying environmentally sustainable options for further evaluation.

Table 1-6: Coarse Screening Process Environmental Coarse Screening Scoring

Scoring	Description
R	High risk – mitigation likely to be difficult or not possible
A	Moderate risk - mitigation possible
G	Acceptable/Compliant
N/A	Likely to have a neutral effect or not applicable
?	Effects uncertain or not possible to assess at this stage

Phase B: Comprehensive Criteria Screening

Remaining options are then taken to Phase B, where a further coarse screening exercise is undertaken. Options that successfully pass the technical and environmental criteria in Phase A progress to Phase B. This second phase involves a more rigorous and multifaceted evaluation against a broader range of criteria.

By implementing this Coarse Screening Process, we can more effectively identify and prioritise options that not only meet technical and environmental requirements but also align with broader strategic, economic, and social objectives. This approach significantly enhances the overall quality and robustness of the Optioneering process.

We assessed **714 different options** for WwTPs during Stage 3 - Coarse Screening

The comprehensive screening process evaluated 714 distinct options across three strategy horizons for the WwTPs, including considerations for imports from nearby facilities. Of these, 237 options successfully passed the coarse screening stage and progressed to fine screening.

The assessment revealed a notable shift in viable options across different time horizons. In the 2030 scenario, short-term solutions, specifically Options A1 and A2, passed the screening process. However, these same options proved inadequate when evaluated against the 2080 strategy horizon. This rejection primarily stemmed from concerns regarding the limited design life of existing assets and the necessity for a more sustainable, long-term approach.

Consequently, the 2080 scenario favoured Options A4, A5, and A6, which demonstrated a higher pass rate in the coarse screening process. This trend underscores the critical importance of considering extended timeframes and the longevity of infrastructure investments in future planning. The analysis highlights the need for adaptive strategies that can meet both immediate needs and long-term sustainability goals in wastewater treatment infrastructure development.

1.4 Stage 4 – Fine Screening Criteria & Methodology

Fine Screening is a crucial step in the option evaluation process, following the initial Coarse Screening phase. This stage involves a more comprehensive desktop assessment of the options that have successfully passed the initial screening. The primary tool used in this process is the Multi Criteria Assessment (MCA).

The objective of MCA and Fine Screening is to determine potential benefits and impacts of options across key criteria, enable comparison of multiple factors simultaneously, and assess options relative to each other. This approach allows for a holistic evaluation. The comprehensive nature of this process requires a more in-depth analysis of each option, examining their potential benefits and impacts against the established key criteria.

The MCA process is based on the Uisce Éireann Multi-Criteria Analysis Model for Wastewater (AMS-AMT-FM-038 methodology, which has been customised to provide a structured and transparent approach, inform the decision-making process, and minimize subjectivity to the extent possible. A key feature of this methodology is its consideration of both monetary and non-monetary objectives, recognizing the influence of various factors on decision-making. This allows for a balanced evaluation of diverse criteria, ensuring a thorough assessment of each option. The Criteria Scoring Description and its weighting can be found in Table 1-7.

Table 1-7: Criteria Scoring Description & Weighting

Objectives	Criteria	Description	Weighting
Addressing the Need	Treatment Capacity	Uisce Éireann supports social and economic growth through the provision of wastewater services and is committed to optimising treatment and storage capacity to cater for planned growth in line with the National Planning Framework and subject to constraints.	1.11
	Network Capacity	Uisce Éireann supports social and economic growth through the provision of wastewater services and is committed to providing network connectivity to cater for planned growth in line with the National Planning Framework and subject to constraints.	1.03
	Final Effluent Compliance	Compliance of the wastewater treatment process under the new requirements under recast UWWTD and Wastewater Discharge Authorisation Regulations is assessed.	1.15
Deliverability	Design Complexity, Ease of Implementation & Feasibility	*Design Complexity*: Does the proposed option require significant future studies (feasibility, site investigation, planning and infrastructure modification)? Is the proposed option a commonly installed/implemented solution? *Ease of Implementation*: Can the proposed be implemented safely and feasibly without the	1

		requirement of complex construction activities and community/environmental interaction? *Feasibility*: Is the proposed option feasible to install - is there sufficient land availability and site suitability to improve feasibility and implementation of the proposed option?	
	Planning & Regulation	A measure of the satisfaction of relevant legislations and legal requirements in order to ensure success in the planning phase. Are there constraints around land ownership, type and availability? Consideration of: Zoning, Land Ownership, Land Contamination, Environmental Zoning and Constraints Proximity, Planning Policies and Objectives, Planning Consent Route, Planning History.	1
	Delivery Timeline & Alignment	Alignment: A measure of the synergy with UÉ's broader investment portfolio; and synergies between different assets and processes that UÉ use. Does the option utilise existing technologies and systems? Are there other synergies with other interventions, undertaken by Uisce Éireann for example sludge treatment and resource recovery initiatives.	1
Risk & Resilience	Flexibility & Scalability	Prioritise a flexible approach to enable UÉ to adapt its approach to project delivery to evolving needs. Is it possible to adapt/scale the option once delivered to meet any future changes? Does the option allow phased or incremental delivery of the intervention?	1
	Delivery Risk	There are benefits associated with a simple and safe approach to construction and operation, in order to ensure successful construction and delivery phases of projects. This criteria considers if there are construction uncertainties due to land stability or contamination risk, risk to disruption of other Uisce Éireann operations and the complexity of the solution.	1
Customer and Stakeholder Support	Impact on Customers	The collection, storage and treatment of wastewater has the potential to have a negative impact on customer well-being and experience. Does the option create any barriers in relation to proximity to populated areas, odour, noise and	1

		aesthetics? Are new community benefits provided?	
	Community Support, Health and Wellbeing	The impacts of UÉ investments on local communities, as well as the public perception of the investment e.g., broad-based public endorsement, extensive stakeholder collaboration, or added community amenities). The health and other impacts of UÉ investments on local people including improving community health, safety, and wellbeing, addressing major risk factors or providing robust enhancements to local living conditions and public facilities including to Shellfish Waters or Bathing Waters.	1
Environmental & Sustainability	Water Environment	Prevent deterioration of the WFD status of waterbodies regarding quality and quantity due to discharges of wastewater from treatment plants. Contribute towards the "no deterioration" WFD condition target and restore and improve waterbody status to meet WFD and RBMP objectives. Consider if flood risk to property is increased due to change to base river flows.	1.15
	Waterbody Impact (Existing and New)		
	Waterbody Flood Risk		
	Biodiversity	Consider how option protects and enhances terrestrial and aquatic biodiversity and habitat connectivity, with regard for Natura 2000 sites and nationally designated sites and protected species. Does option support Biodiversity Action Plan (BAP) commitments to achieving Biodiversity Net Gain minimising loss of habitat and optimising benefits.	1.15
	AA-Natura 2000 Sites		
	Aquatic Biodiversity		
	Terrestrial Biodiversity (BNG)		
	GHG Emissions	Considering all carbon aspects—construction materials (embodied), ongoing operations (energy, chemicals), and total lifecycle—does this option increase or decrease overall GHG emissions relative to today's baseline? Uisce Éireann's key sustainability targets: 51% absolute reduction in GHG emissions by 2030, Net Zero Carbon by 2040, 40% energy demand met by installed renewables by 2035.	0.96
	Embodied Carbon		
	Operational Carbon		
	Whole Life Carbon		
	Energy Efficiency	Uisce Éireann have a 50% energy efficiency improvement target in the delivery of services by 2030. This criteria shall be used to assess the energy efficiency of proposed option noting that this does not result in a net reduction of energy consumption but an improvement in the use of energy.	0.96
	Climate Resilience	Uisce Éireann should ensure a climate-resilient wastewater service by identifying and assessing climate risks and implementing physical and non-physical solutions ('adaptation solutions') that	0.89

		substantially reduce the most important physical climate risks that are material to wastewater services, assets and their surrounding areas.	
	Circular Economy	Uisce Éireann has the opportunity to contribute to carbon neutrality and circular economy by optimising the re-use of materials. This includes energy recovery and nutrient recovery from wastewater treatment for use. This also includes the re-use of construction materials. Does the option promote circular economy principles (material reuse, energy recovery, nutrient recycling)? Is waste minimised? Does the option contribute to carbon neutrality?	0.78

The criteria listed in the above table is for each option is subject to rigorous and objective assessment using uniform scoring criteria, based on best publicly available datasets. The scoring mechanism employs a seven-point Likert scale, ranging from -3 to 3 for each criterion, as set out in Table 1-8. This scale provides a nuanced approach to evaluation, allowing for an assessment of both positive and negative aspects of each Option.

Table 1-8: MCA Grading System

Criteria Scoring	Description
-3	The option significantly worsens the wastewater system and/or environment compared to the strategy timeline.
-2	The option moderately worsens the wastewater system and/or environment compared to the strategy timeline.
-1	The option slightly worsens the wastewater system and/or environment compared to the strategy timeline.
0	The option has no effect on the wastewater system and/or environment compared to the strategy timeline.
1	The option slightly betters the wastewater system and/or environment compared to the strategy timeline.
2	The option moderately betters the wastewater system and/or environment compared to the strategy timeline.
3	The option significantly betters the wastewater system and/or environment compared to the strategy timeline.

Capital Expenditure (CAPEX) and Operational Expenditure (OPEX) costs are estimated for each Option to determine the Whole Life Cost for all options passed through Coarse Screening. A point grading system has been developed to rank options based on:

- Estimated CAPEX
- Estimated OPEX
- Whole Life Costs (WLC): based on a 50-year life cycle; repair, maintenance and replacement cost and inflation not included

Stage 1 of the Optioneering and Solutions Development process identified the projected 2080 wastewater treatment demand to be less than 5,000PE for 20 of the 26 sites within the study area, with the remaining sites having a projected demand of over 25,000PE. Therefore, two cost scoring grading systems have been developed in order to benchmark and compare options for smaller sites and larger sites. Using the same

scoring system would not provide the level of differentiation required to identify preferred solutions for smaller sites. Additionally, cost advantages/disadvantages of identified strategic solutions would not be differentiated without a separate scale. For the purpose of this assessment, small-medium sites are considered to be any WwTP with an existing capacity less than 5,000PE. The Cost Scoring Matrices for small-medium and large sites implemented within the fine screening process are shown in Tables 1-9 and 1-10 below.

Table 1-9: Small-Medium Scale Cost Scoring Matrix

Score	CAPEX (€)	OPEX (€/yr)	WLC (€)
1	+€50.0m	+€750,001	+€87.5m
2	€25.0m - €50.0m	€500,001 - €750,000	€50.0m - €87.5m
3	€10.0m - €25.0m	€250,001 - €500,000	€22.5m - €50.0m
4	€5.0m - €10.0m	€100,001 - €250,000	€10.0m - €22.5m
5	€2.5m - €5.0m	€50,001 - €100,000	€5.0m - €10.0m
6	€0.5m - €2.5m	€20,001 - €50,000	€1.5m - €5.0m
7	€0 - €0.5m	€0 - €20,000	€0 - €1.5m

Table 1-10: Large Scale Cost Scoring Matrix

Score	CAPEX (€)	OPEX (€/yr)	WLC (€)
1	€500m	€7.25m	€862.5m
2	€250m - €500m	€4.75m - €7.25m	€487.5m - €862.5
3	€100m - €250m	€2.75m - €4.75m	€237.5m - €487.5
4	€50m - €100m	€1.25m - €2.75m	€112.5m - €237.5
5	€25m - €50m	€0.75m - €1.25m	€62.5m - €112.5
6	€10m - €25m	€0.5m - €0.75m	€35.m - €62.5
7	€0 - €10m	€0m - €0.5m	€0 - €35.0

CAPEX, OPEX and Whole Life Cost are each assigned a weighting of 0.14 when undergoing the MCA. Upon completion of the assessment for all criteria, a final score is assigned to each Option. This cumulative score serves as a quantitative measure of the Option's overall performance across all evaluated criteria. The final score facilitates a direct comparison between Options, aiding decision-makers in identifying the most promising solutions.

It is important to note that while this scoring system provides a valuable quantitative basis for comparison, it should be considered alongside qualitative assessments and expert judgment to ensure a holistic evaluation of each Option.

It's important to note that options which initially passed the coarse screening stage may still be eliminated during fine screening if a more thorough assessment reveals unsuitability. This iterative process ensures that only the most promising options progress through each stage of evaluation.

High-scoring options from the fine screening process are subsequently advanced for further scrutiny in the final assessment of the feasible approaches. This rigorous examination aims to identify the recommended approach that best meets the project's objectives and constraints.

In cases where options perform poorly against specific sub-criteria, the potential for design modifications or mitigation measures to address these shortcomings is carefully considered. This approach allows for the refinement and improvement of options that may initially appear less favourable but have the potential for

enhancement. If there is any uncertainty regarding the feasibility of a particular option, it is carried forward to the Feasible Approach list, with associated risks clearly identified. This practice aligns with the general aim of retaining options for further consideration unless there is unequivocal justification for their removal. By retaining options where there is uncertainty or potential for issues to be addressed through design or mitigation, the process maximizes the likelihood of identifying the best overall outcome as the Recommended Approach.

The Screening process produced **211 Options** for the WwTPs in the CMA. These Options or a combination of these Options are then appraised and selected as **Feasible Approaches** to ultimately select our **Recommended Approach**

1.5 Stage 5 – Final Assessment of Short List

The fifth and final stage of the Optioneering and Solutions Development process is to develop the feasible approaches and assess them against bespoke criteria. This facilitates the consideration of long-term strategic plans and enables the identification of potential option combinations. By aligning the assessment with broader strategic objectives, the process ensures that selected options not only address immediate needs but also contribute to long-term sustainability and efficiency.

Recognising the significance of interactions and interdependencies among all individual catchments within the CMA, we have segmented the CMA into smaller, interconnected sub-catchments, each comprising of multiple WwTPs. The development of Feasible Approaches for the CMA has been achieved through a strategic combination of individual options from each agglomeration within a sub catchment. Building on the outcomes of the MCA, optimisation of options for each agglomeration were considered to develop feasible approaches. This process has been further enhanced by incorporating options from agglomerations that are likely to have significant interactions with one another. By considering potential interactions between different areas, we have created a more integrated and efficient set of approaches that aim to maximise benefits across the entire CMA.

For each Feasible Approach, a high level analysis is conducted along with associated high level cost estimates. It's important to note that at this stage, the designs, costings, and environmental assessments are primarily desk-based and conducted at a plan level. These initial assessments provide a solid foundation for decision-making, while recognising that further refinement and detailed analysis will occur at the project level.

The cost estimation process encompasses both construction and operational costs, providing a high level overview of the financial implications of each option. This approach to costing ensures that decision-makers have a better understanding of both short-term and long-term financial commitments associated with each option.

The final assessment of options to develop Feasible Approaches is designed to interact seamlessly with the development goals of the CMA. This interaction is crucial for considering long-term strategic plans and identifying potential option combinations that can address wastewater treatment needs in an optimal manner.

This final stage of the optioneering process sets the stage for informed decision-making. By combining detailed technical assessments, cost estimations, and environmental and social valuations, it provides a comprehensive basis for selecting the Recommended Approach. The process acknowledges the need for further development at the project level, ensuring that the selected options remain flexible and adaptable to more detailed scrutiny and changing circumstances.

The outcome of this stage not only determines the most suitable approaches for implementation but also lays the groundwork for future detailed planning and execution. It represents the culmination of a thorough, multi-faceted evaluation process, designed to identify solutions that are technically sound, economically viable, environmentally sustainable, and socially responsible.

2 Results of Optioneering and Feasible Approaches

2.1 Overview

Following the optioneering process

- 714 Options were developed as a List of Unconstrained Options
- 237 Options passed through Coarse Screening
- 211 Options were passed through Fine Screening
- Utilising a combination of Options from each agglomeration, 30 Feasible Approaches were developed across 11 sub-catchments
- 1 Recommended Approach

A summary graph is included below.

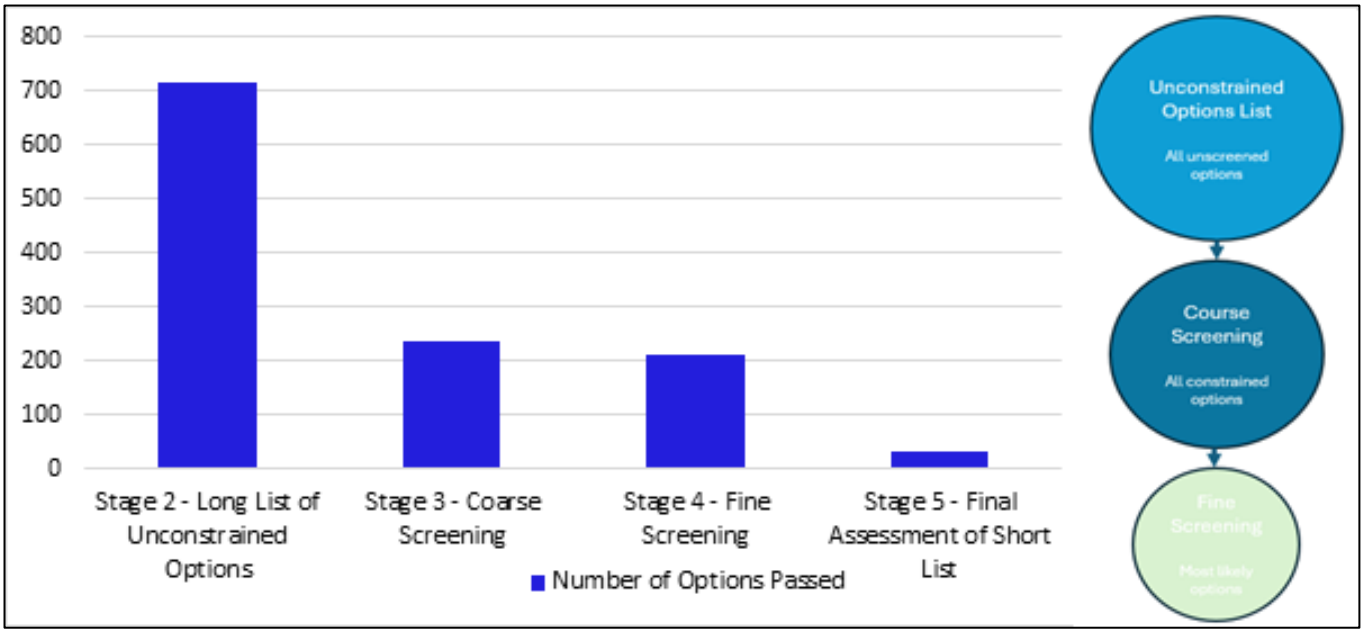


Figure 2-1: Summary of Optioneering Outputs

This section examines the outcomes of the optioneering phase and the identification of the **Recommended Approach** for individual sites and the region collectively. It is a concise summary of the key information gathered during our assessment process. Information obtained in WwTP assessments, network investigations, environmental and planning evaluations that are presented here have been carefully selected for their significant impact on decision-making processes related to the CWS.

Recognising the significance of interactions and interdependencies among all individual catchments within the CMA, we have segmented the CMA into smaller, interconnected sub-catchments, each comprising of multiple WwTPs. Settlements not currently served by a WwTP but that are incorporated into the overall strategy are included here such as Monard, Ballymore and Leamlara. The results for each WwTP are independently evaluated and analysed, with Feasible Approaches and the ultimate Recommended Approach determined by considering the entire sub-catchment, accounting for the dependencies and interactions among all WwTPs within that area.

The sub catchments are shown below in Figure 2-2 and Table 2-1.

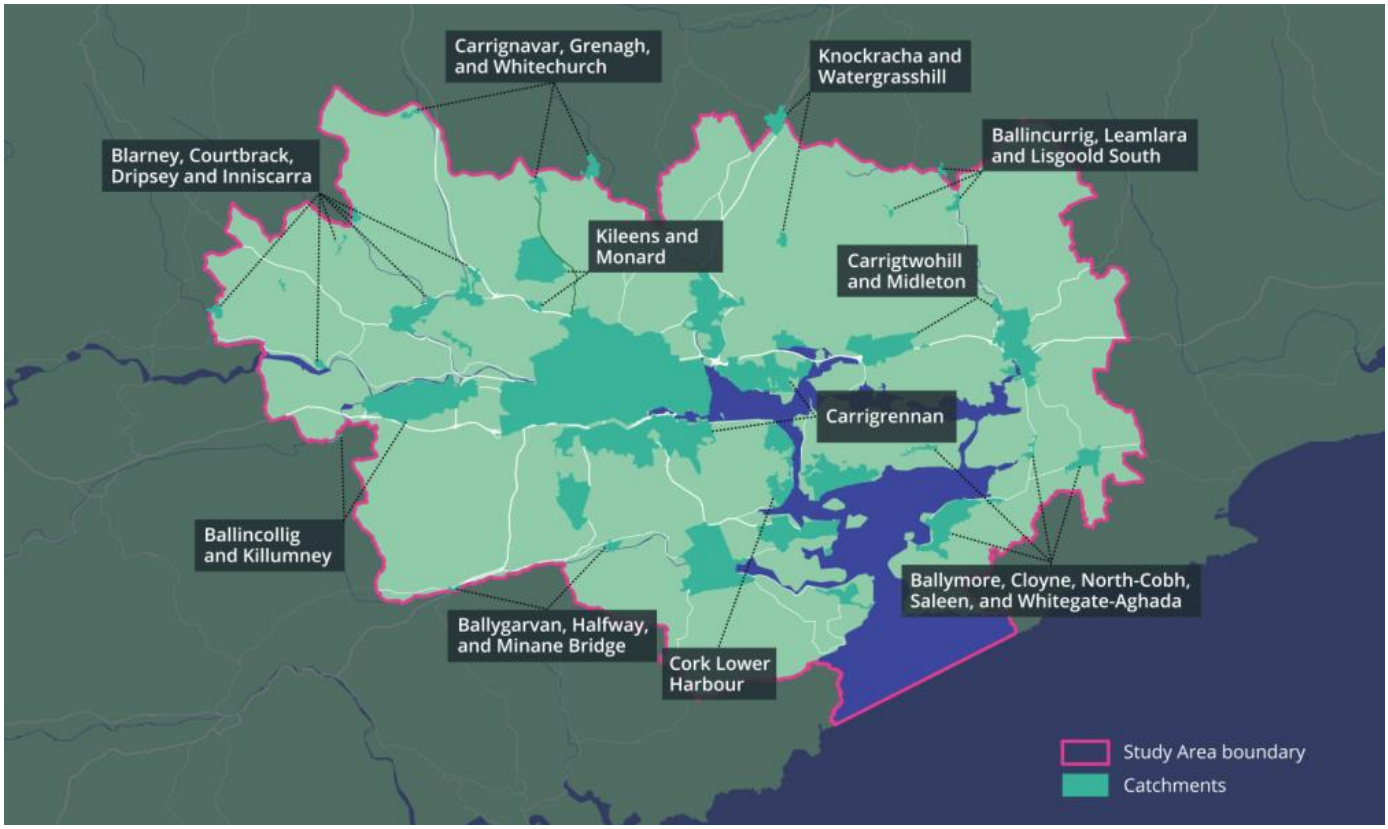


Figure 2-2: Sub Catchments within the CMA

Table 2-1: Sub Catchments within the CMA

Sub Catchment	Agglomerations
Sub Catchment 1	Blarney WwTP
	Courtbrack WwTP
	Dripsey WwTP
	Inniscarra WwTP
Sub Catchment 2	Kileens WwTP
	Monard
Sub Catchment 3	Carrignavar WwTP
	Grenagh WwTP
	Whitechurch WwTP
Sub Catchment 4	Knockraha WwTP
	Watergrasshill WwTP
Sub Catchment 5	Carrigrennan WwTP
Sub Catchment 6	Ballygarvan WwTP
	Halfway WwTP
	Minane Bridge (River Valley) WwTP
Sub Catchment 7	Ballincollig WwTP
	Killumney WwTP
Sub Catchment 8	Cork Lower Harbour WwTP
	Carrigtwohill WwTP

Sub Catchment 9	Midleton WwTP
Sub Catchment 10	Ballymore
	North Cobh WwTP
	Cloyne WwTP
	Saleen WwTP
	Whitegate – Aghada WwTP
Sub Catchment 11	Ballincurrig WwTP
	Leamlara
	Lisgoold South WwTP
	Lisgoold North WwTP

Following the optioneering phase, several potential Feasible Approaches have been identified for each sub-catchment. These solutions incorporate the highest-scoring options derived from the MCA. Each Feasible Approach undergoes thorough analysis and consideration, taking into account the broader context of the CWS. This method ensures that the final Recommended Approach is not only optimal for the individual sub-catchment but also aligns with and supports the overarching objectives of the CWS. This approach ensures a holistic assessment of the region's wastewater management needs and opportunities.

2.2 Sub Catchment 1 - Blarney, Courtbrack, Dripsey, and Inniscarra

2.2.1 Blarney

Introduction

Blarney WwTP is located approximately 9.5 km northwest of Cork City and provides wastewater services to the town of Blarney. An upgrade of the works was commissioned in 2013 and Cork County Council operate and maintain the Blarney WwTP on behalf of Uisce Éireann.

Blarney WwTP comprises of preliminary and secondary treatment and underwent an M&E upgrade in 2022. This upgrade includes new inlet pumps, a Fine Bubble Diffused Aeration (FBDA) system, and associated blowers. The wastewater treatment process is a conventional activated sludge process (ASP). There is also sludge treatment on-site consisting of thickening and sludge dewatering. The treated wastewater is discharged into the Shournagh river.

The existing wastewater treatment process is failing to achieve the discharge requirement specified within the WWDL.

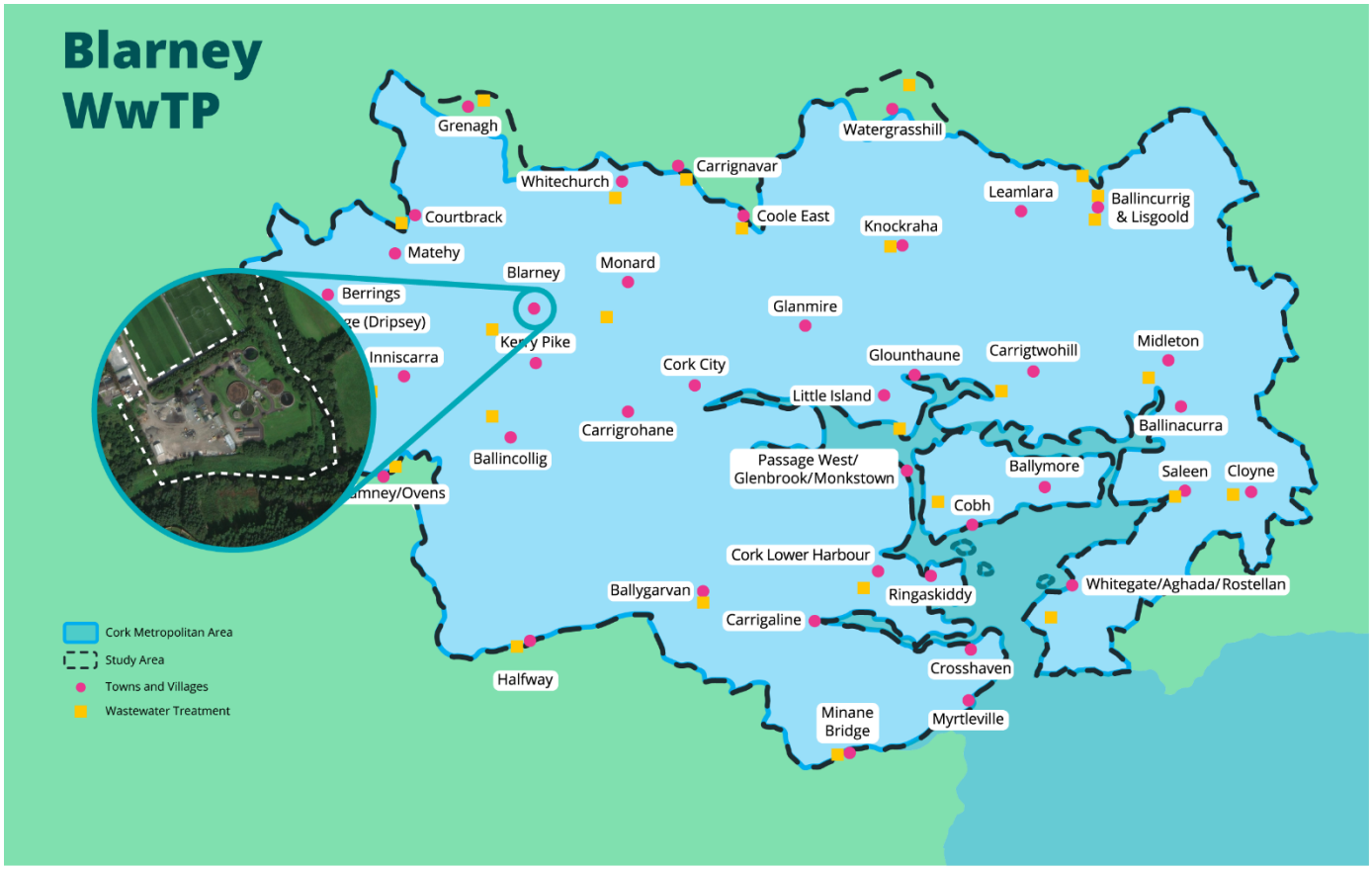


Figure 2-3: Blarney Location

Table 2-2: Blarney WwTP Details

Design Organic PE	Storm Management	Inlet Works	Primary Treatment	Secondary Treatment	Tertiary Treatment	Chemical P Removal	Sludge Treatment	Installation Date
13,000	Storm Tank	Screening & Grit Removal	n/a	ASP	n/a	Ferric	Thickening & Dewatering	2013 (M&E 2022)

Table 2-3: Current and Projected Organic (PE) and Hydraulic Loading at Blarney WwTP

Parameter	Existing Capacity	Current (2024) Loading	2030	2055	2080
Organic Loading (PE)	13,000	10,150	13,724	23,640	26,939
Peak Hydraulic Loading (m^3/d)	2,925	8,166	6,683	10,451	12,678

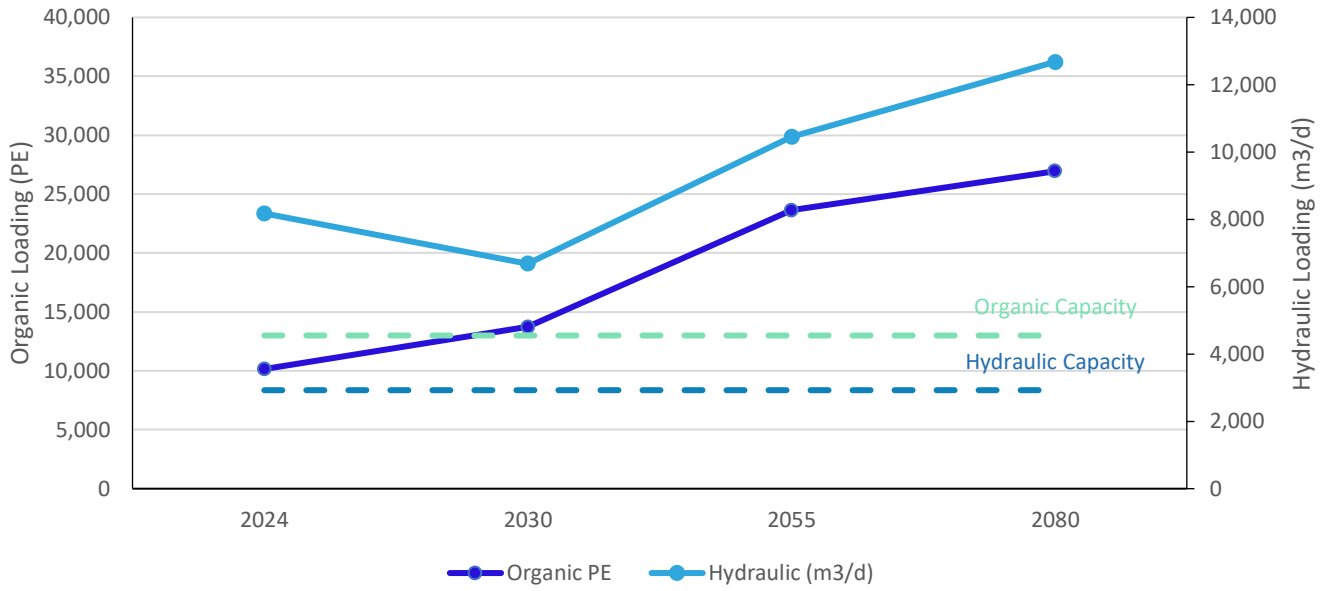


Figure 2-4: Current and Projected Loadings at Blarney WwTP

Current and Projected Discharge Limits

Following water quality modelling conducted at the existing WwTP discharge point, environmentally sustainable discharge limits based on compliance with the appropriate WFD Environmental Quality Standards (EQS) have been determined based on projected population equivalent (PE) loading to the WwTP across the current and future Strategy horizons. The environmentally sustainable discharge limits for these scenarios have been summarised in Table 2-4.

Table 2-4: Existing WWDL ELVs and Environmentally Sustainable Discharge Limits at Blarney WwTP

Parameter	Existing ELVs	2030 Environmentally Sustainable Discharge Limits	2055 Environmentally Sustainable Discharge Limits	2080 Environmentally Sustainable Discharge Limits
BOD	20 mg/l	4 mg/l	3 mg/l	2 mg/l
Ammonia	1.5 mg/l	0.2 mg/l	0.2 mg/l	0.1 mg/l
OrthoP	0.8 mg/l	0.1 mg/l	0.1 mg/l	0.1 mg/l
More Stringent?	-	Y	Y	Y

Summary of Observed Constraints

As part of the delivery of this Strategy, advancement of the Optioneering Process assessed potential Network, Ecological, Environmental and Planning constraints that may impact the development of feasible approaches. Key findings pertinent to this catchment have been summarised below:

Network Constraints

A separate assessment of the existing wastewater network for this agglomeration, including maps and drawings illustrating the location of constraints has been undertaken as part of the Network Modelling Report which is included in Appendix 4.

The network assessment has identified flooding and surcharging in the main trunk of the network under both current and all future scenarios, based on modelled results. If no interventions are undertaken, future

scenarios show a worsening trend, with increased levels of network flooding and surcharging. Overall, the network is under significant pressure and will require substantial upgrades, regardless of the final WwTP solution selected.

Environmental and Ecological Constraints

The discharge location waterbody is River Shournagh_030 (River Shournagh) with Moderate WFD Status (cycle 3 2016-2021), on the High Status Objective list and classified as At Risk (2022). No European designated sites (SPAs and SACs) are located in proximity or with direct pathways to the current WwTP and the discharge location is more than 10 km away from the nearest SPA/SAC. Two National designated sites, Shournagh Valley pNHA (includes sections of the Shournagh River) and Lee Valley pNHA (includes sections of valley of the River Lee) are located 1.5 km and 3.5 km respectively downstream from the discharge. Cork City Water Supply freshwater abstraction (Abstract River Lee) is located approximately 10 km downstream from the current discharge location. In the past five years there have been some odour complaints within 500 m of the plant.

Planning Constraints

The planning assessment has identified no zoning constraints or planning restrictions surrounding the site boundary.

Coarse Screening

The coarse screening was undertaken on the unconstrained list of options at Blarney WwTP, which are shown in Table 1-1, as per the methodology outlined in Section 1.3. To provide context for the coarse screening results, which are outlined in Table 2-5, commentary on the coarse screening exercise is provided below.

- Option A0 (Do Nothing) has not been considered as a feasible option for the 2080 strategy horizon as the existing WwTP will be over capacity and not achieving the discharge requirements as set in the WWDL.
- Option A1 (Do Minimum – Process Optimisation) has been shortlisted in the short term due to a projected 5.5% capacity increase in the 2030 horizon, with the potential to meet current WWDL requirements. However, it does not meet WQM environmentally sustainable discharge limits. The option has not been considered for the 2080 strategy horizon, as both organic and hydraulic capacities are currently being exceeded, and the existing assets will surpass their service life after 2055.
- Option A2 (Reuse with Investment – Existing Discharge Location) has been screened out for the 2080 strategy horizon as the existing assets will have exceeded their design life.
- Option A3 (Reuse with investment – New Discharge Location) was considered for the 2030 and 2055 strategy horizons as part of a phased approach to necessitate the 2080 strategy, as the existing assets are expected to have sufficient remaining service life. A capacity upgrade of approximately 750 PE is required to be initiated in the 2030 horizon, increasing to around 10,650 PE in the 2080 strategy horizon. The existing treatment process is likely to remain suitable for future needs. An alternative discharge location is proposed to reduce treatment intensity—specifically, a site downstream of the Ballincollig WwTP within the River Lee. However, WQM data for Ballincollig suggests that the environmentally sustainable discharge limit requirements are likely to be stringent in this upstream stretch of the river. It is important to note that this section of the river is upstream of a drinking water abstraction point, posing a potential risk to water supply. As a result, additional tertiary and quaternary treatment requirements may be necessary by 2045.
- Option A4 (New Treatment Process on Current Site with New Discharge) was considered in the 2080 strategy horizon as the existing treatment process is unlikely to remain suitable for future needs. A new

discharge location was recommended to be identified due to stringent environmentally sustainable discharge limit requirements.

- Option A5 (New Greenfield Plant with New Discharge) was considered in the 2080 strategy horizon as the existing treatment process is unlikely to remain suitable for future needs and site expansion is likely required. However, land availability constraints were not identified and so the option was progressed as amber, requiring additional planning and feasibility assessment in the Fine Screening stage. A new discharge location was recommended for the reasons outlined above.
- Option A6 (Wastewater Load Transfer) is considered feasible for each strategy horizon, as the existing plant will already exceed its organic and hydraulic capacity projections in the 2030 strategy horizon. Additionally, the existing assets are projected to surpass their service life after the 2055 horizon. However, the existing WwTP lacks adequate stormwater storage. Further route assessment is required to determine the most viability transfer solution.

Table 2-5: Coarse Screening Output

Coarse Screening Results							
Long List of Options	**A0**	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**
2080	**N**	**N**	**N**	**N**	**Y (New Discharge Location)**	**Y (New Discharge Location)**	**Y**
2055	**N**	**N**	**Y**	**Y**	**N**	**N**	**Y**
2030	**N**	**Y**	**Y**	**Y**	**N**	**N**	**Y**

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening

Any options for the strategy horizon years of 2030 and 2055 should facilitate implementation of the longer term 2080 preferred solution and should not compromise the ability to implement this. Further option defining is undertaken in order to undertake the MCA fairly and adequately. Alternative final effluent discharge locations were identified using the same WQM methodology and consider current river discharge conditions. Transfer solutions consider the additional capacity/ability of surrounding existing WwTPs to accept transferred wastewater and the potential impact on their existing or proposed discharge locations. At this stage of optioneering, routes were selected based on conservative routing assumptions and it is important to note that a full route selection process was not undertaken. Routes ensure minimal impact on the public and the environment and reduce delivery risk associated with land acquisition and planning requirements. The options progressed to fine screening are outlined in Table 2-6.

Table 2-6: 2080 Options Advancing to Fine Screening

Options Progressed to Fine Screening for 2080	Description
A4	New Treatment Process on Current Site with New Discharge to existing Carrigrennan Outfall
A5	New Greenfield Plant with New Discharge to the River Lee
A6	Wastewater Load Transfer to Carrigrennan WwTP via a Dedicated Transfer Pipeline

Fine Screening

The options presented in Table 2-6 underwent fine screening in the form of an MCA as detailed in Section 1.4. The scoring and results of the MCA are presented in Table 2-7.

Table 2-7: MCA Results for Blarney WwTP

Objectives	Criteria	Option A4	Option A5	Option A6
Addressing the Need	Treatment Capacity	3	3	2
	Network Capacity	2	2	3
	Final Effluent Compliance	3	3	3
Deliverability	Design Complexity, Ease of Implementation & Feasibility	-2	-3	-2
	Planning & Regulation	-1	-2	-1
	Delivery Timeline & Alignment	-1	-2	1
Risk & Resilience	Flexibility & Scalability	1	2	-1
	Delivery Risk	-2	-2	-2
Customer and Stakeholder Support	Impact on Customers	1	1	3
	Community Support, Health and Wellbeing	-1	-1	2
Environmental & Sustainability	Water Environment	2	2	3
	Waterbody Impact (Existing and New)	2	2	3
	Waterbody Flood Risk	0	0	-2
	Biodiversity	-1	-2	-2
	AA-Natura 2000 Sites	0	0	0
	Aquatic Biodiversity	2	2	-2
	Terrestrial Biodiversity (BNG)	-1	-2	0
	GHG Emissions	-0.5	0	1
	Embodied Carbon	-3	-2	-1
	Operational Carbon	2	2	3
	Energy Efficiency	2	2	3
	Climate Resilience	2	2	3
	Circular Economy	-1	-1	1
Weighted Average Sub Total		**0.42**	**0.15**	**1**
Cost	CAPEX	4	3	4
	OPEX	5	5	6
	Whole Life Cost	4	4	4
Combined Score		**2.27**	**1.86**	**3.00**
Rank		**2nd**	**3rd**	**1st**

The MCA concluded that Option A6 ranks first against the fine screening criteria for the 2080 horizon and is more cost-effective to implement than Options A4 and A5. When considering 2080 in isolation, all existing assets would require replacement unless phased upgrades are undertaken in earlier planning periods. For the 2055 horizon, Option A6 also scores highest in terms of asset reuse potential and circular economy with a consolidated wastewater collection and biosolids treatment at Carrigrennan WwTP presenting a greater resource recovery efficiency opportunity (biogas recovery and fossil fuel reduction).

Wastewater Treatment Summary

The optioneering process for Blarney WwTP has yielded recommendations for future development:

The highest ranked option ultimately involves transferring wastewater to Carrigrennan WwTP via a dedicated transfer pipeline (Option A6). This approach addresses receiving waterbody quality concerns and risks, and circular economy by consolidating treatment at a centralised location and improves overall treatment efficiency whilst simultaneously protecting the environment and ecological boundaries. This strategy ensures long-term sustainability by leveraging existing treatment facilities at Carrigrennan WwTP and protecting inland rivers sensitive to climate change.

This approach addresses several critical challenges at the Blarney WwTP, including flooding and surcharging of the main network trunk under both current and future scenarios, as indicated by the network model; vulnerability of aquatic ecology due to the frequency and quality of overflows.

Wastewater Network Upgrade Summary

A separate assessment of network upgrades for this agglomeration has been undertaken as part of the Network Modelling Report which is included in Appendix 4. Below is a brief overview of the proposed upgrades within the Blarney catchment, addressing SWO compliance and future development constraints such as surcharge and flooding due to development impacts. Unless otherwise stated specifically, these proposed upgrades are proposed to be initiated in the 2030 strategy horizon. The development process of these proposed upgrades, as well as maps and drawings illustrating the location of the required upgrades are provided in more detail in the Network Modelling Report in Appendix 4.

Storage at Gothic Bridge WwPS: Additional storage is to be provided at the wet well chamber.

Storage at Kerry Pike WwPS: The pass forward flow (PFF) is to be increased, with additional storage added to the wet well chamber.

Storage at Cloghroe WwPS: Additional storage is to be provided at the wet well chamber.

Network Upgrade Across Catchment: 5.5km of existing sewer system to be upsized to provide additional network capacity.

Network Infiltration Reduction: Proposed 70% reduction in network infiltration, equivalent to 42 hectares within the upstream network to provide additional capacity.

WwTP Storm Tank Enhancement: Additional storage to be provided at the storm tank at the WwTP including an emergency overflow. This plan also includes the installation of a 26 km new rising main, which will pump forward flow to Cork City catchment and ultimately Carrigrennan WwTP, to be implemented in the 2055 strategy horizon.

2.2.2 Courtbrack

Introduction

Courtbrack WwTP is located approximately 16.5km northwest of Cork city, opposite the Drom Slí housing estate in Courtbrack village. It is a small sewage works commissioned in 2011 with a design capacity of 250 PE. Ward and Burke operate and maintain Courtbrack WwTP on behalf of UÉ under a 20-year DBO contract.

The sewage works comprises preliminary mechanical screening and secondary treatment that consists of a Sequence Batch Reactor (SBR) with diffused aeration. There is a sludge holding tank on site but no sludge treatment and there is a storm balancing tank with no overflow. Treated effluent from the plant is discharged to the river Shournagh.

From effluent samples collected at the WwTP, it was determined that the existing wastewater treatment process is currently performing sufficiently and is achieving the discharge requirement specified within the WWDL.

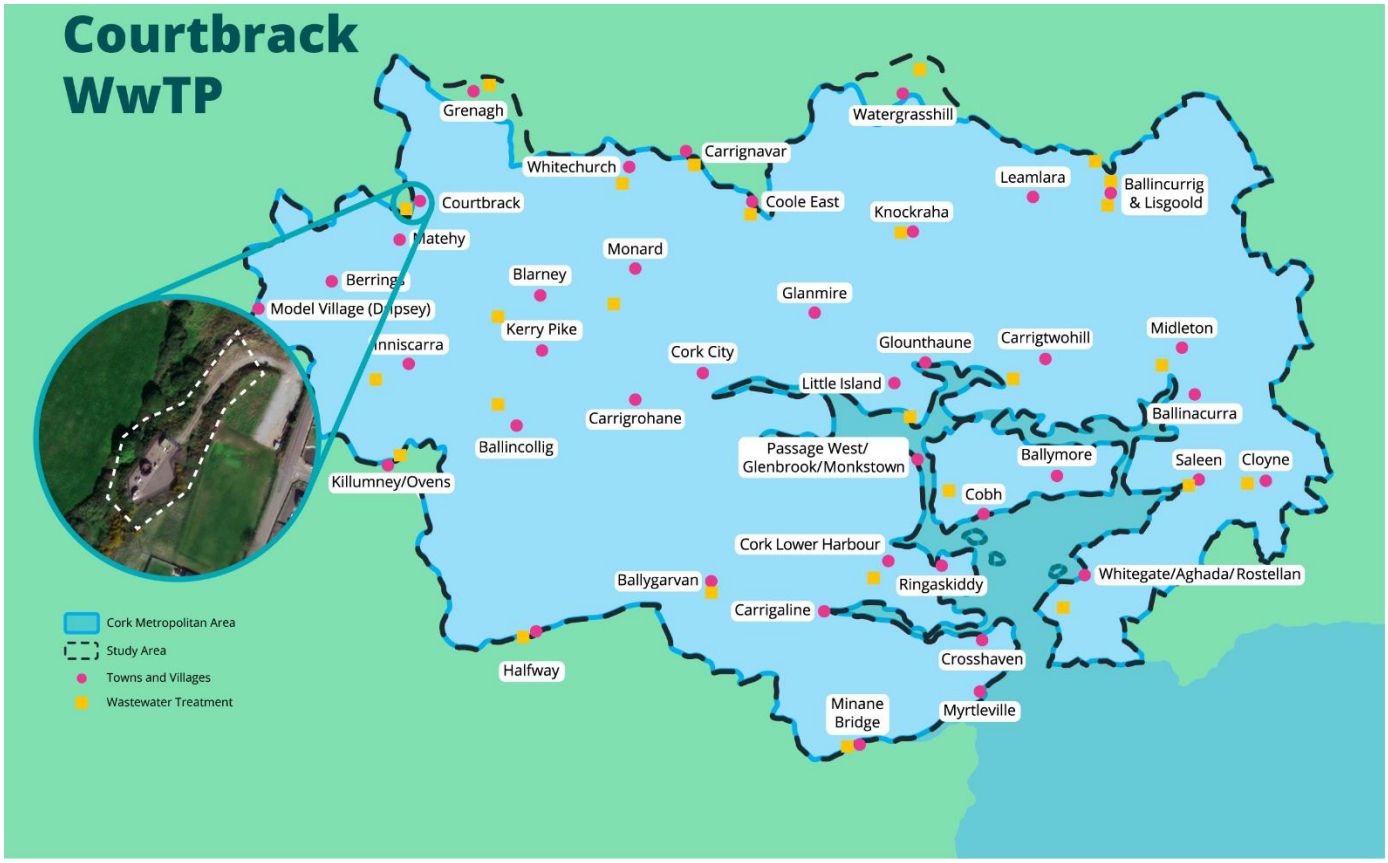


Figure 2-5:Courtbrack Location

Table 2-8: Courtbrack WwTP Details

PE	Storm Management	Inlet Works	Primary Treatment	Secondary Treatment	Tertiary Treatment	Chemical P Removal	Sludge Treatment	Installation Date
250	n/a	Screening	n/a	SBR	n/a	n/a	n/a	2011

Table 2-9: Current and Projected Organic (PE) and Hydraulic Loading at Courtbrack WwTP

Parameter	Existing Capacity	Current (2024) Loading	2030	2055	2080
Organic Loading (PE)	250	374	660	752	836
Hydraulic Loading (m^3/d)	138	-	380	432	481

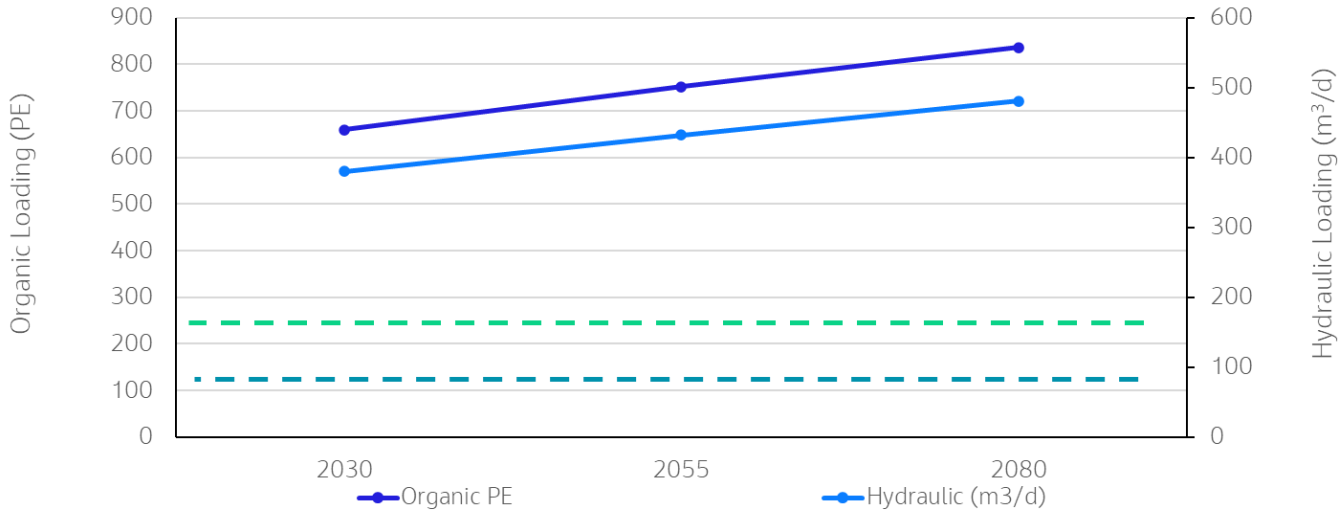


Figure 2-6: Current and Projected Loadings at Courtbrack WwTP

Current and Projected Discharge Limits

Following water quality modelling conducted at the existing WwTP discharge point, environmentally sustainable discharge limits based on compliance with the appropriate WFD EQS have been determined based on projected PE loading to the WwTP across the current and future Strategy horizons. The environmentally sustainable discharge limits for these scenarios have been summarised in Table 2-10.

Table 2-10: Existing WWDL ELVs and Environmentally Sustainable Discharge Limits at Courtbrack WwTP

Parameter	Existing ELVs	2030 Environmentally Sustainable Discharge Limits	2055 Environmentally Sustainable Discharge Limits	2080 Environmentally Sustainable Discharge Limits
BOD	25 mg/l	25 mg/l	25 mg/l	25 mg/l
Ammonia	10 mg/l	3.8 mg/l	3.2 mg/l	2.9 mg/l
OrthoP	2 mg/l	1.6 mg/l	1.3 mg/l	1.4 mg/l
More Stringent?	-	Y	Y	Y

Summary of Observed Constraints

As part of the delivery of this Strategy, advancement of the Optioneering Process assessed potential Network, Ecological, Environmental and Planning constraints that may impact the development of feasible approaches. Key findings pertinent to this catchment have been summarised below:

Network Constraints

The network assessment has identified flooding and surcharging of the main trunk across both current and future scenarios through hydraulic modelling. Future scenarios indicate an increase in the extent of network flooding and surcharging. There are no stormwater overflows (SWOs) present in the network.

Environmental and Ecological Constraints

The discharge location waterbody is River Shournagh_020 (River Shournagh) with High WFD Status (cycle 3 2016-2021), on the High Status Objective list and classified as At Risk (2022). No European designated sites (SPAs and SACs) are located in proximity or with direct pathways to the current WwTP and the discharge

locations is more than 10 km away from nearest SPA/SAC. The national designated site Shournagh Valley pNHA (sections of the Shournagh River) is located 1.5 km downstream from the discharge.

Planning Constraints

The planning assessment has noted no map-based objectives or zoning impediments which may impact extension on the existing site. However, there are available footprint constraints as adjacent land is privately owned. The site is 1,365m^2 with private land encompassing 17,000m^2 surrounding the site. Area's located to the west of the site boundary are located within Flood Zones A and B, which minimises any potential to expand the site to the West.

Coarse Screening

The coarse screening was undertaken on the unconstrained list of options at Courtbrack WwTP, which are shown in Table 1-1, as per the methodology outlined in Section 1.3. To provide context for the coarse screening results, which are outlined in Table 2-11, commentary on the coarse screening exercise is provided below.

- Option A0 (Do Nothing) has not been considered for the 2080 horizon, as both organic and hydraulic capacities will be exceeded by 2030 strategy horizon, and the existing assets are expected to reach the end of their service life in the 2055 strategy horizon.
- Option A1 (Do Minimum – Process Optimisation) has not been considered for the 2080 horizon, as both organic and hydraulic capacities will be exceeded by the 2030 strategy horizon, and the existing assets are expected to reach the end of their service life in the 2080 strategy horizon.
- Option A2 (Reuse with Investment – Existing Discharge Location) has not been considered for the 2080 horizon. However, this option is considered viable for short term horizons as the existing assets have sufficient remaining life and the environmentally sustainable discharge limits are not overly stringent for the current discharge location. An upgrade capacity of 500PE would be required to be initiated in the 2055 strategy horizon.
- Option A3 (Reuse with Investment – New Discharge Location) has an amber classification for 2030 and 2055 as the WQM indicates the current discharge location is acceptable for future loadings. The option has been discounted for the 2080 strategy horizon, as the existing assets are expected to reach the end of their service life.
- Option A4 (New Treatment Process on Current Site with Existing Discharge) proposes using the existing discharge location, however planning risks have been identified due to the required site expansion.
- Option A5 (New Greenfield Plant with Existing Discharge) is considered based on planning assessment results. The existing asset life will have expired, requiring full replacement of infrastructure and increased capacity to meet future demands.
- Option A6 (Wastewater Load Transfer) involves transfer to Carrigrennan via Blarney. In the 2080 strategy horizon, organic capacity is exceeded, and the existing assets will have reached the end of their service life.

Table 2-11: Coarse Screening Output

Coarse Screening Results							
Long List of Options	**A0**	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**
2080	**N**	**N**	**N**	**N**	**Y**	**Y**	**Y**
2055	**N**	**N**	**Y**	**Y**	**N**	**N**	**Y**

2030	**N**	**N**	**Y**	**Y**	**N**	**N**	**Y**

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening

Any options for the strategy horizon years of 2030 and 2055 should facilitate implementation of the longer term 2080 preferred solution and should not compromise the ability to implement this. Further option defining is undertaken in order to undertake the MCA fairly and adequately. Transfer solutions consider the additional capacity/ability of surrounding existing WwTPs to accept transferred wastewater and the potential impact on their existing or proposed discharge locations – in this instance Blarney WwTP was not considered a feasible receiving plant due to existing and future capacity constraints and projected WQM of the Shournagh River. As detailed above, the planning assessment did not identify potential site expansion constraints which is reflected in the fine scoring results provided in Table 2-13. At this stage of optioneering, routes were selected based on conservative routing assumptions and it is important to note that a full route selection process was not undertaken. Routes ensure minimal impact on the public and the environment and reduce delivery risk associated with land acquisition and planning requirements. The options progressed to fine screening are outlined in Table 2-12.

Table 2-12: 2080 Options Advancing to Fine Screening

Options Progressed to Fine Screening for 2080	Description
A4	New Treatment Process on Current Site and Discharge to Existing Location
A5	New Greenfield Plant with Discharge to Existing Location
A6	Wastewater Load Transfer to Carrigrennan WwTP via Blarney Transfer

Fine Screening

The options presented in Table 2-12 underwent fine screening in the form of an MCA as detailed in Section 1.4. The scoring and results of the MCA are presented in Table 2-13.

Table 2-13: MCA Results for Courtbrack WwTP

Objectives	Criteria	Option A4	Option A5	Option A6
Addressing the Need	Treatment Capacity	3	3	3
	Network Capacity	3	3	1
	Final Effluent Compliance	3	3	3
Deliverability	Design Complexity, Ease of Implementation & Feasibility	1	-2	-2
	Planning & Regulation	-1	-1	-1
	Delivery Timeline & Alignment	1	-2	1
Risk & Resilience	Flexibility & Scalability	1	2	-2
	Delivery Risk	-1	-2	-2
Customer and Stakeholder Support	Impact on Customers	-1	1	2
	Community Support, Health and Wellbeing	2	1	3
Environmental & Sustainability	Water Environment	2	1	3
	Waterbody Impact (Existing and New)	2	1	3
	Waterbody Flood Risk	0	0	0
	Biodiversity	2	1	3
	AA-Natura 2000 Sites	0	0	0

	Aquatic Biodiversity	2	2	2
	Terrestrial Biodiversity (BNG)	0	-1	1
	GHG Emissions	0	-0.5	-0.5
	Embodied Carbon	-1	-2	-3
	Operational Carbon	1	1	2
	Energy Efficiency	1	2	3
	Climate Resilience	1	2	3
	Circular Economy	-1	-2	1
Weighted Average Sub Total		**1.08**	**0.67**	**1.21**
Cost	CAPEX	4	4	4
	OPEX	6	6	6
	Whole Life Cost	5	4	5
Combined Score		**3.2**	**2.7**	**3.4**
Rank		**2nd**	**3rd**	**1st**

The MCA concluded that Option A6 ranks first against the fine screening criteria for the 2080 horizon and is more cost-effective to implement than Options A4 and A5. Looking at the 2080 horizon in isolation, all existing assets will need replacement unless phased upgrades are implemented in earlier horizons. Fine screening indicates that Option A4 is the second preferred choice based on the identified planning risks for the 2080 horizon.

Wastewater Treatment Summary

The optioneering process for Courtbrack WwTP has yielded recommendations for future development:

The highest ranked option ultimately involves transferring wastewater to Carrigrennan WwTP via Blarney (Option A6). This approach addresses the limitations of the current site. This strategy ensures long-term sustainability by leveraging the capacity of Carrigrennan WwTP.

This approach addresses several key challenges identified at Courtbrack WwTP, including the site boundary constraints limiting expansion possibilities, the projected exceedance of organic loading capacity in the 2080 strategy horizon and the existing assets nearing end of asset life by the 2055 strategy horizon.

Wastewater Network Upgrade Summary

A separate assessment of network upgrades for this agglomeration has been undertaken as part of the Network Modelling Report which is included in Appendix 4. Below is a brief overview of the proposed upgrades within the Courtbrack agglomeration, addressing SWO compliance and future development constraints such as surcharge and flooding due to development impacts. Unless otherwise stated specifically, these proposed upgrades are proposed to be initiated in the 2030 strategy horizon. The development process of these proposed upgrades, as well as maps and drawings illustrating the location of the required upgrades are provided in more detail in the Network Modelling Report in Appendix 4.

WWTP Storm Tank Enhancement: An increase of storage capacity has been proposed at the Courtbrack WwTP.

Network Upgrade Across Catchment: An upgrade of c. 200m of the existing sewer system is proposed, along with the addition of c. 1.1km of new sewer lines to increase the network's capacity.

Online Storage Across Catchment: Additional storage to be provided at the network manhole chambers.

New storage at CK-RD Development WwPS: Storage proposed at development site with a new rising main connecting to the network.

2.2.3 Dripsey

Introduction

Dripsey is a settlement located approximately 19 km west of Cork City and 1 km north of the River Lee at the Inniscarra Lake Reservoir. Dripsey WwTP was commissioned in 2022 and it is currently operated and maintained by Cork County Council on behalf of UÉ.

The wastewater treatment process involves preliminary, primary and secondary treatment, before discharging at the outfall to Dripsey River. Primary treatment is via a primary settlement tank (PST) and secondary treatment is achieved by rotating biological contactors (RBC) Waste sludge is blended in the sludge blending/holding tank and thickened with a picket fence thickener before dewatering is carried out using the belt press units on site.

The existing wastewater treatment process is currently performing sufficiently and is achieving the discharge requirement specified within the WWDL

Figure 2-7: Dripsey Location

Table 2-14: Dripsey WwTP Details

Organic Design PE	Storm Management	Inlet Works	Primary Treatment	Secondary Treatment	Tertiary Treatment	Chemical P Removal	Sludge Treatment	Installation Date
600	SWO	Screening & Grit Removal	PST	RBCs	n/a	2-point Ferric	Thickening	2022

Table 2-15: Current and Projected Organic (PE) and Hydraulic Loading at Dripsey WwTP

Parameter	Existing Capacity	Current (2024) Loading	2030	2055	2080
Organic Loading (PE)	600	469	628	726	817
Peak Hydraulic Loading (m^3/d)	135	792	407	470	529

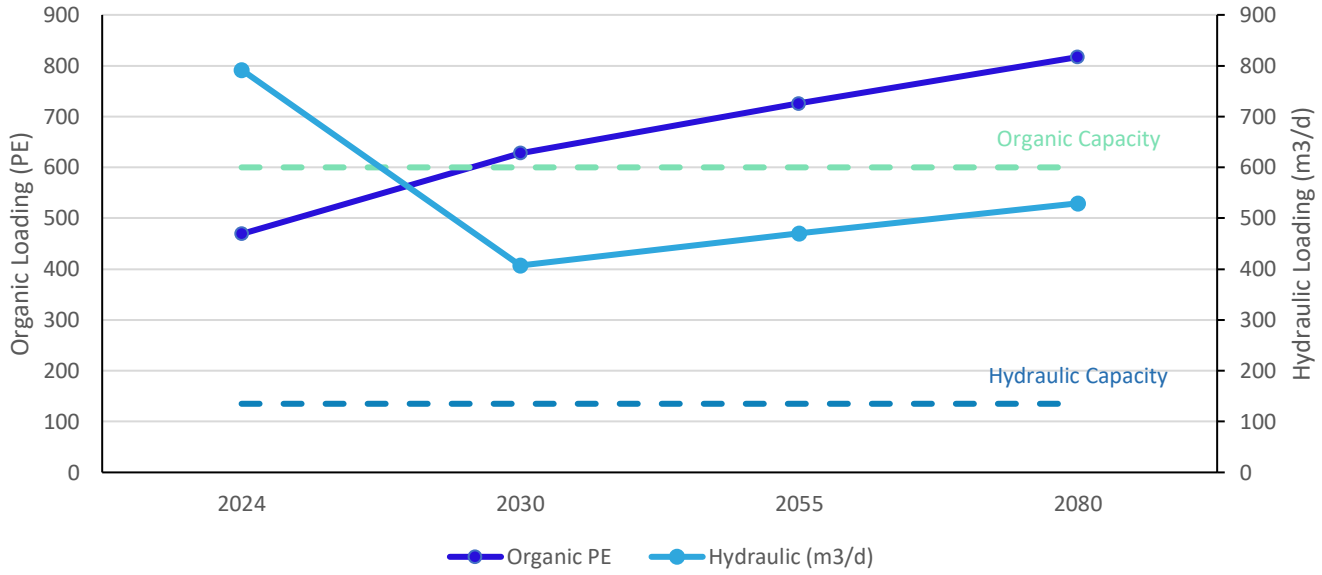


Figure 2-8: Current and Projected Loadings at Dripsey WwTP

Current and Projected Discharge Limits

Following water quality modelling conducted at the existing WwTP discharge point, environmentally sustainable discharge limits based on compliance with the appropriate WFD EQS have been determined based on projected PE loading to the WwTP across the current and future Strategy horizons. The environmentally sustainable discharge limits for these scenarios have been summarised in Table 2-16.

Table 2-16: Existing WWDL ELVs and Environmentally Sustainable Discharge Limits at Dripsey WwTP

Parameter	Existing ELVs	2030 Environmentally Sustainable Discharge Limits	2055 Environmentally Sustainable Discharge Limits	2080 Environmentally Sustainable Discharge Limits
BOD	25 mg/l	25 mg/l	21 mg/l	19 mg/l

Ammonia	10 mg/l	3.5 mg/l	3.0 mg/l	2.7 mg/l
OrthoP	5 mg/l	1.6 mg/l	1.4 mg/l	1.2 mg/l
More Stringent?	-	Y	Y	Y

Summary of Observed Constraints

As part of the delivery of this Strategy, advancement of the Optioneering Process assessed potential Network, Ecological, Environmental and Planning constraints that may impact the development of feasible approaches. Key findings pertinent to this catchment have been summarised below:

Network Constraints

A separate assessment of the existing wastewater network for this agglomeration, including maps and drawings illustrating the location of constraints has been undertaken as part of the Network Modelling Report which is included in Appendix 4.

The network assessment has identified flooding and surcharging in the main trunk of the network under current and all future scenarios, based on modelled results. Future projections indicate a worsening trend, with increased levels of flooding and surcharging across the network.

Environmental and Ecological Constraints

The discharge location waterbody is Dripsey_020 (Dripsey River) with High WFD Status (cycle 3 2016-2021), on the High Status Objective list and classified as At Risk (2022). No European or national designated sites are located in proximity or within direct pathways to current WwTP and the discharge location is more than 10 km away from nearest SPA/SAC. Lee Valley pNHA (sections of valley of the River Lee) is located approximately 7 km downstream from the discharge. Cork City Water Supply freshwater abstraction (Abstract Inniscarra lake) is located 6.5 km downstream from discharge location.

Planning Constraints

The planning assessment has noted no map-based objectives or zoning impediments which may impact extension on the existing site. However, the northwestern portion of the site lies within Flood Zones A and B, which will necessitate an FRA.

Coarse Screening

The coarse screening was undertaken on the unconstrained list of options at Dripsey WwTP, which are shown in Table 1-1, as per the methodology outlined in Section 1.3. To provide context for the coarse screening results, which are outlined in Table 2-17, commentary on the coarse screening exercise is provided below.

- Option A0 (Do Nothing) has not been considered for the 2080 strategy horizon as organic capacity is projected to be exceeded and the existing assets will be nearing the end of their service life. It is also not recommended as environmentally sustainable discharge limits are projected to be more stringent.
- Option A1 (Do Minimum – Process Optimisation) has not been considered for the 2080 strategy horizon, as organic capacity is exceeded by more than 10%, and the existing assets are nearing the end of their service life. It is also not recommended as environmentally sustainable discharge limits are expected to become more stringent.
- Option A2 (Reuse with Investment – Existing Discharge Location) has been discounted for the 2080 horizon as the existing assets are nearing the end of their operational life. The option was considered for the 2030 and 2055 strategy horizons as part of a phased approach to necessitate the 2080 strategy as the existing assets are expected to have sufficient remaining service life.

- Option A3 (Reuse with investment – New Discharge Location) has been discounted as less stringent discharge location not required.
- Option A4 (New Treatment Process on Current Site) option has been considered for implementation in the 2080 strategy horizon, as the existing assets will have reached the end of their operational life. A full replacement of the current infrastructure is required, along with an upgrade to meet increased capacity demands. The proposed upgrade will accommodate a capacity of 850 PE.
- Option A5 (New Greenfield Plant with New Discharge) is considered for the 2080 strategy horizon as the existing treatment process is unlikely to remain suitable for future needs and site expansion is likely required. However, land availability constraints were not identified and so the option was progressed as amber, requiring additional planning and feasibility assessment in the Fine Screening stage.
- Option A6 (Wastewater Load Transfer to Cork City via Blarney and Inniscarra) has been considered for the 2080 horizon as organic capacity exceeded and existing asset life exceeded. Option also considered for 2055 depending on MCA outputs in fine screening stage.

Table 2-17: Coarse Screening Output

Coarse Screening Results							
Long List of Options	**A0**	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**
2080	N	N	N	N	Y	Y	Y
2055	N	N	Y	Y	N	N	Y
2030	N	Y	Y	N	N	N	N

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening

Any options for the strategy horizon years of 2030 and 2055 should facilitate implementation of the longer term 2080 preferred solution and should not compromise the ability to implement this. Further option defining is undertaken in order to undertake the MCA fairly and adequately. Alternative final effluent discharge locations were identified using the same WQM methodology and consider current discharge conditions. Transfer solutions consider the additional capacity/ability of surrounding existing WwTPs to accept transferred wastewater and the potential impact on their existing or proposed discharge locations. At this stage of optioneering, routes were selected based on conservative routing assumptions and it is important to note that a full route selection process was not undertaken. Routes ensure minimal impact on the public and the environment and reduce delivery risk associated with land acquisition and planning requirements. The options progressed to fine screening are outlined in Table 2-18.

Table 2-18: 2080 Options Advancing to Fine Screening

Options Progressed to Fine Screening for 2080	Description
A4	New Treatment Process on Current Site with Existing Discharge
A5	New Greenfield Plant with Existing Discharge
A6	Wastewater Load Transfer to Carrigrennan WwTP via Inniscarra & Blarney Transfer

Fine Screening

The options presented in Table 2-18 underwent fine screening in the form of an MCA as detailed in Section 1.4. The scoring and results of the MCA are presented in Table 2-19.

Table 2-19: MCA Results for Dripsey WwTP

Objectives	Criteria	Option A4	Option A5	Option A6
Addressing the Need	Treatment Capacity	3	3	3
	Network Capacity	3	3	1
	Final Effluent Compliance	3	3	3
Deliverability	Design Complexity, Ease of Implementation & Feasibility	-1	1	-2
	Planning & Regulation	-1	-2	-2
	Delivery Timeline & Alignment	-1	-2	1
Risk & Resilience	Flexibility & Scalability	1	2	-2
	Delivery Risk	1	-1	-2
Customer and Stakeholder Support	Impact on Customers	1	2	1
	Community Support, Health and Wellbeing	1	0	2
Environmental & Sustainability	Water Environment	2	2	3
	Waterbody Impact (Existing and New)	2	2	3
	Waterbody Flood Risk	0	0	0
	Biodiversity	1	0	2
	AA-Natura 2000 Sites	0	0	0
	Aquatic Biodiversity	2	2	2
	Terrestrial Biodiversity (BNG)	-1	-2	0
	GHG Emissions	0	-0.5	-0.5
	Embodied Carbon	-1	-2	-3
	Operational Carbon	1	1	2
	Energy Efficiency	1	2	3
	Climate Resilience	1	3	3
	Circular Economy	0	-2	2
Weighted Average Sub Total		**1.00**	**0.91**	**1.00**
Cost	CAPEX	6	5	4
	OPEX	6	6	7
	Whole Life Cost	5	5	5
Combined Score		**3.43**	**3.2**	**3.29**
Rank		**1st**	**3rd**	**2nd**

The MCA concluded that Option A4 ranks highest against the fine screening criteria and is more cost-effective to implement than Options A5 and A6. When considering the 2080 horizon in isolation, the installation of a transfer pipeline to Blarney also requires the implementation of the Blarney transfer to Carrigrennan and will ultimately require the transfer of wastewater from Dripsey to Carrigrennan which poses operational and septicity risks. Option A4 aligns with maximising the reusing existing assets where feasible with assets only recently installed at Dripsey.

Wastewater Treatment Summary

The optioneering process for Dripsey WwTP has yielded recommendations for future development:

For the future strategy horizons, it is recommended to adopt a long-term, resilient solution. The highest ranked option ultimately involves reusing existing recently installed assets and providing the necessary treatment to meet discharging water quality standards in the future. This option mitigates disturbance to the public and environment, reducing the overall embodied carbon emissions associated with an additional ~7km pipeline.

Wastewater Network Upgrade Summary

A separate assessment of network upgrades for this agglomeration has been undertaken as part of the Network Modelling Report which is included in Appendix 4. Below is a brief overview of the proposed upgrades within the Dripsey agglomeration, addressing SWO compliance and future development constraints such as surcharge and flooding due to development impacts. Unless otherwise stated specifically, these proposed upgrades are proposed to be initiated in the 2030 strategy horizon. The development process of these proposed upgrades, as well as maps and drawings illustrating the location of the required upgrades are provided in more detail in the Network Modelling Report in Appendix 4.

WwTP Storm Tank Enhancement: Additional storage to be provided at the storm tank at the WwTP as follows to resolve SWO compliance and cater future developments.

Network Upgrade Across Catchment: An upgrade of c. 200m of the existing sewer system is proposed to increase the network's capacity.

2.2.4 Inniscarra

Introduction

Inniscarra WwTP serves the Inniscarra waterworks and 3 domestic bungalows adjacent to the WwTP. The Inniscarra agglomeration is located within the Inniscarra Water Treatment Plant site. The waterworks is located approximately 5 km west of the town of Ballincollig. It was commissioned in 1993, and it is currently operated and maintained by Cork County Council on behalf of UÉ.

The current Inniscarra population has a PE less than 500 and therefore the WwTP final effluent discharge does not have a current wastewater discharge license prescribed by the EPA. Final effluent quality must comply with the requirements of the Urban Wastewater Treatment Directive (91/271/EEC). The existing sewage treatment process comprises an inlet screen, an aeration package plant and percolation area. Treated effluent from Inniscarra WwTP is discharged to the Ballinhassig East Groundwater Body.

Figure 2-9: Inniscarra Location

Table 2-20: Inniscarra WwTP Details

Organic Design PE	Storm Management	Inlet Works	Primary Treatment	Secondary Treatment	Tertiary Treatment	Chemical P Removal	Sludge Treatment	Installation Date
100	n/a	Screening	n/a	Aeration Package Plant	Percolation	n/a	n/a	1993

Table 2-21: Current and Projected Organic (PE) and Hydraulic Loading at Inniscarra WwTP

Parameter	Existing Capacity	Current (2024) Loading	2030	2055	2080
Organic Loading (PE)	100	62	334	401	455
Peak Hydraulic Loading (m^3/d)	N/A	N/A	192	231	262

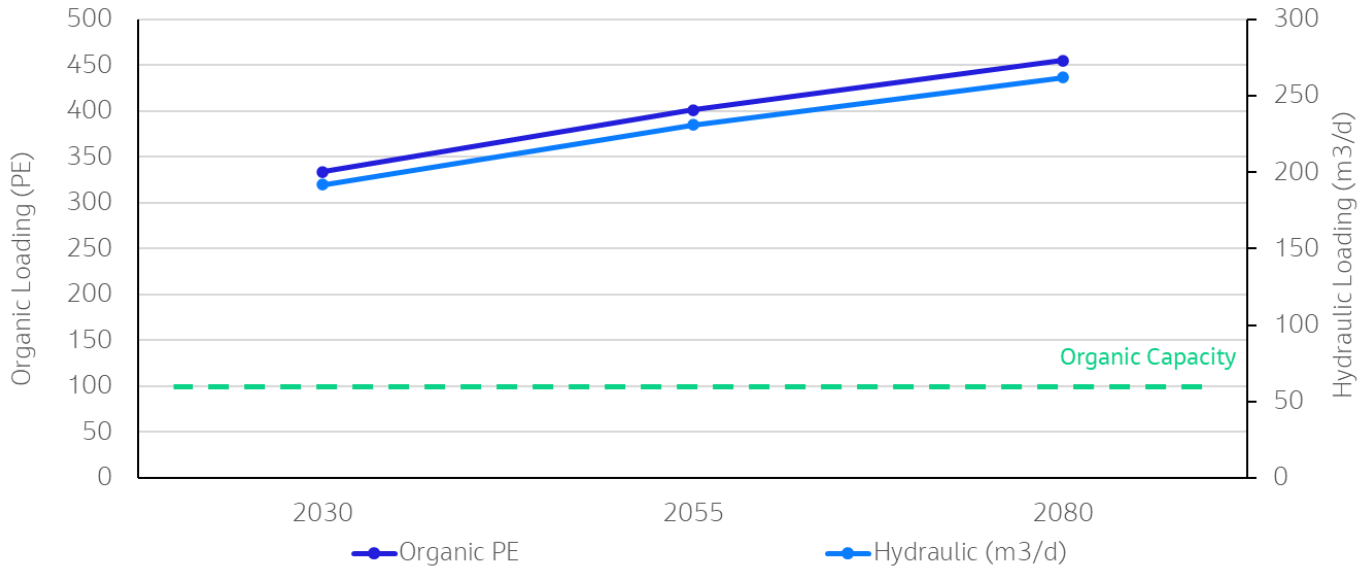


Figure 2-10: Current and Projected Loadings at Inniscarra

Current and Projected Discharge Limits

Following water quality modelling conducted at the existing WwTP discharge point, environmentally sustainable discharge limits based on compliance with the appropriate WFD EQS have been determined based on projected PE loading to the WwTP across the current and future Strategy horizons. The environmentally sustainable discharge limits for these scenarios have been summarised in Table 2-22.

Table 2-22: Existing WWDL ELVs and Environmentally Sustainable Discharge Limits at Inniscarra WwTP

Parameter	Existing ELVs	2030 Environmentally Sustainable Discharge Limits	2055 Environmentally Sustainable Discharge Limits	2080 Environmentally Sustainable Discharge Limits
BOD	25 mg/l	25 mg/l	25 mg/l	25 mg/l
Ammonia	10 mg/l	10 mg/l	10 mg/l	10 mg/l
OrthoP	5 mg/l	5 mg/l	5 mg/l	5 mg/l
More Stringent?	-	N	N	N

Summary of Observed Constraints

As part of the delivery of this Strategy, advancement of the Optioneering Process assessed potential Network, Ecological, Environmental and Planning constraints that may impact the development of feasible approaches. Key findings pertinent to this catchment have been summarised below:

Network Constraints

A separate assessment of the existing wastewater network for this agglomeration, including maps and drawings illustrating the location of constraints has been undertaken as part of the Network Modelling Report which is included in Appendix 4.

The network assessment has identified that modelling indicates flooding and surcharging of the main trunk of the network across both current and all future scenarios. These future scenarios show an increase in the extent of overall network flooding and surcharging. While the WwTP's SWO is currently compliant, it is at risk of non-compliance under the 2080 scenario should no action be taken.

Environmental and Ecological Constraints

The existing discharge location is a groundwater soakaway that flows into Inniscarra Lake. The lake has a Good WFD Status (cycle 3 2016-2021) and is classified as At Risk (2022). No European designated sites are located in proximity or with direct pathways to the current WwTP and the discharge location is more than 10 km away from nearest SPA/SAC. National designated site Lee Valley pNHA (the valley of the River Lee) is located 1.5 km downstream from the discharge. Cork City Water Supply freshwater abstraction (Abstract Inniscarra lake) is location 6.60 km downstream from the discharge outfall.

Planning Constraints

The existing site is 2,000m^2 and surrounded by 13,500m^2 of land owned by Cork County. However, the development plan zoning indicates existing residential and other land uses, with the proposed WwTP not listed as an appropriate use. The southern portion of the site lies within Flood Zone A and will require a Flood Risk Assessment, which minimises any potential to expand the site to the south.

Coarse Screening

The coarse screening was undertaken on the unconstrained list of options at Inniscarra WwTP, which are shown in Table 1-1, as per the methodology outlined in Section 1.3. To provide context for the coarse screening results, which are outlined in Table 2-23, commentary on the coarse screening exercise is provided below.

- Option A0 (Do Nothing) has not been considered for the 2080 horizon, as both organic and hydraulic capacities will be exceeded in the strategy 2030 horizon, and the existing assets are nearing end of asset life in the 2055 strategy horizon.
- Option A1 (Do Minimum – Process Optimisation) has not been considered for the 2080 horizon, as both organic and hydraulic capacities will be exceeded in the strategy 2030 horizon, and the existing assets are nearing end of asset life in the 2055 strategy horizon.
- Option A2 (Reuse with Investment – Existing Discharge Location) has not been considered for the 2080 horizon, as the remaining asset life will be insufficient. It has been considered viable for the near-term horizon of 2030 as part of a phased approach, as the existing assets have sufficient remaining life, and the current discharge location is subject to less stringent environmentally sustainable discharge limits. An upgrade to a capacity of 250PE will be required to be initiated in the 2055 strategy horizon to meet projected demands.
- Option A3 (Reuse with investment – new discharge location) is not considered viable, as the existing assets do not have sufficient remaining life to meet the demands in the 2080 strategy horizon. Additionally, there is no need for an alternative discharge location, as the current location is subject to less stringent environmentally sustainable discharge limits.
- Option A4 (New Treatment Process on Current Site with Existing Discharge Location) has been considered viable for the 2080 horizon, as the existing assets will require upgrades to accommodate increased capacity demands. Retaining the current discharge location is appropriate, given that it is subject to less stringent environmentally sustainable discharge limits, making this option practical for long-term planning.
- Option A5 (New Greenfield Plant with New Discharge) has not been considered for the 2080 strategy horizon despite limitations associated with the existing site boundary. Further planning assessments did not identify existing site expansion constraints.
- Option A6 (Wastewater Load Transfer to Carrigrennan via Blarney) is considered feasible for the 2080 strategy horizon as the organic capacity and existing asset life shall be exceeded by 2080.

Table 2-23: Coarse Screening Output

Coarse Screening Results							
Long List of Options	**A0**	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**
2080	**N**	**N**	**N**	**N**	**Y (Existing Discharge Location)**	**N**	**Y**
2055	**N**	**N**	**N**	**N**	**Y (Existing Discharge Location)**	**N**	**Y**
2030	**N**	**N**	**Y**	**N**	**N**	**N**	**Y**

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening

Any options for the strategy horizon years of 2030 and 2055 should facilitate implementation of the longer term 2080 strategy horizon preferred solution and should not compromise the ability to implement this. Further option defining is undertaken in order to undertake the MCA fairly and adequately. Option A5 was not progressed to fine screening for the 2080 strategy horizon as planning assessment did not identify existing site expansion constraints. A transfer solution (Option A6) identified Carrigrennan WwTP as the most acceptable load receiving plant, Blarney WwTP was discounted due to existing and future capacity constraints and more stringent discharge requirements to the Shournagh River. Option A6 proposed the transfer of wastewater to the proposed Blarney wastewater transfer, as outlined in Section 2.2.1.

Table 2-24: 2080 Options Advancing to Fine Screening

Options Progressed to Fine Screening for 2080	Description
A4	Option A4 (New Treatment Process on Current Site with existing discharge)
A6	Option A6 (Wastewater Load Transfer via Blarney)

Fine Screening

The options presented in Table 2-24 underwent fine screening in the form of an MCA as detailed in Section 1.4. The scoring and results of the MCA are presented in Table 2-25.

Table 2-25: MCA Results for Inniscarra WwTP

Objectives	Criteria	Option A4	Option A6
Addressing the Need	Treatment Capacity	3	3
	Network Capacity	3	3
	Final Effluent Compliance	3	3
Deliverability	Design Complexity, Ease of Implementation & Feasibility	1	-1
	Planning & Regulation	-1	1
	Delivery Timeline & Alignment	1	1
Risk & Resilience	Flexibility & Scalability	1	-2
	Delivery Risk	-1	-1

Customer and Stakeholder Support	Impact on Customers	1	2
	Community Support, Health and Wellbeing	1	1
Environmental & Sustainability	Water Environment	1	2
	Waterbody Impact (Existing and New)	1	2
	Waterbody Flood Risk	0	0
	Biodiversity	-1	2
	AA-Natura 2000 Sites	0	0
	Aquatic Biodiversity	2	2
	Terrestrial Biodiversity (BNG)	-1	0
	GHG Emissions	0	-0.5
	Embodied Carbon	-1	-3
	Operational Carbon	1	2
	Energy Efficiency	1	3
	Climate Resilience	1	3
	Circular Economy	-1	1
Weighted Average Sub Total		**0.72**	**1.20**
Cost	CAPEX	5	4
	OPEX	6	7
	Whole Life Cost	5	5
Combined Score		**3.00**	**3.49**
Rank		**2nd**	**1st**

The MCA concluded that Option A6 ranks first against the fine screening criteria for the 2080 horizon providing greater sustainability and water environment protection benefits whilst reducing impact on customers and the public.

Wastewater Treatment Summary

In summary, the optioneering process for Inniscarra WwTP has yielded recommendations for future development:

The highest ranked option involves transferring wastewater to Carrigrennan WwTP via the Blarney transfer solution (Option A6). This approach addresses the limitations of the current site. This strategy ensures long-term sustainability by leveraging the capacity of Carrigrennan WwTP and improving treatment efficiencies via the consolidation of wastewater.

Wastewater Network Upgrade Summary

A separate assessment of network upgrades for this agglomeration has been undertaken as part of the Network Modelling Report which is included in Appendix 4. Below is a brief overview of the proposed upgrades within the Inniscarra agglomeration, addressing SWO compliance and future development constraints such as surcharge and flooding due to development impacts. Unless otherwise stated specifically, these proposed upgrades are proposed to be initiated in the 2030 strategy horizon. The development process of these proposed upgrades, as well as maps and drawings illustrating the location of the required upgrades are provided in more detail in the Network Modelling Report in Appendix 4.

New storage at Inniscarra WwPS: A storage facility is proposed at the Inniscarra treatment site. This plan also includes the installation of a c. 5.9km new rising main, which will pump forward flow to Blarney WwTP and to decommission the existing treatment plant. This is proposed to be initiated in the 2030 horizon.

Storage at Environment Building WwPS: Additional storage to be provided at the wet well chamber.

2.2.5 Feasible Approaches for Blarney, Courtbrack, Dripsey and Inniscarra

The results of the fine screening process and MCA were assessed and taken forward to develop 3 No. Feasible Approaches for the sub catchment. These approaches comprise combinations of options for each agglomeration, carefully selected to best achieve the goals of the CWS. The wastewater network upgrade proposals for each catchment mentioned above are common amongst Feasible Approaches detailed below.

Our approach ensures that the selected strategies are not only technically viable but also align with the long-term vision for wastewater management in the region.

These Approaches are summarised in Table 2-26 overleaf.

Feasible Approach 1 presents an integrated approach for managing wastewater in Blarney, Courtbrack, Dripsey, and Inniscarra through the 2080 strategy horizon, combining the highest-ranking MCA options for each site.

- **Blarney**: It is proposed to initiate the optimisation of the existing treatment regime of the WwTP for the 2030 horizon to ensure compliance with its ELVs. Due to ever more stringent projected environmentally sustainable discharge limits from 2055 onwards, it is not feasible to continue operation of the current WwTP while adhering to discharge requirements. Therefore, for the 2055 horizon it is proposed to initiate the decommissioning of the WwTP and transfer wastewater to be treated at Carrigrennan WwTP via the existing Ballyvolane Pumping Station and a proposed intermediary pumping station which will also transfer flows from Monard. This will require construction of a new transfer PS at the existing site and a 26km pipeline from the existing Blarney WwTP to Carrigrennan WwTP inlet via the existing Ballyvolane PS. It is recommended to begin construction of the wastewater transfer pipeline prior to 2055 to allow the decommissioning of the WwTP and also allow the transfer of wastewater from other catchments such as Monard. The Ballyvolane PS upgrade requirements have been assessed and are detailed within the Network Modelling Report which is included in Appendix 4.
- **Courtbrack:** Courtbrack WwTP is currently overloaded, therefore it is proposed to upgrade the WwTP by an additional 600 PE to accommodate existing loading and future projected loading to be initiated for the 2030 strategy horizon. During the 2080 strategy horizon, the existing infrastructure will have reached its asset life therefore necessitating the need to initiate a capital replacement of the existing 250 PE capacity.
- **Dripsey:** It is proposed to initiate the optimisation of Dripsey WwTP in the 2030 horizon (by reviewing current chemical phosphorus removal dosing and updating current operational procedures to provide greater treatment efficiency of the existing equipment) in order to bring the plant to compliance with its projected environmentally sustainable discharge limits. As its loadings increase with projected population growth, it is proposed to initiate an upgrade of the WwTP by an additional 250 PE in the 2055 strategy horizon and continue the operation of the WwTP through to the 2080 strategy horizon. During the 2080 strategy horizon, the existing infrastructure will have reached its asset life therefore necessitating the need to initiate a capital replacement of the existing 600 PE capacity.
- **Inniscarra:** Inniscarra WwTP is projected to be overloaded by the 2030 horizon. It is proposed to initiate the decommissioning of the WwTP in the 2030 horizon and transfer wastewater to Blarney WwTP for treatment. This necessitates the construction of a 5.9km wastewater pipeline and associated pumping station to be constructed on the existing WwTP site. As Blarney WwTP is proposed to be decommissioned in the 2055 strategy horizon, wastewater will continue to be pumped to Blarney for forward pumping to Ballyvolane PS and ultimately Carrigrennan WwTP for treatment. The proposed Inniscarra PS will be designed to accommodate the projected 2055 and 2080 strategy horizon flows.

The implementation of **Feasible Approach 1** necessitates an upgrade to Carrigrennan WwTP and Ballyvolane PS, increasing their capacity to manage the additional inflows from Blarney and Inniscarra for the 2055 and 2080 horizon. This capacity expansion has been factored into the evaluation and assessment of Carrigrennan WwTP.

Feasible Approach 2 explores alternative high-scoring options from the MCA, proposing a phased approach to address the wastewater management needs of the sub catchment through to the 2080 strategy horizon.

- **Blarney**: In order to address projected capacity issues at Blarney WwTP it is proposed to initiate the upgrade of the WwTP by an additional 2,000 PE in the 2030 strategy horizon. However, this will only resolve capacity issues, the issue regarding achieving more stringent projected environmentally sustainable discharge limits will remain. To resolve this issue, a 26 km final effluent transfer pipeline and associated pumping station at Blarney WwTP will need to be constructed. The transfer pipeline will discharge final effluent at Carrigrennan WwTP and will be transferred via the existing Ballyvolane PS. The transfer will be sufficiently sized to cater for projected 2080 flows at the WwTP including any flows transferred from nearby agglomerations. Population projections are set to increase further in the 2055 strategy horizon, which will necessitate a further expansion of the WwTP by an additional 10,500 PE to be initiated for the 2055 strategy horizon. In the 2080 strategy horizon, the existing infrastructure will have reached the end of its design life, therefore a capital replacement of 13,000 PE will be required to be initiated in the 2080 strategy horizon as well as an additional 4,000 PE upgrade to accommodate increase loading projections in the agglomeration as well as incoming wastewater from Dripsey, Courtbrack and Inniscarra.
- **Courtbrack:** It is proposed to initiate the decommission of Courtbrack WwTP and transfer wastewater to Blarney WwTP for treatment in the 2030 strategy horizon. A 10.5km wastewater transfer pipeline will need to be constructed along with an associated pumping station, capable of pumping flows for the projected 2080 loading. The Courtbrack PS will continue to operate through the 2055 and 2080 horizons.
- **Dripsey:** It is proposed to initiate the optimisation of Dripsey WwTP in the 2030 horizon in order to ensure WwTP compliance with its existing discharge ELVs and projected environmentally sustainable discharge limits. Due to aging assets and insufficient capacity at the existing WwTP in the 2055 strategy horizon it is proposed to initiate the decommissioning of Dripsey WwTP and transfer wastewater to Blarney WwTP (via Inniscarra) for treatment in the 2055 strategy horizon. This approach will require a 6.7km wastewater transfer main to be constructed as well as an associated PS, capable of pumping the projected 2080 strategy horizon wastewater loadings for the agglomeration. The proposed Dripsey PS will continue to operate through to the 2080 strategy horizon.
- **Inniscarra:** The approach for Inniscarra is identical to Feasible Approach 1, decommissioning the WwTP and transferring the wastewater to Blarney WwTP. The proposed Inniscarra PS will continue to operate through the 2055 and 2080 horizons.

Feasible Approach 3 investigates combinations of further options that have passed the fine screening process.

- **Blarney**: To address projected capacity constraints at Blarney WwTP, an upgrade of 1,100 PE is proposed to be initiated in the 2030 horizon. However, this upgrade will only resolve capacity issues, leaving the challenge of meeting more stringent projected environmentally sustainable discharge limits unaddressed. To tackle this, the construction of a treated effluent pipeline from Blarney WwTP to Carrigrennan WwTP via Ballyvolane PS is proposed. This solution involves building a 26km pipeline and a pumping station at Blarney WwTP, sized to handle projected 2080 flows. Anticipated population growth in the 2055 strategy horizon will necessitate a further expansion of the WwTP by an additional

10,000 PE to be initiated in the 2055 strategy horizon. In the 2080 strategy horizon, as the existing infrastructure reaches the end of its design life, a capital replacement of 13,000 PE will be required to be initiated. An additional upgrade of 3,400 PE will also be required to accommodate increased loading projections in the agglomeration.

- **Courtbrack:** The approach for Courtbrack is identical to Feasible Approach 1, upgrading the existing WwTP by 600 PE in the 2030 horizon and carrying out capital replacement on 250 PE in the 2080 strategy horizon.
- **Dripsey:** Dripsey WwTP is projected to be under capacity by 2030 based on population projections. It is therefore recommended to initiate the upgrade of the plant by an additional 700 PE, satisfying the projected loadings through to the 2080 strategy horizon and capable of accepting wastewater from Inniscarra. The WwTP shall continue to operate to the 2080 strategy horizon utilising the existing discharge location.
- **Inniscarra:** Inniscarra WwTP is projected to be overloaded by 2030. Therefore, it is proposed to initiate the decommission of the WwTP and transfer wastewater to Drispey WwTP for treatment. This necessitates the construction of a 5.9km wastewater pipeline and associated pumping station on the existing site. The proposed Inniscarra PS will be designed to accommodate projected 2080 flows.

Table 2-26: Feasible Approaches for Blarney, Courtbrack, Dripsey and Inniscarra

Strategy Horizon	Catchment	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
2030	Blarney WwTP	• Optimise WwTP to bring to compliance with current ELVs.	• Upgrade WwTP by 2,000 PE. • Construct FE transfer to Carrigrennan WwTP via Ballyvolane PS	• Upgrade WwTP by 1,100 PE. • Construct FE Transfer to Carrigrennan WwTP via Ballyvolane PS
	Inniscarra WwTP	• Construct WW transfer to Blarney WwTP and associated WwPS. • Decommission WwTP	• Decommission WwTP. • Construct WW transfer to Blarney WwTP and associated WwPS.	• Decommission WwTP. • Construct WW transfer to Dripsey WwTP and associated WwPS.
	Dripsey WwTP	• Optimise WwTP to bring to compliance with current ELVs	• Optimise WwTP to bring to compliance with current ELVs	• Upgrade WwTP by additional 700 PE utilising existing discharge
	Courtbrack WwTP	• Upgrade WwTP by additional 600 PE utilising existing discharge	• Decommission WwTP • Construct WW transfer to Blarney WwTP and associated WwPS.	• Upgrade WwTP by additional 600 PE utilising existing discharge
2055	Blarney WwTP	• Construct a new Wastewater Transfer Pumping Station (WwPS) • Construct new wastewater transfer pipe to Carrigrennan WwTP via new intermediary WwPS and existing Ballyvolane PS • Decommission WwTP.	• Upgrade WwTP by additional 10,500 PE	• Upgrade WwTP by additional 10,000 PE
	Inniscarra WwTP	• Continue to operate WwPS	• Continue to operate WwPS	• Continue to operate WwPS
	Dripsey WwTP	• Upgrade WwTP by an additional 250 PE utilising existing discharge	• Construct WW transfer to Blarney WwTP via Inniscarra and associated WwPS.	• Continue to operate WwTP

Strategy Horizon	Catchment	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
			• Decommission WwTP.	
	Courtbrack WwTP	• Continue to operate WwTP	• Continue to operate WwPS	• Continue to operate WwTP
2080	Blarney WwTP	• Continue to operate WwPS	• Capital replacement of 13,000 PE of WwTP with further upgrade of 4,000 PE	• Capital replacement of 13,000 PE of WwTP with further upgrade of 3,400 PE
	Inniscarra WwTP	• Continue to operate WwPS	• Continue to operate WwPS	• Continue to operate WwPS
	Dripsey WwTP	• Continue to operate WwTP • Capital replacement of 600PE of WwTP	• Continue to operate WwPS	• Continue to operate WwTP
	Courtbrack WwTP	• Continue to operate WwTP • Capital replacement of 250 PE of WwTP	• Continue to operate WwPS	• Capital replacement of 250 PE of WwTP

2.2.6 Recommended Approach and Implementation Strategy for Blarney, Courtbrack, Dripsey and Inniscarra

Based on the analysis conducted above, **Feasible Approach 1** is recommended for implementation and further development as an integral component of the CWS. This recommendation stems from the approach's superior performance across the assessed criteria and its alignment with the broader CWS objectives, making it the most suitable and sustainable solution for addressing the sub-catchment's wastewater management needs.

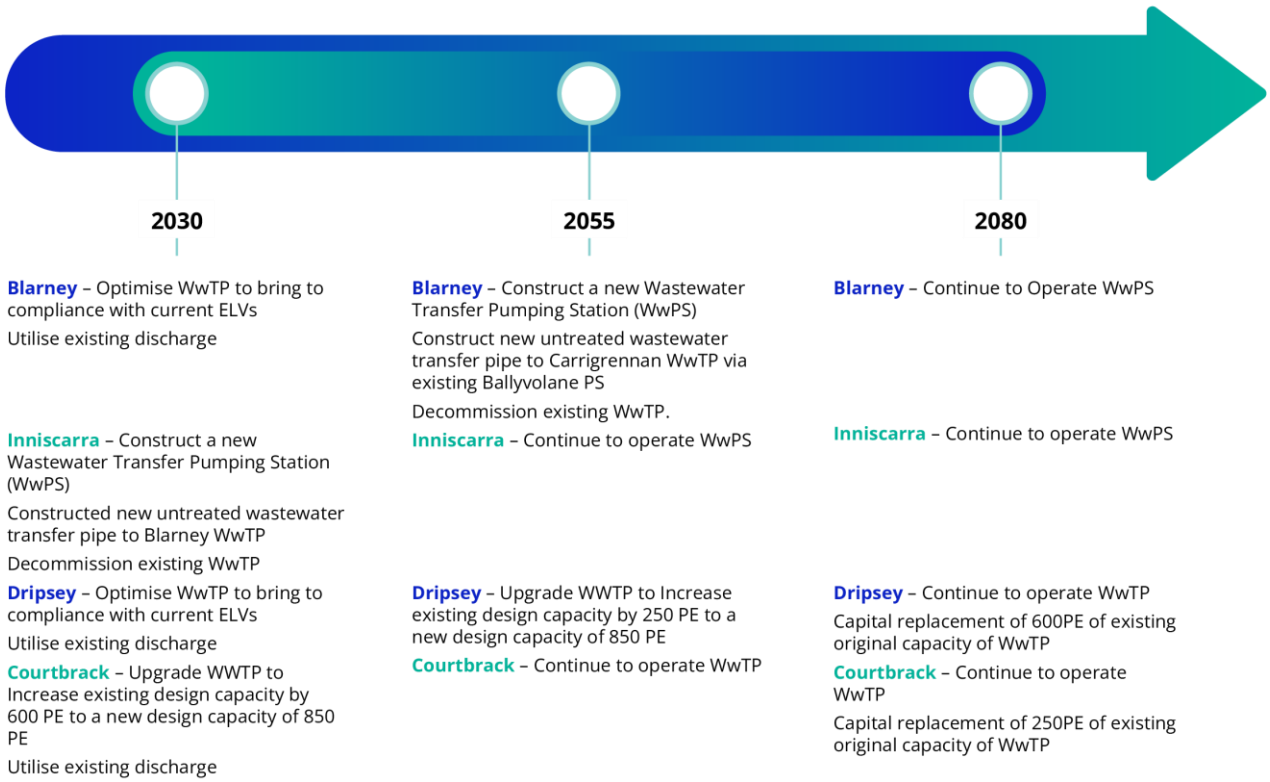


Figure 2-11: Proposed Implementation Strategy for Blarney, Courtbrack, Dripsey and Inniscarra

Figure 2-12: Recommended Approach for Blarney, Courtbrack, Dripsey and Inniscarra

2.3 Kileens and Monard

2.3.1 Kileens

Introduction

Kileens WwTP is located approximately 1.5km to the west of Cork City. Cork County Council operate and maintain Kileens WwTP on behalf of UÉ.

The WwTP has a design capacity of 600 PE and the plant consists of a Preliminary Treatment (Screening), Primary Treatment (Primary Settlement) and Secondary Treatment (Rotating Biological Contactors BiolExtended Aeration and Clarifier) followed by Tertiary Treatment (Sand Filtration). There is a storm management system and sludge storage at Kileens WwTP. There are no emergency overflows upstream (or within) the WwTP and no secondary overflow discharges from the WwTP. All treated effluent from the WwTP drains by gravity to the Blarney River, located adjacent to the plant. Projections demonstrate significant population growth in the area.

The existing wastewater treatment process is failing to achieve the discharge requirements specified within its WWDL.

Figure 2-13: Kileens Location

Table 2-27: Kileens WwTP Details

Organic Design PE	Storm Management	Inlet Works	Primary Treatment	Secondary Treatment	Tertiary Treatment	Chemical P Removal	Sludge Treatment	Installation Date
600	Storm Tank	Screening	PSTs	RBCs	Sand Filtration	n/a	n/a	2009

Table 2-28:Current and Projected Organic (PE) and Hydraulic Loadings to Kileens WwTP

Parameter	Existing Capacity	Current (2024) Loading	2030	2055	2080
Organic Loading (PE)	600	917	1,500	2,084	2,285
Peak Hydraulic Loading (m^3/d)	270	265	709	1,069	1,205

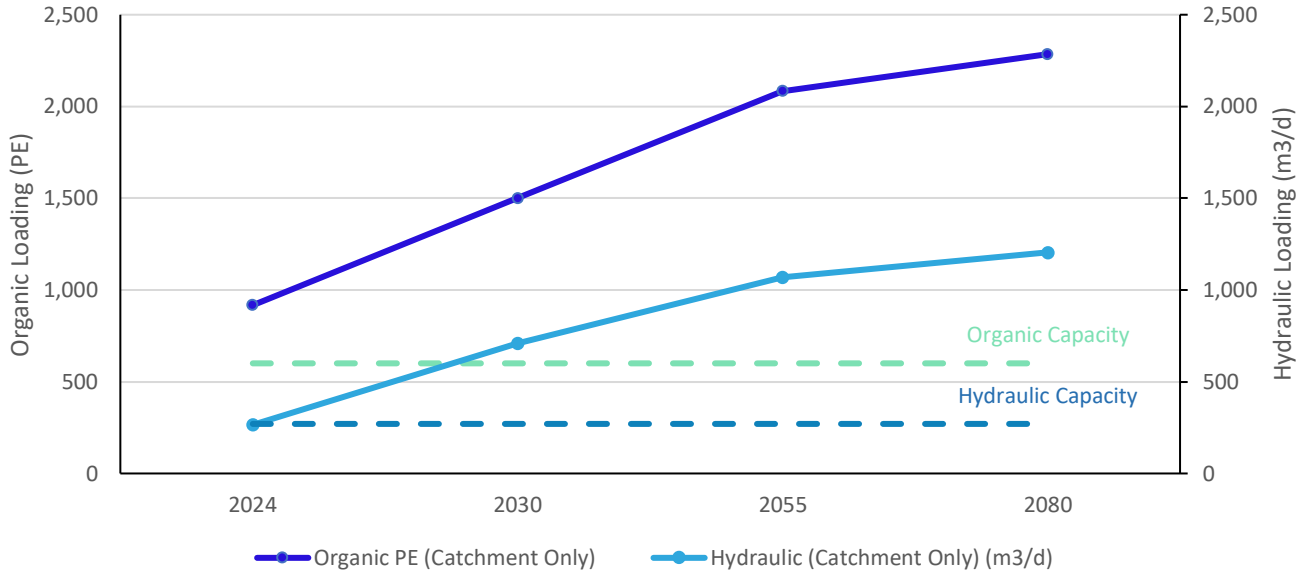


Figure 2-14: Current and Projected Loadings at Kileens WwTP

Current and Projected Discharge Limits

Following water quality modelling conducted at the existing WwTP discharge point, environmentally sustainable discharge limits s based on compliance with the appropriate WFD EQS have been determined based on projected PE loading to the WwTP across the current and future Strategy horizons. The environmentally sustainable discharge limits for these scenarios have been summarised in Table 2-29.

Table 2-29: Existing WWDL ELV and Environmentally Sustainable Discharge Limits at Kileens WwTP

Parameter	Existing ELVs	2030 Environmentally Sustainable Discharge Limits	2055 Environmentally Sustainable Discharge Limits	2080 Environmentally Sustainable Discharge Limits
BOD	25 mg/l	4 mg/l	3 mg/l	3 mg/l
Ammonia	28.4 mg/l	0.6 mg/l	0.4 mg/l	0.4 mg/l

OrthoP	1 mg/l	0.3 mg/l	0.2 mg/l	0.2 mg/l
More Stringent?	-	Y	Y	Y

As shown in Table 2-29, the environmentally sustainable discharge limits for the future horizons are considerably more stringent than the current WWDL requirements which would necessitate additional wastewater treatment processes for the continuation of discharging treated effluent at the current location.

Summary of Observed Constraints

As part of the delivery of this Strategy, advancement of the Optioneering Process assessed potential Network, Ecological, Environmental and Planning constraints that may impact the development of feasible approaches. Key findings pertinent to this catchment have been summarised below:

Network Constraints

A separate assessment of the existing wastewater network for this agglomeration, including maps and drawings illustrating the location of constraints has been undertaken as part of the Network Modelling Report which is included in Appendix 4.

The network assessment identified potential flooding and surcharging conditions under current and future scenarios within the main trunk sewer within the Kileens catchment wastewater network. Based on future loading scenarios, model projections indicate a substantial increase in both the extent and frequency of these issues throughout the existing network. Notably, a Storm Water Overflow (SWO) is present within the system however, based on modelling exercises undertaken, it is currently non-compliant and projected to remain at risk of non-compliance in the 2080 strategy horizon.

Environmental and Ecological Constraints

The discharge location waterbody is Blarney_010 (Blarney River) with Moderate WFD Status (cycle 3 2016-2021) and classified as At Risk (2022). No European designated sites (SPAs and SACs) are located in proximity or with direct pathways to the current WwTP and the discharge outfall is more than 10 km away from the nearest SPA/SAC. Three national designated sites, Blarney Bog pNHA, Blarney Castle Woods pNHA (sections of Blarney River) and Shournagh Valley pNHA are located 0.4 km, 2.5 km and 6 km respectively downstream of the discharge.

Planning Constraints

Regarding planning, the assessment identified several factors that may influence future development at the site. The planning assessment has identified that the site is zoned for Sustainable Residential Neighbourhoods under the County Development Plan. There is limited space available for expansion within the existing site boundary, and the surrounding area is adjacent to residential properties. As a result, pre-planning consultations with the local authority are likely to be required to address zoning constraints and potential community impacts.

Coarse Screening

The coarse screening was undertaken on the unconstrained list of options at Kileens WwTP, which are shown in Table 1-1, as per the methodology outlined in Section 1.3. To provide context for the coarse screening results, which are outlined in Table 2-30, commentary on the coarse screening exercise is provided below.

- Option A0 (Do Nothing) has not been considered as a feasible option for the 2080 strategy horizon as the existing WwTP is currently over capacity and is not achieving the discharge requirements as set in the WWDL.

- Option A1 (Do Minimum – Process Optimisation) has been deemed unfeasible for the 2080 horizon due to the projected exceedance of both organic and hydraulic capacities of the WwTP, coupled with the anticipated end-of-life status of existing assets.
- Option A2 (Reuse with Investment – Existing Discharge Location) has been screened out for 2055 and the 2080 strategy horizons as the existing assets will have exceeded their design life.
- Option A3 (Reuse with investment – New Discharge Location) has been screened out for the 2080 strategy horizon as the existing assets will have exceeded their design life.
- Option A4 (New Treatment Process on Current Site with New Discharge Location) has been screened out for the 2080 strategy horizon due to the outcomes of the planning assessment, which identified constraints limiting future expansion at the current site.
- Option A5 (New Greenfield Plant with New Discharge) has been considered viable for the 2080 strategy horizon, as the existing asset life will have been exceeded after the 2055 strategy horizon. The required upgrade capacity is 2,300 PE. Constraints at the existing site boundary and the need for a new discharge location, due to more stringent environmentally sustainable discharge limits, support this.
- Option A6 (Wastewater Load Transfer to Carrigrennan WwTP via Cork City Network or via Northern Orbital Sewer (NOS)) is considered viable for the 2080 horizon, as both the organic treatment capacity and the remaining asset life are projected to be exceeded.

Table 2-30: Coarse Screening Output

Coarse Screening Results							
Long List of Options	**A0**	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**
2080	**N**	**N**	**N**	**N**	**N**	**Y (New Discharge Location)**	**Y**
2055	**N**	**N**	**N**	**N**	**N**	**Y (New Discharge Location)**	**Y**
2030	**N**	**N**	**Y**	**N**	**N**	**N**	**Y**

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening

Any options for the strategy horizon years of 2030 and 2055 should facilitate implementation of the longer term 2080 preferred solution and should not compromise the ability to implement this.

At the time of options screening, a project to decommission the existing WwTP and transfer (preliminary treated) wastewater to the Cork City Network was in the later stages of design. A fine screening MCA was conducted on this pre-existing project scope and Option 5 to validate previous design optioneering decisions however assessing the benefits/disbenefits of the projects under the CWS drivers.

Table 2-31: 2080 Options Advancing to Fine Screening

Options Progressed to Fine Screening for 2080	Description
A5	(New Greenfield Plant with New Discharge at River Lee
A6	Wastewater Load Transfer to Carrigrennan via Cork City

Fine Screening

The options presented in Table 2-31 underwent fine screening in the form of an MCA as detailed in Section 1.4. The scoring and results of the MCA are presented in Table 2-32.

Table 2-32: MCA Results for Kileens WwTP

Objectives	Criteria	Option A5	Option A6 (via Cork)
Addressing the Need	Treatment Capacity	3	3
	Network Capacity	3	-3
	Final Effluent Compliance	2	2
Deliverability	Design Complexity, Ease of Implementation & Feasibility	-2	1
	Planning & Regulation	-1	2
	Delivery Timeline & Alignment	-1	1
Risk & Resilience	Flexibility & Scalability	2	-1
	Delivery Risk	-2	-1
Customer and Stakeholder Support	Impact on Customers	2	3
	Community Support, Health and Wellbeing	1	3
Environmental & Sustainability	Water Environment	2	3
	Waterbody Impact (Existing and New)	2	3
	Waterbody Flood Risk	0	0
	Biodiversity	-2	2
	AA-Natura 2000 Sites	0	0
	Aquatic Biodiversity	2	2
	Terrestrial Biodiversity (BNG)	-2	0
	GHG Emissions	0	1
	Embodied Carbon	-2	-1
	Operational Carbon	2	3
	Energy Efficiency	2	3
	Climate Resilience	3	3
	Circular Economy	-1	1
Weighted Average Sub Total		**0.71**	**1.46**
Rank		**2nd**	**1st**

The MCA concluded that Option A6 ranks first against the fine screening criteria for the 2080 horizon and is more cost-effective to implement than Options A5.

Wastewater Treatment Summary

In summary, the optioneering process for Kileens WwTP has yielded recommendations for future development:

The highest ranked option ultimately involves transferring wastewater to Carrigrennan WwTP via the Northpoint Business Park (Option A6). This approach addresses receiving waterbody quality concerns and risks, optimises circular economy by consolidating treatment at a centralised location and improves overall treatment efficiency whilst simultaneously protecting the environment and ecological boundaries. This strategy ensures long-term sustainability by leveraging existing treatment facilities at Carrigrennan WwTP and protecting inland rivers sensitive to climate change.

This option effectively addresses several key challenges identified at Kileens WwTP, including the site boundary constraints limiting expansion possibilities, the current exceedance of organic loading capacity and the remaining asset life projected to be exceeded after the 2055 strategy horizon.

Wastewater Network Upgrade Summary

A separate assessment of network upgrades for this agglomeration has been undertaken as part of the Network Modelling Report which is included in Appendix 4. Below is a brief overview of the proposed upgrades within the Kileens agglomeration, addressing SWO compliance and future development constraints such as surcharge and flooding due to development impacts. Unless otherwise stated specifically, these proposed upgrades are proposed to be initiated in the 2030 strategy horizon. The development process of these proposed upgrades, as well as maps and drawings illustrating the location of the required upgrades are provided in more detail in the Network Modelling Report in Appendix 4.

New storage at Killeens WwPS: A storage facility has been proposed at the Kileens WwTP site. This plan also includes the installation of a new rising main, which will pump forward flow to Cork City catchment and decommission the treatment plant in the 2030 horizon.

New storage at Rathpeacon WwPS: Additional storage to be provided at the wet well chamber.

New storage at Monard for treated final effluent transfer: A storage facility has been proposed at the Monard development site. This plan also includes the installation of a new rising main, which will pump forward flow to the Cork City treatment outfall location at Carrigrennan.

2.3.2 Monard

Monard is a proposed settlement northeast of Blarney and is not considered a Census Town by the CSO. It is designated as a Special Development Zone (SDZ) in the Cork County Development Plan 2022 with an expected population of 4,000 after 2028. The population is projected to significantly increase to approximately 11,000 in the 2055 strategy horizon and 13,500 in the 2080 strategy horizon. The existing catchment does not have a significant wastewater network and resultingly does not have an existing wastewater treatment process that is operated by UE.

The CWS aims to identify optimal wastewater solutions for this area to be initiated for the 2080 strategy horizon. There are no adequate discharge locations within the local proximity of the proposed catchment plot therefore limiting potential solutions. Two options were identified at the fine screening stage which are detailed below:

- Option A5 – New Greenfield WwTP with final effluent transfer and discharge to Carrigrennan outfall
- Option A6 –Wastewater Transfer to Carrigrennan via the proposed Blarney WW transfer.

Given the current population of this agglomeration is 273 persons according to the latest CSO2022 data, long term solutions for the catchment have been identified but must be reviewed regularly to understand housing development targets and timely delivery of network and wastewater treatment solutions.

It was identified the most cost effective solution for Monard is to construct a wastewater transfer pipeline from the proposed catchment to the proposed Blarney wastewater transfer with wastewater treatment provided at Carrigrennan WwTP. This solution has synergies with identified optimal CWS solutions and mitigates risk of investment for a large treatment plant that may not fulfil its full capacity. This catchment will be actively and regularly reviewed to ensure optimal solutions or update to solutions are captured and implemented.

2.3.3 Feasible Approaches for Kileens and Monard

The results of the fine screening process and MCA were assessed and taken forward to develop 3 No. Feasible Approaches for the sub catchment. These approaches comprise combinations of options for each agglomeration, carefully selected to best achieve the goals of the CWS. The wastewater network upgrade proposals for each catchment mentioned above are common amongst Feasible Approaches detailed below

Our approach ensures that the selected strategies are not only technically viable but also align with the long-term vision for wastewater management in the region.

These Approaches are summarised in Table 2-33 overleaf.

Feasible Approach 1 presents an integrated approach for managing wastewater in Kileens and Monard through 2080, combining the highest-ranking MCA options for each site.

- **Kileens:** Kileens WwTP is currently overloaded. It is proposed to initiate the decommission of the WwTP in the 2030 strategy horizon and transfer wastewater to the Cork City Network at Northpoint Business Park, with flows being forwarded to Carrigrennan WwTP for treatment. This necessitates the construction of a 2.2km wastewater pipeline and associated pumping station at the existing WwTP site. The proposed Kileens PS will be designed to accommodate projected 2080 flows.
- **Monard:** It is proposed to transfer wastewater from Monard to a new intermediate pumping station on the proposed new Blarney transfer line and ultimately to Carrigrennan WwTP for treatment. This will necessitate a new pumping station at Monard also. A phased approach or incremental delivery may be required due to the slow to rapid growth of the agglomeration over the study period, in order to mitigate against potential operational issues and septicity risk. The proposed Monard PS will be designed to accommodate projected 2080 flows. It is proposed to initiate these works in the 2030 strategy horizon.

Feasible Approach 2 investigates further options that have passed the fine screening process.

- **Kileens:** For Kileens WwTP it is proposed to initiate the decommission of the WwTP and transfer wastewater to the proposed Blarney wastewater transfer main and ultimately to Carrigrennan WwTP for treatment. This necessitates the construction of a wastewater pipeline and associated pumping station at the existing WwTP site. The proposed Kileens PS will be designed to accommodate projected 2080 strategy horizon flows.
- **Monard:** For Monard, the approach is identical to Feasible Approach 1. It is proposed to transfer wastewater to an intermediate PS on the proposed Blarney wastewater transfer main and ultimately to Carrigrennan WwTP for treatment.

Feasible Approach 3 investigates further options that have passed the fine screening process.

- **Kileens:** For Kileens WwTP, this approach is identical to Feasible Approach 1. It is proposed to decommission the WwTP and transfer wastewater to the Cork City Network at Northpoint Business Park, with flows being forwarded to Carrigrennan WwTP for treatment.

- **Monard:** For Monard, in the 2030 strategy horizon, it is proposed to initiate the construction of a new WwTP with a capacity of 5,000 PE to accommodate its existing loadings and to upgrade the WwTP in the 2055 strategy horizon by 15,000 PE in order to accommodate projected loadings of the 2080 strategy horizon. This approach will also necessitate the construction of a final effluent pumping stations and associated effluent transfer pipeline to transfer effluent the existing Ballyvolane PS for further treatment at Carrigrennan WwTP.

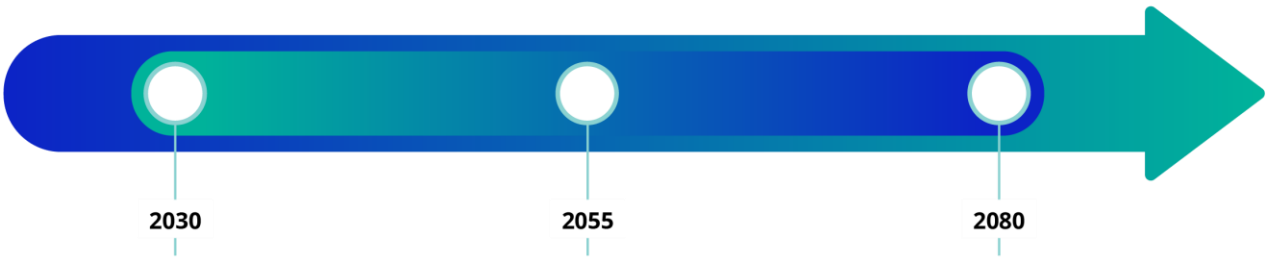
Table 2-33: Feasible Approaches Solutions for Kileens and Monard

Strategy Horizon	Catchment	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
2030	Kileens WwTP	• Construct a new Wastewater Transfer Pumping Station (WwPS) • Construct WW transfer to Cork City Network at Northpoint Business Park • Decommission WwTP.	• Construct a new Wastewater Transfer Pumping Station (WwPS) • Construct WW transfer to proposed Blarney transfer line. • Decommission WwTP.	• Construct a new Wastewater Transfer Pumping Station (WwPS) • Construct WW transfer to Cork City Network at Northpoint Business Park • Decommission WwTP.
	Monard	• Construct a new Wastewater Transfer Pumping Station at Monard (WwPS) • Construct new wastewater transfer (Twin Main) • Construct new intermediate Wastewater Transfer Pumping Station (WwPS) between Blarney and Ballyvolane PS to take inflows from both Monard and Blarney • Construct new Wastewater Transfer (Twin Main)	• Construct a new Wastewater Transfer Pumping Station at Monard (WwPS) • Construct new wastewater transfer (Twin Main) • Construct new intermediate Wastewater Transfer Pumping Station (WwPS) between Blarney and Ballyvolane PS to take inflows from both Monard, Kileens and Blarney • Construct new Wastewater Transfer (Twin Main)	• Construct new WwTP (5,000PE). Construct FE transfer to Ballyvolane PS and associated PS.
2055	Kileens WwTP	• Continue to operate WwPS	• Continue to operate WwPS	• Continue to operate WwPS
	Monard	• Continue to operate WwPS	• Upsize wastewater transfer	• Upgrade WwTP by 15,000PE

Strategy Horizon	Catchment	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
2080	Kileens WwTP	• Continue to operate WwPS	• Continue to operate WwPS	• Continue to operate WwPS
	Monard	• Continue to operate WwPS	• Continue to operate WwPS	• Continue to operate WwTP

2.3.4 Recommended Approach and Implementation Strategy for Kileens and Monard

Based on the analysis conducted above, **Feasible Approach 1** is recommended for implementation and further development as an integral component of the CWS. This recommendation stems from the approach's superior performance across the assessed criteria and its alignment with the broader CWS objectives, making it the most suitable and sustainable solution for addressing the sub-catchment's wastewater management needs.



Kileens – Construct a new Wastewater Transfer Pumping Station (WwPS)

Construct new untreated wastewater transfer pipe to Cork City Network at Northpoint Business Park

Decommission existing WwTP.

Monard – Construct a new Wastewater Transfer Pumping Station at Monard (WwPS)

Construct new untreated wastewater transfer (Twin Main)

Construct new intermediate Wastewater Transfer Pumping Station (WwPS) between Blarney and Ballyvolane PS to take inflows from both Monard and Blarney

Construct new Untreated Wastewater Transfer (Twin Main) to Carrigrennan WwTP via existing Ballyvolane PS

Kileens – Continue to Operate WwPS

Monard – Continue to operate WwPSs

Kileens – Continue to Operate WwPS

Monard – Continue to operate WwPSs

Figure 2-15: Proposed Implementation Strategy for Kileens and Monard

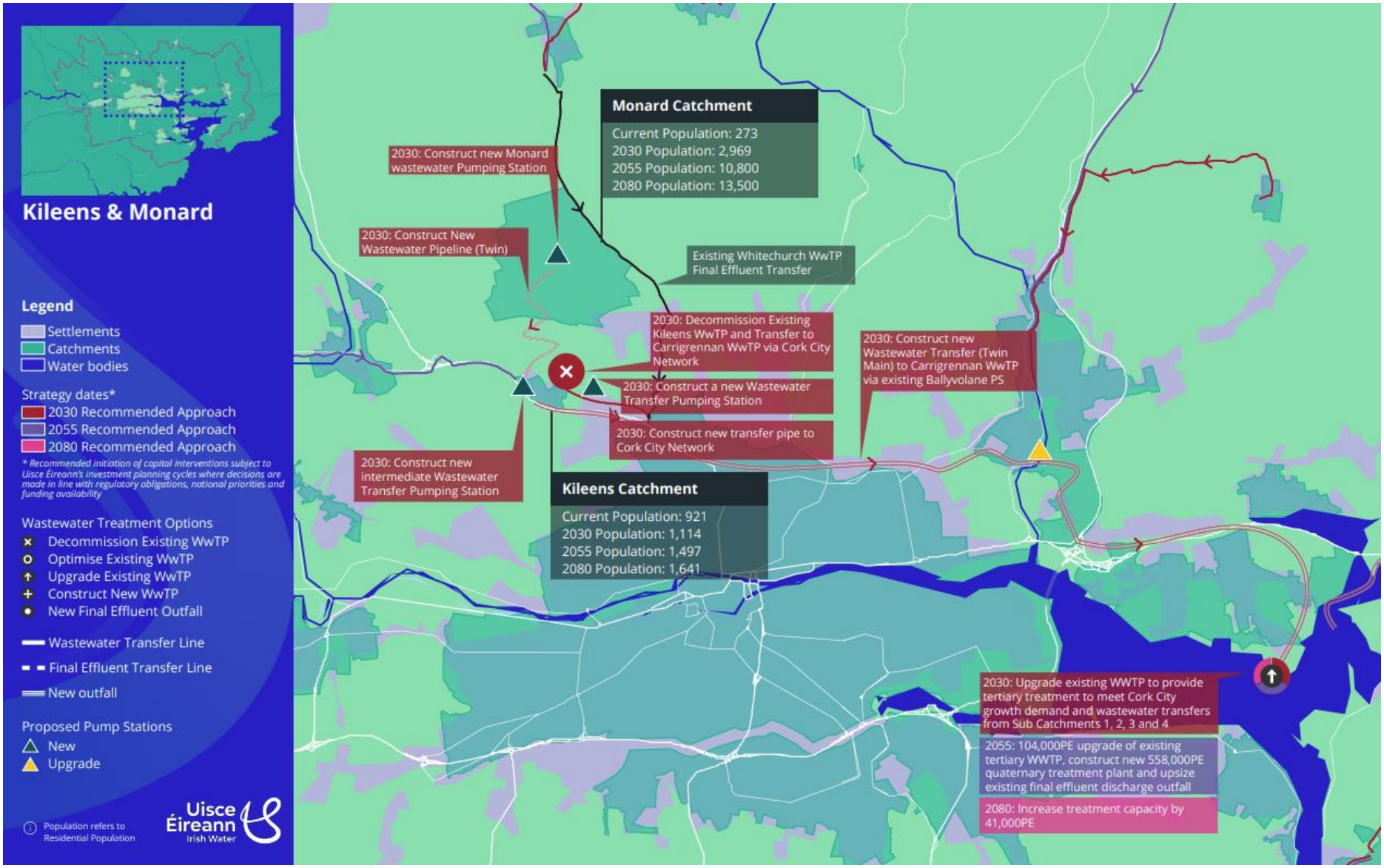


Figure 2-16: Recommended Approach for Kileens and Monard

2.4 Carrignavar, Grenagh, and Whitechurch

2.4.1 Carrignavar

Introduction

Carrignavar WwTP is located approximately 8km north of Cork City and 2km east of Whitechurch in the Cloghnagashee River Valley. UÉ operate and maintain Carrignavar WwTP.

The WwTP has a design capacity of 300 PE and the plant consists of a Primary Treatment (Primary Settlement) and Secondary Treatment (Extended Aeration and Clarifier) followed by tertiary UV treatment. There is no storm management system or sludge treatment at Carrignavar WwTP. There are no emergency overflows upstream (or within) the WwTP and no secondary overflow discharges from the WwTP. All treated effluent from the WwTP drains by gravity to the Ballycaskin River, a tributary to the Glashaboy River, located adjacent to the plant. Projections demonstrate significant population growth in the area.

The existing wastewater treatment process is currently performing very poorly and is failing to achieve the discharge requirements specified within its WWDL.

Figure 2-17: Carrignavar Location

Table 2-34: Carrignavar WwTP Details

Organic Design PE	Storm Management	Inlet Works	Primary Treatment	Secondary Treatment	Tertiary Treatment	Chemical P Removal	Sludge Treatment	Installation Date
300	n/a	n/a	PST	ASP	UV Disinfection	n/a	n/a	2000

Table 2-35: Current and Projected Organic (PE) and Hydraulic Loading to Carrignavar WwTP

Parameter	Existing Capacity	Current Loading	2030	2055	2080
Organic Loading (PE)	300	694	907	1,104	1,248
Peak Hydraulic Loading (m^3/d)	68	611	538	655	740

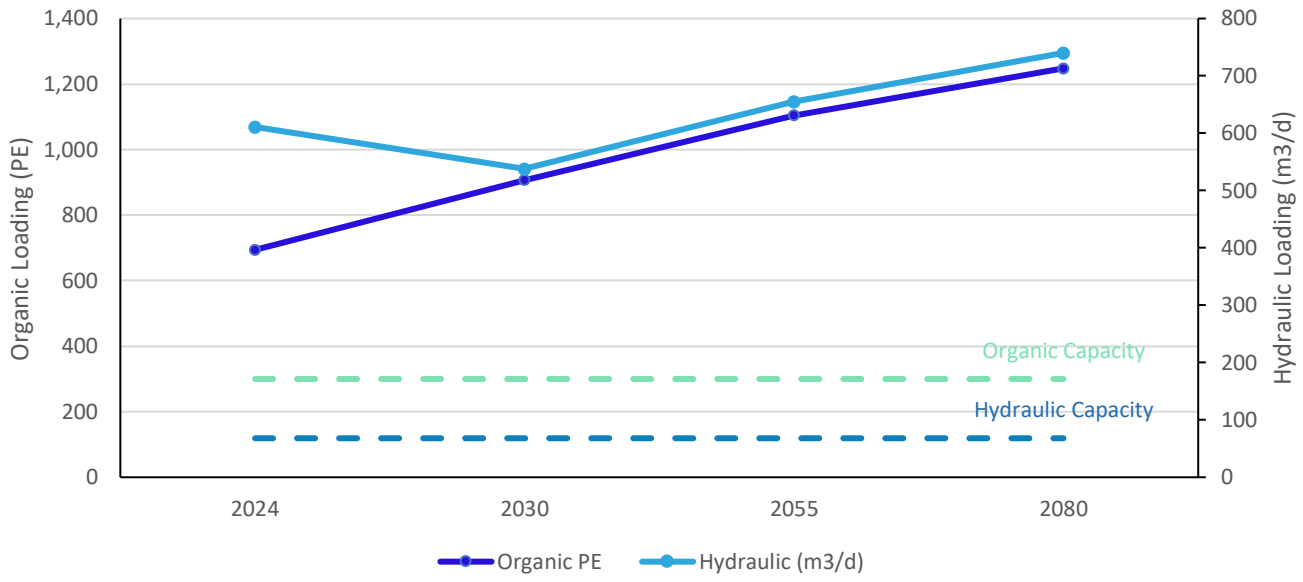


Figure 2-18: Current and Projected Loadings at Carrignavar WwTP

Current and Projected Discharge Limits

Following water quality modelling conducted at the existing WwTP discharge point, environmentally sustainable discharge limits based on compliance with the appropriate WFD EQS have been determined based on projected PE loading to the WwTP across the current and future Strategy horizons. The environmentally sustainable discharge limits for these scenarios have been summarised in Table 2-36.

Table 2-36: Existing WWDL ELVs and Environmentally Sustainable Discharge Limits at Carrignavar WwTP

Parameter	Existing WWDL ELVs	2030 Environmentally Sustainable	2055 Environmentally Sustainable	2080 Environmentally Sustainable

		Discharge Limits	Discharge Limits	Discharge Limits
BOD	25 mg/l	14 mg/l	11 mg/l	10 mg/l
Ammonia	2 mg/l	0.8 mg/l	0.6 mg/l	0.6 mg/l
OrthoP	1.5 mg/l	0.4 mg/l	0.3 mg/l	0.3 mg/l
More Stringent?	-	Y	Y	Y

As shown in Table 2-36, the projected environmentally sustainable discharge limits for the future horizons are considerably more stringent than the current WWDL requirements which would necessitate additional wastewater treatment processes for the continuation of discharging treated effluent at the current location.

Summary of Observed Constraints

As part of the delivery of this Strategy, advancement of the Optioneering Process assessed potential Network, Ecological, Environmental and Planning constraints that may impact the development of feasible approaches. Key findings pertinent to this catchment have been summarised below:

Network Constraints

A separate assessment of the existing wastewater network for this agglomeration, including maps and drawings illustrating the location of constraints has been undertaken as part of the Network Modelling Report which is included in Appendix 4.

The network assessment identified potential flooding and surcharging conditions under current and future scenarios within the main trunk sewer within the Carrignavar agglomeration wastewater network. Based on future loading scenarios, model projections indicate a substantial increase in both the extent and frequency of these issues throughout the existing network. Notably, there are no Storm Water Overflows (SWOs) present in the system.

Environmental and Ecological Constraints

The discharge location waterbody is Glashaboy (Lough Mahon)_020 (River Glashaboy) with Good WFD Status (cycle 3 2016-2021) and classified as Under Review for Risk Status (2022). No European nor national designated sites are in proximity or withing direct pathways to the current WwTP and the discharge outfall is more than 9 km away from nearest SPA/SAC/pNHA.

Planning Constraints

The planning assessment identified the restricted area available for potential expansion within the existing footprint. However, this challenge is mitigated by the availability of additional land in the vicinity. Furthermore, no zoning issues have been identified, and it is anticipated that planning approval for any necessary improvements or expansions would likely be supported.

Coarse Screening

The coarse screening was undertaken on the unconstrained list of options at Carrignavar WwTP, which are shown in Table 1-1, as per the methodology outlined in Section 1.3. To provide context for the coarse screening results, which are outlined in Table 2-37, commentary on the coarse screening exercise is provided below.

- Option A0 (Do Nothing) has not been considered as a feasible option for the 2080 strategy horizon as the existing WwTP is currently over capacity and is not achieving the discharge requirements as set in the WWDL.

- Option A1 (Do Minimum – Process Optimisation) has been deemed unfeasible for the 2080 horizon due to the projected exceedance of both organic and hydraulic capacities of the WwTP, coupled with the anticipated end-of-life status of existing assets.
- Option A2 (Reuse with Investment – Existing Discharge Location) has been screened out for the 2055 and the 2080 strategy horizons as the existing assets will have exceeded their design life.
- Option A3 (Reuse with Investment – New Discharge Location) has been screened out for the 2055 and the 2080 strategy horizons as the existing assets will have exceeded their design life.
- Option A4 (New Treatment Process on Current Site with New Discharge Location) has been considered viable for the 2080 strategy horizon, as both the organic and hydraulic capacities are projected to be exceeded, and the remaining asset life will be insufficient, thus necessitating the need for a new treatment process on site. The current site boundary is unlikely to pose a significant risk to its implementation. An alternative discharge point will be assessed and identified within the Stage 4 - Fine Screening process but is expected to be downstream on the River Glashaboy as WQM indicated less stringent environmentally sustainable discharge limits.
- Option A5 (New Greenfield Plant with New Discharge) has been considered viable for the 2080 strategy horizon. As with earlier options, a new discharge location is recommended.
- Option A6 (Wastewater Load Transfer to Carrigrennan WwTP via Whitechurch) is considered viable for the 2080 horizon, as both the organic treatment capacity and the remaining asset life are projected to be exceeded.

Table 2-37: Coarse Screening Output of Carrignavar WwTP

Coarse Screening Results							
Long List of Options	**A0**	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**
2080	**N**	**N**	**N**	**N**	**Y (New Discharge Location)**	**Y (New Discharge Location)**	**Y**
2055	**N**	**N**	**N**	**N**	**Y (New Discharge Location)**	**N**	**Y**
2030	**N**	**N**	**Y**	**Y**	**N**	**N**	**Y**

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening

Any options for the strategy horizon years of 2030 and 2055 should facilitate implementation of the longer term 2080 preferred solution and should not compromise the ability to implement this. Further option defining is undertaken in order to undertake the MCA fairly and adequately. Through the WQM process, a new discharge location on the River Glashaboy was identified to have less stringent environmentally sustainable discharge limits and existing waterbody pressures. The existing site boundary and planning assessment did not identify any potential constraints to expansion, however since an expansion is likely to be required, Option A5 was progressed to fine screening. The existing Whitechurch WwTP was identified as a potential wastewater load receiver due to projected spare capacity and existing final effluent discharge arrangements.

Table 2-38: 2080 Options Advancing to Fine Screening

Options Progressed to Fine Screening for 2080	Description
A4	New Treatment Process on Current Site with New Discharge at River Glashaboy
A5	New Greenfield Plant with New Discharge at River Glashaboy
A6	Wastewater Load Transfer via Whitechurch

Fine Screening

The options presented in Table 2-38 underwent fine screening in the form of an MCA as detailed in Section 1.4. The scoring and results of the MCA are presented in Table 2-39.

Table 2-39: MCA Results for Carrignavar WwTP

Objectives	Criteria	Option A4	Option A5	Option A6
Addressing the Need	Treatment Capacity	3	3	3
	Network Capacity	3	3	2
	Final Effluent Compliance	3	2	3
Deliverability	Design Complexity, Ease of Implementation & Feasibility	-1	-2	1
	Planning & Regulation	-1	-2	-1
	Delivery Timeline & Alignment	-1	-2	1
Risk & Resilience	Flexibility & Scalability	1	2	-2
	Delivery Risk	-1	-2	-1
Customer and Stakeholder Support	Impact on Customers	1	1	2
	Community Support, Health and Wellbeing	1	1	2
Environmental & Sustainability	Water Environment	1	1	3
	Waterbody Impact (Existing and New)	1	1	3
	Waterbody Flood Risk	0	0	0
	Biodiversity	0	-1	3
	AA-Natura 2000 Sites	0	0	0
	Aquatic Biodiversity	2	2	3
	Terrestrial Biodiversity (BNG)	0	-1	0
	GHG Emissions	0.5	-0.5	0
	Embodied Carbon	-1	-3	-3
	Operational Carbon	2	2	3
	Energy Efficiency	1	2	3
	Climate Resilience	-1	1	3
	Circular Economy	0	-1	1
Weighted Average Sub Total		**0.65**	**0.39**	**1.49**
Cost	CAPEX	3	2	5
	OPEX	5	5	6
	Whole Life Cost	3	3	5
Combined Score		**2.22**	**1.82**	**3.77**
Rank		**2nd**	**3rd**	**1st**

The MCA has identified Option A6 as the highest-ranking option against the fine screening criteria for the 2080 strategy horizon and offers a more cost-effective implementation and better alignment with the goals of the CWS and UÉ compared to Options A4 and A5.

Wastewater Treatment Summary

The optioneering process for Carrignavar WwTP has yielded recommendations for future development:

The highest ranked option involves transferring wastewater to Carrigrennan WwTP via Whitechurch WwTP and connection to the Cork City Network (Option A6). This approach addresses receiving waterbody quality concerns and risks by consolidating treatment at a centralised location and improves overall treatment efficiency whilst simultaneously protecting the environment and ecological boundaries. This strategy ensures long-term sustainability by leveraging existing treatment facilities at Carrigrennan WwTP and protecting inland rivers sensitive to climate change.

This option effectively addresses several key challenges identified at Carrignavar WwTP including the projected exceedance of organic loading capacity in the 2030 horizon and the existing assets nearing end of asset life in the 2055 strategy horizon.

Wastewater Network Upgrade Summary

A separate assessment of network upgrades for this agglomeration has been undertaken as part of the Network Modelling Report which is included in Appendix 4. Below is a brief overview of the proposed upgrades within the Carrignavar agglomeration, addressing SWO compliance and future development constraints such as surcharge and flooding due to development impacts. Unless otherwise stated specifically, these proposed upgrades are proposed to be initiated in the 2030 strategy horizon. The development process of these proposed upgrades, as well as maps and drawings illustrating the location of the required upgrades are provided in more detail in the Network Modelling Report in Appendix 4.

New storage at Carrignavar WwPS: A storage facility has been proposed at the Carrignavar treatment site. This plan also includes the installation of a 3.8km new rising main, which will pump forward flow to Cork City catchment and decommission the treatment plant in the 2030 horizon.

Network Upgrade Across Catchment: An upgrade of 1km of the existing sewer system is proposed to increase the network's capacity.

2.4.2 Grenagh

Introduction

Grenagh WwTP is located approximately 16km north of Cork City at Grenagh, County Cork. The Grenagh agglomeration consists of a village with a largely substantial residential element. EPS operate and maintain Grenagh WwTP on behalf of UÉ under a DBO 20-year contract.

The WwTP has a design capacity of 1,200 PE and the plant consists of a Preliminary Treatment and Secondary Treatment (Activated Sludge Plant). Sludge arising on site is stored in a single sludge storage tank. Treated effluent from the plant is discharged to the River Martin, a tributary of the River Blarney.

The existing wastewater treatment process has capacity for increased flows and is currently achieving the discharge requirements specified within its WWDL for the most part, however the final effluent does not meet the Total Nitrogen ELV consistently.

Figure 2-19: Grenagh Location

Table 2-40: Grenagh WwTP Details

Organic Design PE	Storm Management	Inlet Works	Primary Treatment	Secondary Treatment	Tertiary Treatment	Chemical P Removal	Sludge Treatment	Installation Date
1,200	Storage Tank	Screening	n/a	ASP	n/a	n/a	n/a	<2004

Table 2-41: Current and Projected Organic (PE) and Hydraulic Loading at Grenagh WwTP

Parameter	Existing Capacity	Current (2024) Loading	2030	2055	2080
Organic Loading (PE)	1,200	618	1,042	1,250	1,411
Peak Hydraulic Loading (m^3/d)	648	-	599	719	740

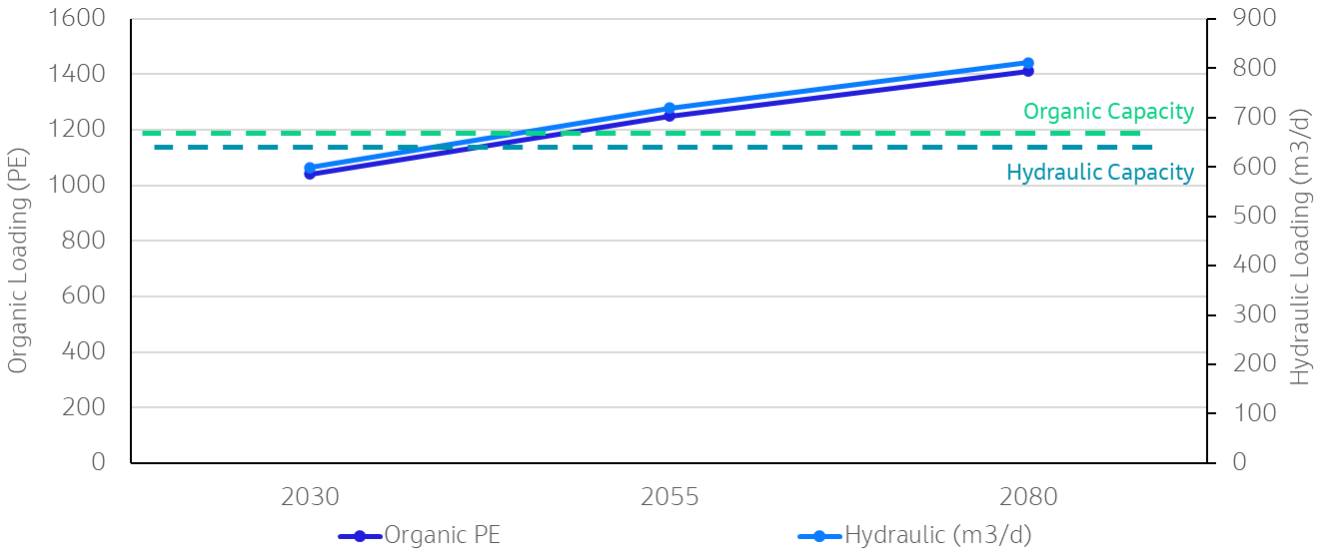


Figure 2-20: Current and Projected Loadings at Grenagh WwTP

Current and Projected Discharge Limits

Following water quality modelling conducted at the existing WwTP discharge point, environmentally sustainable discharge limits based on compliance with the appropriate WFD EQS have been determined based on projected PE loading to the WwTP across the current and future Strategy horizons. The environmentally sustainable discharge limits for these scenarios have been summarised in Table 2-42.

Table 2-42: Existing WWDL ELVs and Environmentally Sustainable Discharge Limits at Grenagh WwTP

Parameter	Existing WWDL ELVs	2030 Environmentally Sustainable Discharge Limits	2055 Environmentally Sustainable Discharge Limits	2080 Environmentally Sustainable Discharge Limits
BOD	25 mg/l	2.7 mg/l	2.3 mg/l	2 mg/l
Ammonia	3 mg/l	0.6 mg/l	0.5 mg/l	0.5 mg/l
OrthoP	1.65 mg/l	0.3 mg/l	0.3 mg/l	0.2 mg/l
More Stringent?	-	Y	Y	Y

Summary of Observed Constraints

As part of the delivery of this Strategy, advancement of the Optioneering Process assessed potential Network, Ecological, Environmental and Planning constraints that may impact the development of feasible approaches. Key findings pertinent to this catchment have been summarised below:

Network Constraints

A separate assessment of the existing wastewater network for this catchment, including maps and drawings illustrating the location of constraints has been undertaken as part of the Network Modelling Report which is included in Appendix 4.

The network assessment identified potential flooding and surcharging conditions under current and future scenarios within the main trunk sewer within the Grenagh catchment WW network. Based on future loading scenarios, model projections indicate an increase in both the extent and frequency of these issues throughout the existing network.

Environmental and Ecological Constraints

The discharge location waterbody is Martin_010 (River Martin) with Moderate WFD Status (cycle 3 2016-2021) and classified as AT Risk (2022). No European designated sites (SPAs and SACs) are located in proximity or within direct pathways to the current WwTP and the discharge outfall is more than 10 km away from the nearest SPA/SAC. The national designated site, Ardamadane Wood pNHA (includes section of River Martin) is located approximately 7 km from the discharge outfall.

Planning Constraints

The planning assessment has found no site boundary constraints or noted zoning impediments that may hinder future development.

Coarse Screening

The coarse screening was undertaken on the unconstrained list of options at Grenagh WwTP, which are shown in Table 1-1, as per the methodology outlined in Section 1.3. To provide context for the coarse screening results, which are outlined in Table 2-43, commentary on the coarse screening exercise is provided below.

- Option A0 (Do Nothing) has not been considered as a feasible option for the 2080 strategy horizon as it is projected that the existing WwTP will be exceeded and the existing assets will have exceeded their design life.
- Option A1 (Do Minimum – Process Optimisation) has been deemed unfeasible for the 2080 horizon due to the projected exceedance of both organic and hydraulic capacities of the WwTP, coupled with the anticipated end-of-life status of existing assets.
- Option A2 (Reuse with Investment – Existing Discharge Location) has been screened out for the 2080 strategy horizon as the existing assets will have exceeded their design life.
- Option A3 (Reuse with investment with New Discharge Location) has been screened out for the 2080 strategy horizon as the existing assets will have exceeded their design life.
- Option A4 (New Treatment Process on Current Site with New Discharge Location) has been considered viable for the 2080 strategy horizon, as both the organic and hydraulic capacities are projected to be exceeded, and the remaining asset life will be insufficient, thus necessitating the need for a new treatment process on site.
- Option A5 (New Greenfield Plant with New Discharge) has been considered viable for the 2080 strategy horizon, as both the organic and hydraulic capacities are projected to be exceeded, and the remaining asset life will be insufficient, thus necessitating the need for a new treatment process.
- Option A6 (Wastewater Load Transfer to Carrigrennan WwTP via Whitechurch WwTP) is considered viable for the 2080 horizon year, as both the organic treatment capacity and the remaining asset life are projected to be exceeded.

Table 2-43: Coarse Screening Output of Grenagh WwTP

Coarse Screening Results							
Long List of Options	**A0**	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**
2080	N	N	N	N	Y	Y	Y
2055	N	Y	Y	Y	N	N	Y

2030	**Y**	**Y**	**N**	**N**	**N**	**N**	**Y**

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening

Any options for the strategy horizon years of 2030 and 2055 should facilitate implementation of the longer term 2080 strategy horizon preferred solution and should not compromise the ability to implement this. Further option defining is undertaken in order to undertake the MCA fairly and adequately. The projected WQM indicates very stringent environmentally sustainable discharge limits for future strategy horizons. It is therefore recommended to discharge final effluent to an alternative location, this was identified as the River Martin where waterbody pressures and resulting environmentally sustainable discharge limits are less stringent. The existing site boundary and planning assessment did not identify any potential constraints to expansion, however since an expansion is likely to be required, Option A5 was progressed to fine screening due to the limited land availability and access issues for new plant construction. The existing Whitechurch WwTP was identified as a potential wastewater load receiver due to projected spare capacity and existing final effluent discharge arrangements.

Table 2-44: 2080 Options Advancing to Fine Screening

Options Progressed to Fine Screening for 2080	Description
A4	New Treatment Process on Current Site with New Discharge location at the River Martin
A5	New Greenfield Plant with New Discharge location at the River Martin
A6	Wastewater Load Transfer via Whitechurch

Fine Screening

The options presented in Table 2-44 underwent fine screening in the form of an MCA as detailed in Section 1.4. The scoring and results of the MCA are presented in Table 2-45.

Table 2-45: MCA Results for Grenagh WwTP

Objectives	Criteria	Option A4	Option A5	Option A6
Addressing the Need	Treatment Capacity	3	3	3
	Network Capacity	3	3	2
	Final Effluent Compliance	3	2	3
Deliverability	Design Complexity, Ease of Implementation & Feasibility	-1	-2	1
	Planning & Regulation	-1	-2	-1
	Delivery Timeline & Alignment	-1	-2	1
Risk & Resilience	Flexibility & Scalability	1	2	-2
	Delivery Risk	-1	-2	-1
Customer and Stakeholder Support	Impact on Customers	1	1	2
	Community Support, Health and Wellbeing	1	1	2
Environmental & Sustainability	Water Environment	2	2	3
	Waterbody Impact (Existing and New)	2	2	3
	Waterbody Flood Risk	0	0	0
	Biodiversity	-2	-2	2

	AA-Natura 2000 Sites	0	0	0
	Aquatic Biodiversity	-2	-2	2
	Terrestrial Biodiversity (BNG)	-1	-1	0
	GHG Emissions	0.5	-0.5	0
	Embodied Carbon	-1	-3	-3
	Operational Carbon	2	2	3
	Energy Efficiency	1	2	3
	Climate Resilience	-1	1	3
	Circular Economy	0	-1	1
Weighted Average Sub Total		**0.58**	**0.39**	**1.42**
Cost	CAPEX	3	2	4
	OPEX	6	6	6
	Whole Life Cost	3	3	4
Combined Score		**2.30**	**1.96**	**3.42**
Rank		**2nd**	**3rd**	**1st**

The MCA has identified Option A6 as the highest-ranking option against the fine screening criteria for the 2080 strategy horizon and offers a more cost-effective implementation and better alignment with the goals of the CWS and UÉ compared to Options A4 and A5.

Wastewater Treatment Summary

In summary, the optioneering process for Grenagh WwTP has yielded recommendations for future development:

The highest ranked option ultimately involves transferring wastewater to Whitechurch WwTP and subsequent transfer to the existing connection to the Cork City Network (Option A6). This approach addresses receiving waterbody quality concerns and risks by consolidating treatment at a centralised location and improves overall treatment efficiency whilst simultaneously protecting the environment and ecological boundaries. This strategy ensures long-term sustainability by leveraging existing treatment facilities at Carrigrennan WwTP and protecting inland rivers sensitive to climate change.

This option effectively addresses several key challenges identified at Grenagh WwTP, the projected exceedance of organic loading capacity and the existing assets nearing end of asset life in the 2055 strategy horizon, and the projected more stringent environmentally sustainable discharge limits at the present discharge location in the River Martin.

Wastewater Network Upgrade Summary

A separate assessment of network upgrades for this agglomeration has been undertaken as part of the Network Modelling Report which is included in Appendix 4. Below is a brief overview of the proposed upgrades within the Grenagh agglomeration, addressing SWO compliance and future development constraints such as surcharge and flooding due to development impacts. Unless otherwise stated specifically, these proposed upgrades are proposed to be initiated in the 2030 strategy horizon. The development process of these proposed upgrades, as well as maps and drawings illustrating the location of the required upgrades are provided in more detail in the Network Modelling Report in Appendix 4.

New storage at Grenagh WwPS: A storage facility has been proposed at the Grenagh treatment site. This plan also includes the installation of a c. 9km new rising main, which will pump forward flow to Cork City catchment and decommission the treatment plant in the 2055 strategy horizon.

Network Upgrade Across Catchment: An upgrade of c. 3.4km of the existing sewer system is proposed, along with the addition of c. 0.75km of new sewer lines to increase the network's capacity.

New storage at Grenagh_X-01 Development WwPS: Storage has been proposed at development site with a new rising main connecting to the network.

2.4.3 Whitechurch

Introduction

Whitechurch WwTP is located at Farranstig, Whitechurch, County Cork, approximately 11km north of Cork City.

The WwTP has a design capacity of 3,000 PE and the plant comprises preliminary treatment with a mechanical screen, followed by biological treatment within 2 No. activated sludge tanks and final settlement in clarifiers. There is no discharge license for Whitechurch WwTP as it discharges treated effluent to the Cork City network. There is no storm management system on site. Waste sludge is thickened on site by a picket fence thickener. While population in the area is projected to increase, the WwTP shall have additional capacity to accommodate the increase in loads through to the 2080 strategy horizon. Although there are no ELVs for Whitechurch WwTP as it discharges into the Cork city network, this site does have contracted treated effluent limits which the site is currently achieving.

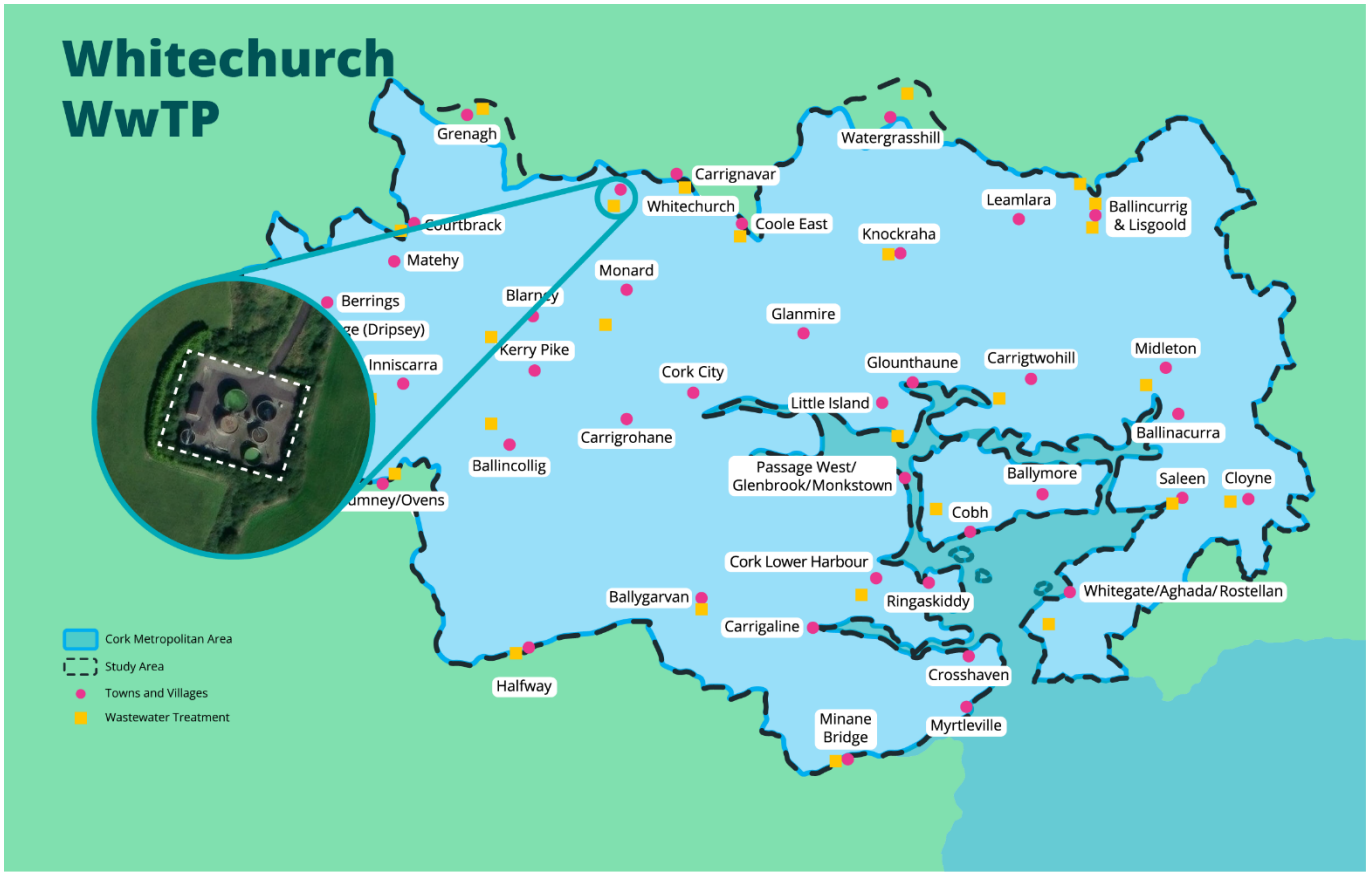


Figure 2-21: Whitechurch Location

Table 2-46: Whitechurch WwTP Details

PE	Storm Management	Inlet Works	Primary Treatment	Secondary Treatment	Tertiary Treatment	Chemical P Removal	Sludge Treatment	Installation Date
3000	n/a	Screening	n/a	ASP	n/a	n/a	Thickening	2008

Table 2-47: Current and Projected Organic (PE) and Hydraulic Loading at Whitechurch WwTP

Parameter	Existing Capacity	Current (2024) Loading	2030	2055	2080
Organic Loading (PE)	3,000	863	1,091	1,262	1,418
Hydraulic Loading (m^3/d)	1,800	897	627	726	815

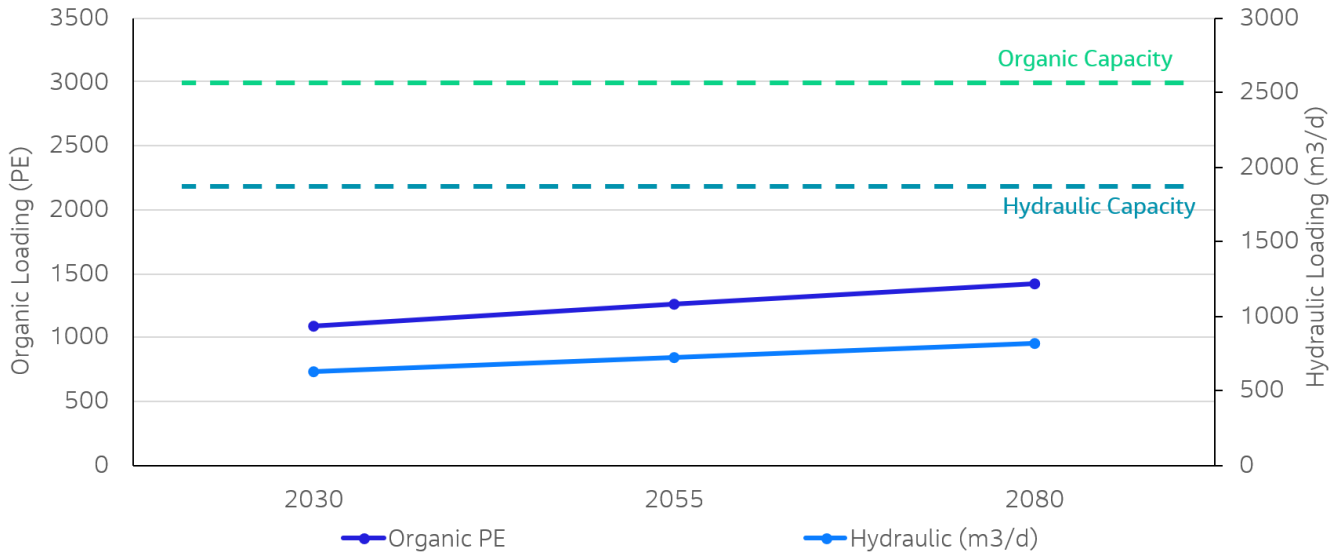


Figure 2-22: Current and Projected Loadings at Whitechurch WwTP

Current and Projected Discharge Limits

Following water quality modelling conducted at the Blarney River adjacent to the WwTP with a view of utilising this reach as a potential future discharge point, environmentally sustainable discharge limits based on compliance with the appropriate WFD EQS have been determined based on projected PE loading to the WwTP across the future Strategy horizons. The environmentally sustainable discharge limits for these scenarios have been summarised in Table 2-48.

Table 2-48: Projected Environmentally Sustainable Discharge Limits at Whitechurch WwTP

Parameter	2030 Environmentally Sustainable Discharge Limits	2055 Environmentally Sustainable Discharge Limits	2080 Environmentally Sustainable Discharge Limits
BOD	3 mg/l	3 mg/l	3 mg/l

Ammonia	0.2 mg/l	0.2 mg/l	0.2 mg/l
OrthoP	0.1 mg/l	0.1 mg/l	0.1 mg/l
More Stringent?	Y	Y	Y

Summary of Observed Constraints

As part of the delivery of this Strategy, advancement of the Optioneering Process assessed potential Network, Ecological, Environmental and Planning constraints that may impact the development of feasible approaches. Key findings pertinent to this catchment have been summarised below:

Network Constraints

A separate assessment of the existing wastewater network for this agglomeration, including maps and drawings illustrating the location of constraints has been undertaken as part of the Network Modelling Report which is included in Appendix 4.

Environmental and Ecological Constraints

There are no designated sites in proximity or with direct pathways to Whitechurch WwTP and the site discharges to the Cork City Network so there is no river discharge point.

Planning Constraints

The planning assessment did not identify any major constraints regarding zoning or available lands. A planning application was submitted in 2010 for 127 properties in the area, however this is unlikely to have any significant impact.

Coarse Screening

The coarse screening was undertaken on the unconstrained list of options at Whitechurch WwTP, which are shown in Table 1-1, as per the methodology outlined in Section 1.3. To provide context for the coarse screening results, which are outlined in Table 2-49, commentary on the coarse screening exercise is provided below.

- Option A0 (Do Nothing) has not been considered as a feasible option for the 2080 strategy horizon as it is projected that the existing WwTP assets will have exceeded their design life.
- Option A1 (Do Minimum – Process Optimisation) has been considered as a feasible option for the 2080 strategy horizon as the there is sufficient capacity at the WwTP, however the existing asset condition is likely to be poor by that time.
- Option A2 (Reuse with Investment – Existing Discharge Location) has not been considered for the 2080 strategy horizon as the there is sufficient capacity at the WwTP and does not necessitate intervention according to this option description.
- Option A3 (Reuse with investment – New Discharge Location) has not been considered for the 2080 strategy horizon as the there is sufficient capacity at the WwTP and does not necessitate intervention according to this option description.
- Option A4 (New Treatment Process on Current Site) has not been considered for the 2080 strategy horizon for the same reasons identified above.
- Option A5 (New Greenfield Plant) has not been considered for the 2080 strategy horizon for the same reasons identified above.
- Option A6 (Wastewater Load Transfer to Carrigrennan via Cork City Network) is considered viable for the 2080 horizon and presents an optimal solution for assets currently in place.

Table 2-49: Coarse Screening Output for Whitechurch WwTP

Coarse Screening Results							
Long List of Options	A0	A1	A2	A3	A4	A5	A6
2080	N	Y	N	N	N	N	Y
2055	N	Y	N	N	N	N	Y
2030	N	Y	N	N	N	N	Y

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening

Any options for the strategy horizon years of 2030 and 2055 should facilitate implementation of the longer term 2080 strategy horizon preferred solution and should not compromise the ability to implement this. The coarse screening process assessed the Whitechurch WwTP and catchment demands in isolation of other identified CWS solutions. As detailed above, future flow and load projections do not indicate future capacity issues at the WwTP, however the existing assets are likely to have surpassed their operatable life.

Table 2-50: 2080 Options Advancing to Fine Screening

Options Progressed to Fine Screening for 2080	Description
A1	Process Optimisation
A6	Wastewater Load Transfer via Cork City

Fine Screening

The options presented in Table 2-50 underwent fine screening in the form of an MCA as detailed in Section 1.4. The scoring and results of the MCA are presented in Table 2-51.

Table 2-51: MCA Results for Whitechurch WwTP

Objectives	Criteria	Option A1	Option A6
Addressing the Need	Treatment Capacity	1	2
	Network Capacity	1	3
	Final Effluent Compliance	2	2
Deliverability	Design Complexity, Ease of Implementation & Feasibility	3	1
	Planning & Regulation	3	3
	Delivery Timeline & Alignment	3	2
Risk & Resilience	Flexibility & Scalability	-3	-3
	Delivery Risk	2	-1
Customer and Stakeholder Support	Impact on Customers	1	3
	Community Support, Health and Wellbeing	1	3
Environmental & Sustainability	Water Environment	0	0
	Waterbody Impact (Existing and New)	0	0
	Waterbody Flood Risk	0	0
	Biodiversity	0	0
	AA-Natura 2000 Sites	0	0
	Aquatic Biodiversity	0	0

	Terrestrial Biodiversity (BNG)	0	0
	GHG Emissions	2	0.5
	Embodied Carbon	3	-1
	Operational Carbon	1	2
	Energy Efficiency	1	2
	Climate Resilience	0	3
	Circular Economy	-1	1
Weighted Average Sub Total		**1.02**	**1.33**
Rank		**2nd**	**1st**

The MCA has identified Option A6 as the highest-ranking option against the fine screening criteria for the 2080 strategy horizon and offers better alignment with the goals of the CWS and UÉ compared to Option A1.

Wastewater Treatment Summary

The optioneering process for Whitechurch WwTP has yielded recommendations for future development:

The highest ranked option ultimately involves transferring wastewater to Carrigrennan WwTP via the Cork City Network (Option A6). This strategy ensures long-term sustainability by leveraging the capacity and less stringent treatment requirements of Carrigrennan WwTP.

This approach addresses several key challenges identified at Whitechurch WwTP including the expected poor condition of existing assets in the 2080 strategy horizon.

Whitechurch WwTP's existing treatment capacity availability can be utilised to treat transferred wastewater from nearby agglomerations. This is looked at in further detail while developing Feasible Approaches. No further wastewater network improvements have been proposed for Whitechurch.

2.4.4 Feasible Approaches for Carrignavar, Grenagh, and Whitechurch

The results of the fine screening process and MCA were assessed and taken forward to develop 3 No. Feasible Approaches for the sub catchment. These approaches comprise combinations of options for each agglomeration, carefully selected to best achieve the goals of the CWS. The wastewater network upgrade proposals for each catchment mentioned above are common amongst Feasible Approaches detailed below

Our approach ensures that the selected strategies are not only technically viable but also align with the long-term vision for wastewater management in the region.

These Approaches are summarised in Table 2-52 overleaf.

Feasible Approach 1 presents an integrated approach for managing wastewater in Carrignavar, Grenagh, and Whitechurch through 2080 strategy horizon, combining the highest-ranking MCA options for each site.

- **Carrignavar:** For Carrignavar, the environmentally sustainable discharge limits projected for 2030 are considerably more stringent than current ELVs and the capacity of the plant is currently exceeded. Therefore, it is proposed to initiate the decommissioning of the existing WwTP in the 2030 horizon and construct a new wastewater transfer pumping station and 3.8km pipeline capable of transferring 1,250 PE, designed to handle wastewater flows projected for the 2055 and 2080 strategy horizon to Whitechurch WwTP. It is proposed to continue operation of this pumping station through the 2055 and 2080 strategy horizons.
- **Grenagh:** For Grenagh, the environmentally sustainable discharge limits projected for 2030 are considerably more stringent than current ELVs and it is proposed to initiate optimisation of the existing in order to achieve these standards in the 2030 horizon. As incoming loads increase in the

2055 strategy horizon, the existing WwTP will become overloaded, therefore it is proposed to initiate the decommissioning of the WwTP and construct a new wastewater transfer to Whitechurch WwTP. This new Grenagh Pumping Station will be capable of transferring 1,450 PE, designed to handle wastewater flows projected for the 2080 horizon, pumping wastewater to Whitechurch WwTP via a newly constructed 9km pipeline. It is proposed to continue operation this pumping station through the 2080 strategy horizon.

- **Whitechurch:** For the 2030 strategy horizon, Whitechurch WwTP is proposed to collect an additional 910 PE from Carrignavar in addition to the projected Whitechurch catchment growth. The existing WwTP is capable of treating this additional load and therefore it is proposed to continue the operation of the existing WwTP for the 2030 horizon. Flows from Grenagh are proposed to be transferred to Whitechurch in the 2055 strategy horizon, and the asset life of the existing WwTP will have been reached. Therefore, it is proposed to initiate the conversion of the WwTP to a terminal pumping station in the 2055 strategy horizon, sufficiently sized for 2080 flows, capable of pumping 4,200 PE to Carrigrennan WwTP. The existing transfer main from Whitechurch WwTP is proposed to be retained, however it will be used for the transfer of wastewater rather than treated effluent in this instance. It is proposed to continuously operate this pumping station through the 2080 strategy horizon.

The implementation of **Feasible Approach 1** necessitates an upgrade to Carrigrennan WwTP, increasing its capacity by an additional 4,200 PE to manage the additional inflows from Carrignavar, Grenagh and Whitechurch for the 2080 horizon. This capacity expansion has been factored into the evaluation and assessment of Carrigrennan WwTP.

Feasible Approach 2 explores alternative high-scoring options from the MCA, proposing a phased approach to address the wastewater management needs of the agglomeration through the 2080 horizon.

- **Carrignavar:** The existing Carrignavar WwTP is presently over capacity and the issue will worsen with increased loads in future strategy horizons. It is proposed to initiate the upgrade of the existing WwTP by an additional 1,000 PE in the 2030 strategy horizon thus ensuring sufficient capacity for the 2055 and 2080 strategy horizons. The upgrade of the WwTP will also necessitate an alternative discharge location and the associated construction of a final effluent transfer pipeline and pumping arrangements. The final effluent pipeline will convey treated effluent from the WwTP to a new discharge point on the Glashaboy River, approximately 6.4km from the existing site. It is proposed to continue to operate this upgraded WwTP through the 2055 and 2080 strategy horizons, although due to the asset life of the WwTP being exceeded in the 2080 strategy horizon, a capital replacement of the entire plant will be required to be initiated.
- **Grenagh:** The proposed option for Grenagh WwTP is consistent with Feasible Approach 1, requiring a decommission of the WwTP to be initiated in the 2055 strategy horizon and transferring wastewater for treatment at Whitechurch WwTP.
- **Whitechurch:** For the 2055 strategy horizon, Whitechurch WwTP is proposed to collect an additional 1,250 PE from Grenagh. The existing WwTP was found to be capable of treating this additional load and therefore it is proposed to continue the operation of the existing WwTP for 2030 and 2055 strategy horizons. For the 2080 horizon, due to increasing asset age and increasing incoming flows, it is proposed to initiate the conversion of the WwTP to a terminal pumping station, pumping wastewater to Carrigrennan WwTP. As with Feasible Approach 1, the existing transfer main from Whitechurch WwTP will be retained, however it will be for the transfer of wastewater rather than treated effluent in this instance. The Whitechurch Pumping Station is proposed to be be sized for

3,000 PE, fewer than the Feasible Approach 1 proposal, as no flows from Carrignavar will be transferred to Whitechurch.

The implementation of **Feasible Approach 2** necessitates an upgrade to Carrigrennan WwTP, increasing its capacity by an additional 3,000 PE to manage the additional inflows from Grenagh and Whitechurch for the 2080 horizon. This capacity expansion has been factored into the evaluation and assessment of Carrigrennan WwTP.

Feasible Approach 3 investigates further options that have passed the fine screening process.

- **Carrignavar:** The approach for Carrignavar is consistent with Feasible Approach 2, upgrading the existing WwTP and identifying a new discharge location.
- **Grenagh:** Likewise, process optimisation of existing Grenagh WwTP is proposed to be implemented in the 2030 strategy horizon to achieve projected environmentally sustainable discharge limits. As incoming loads increase and asset age increases in the 2055 strategy horizon, it is proposed to initiate the replacement of assets with age in excess of 50 years, which amounts to 1,200 PE. To accommodate increased flows, an additional upgrade of 250 PE is necessary at the WwTP and it is proposed to initiate this upgrade in the 2055 strategy horizon. The environmentally sustainable discharge limits at the discharge location are projected to be much more stringent in the 2055 strategy horizon, therefore this proposal necessitates identifying a new discharge location. A discharge location downstream on the River Martin, approximately 12km away has been identified as a potential location. It is proposed to initiate the construction of an effluent discharge pipeline is with associated pumping setup for this proposal. The WwTP shall continue to operate in the 2080 horizon.
- **Whitechurch:** The approach for Whitechurch is consistent with Feasible Approach 2, continuing to operate the WwTP through the 2030 and 2055 horizons and converting the WwTP to a terminal pumping station, pumping wastewater to Carrigrennan WwTP for the 2080 horizon.

Table 2-52: Feasible Approaches for Carrignavar, Grenagh, and Whitechurch

Strategy Horizon	Catchment	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
2030	Carrignavar WwTP	• Construct a new Wastewater Transfer Pumping Station (WwPS) • Constructed new wastewater transfer pipe from Carrignavar to Whitechurch WwTP • Decommission existing WwTP.	• 1,000 PE upgrade of existing WwTP. • Construct FE transfer to new discharge location, downstream on River Glashaboy with associated Pumping Station	• 1,000 PE upgrade of existing WwTP. • Construct FE transfer to new discharge location, downstream on River Glashaboy with associated Pumping Station
	Grenagh WwTP	• Optimise WwTP to bring to compliance with ELVs	• Optimise WwTP to bring to compliance with ELVs	• Optimise WwTP to bring to compliance with ELVs
	Whitechurch WwTP	• Continue to operate WwTP	• Continue to operate WwTP	• Continue to operate WwTP
2055	Carrignavar WwTP	• Continue to operate WwPS	• Continue to operate WwTP	• Continue to operate WwTP
	Grenagh WwTP	• Construct a new Wastewater Pumping Station (WwPS) • Constructed new wastewater transfer pipe from Grenagh to Whitechurch WWTP • Decommission existing WwTP.	• Construct a new Wastewater Pumping Station (WwPS) • Constructed new wastewater transfer pipe from Grenagh to Whitechurch WWTP • Decommission existing WwTP.	• 250 PE upgrade of existing WwTP. • 1,200 PE WwTP capital replacement. • Construct FE transfer to new discharge location, downstream on River Martin with associated Pumping Station
	Whitechurch WwTP	• Decommission / convert WwTP. • Construct terminal WwPS • Utilise existing pipeline to Cork City network.	• Continue to operate WwTP	• Continue to operate WwTP

Strategy Horizon	Catchment	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
2080	Carrignavar WwTP	• Continue to operate WwPS	• 1,300 PE WwTP Capital replacement	• Capital replacement of WwTP
	Grenagh WwTP	• Continue to operate WwPS	• Continue to operate WwPS	• Continue to operate WwTP
	Whitechurch WwTP	• Continue to operate WwPS	• Decommission / convert WwTP. • Construct terminal WwPS • Utilise existing pipeline to Cork City network.	• Decommission / convert WwTP. • Construct terminal WwPS • Utilise existing pipeline to Cork City network.

2.4.5 Recommended Approach and Implementation Strategy for Carrignavar, Grenagh, and Whitechurch

Based on the analysis conducted above, **Feasible Approach 1** is recommended for implementation and further development as an integral component of the CWS. This recommendation stems from the approach's superior performance across the assessed criteria and its alignment with the broader CWS objectives, making it the most suitable and sustainable solution for addressing the sub-catchment's wastewater management needs.

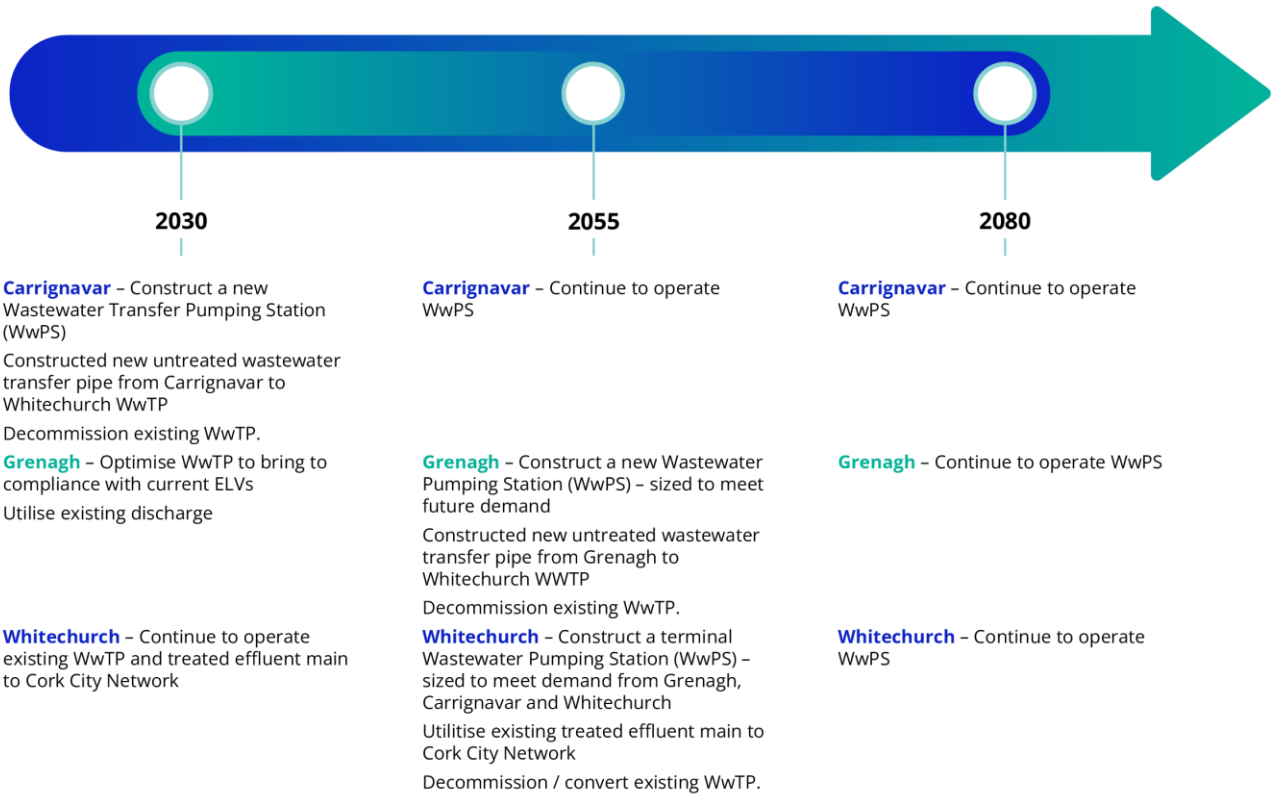


Figure 2-23: Proposed Implementation Strategy for Carrignavar, Grenagh, and Whitechurch

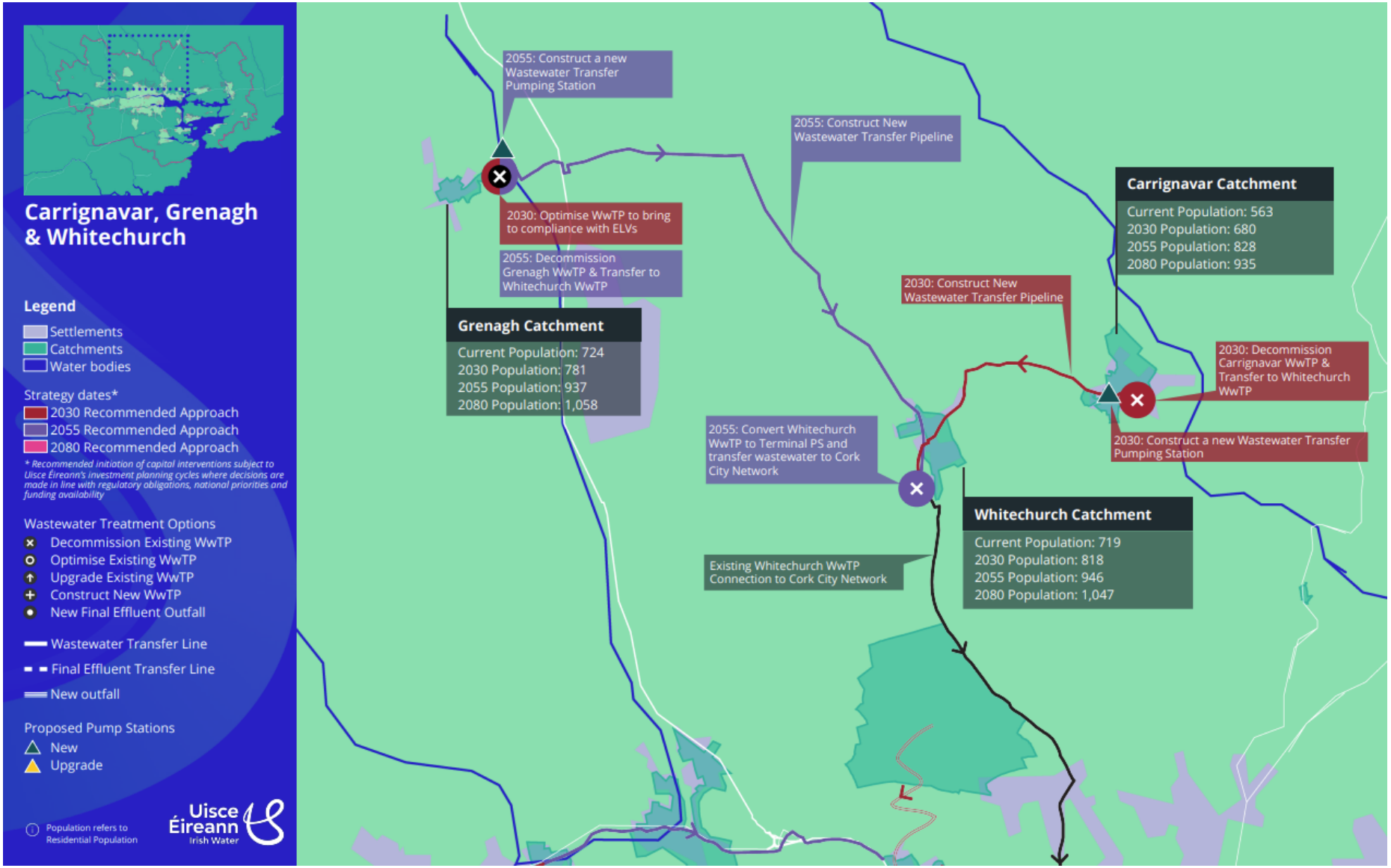


Figure 2-24: Recommended Approach for Carrignavar, Grenagh and Whitechurch

2.5 Knockraha and Watergrasshill

2.5.1 Knockraha

Introduction

Knockraha WwTP is located at Gogganstown, Knockraha, Northeast of Cork city. Knockraha WwTP was built in 2021 and is currently operated and maintained by O'Leary and O'Sullivan on behalf of UÉ under a DBO contract. Knockraha WwTP was constructed to provide treatment of wastewater from the housing estates of Glenmore Heights and Ard Abhainn in Knockraha, Co. Cork due to the lack of treatment capacity in the existing public treatment plant (Chapel Hill). Knockraha treatment plant has a design capacity of 350 PE and treated wastewater is discharged to a percolation area located 0.5km from the Butlerstown river.

Knockraha WwTP consists of a primary, secondary and tertiary treatment. Treated effluent is discharged to a percolation area.

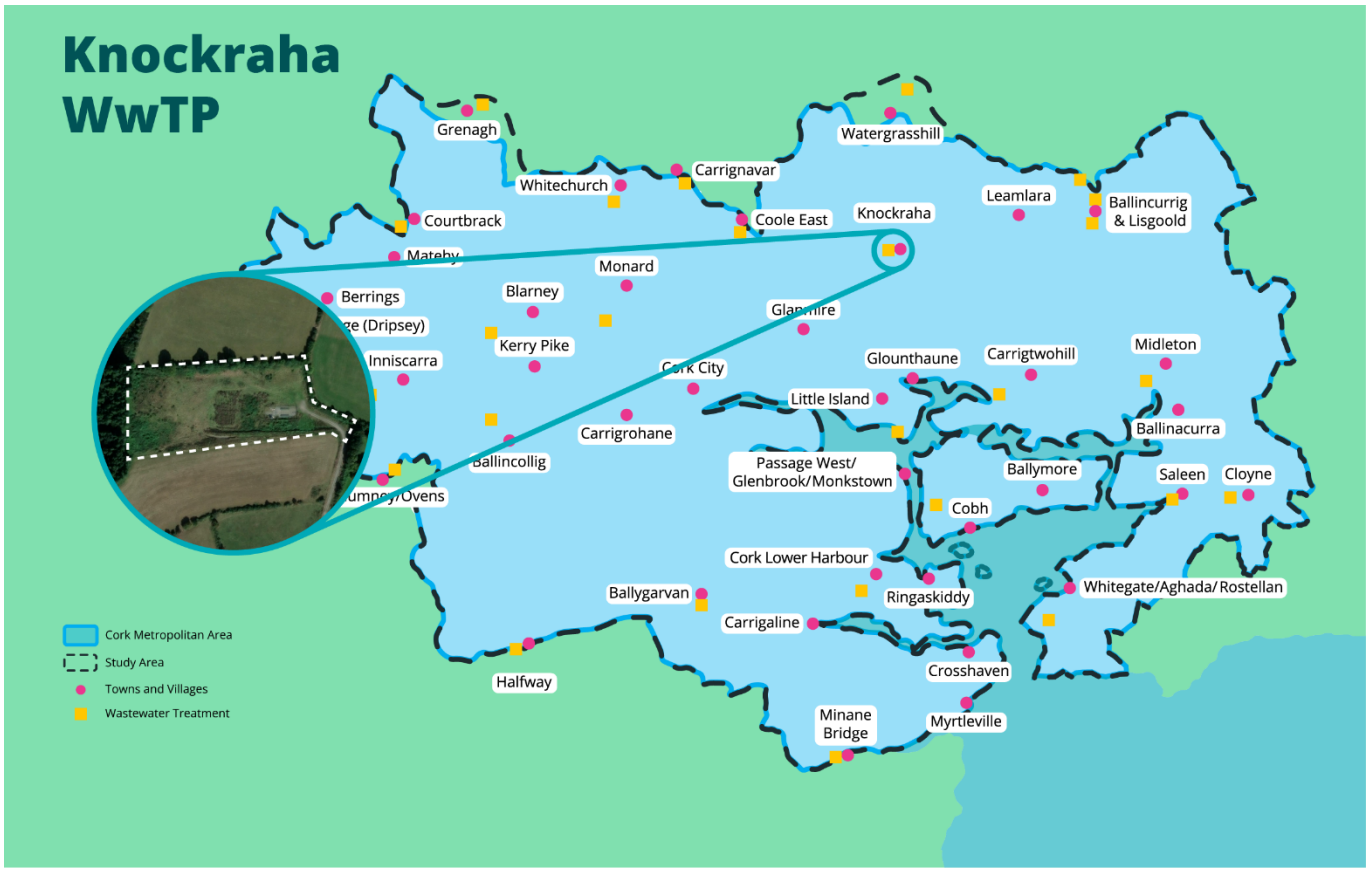


Figure 2-25: Knockraha Location

Table 2-53: Knockraha WwTP Details

Organic Design PE	Storm Management	Inlet Works	Primary Treatment	Secondary Treatment	Tertiary Treatment	Chemical P Removal	Sludge Treatment	Installation Date
350	n/a	n/a	PST	RBCs	Tertiary Filter & UV	Sodium Hypo	n/a	2021

Table 2-54: Current and Projected Discharge Limits

Parameter	Existing Capacity	Current (2024) Loading	2030	2055	2080
Organic Loading (PE)	350	244	737	841	935
Peak Hydraulic Loading (m^3/d)	-	-	424	484	538

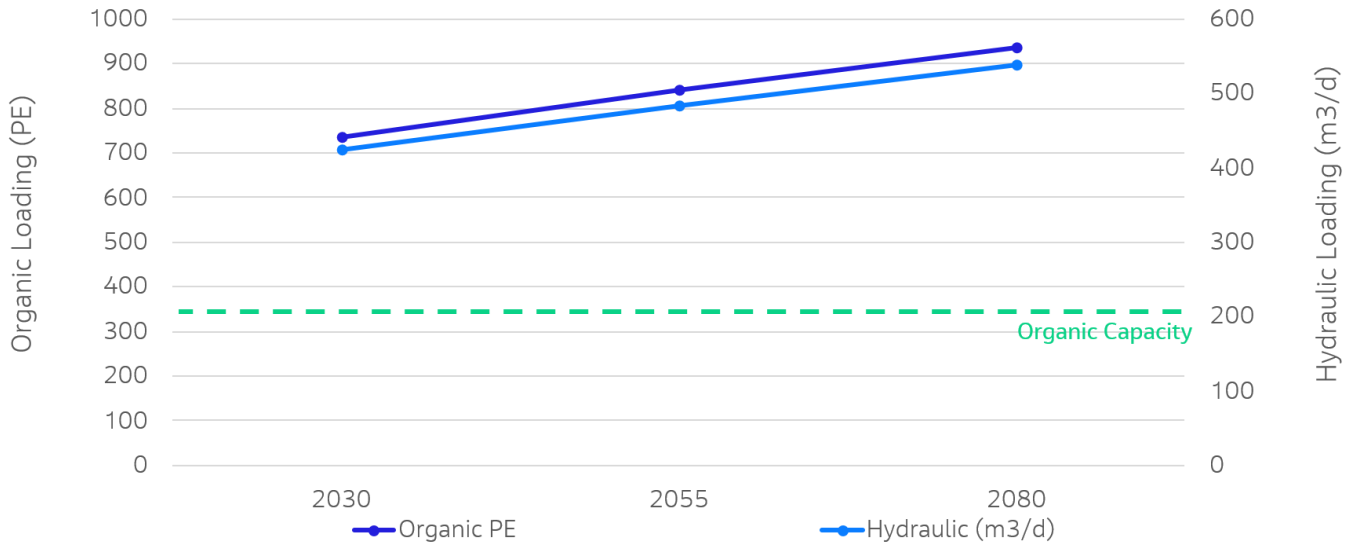


Figure 2-26: Current and Projected Loadings at Knockraha WwTP

Current and Projected Discharge Limits

Following water quality modelling conducted at the River Butlerstown adjacent to the existing WwTP discharge, environmentally sustainable discharge limits based on compliance with the appropriate WFD EQS have been determined based on projected PE loading to the WwTP across the current and future Strategy horizons. The environmentally sustainable discharge limits for these scenarios have been summarised in Table 2-55.

Table 2-55: Existing WWDL ELVs and Environmentally Sustainable Discharge Limits at Knockraha WwTP

Parameter	Existing ELVs	2030 Environmentally Sustainable Discharge Limits	2055 Environmentally Sustainable Discharge Limits	2080 Environmentally Sustainable Discharge Limits
BOD	25	24	21	19

Ammonia	5	1.0	0.9	0.8
OrthoP	1.5	0.5	0.4	0.4
More Stringent?	-	Y	Y	Y

Summary of Observed Constraints

As part of the delivery of this Strategy, advancement of the Optioneering Process assessed potential Network, Ecological, Environmental and Planning constraints that may impact the development of feasible approaches. Key findings pertinent to this catchment have been summarised below:

Network Constraints

A separate assessment of the existing wastewater network for this agglomeration, including maps and drawings illustrating the location of constraints has been undertaken as part of the Network Modelling Report which is included in Appendix 4.

The network assessment has identified that a large portion of the system is currently discharging to private septic tanks. While no flooding has been observed in the existing modelled network, future modelling indicates flooding and surcharging of the main trunk across all projected scenarios. Additionally, there are no stormwater overflows (SWOs) present in the network.

Environmental and Ecological Constraints

The discharge location is a groundwater soakaway located 0.5 km from waterbody Butlerstown_020 (Butlerstown River) with Good WFD Status (cycle 3 2016-2021) and classified as Not At Risk (2022). Cork Harbour SPA, Great Island SAC and Glanmire Wood pNHA (includes section of Glashaboy River) are located approximately 5 km downstream from the discharge. Cork City Water Supply freshwater abstraction (Abstract Glashaboy River) is located 7 km downstream from the discharge.

Planning Constraints

The planning assessment has identified no site boundary constraints, with no map-based objectives or zoning impediments which may impact extension on the existing site. Additionally, there are no planning permission restrictions and/or risks that may impact future development or expansion of the site. The site is 1,100m^2. According to landdirect.ie, private landowners own the land that contains Knockraha WwTP and there is abundant space for upgrades if required.

Coarse Screening

The coarse screening was undertaken on the unconstrained list of options at Knockraha WwTP, which are shown in Table 1-1, as per the methodology outlined in Section 1.3. To provide context for the coarse screening results, which are outlined in Table 2-56, commentary on the coarse screening exercise is provided below.

- Option A0 (Do Nothing) has not been considered for the 2080 horizon, as both organic and hydraulic capacities will be exceeded by 2030, and the existing assets are nearing end of asset life in the 2055 strategy horizon.
- Option A1 (Do Minimum – Process Optimisation) has not been considered for the 2080 horizon, as both organic and hydraulic capacities will be exceeded by 2030, and the existing assets are nearing end of asset life in the 2055 strategy horizon.
- Option A2 (Reuse with Investment – Existing Discharge Location) was not considered viable for the 2080 horizon due to the existing discharge location waterbody pressures.

- Option A3 (Reuse with investment – New Discharge Location) has not been considered for the 2080 horizon as the existing asset life would be exceeded. However, it is considered to enable the short term strategy for 2030 and 2050, as the existing assets have sufficient remaining life to meet the projected demands for 2055 and 2080 horizons. The new discharge location is expected to have less stringent environmentally sustainable discharge limits.
- Option A4 (New Treatment Process on Current Site with New or Existing Discharge Location) is considered for the 2080 horizon, as the existing assets will require upgrades to accommodate increased capacity demands. The new discharge location is expected to have less stringent environmentally sustainable discharge limits, as previously noted, making this option both practical and cost-effective for long-term planning. However, the footprint of the current site may be constrained, and there are potential risks associated with the need to expand onto privately owned land.
- Option A5 (New Greenfield Plant with New Discharge) has been shortlisted as a counterfactual to provide additional evidence in support of the preferred optioneering. The current site boundary is unlikely to pose a significant risk to the implementation of Option A4. As with previous options, a new discharge location is recommended.
- Option A6 (Wastewater Load Transfer to Carrigrennan via Glanmire) is considered feasible for 2080 horizon and is the preferred option as the organic capacity and existing asset life would be exceeded in 2080.

Table 2-56: Coarse Screening Output

Coarse Screening Results							
Long List of Options	**A0**	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**
2080	**N**	**N**	**N**	**N**	**Y**	**Y (New Discharge Location)**	**Y**
2055	**N**	**N**	**Y**	**Y**	**N**	**N**	**Y**
2030	**N**	**N**	**Y**	**Y**	**N**	**N**	**Y**

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening

Any options for the strategy horizon years of 2030 and 2055 should facilitate implementation of the longer term 2080 preferred solution and should not compromise the ability to implement this. Further option defining is undertaken in order to undertake the MCA fairly and adequately. Option A4 with discharge to the existing location has advanced to fine screening to ascertain the risk to the existing waterbody. As previously mentioned, an alternative discharge location was identified at Butlerstown River which presents less stringent environmentally sustainable discharge limits. Therefore, an additional iteration of Option A4 is included to assess the transfer of final effluent to this location. The planning assessment identified potential planning permission restrictions and risks, therefore Option A5 for a new greenfield plant was advanced to fine screening. This option includes for the transfer of final effluent to Butlerstown River. Carrigrennan WwTP was identified as a potential wastewater transfer receiver and Option A6 assesses this transfer via the existing Glamire TPS to Carrigrennan.

Table 2-57: 2080 Options Advancing to Fine Screening

Options Progressed to Fine Screening for 2080	Description
A4	New Treatment Process on Current Site with Existing Discharge Location
A4	New Treatment Process on Current Site with New Discharge Location to Butlerstown River
A5	New Greenfield Plant with New Discharge to Butlerstown River
A6	Wastewater Load Transfer to Carrigrennan via Glanmire TPS

Fine Screening

The options presented in Table 2-57 underwent fine screening in the form of an MCA as detailed in Section 1.4. The scoring and results of the MCA are presented in Table 2-58.

Table 2-58: MCA Results for Knockraha WwTP

Objectives	Criteria	Option A4 (Existing Discharge Location)	Option A4 (New Discharge Location)	Option A5	Option A6
Addressing the Need	Treatment Capacity	3	3	3	3
	Network Capacity	1	3	3	3
	Final Effluent Compliance	2	3	3	3
Deliverability	Design Complexity, Ease of Implementation & Feasibility	1	-1	-1	1
	Planning & Regulation	-1	-1	-3	2
	Delivery Timeline & Alignment	3	2	-1	1
Risk & Resilience	Flexibility & Scalability	1	1	2	-1
	Delivery Risk	-2	-2	-2	-1
Customer and Stakeholder Support	Impact on Customers	3	3	1	3
	Community Support, Health and Wellbeing	-1	-1	1	3
Environmental & Sustainability	Water Environment	1	1	1	3
	Waterbody Impact (Existing and New)	1	1	1	3
	Waterbody Flood Risk	0	0	0	0
	Biodiversity	-1	-1	-1	3
	AA-Natura 2000 Sites	0	0	0	0
	Aquatic Biodiversity	1	1	1	3
	Terrestrial Biodiversity (BNG)	-1	-1	-1	0
	GHG Emissions	0.5	-0.5	-0.5	0.5
	Embodied Carbon	-1	-2	-3	-2
	Operational Carbon	2	1	2	3
	Energy Efficiency	2	1	1	3
	Climate Resilience	2	2	2	3
	Circular Economy	-1	-1	-1	1
Weighted Average Sub Total		**0.87**	**0.76**	**0.52**	**1.95**

Cost	CAPEX	3	3	3	4
	OPEX	6	5	5	6
	Whole Life Cost	4	4	3	4
Combined Score		**2.73**	**2.48**	**2.09**	**3.95**
Rank		**2nd**	**3rd**	**4th**	**1st**

Looking at the 2080 strategy horizon, Option A6 ranks first against the fine screening criteria and is more cost-effective to implement than either Option A4 or A5.

Wastewater Treatment Summary

The optioneering process for Knockraha WwTP has yielded recommendations for future development:

The highest ranked option ultimately involves transferring wastewater to Carrigrennan WwTP via Glanmire TPS (Option A6). This approach ensures long-term sustainability by leveraging the capacity and less stringent treatment requirements of Carrigrennan WwTP.

Wastewater Network Upgrade Summary

A separate assessment of network upgrades for this agglomeration has been undertaken as part of the Network Modelling Report which is included in Appendix 4. Below is a brief overview of the proposed upgrades within the Knockraha agglomeration, addressing SWO compliance and future development constraints such as surcharge and flooding due to development impacts. Unless otherwise stated specifically, these proposed upgrades are proposed to be initiated in the 2030 strategy horizon. The development process of these proposed upgrades, as well as maps and drawings illustrating the location of the required upgrades are provided in more detail in the Network Modelling Report in Appendix 4.

New storage at Knockraha WwPS: A storage facility has been proposed at the Knockraha treatment site. This plan also includes the installation of a c. 7km new rising main, which will pump forward flow to Cork City catchment and decommission the treatment plant in the 2030 horizon.

Additional storage at Glenmore WwPS: Additional storage to be provided at the wet well chamber. Also, an increase in pass forward flows.

2.5.2 Watergrasshill

Introduction

Watergrasshill WwTP lies approximately 22km north of Cork city and serves the Watergrasshill catchment. It was commissioned in 2002 on a 0.2-hectare site and issued with its EPA licence (D201- 01) in November 2009. It is currently operated and maintained by Cork County Council on behalf of UÉ.

The treatment plant has a design capacity of 3,000 PE and treated wastewater is discharged to a small stream named Flesk (Bride). The existing wastewater treatment process comprises preliminary treatment and secondary treatment. The tertiary sand filters at the site have been decommissioned.

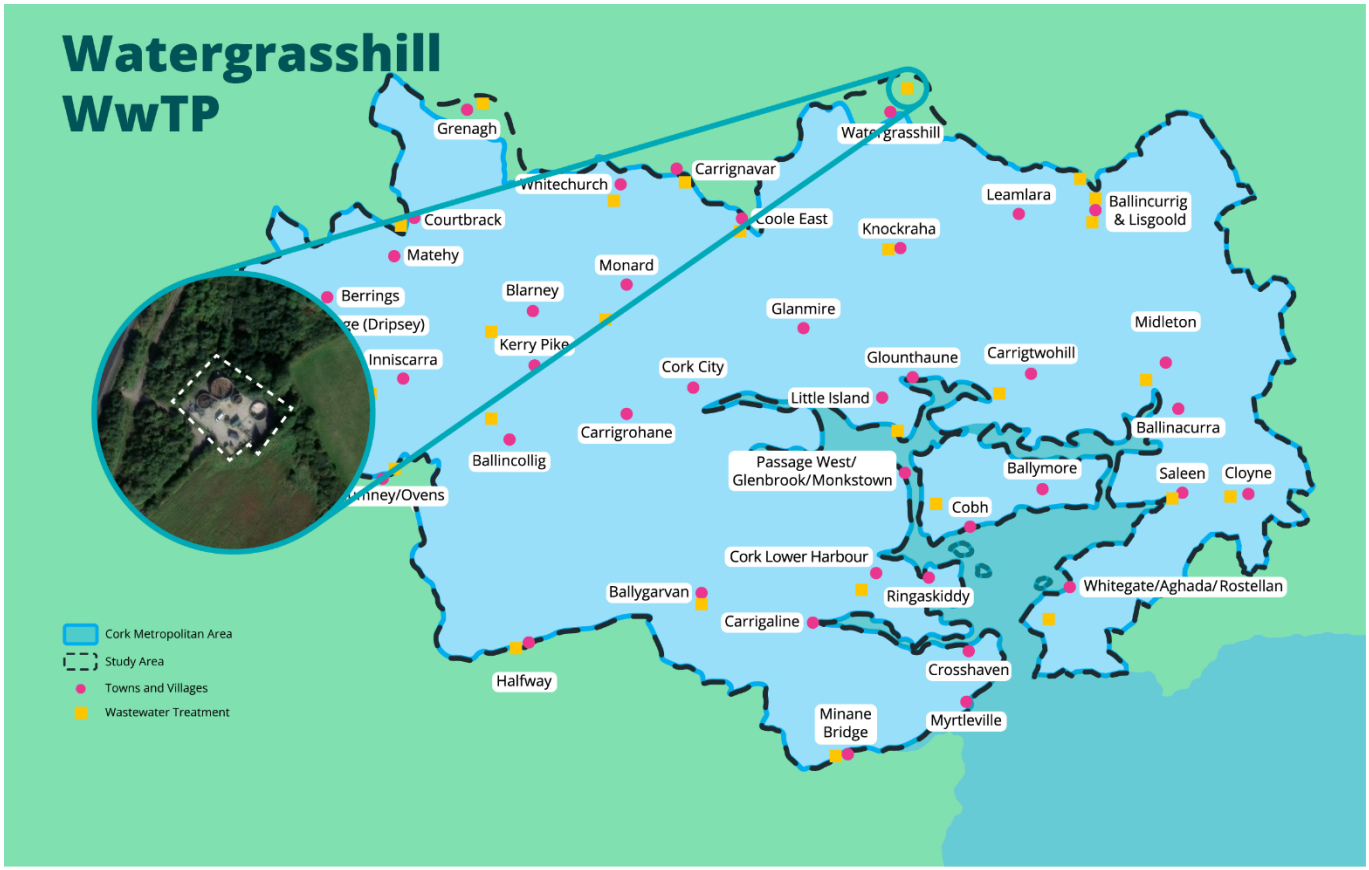


Figure 2-27: Watergrasshill Location

Table 2-59: Watergrasshill WWTP Details

Organic Design PE	Storm Management	Inlet Works	Primary Treatment	Secondary Treatment	Tertiary Treatment	Chemical P Removal	Sludge Treatment	Installation Date
3,000	Storage Tanks	Screening and Grit Removal	n/a	ASP	RGF	Ferric Dosing	Thickening	2002

Table 2-60: Current and Projected Organic (PE) and Hydraulic Loading at Watergrasshill WwTP

Parameter	Existing Capacity	Current (2024) Loading	2030	2055	2080
Organic Loading (PE)	3,000	2,126	2,892	3,450	3,871
Hydraulic Loading (m^3/d)	2,025	1,387	2,096	2,501	2,806

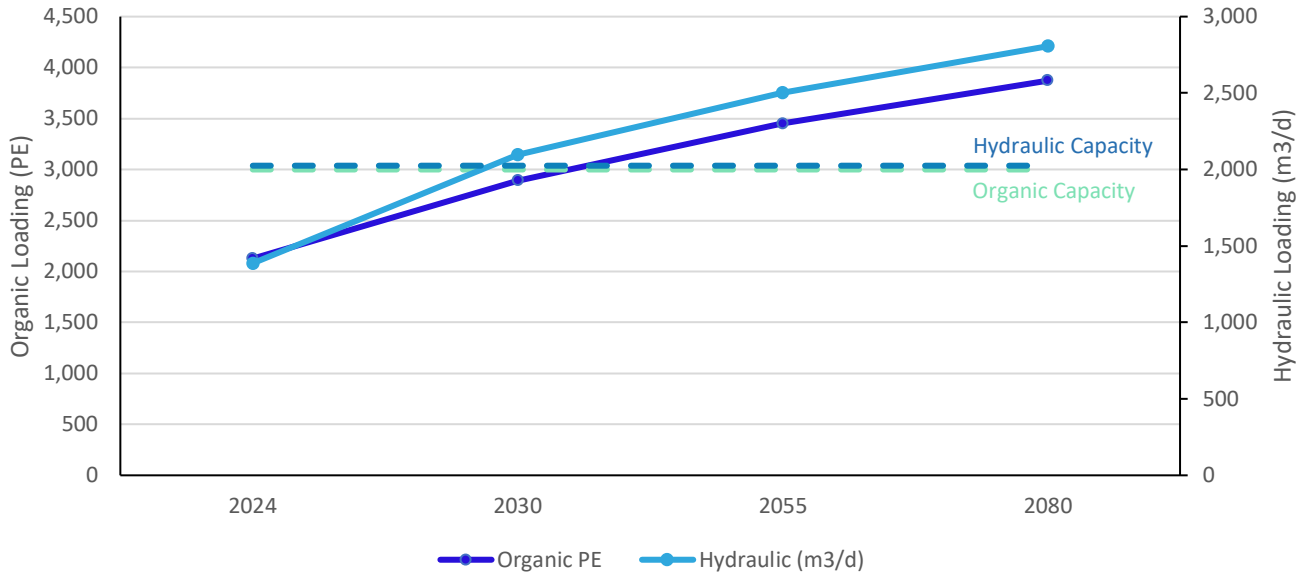


Figure 2-28: Current and Projected Loadings at Watergrasshill

Summary of Observed Constraints

As part of the delivery of this Strategy, advancement of the Optioneering Process assessed potential Network, Ecological, Environmental and Planning constraints that may impact the development of feasible approaches. Key findings pertinent to this catchment have been summarised below:

Network Constraints

A separate assessment of the existing wastewater network for this agglomeration, including maps and drawings illustrating the location of constraints has been undertaken as part of the Network Modelling Report which is included in Appendix 4.

The network assessment has identified that the main trunk of the network is subject to flooding and surcharging under both current and all future scenarios. Future projections indicate an increase in the extent of flooding and surcharging across the network. While the WwTP SWO is currently compliant, it is projected to become non-compliant by the 2080 scenario.

Environmental and Ecological Constraints

The discharge location waterbody is Flesk (Bride)_010 with Poor WFD Status (cycle 3 2016-2021) and classified as At Risk (2022). Blackwater River SAC is located 2.5 km downstream from the discharge outfall. The current ELVs for the site are BOD: 10mg/l, Ammonia: 1mg/l, and OrthoP: 1mg/l.

Planning Constraints

The planning assessment has identified no recorded zoning issues or map-based objectives. However, it identified that there is limited space available for upgrades within the existing site boundary.

Coarse Screening

The coarse screening was undertaken on the unconstrained list of options at Watergrasshill WwTP, which are shown in Table 1-1, as per the methodology outlined in Section 1.3. To provide context for the coarse

screening results, which are outlined in Table 2-61, commentary on the coarse screening exercise is provided below.

- Option A0 (Do Nothing) has not been considered for the 2080 horizon, as both organic and hydraulic capacities will be exceeded in the 2055 strategy horizon, and the existing assets are nearing end of asset life in the 2055 strategy horizon.
- Option A1 (Do Minimum – Process Optimisation) has not been considered for the 2080 horizon, as both organic and hydraulic capacities will be exceeded in the 2055 strategy horizon, and the existing assets are nearing end of asset life in the 2055 strategy horizon.
- Option A2 (Reuse with Investment – Existing Discharge Location) was not considered viable for the 2080 horizon as the existing asset life will be surpassed in the 2055 strategy horizon.
- Option A3 (Reuse with investment – New Discharge Location) was not considered viable for the 2080 horizon as the existing asset life will be surpassed in the 2055 strategy horizon.
- Option A4 (New Treatment Process on Current Site) has not been considered given the constraints of the existing site boundary, limiting any further upgrades.
- Option A5 (New Greenfield Plant with New Discharge) has been considered for long term horizons of 2055 and 2080 as the existing assets life will have expired in the 2055 strategy horizon. This option has also been shortlisted given the existing site boundary expansion constraints.
- Option A6 (Wastewater Load Transfer to Carrigrennan via Cork City) is considered feasible for each horizon year as the organic and hydraulic capacity is projected to be exceeded, and the existing assets are nearing end of asset life in the 2055 strategy horizon. For 2080 horizon, Cork City network capacity is likely to be insufficient to receive additional load, therefore transferring wastewater to Carrigrennan WwTP has been considered.

Table 2-61: Coarse Screening Output

Coarse Screening Results							
Long List of Options	**A0**	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**
2080	**N**	**N**	**N**	**N**	**N**	**Y (New Discharge Location)**	**Y**
2055	**N**	**N**	**N**	**N**	**N**	**Y (New Discharge Location)**	**Y**
2030	**N**	**Y**	**N**	**N**	**N**	**N**	**Y**

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening

Any options for the strategy horizon years of 2030 and 2055 should facilitate implementation of the longer term 2080 horizon preferred solution and should not compromise the ability to implement this. Further option defining is undertaken in order to undertake the MCA fairly and adequately. At this stage of assessment, specific site locations have not been identified and typical project stage site selection assessments have not been undertaken. Potential proximity areas for potential greenfield site locations have been identified and planning and environmental assessments have been undertaken to facilitate the MCA process. Similarly, transfer routes were selected based conservative routing assumptions and it is important

to note that a full route selection process was not undertaken. Routes ensure minimal impact on the public and the environment and reduce delivery risk associated with land acquisition and planning requirements. For Watergrasshill, the WQM indicates very stringent environmentally sustainable discharge limits requirements and a potential new discharge location on the Butlerstown River was identified presenting fewer waterbody pressures. Carrigrennan WwTP was also identified as a potential wastewater transfer receiver, Option 6 was defined to transfer wastewater to the Glanmire TPS for further treatment at Carrigrennan WwTP.

Table 2-62: 2080 Options Advancing to Fine Screening

Options Progressed to Fine Screening for 2080	Description
A5	New Greenfield Plant with New Discharge to Butlerstown River
A6	Wastewater Load Transfer to Carrigrennan WwTP via Glanmire TPS

Fine Screening

The options presented in Table 2-62 underwent fine screening in the form of an MCA as detailed in Section 1.4. The scoring and results of the MCA are presented in Table 2-63.

Table 2-63: MCA Results for Watergrasshill WwTP

Objectives	Criteria	Option A5	Option A6
Addressing the Need	Treatment Capacity	3	2
	Network Capacity	3	2
	Final Effluent Compliance	2	3
Deliverability	Design Complexity, Ease of Implementation & Feasibility	-3	1
	Planning & Regulation	-2	2
	Delivery Timeline & Alignment	-1	1
Risk & Resilience	Flexibility & Scalability	2	-1
	Delivery Risk	-2	-1
Customer and Stakeholder Support	Impact on Customers	1	3
	Community Support, Health and Wellbeing	2	2
Environmental & Sustainability	Water Environment	3	3
	Waterbody Impact (Existing and New)	3	3
	Waterbody Flood Risk	0	0
	Biodiversity	-2	2
	AA-Natura 2000 Sites	0	0
	Aquatic Biodiversity	2	2
	Terrestrial Biodiversity (BNG)	-2	0
	GHG Emissions	-0.5	0
	Embodied Carbon	-3	-3
	Operational Carbon	2	3
	Energy Efficiency	2	3
	Climate Resilience	2	3
	Circular Economy	-1	1
Weighted Average Sub Total		**0.58**	**1.66**
Cost	CAPEX	3	3
	OPEX	3	4
	Whole Life Cost	3	3

Combined Score	**1.86**	**3.09**
Rank	**2nd**	**1st**

Option A6 connection to Cork City network is ranked the highest, both on technical and cost criteria. However, as there is sufficient existing asset life it is recommended to consider Option A1 to optimise capacity to meet current WWDL requirements for 2030. In 2080 horizon, Option A6 ranks 1st against the fine screening criteria and is cheaper to implement than Option A5. Option A5 requires a new discharge location which increases complexity, risk and overall cost.

Wastewater Treatment Summary

The optioneering process for Watergrasshill WwTP has yielded recommendations for future development:

The existing plant is currently not performing despite underloading, however optimising the existing WwTP treatment performance can achieve its environmentally sustainable discharge limits in the short term. The highest ranked option ultimately proposes to transfer wastewater to Carrigrennan WwTP via the existing Cork city network, offering a resilient and cost-effective solution that supports the entire strategy over the long term.

Wastewater Network Upgrade Summary

A separate assessment of network upgrades for this agglomeration has been undertaken as part of the Network Modelling Report which is included in Appendix 4. Below is a brief overview of the proposed upgrades within the Watergrasshill catchment, addressing SWO compliance and future development constraints such as surcharge and flooding due to development impacts. Unless otherwise stated specifically, these proposed upgrades are proposed to be initiated in the 2030 strategy horizon. The development process of these proposed upgrades, as well as maps and drawings illustrating the location of the required upgrades are provided in more detail in the Network Modelling Report in Appendix 4:

New storage at Watergrasshill WwPS: A storage facility has been proposed at the Watergrasshill treatment site. This plan also includes the installation of a c. 10km new rising main, which will pump forward flow to the Cork City catchment and decommission the treatment plant in the 2055 strategy horizon.

Network Upgrade Across Catchment: An upgrade of c. 320m of the existing sewer system is proposed to increase the network's capacity.

Additional storage at The Orchard WwPS: Additional storage to be provided at the wet well chamber.

Additional storage at Church View WwPS: Additional storage to be provided at the wet well chamber.

Storm area separation: Proposed c. 0.316ha of road and c. 1.883ha of hard standing reduction within foul/combined network to provide additional capacity.

2.5.3 Feasible Approaches for Knockraha and Watergrasshill

The results of the fine screening process and MCA were assessed and taken forward to develop 3 No. Feasible Approaches for the sub catchment. These approaches comprise combinations of options for each agglomeration, carefully selected to best achieve the goals of the CWS. The wastewater network upgrade proposals for each catchment mentioned above are common amongst Feasible Approaches detailed below

Our approach ensures that the selected strategies are not only technically viable but also align with the long-term vision for wastewater management in the region.

These Approaches are summarised in Table 2-64 overleaf.

Feasible Approach 1 integrates the highest-ranking MCA options for both Knockraha and Watergrasshill sites, proposing a comprehensive strategy for wastewater management through 2080 horizon.

- **Knockraha:** For Knockraha, it is proposed to initiate the decommission of the existing WwTP in the 2030 horizon and construct a new wastewater transfer pumping station on the existing site. The Knockraha Pumping Station will be designed to transfer wastewater flows projected for 2055 and 2080 strategy horizon load projections, pumping wastewater to Carrigrennan WwTP via Glanmire Terminal Pumping Station through a newly constructed 7km pipeline.
- **Watergrasshill:** The proposed Watergrasshill site strategy is phased, beginning with process optimisation of the existing plant to be initiated in the 2030 horizon to meet WWDL requirements through enhanced ferric sulphate dosing or improved Return Activated Sludge (RAS) and aeration controls. In the 2055 strategy horizon, as the plant reaches the end of its asset life, the strategy proposes to initiate the decommissioning of the WwTP and replacing it with a new wastewater transfer system. This system will include a 10km pipeline and a new transfer pumping station, sized to accommodate 2080 flow projections, connecting Watergrasshill WwTP to Glanmire Terminal Pumping Station for onward pumping and treatment at Carrigrennan WwTP.

The implementation of **Feasible Approach 1** necessitates an upgrade to Carrigrennan WwTP, increasing its capacity by an additional 4,850 PE in the 2055 strategy horizon to manage the additional inflows from Watergrasshill and Knockraha for the 2080 horizon. This capacity expansion has been factored into the evaluation and assessment of Carrigrennan WwTP.

Feasible Approach 2 explores alternative high-scoring options from the MCA, proposing a phased approach to address the wastewater management needs of Knockraha through 2080 horizon.

- **Knockraha:** The initial phase, proposed to be initiated in the 2030 horizon, involves expanding the capacity of the overloaded Knockraha WwTP by 500 PE to accommodate the projected 2055 load. To address limitations in the existing discharge system, which currently relies on ground percolation, the plan includes the construction of a new on-site treated effluent transfer pumping station. The Knockraha Pumping Station will be designed to manage treated effluent from the WwTP, with capacity to handle wastewater flows projected for the 2055 and 2080 strategy horizons. The pumping system will transfer effluent to Carrigrennan WwTP via Glanmire Terminal Pumping Station through a newly constructed 7km pipeline. Looking ahead to 2080 horizon, it is proposed to initiate a capital replacement of 350 PE of the WwTP's capacity, coupled with a further upgrade of 100 PE to meet the anticipated increase in loads.
- **Watergrasshill:** As with Feasible Approach 1, the Watergrasshill site strategy proposes to initiate the process optimisation of the existing plant in the 2030 horizon to meet WWDL requirements through enhanced ferric sulphate dosing or improved RAS and aeration controls. As the WwTP will have surpassed its asset life in the 2055 strategy horizon, the proposal involves initiating the construction of a new 3,900 PE WwTP. Recognising the limitations associated with the current discharge location, it is proposed to transfer the treated effluent from the new facility to Carrigrennan WwTP via Glanmire Terminal Pumping Station. This will be facilitated by the construction of a 10km final effluent transfer pipeline and associated final effluent pumping station on the site.

The implementation of **Feasible Approach 2** necessitates an upgrade to Carrigrennan WwTP, increasing its capacity by 4,850 PE by 2055 to manage the additional inflows from Watergrasshill and Knockraha for the 2080 horizon. This capacity expansion has been factored into the evaluation and assessment of Carrigrennan WwTP.

Feasible Approach 3 investigates further options that have passed the fine screening process.

- **Knockraha:** Similar to Feasible Approach 2, the 2030 horizon proposal for Knockraha involves expanding the capacity of the WwTP by 500 PE to accommodate the projected 2055 load to be initiated in the 2030 strategy horizon. To address limitations in the existing discharge location, the proposal outlines the construction of a 4km final effluent transfer pipeline to convey treated effluent from the WwTP to a new discharge point on the Butlerstown River via the proposed Watergrasshill FE pumping station, strategically located downstream of the abstraction point for Glanmire WTP. For 2080 horizon, it is proposed to initiate a capital replacement of 350 PE of the WwTP's capacity, coupled with a further upgrade of 100 PE to meet the anticipated increase in loads.
- **Watergrasshill:** To resolve the ongoing issues with the discharge location at Watergrasshill WwTP, the proposal outlines to initiate the construction of a 12km final effluent transfer pipeline in the 2030 horizon to convey treated effluent from the WwTP to a new discharge point on the Butlerstown River, strategically located downstream of the abstraction point for Glanmire WTP. The design of this pipeline incorporates additional capacity to collect and transfer treated effluent from Knockraha WwTP, with dimensions sufficient to accommodate projected flows through 2080 horizon. Due to the asset life of the existing WwTP, the proposal includes to initiate the construction of a new 3,900 PE greenfield WwTP in the 2055 strategy horizon which shall be sufficiently sized to treat the loads for the 2080 horizon.

Table 2-64: Feasible Approaches for Knockraha and Watergrasshill

Strategy Horizon	Catchment	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
2030	Knockraha WwTP	• Construct a new Wastewater Transfer Pumping Station (WwPS) • Construct a new wastewater transfer pipe to from Knockraha to existing Glanmire Bridge PS • Decommission existing WwTP.	• 500PE upgrade of existing WwTP • Construct FE transfer to Glanmire Bridge PS and associated Pumping Station	• 500PE upgrade of existing WwTP • Construct FE transfer to Butlerstown River and associated Pumping Station via new Watergrasshill FE Pumping Station
	Watergrasshill WwTP	• Optimise WwTP to bring to compliance with current ELVs	• Optimise WwTP to bring to compliance with current ELVs	• Construct Final Effluent Transfer to Butlerstown River and associated Pumping Station
2055	Knockraha WwTP	• Continue to Operate WwPS	• Continue to Operate WwTP	• Continue to Operate WwTP
	Watergrasshill WwTP	• Construct a new Wastewater Pumping Station (WwPS) • Construct a new wastewater transfer pipe from Watergrasshill to existing Glanmire Bridge PS • Decommission existing WwTP	• Construct New 3,900PE Brownfield WwTP • Construct FE transfer to Glanmire Bridge PS (10km via roads) and associated Pumping Station	• Construct New 3,900PE WwTP
2080	Knockraha WwTP	• Continue to Operate WwPS	• 100 PE upgrade of existing WwTP. • 350 PE WwTP capital replacement.	• 100 PE upgrade of existing WwTP. • 350 PE WwTP capital replacement.
	Watergrasshill WwTP	• Continue to Operate WwPS	• Continue to Operate WwTP	• Continue to Operate WwTP

2.5.4 Recommended Approach and Implementation Strategy for Knockraha and Watergrasshill

Based on the analysis conducted above, **Feasible Approach 1** is recommended for implementation and further development as an integral component of the CWS. This recommendation stems from the approach's superior performance across the assessed criteria and its alignment with the broader CWS objectives, making it the most suitable and sustainable solution for addressing the sub-catchment's wastewater management needs.

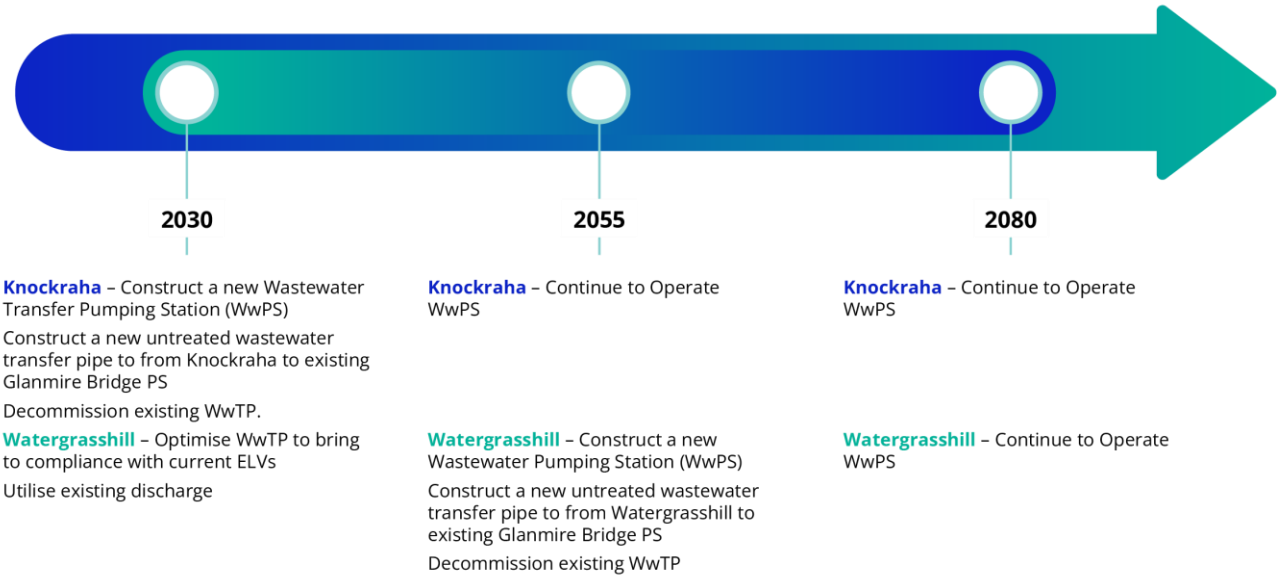


Figure 2-29: Proposed Implementation Strategy for Knockraha and Watergrasshill

Figure 2-30: Recommended Approach for Knockraha and Watergrasshill

2.6 Carrigrennan

Introduction

Carrigrennan WwTP is located at Little Island 11km east of Cork city centre. The treatment plant is operated and maintained by UÉ.

The WwTP has a design capacity of 413,200 PE as listed on UÉ Annual Environmental Reports (AER), however the actual organic capacity is thought to be lower than this. The treatment process comprises of preliminary, primary, and secondary treatment. Sludge treatment on-site consists of thickening, anaerobic digestion (AD), sludge dewatering and a thermal drying process. The treated effluent discharges through an outfall to Lough Mahon, which is approximately 520m downgradient from the boundary of Great Island Channel SAC.

The existing wastewater treatment process is currently achieving its discharge requirements specified within its WWDL, with the exception of Total Nitrogen which is non compliant.

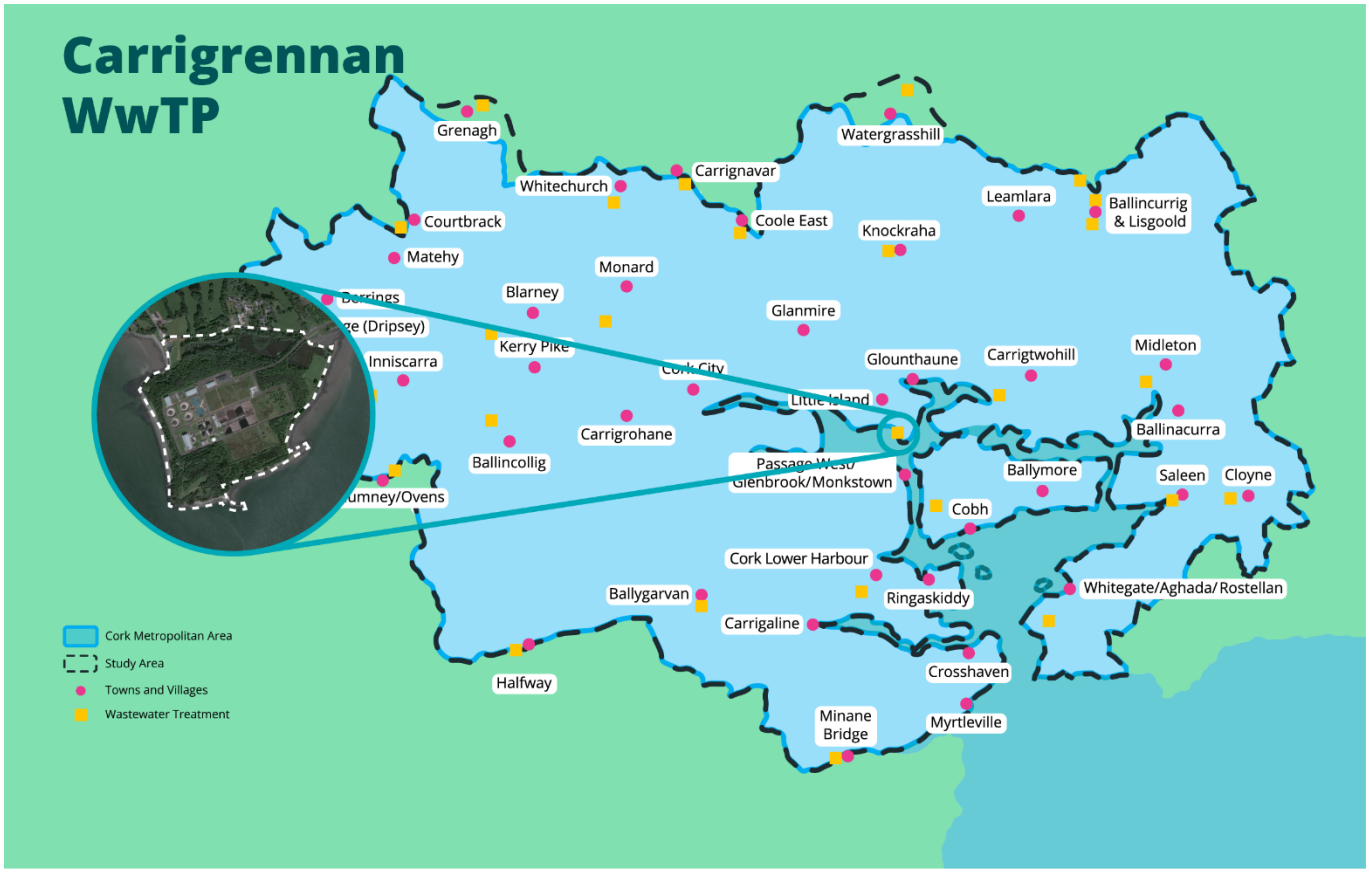


Figure 2-31: Carrigrennan Location

Table 2-65: Carrigrennan WwTP Details

Design PE	Storm Management	Inlet Works	Primary Treatment	Secondary Treatment	Tertiary Treatment	Chemical P Removal	Sludge Treatment	Installation Date
413,200	Storage Tanks	Inlet Screens, Grit Removal	PSTs	SBRs	n/a	Ferric Dosing	AD & Biogas Plant	2003

Table 2-66: Current and Projected Organic (PE) and Hydraulic Loading to Carrigrennan WwTP

Parameter	Existing Capacity	Current (2024) Loading	2030	2055	2080
Organic Loading (PE)	413,200	298,001	390,857	465,286	500,415
Hydraulic Loading (m^3/d)	359,592	158,269	303,961	359,535	385,765

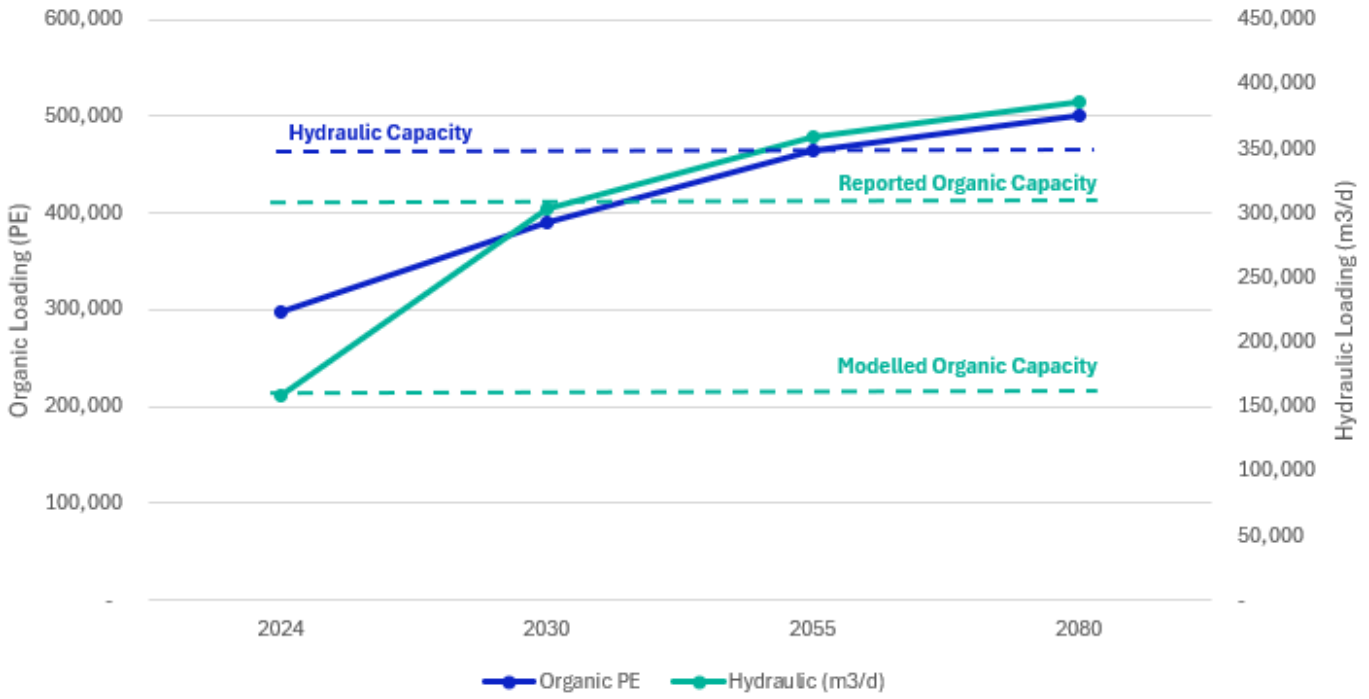


Figure 2-32: Current and Projected Loadings at Carrigrennan WwTP

Current and Projected Discharge Limits

Following water quality modelling conducted at the existing WwTP discharge point, environmentally sustainable discharge limits for both summer and winter based on compliance with the appropriate WFD EQS have been determined based on projected PE loading to the WwTP across the current and future Strategy horizons. The environmentally sustainable discharge limits for these scenarios have been summarised in Table 2-67. Note, under the rUWWTD the total phosphorous ELV for wastewater treatment plants greater than 10,000PE must be no greater than 0.5mg/l.

Table 2-67: Existing WWDL ELVs and Environmentally Sustainable Discharge Limits at Carrigrennan WwTP

Parameter	Existing ELVs	2030 Environmentally Sustainable Discharge Limits	2055 Environmentally Sustainable Discharge Limits	2080 Environmentally Sustainable Discharge Limits
BOD	25	25	25	25
TN	25	25	8	8
TP	2.5	2.5	0.5	0.5
More Stringent?	-	Y	Y	Y

As shown in Table 2-67, the environmentally sustainable discharge limits for the future horizons are considerably more stringent than the current WWDL requirements which would necessitate additional wastewater treatment processes for the continuation of discharging treated effluent at the current location.

Summary of Observed Constraints

As part of the delivery of this Strategy, advancement of the Optioneering Process assessed potential Network, Ecological, Environmental and Planning constraints that may impact the development of feasible approaches. Key findings pertinent to this catchment have been summarised below:

Network Constraints

A separate assessment of the existing wastewater network for this agglomeration, including maps and drawings illustrating the location of constraints has been undertaken as part of the Network Modelling Report which is included in Appendix 4.

Based on the values reported in the AER, Carrigrennan WwTP has hydraulic and organic capacity to treat current loads and receive more flow and load in the future. However, the modelled organic capacity highlights that plant could already exceed its capacity. The network assessment has identified that the current network is experiencing surcharging and flooding across the catchment. The proposed DAP infrastructure upgrades will reduce some of this surcharge, however the 2080 scenario development requirements exceed the network capacity in some areas, especially in the areas where new developments join existing networks. The current model has 21 non-compliant SWOs, which reduces to only 5 non-compliant SWOs after DAP infrastructure upgrades.

Environmental and Ecological Constraints

The discharge location is transitional waterbody Lough Mahon with Moderate WFD Status (cycle 3 2016-2021) and classified as At Risk (2022). There are no European or National designated sites with direct pathway to the discharge. However, the WwTP site is surrounded by Cork Harbour SPA and Great Island Channel SAC/pNHA.

Planning Constraints

The planning assessment for the wastewater treatment plant has revealed favourable conditions for potential future developments. The site is surrounded by UÉ land providing ample green space for potential upgrades or expansions. Notably, the assessment did not identify any site boundary constraints or planning permission restrictions that would impede future improvements. This absence of major planning obstacles suggests that any necessary upgrades or expansions to the facility would likely receive support from planning authorities. The availability of considerable adjacent land offers flexibility for future development, ensuring that the

wastewater treatment plant can adapt to changing needs and regulatory requirements without significant planning hurdles.

Coarse Screening

The coarse screening was undertaken on the unconstrained list of options at Carrigrennan WwTP, which are shown in Table 1-1, as per the methodology outlined in Section 1.3. To provide context for the coarse screening results, which are outlined in Table 2-68, commentary on the coarse screening exercise is provided below.

- Option A0 (Do Nothing) has not been considered as a feasible option for 2080 as the WwTP would be over hydraulic and organic capacity.
- Option A1 (Do Minimum – Process Optimisation) has been deemed unfeasible for the 2080 horizon due to the projected exceedance of both organic and hydraulic capacities of the WwTP, coupled with the anticipated end-of-life status of existing assets.
- Option A2 (Reuse with Investment at Existing Discharge Location) has been screened out for 2080 horizon as the existing assets will have exceeded their design life.
- Option A3 (Reuse with Investment – New Discharge Location) has been screened out for 2080 horizon as the existing assets will have exceeded their design life.
- Option A4 (New Treatment Process on Existing Site with Existing Discharge Location) has been considered viable for 2080 horizon, as both the organic and hydraulic capacities are projected to be exceeded, and the remaining asset life will be insufficient, thus necessitating the need for a new treatment process on site.
- Option A5 (New Greenfield Plant with Existing Discharge Location) has been considered viable for 2080 horizon. The option scores as amber as the relocation of the existing WwTP, which is the second largest plant in Ireland, is unlikely to be feasible from both a planning and cost perspective and would present a number of regulatory constraints and overall impact on our customers and ability to implement projects identified within this CWS.
- Option A6 (Wastewater Load Transfer to another WwTP) was screened out at this stage as alternative WwTPs with treatment capacity of this magnitude are not available.

Table 2-68: Coarse Screening Output at Carrigrennan

Coarse Screening Results							
Long List of Options	**A0**	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**
2080	**N**	**N**	**N**	**N**	**Y (with Existing Discharge)**	**Y (with Existing Discharge)**	**N**
2055	**N**	**N**	**Y**	**N**	**N**	**N**	**N**
2030	**N**	**Y**	**Y**	**N**	**N**	**N**	**N**

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening

Any options for the strategy horizon years of 2030 and 2055 should facilitate implementation of the longer term 2080 preferred solution and should not compromise the ability to implement this. Further option defining is undertaken in order to undertake the MCA fairly and adequately.

Table 2-69: 2080 Options Advancing to Fine Screening

Options Progressed to Fine Screening for 2080	Description
A4	New Treatment Process on Existing Site with Existing Discharge Location
A5	New Greenfield Plant with Existing Discharge Location

Fine Screening

The options presented in Table 2-69 underwent fine screening in the form of an MCA as detailed in Section 1.4. The scoring and results of the MCA are presented in Table 2-70. As noted in previous sections, several feasible and recommend approaches for WwTPs within the CMA proposed to transfer wastewater to Carrigrennan for treatment and discharge. In undertaking the MCA for Carrigrennan, receiving imports from these WwTPs was considered and evaluated accordingly ensuring the highest-ranking options for Carrigrennan consider the needs of the CMA as a whole.

Table 2-70: MCA Results for Carrigrennan WwTP

Objectives	Criteria	Option A4	Option A5
Addressing the Need	Treatment Capacity	3	3
	Network Capacity	3	3
	Final Effluent Compliance	3	3
Deliverability	Design Complexity, Ease of Implementation & Feasibility	1	-3
	Planning & Regulation	0	-3
	Delivery Timeline & Alignment	1	-2
Risk & Resilience	Flexibility & Scalability	1	2
	Delivery Risk	1	-3
Customer and Stakeholder Support	Impact on Customers	1	-1
	Community Support, Health and Wellbeing	2	2
Environmental & Sustainability	Water Environment	2	2
	Waterbody Impact (Existing and New)	0	2
	Waterbody Flood Risk	-1	0
	Biodiversity	-1	-3
	AA-Natura 2000 Sites	2	-3
	Aquatic Biodiversity	-1	3
	Terrestrial Biodiversity (BNG)	0.5	-3
	GHG Emissions	-1	-0.5
	Embodied Carbon	2	-3
	Operational Carbon	2	2
	Energy Efficiency	1	2
	Climate Resilience	1	3
	Circular Economy	3	-1
Weighted Average Sub Total		**1.46**	**0.25**
Cost	CAPEX	2	1
	OPEX	1	1
	Whole Life Cost	1	1
Combined Score		**2.03**	**0.68**
Rank		**1st**	**2nd**

The MCA has identified Option A4 as the highest-ranking option against the fine screening criteria for the 2080 strategy horizon and offers a more cost-effective implementation and better alignment with the goals of the CWS and UÉ compared to Option A5.

Wastewater Treatment Summary

In summary, the optioneering process for Carrigrennan WwTP has yielded recommendations for future development:

The highest ranked option involves a new treatment process on the existing site (Option A4), as the existing asset life will have expired, requiring the full replacement of existing assets and increased capacity requirements, including tertiary treatment.

This approach addresses several key challenges identified at Carrigrennan WwTP, including insufficient modelled organic capacity. In addition, this will improve water quality at the discharge location, which is of high importance due to the presence of Great Island Channel SAC.

This strategy for Carrigrennan WwTP is part of a broader, integrated approach for managing wastewater in the CMA. The proposals to transfer wastewater from other agglomerations (Blarney, Inniscarra Whitechurch, Grenagh, Carrignavar, Watergrasshill, Kileens, Monard, and Knockraha) to Carrigrennan aligns with the larger wastewater management framework, taking advantage of Carrigrennan's capacity.

Wastewater Network Upgrade Summary

A separate assessment of network upgrades for this agglomeration has been undertaken as part of the Network Modelling Report which is included in Appendix 4. Below is a brief overview of the proposed upgrades within the Carrigrennan agglomeration, addressing SWO compliance and future development constraints such as surcharge and flooding due to development impacts. Unless otherwise stated specifically, these proposed upgrades are proposed to be initiated in the 2030 strategy horizon. The development process of these proposed upgrades, as well as maps and drawings illustrating the location of the required upgrades are provided in more detail in the Network Modelling Report in Appendix 4.

Storage at Ballyvolane WwPS: Additional storage to be provided at the Ballyvolane WwPS including an emergency overflow. This plan also includes the installation of a c. 13.9km new rising main, which will pump forward flow to Cork City WwTP.

Additional storage at Atlantic Pool WwPS: Additional storage to be provided.

Additional storage at Grand Parade WwPS: Additional storage to be provided at the wet well chamber and proposed increase the pass forward flow in the 2055 strategy horizon.

Network Infiltration Reduction: Proposed 50% reduction in tidal infiltration across South Cork to enhance capacity.

Storm area separation: Proposed separation of c. 17 hectares of impermeable areas (including roads, roofs, and hard standings) and c. 52 hectares of permeable areas within the foul/combined network to enhance capacity and ensure SWO compliance across the catchment.

Note: This list is not exhaustive. The upgrades mentioned are proposed as part of the Cork Wastewater Strategy study, in addition to the SWO and flooding options produced in the Cork Wastewater Infrastructure Solution report, which was part of the Drainage Area Plan stage 4 conducted between 2022 and 2023.

2.6.1 Feasible Approaches for Carrigrennan

The results of the fine screening process and MCA were assessed and taken forward to develop 3 No. Feasible Approaches for the sub catchment. These approaches consider the results of the MCA for Carrigrennan while also considering the impacts of feasible approaches of other sub catchments which influence the development of feasible approaches for Carrigrennan. The wastewater network upgrade proposals mentioned above are common amongst Feasible Approaches detailed below.

Our approach ensures that the selected strategies are not only technically viable but also align with the long-term vision for wastewater management in the region.

These Approaches are summarised in Table 2-71 overleaf.

Feasible Approach 1 integrates the highest-ranking MCA options for Carrigrennan while taking cognisance of Recommended Approaches for other sub catchments which impact the future proposal required at Carrigrennan WwTP.

- **Carrigrennan:** For the 2030 horizon, it is proposed to initiate the upgrade the existing WwTP to provide tertiary treatment to meet Cork City growth demand as well as wastewater transfers from Sub Catchments 1,2, 3 and 4. In the 2055 strategy horizon, a 104,000PE upgrade to the tertiary WwTP is proposed to be imitated as well as constructing a new 558,000PE quaternary treatment plant to ensure compliance with the recast UWWTD. The increased loads being treated and discharged at the WwTP necessitate the upsize of the existing treated effluent discharge outfall. Population increases in Cork City and wastewater volume increases in agglomerations that are being transferred to Carrigrennan for treatment necessitate a further 41,000PE increase in the treatment capacity of Carrigrennan, and it is proposed to initiate this upgrade in the 2080 horizon.

Feasible Approach 2 explores implementing the highest ranked option from Carrigrennan while exploring alternative feasible approaches in sub catchments that propose to transfer wastewater to Carrigrennan for treatment.

- **Carrigrennan:** Similar to Feasible Approach 1, for the 2030 horizon it is proposed to initiate the upgrade the existing WwTP to provide tertiary treatment. For the 2055 horizon, it is proposed to initiate a 91,000PE upgrade of the existing tertiary WwTP required to accommodate incoming flows from other sub catchments dependant on the selected approach at these sub catchments. To comply with the recast UWWTD, it is proposed to initiate the construction of a 532,500PE quaternary plant operating in the 2055 strategy horizon with an upsized treated effluent discharge outfall. In the 2080 strategy horizon, a further 40,000PE increase in treatment capacity is proposed to be initiated to accommodate the increase in loads in the agglomeration and accepting transfers from other sub catchments.

Feasible Approach 3 explores implementing the highest-ranking option from the MCA while considering alternative proposals in interacting sub catchments, namely diverting south Cork City loads for treatment at Cork Lower Harbour WwTP.

- **Carrigrennan:** Similar to Feasible Approaches 1 and 2, for the 2030 horizon it is proposed to upgrade the existing WwTP to provide tertiary treatment. For 2055, in order to alleviate any pressures on Carrigrennan WwTP it is proposed to initiate the diversion of the south Cork City network to Cork Lower Harbour WwTP for treatment via the Southern Orbital Sewer. This proposal results in a lower required capacity of the WwTP than Feasible Approach 1 and 2 but will still require a 26,750PE upgrade of the tertiary WwTP and construction of a 435,000PE quaternary WwTP with upsized treated

effluent outfall. This proposed upgrade will cater for projected 2080 horizon flows and is proposed to be initiated in the 2055 horizon and will continue operation of the WwTP through to 2080 horizon.

Table 2-71: Feasible Approaches for Carrigrennan

Strategy Horizon	Catchment	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
2030	Carrigrennan WwTP	• Upgrade existing WwTP to provide tertiary treatment to bring to compliance with current ELVs and to meet Cork City growth demand and wastewater transfers from Sub Catchments 1, 2, 3 and 4	• Upgrade existing WwTP to provide tertiary treatment to bring to compliance with current ELVs and to meet Cork City growth demand and wastewater transfers from Sub Catchments 1, 2, 3 and 4	• Upgrade existing WwTP to provide tertiary treatment to bring to compliance with current ELVs and to meet Cork City growth demand and wastewater transfers from Sub Catchments 1, 2, 3 and 4
2055	Carrigrennan WwTP	• 104,000PE upgrade of existing tertiary WwTP, • Construct new 558,000PE quaternary treatment plant • Upsize existing final effluent discharge outfall	• 91,000PE upgrade of existing tertiary WwTP. • Construct new 532,500PE quaternary treatment plant • Upsize existing final effluent discharge outfall	• Divert south Cork City to Cork Lower Harbour via the Southern Orbital Sewer. • 26,750PE upgrade of existing tertiary WwTP. • Construct new 435,000PE quaternary treatment plant • Upsize existing final effluent discharge outfall
2080	Carrigrennan WwTP	• Increase treatment capacity by 41,000PE	• Increase treatment capacity by 40,000PE	• Continue to operate WwTP

2.6.2 Recommended Approach and Implementation Strategy for Carrigrennan

Based on the analysis conducted above, **Feasible Approach 1** is recommended for implementation and further development as an integral component of the CWS. This recommendation stems from the approach's superior performance across the assessed criteria and its alignment with the broader CWS objectives, making it the most suitable and sustainable solution for addressing the sub-catchment's wastewater management needs.

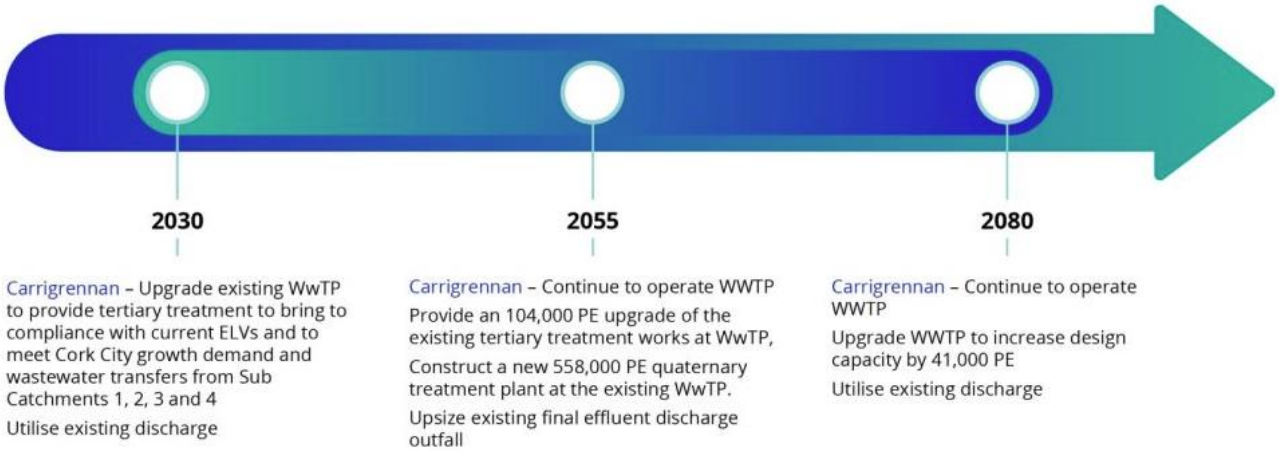


Figure 2-33: Proposed Implementation Strategy for Carrigrennan

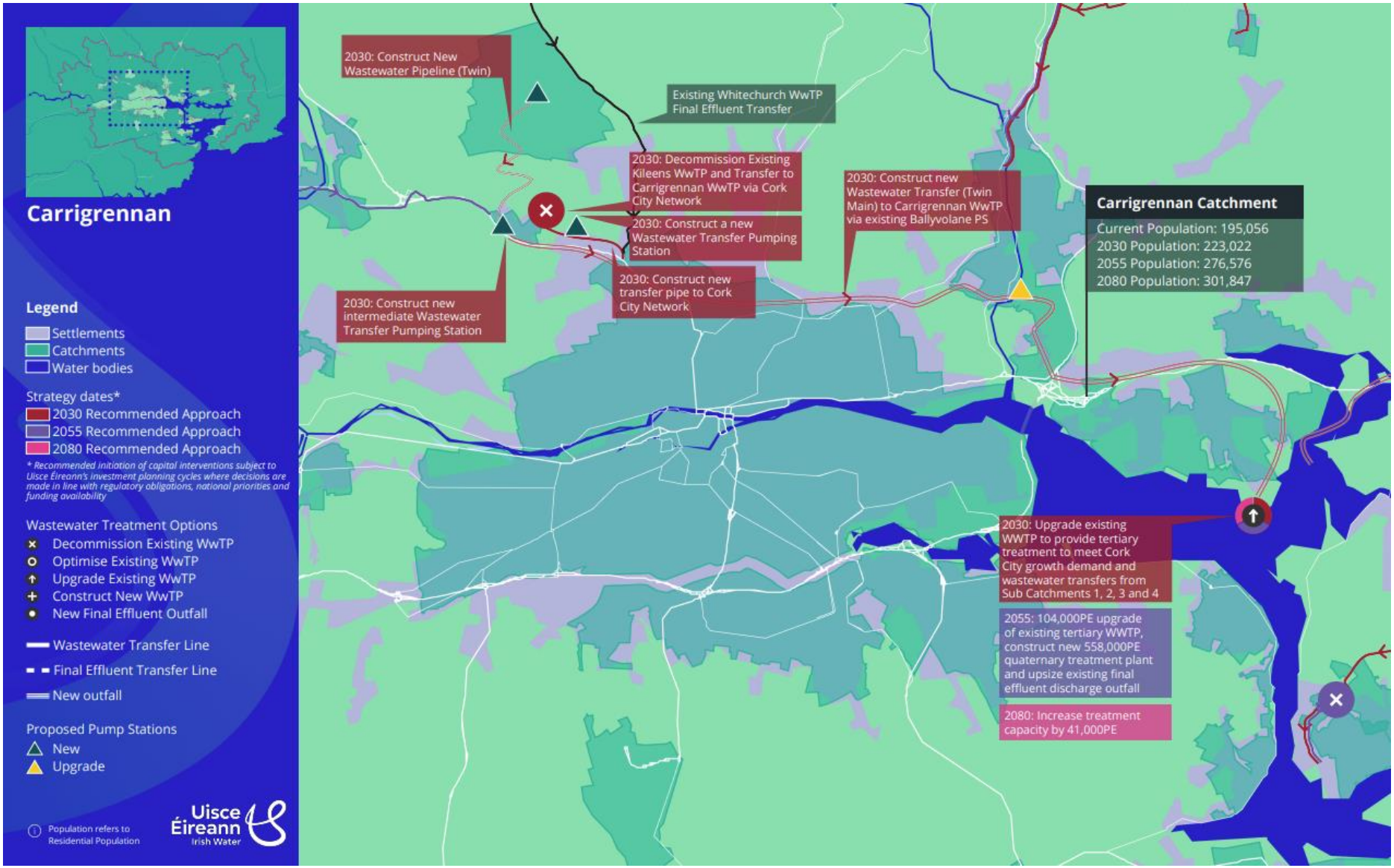


Figure 2-34: Recommended Approach for Carrigrennan

2.7 Ballygarvan, Halfway and Minane Bridge

2.7.1 Ballygarvan

Introduction

Ballygarvan WwTP is located approximately 9km south of Cork City in Ballygarvan village. EPS operate and maintain Ballygarvan WwTP on behalf of UÉ.

The WwTP has a design capacity of 634 PE and the plant consists of Preliminary Treatment (Screening), Secondary Treatment (Activated Sludge Process) and Tertiary Treatment (Sand Filtration) followed by Sludge Treatment (Storage). There is no storm management or chemical dosing at Ballygarvan WwTP. There are no emergency overflows upstream (or within) the WwTP and no overflow discharges from the WwTP. All treated effluent from the WwTP drains by gravity to the Owenboy River.

The existing wastewater treatment process is currently performing poorly and is failing to achieve the discharge requirements specified within its WWDL particularly with regards to Ortho-P.

Figure 2-35: Ballygarvan Location

Table 2-72: Ballygarvan WwTP Details

Organic Design PE	Storm Management	Inlet Works	Primary Treatment	Secondary Treatment	Tertiary Treatment	Chemical P Removal	Sludge Treatment	Installation Date
634	n/a	Screening	n/a	ASP	Sand Filtration	n/a	n/a	2010

Table 2-73: Current and Projected Organic (PE) and Hydraulic Loading to Ballygarvan WwTP

Parameter	Existing Capacity	Current (2024) Loading	2030	2055	2080
Organic Loading (PE)	634	649	930	1,079	1,212
Peak Hydraulic Loading (m^3/d)	375	1,017	535	620	697

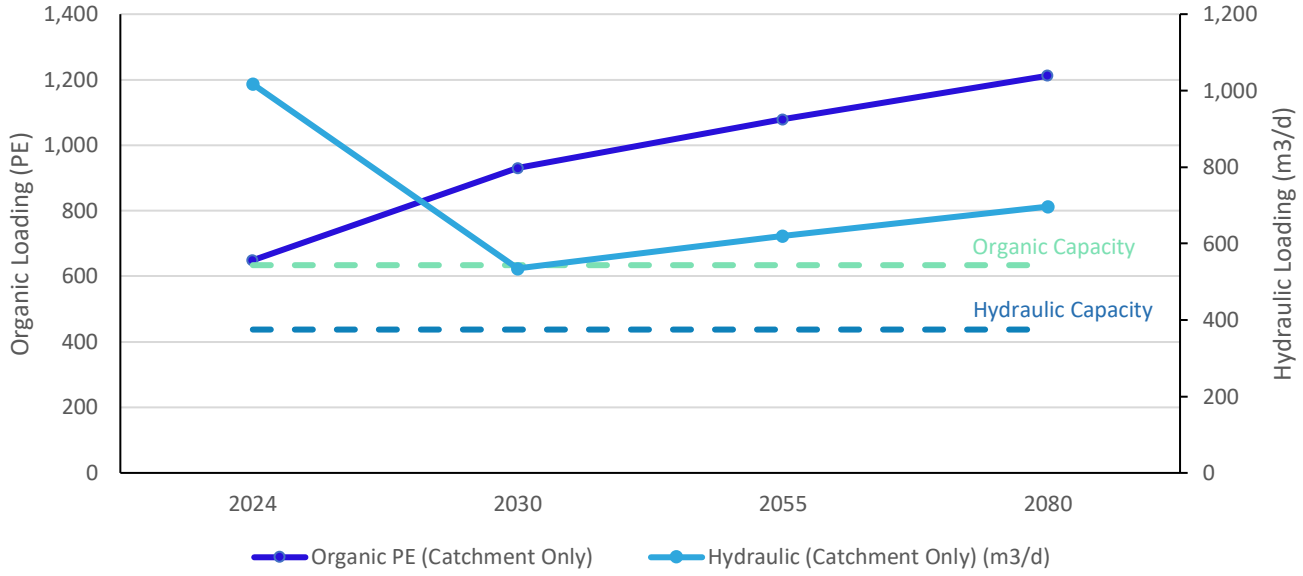


Figure 2-36: Current and Projected Loadings at Ballygarvan WwTP

Current and Projected Discharge Limits

Following water quality modelling conducted at the existing WwTP discharge point, environmentally sustainable discharge limits based on compliance with the appropriate WFD EQS have been determined based on projected PE loading to the WwTP across the current and future Strategy horizons. The environmentally sustainable discharge limits for these scenarios have been summarised in Table 2-74.

Table 2-74: Existing WWDL ELVs and Environmentally Sustainable Discharge Limits at Ballygarvan WwTP

Parameter	Existing ELVs	2030 Environmentally Sustainable Discharge Limits	2055 Environmentally Sustainable Discharge Limits	2080 Environmentally Sustainable Discharge Limits
BOD	25	25	25	25
Ammonia	5	4.1	3.6	3.1

OrthoP	3	3	3	2.7
More Stringent?	-	Y	Y	Y

Summary of Observed Constraints

As part of the delivery of this Strategy, advancement of the Optioneering Process assessed potential Network, Ecological, Environmental and Planning constraints that may impact the development of feasible approaches. Key findings pertinent to this catchment have been summarised below:

Network Constraints

A separate assessment of the existing wastewater network for this catchment, including maps and drawings illustrating the location of constraints has been undertaken as part of the Network Modelling Report which is included in Appendix 4.

The network assessment identified potential flooding and surcharging conditions under current and future scenarios within the main trunk sewer within the Ballygarvan catchment WW network. Based on future loading scenarios, model projections indicate a substantial increase in both the extent and frequency of these issues throughout the existing network.

Environmental and Ecological Constraints

The discharge location waterbody is Owenboy (Cork)_030 (River Owenboy) with Moderate WFD Status (cycle 3 2016-2021) and classified as Under Review for Risk Status (2022). The discharge is located approximately 5 km upstream of a section of Cork Harbour SPA and Owenboy pNHA. In the past five years there have been some odour complaints within 500m of the plant.

Planning Constraints

Regarding planning, the assessment did not identify any major constraints however, it did highlight the restricted area available for potential expansion within the existing footprint as the site is surrounded by Flood Zones A and B. This will necessitate a Flood Risk Assessment (FRA) for any proposed upgrade options. Furthermore, no map-based zoning issues have been identified.

Coarse Screening

The coarse screening was undertaken on the unconstrained list of options at Ballygarvan WwTP, which are shown in Table 1-1, as per the methodology outlined in Section 1.3. To provide context for the coarse screening results, which are outlined in Table 2-75, commentary on the coarse screening exercise is provided below.

- Option A0 (Do Nothing) has not been considered as a feasible option for the 2080 horizon as the existing WwTP is currently over capacity and is not achieving the discharge requirements as set in the WWDL.
- Option A1 (Do Minimum - Process Optimisation) has been deemed unfeasible for the 2080 horizon due to the projected exceedance of both organic and hydraulic capacities of the WwTP, coupled with the anticipated end-of-life status of existing assets.
- Option A2 (Reuse with Investment at Existing Discharge Location) has been screened out for 2080 horizon as the existing assets will have exceeded their design life.
- Option A3 (Reuse with Investment – New Discharge Location) has been screened out for 2080 horizon as the existing assets will have exceeded their design life.
- Option A4 (New Treatment Process on Current Site with Existing Discharge Location) has been considered viable for 2080 horizon, as the remaining asset life will be insufficient thus

necessitating the full replacement of existing assets and an increase in treatment capacity. The existing treatment process is capable of meeting the projected environmentally sustainable discharge limits, however, an upgrade is required to accommodate a projected load of 1,250 PE.

- Option A5 (New Greenfield Plant with Existing Discharge Location) has been considered viable for 2080 horizon, as the remaining asset life will be insufficient thus necessitating the full replacement of existing assets and an increase in treatment capacity.
- Option A6 (Wastewater Load Transfer to Cork Lower Harbour via Carrigaline) is considered feasible for the 2080 horizon, as both organic treatment capacity and the remaining asset life are projected to be exceeded.

Table 2-75: Coarse Screening Output of Ballygarvan WwTP (short-listed options shown in red)

Coarse Screening Results							
Long List of Options	**A0**	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**
2080	N	N	N	N	Y	N	Y
2055	N	N	Y	N	N	N	Y
2030	N	N	Y	N	N	N	Y

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening

Any options for the strategy horizon years of 2030 and 2055 should facilitate implementation of the longer term 2080 preferred solution and should not compromise the ability to implement this. Further option defining is undertaken in order to undertake the MCA fairly and adequately. The planning assessment for the existing Ballygarvan WWTP did not identify potential planning constraints however it did identify potential flood risk assessment requirements. Resultingly, Option A5 was not advanced to fine screening as the recommendation for a new greenfield site was not deemed as optimal or cost beneficial with misalignment with existing policies and strategies for asset reuse and embodied carbon emissions mitigation. Cork Lower Harbour WwTP was identified as a potential wastewater transfer receiver for Ballygarvan noting that other WwTPs within the proximity have ongoing capacity or performance issues. The options progressed to fine screening are outlined in Table 2-76.

Table 2-76: 2080 Options Advancing to Fine Screening

Options Progressed to Fine Screening for 2080	Description
A4	New Treatment Process on Current Site with Existing Discharge Location
A6	Wastewater Load Transfer to Cork Lower Harbour via Carrigaline PS

Fine Screening

The options presented in Table 2-76 underwent fine screening in the form of an MCA as detailed in Section 1.4. The scoring and results of the MCA are presented in Table 2-77.

Table 2-77: MCA Results for Ballygarvan WwTP

Objectives	Criteria	Option A4	Option A6
Addressing the Need	Treatment Capacity	3	3
	Network Capacity	3	3

	Final Effluent Compliance	3	3
Deliverability	Design Complexity, Ease of Implementation & Feasibility	-1	1
	Planning & Regulation	-2	-1
	Delivery Timeline & Alignment	1	2
Risk & Resilience	Flexibility & Scalability	1	-1
	Delivery Risk	-1	-1
Customer and Stakeholder Support	Impact on Customers	2	3
	Community Support, Health and Wellbeing	1	2
Environmental & Sustainability	Water Environment	2	3
	Waterbody Impact (Existing and New)	2	3
	Waterbody Flood Risk	0	0
	Biodiversity	1	2
	AA-Natura 2000 Sites	0	0
	Aquatic Biodiversity	2	2
	Terrestrial Biodiversity (BNG)	-1	0
	GHG Emissions	0.5	0
	Embodied Carbon	-1	-3
	Operational Carbon	2	3
	Energy Efficiency	2	3
	Climate Resilience	1	3
	Circular Economy	0	2
Weighted Average Sub Total		**1.09**	**1.71**
Cost	CAPEX	3	4
	OPEX	6	6
	Whole Life Cost	4	5
Combined Score		**2.95**	**3.86**
Rank		**2nd**	**1st**

The MCA has identified Option A6 as the highest-ranking option against the fine screening criteria for the 2080 strategy horizon and offers a more cost-effective implementation and better alignment with the goals of the CWS and UÉ compared to A5.

Wastewater Treatment Summary

The optioneering process for Ballygarvan WwTP has yielded recommendations for future development:

The highest ranked option ultimately involves transferring wastewater to Cork Lower Harbour WwTP via a proposed wastewater transfer pipeline and pumping station (Option A6). This approach addresses receiving waterbody quality concerns and risks by consolidating treatment at a centralised location and improves overall treatment efficiency whilst simultaneously protecting the environment and ecological boundaries. This strategy ensures long-term sustainability by leveraging existing treatment facilities at Cork Lower Harbour WwTP and protecting inland rivers sensitive to climate change.

This option effectively addresses several key challenges identified at Ballygarvan WwTP, including the site boundary constraints limiting expansion possibilities, the current exceedance of organic loading capacity and the existing assets surpassing asset life after 2055.

Wastewater Network Upgrade Summary

A separate assessment of network upgrades for this agglomeration has been undertaken as part of the Network Modelling Report which is included in Appendix 4. Below is a brief overview of the proposed upgrades within the Ballygarvan agglomeration, addressing SWO compliance and future development constraints such as surcharge and flooding due to development impacts. Unless otherwise stated specifically, these proposed upgrades are proposed to be initiated in the 2030 strategy horizon. The development process of these proposed upgrades, as well as maps and drawings illustrating the location of the required upgrades are provided in more detail in the Network Modelling Report in Appendix 4.

New storage at Ballygarvan WwPS: A storage facility has been proposed at the Ballygarvan treatment site. This plan also includes the installation of a c. 5.4km new rising main, which will pump forward flow to Cork Lower harbour catchment and decommission the treatment plant in the 2030 horizon.

Network Upgrade Across Catchment: An upgrade of c. 2.7km of the existing sewer system is proposed, along with the addition of c. 1.1km of new sewer lines to increase the network's capacity.

2.7.2 Halfway

Introduction

Halfway WwTP is located approximately 12 kilometres southwest of Cork City and 13 kilometres northeast of Bandon. EPS operate and maintain Halfway WwTP on behalf of UÉ.

The WwTP has a design capacity of 450 PE and the plant consists of Preliminary Treatment (Inlet Screens) and Secondary Treatment (Membrane Bioreactors) followed by Chemical Dosing (Ferric Chloride). There are no storm management systems, primary treatment, tertiary treatment or sludge treatment at Halfway WwTP. There are no emergency overflows at the WwTP and no secondary overflow discharges from the WwTP. All treated effluent from the WwTP drains by gravity to the Owenboy River, located adjacent to the plant.

The existing wastewater treatment process is currently performing sufficiently, while the plant is achieving the discharge requirements specified within its WWDL, with the exception of Total P where a number of non-compliances have occurred.

Figure 2-37: Halfway Location

Table 2-78: Halfway WwTP Details

Design Organic PE	Storm Management	Inlet Works	Primary Treatment	Secondary Treatment	Tertiary Treatment	Chemical P Removal	Sludge Treatment	Installation Date
450	n/a	Inlet Screen	n/a	MBRs	n/a	FeCl	n/a	2005

Table 2-79: Current and Projected Organic (PE) and Hydraulic Loadings at Halfway WwTP

Parameter	Existing Capacity	Current (2024) Loading	2030	2055	2080
Organic Loading (PE)	450	258	363	417	470
Peak Hydraulic Loading (m^3/d)	270	78	209	240	270

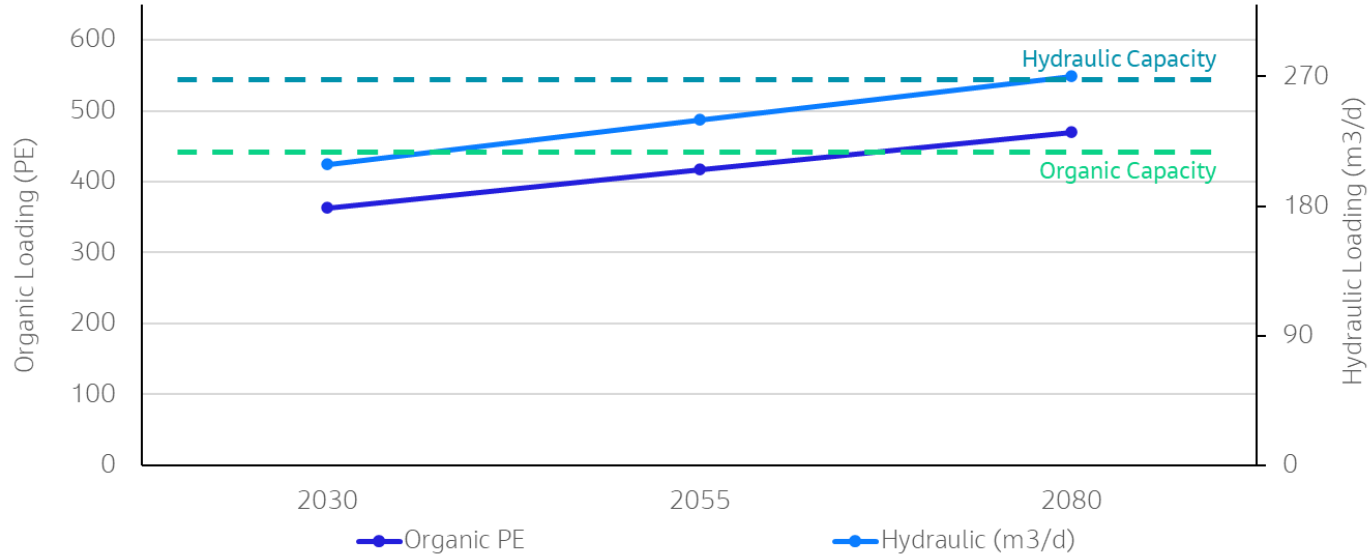


Figure 2-38: Current and Projected Loadings at Halfway WwTP

Current and Projected Discharge Limits

Following water quality modelling conducted at the existing WwTP discharge point, environmentally sustainable discharge limits based on compliance with the appropriate WFD EQS have been determined based on projected PE loading to the WwTP across the current and future Strategy horizons. The environmentally sustainable discharge limits for these scenarios have been summarised in Table 2-80.

Table 2-80: Existing WWDL ELVs and Environmentally Sustainable Discharge Limits at Halfway WwTP

Parameter	Existing ELVs	2030 Environmentally Sustainable Discharge Limits	2055 Environmentally Sustainable Discharge Limits	2080 Environmentally Sustainable Discharge Limits
BOD	5 mg/l	5 mg/l	5 mg/l	5 mg/l
Ammonia	2 mg/l	2 mg/l	2 mg/l	2 mg/l
OrthoP	1 mg/l	1 mg/l	1 mg/l	1 mg/l
More Stringent?	-	N	N	N

Summary of Observed Constraints

As part of the delivery of this Strategy, advancement of the Optioneering Process assessed potential Network, Ecological, Environmental and Planning constraints that may impact the development of feasible approaches. Key findings pertinent to this catchment have been summarised below:

Network Constraints

A separate assessment of the existing wastewater network for this catchment, including maps and drawings illustrating the location of constraints has been undertaken as part of the Network Modelling Report which is included in Appendix 4.

The network assessment identified potential operational challenges at the site due to the absence of dedicated stormwater discharge, which has led to frequent wastewater backing within the system and subsequent recurring spills to the receiving watercourse.

Environmental and Ecological Constraints

The discharge location is Owenboy (Cork)_020 (River Owenboy) with Moderate WFD Status (cycle 3 2016-2021) and classified as At Risk (2022). No European nor National designated sites are located in proximity or with direct pathways to the current WwTP and the discharge outfall is more than 10 km away from nearest SPA/SAC/pNHA. In the past five years there have been some odour complaints within 500 m of the plant.

Planning Constraints

Regarding planning, the assessment has identified the site boundary as a significant constraint, with no available space for future expansion. Additionally, the area immediately to the south of the site is located within Food Zone A, further limiting development options.

Coarse Screening

The coarse screening was undertaken on the unconstrained list of options at Halfway WwTP, which are shown in Table 1-1, as per the methodology outlined in Section 1.3. To provide context for the coarse screening results, which are outlined in Table 2-81, commentary on the coarse screening exercise is provided below.

- Option A0 (Do Nothing) has not been considered as a feasible option for the 2080 horizon as the existing WwTP is projected to be over capacity and is not achieving ELVs with respect to Total P.
- Option A1 (Do Minimum – Process Optimisation) is considered viable for the 2080 horizon, as the plant provides sufficient hydraulic capacity. However, the existing asset's life expectancy is projected to be exceeded after 2055.
- Options A2 (Reuse with investment – Existing Discharge Location) has been screened out for the 2080 horizon as the existing assets will have exceeded their design life.
- Option A3 (Reuse with investment – New Discharge Location) has been screened out for the 2080 horizon as the existing assets will have exceeded their design life.
- Option A4 (New Treatment Process on Current Site) has not been considered viable for the 2080 horizon based on the planning assessment outputs as previously mentioned.
- Options A5 (New Greenfield Plant) has been considered viable for the 2080 horizon, given that the existing site boundary imposes significant constraints on future expansion.
- Option A6 (Wastewater Transfer to Cork Lower Harbour WwTP via Ballygarvan) is considered viable for the 2080 horizon, as both the organic treatment capacity and the remaining asset life are projected to be exceeded.

Table 2-81: Coarse Screening Output

Coarse Screening Results							
Long List of Options	**A0**	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**
2080	N	Y	N	N	N	Y	Y
2055	N	Y	N	N	N	N	Y
2030	N	Y	N	N	N	N	Y

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening

Any options for the strategy horizon years of 2030 and 2055 should facilitate implementation of the longer term 2080 preferred solution and should not compromise the ability to implement this. Further option

defining is undertaken in order to undertake the MCA fairly and adequately. At this stage of assessment, specific site locations have not been identified and typical project stage site selection assessments have not been undertaken. Potential proximity areas for potential greenfield site locations have been identified and planning and environmental assessments have been undertaken to facilitate the MCA process. Similarly, transfer routes were selected based on conservative routing assumptions and it is important to note that a full route selection process was not undertaken. Routes ensure minimal impact on the public and the environment and reduce delivery risk associated with land acquisition and planning requirements. Cork Lower Harbour WwTP was identified as a potential wastewater transfer receiver for Ballygarvan noting that other WwTPs within the proximity have ongoing capacity or performance issues. Note, Option 6 includes for the transfer of wastewater to Cork Lower Harbour WwTP via Ballygarvan and relies on the results of the Ballygarvan MCA.

The options progressed to fine screening are outlined in .

Table 2-82: 2080 Options Advancing to Fine Screening

Options Progressed to Fine Screening for 2080	Description
A1	Do Minimum – Process Optimisation
A5	New Greenfield Plant with Existing Discharge
A6	Wastewater Transfer to Cork Lower Harbour WwTP via Ballygarvan

Fine Screening

The options presented in Table 2-82 underwent fine screening in the form of an MCA as detailed in Section 1.4. The scoring and results of the MCA are presented in Table 2-83.

Table 2-83: MCA Results for Halfway WwTP

Objectives	Criteria	Option A1	Option A5	Option A6
Addressing the Need	Treatment Capacity	-1	3	3
	Network Capacity	-1	3	3
	Final Effluent Compliance	-1	3	3
Deliverability	Design Complexity, Ease of Implementation & Feasibility	3	-1	1
	Planning & Regulation	0	-1	-1
	Delivery Timeline & Alignment	3	-1	1
Risk & Resilience	Flexibility & Scalability	-3	3	-1
	Delivery Risk	-3	-2	-1
Customer and Stakeholder Support	Impact on Customers	-1	1	3
	Community Support, Health and Wellbeing	-2	2	3
Environmental & Sustainability	Water Environment	-2	1	3
	Waterbody Impact (Existing and New)	-2	1	3
	Waterbody Flood Risk	0	0	0
	Biodiversity	-2	1	3
	AA-Natura 2000 Sites	0	0	0
	Aquatic Biodiversity	-2	2	3
	Terrestrial Biodiversity (BNG)	0	-1	0
	GHG Emissions	2	-0.5	0
	Embodied Carbon	3	-3	-3

	Operational Carbon	1	2	3
	Energy Efficiency	1	2	3
	Climate Resilience	0	2	3
	Circular Economy	1	-1	1
Weighted Average Sub Total		**-0.4**	**0.96**	**1.74**
Cost	CAPEX	7	4	4
	OPEX	7	6	6
	Whole Life Cost	7	4	4
Combined Score		**2.55**	**2.96**	**3.74**
Rank		**3rd**	**2nd**	**1st**

The MCA has identified Option A6 as the highest-ranking option against the fine screening criteria for the 2080 strategy horizon and offers a better alignment with the goals of the CWS and UÉ compared to Options A1 and A5.

Wastewater Treatment Summary

The optioneering process for Halfway WWwTP has yielded recommendations for future development:

The highest ranked option ultimately involves transferring wastewater to Cork Lower Harbour WwTP via Ballygarvan and the proposed wastewater transfer pipeline and Pumping Station (Option A6). This approach addresses receiving waterbody quality concerns and risks by consolidating treatment at a centralised location and improves overall treatment efficiency whilst simultaneously protecting the environment and ecological boundaries. This strategy ensures long-term sustainability by leveraging existing treatment facilities at Cork Lower Harbour WwTP and protecting inland rivers sensitive to climate change.

This option effectively addresses several key challenges identified at Halfway WwTP, including the site boundary constraints limiting expansion possibilities and the projected exceedance of organic loading capacity in the 2080 horizon.

Wastewater Network Upgrade Summary

A separate assessment of network upgrades for this agglomeration has been undertaken as part of the Network Modelling Report which is included in Appendix 4. Below is a brief overview of the proposed upgrades within the Halfway agglomeration, addressing SWO compliance and future development constraints such as surcharge and flooding due to development impacts. Unless otherwise stated specifically, these proposed upgrades are proposed to be initiated in the 2030 strategy horizon. The development process of these proposed upgrades, as well as maps and drawings illustrating the location of the required upgrades are provided in more detail in the Network Modelling Report in Appendix 4.

New storage at Halfway WwPS: A storage facility has been proposed at the Halfway treatment site. This plan also includes to initiate the installation of a c. 8.4km new rising main, which will pump forward flow to Cork Lower harbour catchment and decommission the treatment plant in the 2080 horizon.

Network Upgrade Across Catchment: An upgrade of c. 400m of the existing sewer system is proposed to increase the network's capacity.

2.7.3 Minane Bridge (River Valley)

Introduction

Minane Bridge WwTP is located approximately 7km south of Carrigaline, adjacent to the River Valley housing estate. Cork County Council operate and maintain the Minane Bridge WwTP on behalf of UÉ.

The WwTP has a design capacity of 250 PE and the plant consists of Primary Treatment (Primary Settlement Tank) and Secondary Treatment (ASP) followed by Tertiary Treatment (Tertiary Reed Bed). Treated effluent discharges to the Minane River. There is a 4m^3 storage chamber which is used to hold excess storm flow until it can be redirected to the distribution chamber. The WwTP contains a storm water overflow that discharges directly into the Minane river.

The performance of the existing wastewater treatment process is currently unknown. However, the WwTP is meeting the discharge requirements specified in its WWDL.

Figure 2-39: Minane Bridge WwTP Location

Table 2-84: Minane Bridge WwTP Details

Organic Design PE	Storm Management	Preliminary Treatment	Primary Treatment	Secondary Treatment	Tertiary Treatment	Chemical P Removal	Sludge Treatment	Installation Date
250	Storage	n/a	PST	ASP	Reed Bed	n/a	n/a	2009

Table 2-85: Current and Projected Organic (PE) and Hydraulic Loading to Minane Bridge WwTP

Parameter	Existing Capacity	Current (2024) Loading	2030	2055	2080
Organic Loading (PE)	250	98	426	511	577

Parameter	Existing Capacity	Current (2024) Loading	2030	2055	2080
Peak Hydraulic Loading (m^3/d)	-	-	245	294	332

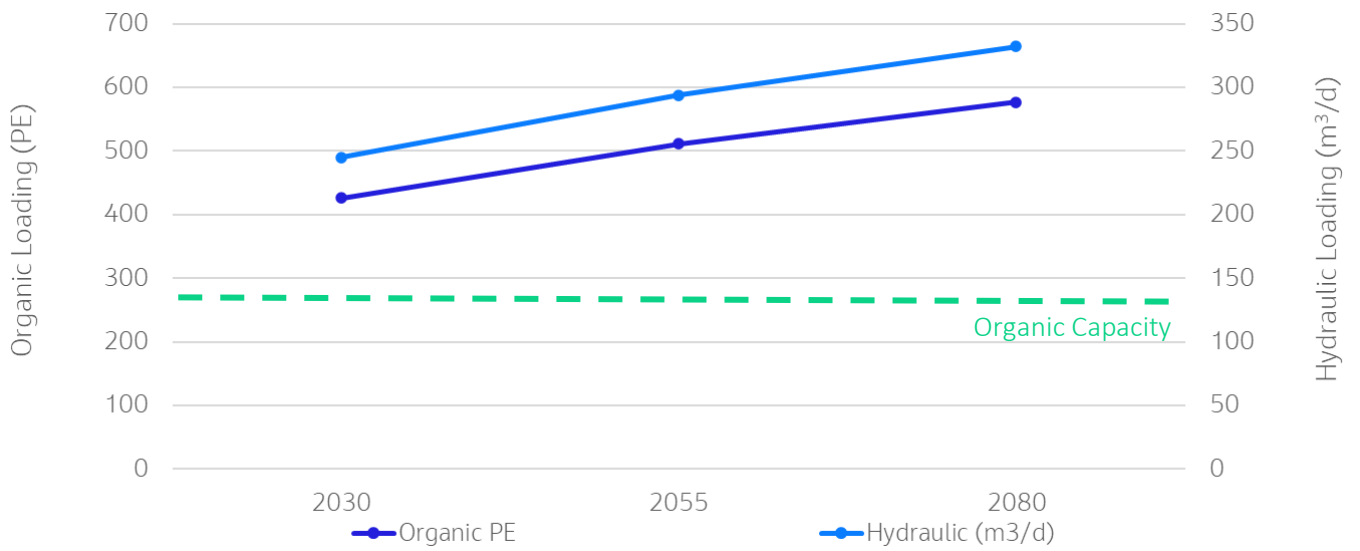


Figure 2-40: Current and Projected Loadings at Minane Bridge

Current and Projected Discharge Limits

Following water quality modelling conducted at the existing WwTP discharge point, environmentally sustainable discharge limits based on compliance with the appropriate WFD EQS have been determined based on projected PE loading to the WwTP across the current and future Strategy horizons. The environmentally sustainable discharge limits for these scenarios have been summarised in Table 2-86.

Table 2-86: Existing WWDL ELVs and Environmentally Sustainable Discharge Limits at Minane Bridge WwTP

Parameter	Existing ELVs	2030 Environmentally Sustainable Discharge Limits	2055 Environmentally Sustainable Discharge Limits	2080 Environmentally Sustainable Discharge Limits
BOD	25	25	25	25
TN	15	15	15	15
TP	2.5	2.5	2.5	2.5
More Stringent?	-	N	N	N

Summary of Observed Constraints

As part of the delivery of this Strategy, advancement of the Optioneering Process assessed potential Network, Ecological, Environmental and Planning constraints that may impact the development of feasible approaches. Key findings pertinent to this catchment have been summarised below:

Network Constraints

A separate assessment of the existing wastewater network for this agglomeration, including maps and drawings illustrating the location of constraints has been undertaken as part of the Network Modelling Report which is included in Appendix 4.

The network assessment identified potential flooding and surcharging conditions under current and future scenarios within the main trunk sewer within the Minane Bridge catchment WW network. There is a Storm Water Overflow (SWO) present in the system which discharges directly to the Minane River, along with all treated effluent.

Environmental and Ecological Constraints

The discharge location is Minane (Cork)_010 (Minane River) with Good WFD Status (cycle 3 2016-2021) and classified as Under Review for Risk Status (2022). The WwTP is located adjacent to the Minane Bridge Marsh pNHA with the discharge outfall located within the pNHA site. The discharge is also approximately 3 km upstream the Cork Harbour SPA and approximately 5 km upstream of the nearest Bathing Water site (Fountainstown Blue Flag and Green Coast Beach). In the past five years there have been some odour complaints within 500 m from the plant.

Planning Constraints

Regarding planning, the assessment identified several factors that may influence future development at the site. While there are map-based objectives and partial zoning to the south of the site, this area may require pre-planning consultation to clarify development potential. Furthermore, portions of the southern area fall within Flood Zones A and B, which may require a Flood Risk Assessment (FRA) to support any proposed upgrade options within the existing site footprint.

Coarse Screening

The coarse screening was undertaken on the unconstrained list of options at Minane Bridge WwTP, which are shown in Table 1-1, as per the methodology outlined in Section 1.3. To provide context for the coarse screening results, which are outlined in Table 2-87, commentary on the coarse screening exercise is provided below.

- Option A0 (Do Nothing) has not been considered as a feasible option for the 2080 horizon as the existing WwTP is projected to exceed capacity and is not achieving the discharge requirements as set in the WWDL.
- Option A1 (Do Minimum – Process Optimisation) has not been considered for the 2080 horizon due to the projected exceedance of both organic and hydraulic capacities of the WwTP, coupled with the anticipated end-of-life status of existing assets.
- Option A2 (Reuse with Investment – Existing Discharge Location) has not been considered for the 2080 horizon as the existing assets will have exceeded their design life.
- Option A3 (Reuse with investment – New Discharge location) has not been considered for the 2080 horizon as the existing assets will have exceeded their design life.
- Option A4 (New Treatment Process on Current Site) has been considered viable for the 2080 horizon, as both the organic and hydraulic capacities are projected to be exceeded, and the remaining asset life will be insufficient, thus necessitating the need for a new treatment process on site. However, planning constraints at the existing site may pose as a risk to its implementation.
- Option A5 (New Greenfield Plant) has been considered viable for the 2080 horizon due to the potential planning constraints at the existing site.

- Option A6 (Wastewater Load Transfer to Cork Lower Harbour WwTP via Carrigaline TPS) is considered viable for the 2080 horizon, as both the organic treatment capacity and the remaining asset life are projected to be exceeded.

Table 2-87: Coarse Screening Output

Coarse Screening Results							
Long List of Options	A0	A1	A2	A3	A4	A5	A6
2080	N	N	N	N	N	Y	Y
2055	N	N	Y	Y	N	N	Y
2030	N	N	Y	N	N	N	Y

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening

Any options for the strategy horizon years of 2030 and 2055 should facilitate implementation of the longer term 2080 preferred solution and should not compromise the ability to implement this. Further option defining is undertaken in order to undertake the MCA fairly and adequately. Additionally, the existing site is located within flood zones and an area of the site is partial zoned. These considerations have ultimately screened out Option A4 as a potential solution and was therefore not advanced to fine screening.

At this stage of assessment, specific site locations have not been identified and typical project stage site selection assessments have not been undertaken. Potential proximity areas for potential greenfield site locations have been identified and planning and environmental assessments have been undertaken to facilitate the MCA process. Similarly, transfer routes were selected based on conservative routing assumptions and it is important to note that a full route selection process was not undertaken. Routes ensure minimal impact on the public and the environment and reduce delivery risk associated with land acquisition and planning requirements. Cork Lower Harbour WwTP was identified as a potential wastewater transfer receiver for Minane Bridge noting that other WwTPs within the proximity have ongoing capacity or performance issues.

The options progressed to fine screening are outlined in .

Table 2-88: 2080 Options Advancing to Fine Screening

Options Progressed to Fine Screening for 2080	Description
A5	New Greenfield Plant with Existing Discharge
A6	Wastewater Load Transfer to Cork Lower Harbour WwTP via Carrigaline

Fine Screening

The options presented in Table 2-88 underwent fine screening in the form of an MCA as detailed in Section 1.4. The scoring and results of the MCA are presented in Table 2-89.

Table 2-89: MCA Results for Minane Bridge WwTP

Objectives	Criteria	Option A5	Option A6
Addressing the Need	Treatment Capacity	3	3
	Network Capacity	3	3

	Final Effluent Compliance	3	3
Deliverability	Design Complexity, Ease of Implementation & Feasibility	-2	1
	Planning & Regulation	-1	2
	Delivery Timeline & Alignment	-2	2
Risk & Resilience	Flexibility & Scalability	-1	-1
	Delivery Risk	-2	-1
Customer and Stakeholder Support	Impact on Customers	2	3
	Community Support, Health and Wellbeing	3	3
Environmental & Sustainability	Water Environment	1	3
	Waterbody Impact (Existing and New)	1	3
	Waterbody Flood Risk	0	0
	Biodiversity	-2	2
	AA-Natura 2000 Sites	0	0
	Aquatic Biodiversity	2	2
	Terrestrial Biodiversity (BNG)	-2	0
	GHG Emissions	-0.5	0.5
	Embodied Carbon	-3	-2
	Operational Carbon	2	3
	Energy Efficiency	2	3
	Climate Resilience	2	3
	Circular Economy	-1	1
Weighted Average Sub Total		**0.5**	**1.94**
Cost	CAPEX	4	4
	OPEX	6	6
	Whole Life Cost	4	5
Combined Score		**2.50**	**4.09**
Rank		**2nd**	**1st**

The MCA has identified Option A6 as the highest-ranking option against the fine screening criteria for the 2080 strategy horizon and offers a more cost-effective implementation and better alignment with the goals of the CWS and UÉ compared to Option A5.

Wastewater Treatment Summary

The optioneering process for Minane Bridge WwTP has yielded recommendations for future development:

The highest ranked option ultimately involves transferring wastewater to Cork Lower Harbour WwTP via Carrigaline Pumping Station (Option A6). This approach addresses receiving waterbody quality concerns and improves overall treatment efficiency whilst simultaneously protecting the environment and ecological boundaries. This strategy ensures long-term sustainability by leveraging existing treatment facilities at Cork Lower Harbour WwTP and protecting inland rivers sensitive to climate change.

This option effectively addresses several key challenges identified at Minane Bridge WwTP, including the site boundary constraints limiting expansion possibilities, the projected exceedance of organic loading capacity in the 2030 horizon and the existing assets nearing end of asset life in the 2080 horizon.

Wastewater Network Upgrade Summary

A separate assessment of network upgrades for this agglomeration has been undertaken as part of the Network Modelling Report which is included in Appendix 4. Below is a brief overview of the proposed

upgrades within the Minane Bridge agglomeration, addressing SWO compliance and future development constraints such as surcharge and flooding due to development impacts. Unless otherwise stated specifically, these proposed upgrades are proposed to be initiated in the 2030 strategy horizon. The development process of these proposed upgrades, as well as maps and drawings illustrating the location of the required upgrades are provided in more detail in the Network Modelling Report in Appendix 4.

New storage at Minane Bridge WwPS: A storage facility has been proposed at the Minane Bridge treatment site. This plan also includes the installation of a c. 8.8km new rising main, which will pump forward flow to the Cork Lower harbour catchment and decommission the treatment plant in the 2030 horizon.

Network Upgrade Across Catchment: An upgrade of c. 36m of the existing sewer system is proposed to increase the network's capacity.

New storage at T-01 Development WwPS: Storage has been proposed at development site with a new rising main connecting to the network.

New storage at ME-RD Development WwPS: Storage has been proposed at development site with a new rising main connecting to the network.

2.7.4 Feasible Approaches for Ballygarvan, Halfway, and Minane Bridge

The results of the fine screening process and MCA were assessed and taken forward to develop 3 No. Feasible Approaches for the sub catchment. These approaches comprise combinations of options for each agglomeration, carefully selected to best achieve the goals of the CWS. The wastewater network upgrade proposals for each catchment mentioned above are common amongst Feasible Approaches detailed below

Our approach ensures that the selected strategies are not only technically viable but also align with the long-term vision for wastewater management in the region.

These Approaches are summarised in Table 2-90 overleaf.

Feasible Approach 1 presents an integrated approach for managing wastewater in Ballygarvan, Halfway and River Valley through the 2080 strategy horizon, combining the highest-ranking MCA options for each site.

- **Ballygarvan:** For Ballygarvan, it is proposed initiate the decommission of the existing WwTP in the 2030 horizon and construct a new wastewater transfer pumping station. The new Ballygarvan Pumping Station will be capable of transferring 1,750 PE, designed to handle wastewater flows projected for 2055 and 2080 strategy horizons and any future transferred flows, pumping wastewater to Cork Lower Harbour WwTP for treatment via Carrigaline pumping station. It is proposed to construct an associated 5.4km rising main and to continuously operate this pumping station through the 2055 and 2080 strategy horizons.
- **Halfway:** Halfway WwTP has sufficient capacity to treat the 2030 and 2055 horizon projected loads, however in order to ensure compliance with its ELVs it is proposed to initiate the optimisation of the ferric sulphate regime of the WwTP to achieve this in the 2030 horizon. The WwTP will have reached the end of its asset life in the 2080 horizon, therefore it is proposed to initiate the decommission of the WwTP and construct a new pumping station at the site which will pump wastewater to Cork Lower Harbour WwTP via Ballygarvan. The new Halfway Pumping Station will be capable of transferring 500 PE, equivalent to projected flows for 2080 horizon, to Ballygarvan via a newly constructed 8.4km rising main.
- **Minane Bridge:** For Minane Bridge, it is proposed to initiate decommissioning of the existing WwTP in the 2030 horizon and construct a new wastewater transfer pumping station on the site. The new

Minane Bridge Pumping Station will be capable of transferring 600 PE, designed to handle wastewater flows projected for 2055 and 2080 horizons, pumping wastewater to Cork Lower Harbour WwTP via Carrigaline pumping station. It is proposed to initiate the construction an associated 5km rising main. It is proposed to continuously operate this pumping station through the 2055 and 2080 strategy horizons.

The implementation of **Feasible Approach 1** necessitates an upgrade to Cork Lower Harbour WwTP, increasing its capacity in the 2030 and 2080 horizons to manage the additional inflows from these agglomerations. This capacity expansion has been factored into the evaluation and assessment of Cork Lower Harbour WwTP

Feasible Approach 2 explores alternative high-scoring options from the MCA, proposing a phased approach to address the wastewater management needs of the agglomeration through 2080.

- **Ballygarvan:** It is proposed to initiate the upgrade of the existing Ballygarvan WwTP by an additional 500 PE in the 2030 horizon to address the capacity issues the plant is experiencing. The WwTP upgrade will be sufficient to cater for projected 2055 flows loads also. In 2080 horizon, the asset life of the WwTP will have expired and therefore a capital replacement of 634 PE is proposed to be initiated for for the 2080 horizon in conjunction with a further 750 PE upgrade to meet the projected demand.
- **Halfway:** The proposal for Halfway WwTP is in line with Feasible Approach 1, optimising the existing WwTP in the 2030 horizon to meet ELVs and to continue operation of the WwTP until it is to be decommissioned, and wastewater transferred to Ballygarvan to be initiated in the 2080 horizon.
- **Minane Bridge:** In the 2030 strategy horizon it is proposed to initiate the upgrade of the existing Minane Bridge WwTP by an additional 300 PE, which will ensure treatment up to projected 2080 loads. The WwTP is proposed to continue to be in operation throughout to 2080 horizon, when a capital replacement of 300 PE is proposed for the plant.

Feasible Approach 3 investigates further options that have passed the fine screening process.

- **Ballygarvan:** The proposed approach for Ballygarvan is consistent with Feasible Approach 1, decommissioning the WwTP and transferring wastewater to Cork Lower Harbour WwTP via Carrigaline PS.
- **Halfway WwTP:** For Halfway WwTP, it is proposed to initiate to optimise the process at the existing WwTP by improving the ferric sulphate dosing to achieve the projected environmentally sustainable discharge limits for the 2030 and 2055 horizons. It is proposed that the WwTP will undergo a capital replacement of 500 PE and upgrade works of an additional 500 PE to be initiated in the 2080 horizon due to loading projections exceeding its organic capacity and the existing asset life.
- **Minane Bridge:** The proposal for Minane Bridge WwTP is consistent with Feasible Approach 1, the decommissioning of the WwTP in the 2030 horizon and the transfer of wastewater to Cork Lower Harbour WwTP via Carrigaline PS. It is proposed to continue this operation through to 2080 horizon.

Table 2-90: Feasible Approaches for Ballygarvan, Halfway, and Minane Bridge (River Valley)

Strategy Horizon	Catchment	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
2030	Ballygarvan WwTP	• Construct a new Wastewater Transfer Pumping Station (WwPS) • Construct wastewater transfer pipe to Cork Lower Harbour WwTP via existing Carrigaline PS • Decommission existing WwTP.	• 500 PE upgrade of existing WwTP	• Construct a new Wastewater Transfer Pumping Station (WwPS) • Construct wastewater transfer pipe to Cork Lower Harbour WwTP via existing Carrigaline PS • Decommission existing WwTP.
	Halfway WwTP	• Optimise WwTP to bring to compliance with current ELVs	• Optimise WwTP to bring to compliance with current ELVs	• Optimise WwTP to bring to compliance with current ELVs
	Minane Bridge WwTP	• Construct a new Wastewater Transfer Pumping Station (WwPS) • Construct wastewater transfer pipe to Cork Lower Harbour WwTP via existing Carrigaline PS • Decommission existing WwTP.	• 300PE upgrade of existing WwTP	• Construct a new Wastewater Transfer Pumping Station (WwPS) • Construct wastewater transfer pipe to Cork Lower Harbour WwTP via existing Carrigaline PS • Decommission existing WwTP.
2055	Ballygarvan WwTP	• Continue to operate WwPS	• Continue to operate WwPS	• Continue to operate WwPS
	Halfway WwTP	• Continue to operate WwTP	• Continue to operate WwTP	• Continue to operate WwTP
	Minane Bridge WwTP	• Continue to operate WwPS	• Continue to operate WwTP	• Continue to operate WwPS
2080	Ballygarvan WwTP	• Continue to operate WwPS	• 750PE upgrade of existing WwTP. • 634PE WwTP capital replacement	• Continue to operate WwPS

Strategy Horizon	Catchment	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
	Halfway WwTP	• Construct a new Wastewater Transfer Pumping Station (WwPS) • Construct wastewater transfer pipe to Cork Lower Harbour WwTP via Ballygarvan WwPS • Decommission WwTP.	• Construct a new Wastewater Transfer Pumping Station (WwPS) • Construct wastewater transfer pipe to Cork Lower Harbour WwTP via Ballygarvan WwPS • Decommission WwTP.	• 500PE upgrade of existing WwTP. • 500PE WwTP capital replacement
	Minane Bridge WwTP	• Continue to operate WwPS	• 300PE WwTP capital replacement	• Continue to operate WwPS

2.7.5 Recommended Approach and Implementation Strategy for Ballygarvan, Halfway, and Minane Bridge

Based on the analysis conducted above, **Feasible Approach 1** is recommended for implementation and further development as an integral component of the CWS. This recommendation stems from the approach's superior performance across the assessed criteria and its alignment with the broader CWS objectives, making it the most suitable and sustainable solution for addressing the sub-catchment's wastewater management needs.

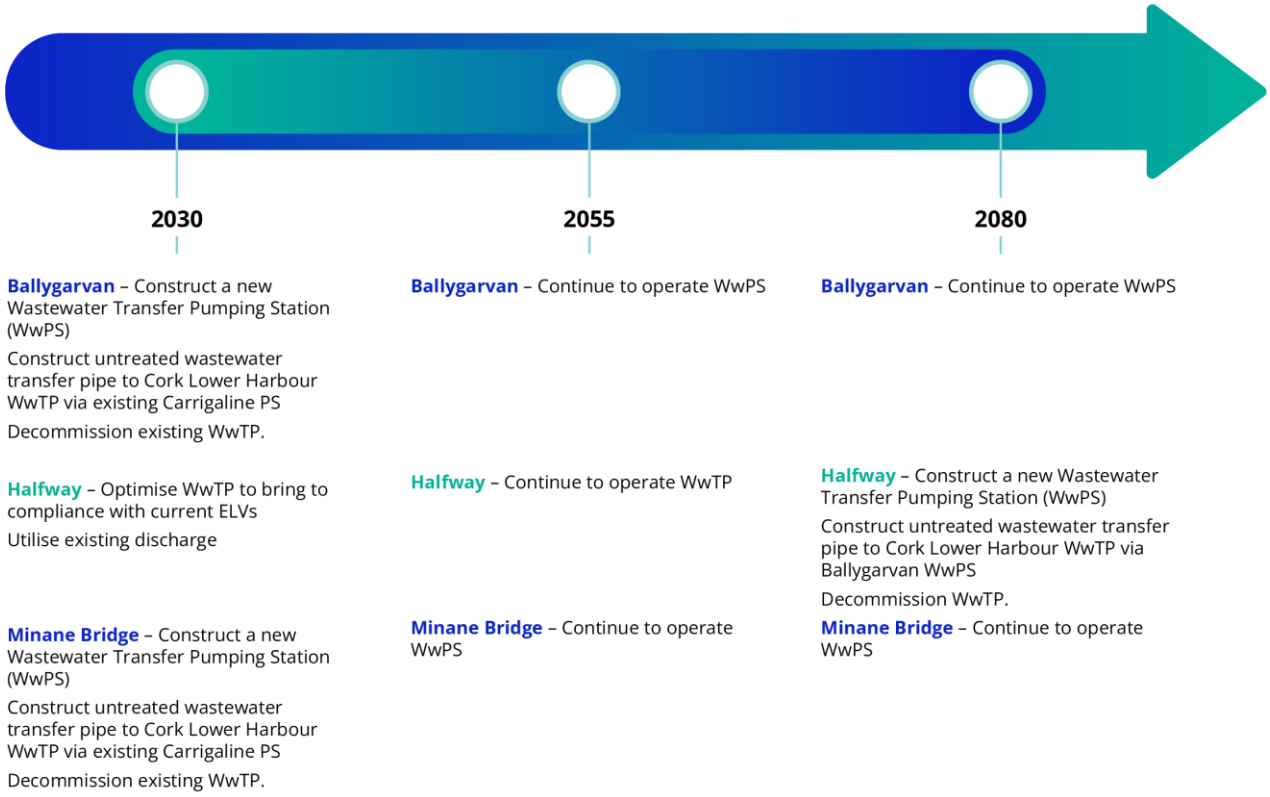


Figure 2-41: Proposed Implementation Strategy for Ballygarvan, Halfway, and Minane Bridge

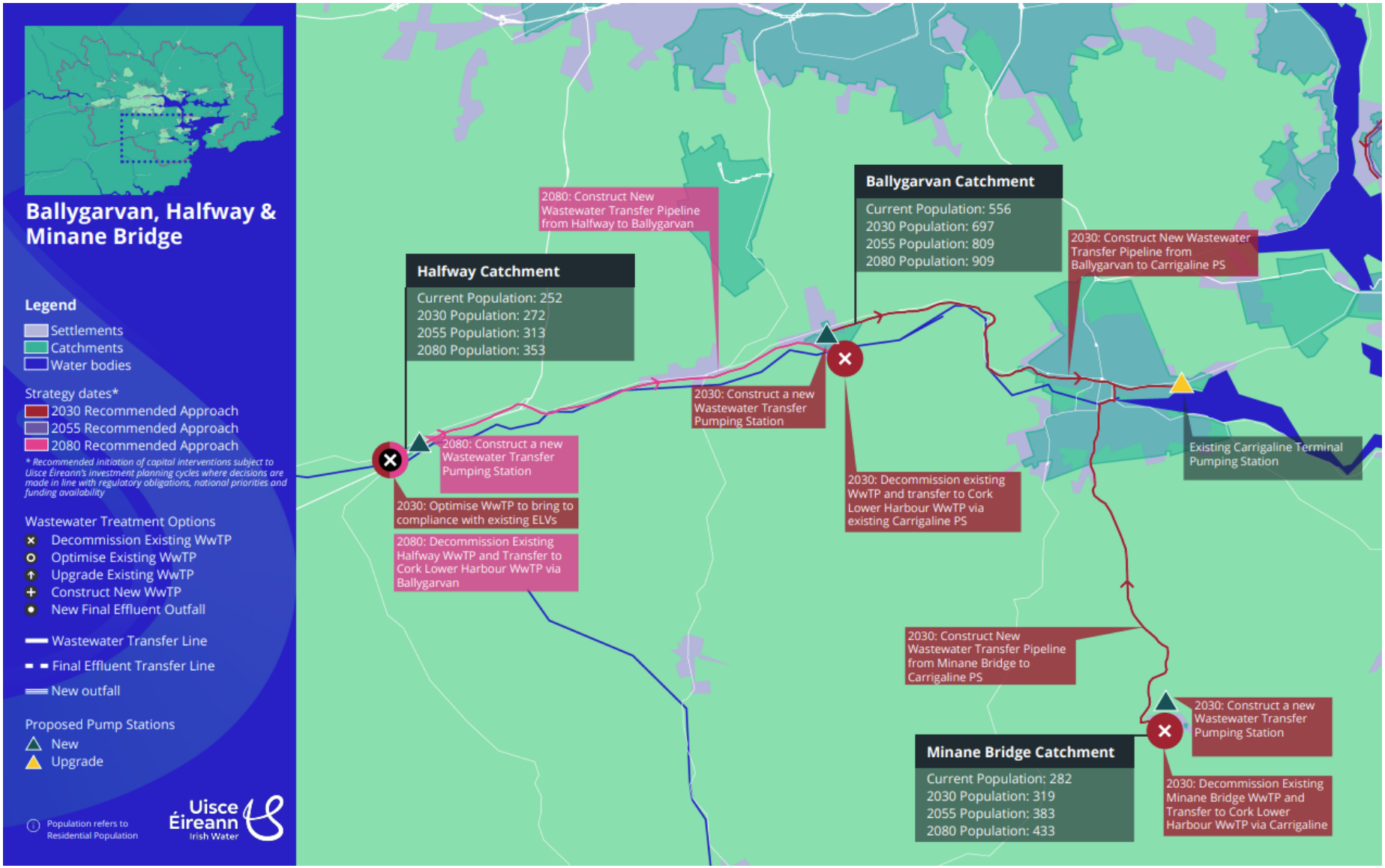


Figure 2-42: Recommended Approach for Ballygarvan, Halfway, and Minane Bridge

2.8 Ballincollig and Killumney

2.8.1 Ballincollig

Introduction

Ballincollig WwTP is located in Ballincollig, approximately 8.5km west of Cork city and caters for the wastewater from the suburb of Ballincollig and its environs in County Cork. Ballincollig WwTP is currently operated by Cork County Council on behalf of UÉ.

The WwTP has a design capacity of 33,000 PE. It receives septic sludge from other Council-operated sites, including Ovens and Killumney, which is discharged with the raw influent. The original plant consisted of primary sedimentation tanks and percolating filters. It was later upgraded in 1982 to include an oxidation ditch and two final settlement tank (FST) clarifiers. Additional improvements were made in 2013-14, including the addition of storm tanks, screening and compaction equipment, a Dissolved Air Flotation (DAF) unit for grease removal, and four new aeration blowers. The facility also has on-site sludge treatment capabilities, consisting of a picket fence thickener and a centrifuge for sludge thickening and dewatering. After treatment, the processed wastewater is discharged into the River Lee.

The existing wastewater treatment process is failing to achieve the discharge requirements specified within its WWDL.

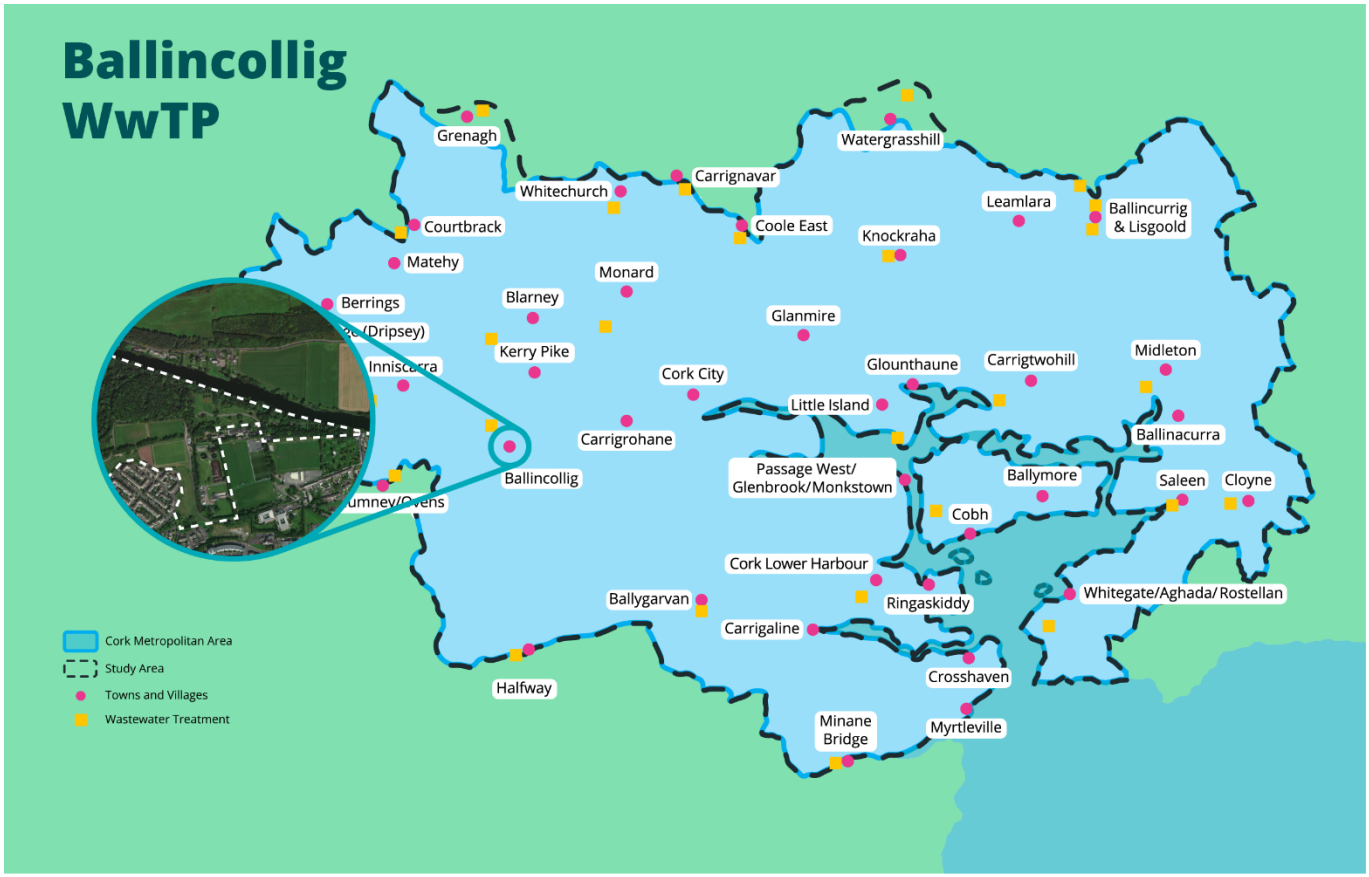


Figure 2-43: Ballincollig Location

Table 2-91: Ballincollig WwTP Details

Organic Design PE	Storm Management	Preliminary Treatment	Primary Treatment	Secondary Treatment	Tertiary Treatment	Chemical P Removal	Sludge Treatment	Installation Date
33,000	Storage Tanks	Inlet Screens, Grit Removal	n/a	ASP – Oxidation Ditch	n/a	Ferric Dosing	Thickening & Dewatering	1982

Table 2-92: Current and Projected Organic (PE) and Hydraulic Loading to Ballincollig WwTP

Parameter	Existing Capacity	Current (2024) Loading	2030	2055	2080
Organic Loading (PE)	33,000	25,105	37,755	59,486	67,214
Peak Hydraulic Loading (m^3/d)	22,275	16,580	23,953	38,622	43,838

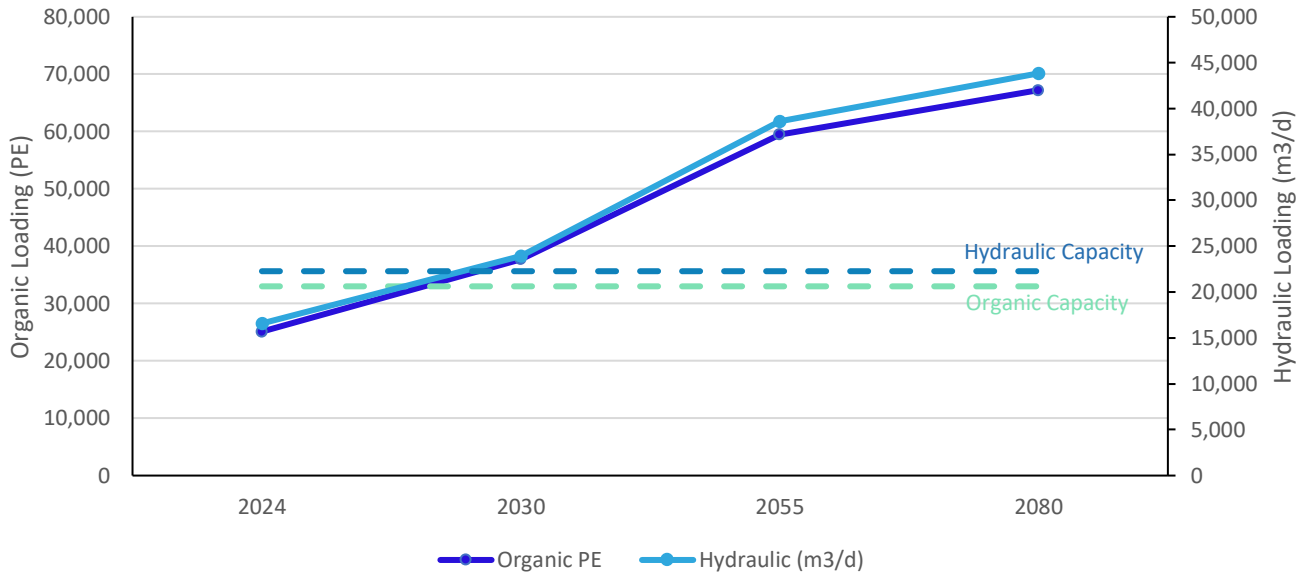


Figure 2-44: Current and Projected Loadings at Ballincollig WwTP

Current and Projected Discharge Limits

Following water quality modelling conducted at the existing WwTP discharge point, environmentally sustainable discharge limits based on compliance with the appropriate WFD EQS have been determined based on projected PE loading to the WwTP across the current and future Strategy horizons. The environmentally sustainable discharge limits for these scenarios have been summarised in Table 2-93.

Table 2-93: Existing WWDL ELVs and Environmentally Sustainable Discharge Limits Ballincollig WwTP

Parameter	Existing ELVs	2030 Environmentally Sustainable Discharge Limits	2055 Environmentally Sustainable Discharge Limits	2080 Environmentally Sustainable Discharge Limits
BOD	25 mg/l	20	13	12
Ammonia	5 mg/l	1.1	0.7	0.7
OrthoP	2 mg/l	0.6	0.4	0.4
More Stringent?	-	Y	Y	Y

As shown in Table 2-93, the environmentally sustainable discharge limits for the future horizons are considerably more stringent than the current WWDL requirements which would necessitate additional wastewater treatment processes for the continuation of discharging treated effluent at the current location.

Summary of Observed Constraints

As part of the delivery of this Strategy, advancement of the Optioneering Process assessed potential Network, Ecological, Environmental and Planning constraints that may impact the development of feasible approaches. Key findings pertinent to this catchment have been summarised below:

Network Constraints

A separate assessment of the existing wastewater network for this agglomeration, including maps and drawings illustrating the location of constraints has been undertaken as part of the Network Modelling Report which is included in Appendix 4.

The network assessment has identified that the current Ballincollig network is experiencing surcharging and flooding issues, which are projected to increase in future scenarios. While all SWOs are currently compliant, the model predicts that between one and two SWOs may become non-compliant in the future.

Environmental and Ecological Constraints

The discharge location waterbody is Lee (Cork)_090 (River Lee) with Good WFD Status (cycle 3 2016-2021) and classified as At Risk (2022). No European designated sites in proximity or with direct pathways to the current WwTP and the discharge outfall is more than 10 km away from the nearest SPA/SACs. Lee Valley pNHA (includes sections of valley of the River Lee) is located 1 km downstream from the discharge. Cork City Water Supply freshwater abstraction (Abstract River Lee) is located 7 km downstream from discharge location. In the past five years there have been some odour complaints within 500 m distance from the plant.

Planning Constraints

Regarding planning, the assessment has identified limited space for expansion of the WwTP. There is limited space available on site for expansion. Furthermore, the site is constrained by recreational uses adjacent to the east and west, a proposed walkway/cycleway to the north, and also a protected structure to the north. These factors may present challenges for any necessary improvements or expansions to the facility.

Coarse Screening

The coarse screening was undertaken on the unconstrained list of options at Ballincollig WwTP, which are shown in Table 1-1, as per the methodology outlined in Section 1.3. To provide context for the coarse screening results, which are outlined in Table 2-94, commentary on the coarse screening exercise is provided below.

- Option A0 (Do Nothing) has not been considered as a feasible option for the 2080 horizon as the existing WwTP is currently over capacity and is not achieving the discharge requirements as set in the WWDL.
- Option A1 (Do Minimum – Process Optimisation) has been deemed unfeasible for the 2080 horizon due to the projected exceedance of both organic and hydraulic capacities of the WwTP, coupled with the anticipated end-of-life status of existing assets.
- Option A2 (Reuse with Investment – Existing Discharge Location) has been screened out for the 2080 horizon as the existing assets will have exceeded their design life.
- Option A3 (Reuse with Investment – New Discharge Location) has been screened out for the 2080 horizon as the existing assets will have exceeded their design life.
- Option A4 (New Treatment Process on Existing Site with Existing Discharge Location) was considered viable for the 2080 timeframe but there are concerns regarding the existing site limitations for potential expansion.
- Option A5 (New Greenfield Plant with Existing Discharge Location) has been considered viable for the 2080 horizon. A complete site selection for a new WwTP location would need to be undertaken, and the rUWWTD would require tertiary and quaternary treatment upgrades.
- Option A6 (Wastewater Load Transfer to another WwTP) would be feasible for two transfers, either to Carrigrennan WwTP via Cork City or to Cork Lower Harbour WwTP via S.O.S. The Cork City network capacity is likely to be insufficient to be able to receive additional load, therefore the transfer to Cork Lower Harbour WwTP would feasible.

Table 2-94: Coarse Screening Output of Ballincollig

Coarse Screening Results							
Long List of Options	**A0**	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**
2080	**N**	**N**	**N**	**N**	**Y**	**Y (with Existing Discharge)**	**N**
2055	**N**	**Y**	**N**	**N**	**Y (with Existing Discharge)**	**Y (with Existing Discharge)**	**Y**
2030	**N**	**Y**	**Y**	**Y**	**N**	**N**	**Y**

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening

Any options for the strategy horizon years of 2030 and 2055 should facilitate implementation of the longer term 2080 preferred solution and should not compromise the ability to implement this. Further option defining is undertaken in order to undertake the MCA fairly and adequately. Option A6 transfer of wastewater to Cork Lower Harbour was not advanced to fine screening as the transfer would the transfer of over 70,000PE of wastewater presenting operational issues and risk of septicity. This option would also require the treatment of Ballincollig and Cork Lower Harbour loads to a minimum of quaternary treatment (under the recast UWWTD) and trigger the requirement for an additional marine outfall at Cork Lower Harbour thus increasing delivery risk and timeliness. Option A4 was not identified as a feasible option within the coarse screening stage due to proximity to local residents and public amenities. The existing site has space constraints for construction. However, it was advanced to fine screening to validate the selection of Option A5 as the optimal solution. Option A4 included for the transfer of final effluent to Cork Lower Harbour which

would also require quaternary treatment and additional outfall capacity thus demonstrating the complexity and external constraints associated with Ballincollig optioneering process.

Option A5 includes for the relocation of the existing WwTP to the opposite side of the River Lee to provide sufficient area for project treatment demands. Treated effluent would be discharged to the same reach of river as current operation.

Table 2-95: 2080 Options Advancing to Fine Screening

Options Progressed to Fine Screening for 2080	Description
A4	New Treatment Process on Existing Site with Existing Discharge Location
A5	New Greenfield Plant with Existing Discharge

Fine Screening

The options presented in Table 2-95 underwent fine screening in the form of an MCA as detailed in Section 1.4. The scoring and results of the MCA are presented in Table 2-96.

Table 2-96: MCA Results for Ballincollig WwTP

Objectives	Criteria	Option A4	Option A5
Addressing the Need	Treatment Capacity	3	3
	Network Capacity	1	2
	Final Effluent Compliance	3	3
Deliverability	Design Complexity, Ease of Implementation & Feasibility	-2	-1
	Planning & Regulation	-2	-1
	Delivery Timeline & Alignment	-1	-2
Risk & Resilience	Flexibility & Scalability	-2	2
	Delivery Risk	-3	-1
Customer and Stakeholder Support	Impact on Customers	-2	1
	Community Support, Health and Wellbeing	0	-1
Environmental & Sustainability	Water Environment	2	1
	Waterbody Impact (Existing and New)	3	2
	Waterbody Flood Risk	0	0
	Biodiversity	1	0
	AA-Natura 2000 Sites	0	0
	Aquatic Biodiversity	2	0
	Terrestrial Biodiversity (BNG)	0	-1
	GHG Emissions	-1	-1
	Embodied Carbon	-3	-1
	Operational Carbon	1	-1
	Energy Efficiency	2	1
	Climate Resilience	3	1
	Circular Economy	1	-1
Weighted Average Sub Total		**0.23**	**0.44**
Cost	CAPEX	3	3
	OPEX	3	4
	Whole Life Cost	3	4
Combined Score		**1.51**	**2.01**
Rank		**2nd**	**1st**

The MCA has identified Option A5 (New Greenfield Plant with New Discharge at River Lee) as the highest-ranking option against the fine screening criteria for the 2080 strategy horizon and offers better alignment with the goals of the CWS and UÉ compared to Option A6 or Option A4.

Wastewater Treatment Summary

The optioneering process for Ballincollig WwTP has yielded recommendations for future development:

The preferred strategy involves construction of a new WwTP at a greenfield site to the north of the existing site on the north banks of the River Lee (Option A5). This approach addresses several key challenges identified at Ballincollig WwTP, including ensuring sufficient treatment to achieve its projected stringent environmentally sustainable discharge limits. This option also avoids potential planning challenges associated with the limited space for expansion at this site.

Wastewater Network Upgrade Summary

A separate assessment of network upgrades for this agglomeration has been undertaken as part of the Network Modelling Report which is included in Appendix 4. Below is a brief overview of the proposed upgrades within the Ballincollig agglomeration, addressing SWO compliance and future development constraints such as surcharge and flooding due to development impacts. Unless otherwise stated specifically, these proposed upgrades are proposed to be initiated in the 2030 strategy horizon. The development process of these proposed upgrades, as well as maps and drawings illustrating the location of the required upgrades are provided in more detail in the Network Modelling Report in Appendix 4.

Proposed Development Rising Main Route: It is proposed that flows will be pumped downstream to the gravity network avoiding Maglin PS to alleviate pressure on Maglin PS.

Storage at Maglin Pumping Station (PS): Additional storage to be provided at the Maglin PS.

Network upgrade to mitigate flooding: Approximately 1.3km of existing sewer system to be upsized to provide additional network capacity.

Network Infiltration Reduction: Proposed 50% reduction in network infiltration, equivalent to c. 10 hectares within the upstream network to provide additional capacity.

Additional Storage at Harrington Street: To mitigate flooding caused by existing hydraulic constraints and proposed new developments, additional storage to be provided in the public car park near Harrington Street.

WwTP Storm Tank Enhancement: Additional storm storage to be provided at the WwTP.

2.8.2 Killumney

Introduction

Killumney WwTP is located at in the centre of the Killumney village adjacent to the river Bride and approximately 5.8 km southwest of Ballincollig. The WwTP was commissioned in 1999 and Cork County Council operate and maintain the WwTP on behalf of UÉ.

The current WwTP infrastructure includes a control building, foul sump, valve chamber, above ground process treatment tank, final effluent sampler and outfall pipe. The treatment processes currently in operation in Killumney WwTP are aeration and settlement. Within Killumney village there is a private WwTP (Grange Manor). Grange Manor WwTP was built to serve 275 houses of the Grange Manor Estate.

There is an ongoing project involving the decommissioning of Killumney WwTP and connecting the flows from Killumney WwTP and Grange Manor WwTP to be transferred via a rising main for treatment at Ballincollig

WwTP. As this project is currently advancing, it will form part of the approach of the CWS and no optioneering of the Killumney WwTP is required.

Figure 2-45: Killumney Location

Wastewater Network Upgrade Summary

A separate assessment of network upgrades for this agglomeration has been undertaken as part of the Network Modelling Report which is included in Appendix 4. Below is a brief overview of the proposed upgrades within the Killumney catchment, addressing SWO compliance and future development constraints such as surcharge and flooding due to development impacts. Unless otherwise stated specifically, these proposed upgrades are proposed to be initiated in the 2030 strategy horizon. The development process of these proposed upgrades, as well as maps and drawings illustrating the location of the required upgrades are provided in more detail in the Network Modelling Report in Appendix 4.

New storage at Killumney WwPS: A storage facility has been proposed at the Killumney treatment site. This plan also includes the installation of a c. 4.5km new rising main, which will pump forward flow to Ballincollig catchment and decommission the treatment plant in the 2030 horizon.

Network Upgrade Across Catchment: An upgrade of c. 3.5km of the existing sewer system is proposed to increase the network's capacity.

2.8.3 Feasible Approaches for Ballincollig and Killumney

The results of the fine screening process and MCA were assessed and taken forward to develop 2 No. Feasible Approaches for the sub catchment. These approaches comprise combinations of options for each agglomeration, carefully selected to best achieve the goals of the CWS. The wastewater network upgrade proposals for each catchment mentioned above are common amongst Feasible Approaches detailed below.

Our approach ensures that the selected strategies are not only technically viable but also align with the long-term vision for wastewater management in the region.

These Approaches are summarised in Table 2-97 below.

Feasible Approach 1 integrates the highest-ranking MCA options for Ballincollig and Killumney sites, proposing a comprehensive strategy for wastewater management through 2080 horizon.

- **Ballincollig:** Increased loadings to Ballincollig WwTP and limited available space for expansion on the current site necessitates the need for a new greenfield WwTP to be constructed. Several areas were assessed and evaluated for the location of the new WwTP and it was determined that the optimum location for the new WwTP is to the north of the existing WwTP on the northern side of the River Lee. Alternative discharge locations were assessed further downstream on the River Lee, however no preferable location was identified upstream of the Lee Road WTP intake location. Therefore, in order to achieve its ELV tertiary treatment will is proposed at the new WwTP. For the 2030 strategy horizon it is proposed to initiate the development of a new 64,000 PE tertiary WwTP utilising the existing discharge location. It is also proposed to initiate the construction of a transfer pipeline which transfers wastewater from the existing site to the proposed WwTP. When the new WwTP is operational, it is proposed that the existing WwTP is to be decommissioned. In the 2055 strategy horizon, a further 8,000 PE upgrade is proposed to be initiated at the WwTP which will be sufficient to cater for 2080 projections. In order to comply with the recast UWWTD, a new quaternary treatment is proposed for the full 72,000PE capacity and it proposed to be initiated in the 2055 strategy. The plant will continue to be operated as such for the 2080 strategy horizon.
- **Killumney:** There is an ongoing project to transfer wastewater to Ballincollig WwTP for treatment for the 2030 horizon. Upon completion, wastewater will continually be transferred to Ballincollig through to 2080 horizon.

Feasible Approach 2 explores alternative high-scoring options from the MCA, proposing a phased approach to address the wastewater management needs of the agglomeration through 2080 horizon.

- **Ballincollig:** In the 2030 horizon, projected loadings will exceed capacity at the WwTP, therefore it is proposed to initiate the upgrade of the existing WwTP by an additional 10,000PE. In the 2055 strategy horizon, a further 19,000PE upgrade at the WwTP is proposed to be initiated, and as the existing assets will have exceeded their asset life a capital replacement of 33,000PE is proposed. Due to space constraints at the existing site, it is not possible to provide quaternary treatment necessary to achieve the environmentally sustainable discharge limits to comply with ELVs at the existing discharge location. Therefore, it is proposed to construct a treated effluent transfer to Cork Lower Harbour WwTP for quaternary treatment. The transfer pipeline shall be 24km in length and requires an associated pumping station. For the 2080 strategy horizon it is proposed to continue operation of the WwTP and PS.
- **Killumney:** Similar to Feasible Approach 1, the proposal for Killumney is to continue the transfer of wastewater to Ballincollig following completion of the ongoing project.

Table 2-97: Feasible Approaches for Ballincollig and Killumney

Strategy Horizon	Catchment	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
2030	Ballincollig WwTP	• Construct a New Greenfield WwTP (including tertiary treatment) with design capacity of 64,000 PE north of Lee River. • Construct transfer pipeline from existing Ballincollig site to new site across the Lee River • Construct a new outfall discharge from new WWTP to Lee River	• 10,000PE upgrade of existing WwTP.	• No viable option
	Killumney WwTP	• Construct a new Wastewater Transfer Pumping Station (WwPS) • Construct a new wastewater transfer pipe from Killumney to Ballincollig WwTP • Decommission existing WwTP	• Construct a new Wastewater Transfer Pumping Station (WwPS) • Construct a new wastewater transfer pipe from Killumney to Ballincollig WwTP • Decommission existing WwTP	
2055	Ballincollig WwTP	• Decommission Existing WwTP when New Plant Constructed. • Upgrade WWTP to increase existing design capacity by 8,000 PE to a new design capacity of 72,000 PE • Construct a new 72,000 PE quaternary treatment plant at the new greenfield WwTP	• 19,000PE upgrade of existing WwTP. • 33,000PE WwTP capital replacement. • Construct FE transfer to Cork Lower Harbour WwTP (for quaternary treatment) and associated WwPS	

Strategy Horizon	Catchment	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
	Killumney WwTP	• Continue to operate WwPS	• Continue to operate WwPS	
2080	Ballincollig WwTP	• Continue to operate WwTP	• Continue to operate WwTP	
	Killumney WwTP	• Continue to operate WwPS	• Continue to operate WwPS	

2.8.4 Recommended Approach and Implementation Strategy for Ballincollig and Killumney

Based on the analysis conducted above, **Feasible Approach 1** is recommended for implementation and further development as an integral component of the CWS. This recommendation stems from the approach's superior performance across the assessed criteria and its alignment with the broader CWS objectives, making it the most suitable and sustainable solution for addressing the sub-catchment's wastewater management needs.

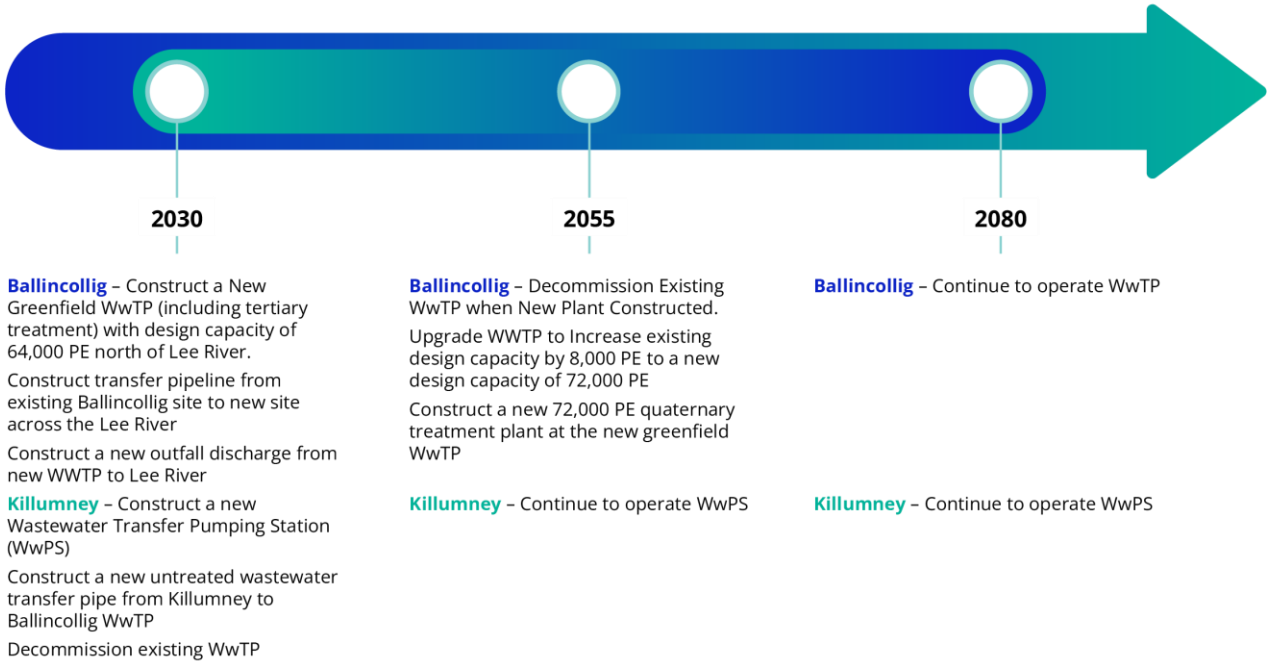


Figure 2-46: Proposed Implementation Strategy for Ballincollig and Killumney

Figure 2-47: Recommended Approach for Ballincollig and Killumney

2.9 Cork Lower Harbour

Introduction

Cork Lower Harbour WwTP is located approximately 12 km southeast of Cork city centre. The plant is operated and maintained by UÉ.

The WwTP has a design capacity of 65,000 PE and comprises of preliminary and secondary treatment. There is also sludge treatment on-site consisting of thickening, digestion, and dewatering. The catchment includes the Ringaskiddy, Crosshaven, and Carrigaline agglomerations, mostly comprising of domestic wastewater, consisting of residential and commercial flows, as well as part of the non-domestic and/or industrial flow. It is noted the catchment has several major industry discharge licences, including pharmaceutical waste. The treated effluent discharges to Lower Cork Harbour, via a 4.25km glass reinforced plastic outfall ranging in diameter from 450mm to 1500mm.

The existing wastewater treatment process is not achieving its discharge requirements specified within its WWDL.

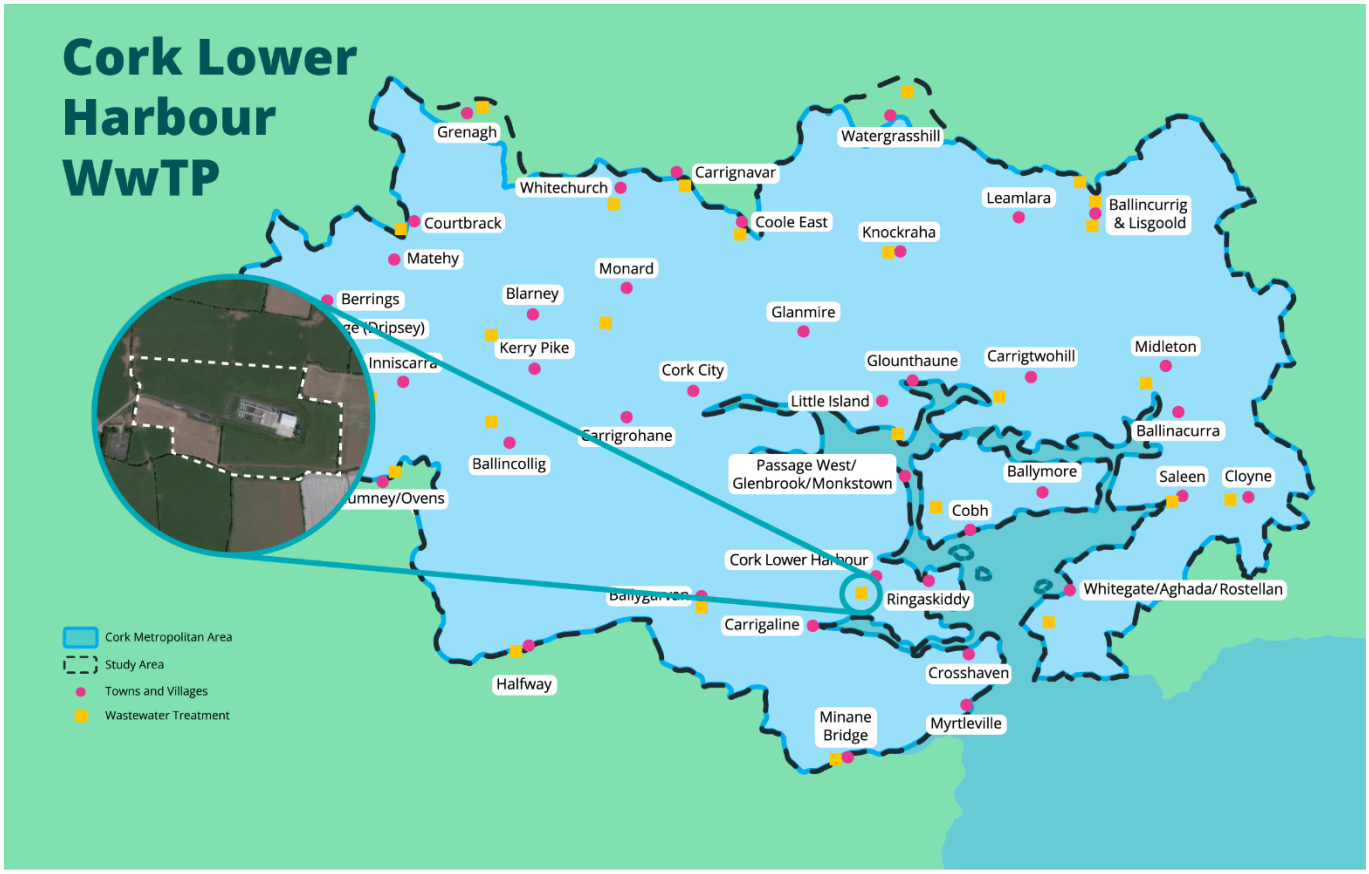


Figure 2-48: Cork Lower Harbour Location

Table 2-98: Cork Lower Harbour WwTP Details

Organic Design PE	Storm Management	Inlet Works	Primary Treatment	Secondary Treatment	Tertiary Treatment	Chemical P Removal	Sludge Treatment	Installation Date
65,000	Storage Tanks	Inlet Screens, Grit Removal	n/a	AGS	n/a	n/a	Dewatering	2017

Table 2-99: Current and Projected Organic (PE) and Hydraulic Loading to Cork Lower Harbour WwTP

Parameter	Existing Capacity	Current (2024) Loading	2030	2055	2080
Organic Loading (PE)	65,000	48,990	66,955	81,307	92,431
Peak Hydraulic Loading (m3/d)	43,875	16,696	57,808	67,495	75,004

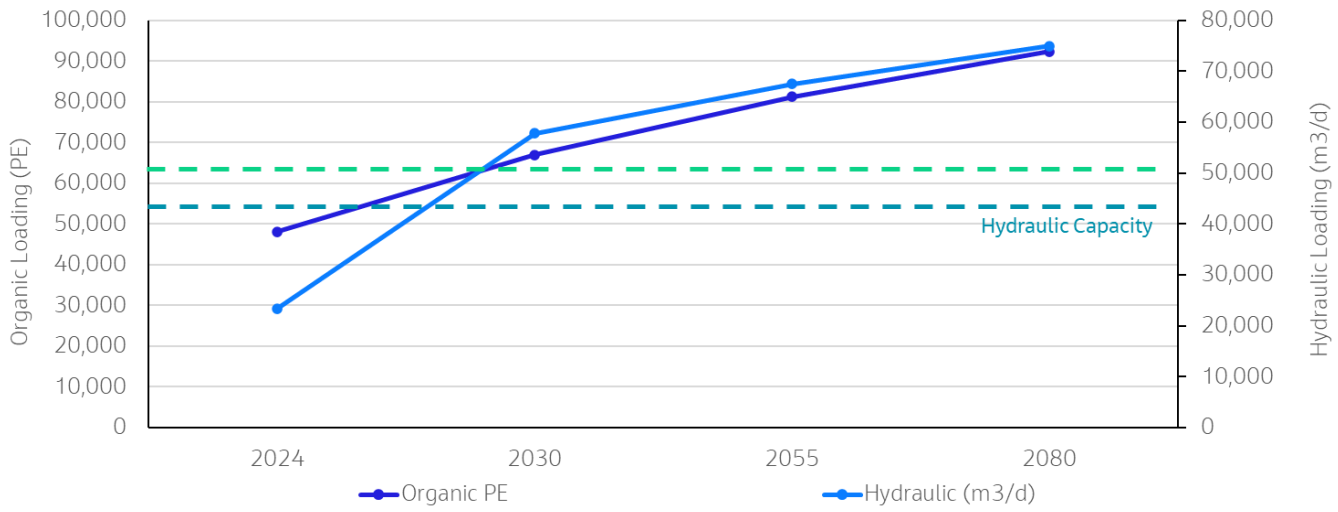


Figure 2-49: Current and Projected Loadings at Cork Lower Harbour WwTP

Current and Projected Discharge Limits

Following water quality modelling conducted at the existing WwTP discharge point, environmentally sustainable discharge limits based on compliance with the appropriate WFD EQS have been determined based on projected PE loading to the WwTP across the current and future Strategy horizons. The environmentally sustainable discharge limits for these scenarios have been summarised in Table 2-100.

Table 2-100: Existing WWDL ELVs and Environmentally Sustainable Discharge Limits at Cork Lower Harbour WwTP

Parameter	Existing ELVs	2030 Environmentally Sustainable Discharge Limits	2055 Environmentally Sustainable Discharge Limits	2080 Environmentally Sustainable Discharge Limits
BOD	245 mg/l	245 mg/l	245 mg/l	245 mg/l
DIN	95 mg/l	95 mg/l	95 mg/l	95 mg/l
TP	2 mg/l	2 mg/l	2 mg/l	2 mg/l
More Stringent?	-	N	N	N

It can be seen that the environmentally sustainable discharge limits for the future horizons are not more stringent than the current WWDL requirements which does not necessitate additional wastewater treatment processes for the continuation of discharging treated effluent at the current load at the current location.

Summary of Observed Constraints

As part of the delivery of this Strategy, advancement of the Optioneering Process assessed potential Network, Ecological, Environmental and Planning constraints that may impact the development of feasible approaches. Key findings pertinent to this catchment have been summarised below:

Network Constraints

A separate assessment of the existing wastewater network for this agglomeration, including maps and drawings illustrating the location of constraints has been undertaken as part of the Network Modelling Report which is included in Appendix 4.

The network assessment has identified that the majority of the Cork Lower Harbour network has capacity both now and in the future strategy horizon scenarios. The network in Cobh experiences the highest amount of flooding, both presently and in future scenarios. Some additional flooding and surcharging were recorded in future scenarios network modelling but the majority was in areas of new development. All SWOs are compliant at present, but 7 network SWOs will become non-compliant in the 2080 scenario.

Environmental and Ecological Constraints

The discharge location waterbody is Lee (Cork)_090 (River Lee) with Good WFD Status (cycle 3 2016-2021) and classified as At Risk (2022). No European designated sites are in proximity or with direct pathways to the current WwTP and the discharge outfall is more than 10 km away from nearest SPA/SAC. Lee Valley pNHA (includes sections of valley of the River Lee) is located 1 km downstream from the discharge. Cork City Water Supply freshwater abstraction (Abstract River Lee) is located approximately 7 km downstream from discharge outfall. In the past five years there have been some odour complaints within 500 m distance from the plant.

Planning Constraints

The planning assessment has noted no site boundary constraints or planning permission restrictions. The site is 24,600m^2 with UÉ land surrounding the site with an overall area of 110,000m^2. Therefore, there is considerable land available for upgrades. This absence of major planning obstacles suggests that any necessary upgrades or expansions to the facility would likely receive support from planning authorities. The availability of considerable adjacent land offers flexibility for future development, ensuring that the WwTP can adapt to changing needs and regulatory requirements without significant planning hurdles. Notably, Cork

Lower Harbour WwTP has been selected as the Sludge Hub Centre (SHC) for the Southern Region and is now awaiting further review and value engineering to determine the next steps in the design and build phase.

Coarse Screening

The coarse screening was undertaken on the unconstrained list of options at Cork Lower Harbour WwTP, which are shown in Table 1-1, as per the methodology outlined in Section 1.3. To provide context for the coarse screening results, which are outlined in Table 2-101, commentary on the coarse screening exercise is provided below.

- Option A1 (Do Minimum – Optimisation of Current Secondary Treatment System) has not been considered as a feasible option for the 2080 horizon as the WwTP would be over hydraulic and organic capacity.
- Option A2 (Reuse with Investment at Existing Discharge Location) has been deemed unfeasible for the 2080 horizon due to the projected exceedance of both organic and hydraulic capacities of the WwTP, coupled with the anticipated end-of-life status of existing assets.
- Option A3 (Reuse with Investment – New Discharge Location) has been screened out for the 2080 horizon as the existing assets will have exceeded their design life.
- Option A4 (New Treatment Process on Existing Site with Existing Discharge Location) has been considered viable for the 2080 horizon, as both the organic and hydraulic capacities are projected to be exceeded, and the remaining asset life will be insufficient, thus necessitating the need for a new treatment process on site.
- Option A5 (New Greenfield Plant with New Discharge Location) has been considered viable for the 2080 horizon. The relocation of the Cork Lower Harbour WwTP would potentially require a new outfall at a different location.
- Option A6 (Wastewater Load Transfer to another WwTP) was screened out at this stage as no alternative WwTP with sufficient treatment capacity could be identified.

Table 2-101: Coarse Screening Output at Cork Lower Harbour (short-listed options shown in red)

Coarse Screening Results							
Long List of Options	**A0**	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**
2080	N	N	N	N	Y	Y	N
2055	N	N	Y	N	N	N	N
2030	N	Y	Y	N	N	N	N

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening

Any options for the strategy horizon years of 2030 and 2055 should facilitate implementation of the longer term 2080 preferred solution and should not compromise the ability to implement this. Further option defining is undertaken in order to undertake the MCA fairly and adequately. Option A5 was identified as a feasible option within the coarse screening stage however planning and ecological assessments did not identify potential constraints associated with the upgrade of the existing site. However, the option was advanced to fine screening to validate the selection of Option A4 as the optimal solution.

Table 2-102: 2080 Options Advancing to Fine Screening

Options Progressed to Fine Screening for 2080	Description
A4	New Treatment Process on Existing Site with Existing Discharge Location
A5	New Greenfield Plant with New Discharge Location

Fine Screening

The options presented in Table 2-102 underwent fine screening in the form of an MCA as detailed in Section 1.4. The scoring and results of the MCA are presented in Table 2-103.

Table 2-103: MCA Results for Cork Lower Harbour WwTP

Objectives	Criteria	Option A4	Option A5
Addressing the Need	Treatment Capacity	3	3
	Network Capacity	3	3
	Final Effluent Compliance	3	3
Deliverability	Design Complexity, Ease of Implementation & Feasibility	-1	-2
	Planning & Regulation	0	-2
	Delivery Timeline & Alignment	3	-2
Risk & Resilience	Flexibility & Scalability	1	2
	Delivery Risk	1	-1
Customer and Stakeholder Support	Impact on Customers	1	2
	Community Support, Health and Wellbeing	2	2
Environmental & Sustainability	Water Environment	2	2
	Waterbody Impact (Existing and New)	2	2
	Waterbody Flood Risk	0	0
	Biodiversity	-1	-2
	AA-Natura 2000 Sites	0	0
	Aquatic Biodiversity	1	2
	Terrestrial Biodiversity (BNG)	-1	-2
	GHG Emissions	0	-0.5
	Embodied Carbon	-2	-3
	Operational Carbon	2	2
	Energy Efficiency	1	2
	Climate Resilience	0	2
	Circular Economy	-1	-2
Weighted Average Sub Total		**1.12**	**0.65**
Cost	CAPEX	3	3
	OPEX	4	4
	Whole Life Cost	4	3
Combined Score		**2.70**	**2.08**
Rank		**1st**	**2nd**

The MCA has identified Option A4 as the highest-ranking option against the fine screening criteria for the 2080 strategy horizon and offers a better alignment with the goals of the CWS and UÉ compared to Option A5.

Wastewater Treatment Summary

The optioneering process for Cork Lower Harbour WwTP has yielded recommendations for future development:

The highest ranked option for the 2080 horizon is to implement a new treatment process on the current site (Option A4). This strategy ensures long-term sustainability, leveraging the existing location while completely upgrading the treatment capabilities to meet projected needs and environmental standards

This strategy for Cork Lower Harbour WwTP is part of a broader, integrated approach for managing wastewater in the CMA. The proposals to transfer wastewater from other agglomerations (Ballygarvan, Halfway, Minane Bridge, North Cobh, Ballymore) to Cork Lower Harbour aligns with the larger wastewater management framework, taking advantage of Cork Lower Harbour's capacity.

Wastewater Network Upgrade Summary

A separate assessment of network upgrades for this agglomeration has been undertaken as part of the Network Modelling Report which is included in Appendix 4. Below is a brief overview of the proposed upgrades within the Cork Lower Harbour agglomeration, addressing SWO compliance and future development constraints such as surcharge and flooding due to development impacts. Unless otherwise stated specifically, these proposed upgrades are proposed to be initiated in the 2030 strategy horizon. The development process of these proposed upgrades, as well as maps and drawings illustrating the location of the required upgrades are provided in more detail in the Network Modelling Report in Appendix 4.

Pumps upsize at Church Road WwPS: The pass forward flow is proposed to be upsized.

Storage at Cork Road WwPS: Additional storage proposed to be added to the wet well chamber.

Storage at Town Parks (Attenuation Tank) WwPS: Additional storage added to the wet well chamber.

New storage at North Cobh WwPS: Additional storage has been proposed at North Cobh with c. 1.79km of new rising main and decommission existing North Cobh WwTP.

Network Infiltration Reduction: New Flap Values proposed at Dock Cottage WwPS and Old Town Hall WwPS overflows.

Network Upgrade Across Catchment: Approximately 2.3km and 1.9km of existing sewer system to be upsized to provide additional network capacity in 2055 and 2080 strategy horizon respectively.

Pumps upsize at Crosshaven 1 WwPS: The pass forward flow to be increased.

Pumps upsize at Crosshaven 2 WwPS (Car park): The pass forward flow to be increased.

2.9.1 Feasible Approaches for Cork Lower Harbour

The development of feasible approaches for addressing the wastewater needs of the sub-catchment involved an evaluation process. The results of the fine screening process and MCA were assessed and taken forward to develop 3 No. Feasible Approaches for the sub catchment. These approaches comprise various combinations of options for Cork Lower Harbour, carefully selected to best achieve the goals of the CWS.

The formulation of feasible approaches has incorporated the potential for wastewater imports from nearby WwTPs, contingent on the outcomes of Recommended Approach for individual sub-catchments. For example, the Recommended Approach for Sub Catchment 6 involves redirecting wastewater flows from Ballygarvan and Minane Bridge to Cork Lower Harbour. Consequently, this projected increase in flows has been factored

into the development of Feasible Approaches for Cork Lower Harbour's infrastructure planning within the same strategic timeframe.

All Feasible Approaches underwent thorough assessment and evaluation, taking into account both the specific needs of the sub-catchment and the broader requirements of the CMA. This systematic approach ensures that the selected strategies are not only technically viable but also align with the long-term vision for wastewater management in the region. The process has been designed to identify the most effective and sustainable solutions for managing wastewater infrastructure, considering environmental impact, cost-effectiveness, and future growth projections for the area.

These Approaches are summarised in Table 2-104 overleaf.

Feasible Approach 1 was developed based on the results of the MCA for Cork Lower Harbour and taking cognisance of the interactions between other WwTPs in the vicinity that extend beyond the scope of Cork Lower Harbour WwTP's individual development plan.

- **Cork Lower Harbour:** For the 2030 strategy horizon, it is proposed to initiate the upgrade of the capacity of the WwTP by an additional 5,000PE to accommodate additional flows from the catchment as well as accepting transferred flows from Ballygarvan and Minane Bridge, which is the Recommended Approach for Sub Catchment 6, as well as from Ballymore. It is also proposed to initiate the installation of tertiary treatment at the site to ensure satisfactory treatment and adherence to its ELVs. Due to ever increasing load projections in Cork Lower Harbour, Ballygarvan, Ballymore and Minane Bridge and accepting further flows from North Cobh, it is proposed to initiate a further capacity upgrade for the 2055 strategy horizon. This approach proposes a 15,000PE upgrade to accommodate the flows and maintain capacity. As population growth further increases into the 2080 strategy horizon, a further 13,000PE upgrade is proposed to be implemented for Cork Lower Harbour WwTP, this upgrade also incorporates the proposed wastewater transfer from Halfway which forms part of the Recommended Approach for Sub Catchment 6. In the 2080 strategy horizon, the existing assets at Cork Lower Harbour WwTP will have reached the end of its design life, therefore a capital replacement of 65,000PE is proposed to be initiated.

Feasible Approach 2 explores combinations of other high scoring options in the MCA across the strategy horizons while also looking at combinations of potential wastewater imports from WwTPs in the vicinity. This approach looks at utilising the existing WwTP with periodic upgrades on the existing site to accommodate growth in incoming flows.

- **Cork Lower Harbour:** The proposed approach for the 2030 horizon is identical to that of Feasible Approach 1, upgrading the WwTP to accommodate increase in flows resulting in population growth and incoming transfers from Ballygarvan, Ballymore and Minane Bridge. Similarly for the 2055 strategy horizon, a further 14,000PE upgrade is proposed to accommodate the increasing flows for the sub catchments. However, this approach is considered in conjunction with Feasible Approach 2 at Sub Catchment 7 Ballincollig and Killumney. In this scenario, treated final effluent from Ballincollig WwTP is transferred to Cork Lower Harbour WwTP for discharge due to stringent environmentally sustainable discharge limits requirements at the existing Ballincollig discharge location and downstream on the River Lee. Therefore, a new marine outfall is proposed to be implemented for the 2055 strategy horizon to ensure the final effluent from Cork Lower Harbour WwTP and Ballincollig WwTP is discharged compliantly to Lower Cork Harbour without any detrimental effects to the receiving environment. The proposed approach for 2080 horizon is identical to that of Feasible Approach 1, upgrading the WwTP to accommodate increase in flows resulting in population growth and incoming transfers from Ballygarvan, Halfway, Ballymore, North Cobh and Minane Bridge while

continuing to accept treated effluent from Ballincollig for discharge via the outfall. In the 2080 strategy horizon, the existing assets at Cork Lower Harbour WwTP will have reached the end of its design life, therefore a capital replacement of 65,000PE is proposed to be initiated.

Feasible Approach 3 explores at potential upgrades required for Cork Lower Harbour while also treating increased loads diverted from the south Cork City wastewater network in an effort to alleviate the flows being treated at Carrigrennan WwTP.

- **Cork Lower Harbour:** The proposed approach for the 2030 horizon is identical to that of Feasible Approach 1 and Feasible Approach 2, upgrading the WwTP to accommodate increase in flows resulting in population growth and incoming transfers from Ballygarvan, Ballymore and Minane Bridge. In the 2055 strategy horizon, it is proposed to initiate the diversion of 61,000PE of wastewater from the south Cork City network to Cork Lower Harbour for treatment via a Southern Orbital sewer. This approach is to be delivered in conjunction with Feasible Approach 3 for Carrigrennan in an effort to reduce the loads to be treated at Carrigrennan WwTP. Due to increased loads from Cork Lower Harbour catchment, Ballygarvan, Ballymore, North Cobh, Minane Bridge and the additional load from south Cork City, a 75,000PE upgrade to the WwTP is proposed to be initiated to sufficiently treat the incoming wastewater. As with Feasible Approach 2, it is proposed to transfer treated final effluent from Ballincollig WwTP to Cork Lower Harbour for discharge via a new marine outfall. Due to the increased discharge from Cork Lower Harbour accounting for the diversion of 61,000PE from south Cork City, it is proposed to provide quaternary treatment for all effluent to be discharged via the new outfall. Therefore, it is proposed to initiate the construction of a new 235,000PE quaternary WwTP for wastewater treated at Cork Lower Harbour as well as Ballincollig prior to discharge in the 2055 strategy horizon. As population growth further increases into the 2080 strategy horizon, a further 18,000PE upgrade is proposed to be initiated for Cork Lower Harbour WwTP, this upgrade also incorporates the proposed wastewater transfer from Halfway WwTP which forms part of the Recommended Approach for Sub Catchment 6. In the 2080 strategy horizon, the existing assets at Cork Lower Harbour WwTP will have reached the end of its design life, therefore a capital replacement of 65,000PE is proposed to be initiated.

Table 2-104: Feasible Approaches for Cork Lower Harbour

Strategy Horizon	Catchment	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
2030	Cork Lower Harbour WwTP	• Upgrade existing WwTP to increase existing design capacity by 5,000 PE and to cater for loads from Sub-Catchments 6 and 10. • Upgrade WwTP to provide tertiary treatment to bring plant to compliance with current ELVs for a 70,000 PE design capacity	• Upgrade existing WwTP to increase existing design capacity by 5,000 PE and to cater for loads from Sub-Catchments 6 and 10. • Upgrade WwTP to provide tertiary treatment to bring plant to compliance with current ELVs for a 70,000 PE design capacity	• Upgrade existing WwTP to increase existing design capacity by 5,000 PE and to cater for loads from Sub-Catchments 6 and 10. • Upgrade WwTP to provide tertiary treatment to bring plant to compliance with current ELVs for a 70,000 PE design capacity
2055	Cork Lower Harbour WwTP	• Upgrade existing WwTP to increase existing design capacity by 15,000 PE and to cater for loads from Sub-Catchments 6 and 10.	• Upgrade existing WwTP to increase existing design capacity by 15,000 PE and to cater for loads from Sub-Catchments 6 and 10. • Construct new marine outfall	• 75,000PE upgrade of existing WwTP • Construct new 235,000PE quaternary WwTP (including Ballincollig WwTP FE treatment [see Table 11-8] • Construct new marine outfall to discharge Cork Lower Harbour WwTP and Ballincollig FE
2080	Cork Lower Harbour WwTP	• Upgrade existing WwTP to increase existing design capacity by 13,000 PE and to cater for loads from Sub-Catchments 6 and 10. • 65,000PE WwTP capital replacement	• Upgrade existing WwTP to increase existing design capacity by 13,000 PE and to cater for loads from Sub-Catchments 6 and 10. • 65,000PE WwTP capital replacement	• Upgrade existing WWTP to increase existing design capacity by 18,000 PE and to cater for loads from Sub-Catchments 6 and 10 and South Cork City WW diversion. • 65,000PE WwTP capital replacement

2.9.2 Recommended Approach and Implementation Strategy for Cork Lower Harbour

Based on the analysis conducted above, **Feasible Approach 1** is recommended for implementation and further development as an integral component of the CWS. This recommendation stems from the approach's superior performance across the assessed criteria and its alignment with the broader CWS objectives, making it the most suitable and sustainable solution for addressing the sub-catchment's wastewater management needs.

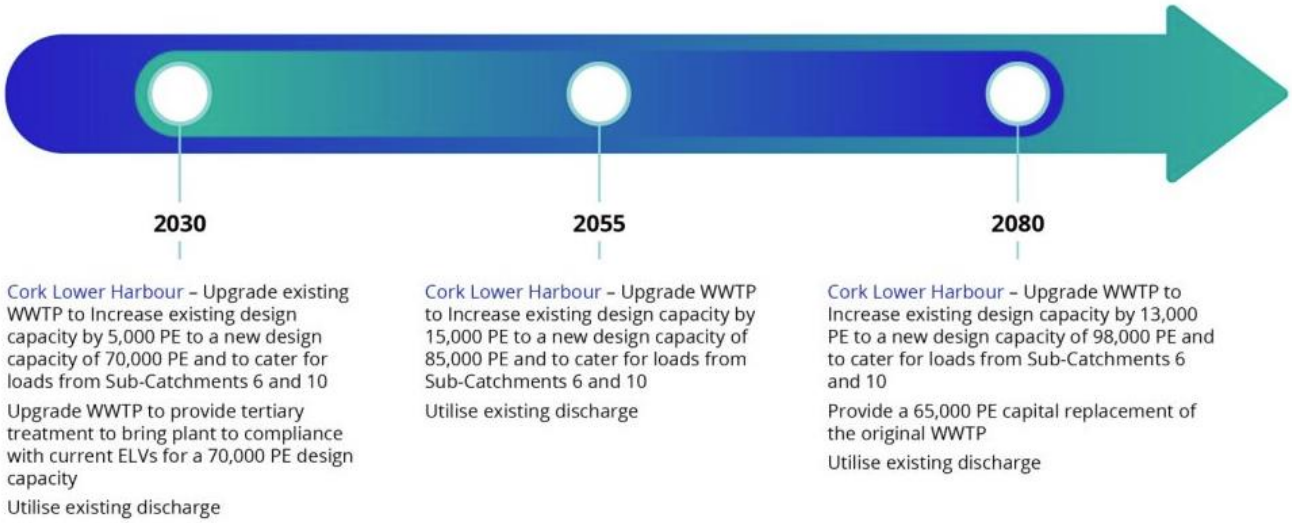


Figure 2-50: Proposed Implementation Strategy for Cork Lower Harbour

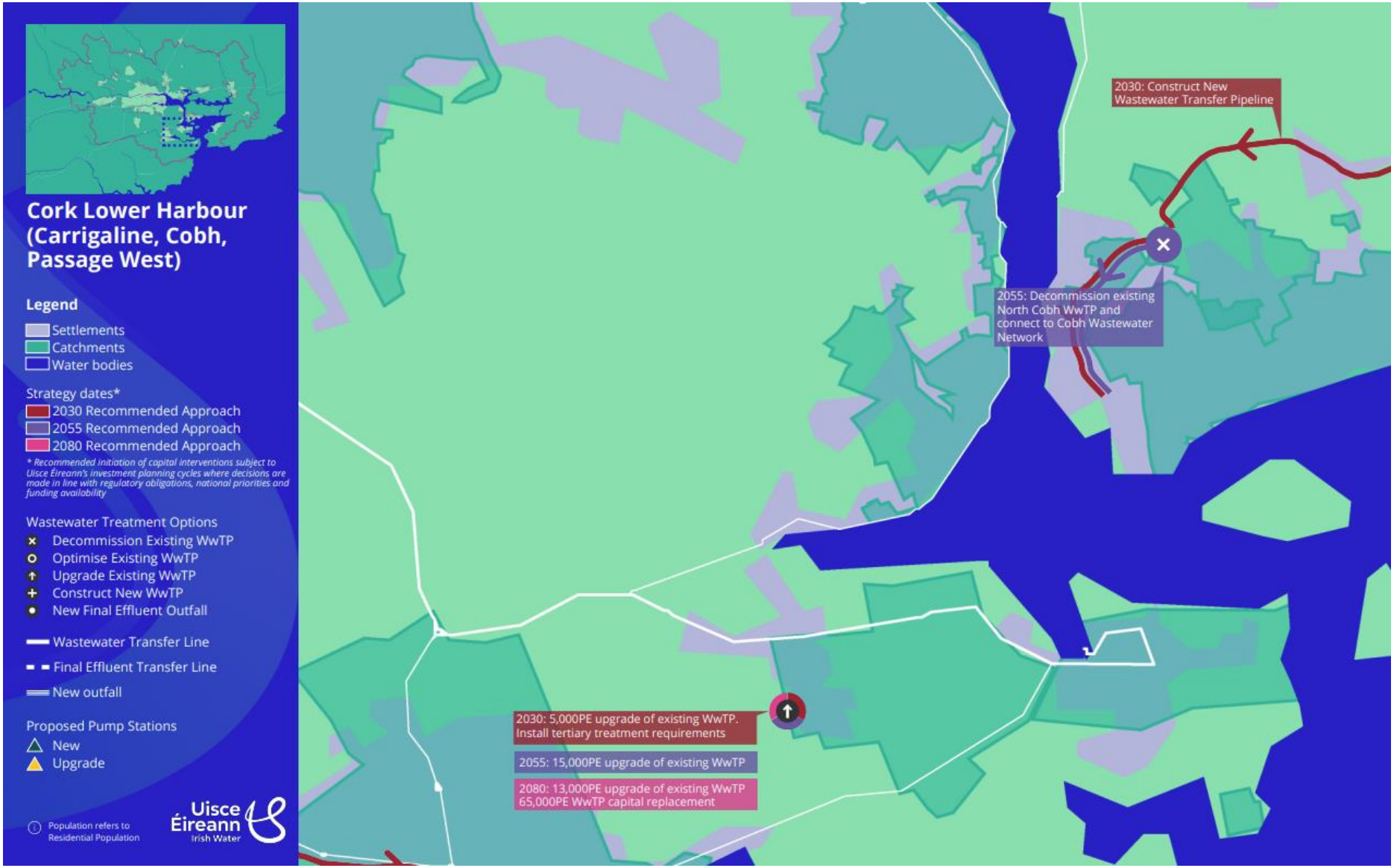


Figure 2-51: Recommended Approach for Cork Lower Harbour

2.10 Carrigtwohill and Midleton

2.10.1 Carrigtwohill

Introduction

Carrigtwohill WwTP is located at Tullagreen to the south of Carrigtwohill, County Cork. The WwTP was commissioned in 2016 and is operated by EPS on behalf of UÉ under a 20-year DBO contract.

The WwTP has a design capacity of 30,000 PE and comprises of preliminary and secondary treatment. There is also sludge treatment on-site consisting of sludge thickening and dewatering. The plant treats mainly industrial loads with little domestic loads. Treated effluent is discharged via a 1.28km long outfall pipe into the Slatty Waters Estuary. This waterbody belongs to the Great Island Channel SAC and SPA. There is an ongoing UÉ project intended to transfer loads from Midelton to Carrigtwohill WwTP. This is considered throughout the optioneering process.

The existing wastewater treatment process is currently performing but may need additional chemical dosing to meet the total P ELV limit.

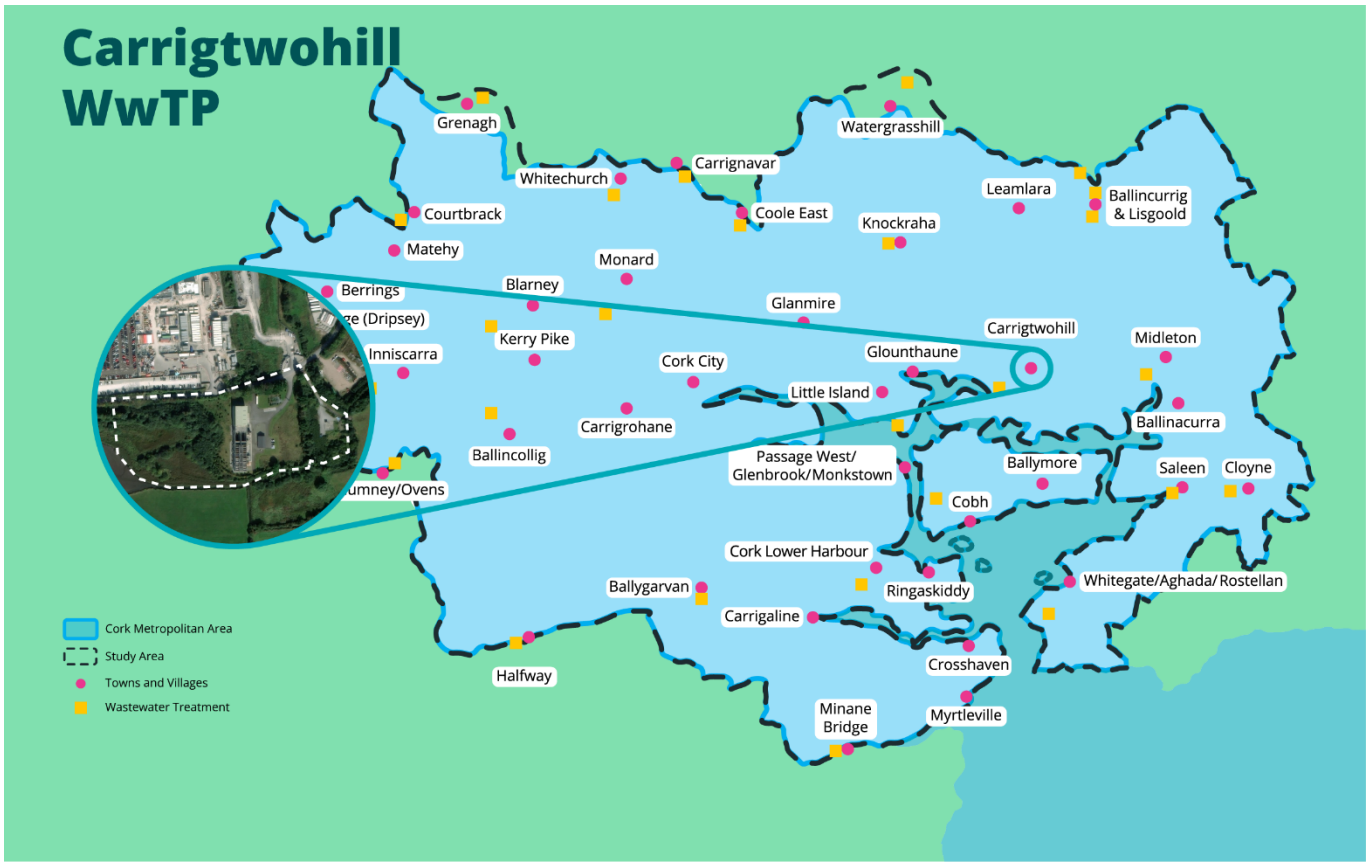


Figure 2-52: Carrigtwohill Location

Table 2-105: Carrigtwohill WwTP Details

Organic Design PE	Storm Management	Inlet Works	Primary Treatment	Secondary Treatment	Tertiary Treatment	Chemical P Removal	Sludge Treatment	Installation Date
30,000	SWO + Tank	Inlet and Grit	n/a	AGS	n/a	FeCl	Thickening & Dewatering	2016

Table 2-106: Current and Projected Organic (PE) and Hydraulic Loading to Carrigtwohill WwTP

Parameter	Existing Capacity	Current (2024) Loading	2030	2055	2080
Organic Loading (PE)	30,000	9,293	25,517 (42,167)*	28,547 (45,197)*	30,340 (46,990)*
Hydraulic Loading (m^3/d)	20,250	13,185	27,482 (38,832)*	29,528 (40,878)*	30,738 (42,088)*

***() accounting for maximum Middleton load transfer to Carrigtwohill**

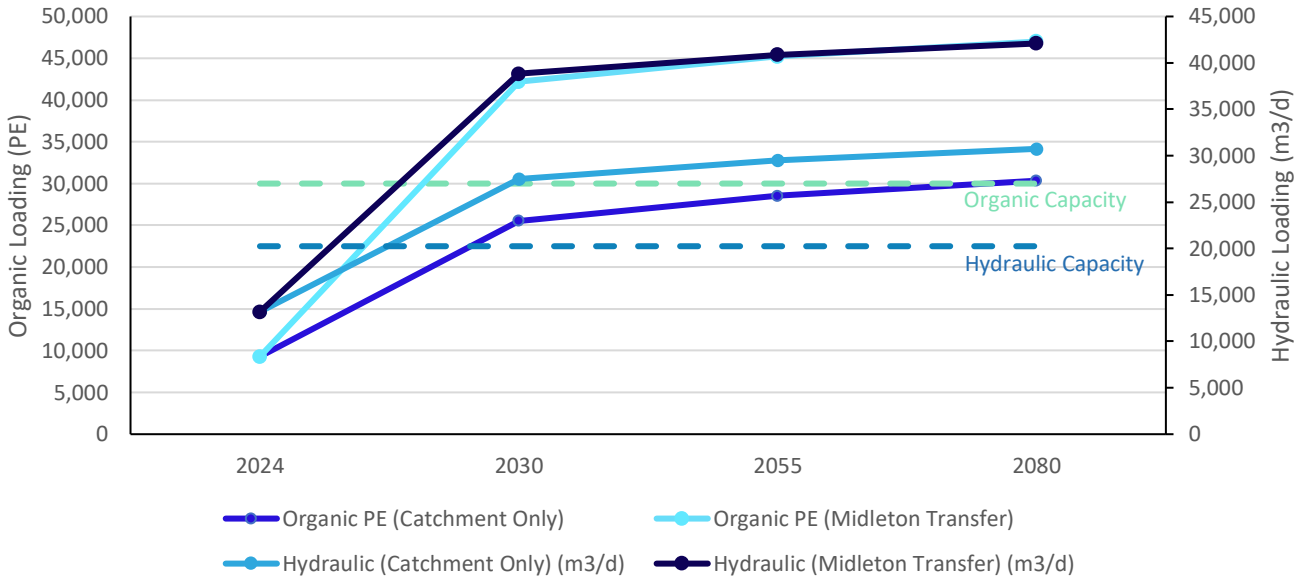


Figure 2-53: Current and Projected Loadings at Carrigtwohill WwTP

Current and Projected Discharge Limits

Following water quality modelling conducted at the existing WwTP discharge point, environmentally sustainable discharge limits based on compliance with the appropriate WFD EQS have been determined based on projected PE loading to the WwTP across the current and future Strategy horizons. The environmentally sustainable discharge limits for these scenarios have been summarised in Table 2-107.

Table 2-107: Existing WWDL ELVs and Environmentally Sustainable Discharge Limits at Carrigtwohill

Parameter	Existing ELVs	2030 Environmentally Sustainable Discharge Limits	2055 Environmentally Sustainable Discharge Limits	2080 Environmentally Sustainable Discharge Limits
BOD	25 mg/l	25 mg/l	25 mg/l	25 mg/l
TN	25 mg/l	25 mg/l	10 mg/l	10 mg/l
TP	2.5 mg/l	2.5 mg/l	0.7 mg/l	0.7 mg/l
More Stringent?	-	N	Y	Y

Summary of Observed Constraints

As part of the delivery of this Strategy, advancement of the Optioneering Process assessed potential Network, Ecological, Environmental and Planning constraints that may impact the development of feasible approaches. Key findings pertinent to this catchment have been summarised below:

Network Constraints

A separate assessment of the existing wastewater network for this catchment, including maps and drawings illustrating the location of constraints has been undertaken as part of the Network Modelling Report which is included in Appendix 4.

Carrigtwohill WwTP currently lacks sufficient hydraulic and organic capacity to adequately treat both present and projected future flow and loads. The network assessment has revealed ongoing surcharging and flooding issues within the current network, with these problems expected to intensify in future scenarios. However, the current model indicates that all Storm Water Overflows (SWOs) are compliant in both current and future scenarios.

Environmental and Ecological Constraints

The discharge location is transitional waterbody Lough Mahon (Harper's Island. Slatty Water) with Moderate WFD Status (cycle 3 2016-2021) and classified as At Risk (2022). The WwTP is located within Cork Harbour SPA and Great Island Channel SAC/pNHA and discharges into those sites. Additionally, the discharge is located within mudflats and upstream of Atlantic Salt Meadows which are an EU Protected Habitat with inadequate status and declining trend. In the past five years there have been some odour complaints within 500 m distance from the plant.

Planning Constraints

The planning assessment has not identified any zoning constraints or planning restrictions within the immediate site boundary although an SPA, proposed Natural Heritage Area (pNHA), and SAC have been identified to the west of the existing site (see Environmental and Ecological Constraints above). Additionally, the existing site is located within Flood Zone A, which is likely to require a detailed Flood Risk Assessment.

Coarse Screening

The coarse screening was undertaken on the unconstrained list of options at Carrigtwohill WwTP, which are shown in Table 1-1, as per the methodology outlined in Section 1.3. To provide context for the coarse screening results, which are outlined in Table 2-108, commentary on the coarse screening exercise is provided below.

- Option A0 (Do Nothing) has not been considered as a feasible option for the 2080 horizon as the existing WwTP will be over capacity and will not achieving the discharge requirements as set in the WWDL.
- Option A1 (Do Minimum – Process Optimisation) has been deemed unfeasible for the 2080 horizon due to the projected exceedance of both organic and hydraulic capacities of the WwTP, coupled with the anticipated end-of-life status of existing assets.
- Option A2 (Reuse with Investment at Existing Discharge Location) has been screened out for the 2080 horizon as the existing assets will have exceeded their design life.
- Option A3 (Reuse with Investment – New Discharge Location) has been screened out for the 2080 horizon as the existing assets will have exceeded their design life.
- Option A4 (New Treatment Process on Existing Site with New or Existing Discharge Location) has been considered viable for the 2080 horizon, as both the organic and hydraulic capacities are projected to be exceeded, and the remaining asset life will be insufficient, thus necessitating the need for a new treatment process on site. The current site boundary is unlikely to pose a significant risk to its implementation, however flood risk mitigations would likely be required.
- Option A5 (New Greenfield Plant with New Discharge Location) was screened in, but not shortlisted, only as an alternative option to A4 for the 2080 scenario.
- Option A6 (Wastewater Load Transfer to another WwTP) was screened out as the transfer route was deemed too complex and encroached on planning and environmental restrictions.

Table 2-108: Coarse Screening Output of Carrigtwohill WwTP

Coarse Screening Results							
Long List of Options	**A0**	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**
2080	**N**	**N**	**N**	**N**	**Y**	**N (New Discharge Location)**	**N**
2055	**N**	**Y**	**Y**	**N**	**N**	**N**	**N**
2030	**N**	**Y**	**Y**	**N**	**N**	**N**	**N**

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening

Any options for the strategy horizon years of 2030 and 2055 should facilitate implementation of the longer term 2080 preferred solution and should not compromise the ability to implement this. Further option defining is undertaken in order to undertake the MCA fairly and adequately. During option definition, it was established that the existing Carrigtwohill discharge location to the Slatty Waters poses significant ecological and environmental risks should treated load increase above 30,000PE. Alternative discharge locations were assessed in order to protect the biodiversity within the Slatty Waters. Due to the proximity to SACs and sensitive shellfish areas, alternative discharge locations are limited and moving south to south west of the existing site boundary did not provide clear treatment and environmental protection benefits. Thus, extension of the existing outfall to near Lough Mahon was considered feasible and was advanced to the fine screening stage. Option A5 was not advanced to fine screening as the current site boundary has sufficient area for future expansion. The existing treatment process was specifically designed for modular expansion with previous design work completed to increase the design capacity to 45,000PE and 60,000PE.

Two Option A4 solutions with existing and new discharges were advanced to fine screening to ascertain the environmental impact and feasibility of both options.

Table 2-109: 2080 Options Did Advancing to Fine Screening

Options Progressed to Fine Screening for 2080	Description
A4	New Treatment Process on Existing Site with Existing Discharge Location
A4	New Treatment Process on Existing Site with Extend Discharge Beyond Slatty Waters

Fine Screening

The options presented in Table 2-109 underwent fine screening in the form of an MCA as detailed in Section 1.4. The scoring and results of the MCA are presented in Table 2-110.

Table 2-110: MCA Results for Carrigtwohill WwTP

Objectives	Criteria	Option A4 (Existing)	Option A4 (Extended)
Addressing the Need	Treatment Capacity	3	3
	Network Capacity	3	3
	Final Effluent Compliance	3	3
Deliverability	Design Complexity, Ease of Implementation & Feasibility	-2	-2
	Planning & Regulation	-2	-2
	Delivery Timeline & Alignment	1	1
Risk & Resilience	Flexibility & Scalability	1	1
	Delivery Risk	-2	-2
Customer and Stakeholder Support	Impact on Customers	1	1
	Community Support, Health and Wellbeing	2	2
Environmental & Sustainability	Water Environment	-1	1
	Waterbody Impact (Existing and New)	-1	1
	Waterbody Flood Risk	0	0
	Biodiversity	-3	-1
	AA-Natura 2000 Sites	-3	-1
	Aquatic Biodiversity	-2	1
	Terrestrial Biodiversity (BNG)	0	0
	GHG Emissions	0.5	0
	Embodied Carbon	-1	-2
	Operational Carbon	2	2
	Energy Efficiency	2	2
	Climate Resilience	1	2
	Circular Economy	1	1
Weighted Average Sub Total		**0.52**	**0.83**
Cost	CAPEX	4	4
	OPEX	5	5
	Whole Life Cost	4	4
Combined Score		**2.43**	**2.68**
Rank		**2nd**	**1st**

The MCA has identified Option A4 with the extension of the existing outfall as the highest-ranking option against the fine screening criteria for the 2080 strategy horizon. There was a slight difference in the scoring between the existing discharge and extending the discharge location, with the extended outfall scoring higher on the non monetary criteria. When developing the feasible approaches for the sub catchment, consideration will be given to potential transfers from Midleton and impacts it may have on the Carrigtwohill discharge location to identify a Recommended Approach.

Wastewater Treatment Summary

The optioneering process for Carrigtwohill WwTP has yielded recommendations for future development:

The preferred strategy involves the implementation of a new treatment process on the existing site and extending the existing outfall (Option A4). This approach will take use of the existing site, while meeting the future growth within the catchment and addressing the expiring asset life of the plant. This strategy ensures long-term sustainability and protecting inland rivers sensitive to climate change.

Wastewater Network Upgrade Summary

A separate assessment of network upgrades for this agglomeration has been undertaken as part of the Network Modelling Report which is included in Appendix 4. Below is a brief overview of the proposed upgrades within the Carrigtwohill agglomeration, addressing SWO compliance and future development constraints such as surcharge and flooding due to development impacts. Unless otherwise stated specifically, these proposed upgrades are proposed to be initiated in the 2030 strategy horizon. The development process of these proposed upgrades, as well as maps and drawings illustrating the location of the required upgrades are provided in more detail in the Network Modelling Report in Appendix 4.

Network Upsize Main Route: Approximately 300m of existing sewer system to be upsized to provide additional network capacity to resolve flooding issues caused by flows from new developments.

Old Cobh Road WwPS: The pass forward pump rate and the spill pump rate to be upgraded.

WwTP Upgrades: The flow to treatment to be upgraded in the 2030 horizon, with a further increase planned for 2055. A new extended outfall discharge of 3.5km from the plant is also proposed to be initiated in the 2055 horizon.

2.10.2 Midleton

Introduction

Midleton WwTP is located south-west of Midleton town. The treatment plant is operated and maintained by EPS on behalf of UÉ.

The WwTP has a design capacity of 15,000 PE. The existing sewage treatment process comprises of preliminary treatment, and extended aeration followed by final settlement and UV disinfection of the final effluent. Sludge treatment on-site consists of thickening and dewatering. Treated effluent from Midleton WwTP is discharged into the North Channel Great Island at Rathcoursey which is designated as a SAC and SPA.

The existing wastewater treatment process is currently performing very poorly and is failing to achieve the discharge requirements specified within its WWDL. There is an ongoing UÉ project intended to transfer loads from Midleton to Carrigtwohill WwTP (16,500PE capacity). This is considered throughout the optioneering process.

Figure 2-54: Midleton Location

Table 2-111: Midleton WwTP

Organic Design PE	Storm Management	Inlet Works	Primary Treatment	Secondary Treatment	Tertiary Treatment	Chemical P Removal	Sludge Treatment	Installation Date
15,000	n/a	Screening & Grit	n/a	ASP	UV	n/a	Thickening & Dewatering	2000 (2011 M&E Upgrade)

Table 2-112: Current and Projected Organic (PE) and Hydraulic Loading to Midleton WwTP

Parameter	Existing Capacity	Current (2024) Loading	2030	2055	2080
Organic Loading (PE)	15,000	17,361	27,441 (10,941)	33,969 (17,469)	38,867 (22,367)
Peak Hydraulic Loading (m3/d)	10,368	9,355	18,876 (7,526)	23,366 (12,017)	26,735 (15,386)

***() accounting for maximum Midleton load transfer to Carrigtwohill**

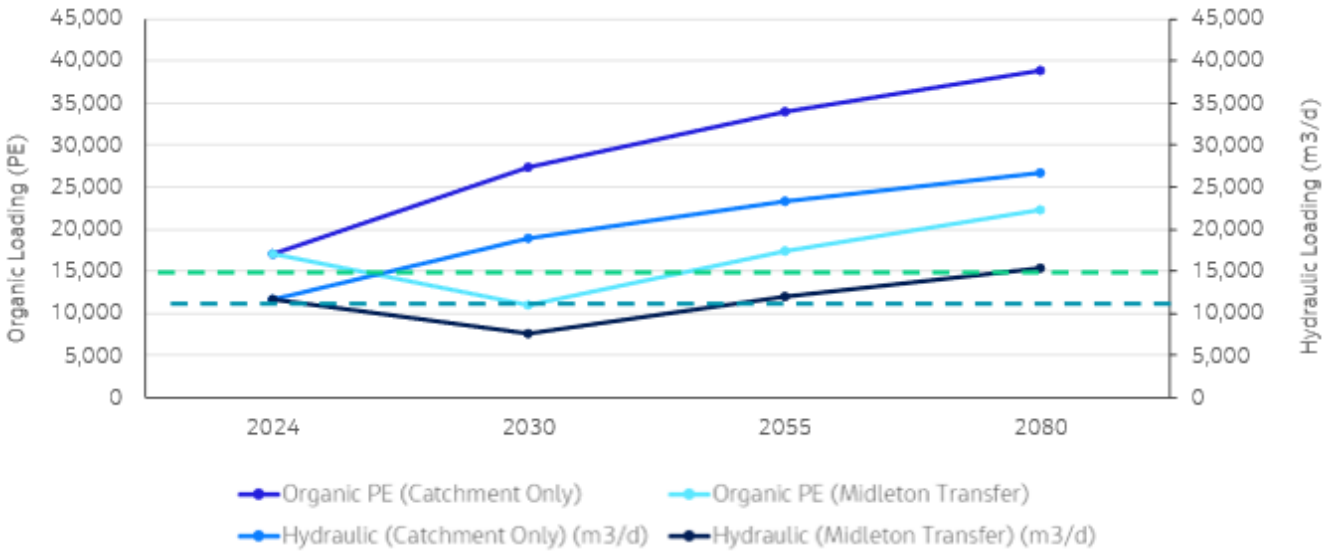


Figure 2-55: Current and Projected Loadings at Midleton WwTP

Current and Projected Discharge Limits

Following water quality modelling conducted at the existing WwTP discharge point, environmentally sustainable discharge limits based on compliance with the appropriate WFD EQS have been determined based on projected PE loading to the WwTP across the current and future Strategy horizons. The environmentally sustainable discharge limits for these scenarios have been summarised in Table 2-113.

Table 2-113: Existing WWDL ELVs and Environmentally Sustainable Discharge Limits at Midleton WwTP

Parameter	Existing ELVs	2030 Environmentally Sustainable Discharge Limits	2055 Environmentally Sustainable Discharge Limits	2080 Environmentally Sustainable Discharge Limits
BOD	25 mg/l	25 mg/l	25 mg/l	25 mg/l
TN	15 mg/l	15 mg/l	10 mg/l	10 mg/l
TP	2 mg/l	2 mg/l	0.7 mg/l	0.7 mg/l
More Stringent?	-	N	Y	Y

As shown in Table 2-113, the environmentally sustainable discharge limits for the future horizons are considerably more stringent than the current WWDL requirements which would necessitate additional wastewater treatment processes for the continuation of discharging treated effluent at the current location.

Summary of Observed Constraints

As part of the delivery of this Strategy, advancement of the Optioneering Process assessed potential Network, Ecological, Environmental and Planning constraints that may impact the development of feasible approaches. Key findings pertinent to this catchment have been summarised below:

Network Constraints

A separate assessment of the existing wastewater network for this agglomeration, including maps and drawings illustrating the location of constraints has been undertaken as part of the Network Modelling Report which is included in Appendix 4.

The network assessment indicates that modelled results consistently show flooding and surcharging across both current and future scenarios. Future projections reveal an overall increase in network flooding and surcharging. Additionally, there is a 17% shortfall in network capacity relative to projected 2080 horizon flows (including the planned transfer). A key constraint is the 600m asbestos cement gravity outfall pipe with a diameter of 450mm.

Environmental and Ecological Constraints

The discharge location is transitional waterbody North Channel Great Island with Moderate WFD Status (cycle 3 2016-2021) and classified as At Risk (2022). There are European, Ramsar and National designated sites in proximity of the WwTP but these are separated from the WwTP by the N25 to the East of the site. The discharge outfall is located immediately downstream of the Great Island Channel SAC/pNHA and Cork Harbour SPA/Ramsar designated sites. In the past five years there have been some odour complaints within 500 m distance from the plant.

Planning Constraints

The planning assessment identifies no zoning constraints or planning restrictions surrounding the site boundary. The existing site is located within Flood Zone A, while the land to the south lies outside this zone. A Flood Risk Assessment (FRA) is likely to be required.

Coarse Screening

The coarse screening was undertaken on the unconstrained list of options at Midleton WwTP, which are shown in Table 1-1, as per the methodology outlined in Section 1.3. To provide context for the coarse screening results, which are outlined in Table 2-114, commentary on the coarse screening exercise is provided below.

- Option A0 (Do Nothing) has not been considered as a feasible option for the 2080 horizon as the existing WwTP is currently over capacity and is not achieving the discharge requirements as set in the WWDL.
- Option A1 (Do Minimum – Process Optimisation) has been deemed unfeasible for the 2080 horizon due to the projected exceedance of both organic and hydraulic capacities of the WwTP, coupled with the anticipated end-of-life status of existing assets.
- Option A2 (Reuse with Investment with Existing Discharge Location) has been screened out for the 2080 horizon as the existing assets will have exceeded their design life.
- Option A3 (Reuse with Investment with New Discharge Location) has been screened out for the 2080 horizon as the existing assets will have exceeded their design life.
- Option A4 (New Treatment Process on Existing Site with Existing Discharge Location) has been considered viable for the 2080 horizon, as both the organic and hydraulic capacities are projected to be exceeded, and the remaining asset life will be insufficient, thus necessitating the need for a new treatment process on site. Full replacement of the current infrastructure is assumed, along with increased capacity requirements. The proposed treatment process is similar to the existing one. Although the upgrade capacity is 17,500 PE, the proposed load transfer of 16,500 PE does not eliminate the need for a capacity increase. The current site boundary is unlikely to pose a significant risk to its implementation.
- Option A5 (New Greenfield Plant with Existing Discharge) has been considered viable for 2080 horizon.

- Option A6 (Wastewater Load Transfer to Carrigtwohill WwTP) is considered viable for the 2080 horizon – this configuration is already progressing and should be considered for future strategy horizons.

Table 2-114: Coarse Screening Output of Midleton WwTP

Coarse Screening Results							
Long List of Options	**A0**	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**
2080	**N**	**N**	**N**	**N**	**Y**	**N**	**Y**
2055	**N**	**N**	**N**	**N**	**Y**	**N**	**Y**
2030	**N**	**N**	**N**	**N**	**N**	**N**	**Y**

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening

Any options for the strategy horizon years of 2030 and 2055 should facilitate implementation of the longer term 2080 preferred solution and should not compromise the ability to implement this. Further option defining is undertaken in order to undertake the MCA fairly and adequately. Existing infrastructure allows for transfer of up to 16,500PE of wastewater from Midleton to Carrigtwohill WwTP which significantly reduces the treatment capacity upgrade requirements of Midleton WwTP. A current design project is progressing which aims to increase treatment capacity to 22,500PE which shall address the 2080 horizon project treatment demand. This design project has identified sufficient area for implementation and has undertaken more detailed planning and environmental assessments than that included within the scope of this strategy. Therefore, Option A5 was not progressed to fine screening as coarse screening criteria for inclusion are no longer met. Therefore, two options (A4 and A6) were advanced to fine screening as outlined below.

Table 2-115: 2080 Options Advancing to Fine Screening

Options Progressed to Fine Screening for 2080	Description
A4	New Treatment Process on Existing Site with Existing Discharge Location
A6	Wastewater Load Transfer to Carrigtwohill WwTP

Fine Screening

The options presented in Table 2-115 underwent fine screening in the form of an MCA as detailed in Section 1.4. The scoring and results of the MCA are presented in Table 2-116.

Table 2-116: MCA Results for Midleton WwTP

Objectives	Criteria	Option A4	Option A6
Addressing the Need	Treatment Capacity	3	2
	Network Capacity	3	3
	Final Effluent Compliance	3	2
Deliverability	Design Complexity, Ease of Implementation & Feasibility	-1	1
	Planning & Regulation	2	3
	Delivery Timeline & Alignment	1	2
Risk & Resilience	Flexibility & Scalability	1	-3
	Delivery Risk	-1	-1

Customer and Stakeholder Support	Impact on Customers	2	3
	Community Support, Health and Wellbeing	2	3
Environmental & Sustainability	Water Environment	2	3
	Waterbody Impact (Existing and New)	2	3
	Waterbody Flood Risk	0	0
	Biodiversity	-1	2
	AA-Natura 2000 Sites	1	1
	Aquatic Biodiversity	1	2
	Terrestrial Biodiversity (BNG)	-1	0
	GHG Emissions	0	1
	Embodied Carbon	-2	-1
	Operational Carbon	2	3
	Energy Efficiency	2	3
	Climate Resilience	2	3
	Circular Economy	-1	1
Weighted Average Sub Total		**1.23**	**1.35**
Cost	CAPEX	5	6
	OPEX	6	7
	Whole Life Cost	5	6
Combined Score		**3.52**	**4.07**
Rank		**2nd**	**1st**

The MCA has identified Option A6 as the highest-ranking option against the fine screening criteria for the 2080 strategy horizon and offers a more cost-effective implementation and better alignment with the goals of the CWS and UÉ compared to Option A4.

Wastewater Treatment Summary

The optioneering process for Midleton WwTP has yielded recommendations for future development:

The preferred strategy involves transferring wastewater Middleton WwTP via Carrigtwohill WwTP (Option A6). This approach addresses receiving waterbody quality concerns and risks and improves overall treatment efficiency whilst simultaneously protecting the environment and ecological boundaries.

This approach addresses several key challenges identified at Midleton WwTP, including network surcharge & flooding. This option also avoids potential environmental challenges associated with the risk to Natura 2000 sites and wider aquatic biodiversity from increased pollution loads.

Wastewater Network Upgrade Summary

A separate assessment of network upgrades for this agglomeration has been undertaken as part of the Network Modelling Report which is included in Appendix 4. Below is a brief overview of the proposed upgrades within the Midleton agglomeration, addressing SWO compliance and future development constraints such as surcharge and flooding due to development impacts. Unless otherwise stated specifically, these proposed upgrades are proposed to be initiated in the 2030 strategy horizon. The development process of these proposed upgrades, as well as maps and drawings illustrating the location of the required upgrades are provided in more detail in the Network Modelling Report in Appendix 4.

Ballick No.1 WwPS: The existing pump capacity at Ballick No.1 PS which pumps to WwTP to be reduced. A new bypass system to be implemented to redirect flows to Waterrock PS via Midleton South PS. Additionally, extra storage to be added.

Ballick No.2 WwPS: The pump rate at Ballick No.2 WwPS to be upgraded. Additional storage to be provided at the pumping station.

Pumps upsize at Abbeywood WwPS: The pass forward flow to be increased to cater for development.

Drurys Avenue SWO: The spill pipe from the storm line to the foul line is proposed to be decommissioned. The foul network to be upsized over a length of c. 451m to address flooding issues.

Riverside SWO: It is proposed to decommission the spill pipe. The foul network to be upsized over 95m to facilitate the flow to Dwyers Road WwPS downstream.

Dwyers Road WwPS: To address flooding caused by new developments upstream of the pumping station, the following updates are proposed to be implemented:

- The pump capacity (carrying flows from the new development) to be increased.
- Existing combined networks upsized over a length of c. 476m to mitigate flooding issues.
- An additional storage capacity was provided at Dwyers Road WwPS and pumps upgraded.

2.10.3 Feasible Approaches for Carrigtwohill and Midleton

The results of the fine screening process and MCA were assessed and taken forward to develop a Feasible Approach for the sub catchment. The wastewater network upgrade proposals for each catchment mentioned above are included in the Feasible Approach detailed below.

Our approach ensures that the selected strategies are not only technically viable but also align with the long-term vision for wastewater management in the region.

The Approach is summarised in Table 2-117 below.

Feasible Approach 1 was developed to align with the objectives of the CWS.

- **Carrigtwohill:** The proposal for Carrigtwohill involves initiating process optimisation of the existing Carrigtwohill WwTP in the 2030 horizon in order to achieve compliance with the projected environmentally sustainable discharge limits at the discharge location. Reacting to increased population growth forecasts and resulting increase in incoming loads, it is proposed to initiate a WwTP upgrade in the 2055 strategy horizon by an additional 15,000 PE to cater for the increased loads from Carrigtwohill and transferred loads from Midleton. The increased treatment capacity at the WwTP will necessitate an extension of the existing outfall which is proposed to be initiated in the 2055 strategy horizon. With projected loads further increasing in the 2080 horizon, and with diminishing asset life, it is proposed to initiate the carrying out of a capital replacement of 30,000 PE at the WwTP in conjunction with an additional upgrade of 2,000 PE for the 2080 horizon.
- **Midleton:** It is proposed to initiate the upgrade of Midleton WwTP by an additional 7,500 PE in the 2030 horizon to ensure sufficient capacity to cater for projected increase in loads. This shall not inhibit the operation of the existing wastewater transfer from Midelton to Carrigtwohill, and 5,100 PE is proposed to be directed to Carrigtwohill for treatment. In the 2055 strategy horizon, it is proposed to increase the transfer of wastewater to Carrigtwohill to 11,600 PE, subject to the upgrade of Carrigtwohill WwTP in the 2055 strategy horizon. Owing to the ageing of the assets at the WwTP, it is proposed to accommodate capital replacement works of 22,500 PE at the plant to be initiated in the 2080 horizon, while continuing operation of the WwTP and transfer of 16,500 PE of wastewater to Carrigtwohill WwTP.

Table 2-117: Feasible Approaches for Carrigtwohill and Midleton

Strategy Horizon	Catchment	Feasible Approach 1
2030	Carrigtwohill WwTP	• Optimise WwTP to bring to compliance with current ELVs
	Midleton WwTP	• 7,500 PE upgrade of existing WwTP. • Continue to operate WwPS to transfer 5,100 PE to Carrigtwohill WwTP.
2055	Carrigtwohill WwTP	• 15,000 PE upgrade of existing WwTP. • Extend the existing 710mm outfall from current location to further south into Lough Mahon
	Midleton WwTP	• Continue to operate WwTP • Continue to operate WwPS to transfer 11,600 PE to Carrigtwohill WwTP
2080	Carrigtwohill WwTP	• 2,000 PE upgrade of existing WwTP. • Capital replacement of 30,000 PE of WwTP.
	Midleton WwTP	• Capital replacement of 22,500 PE of WwTP • Continue to operate WwPS to transfer 16,500 PE to Carrigtwohill WwTP

2.10.4 Recommended Approach and Implementation Strategy for Carrigtwohill and Midleton

Following a comprehensive evaluation of the sub-catchment, only 1 Feasible Approach was progressed as Recommended Approach as it was deemed to fully satisfy the needs of the sub catchment. This approach was assessed across multiple criteria and it was shown to align with the broader CWS objectives, making it suitable for addressing the sub-catchment's wastewater management needs.

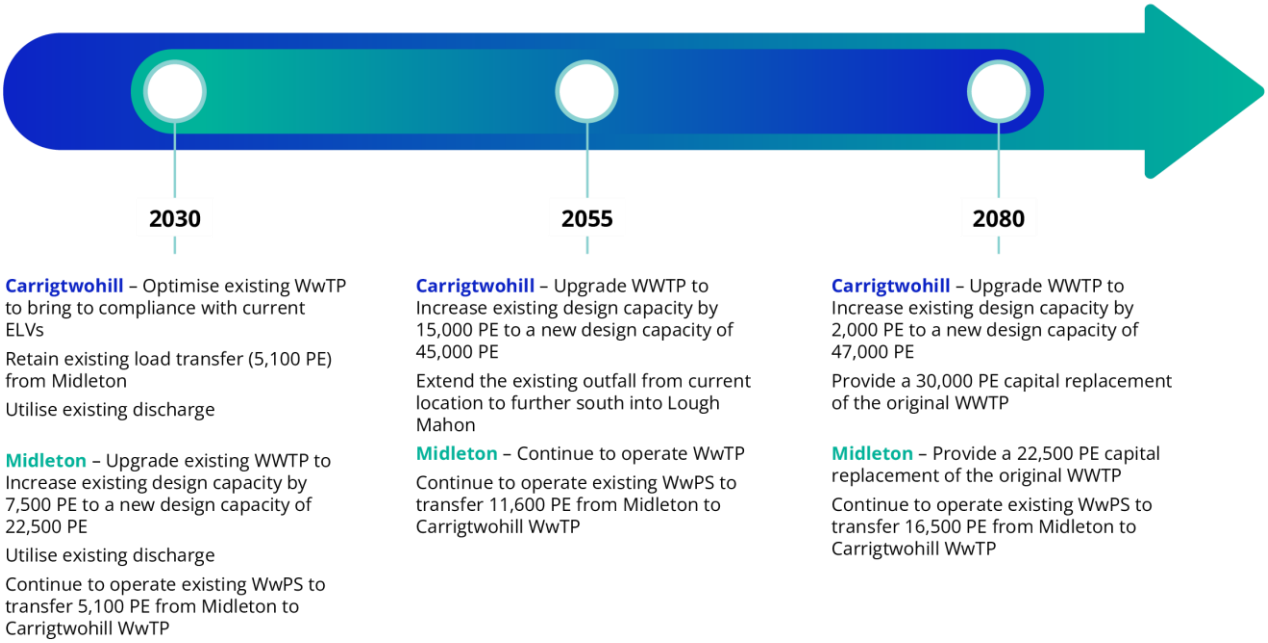


Figure 2-56: Proposed Implementation Strategy for Carrigtwohill and Midleton

Figure 2-57: Recommended Approach for Carrigtwohill and Midleton

2.11 Ballymore, Cloyne, Saleen, North Cobh and Whitegate-Aghada

2.11.1 Ballymore

Ballymore is a small existing agglomeration with a population of 295 according to the latest CSO2022. The agglomeration is expected to grow modestly over the strategy horizons.

The existing catchment does not have a significant wastewater network and resulting does not have existing wastewater treatment infrastructure operated by UE.

The future wastewater load for the strategy horizons was projected and is summarised in

Table 2-118 Projected Organic (PE) Demand of Ballymore

Parameter	2030	2055	2080
Organic Loading (PE)	450	500	550

Option Screening

As discussed, the Ballymore catchment is not currently served by an UÉ wastewater treatment process. The CWS aims to identify optimal wastewater solutions for this area to be initiated for the 2080 horizon. Resultingly, only two options were identified during the coarse screening process which are detailed below:

- Option A5 – New Greenfield WwTP with treated effluent discharge to the Cork Lower Harbour
- Option A6 –Wastewater Transfer to Cork Lower Harbour WwTP via the Cobh Network, specifically connecting at North Cobh to mitigate Cobh Network capacity issues.

Both options were assessed and combined with other feasible approaches with the sub-catchment. The options identified for Ballymore do not interact with solutions presented for Cloyne, Saleen and Whitegate & Aghada. At the fine screening stage, Option A6 was identified as the optimal solution allowing UÉ to implement a wastewater solution in a more timely manner, reducing impact on customers and the public in the local area, reducing biodiversity risks to receiving waters, reducing environmental and sustainability impacts (associated with the construction of a new greenfield WwTP) and providing circular economy and resource recovery benefits through the consolidation of wastewater treatment at Cork Lower Harbour, providing for a better treatment efficiency.

2.11.2 Cloyne

Introduction

Cloyne WwTP is located East of Cork Harbour and serves the village which is approximately 7 km south of Midleton and 4 km east of Cork Harbour. Cloyne WwTP was constructed in 1995, and EPS operate and maintain Cloyne WwTP on behalf of UÉ.

The WwTP has a design capacity of 1,400 PE and the plants consists of preliminary treatment (Screening) and secondary treatment (Activated Sludge Process) followed by tertiary treatment (Reed Beds). Cloyne WwTP is equipped with a SWO PS for effective stormwater management and incorporates sludge thickening facilities for efficient sludge handling. Stormwater overflow from the plant is discharged to the adjacent Spital Stream, while the final treated effluent is discharged to the Knocknamadderee river approximately 2.7km upstream of Cork Harbour.

The existing wastewater treatment process is currently performing poorly and is failing to achieve the discharge requirements specified within its WWDL.

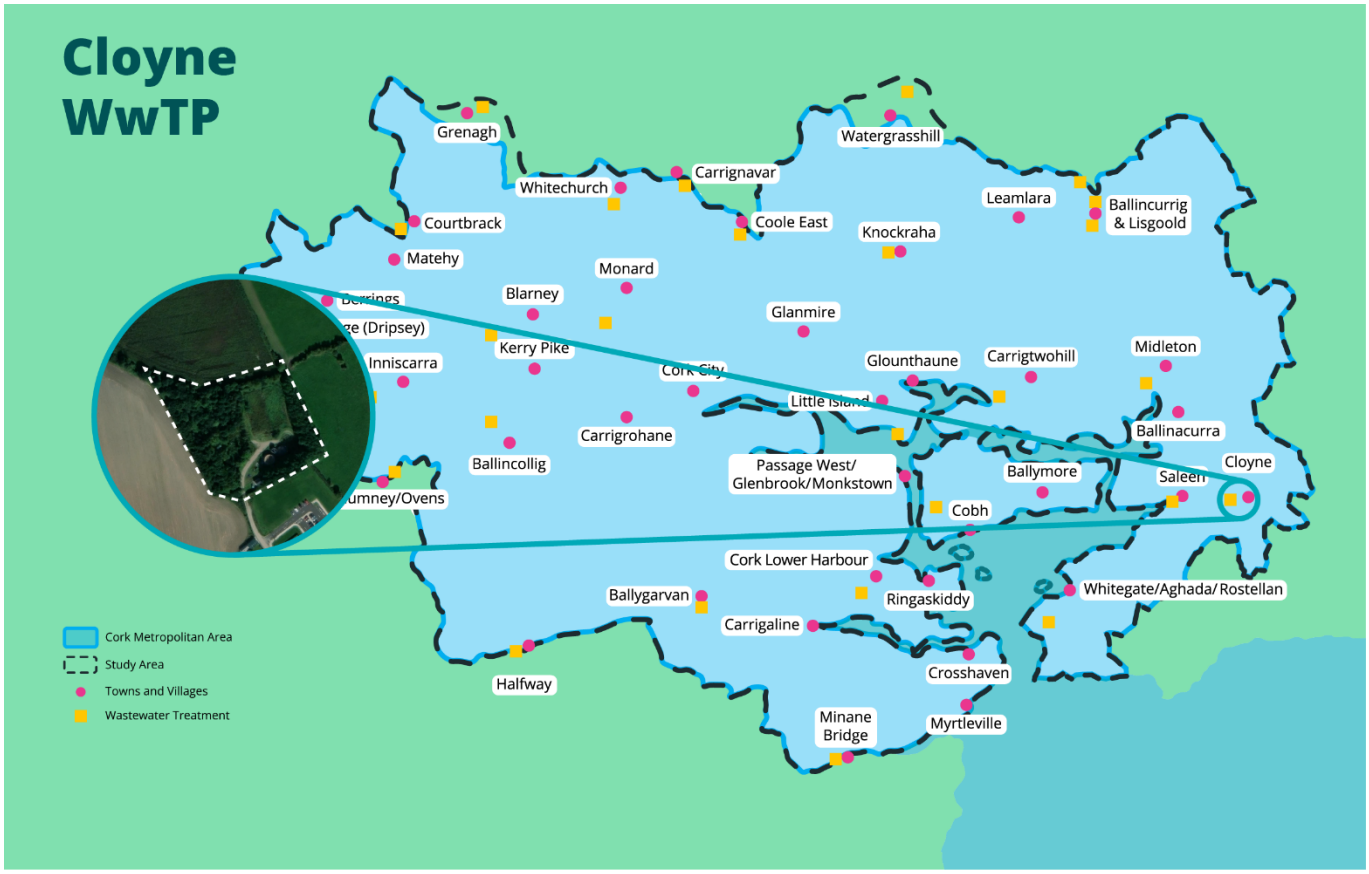


Figure 2-58: Cloyne Location

Table 2-119: Cloyne WwTP Details

Organic Design PE	Storm Management	Inlet Works	Primary Treatment	Secondary Treatment	Tertiary Treatment	Chemical P Removal	Sludge Treatment	Installation Date
1,400	SWO	Screening	n/a	ASP	Reed Beds	n/a	Thickening	1995

Table 2-120:Current and Projected Organic (PE) and Hydraulic at Cloyne WwTP

Parameter	Existing Capacity	Current (2024) Loading	2030	2055	2080
Organic Loading (PE)	1,400	2,268	3,199	3,813	4,279
Peak Hydraulic Loading (m^3/d)	315	510	1,839	2,192	2,460

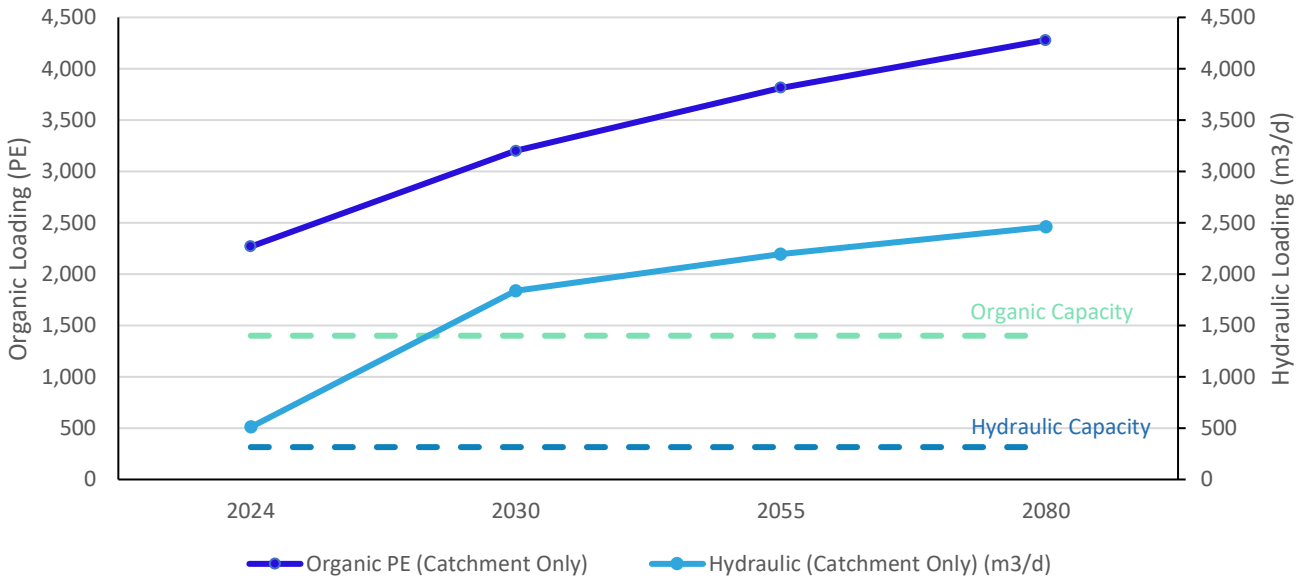


Figure 2-59: Current and Projected Loadings at Cloyne WwTP

Current and Projected Discharge Limits

Following water quality modelling conducted at the existing WwTP discharge point, environmentally sustainable discharge limits based on compliance with the appropriate WFD EQS have been determined based on projected PE loading to the WwTP across the current and future Strategy horizons. The environmentally sustainable discharge limits for these scenarios have been summarised in Table 2-121.

Table 2-121: Existing WWDL ELVS and Environmentally Sustainable Discharge Limits at Cloyne WwTP

Parameter	Existing ELVs	2030 Environmentally Sustainable Discharge Limits	2055 Environmentally Sustainable Discharge Limits	2080 Environmentally Sustainable Discharge Limits
BOD	25 mg/l	25 mg/l	25 mg/l	25 mg/l
TN	45 mg/l	45 mg/l	45 mg/l	45 mg/l
TP	2.5 mg/l	2.5 mg/l	2.5 mg/l	2.5 mg/l
More Stringent?	-	N	N	N

Summary of Observed Constraints

As part of the delivery of this Strategy, advancement of the Optioneering Process assessed potential Network, Ecological, Environmental and Planning constraints that may impact the development of feasible approaches. Key findings pertinent to this catchment have been summarised below:

Network Constraints

A separate assessment of the existing wastewater network for this catchment, including maps and drawings illustrating the location of constraints has been undertaken as part of the Network Modelling Report which is included in Appendix 4.

The network assessment identified potential flooding and surcharging conditions under current and future scenarios within the main trunk sewer within the Cloyne catchment WW network. Based on future loading scenarios, model projections indicate a substantial increase in both the extent and frequency of these issues

throughout the existing network. While the WwTP SWO is currently compliant, it is at risk of non-compliance under future conditions if no mitigation measures are implemented. Furthermore, the WwTP will become non-compliant if it begins receiving flows from Saleen without corresponding upgrades.

Environmental and Ecological Constraints

The discharge location waterbody is KNOCKNAMADDEREE_010 with Good WFD Status (cycle 3 2016-2021) classified as Not At Risk (2022). Cork Harbour SPA and Rostellan Lough, Aghada Shore And Poulnabibe Inlet pNHA are located approximately 2.5 km downstream from the discharge. Rostellan South and Rostellan North Shellfish Waters are located approximately 4.5 km downstream from the discharge. In the past five years there have been some odour complaints within 500 m from the plant.

Planning Constraints

The site is zoned as 'Existing Residential and Other Uses' under the current development plan, and a WwTP is not listed as a compatible use within this zoning category. This presents a potential constraint. Additionally, the area to the north of the site lies within Flood Zones A and B, which may necessitate the preparation of a Flood Risk Assessment as part of any future planning application.

Coarse Screening

The coarse screening was undertaken on the unconstrained list of options at Cloyne WwTP, which are shown in Table 1-1, as per the methodology outlined in Section 1.3. To provide context for the coarse screening results, which are outlined in Table 2-122, commentary on the coarse screening exercise is provided below.

- Option A0 (Do Nothing) has not been considered as a feasible option for the 2080 horizon as the existing WwTP is currently over capacity and is not achieving the discharge requirements as set in the WWDL.
- Option A1 (Do Minimum – Process Optimisation) has been deemed unfeasible for the 2080 horizon due to the projected exceedance of both organic and hydraulic capacities of the WwTP, coupled with the anticipated end-of-life status of existing assets.
- Option A2 (Reuse with Investment with Existing Discharge Location) has been screened out for the 2080 horizon as the existing assets will have exceeded their design life.
- Option A3 (Reuse with investment with New Discharge Location) has been screened out for the 2080 horizon as the existing assets will have exceeded their design life.
- Option A4 (New Treatment Process on Existing Site with New Discharge Location) has been considered viable for 2080 horizon, as both the organic and hydraulic capacities are projected to be exceeded, and the remaining asset life will be insufficient, thus necessitating the need for a new treatment process on site.
- Option A5 (New Greenfield Plant with New Discharge) has not been considered viable for the 2080 horizon based on the planning assessment outputs as previously mentioned.
- Option A6 (Wastewater Load Transfer to Whitegate/Aghada WwTP) is considered viable for the 2080 horizon, as both the organic treatment capacity and the remaining asset life are projected to be exceeded.

Table 2-122: Coarse Screening Output for Cloyne WwTP

Coarse Screening Results							
Long List of Options	A0	A1	A2	A3	A4	A5	A6
2080	N	N	N	N	Y	N	Y
2055	N	N	N	N	Y	N	Y
2030	N	N	Y	N	N	N	Y

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening

Any options for the strategy horizon years of 2030 and 2055 should facilitate implementation of the longer term 2080 preferred solution and should not compromise the ability to implement this. Further option defining is undertaken in order to undertake the MCA fairly and adequately. At Cloyne WwTP, a new discharge location is required due to the projected wastewater treatment demand projections and the capability of the existing stream to accept treated effluent. A new location as Rostellan was identified as an optimal discharge point due to presence of a preexisting outfall. Option A5 for a new greenfield plant was not advanced to fine screening as the planning assessment did not identify potential constraints to prevent site expansion, however a flood risk assessment and full planning review is recommended throughout the project stage. For Option A6, the newly constructed Whitegate & Aghada was identified as a potential load transfer receiver due the availability of land to accommodate expansion. The existing Whitegate and Aghada WwTP discharge location also provides further treatment benefits and reduced risk or impact to environment.

Table 2-123: 2080 Options Advancing to Fine Screening

Options Progressed to Fine Screening for 2080	Description
A4	New Treatment Process on Existing Site with Existing Discharge Location
A6	Wastewater Load Transfer to Whitegate/Aghada WwTP

Fine Screening

The options presented in Table 2-123 underwent fine screening in the form of an MCA as detailed in Section 1.4. The scoring and results of the MCA are presented in Table 2-124.

Table 2-124: MCA Results for Cloyne WwTP

Objectives	Criteria	Option A4	Option A6
Addressing the Need	Treatment Capacity	3	3
	Network Capacity	3	1
	Final Effluent Compliance	3	2
Deliverability	Design Complexity, Ease of Implementation & Feasibility	-1	-1
	Planning & Regulation	1	1
	Delivery Timeline & Alignment	1	1
Risk & Resilience	Flexibility & Scalability	1	-1
	Delivery Risk	1	-1
Customer and Stakeholder Support	Impact on Customers	1	2
	Community Support, Health and Wellbeing	1	2

Environmental & Sustainability	Water Environment	2	3
	Waterbody Impact (Existing and New)	2	3
	Waterbody Flood Risk	0	0
	Biodiversity	2	2
	AA-Natura 2000 Sites	0	-1
	Aquatic Biodiversity	2	2
	Terrestrial Biodiversity (BNG)	-1	-2
	GHG Emissions	0.5	0.5
	Embodied Carbon	-1	-2
	Operational Carbon	2	3
	Energy Efficiency	2	2
	Climate Resilience	1	1
	Circular Economy	-1	1
Weighted Average Sub Total		**1.36**	**1.14**
Cost	CAPEX	3	3
	OPEX	4	4
	Whole Life Cost	3	3
Combined Score		**2.79**	**2.56**
Rank		**1st**	**2nd**

The MCA has identified Option A4 as the highest-ranking option against the fine screening criteria for the 2080 strategy horizon and offers better alignment with the goals of the CWS and UÉ compared to Option A6.

Wastewater Treatment Summary

The optioneering process for Cloyne WwTP has yielded recommendations for future development:

The highest ranked option ultimately involves the upgrade of the existing Cloyne WwTP to address future treatment demand requirements. This approach addresses receiving waterbody quality concerns and risks. This strategy ensures long-term sustainability by leveraging existing treatment facilities and protecting inland rivers sensitive to climate change.

This option effectively addresses several key challenges identified at Cloyne WwTP, including the current exceedance of organic loading capacity and the existing assets nearing end of asset life prior to 2055 and protection of existing discharge locations.

Wastewater Network Upgrade Summary

A separate assessment of network upgrades for this agglomeration has been undertaken as part of the Network Modelling Report which is included in Appendix 4. Below is a brief overview of the proposed upgrades within the Cloyne agglomeration, addressing SWO compliance and future development constraints such as surcharge and flooding due to development impacts. Unless otherwise stated specifically, these proposed upgrades are proposed to be initiated in the 2030 strategy horizon. The development process of these proposed upgrades, as well as maps and drawings illustrating the location of the required upgrades are provided in more detail in the Network Modelling Report in Appendix 4.

WWTP Storm Tank Enhancement: A storage upgrade has been proposed at the Cloyne WwTP. Additionally, a new extended outfall for the treatment works has been proposed.

Network Upgrade Across Catchment: An upgrade of c. 1.9km of the existing sewer system is proposed to increase the network's capacity.

Storage at Cois na Cruma WwPS: Additional storage to be provided at the wet well chamber.

New storage at CY-RAP-01 Development WwPS: Storage has been proposed at development site with a new rising main connecting to the network.

2.11.3 Saleen

Introduction

Saleen WwTP is located within Saleen Village and is currently served by a small septic tank which has become overloaded as the population of Saleen has increased. Saleen WwTP was built in the 1950s and is currently operated and maintained by Cork County Council on behalf of UÉ.

The WwTP has a design capacity of 40 PE and the plant consists of only primary treatment (Septic Tank). There are no storm management system or sludge treatment at Saleen WwTP. There are no emergency overflows upstream (or within) the WwTP and no secondary overflow discharges from the WwTP. All treated effluent from the WwTP drains by gravity to the Cork Harbour, located adjacent to the plant.

Although the plant is achieving the discharge requirements specified within its WWDL, the existing wastewater treatment process is currently performing very poorly.

Figure 2-60: Saleen Location

Table 2-125: Saleen WwTP Details

Organic Design PE	Storm Management	Inlet Works	Primary Treatment	Secondary Treatment	Tertiary Treatment	Chemical P Removal	Sludge Treatment	Installation Date
40	n/a	n/a	Septic tank	n/a	n/a	n/a	n/a	1950s

Table 2-126:Current and Projected Organic (PE)and Hydraulic Lading at Saleen WwTP

Parameter	Existing Capacity	Current (2024) Loading	2030	2055	2080
Organic Loading (PE)	40	605	891	1,032	1,158
Peak Hydraulic Loading (m^3/d)	-	-	512	593	666

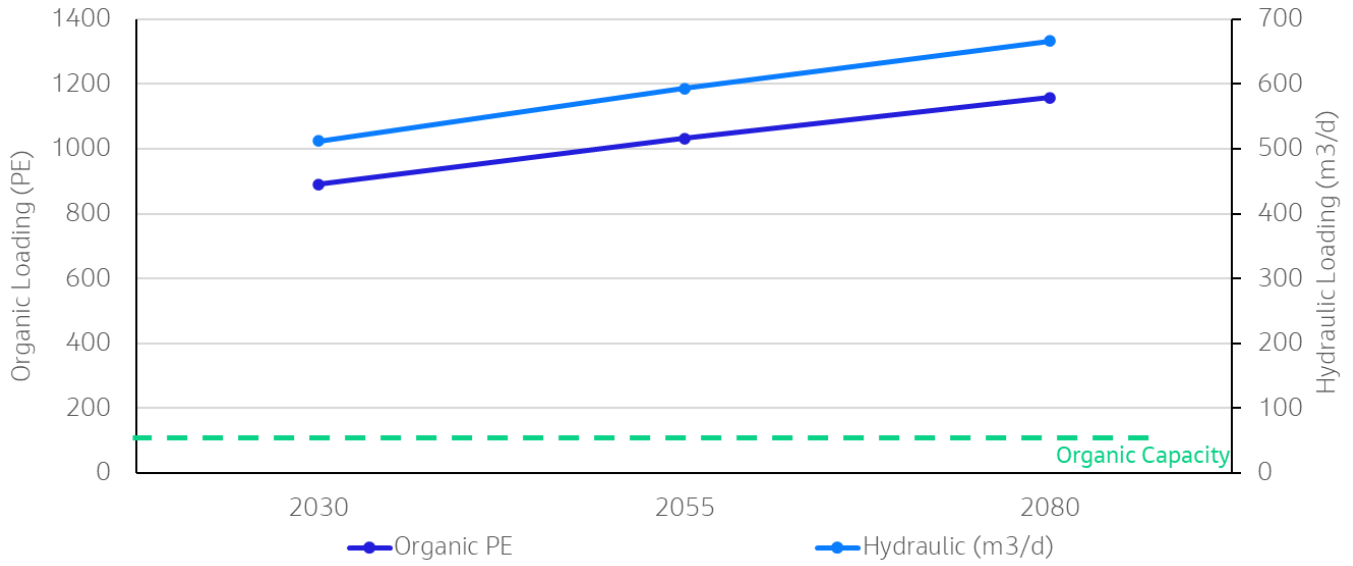


Figure 2-61: Current and Projected Loadings at Saleen WwTP

Current and Projected Discharge Limits

Following water quality modelling conducted at the existing WwTP discharge point, environmentally sustainable discharge limits based on compliance with the appropriate WFD EQS have been determined based on projected PE loading to the WwTP across the current and future Strategy horizons. The environmentally sustainable discharge limits for these scenarios have been summarised in Table 2-127.

Table 2-127: Existing WWDL ELVs and Environmentally Sustainable Discharge Limits at Saleen WwTP

Parameter	Existing ELVs	2030 Environmentally Sustainable Discharge Limits	2055 Environmentally Sustainable Discharge Limits	2080 Environmentally Sustainable Discharge Limits
BOD	25 mg/l	25 mg/l	25 mg/l	25 mg/l

TN	30 mg/l	30 mg/l	30 mg/l	30 mg/l
TP	2.5 mg/l	2.5 mg/l	2.5 mg/l	2.5 mg/l
More Stringent?	-	N	N	N

Summary of Observed Constraints

As part of the delivery of this Strategy, advancement of the Optioneering Process assessed potential Network, Ecological, Environmental and Planning constraints that may impact the development of feasible approaches. Key findings pertinent to this catchment have been summarised below:

Network Constraints

A separate assessment of the existing wastewater network for this agglomeration, including maps and drawings illustrating the location of constraints has been undertaken as part of the Network Modelling Report which is included in Appendix 4.

The network assessment identified potential flooding and surcharging conditions under current and future scenarios within the main trunk sewer within the Saleen catchment WW network. Based on future loading scenarios, model projections indicate a substantial increase in both the extent and frequency of these issues throughout the existing network. Notably, there are no Storm Water Overflows (SWOs) present in the system.

Environmental and Ecological Constraints

The discharge location waterbody is Knocknamadderee_010 with Good WFD Status (cycle 3 2016-2021) which after 70 m changes into the transitional/coastal Cork Harbour waterbody with Moderate WFD Status (cycle 3 2016-2021). Knocknamadderee River is classed as Not At Risk (2022) and Cork Harbour is classed as At Risk (2022). The discharge is located within the Cork Harbour SPA and Rostellan Lough, Aghada Shore And Poulnabibe Inlet pNHA and is 80 m upstream of mudflat and salt marsh habitats. The WwTP is also located 100 m from these sites. Rostellan South and Rostellan North Shellfish Waters are located approximately 2 km downstream from the discharge outfall.

Planning Constraints

Regarding planning, the assessment did not identify any zoning constraints. Land ownership disputes surrounding the existing site boundary present a potential challenge to expansion. According to landdirect.ie, the land on which Saleen WwTP is located is owned by the Minister of Energy. The operator has stated that the land is owned by Coillte. Furthermore, the site's proximity to Flood Zones A and B may necessitate the preparation of a Flood Risk Assessment (FRA) to support any proposed upgrade works within the existing footprint.

Coarse Screening

The coarse screening was undertaken on the unconstrained list of options at Saleen WwTP, which are shown in Table 1-1, as per the methodology outlined in Section 1.3. To provide context for the coarse screening results, which are outlined in Table 2-128, commentary on the coarse screening exercise is provided below.

- Option A0 (Do Nothing) has not been considered as a feasible option for the 2080 horizon as the existing WwTP is currently over capacity. The site's septic tank is in the process of being decommissioned, rendering the existing assets and site unfit for purpose.
- Option A1 (Do Minimum – Process Optimisation) has been deemed unfeasible for the 2080 horizon due to the projected exceedance of both organic and hydraulic capacities of the WwTP, coupled with the current end-of-life status of existing assets.

- Option A2 (Reuse with Investment – Existing Discharge Location) has been screened out for 2080 horizon as the existing assets will have exceeded their design life.
- Option A3 (Reuse with investment – New Discharge Location) has been screened out for the 2080 horizon as the existing assets will have exceeded their design life.
- Option A4 (New Treatment Process on Current Site) has been screened out due to reported issues with land acquisition involving a private owner.
- Option A5 (New Greenfield Plant with Existing Discharge) is considered viable for the 2080 horizon, as both the organic treatment capacity and the remaining asset life are projected to be exceeded.
- Option A6 (Wastewater Load Transfer) is considered viable for the 2080 horizon, as both the organic treatment capacity and the remaining asset life are projected to be exceeded.

Table 2-128: Coarse Screening Output of Saleen WwTP

Coarse Screening Results							
Long List of Options	**A0**	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**
2080	N	N	N	N	N	Y	Y
2055	N	N	N	N	N	Y	Y
2030	N	N	N	N	N	Y	Y

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening

Any options for the strategy horizon years of 2030 and 2055 should facilitate implementation of the longer term 2080 preferred solution and should not compromise the ability to implement this. Further option defining is undertaken in order to undertake the MCA fairly and adequately. At this stage of assessment, specific site locations have not been identified and typical project stage site selection assessments have not been undertaken. Potential proximity areas for potential greenfield site locations have been identified and planning and environmental assessments have been undertaken to facilitate the MCA process. Similarly, transfer routes were selected based on conservative routing assumptions and it is important to note that a full route selection process was not undertaken. Routes ensure minimal impact on the public and the environment and reduce delivery risk associated with land acquisition and planning requirements.

Both Cloyne and Whitegate & Aghada WwTPs were identified as potential wastewater load transfer receivers due to their proximity to Saleen and likely upgrade requirements based on future project treatment demand. The transfer of wastewater from Saleen to Whitegate & Aghada has synergies with options identified for Cloyne, as discussed in Section 2.11.2. Therefore, two iterations of Option A6 have been considered and are dependent on optimal solution identification of the two receiving plants identified.

Table 2-129: 2080 Options Advancing to Fine Screening

Options Progressed to Fine Screening for 2080	Description
A5	New Greenfield Plant with Existing Discharge
A6	Wastewater Load Transfer to Cloyne WwTP
A6	Wastewater Load Transfer to Whitegate & Agahda WwTP

Fine Screening

The options presented in Table 2-129 underwent fine screening in the form of an MCA as detailed in Section 1.4. The scoring and results of the MCA are presented in Table 2-130.

Table 2-130: MCA Results for Saleen WwTP

Objectives	Criteria	Option A5	Option A6 (Cloyne)	Option A6 (W&A)
Addressing the Need	Treatment Capacity	3	2	2
	Network Capacity	3	2	2
	Final Effluent Compliance	2	3	3
Deliverability	Design Complexity, Ease of Implementation & Feasibility	-1	1	1
	Planning & Regulation	-1	-1	-1
	Delivery Timeline & Alignment	3	1	1
Risk & Resilience	Flexibility & Scalability	3	-1	-1
	Delivery Risk	-2	-1	-1
Customer and Stakeholder Support	Impact on Customers	1	3	3
	Community Support, Health and Wellbeing	1	3	3
Environmental & Sustainability	Water Environment	1	2	3
	Waterbody Impact (Existing and New)	1	2	2
	Waterbody Flood Risk	0	0	0
	Biodiversity	-2	-1	-1
	AA-Natura 2000 Sites	2	3	3
	Aquatic Biodiversity	2	3	3
	Terrestrial Biodiversity (BNG)	-2	-1	-1
	GHG Emissions	-1	0	0
	Embodied Carbon	-3	-3	-3
	Operational Carbon	1	3	3
	Energy Efficiency	2	3	3
	Climate Resilience	1	2	2
	Circular Economy	-2	-1	-1
Weighted Average Sub Total		0.73	1.10	1.17
Cost	CAPEX	3	5	4
	OPEX	6	6	6
	Whole Life Cost	4	5	5
Combined Score		**2.59**	**3.38**	**3.31**
Rank		**3rd**	**1st**	**2nd**

The MCA has identified Option A6 transfer to Cloyne WwTP as the highest-ranking option against the fine screening criteria for the 2080 strategy horizon and offers a more cost-effective implementation and better alignment with the goals of the CWS and UÉ compared to Options A5. Option A6 transfer to Whitegate & Aghada WwTP ranks very closely to Option A6 transfer to Cloyne WwTP on both MCA criteria and cost benefits. Record of this output shall be kept to inform future project stages should future constraints or potential benefits not realised at this stage of assessment be identified.

Wastewater Treatment Summary

The optioneering process for Saleen WwTP has yielded recommendations for future development:

The highest ranked option ultimately involves transferring wastewater to Cloyne (Option A6). This strategy ensures long-term sustainability by leveraging existing treatment facilities at Cloyne WwTP and protecting inland rivers sensitive to climate change.

This option effectively addresses several key challenges identified at Saleen WwTP, including reported land acquisition issues that limit on-site expansion potential, the current exceedance of organic loading capacity, and the fact that existing assets have already surpassed their expected service life.

Wastewater Network Upgrade Summary

A separate assessment of network upgrades for this agglomeration has been undertaken as part of the Network Modelling Report which is included in Appendix 4. Below is a brief overview of the proposed upgrades within the Saleen agglomeration, addressing SWO compliance and future development constraints such as surcharge and flooding due to development impacts. Unless otherwise stated specifically, these proposed upgrades are proposed to be initiated in the 2030 strategy horizon. The development process of these proposed upgrades, as well as maps and drawings illustrating the location of the required upgrades are provided in more detail in the Network Modelling Report in Appendix 4.

New storage at Saleen WwPS: A storage facility has been proposed at the Saleen treatment site. This plan also includes the installation of a c. 4.5km new rising main, which will pump forward flow to the Cloyne catchment and decommission the treatment plant in the 2030 horizon.

Network Upgrade Across Catchment: An upgrade of c. 2.5km of the existing sewer system is proposed to increase the network's capacity.

New storage at SN-RD Development WwPS: Storage has been proposed at development site with a new rising main connecting to the network.

2.11.4 North Cobh

Introduction

North Cobh WwTP is located at Ballynoe approximately 1.6 km northwest of Cobh Town Centre. The plant received its first flows in May 2008, and EPS operate and maintain the North Cobh WwTP on behalf of Uisce Éireann.

The WwTP has a design capacity of 4,000 PE with only one module of 2,000 PE used. North Cobh was originally built as an interim measure until the Cork Lower Harbour Main Drainage Scheme WwTP at Cork Lower Harbour was constructed.

North Cobh comprises of; secondary treatment with sludge treatment on-site, consisting of a picket fence thickener. Treated wastewater from the plant is discharged to Cork Harbour.

The existing wastewater treatment process is achieving the discharge requirement specified within the WWDL.

Figure 2-62: North Cobh Location

Table 2-131: North Cobh WwTP Details

Design Organic PE	Storm Management	Inlet Works	Primary Treatment	Secondary Treatment	Tertiary Treatment	Chemical P Removal	Sludge Treatment	Installation Date
2,000	Storm Tank	Screening	n/a	SBR	n/a	n/a	Picket Fence Thickener	2010

Table 2-132: Current and Projected Organic (PE) and Hydraulic Loading at North Cobh WwTP

Parameter	Existing Capacity	Current (2024) Loading	2030	2055	2080
Organic Loading (PE)	2,000	1,790	1,755	2,144	2,454
Peak Hydraulic Loading (m^3/d)	900	1,100	1,009	1,233	1,411

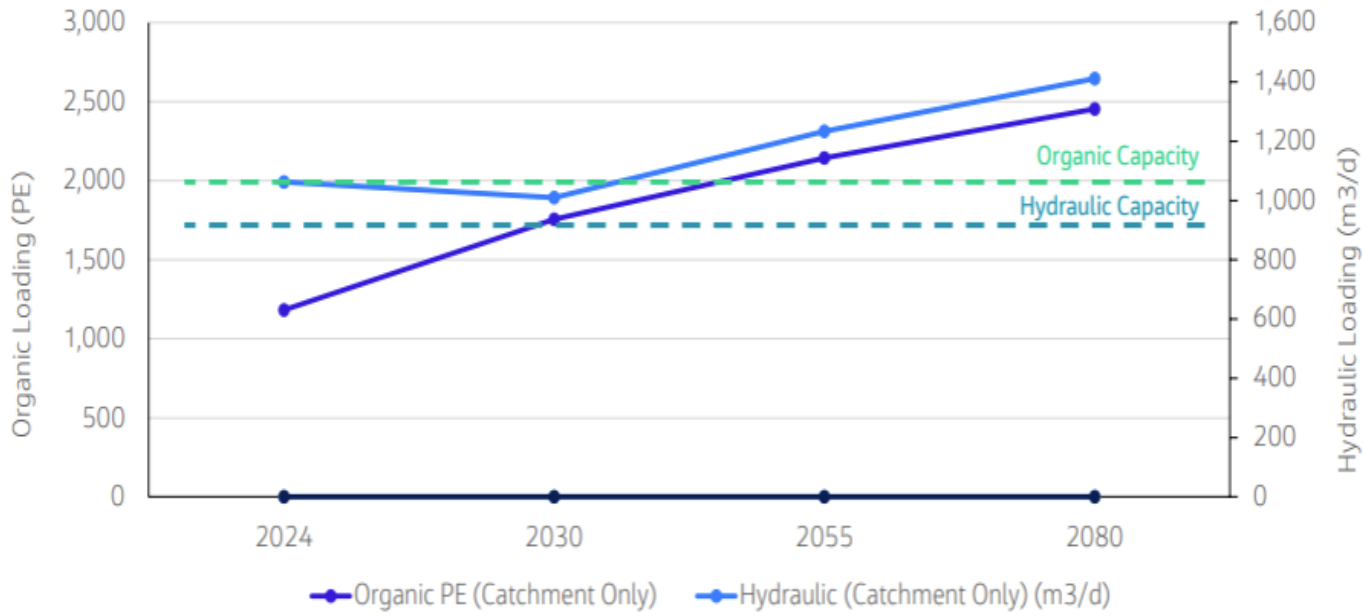


Figure 2-63: Current and Projected Loadings at North Cobh WwTP

Current and Projected Discharge Limits

Following water quality modelling conducted at the existing WwTP discharge point, environmentally sustainable discharge limits based on compliance with the appropriate WFD Environmental Quality Standards (EQS) have been determined based on projected population equivalent (PE) loading to the WwTP across the current and future Strategy horizons. The environmentally sustainable discharge limits for these scenarios have been summarised in Table 2-133.

Table 2-133: Existing WWDL ELVs and Environmentally Sustainable Discharge Limits at North Cobh WwTP

Parameter	Existing ELVs	2030 Environmentally Sustainable Discharge Limits	2055 Environmentally Sustainable Discharge Limits	2080 Environmentally Sustainable Discharge Limits
BOD	25 mg/l	25 mg/l	25 mg/l	25 mg/l
TN	25 mg/l	25 mg/l	25 mg/l	25 mg/l
TP	2.5 mg/l	2.5 mg/l	2.5 mg/l	2.5 mg/l
More Stringent?	-	N	N	N

Summary of Observed Constraints

As part of the delivery of this Strategy, advancement of the Optioneering Process assessed potential Network, Ecological, Environmental and Planning constraints that may impact the development of feasible approaches. Key findings pertinent to this catchment have been summarised below:

Network Constraints

A separate assessment of the existing wastewater network for this agglomeration, including maps and drawings illustrating the location of constraints has been undertaken as part of the Network Modelling Report which is included in Appendix 4.

The network assessment has identified flooding and surcharging in the main trunk of the network under both current and all future scenarios, based on modelled results. If no interventions are undertaken, future scenarios show a worsening trend, with increased levels of network flooding and surcharging. Overall, the network is under significant pressure and will require substantial upgrades, regardless of the final WwTP solution selected.

Environmental and Ecological Constraints

The discharge location waterbody is a transitional water body with Moderate WFD Status (cycle 3 2016-2021), on the High Status Objective list and classified as At Risk (2022). No European designated sites (SPAs and SACs) are located in proximity to the current WwTP and the discharge location within 2.4 km from the nearest SPA/SAC.

Planning Constraints

The planning assessment has identified no zoning constraints or planning restrictions surrounding the site boundary.

Coarse Screening

The coarse screening was undertaken on the unconstrained list of options at North Cobh WwTP, which are shown in Table 1-1, as per the methodology outlined in Section 1.3. To provide context for the coarse screening results, which are outlined in Table 2-134, commentary on the coarse screening exercise is provided below.

- Option A0 (Do Nothing) has not been considered as a feasible option for the 2080 horizon as the existing WwTP will be over capacity and not achieving the discharge requirements as set in the WWDL.
- Option A1 (Do Minimum – Process Optimisation) has been shortlisted in the short term due to a projected capacity increase achievable in the 2030 horizon, with the potential to meet current WWDL requirements. The option has not been considered for 2080 horizon, as both organic and hydraulic capacities shall be exceeded, and the existing assets will surpass their service life after 2055.
- Option A2 (Reuse with Investment – Existing Discharge Location) has been screened out for the 2080 horizon as the existing assets will have exceeded their design life.
- Option A3 (Reuse with investment – New Discharge Location) has been screened out for the 2080 horizon as the existing assets will have exceeded their design life.
- Option A4 (New Treatment Process on Current Site with New Discharge) was considered for the 2080 horizon as the existing treatment process is unlikely to remain suitable for future needs.
- Option A5 (New Greenfield Plant with New Discharge) was considered in 2080 horizon as the existing treatment process is unlikely to remain suitable for future needs and site expansion is likely required. However, land availability constraints were not identified and so the option was progressed as amber, requiring additional planning and feasibility assessment in the Fine Screening stage.
- Option A6 (Wastewater Load Transfer) is considered feasible for each strategy horizon, as the existing plant was initially planned to be an interim solution and flows were planned to be transferred to Cork Lower Harbour. Additionally, the existing assets are projected to surpass their service life after 2055. Further route assessment is required to determine the most viability transfer solution.

Table 2-134: Coarse Screening Output

Coarse Screening Results							
Long List of Options	A0	A1	A2	A3	A4	A5	A6
2080	N	N	N	N	Y	Y	Y
2055	N	Y	Y	N	N	N	Y
2030	N	Y	N	N	N	N	Y

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening

Any options for the strategy horizon years of 2030 and 2055 should facilitate implementation of the longer term 2080 horizon preferred solution and should not compromise the ability to implement this. Further option defining is undertaken in order to undertake the MCA fairly and adequately. Transfer solutions consider the additional capacity/ability of surrounding existing WwTPs to accept transferred wastewater and the potential impact on their existing or proposed discharge locations. At this stage of optioneering, routes were selected based on conservative routing assumptions and it is important to note that a full route selection process was not undertaken. Routes ensure minimal impact on the public and the environment and reduce delivery risk associated with land acquisition and planning requirements. The options progressed to fine screening are outlined in Table 2-135.

Table 2-135: 2080 Options Advancing to Fine Screening

Options Progressed to Fine Screening for 2080	Description
A4	New Treatment Process on Current Site
A5	New Greenfield Plant
A6	Wastewater Load Transfer to Cork Lower Harbour WwTP via existing Cobh wastewater network

Fine Screening

The options presented in Table 2-135 underwent fine screening in the form of an MCA as detailed in Section 1.4. The scoring and results of the MCA are presented in Table 2-136.

Table 2-136: MCA Results for North Cobh WwTP

Objectives	Criteria	Option A4	Option A5	Option A6
Addressing the Need	Treatment Capacity	3	3	2
	Network Capacity	3	3	-1
	Final Effluent Compliance	3	2	3
Deliverability	Design Complexity, Ease of Implementation & Feasibility	-2	-2	1
	Planning & Regulation	1	-1	2
	Delivery Timeline & Alignment	-1	-1	1
Risk & Resilience	Flexibility & Scalability	-3	1	-2
	Delivery Risk	0	-2	1
	Impact on Customers	-2	2	3

Customer and Stakeholder Support	Community Support, Health and Wellbeing	-2	1	3
Environmental & Sustainability	Water Environment	2	3	3
	Waterbody Impact (Existing and New)	2	3	3
	Waterbody Flood Risk	0	0	-1
	Biodiversity	-1	-2	2
	AA-Natura 2000 Sites	0	0	1
	Aquatic Biodiversity	2	2	2
	Terrestrial Biodiversity (BNG)	-1	-2	0
	GHG Emissions	0	-0.5	1
	Embodied Carbon	-2	-3	-1
	Operational Carbon	2	2	3
	Energy Efficiency	2	2	3
	Climate Resilience	2	1	3
	Circular Economy	-1	-1	1
Weighted Average Sub Total		**0.99**	**0.52**	**1.65**
Cost	CAPEX	3	3	3
	OPEX	5	5	5
	Whole Life Cost	3	3	4
Combined Score		**2.56**	**2.09**	**3.36**
Rank		**2nd**	**3rd**	**1st**

The MCA concluded that Option A6 ranks first against the fine screening criteria for the 2080 horizon and is more cost-effective to implement than Options A4 and A5. When considering 2080 horizon in isolation, all existing assets would require replacement unless phased upgrades are undertaken in earlier planning periods.

Wastewater Treatment Summary

The optioneering process for North Cobh WwTP has yielded recommendations for future development:

The highest ranked option ultimately involves transferring wastewater to Cork Lower Harbour WwTP via the existing Cobh wastewater network (Option A6). This approach addresses receiving waterbody quality concerns and risks, and circular economy by consolidating treatment at a centralised location and improves overall treatment efficiency whilst simultaneously protecting the environment and ecological boundaries. This strategy ensures long-term sustainability by leveraging existing treatment facilities at Cork Lower Harbour WwTP and protecting coastal waters sensitive to climate change.

This approach addresses several critical challenges at the North Cobh WwTP, including flooding and surcharging of the main network trunk under both current and future scenarios, as indicated by the network model; vulnerability of aquatic ecology due to the frequency and quality of overflows.

Wastewater Network Upgrade Summary

A separate assessment of network upgrades for this agglomeration has been undertaken as part of the Network Modelling Report which is included in Appendix 4. Below is a brief overview of the proposed upgrades within the North Cobh catchment. The development process of these proposed upgrades, as well

as maps and drawings illustrating the location of the required upgrades are provided in more detail in the Network Modelling Report in Appendix 4.

North Cobh WwTP: Proposed WwTP decommission, flow diversion and proposed new WwPS with an approx. 2 km rising main to Cobh Village and a new storage arrangement.

2.11.5 Whitegate-Aghada

Introduction

The town of Whitegate & Aghada is located in East County Cork. The agglomeration is currently sub-divided into four drainage areas: Whitegate, Upper Aghada, Lower Aghada and Rostellan, which are located along the east coast of Cork Harbour.

The WwTP has recently been constructed and has been in operation since late 2024. The WwTP has a design capacity of 2,500 PE. The plant consists of preliminary treatment (screening) and primary treatment (primary settlement), while no secondary treatment or tertiary treatment are present. There is storm management system (storm tank) and sludge treatment (storage) at Whitegate/Aghada WwTP. There are no emergency overflows upstream (or within) the WwTP and no secondary overflow discharges from the WwTP. All treated effluent from the WwTP drains by gravity to White Bay, located adjacent to the plant.

Figure 2-64: Whitegate-Aghada Location

Table 2-137: Whitegate-Aghada WwTP Details

Organic Design PE	Storm Management	Inlet Works	Primary Treatment	Secondary Treatment	Tertiary Treatment	Chemical P Removal	Sludge Treatment	Installation Date
2,500	Storm Tank	Screening	PST	n/a	n/a	n/a	n/a	2024

Table 2-138: Current and Projected Organic (PE) and Hydraulic Loading to Whitegate-Aghada WwTP

Parameter	Existing Capacity	Current (2024) Loading	2030	2055	2080
Organic Loading (PE)	2,500	Unknown	3,361	3,959	4,444
Peak Hydraulic Loading (m^3/d)	n/a	Unknown	1,933	2,276	2,555

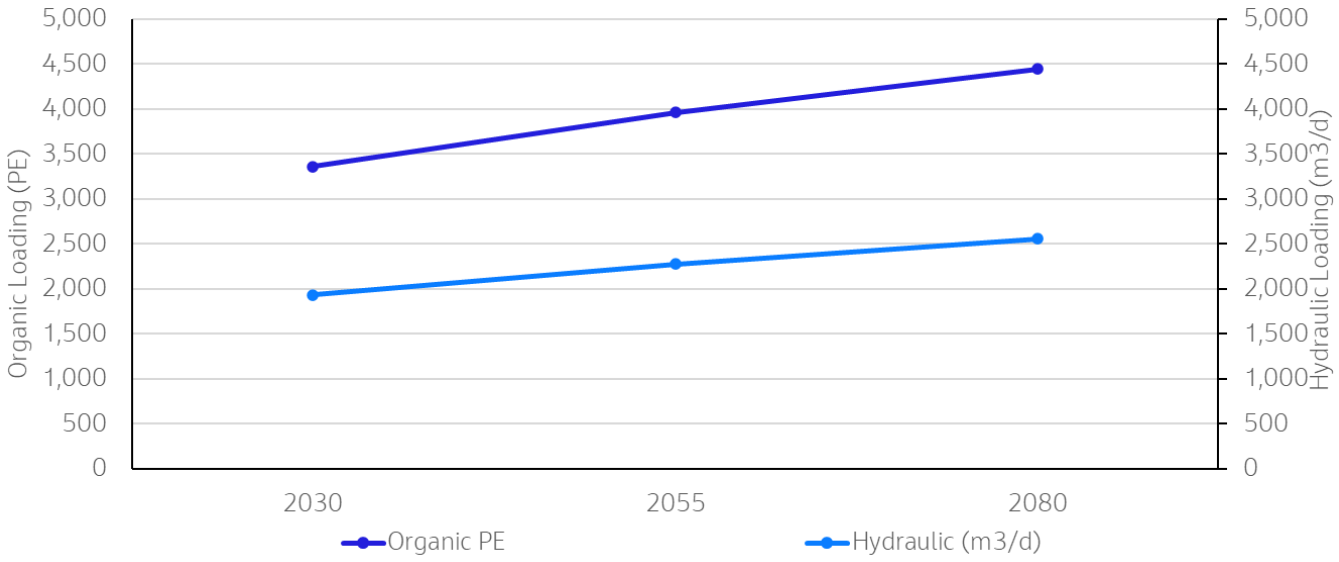


Figure 2-65: Current and Projected Loadings at Whitegate-Aghada WwTP

Current and Projected Discharge Limits

Following water quality modelling conducted at the existing WwTP discharge point, environmentally sustainable discharge limits based on compliance with the appropriate WFD EQS have been determined based on projected PE loading to the WwTP across the current and future Strategy horizons. The environmentally sustainable discharge limits for these scenarios have been summarised in Table 2-139.

Table 2-139: Existing WWDL ELVs and Environmentally Sustainable Discharge Limits at Whitegate-Aghada

Parameter	Existing ELVs	2030 Environmentally Sustainable Discharge Limits	2055 Environmentally Sustainable Discharge Limits	2080 Environmentally Sustainable Discharge Limits
BOD	25 mg/l	25 mg/l	25 mg/l	25 mg/l
TN	54 mg/l	54 mg/l	54 mg/l	54 mg/l
TP	2.5 mg/l	2.5 mg/l	2.5 mg/l	2.5 mg/l
More Stringent?	-	N	N	N

Summary of Observed Constraints

The performance of the Whitegate-Aghada WwTP has not been fully evaluated at this stage, as the facility has very recently undergone significant redevelopment, with a new treatment plant being commissioned.

Environmental and Ecological Constraints

The discharge location waterbody is Outer Cork Harbour with Moderate WFD Status (cycle 3 2016-2021) classified as Not At Risk (2022). No European or National designated sites are in proximity or with direct pathways to the current WwTP and the discharge outfall is more than 10 km away from nearest SPA/SAC. In the past five years there have been some odour complaints within 500 m distance from the plant.

Coarse Screening

The coarse screening was undertaken on the unconstrained list of options at Whitegate-Aghada WwTP, which are shown in Table 1-1, as per the methodology outlined in Section 1.3. To provide context for the coarse screening results, which are outlined in Table 2-140, commentary on the coarse screening exercise is provided below.

- Option A0 (Do Nothing) has not been considered as a feasible option for the 2080 horizon as the existing WwTP is currently over capacity and the existing process treatment type is insufficient to meet the requirements of the future strategy.
- Option A1 (Do Minimum – Process Optimisation) has been deemed unfeasible for the 2080 horizon due to the projected exceedance of both organic and hydraulic capacities of the WwTP, coupled with the anticipated end-of-life status of existing assets.
- Option A2 (Reuse with Investment – Existing Discharge Location) has been deemed unfeasible for the 2080 horizon due to the anticipated end-of-life status of existing assets.
- Option A3 (Reuse with investment – New Discharge Location) has been screened out for 2080 horizon as the remaining assets life are projected to be exceeded and the environmentally sustainable discharge limits are not expected to become more stringent at the existing discharge location.
- Option A4 (New Treatment Process on Current Site with Existing Discharge Location) is considered viable for the 2080 horizon, as the remaining assets life are projected to be exceeded. This option also accounts for increased capacity requirements, and the site is expected to have sufficient footprint to accommodate the necessary upgrades.
- Option A5 (New Greenfield Plant with New Discharge) has been screened out, as the WwTP is currently being commissioned and the environmentally sustainable discharge limits are not expected to become more stringent at the existing discharge location.

- Option A6 (Wastewater Load Transfer) has not been considered, as no feasible transfer solutions were identified that would enhance treatment outcomes. Proposed options, such as pumping inland to a more constrained WwTP and meeting discharge requirements, were found to be impractical.

Table 2-140: Coarse Screening Output of Whitegate-Aghada WwTP (short-listed options shown in red)

Coarse Screening Results							
Long List of Options	**A0**	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**
2080	N	N	N	N	Y	N	N
2055	N	N	Y	N	N	N	N
2030	N	N	Y	N	N	N	N

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening

Any options for the strategy horizon years of 2030 and 2055 should facilitate implementation of the longer term 2080 preferred solution and should not compromise the ability to implement this.

Fine Screening

No fine screening was undertaken for the Whitegate/Aghada WwTP, as the coarse screening assessment identified Option A4 (New Treatment Process on Current Site with Existing Discharge Location) as the only viable option for the 2080 horizon, based on the reasons outlined previously. Option A2 was not considered as the current treatment process is unlikely to provide the required treatment efficiency requirements to meet projected environmentally sustainable discharge limits. Consequently, a fine screening using the Multi-Criteria Analysis (MCA) approach described in Section 1.4 was not conducted.

Wastewater Treatment Summary

The optioneering process for Whitegate & Aghada WwTP has yielded recommendations for future development:

The highest ranked option ultimately involves upgrading the existing plant while maintaining the current discharge location (Option A4). This is necessary to accommodate additional flows due to population increases and potential imports from nearby WwTPs.

Wastewater Network Upgrade Summary

A separate assessment of network upgrades for this agglomeration has been undertaken as part of the Network Modelling Report which is included in Appendix 4. Below is a brief overview of the proposed upgrades within the Whitegate-Aghada agglomeration, addressing SWO compliance and future development constraints such as surcharge and flooding due to development impacts. Unless otherwise stated specifically, these proposed upgrades are proposed to be initiated in the 2030 strategy horizon. The development process of these proposed upgrades, as well as maps and drawings illustrating the location of the required upgrades are provided in more detail in the Network Modelling Report in Appendix 4.

Additional storage at Lower Aghada WwPS: Additional storage has been proposed at the wet well chamber.

Additional storage at Rostellan WwPS and storm tank: Additional storage has been proposed at the wet well chamber.

Additional storage at Whitegate WwPS: Additional storage has been proposed at Whitegate WwPS.

Network Upgrade Across Catchment: An upgrade of c. 6.5km of the existing sewer system is proposed to increase the network's capacity.

2.11.6 Feasible Approaches for Ballymore, Cloyne, Saleen, and Whitegate-Aghada

The results of the fine screening process and MCA were assessed and taken forward to develop 3 No. Feasible Approaches for the sub catchment. These approaches comprise combinations of options for each agglomeration, carefully selected to best achieve the goals of the CWS. The wastewater network upgrade proposals for each catchment mentioned above are common amongst Feasible Approaches detailed below

Our approach ensures that the selected strategies are not only technically viable but also align with the long-term vision for wastewater management in the region.

These Approaches are summarised in Table 2-141 overleaf.

Feasible Approach 1 integrates the higher-ranking MCA options for the agglomeration sites, proposing a comprehensive strategy for wastewater management through 2080 horizon.

- **Ballymore:** For Ballymore, as there is currently no treatment facility in the area at present, it is proposed to initiate the development of a 4.5km wastewater transfer pipe to transfer flows to the existing Cobh wastewater network in the 2030 strategy horizon. The associated Ballymore Pumping Station will be designed to handle wastewater flows projected for the 2055 and 2080 strategy horizons. The Ballymore Pumping Station will continue to operate through to the 2080 horizon.
- **Cloyne:** Cloyne WwTP is proposed to initiate an upgrade of an additional 3,600 PE in the 2030 horizon to cater for increasing loads due to population increase and additional flows being received from Saleen. It is also proposed to initiate the construction a new final effluent outfall to Rostellan. The WwTP shall continue to operate through 2055 and due to aging asset life, a capital replacement of 5,000 PE and a further 500 PE upgrade is proposed to be initiated in the 2080 horizon.
- **Saleen:** For Saleen, it is proposed to initiate the construction a new transfer pumping station and decommission the existing septic tank in the 2030 strategy horizon. The Saleen Pumping Station is proposed to be designed to handle wastewater flows projected for 2055 and 2080 horizons, pumping wastewater to Cloyne WwTP through a newly constructed 4.5km pipeline. The Saleen Pumping Station is proposed to continue to operate through to the 2080 horizon.
- **North Cobh:** It is proposed to continue operation of North Cobh WwTP through the 2030 horizon. In the 2055 strategy horizon, it is proposed that the WwTP shall be decommissioned with incoming flows being pumped to the existing Cobh wastewater network for treatment at Cork Lower Harbour WwTP. This necessitates the construction of a new pumping station to be initiated in the 2055 strategy horizon which will continue to operate through to 2080 horizon.
- **Whitegate-Aghada:** It is proposed to initiate the upgrade of the WwTP of 1,500 PE in the 2030 horizon. The WwTP shall continue to operate through the 2055 strategy horizon and due to aging asset life will require a capital replacement of 4,000 PE and a further 500 PE upgrade is proposed to be initiated in the 2080 horizon.

Feasible Approach 2 explores alternative high-scoring options from the MCA, proposing a phased approach to address the wastewater management needs of the agglomerations through 2080 horizon.

- **Ballymore:** As with Feasible Approach 1, the proposal for Ballymore is to initiate to construct a new pumping station and rising main to transfer wastewater to the Cobh network for treatment in the 2030 strategy horizon.
- **Cloyne:** It is proposed to initiate the decommissioning of the existing Cloyne WwTP in the 2030 horizon with flows being transferred to Whitegate-Aghada WwTP via new a pumping station and transfer main. It is proposed that the new Cloyne Pumping Station's design will accommodate projected wastewater flows for both 2055 and 2080 horizons. It will pump wastewater to the Whitegate-Aghada WwTP via a newly constructed pipeline. It is proposed that the Cloyne Pumping Station will continue to operate through to the 2080 horizon.
- **Saleen:** It is proposed to initiate the transfer of flows from Saleen to Whitegate-Aghada WwTP for treatment for the 2030 horizon. This proposal will require the decommissioning of the existing Saleen septic tank and construction of a new pumping station and transfer pipeline. The Saleen Pumping Station is proposed to be designed to handle wastewater flows projected for 2055 and 2080 horizons, pumping wastewater to Whitegate-Aghada WwTP the Saleen Pumping Station will continue to operate through to the 2080 horizon.
- **North Cobh:** As with Feasible Approach 1, the proposal for Cobh is to continue to operate the WwTP until the 2055 strategy horizon when the WwTP will be decommissioned and incoming flow will be pumped to Cork Lower Harbour via the existing Cobh network for treatment.
- **Whitegate-Aghada:** In order to facilitate the additional loads from Cloyne and Saleen, it is proposed that the Whitegate-Aghada WwTP initiate an upgrade of 5,000 PE in the 2030 strategy horizon. The WwTP shall continue to operate through 2055 horizon, and it is proposed that a further 2,500PE upgrade be initiated. Due to aging asset life, a capital replacement of 7,500 PE to be initiated in the 2080 horizon.

Feasible Approach 3 investigates further options that have passed the fine screening process.

- **Cloyne, Saleen, North Cobh and Whitegate-Aghada:** The proposals for Cloyne, Saleen, North Cobh and Whitegate-Aghada are identical to what has been proposed in Feasible Approach 1, reinforcing the high ranking these received in the MCA.
- **Ballymore:** The difference in the options lies with the approach adapted for Ballymore. As discussed, there is currently no WwTP at Ballymore to treat wastewater arising within the catchment. It is proposed to initiate the development of a new WwTP capable of treating 500 PE at Ballymore in the 2030 strategy horizon. It is proposed that the new WwTP will consist of a discharge at Cork Harbour necessitating a pipeline to be constructed 0.5km on land following existing roads, and a further 0.5km marine outfall. The WwTP is to be initiated in the 2030 horizon and will continue to operate through to 2080 horizon where a capital replacement of the entire WwTP is proposed due to the aging assets and a further upgrade of 50 PE being proposed to account for increased population projections.

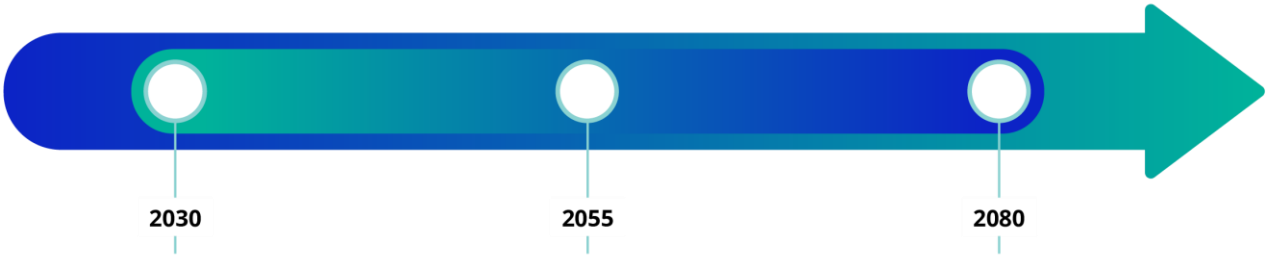
Table 2-141: Feasible Approaches for Ballymore, Cloyne, Saleen, and Whitegate-Aghada

Strategy Horizon	Catchment	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
2030	Cloyne WwTP	• 3,600PE upgrade of existing WwTP. • Construct new FE transfer and outfall to Rostellan and associated Pumping Station.	• Construct wastewater transfer to Whitegate-Aghada WwTP and associated WwPS • Decommission WwTP	• 3,600PE upgrade of existing WwTP. • Construct new FE transfer and outfall to Rostellan and associated Pumping Station.
	Saleen WwTP	• Construct a new Wastewater Transfer Pumping Station (WwPS) • Construct a new wastewater transfer pipe from Saleen to Cloyne WWTP • Decommission existing WwTP	• Construct a new Wastewater Transfer Pumping Station (WwPS) • Construct a new wastewater transfer pipe and transfer to Whitegate-Aghada WwTP • Decommission existing WwTP	• Construct a new Wastewater Transfer Pumping Station (WwPS) • Construct a new wastewater transfer pipe from Saleen to Cloyne WWTP • Decommission existing WwTP
	Ballymore	• Construct a new Wastewater Transfer Pumping Station (WwPS) • Construct a new wastewater transfer pipe from Ballymore to existing Cobh collection network	• Construct a new Wastewater Transfer Pumping Station (WwPS) • Construct a new wastewater transfer pipe from Ballymore to existing Cobh collection network	• Construct new 500 PE WwTP and new FE discharge to Cork Harbour
	Whitegate - Aghada WwTP	• 1,500 PE upgrade of existing WwTP	• 5,000 PE upgrade of existing WwTP	• 1,500 PE upgrade of existing WwTP
	North Cobh WwTP	• Continue to operate WwTP	• Continue to operate WwTP	• Continue to operate WwTP
2055	Cloyne WwTP	• Continue to operate WwTP	• Continue to operate WwPS	• Continue to operate WwTP
	Saleen WwTP	• Continue to operate WwPS	• Continue to operate WwPS	• Continue to operate WwPS
	Ballymore	• Continue to operate WwPS	• Continue to operate WwPS	• Continue to operate WwTP

Strategy Horizon	Catchment	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
	Whitegate - Aghada WwTP	• Continue to operate WwTP	• 2,500 PE upgrade of existing WwTP	• Continue to operate WwTP
	North Cobh WwTP	• Construct a new Wastewater Transfer Pumping Station (WwPS) • Construct a new wastewater transfer pipe from North Cobh to existing Cobh collection network which discharges to Cork Lower Harbour WWTP • Decommission WwTP	• Construct a new Wastewater Transfer Pumping Station (WwPS) • Construct a new wastewater transfer pipe from North Cobh to existing Cobh collection network which discharges to Cork Lower Harbour WWTP • Decommission WwTP	• Construct a new Wastewater Transfer Pumping Station (WwPS) • Construct a new wastewater transfer pipe from North Cobh to existing Cobh collection network which discharges to Cork Lower Harbour WWTP • Decommission WwTP
2080	Cloyne WwTP	• 500 PE upgrade of existing WwTP • 5,000PE WwTP capital replacement	• Continue to operate WwPS	• 500 PE upgrade of existing WwTP • 5,000PE WwTP capital replacement
	Saleen WwTP	• Continue to operate WwPS	• Continue to operate WwPS	• Continue to operate WwPS
	Ballymore	• Continue to operate WwPS	• Continue to operate WwPS	• 50 PE upgrade of existing WwTP • 500PE WwTP capital replacement
	Whitegate - Aghada WwTP	• 500 PE upgrade of existing WwTP • 4,000PE WwTP capital replacement	• 7,500PE WwTP capital replacement	• 500 PE upgrade of existing WwTP • 4,000PE WwTP capital replacement
	North Cobh WwTP	• Continue to operate WwPS	• Continue to operate WwPS	• Continue to operate WwPS

2.11.7 Recommended Approach and Implementation Strategy for Ballymore, North Cobh, Cloyne, Saleen, and Whitegate-Aghada

Based on the analysis conducted above, **Feasible Approach 1** is recommended for implementation and further development as an integral component of the CWS. This recommendation stems from the approach's superior performance across the assessed criteria and its alignment with the broader CWS objectives, making it the most suitable and sustainable solution for addressing the sub-catchment's wastewater management needs.



2030

Cloyne – Upgrade existing WWTP to Increase existing design capacity by 3,600 PE to a new design capacity of 5,000 PE

Construct a new treated wastewater pipe, pumping station and outfall from Cloyne WWTP to Rostellan.

Saleen – Construct a new Wastewater Transfer Pumping Station (WwPS)

Construct a new untreated wastewater transfer pipe from Saleen to Cloyne WWTP

Decommission existing WwTP

Ballymore – Construct a new Wastewater Transfer Pumping Station (WwPS)

Construct a new untreated wastewater transfer pipe from Ballymore to existing Cobh collection network

Whitegate & Aghada – Upgrade existing WWTP to Increase existing design capacity by 1,500 PE to a new design capacity of 4,000 PE

North Cobh – Continue to operate WwTP

Utilise existing discharge

2055

Cloyne – Continue to operate WwTP

Saleen – Continue to operate WwPS

Ballymore – Continue to operate WwPS

Whitegate & Aghada – Continue to operate WwTP

North Cobh – Construct a new Wastewater Transfer Pumping Station (WwPS)

Construct a new untreated wastewater transfer pipe from North Cobh to existing Cobh collection network which discharges to Cork Lower Harbour WWTP

2080

Cloyne – Upgrade existing WWTP to Increase existing design capacity by 500 PE to a new design capacity of 5,500 PE

Provide a 5,000 PE capital replacement of the original WWTP

Saleen – Continue to operate WwPS

Ballymore – Continue to operate WwPS

Whitegate & Aghada – Upgrade existing WWTP to Increase existing design capacity by 500 PE to a new design capacity of 4,500 PE

Provide a 4,000 PE capital replacement of the original WWTP

North Cobh – Continue to operate WwPS

Figure 2-66: Proposed Implementation Strategy for Ballymore, Cloyne, Saleen, and Whitegate-Aghada

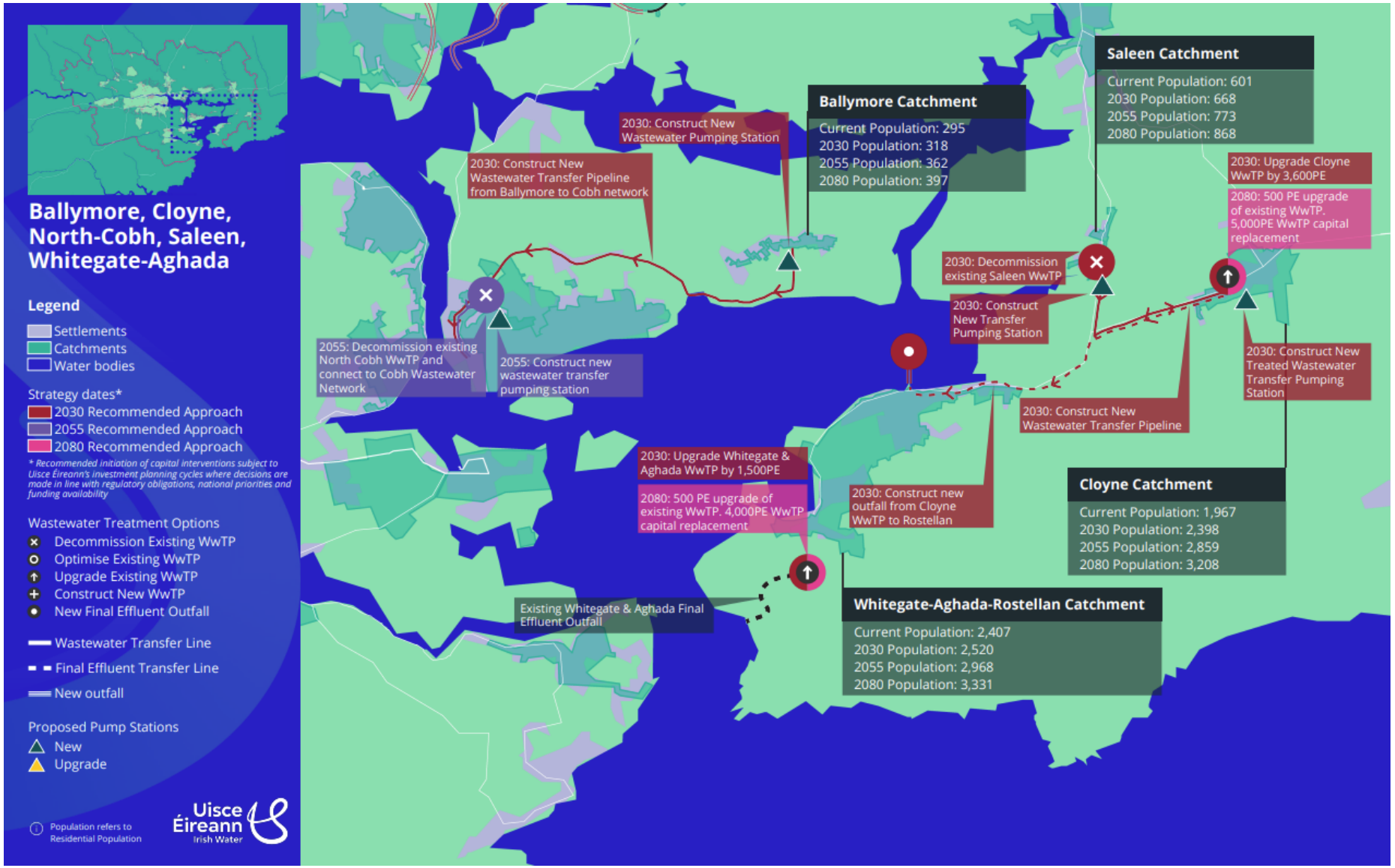


Figure 2-67: Recommended Approach for Ballymore, Cloyne, Saleen, North Cobh and Whitegate-Aghada

2.12 Ballincurrig, Leamlara, and Lisgoold

2.12.1 Ballincurrig

Ballincurrig WwTP is located approximately 19km northeast of Cork City. It was built in the 1950s and is currently operated and maintained by Cork County Council on behalf of UÉ. Ballincurrig WwTP consists of a septic tank, with a design PE of 150, that discharges to ground (Ballinhassig East Ground Waterbody) through the percolation area and is currently overloaded. There is insufficient capacity at Ballincurrig WwTP and the existing WwTP is considered insufficient for reuse.

Therefore, there is an ongoing project involving the decommissioning of Ballincurrig WwTP and intercepting and diverting flows to Lisgoold South WwTP for treatment. This will necessitate the construction of a new pumping station and sewer to pump flows to Lisgoold. As this project is currently advancing, it will form part of the approach of the CWS and no optioneering of the Ballincurrig WwTP is required.

2.12.2 Leamlara

Leamlara is a small existing agglomeration with a population of 476 according to the latest CSO2022. The agglomeration is expected grow modestly over the strategy horizons.

The existing catchment does not have a significant wastewater network and resulting does not have existing wastewater treatment infrastructure operated by UE.

The future wastewater load for the strategy horizons was projected and is summarised in Table 2-142.

Table 2-142 Projected Organic (PE) Demand of Leamlara

Parameter	2030	2055	2080
Organic Loading (PE)	685	823	930

Option Screening

As discussed, the Leamlara catchment is not currently served by a UÉ wastewater treatment process. The CWS aims to identify optimal wastewater solutions for this area to be initiated in the 2080 horizon. Resultingly, only two options were identified during the coarse screening process which are detailed below:

- Option A5 – New Greenfield WwTP with treated effluent transfer and discharge to the Owenacurra River (at Lisgoold South WwTP)
- Option A6 – Wastewater Transfer to Lisgoold WwTP via the dedicated transfer pipeline.

Both options were assessed and combined with other feasible approaches with the sub-catchment. The options identified for Leamlara interact with solutions presented for Lisgoold and Ballincurrig. At the fine screening stage, Option A6 was identified as the optimal solution allowing UÉ to implement a wastewater solution in a more timely manner, reducing impact on customers and the public in the local area, reducing biodiversity risks to receiving waters, reducing environmental and sustainability impacts (associated with the construction of a new greenfield WwTP) and providing circular economy and resource recovery benefits through the consolidation of wastewater treatment at Lisgoold South, providing for a better treatment efficiency. Both options require the installation of 3.7 km conveyance pipeline, thus Option A6 presents cost capital and operational savings.

2.12.3 Lisgoold North

Lisgoold North WwTP is located in the northern half of the village of Lisgoold and is approximately 1.5km south east of Ballincurrig WwTP and 550m north of Lisgoold South WwTP. Lisgoold North WwTP is currently operated and maintained by Cork County Council on behalf of UÉ. Lisgoold North WwTP is located at the edge of an embankment, behind a housing estate in the Owenacurra River valley area. This 80 PE secondary treatment plant comprises of an inlet works, aeration tank, with duty/standby blowers, clarifier and percolation area discharging to ground.

There is an ongoing project involving the decommissioning of Lisgoold North WwTP and diverting flows to Lisgoold South WwTP for treatment via a gravity sewer. As this project is currently advancing, it will form part of the approach of the CWS and no optioneering of the Lisgoold North WwTP is required.

2.12.4 Lisgoold South

Introduction

Lisgoold South WwTP is located approximately 10m from the bank of the Owenacurra River Valley and serves the southern half of the village of Lisgoold. Lisgoold South WwTP is currently operated and maintained by Cork County Council on behalf of UÉ.

The WwTP has a design capacity of 500PE but it is believed that this capacity capability is potentially closer to 125PE. The WwTP comprises a preliminary, secondary and tertiary treatment. Treated effluent from Lisgoold South WwTP is discharged into Owenacurra river.

Site performance at Lisgoold South WwTP has not been analysed as this WwTP as at the time of the site visit the WwTP was not operational as it was undergoing upgrades and raw wastewater was discharged directly in the Owenacurra river.

Table 2-143: Lisgoold South WwTP Details

Organic Design PE	Storm Management	Inlet Works	Primary Treatment	Secondary Treatment	Tertiary Treatment	Chemical P Removal	Sludge Treatment	Installation Date
500	n/a	Screen	Submerged Aerated Media Package Plant		Sand filter	Ferric Sulphate	n/a	2008

Table 2-144: Projected Loadings at Lisgoold South WwTP

Parameter	Existing Capacity	Current (2024) Loading	2030	2055	2080
Organic Loading (PE)	500	Unknown	532	649	733
Hydraulic Loading (m^3/d)	Unknown	Unknown	632	764	863

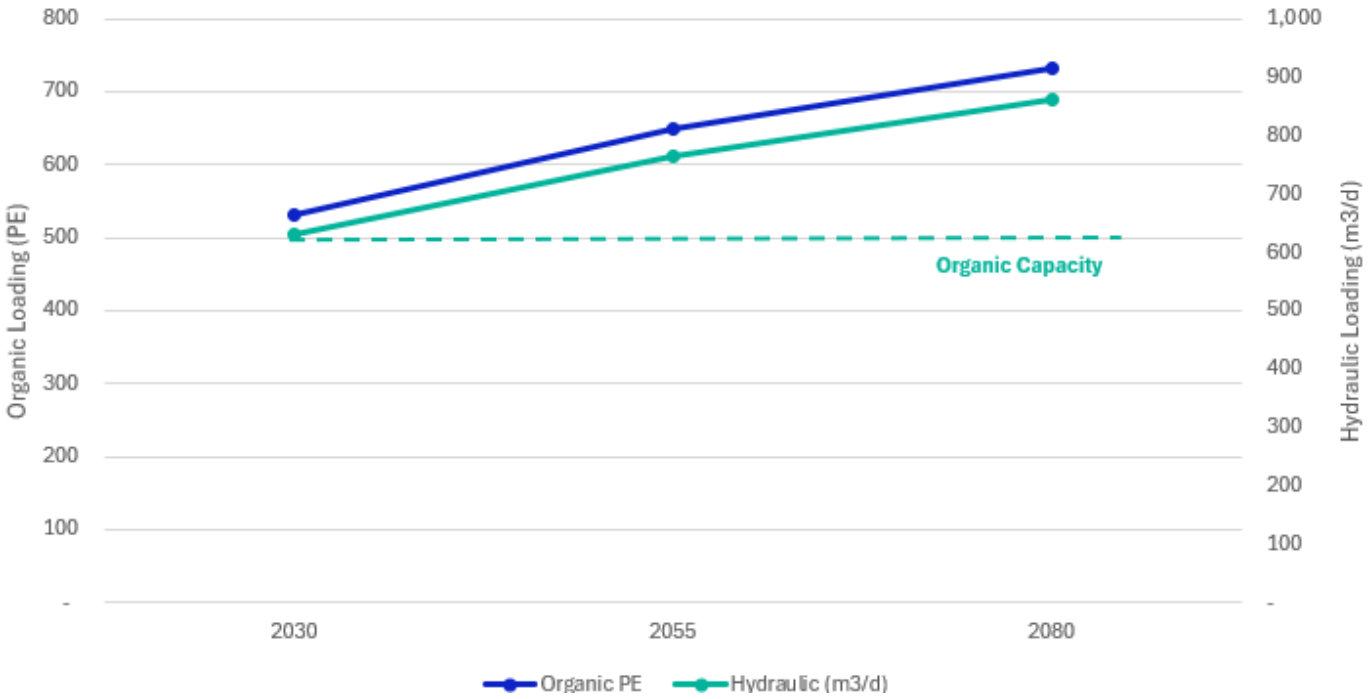


Figure 2-68: Projected Loadings at Lisgoold South WwTP

Following water quality modelling conducted at the existing WwTP discharge point, environmentally sustainable discharge limits based on compliance with the appropriate WFD EQS have been determined based on projected PE loading to the WwTP across the current and future Strategy horizons. The environmentally sustainable discharge limits for these scenarios have been summarised in Table 2-145.

Table 2-145: Existing WWDL ELVs and Environmentally Sustainable Discharge Limits at Lisgoold South WwTP

Parameter	Existing ELVs	2030 Environmentally Sustainable Discharge Limits	2055 Environmentally Sustainable Discharge Limits	2080 Environmentally Sustainable Discharge Limits
BOD	25 mg/l	25 mg/l	25 mg/l	25 mg/l
Ammonia	30 mg/l	3.9 mg/l	3.2 mg/l	2.9 mg/l
OrthoP	3 mg/l	2.8 mg/l	2.3 mg/l	2.0 mg/l
More Stringent?	-	Y	Y	Y

Summary of Observed Constraints

Environmental and Ecological Constraints

The discharge location waterbody is Owennacurra_030 (River Owenacurra) with Good WFD Status (cycle 3 2016-2021) and classified as At Risk (2022). No European or National designated sites are in proximity or with direct pathways to the current WwTP and the discharge outfall is more than 10 km away from nearest SPA/SAC. Zone3 Midleton (Owenacurra River) and Zone3 Tibbotstown (Owenacurra River - Over Pump) freshwater abstractions are located approximately 2.5 km and 4.5 km respectively downstream from the discharge location.

Coarse Screening

The coarse screening was undertaken on the unconstrained list of options at Lisgoold South WwTP, which are shown in Table 1-1, as per the methodology outlined in Section 1.3. Any options for the strategy horizon years of 2030 and 2055 should facilitate implementation of the longer term 2080 preferred solution and should not compromise the ability to implement this. To provide context for the coarse screening results, which are outlined in Table 2-146, commentary on the coarse screening exercise is provided below.

- Option A1 (Do Minimum – Process Optimisation) not been considered as a feasible option for 2080 horizon as the existing WwTP capacity will be exceeded across all strategy horizons.
- Option A2 (Reuse with Investment – Existing Discharge Location) has been shortlisted across all strategy horizons as the WwTP has recently been constructed and commissioned and existing assets are likely to have sufficient operation. This option has been classified as amber due to the potential risk that existing assets may not be suitable for reuse but this shall be reviewed regularly.
- Option A3 (Reuse with investment with New Discharge Location) has been shortlisted as an amber solution as further assessment on available discharge receiving water capacity to accept treated effluent at greater volumes is required. Additionally, the current performance of the site is currently being monitored to determine treatment efficiency. This option will be assessed further when this output is available.
- Option A4 (New Treatment Process on Current Site) has not been shortlisted as existing assets are likely to have sufficient operation for the 2080 strategy horizon.
- Option A5 (New Greenfield Plant) has been shortlisted as the proposed imports to this may require further site expansion. The option has been classified as amber at this stage as further planning and environmental assessments are required to inform the fine screening process.
- Option A6 (Wastewater Load Transfer to Midleton WwTP) has been shortlisted as it presents a potential option should site expansion constraints be identified in the option definition stage.

Table 2-146: Coarse Screening Output

Coarse Screening Results							
Long List of Options	**A0**	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**
2080	N	N	Y	N	N	Y	N
2055	N	N	Y	N	N	N	Y
2030	N	N	Y	N	N	N	Y

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening

Any options for the strategy horizon years of 2030 and 2055 should facilitate implementation of the longer term 2080 preferred solution and should not compromise the ability the implement this. Further option defining is undertaken in order to undertake the MCA fairly and adequately. Option A3 was not advanced to fine screening as the WQM results indicate the existing treatment process is sufficient to achieve projected environmentally sustainable discharge limits. Option A6 was also not advanced to fine screening as the transfer of wastewater to Midleton was viewed as excessive given receiving water constraints were not identified.

Table 2-147: 2080 Options Advancing to Fine Screening

Options Progressed to Fine Screening for 2080	Description
A2	Reuse with Investment with existing discharge location
A5	New Greenfield Plant with existing discharge location

Fine Screening

The options presented in Table 2-147 underwent fine screening in the form of an MCA as detailed in Section 1.4. The scoring and results of the MCA are presented in Table 2-148.

Table 2-148: MCA Results for Lisgoold South WwTP

Objectives	Criteria	Option A2	Option A5
Addressing the Need	Treatment Capacity	3	3
	Network Capacity	1	3
	Final Effluent Compliance	3	3
Deliverability	Design Complexity, Ease of Implementation & Feasibility	-1	-2
	Planning & Regulation	0	-1
	Delivery Timeline & Alignment	1	-1
Risk & Resilience	Flexibility & Scalability	-1	3
	Delivery Risk	3	1
Customer and Stakeholder Support	Impact on Customers	1	2
	Community Support, Health and Wellbeing	2	1
Environmental & Sustainability	Water Environment	1	1
	Waterbody Impact (Existing and New)	1	2
	Waterbody Flood Risk	0	0
	Biodiversity	0	-1
	AA-Natura 2000 Sites	0	0
	Aquatic Biodiversity	1	1
	Terrestrial Biodiversity (BNG)	0	-1
	GHG Emissions	1	-1
	Embodied Carbon	2	-2
	Operational Carbon	2	2
	Energy Efficiency	1	2
	Climate Resilience	0	1
	Circular Economy	1	-2
Weighted Average Sub Total		**1.03**	**0.81**
Cost	CAPEX	3	3
	OPEX	5	5
	Whole Life Cost	4	4
Combined Score		**2.74**	**2.53**
Rank		**1st**	**2nd**

The MCA found that for the 2080 strategy horizons Option A2 ranks 1st against the fine screening criteria. Option A5 ranked second against the fine screening criteria. The site is located beside the River Owenacurra, a housing development, and the R626, which may present expansion restrictions beyond the site boundary, however this has been considered within the MCA and mitigation efforts should be identified at early project stages.

Wastewater Treatment Summary

In summary, the optioneering process for Lisgoold South Wastewater Treatment Plant (WwTP) has yielded clear recommendations for future development:

The preferred strategy involves upgrading and expanding the existing WwTP utilising existing assets and protecting the water quality environment. This strategy ensures long-term sustainability by leveraging the capacity and less stringent treatment requirements of Carrigrennan WwTP.

2.12.5 Wastewater Network Upgrade Summary

A separate assessment of network upgrades for this agglomeration has been undertaken as part of the Network Modelling Report which is included in Appendix 4. Below is a brief overview of the proposed upgrades within the entire sub catchment, addressing SWO compliance and future development constraints such as surcharge and flooding due to development impacts. Unless otherwise stated specifically, these proposed upgrades are proposed to be initiated in the 2030 strategy horizon. The development process of these proposed upgrades, as well as maps and drawings illustrating the location of the required upgrades are provided in more detail in the Network Modelling Report in Appendix 4:

New storage at Ballincurrig WwPS: A storage facility, including an emergency overflow, has been proposed at the Ballincurrig treatment site. This plan also includes the installation of a c. 1.4 km new rising main, which will pump forward flow to Lisgoold South catchment and decommission the treatment plant to be initiated in the 2030 horizon.

WWTP Storm Tank Enhancement: Storage has been proposed at the South Lisgoold Wastewater Treatment Plant (WwTP).

Network Upgrade Across Catchment: An upgrade of 768m of the existing sewer system is proposed to increase the network's capacity.

2.12.6 Feasible Approaches for Ballincurrig, Leamlara and Lisgoold

The results of the fine screening process and MCA were assessed and taken forward to develop 2 No. Feasible Approaches for the sub catchment. These approaches comprise combinations of options for each agglomeration, carefully selected to best achieve the goals of the CWS. The wastewater network upgrade proposals for each catchment mentioned above are common amongst Feasible Approaches detailed below

Our approach ensures that the selected strategies are not only technically viable but also align with the long-term vision for wastewater management in the region.

These Approaches are summarised in Table 2-149 overleaf.

Feasible Approach 1 integrates the highest-ranking MCA options for the agglomeration sites, proposing a comprehensive strategy for wastewater management through 2080 horizon.

- **Ballincurrig:** There is an ongoing project to transfer wastewater from Ballincurrig to Lisgoold South WwTP for treatment for the 2030 horizon. Upon completion, wastewater will continually be transferred to Lisgoold South through to 2080 horizon.
- **Leamlara:** For the 2030 strategy horizon, it is proposed to initiate the development of a wastewater transfer pipeline and associated pumping station to transfer flows to Lisgoold South WwTP for treatment. This PS is proposed to be operating through to the 2080 horizon.
- **Lisgoold North:** There is an ongoing project to transfer wastewater from Lisgoold North to Lisgoold South WwTP via a gravity sewer for treatment for the 2030 horizon. Upon completion, wastewater will continually be transferred to Lisgoold South through to 2080 strategy horizon.
- **Lisgoold South:** Lisgoold South WwTP has the capacity to treat incoming flows from Lisgoold North and Ballincurrig, however due to proposed incoming loads from Leamlara in the 2030 horizon a 1,700PE upgrade is proposed to be initiated. The WwTP will be continuously operated through the 2055 horizon and a capital replacement of 2,200PE and a further upgrade of 200PE is proposed to be initiated in the 2080 horizon.

Feasible Approach 2 explores alternative high-scoring options from the MCA, proposing a phased approach to address the wastewater management needs of the agglomerations through 2080 strategy horizon.

- **Ballincurrig:** There is an ongoing project to transfer wastewater from Ballincurrig to Lisgoold South WwTP for treatment for the 2030 horizon. Upon completion, wastewater will continually be transferred to Lisgoold South through to 2080 strategy horizon.
- **Leamlara:** For the 2030 strategy horizon, it is proposed to initiate the development of a new 950PE WwTP to treat wastewater at Leamlara. This proposal also includes constructing a 3.7km treated effluent outfall to the Owenacurra river. This WwTP will operate throughout the 2080 strategy horizon.
- **Lisgoold North:** There is an ongoing project to transfer wastewater from Lisgoold North to Lisgoold South WwTP via a gravity sewer for treatment for the 2030 horizon. Upon completion, wastewater will continually be transferred to Lisgoold South through to 2080 strategy horizon.
- **Lisgoold South:** Lisgoold South WwTP has the capacity to treat incoming flows from Lisgoold North and Ballincurrig through the 2055 strategy horizon, however due to aging assets a capital replacement of 1,500PE is proposed to be initiated in the 2080 horizon.

Table 2-149: Feasible Approaches for Ballincurrig, Leamlara and Lisgoold

Strategy Horizon	Catchment	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
2030	Ballincurrig WwTP	• Construct a new Wastewater Transfer Pumping Station (WwPS) • Construct a new wastewater transfer pipe from Ballincurrig to Lisgoold South WWTP • Decommission existing WwTP	• Construct a new Wastewater Transfer Pumping Station (WwPS) • Construct a new wastewater transfer pipe from Ballincurrig to Lisgoold South WWTP • Decommission existing WwTP	• No viable option
	Leamlara	• Construct a new Wastewater Transfer Pumping Station (WwPS) • Construct a new wastewater transfer pipe from Leamlara to Lisgoold South WWTP	• Construct new WwTP (950 PE) at Leamlara. • Construct a final effluent transfer to Owenacurra River and associated Pumping Station	
	Lisgoold South WwTP	• 1,700PE upgrade of existing WwTP	• Continue to operate WwTP	
	Lisgoold North WwTP	• Construct a new gravity sewer from Lisgoold North WwTP to Lisgoold South WwTP • Decommission existing Lisgoold North WWTP	• Construct a new gravity sewer from Lisgoold North WwTP to Lisgoold South WwTP • Decommission existing Lisgoold North WWTP	
2055	Ballincurrig WwTP	• Continue to operate WwPS	• Continue to operate WwTP	
	Leamlara	• Continue to operate WwPS	• Continue to operate WwTP	
	Lisgoold South WwTP	• Continue to operate WwTP	• Continue to operate WwTP	
2080	Ballincurrig WwTP	• Continue to operate WwPS	• Continue to operate WwPS	

Strategy Horizon	Catchment	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
	Leamlara	• Continue to operate WwPS	• Continue to operate WwTP	
	Lisgoold South WwTP	• 200 PE upgrade of existing WwTP • 2,200 PE WwTP capital replacement	• 1,500PE WwTP capital replacement	

2.12.7 Recommended Approach and Implementation Strategy for Ballincurrig, Leamlara and Lisgoold

Based on the analysis conducted above, **Feasible Approach 1** is recommended for implementation and further development as an integral component of the CWS. This recommendation stems from the approach's superior performance across the assessed criteria and its alignment with the broader CWS objectives, making it the most suitable and sustainable solution for addressing the sub-catchment's wastewater management needs.

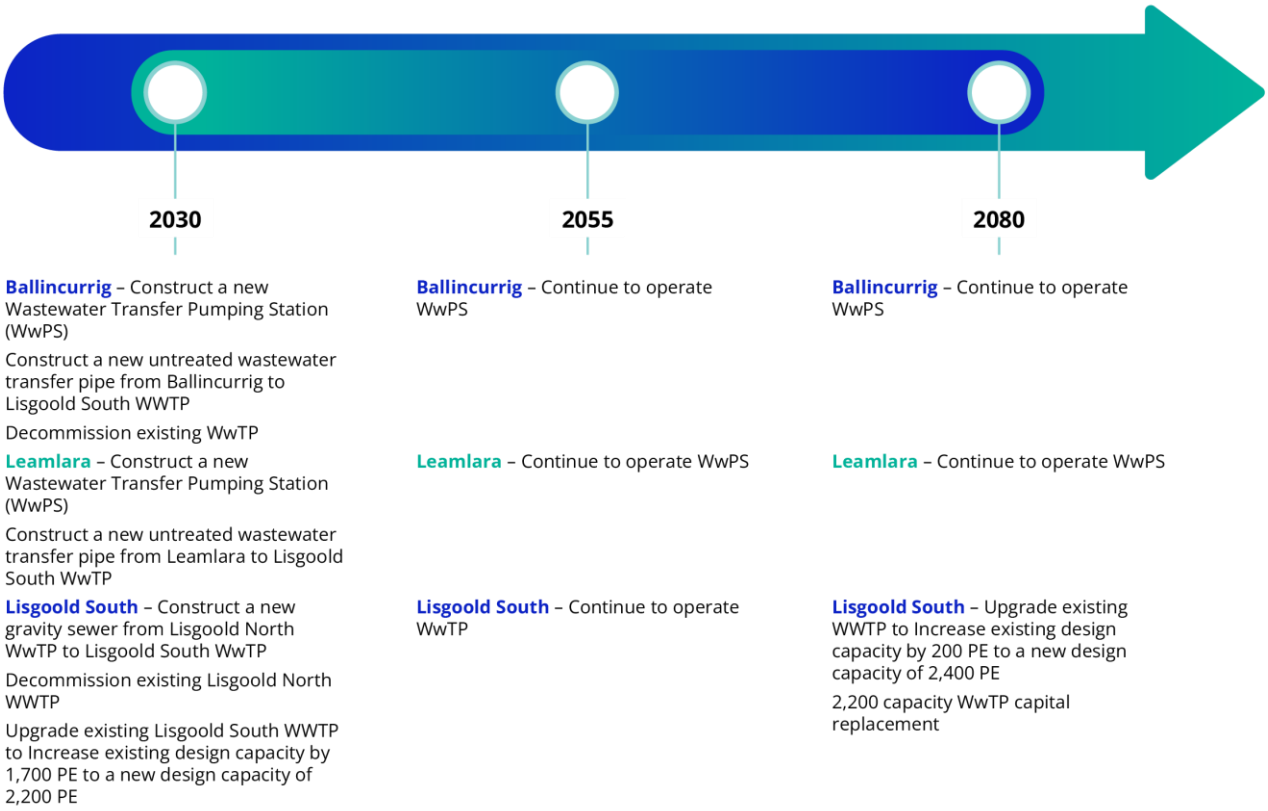


Figure 2-69: Proposed Implementation Strategy for Ballincurrig, Leamlara and Lisgoold

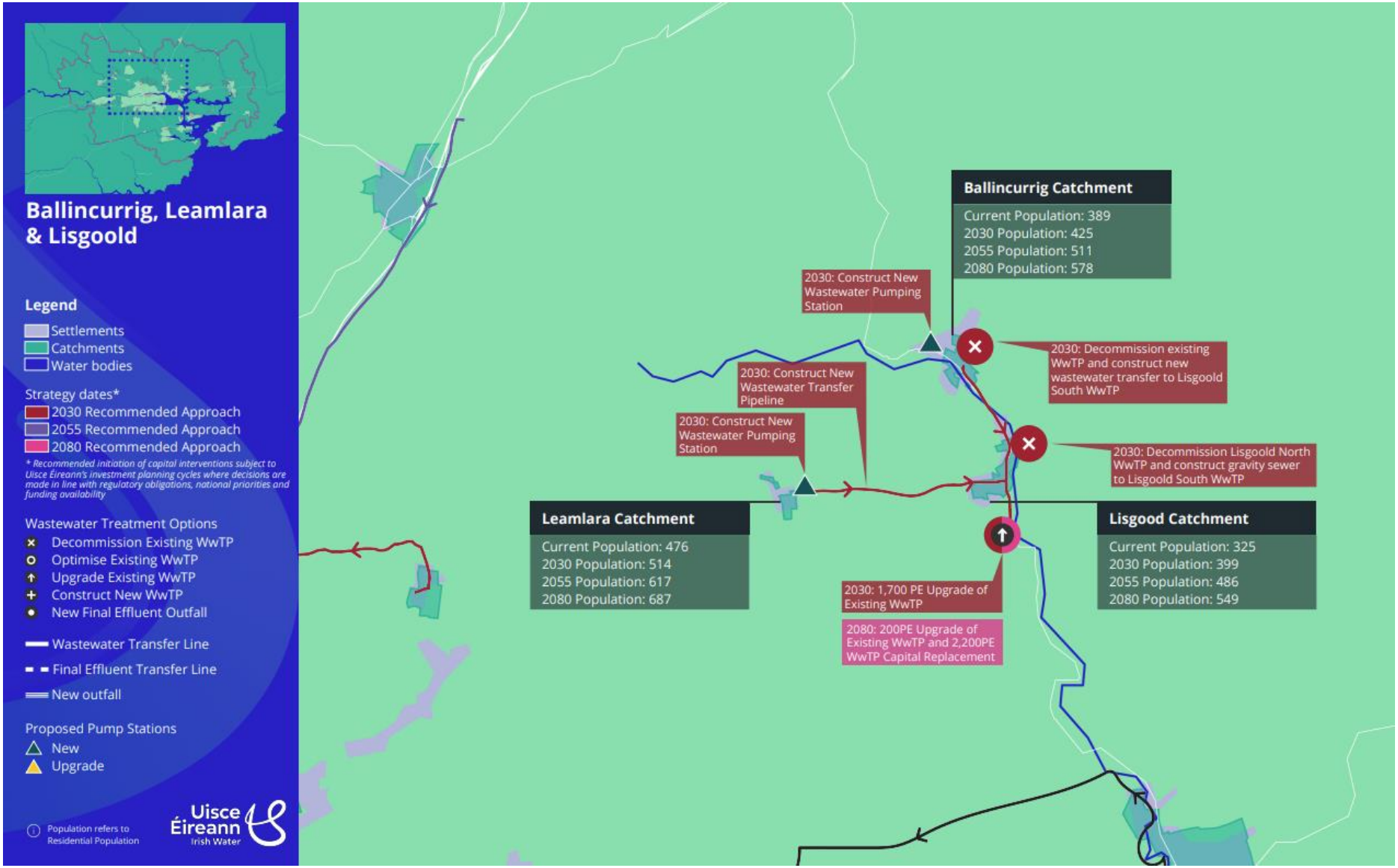


Figure 2-70: Recommended Solution for Ballincurrig, Leamlara and Lisgoold

3 Summary

The wastewater infrastructure within the CWS, including the wastewater network and WwTPs, has undergone a comprehensive optioneering process to determine feasible and preferable solutions addressing the CMA wastewater needs for strategy horizons 2030, 2055, and 2080. The assessment methodology followed a 5-stage process to ensure the selection of the optimum technical approach, considering the functionality of the solution, whole-life cost, and sustainability requirements while maximizing benefits.

Recognising the numerous interactions and dependencies among the agglomerations in the CMA, the study area was strategically divided into smaller sub-catchments where multiple agglomerations interact. The sub catchments are:

- Blarney, Courtbrack, Dripsey, and Inniscarra
- Kileens and Monard
- Carrignavar, Grenagh, and Whitechurch
- Knockraha and Watergrasshill
- Carrigrennan
- Ballygarvan, Halfway and Minane Bridge
- Ballincollig and Killumney
- Cork Lower Harbour
- Carrigtwohill and Midleton
- Ballymore, Cloyne, Saleen, North Cobh and Whitegate-Aghada
- Ballincurrig, Leamlara, and Lisgoold

For optioneering purposes, each agglomeration and WwTP was evaluated independently to determine the highest-ranking options for each site. Initially, a long list of unconstrained options was developed for each agglomeration, aiming to generate a list of options capable of addressing future network and wastewater treatment constraints. All options underwent coarse screening, effectively removing those considered unfeasible to serve and address the needs of the agglomeration. Options passing through coarse screening were subjected to a more rigorous and thorough fine screening evaluation, in which they were qualitatively assessed against key criteria using a Multi Criteria Analysis (MCA) as per the methodology outlined in Uisce Éireann AMS-AMT-FM-038. A key feature of this methodology is its consideration of both monetary and non-monetary objectives. The purpose of this process was to develop a ranked list of options for each agglomeration that could be taken forward to develop Feasible Approaches for the sub-catchment. Any options for the strategy horizon years of 2030 and 2055 should facilitate implementation of the longer term 2080 preferred solution and should not compromise the ability the implement this.

Subsequently, several potential Feasible Approaches were developed for each sub-catchment, incorporating the highest-ranking options derived from the MCA. Each Feasible Approach underwent thorough analysis and consideration, taking into account the broader context of the CWS. Ultimately, a Recommended Approach for each sub-catchment was selected as the optimal solution to address the needs and objectives of the CWS.

The Recommended Approach for the CWS is formed by the collective implementation of the Recommended Approaches for each sub-catchment. An implementation strategy, complete with associated timelines for developing the necessary infrastructure, has been outlined to address the priority needs of the CMA. This approach ensures a cohesive and strategic development of the wastewater infrastructure across the entire CWS, taking into account the specific requirements and challenges of each sub-catchment while maintaining a holistic view of the system's overall objectives and long-term sustainability.