Uisce Éireann
Irish Water

SEA Report: January 2026

Draft Cork Wastewater Strategy

(Cork Metropolitan Area)

Strategic Environmental Assessment: Appendix B Environmental Assessment of Options and Approaches

Tionscadal Éireann
Project Ireland
2040

6 CLEAN WATER AND SANITATION

Safeguarding our water for our future

Contact details

Web:
www.water.ie

Twitter:
@IWCare

Uisce Éireann
PO Box 860
South City Delivery Office
Cork City

Account information or account enquiries

9am–5.30pm, Mon–Fri

Phone:
0818 778 778 or **+353 1 707 2827**

ITRS:
1800 378 378 (for hard of hearing customers)

Water supply queries and emergencies

24 hours a day, 7 days a week

Phone:
0818 778 778 or **+353 1 707 2827**

ITRS:
1800 378 378 (for hard of hearing customers)

Contents

1 SEA options assessment approach

1.1 Introduction

The overall optioneering and solutions development process is set out in the Draft CWS Appendix 6. This covers the overall purpose of the optioneering process to identify strategic drainage and treatment solutions for the Cork Metropolitan Area, assessing the full range of potential options targeting design horizons in 2030, 2055, and 2080.

The assessment methodology follows a 5-stage process aiming to select the optimum technical approach considering the functionality of the solution, taking into account whole-life cost while balancing environmental and sustainability requirements and maximising benefits from the process.

The options appraisal (Table 1-1) is a complex process tailored to this wastewater strategy. It is based on addressing and balancing water quality and ecological requirements for the receiving waters including the Water Framework Directive status objectives identified for each waterbody. These requirements are considered together with the flow capacity at treatment plants, locations of the plants and outfalls, regional sludge management proposals, population growth and the need for 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 wastewater catchments within the CMA which also need to be considered. This included interactions with respect to effluent discharges and their environmental effects on the water environment and related biodiversity value and the ecosystems services provided such as fisheries and recreation. Each challenge presents multiple alternative approaches. The selection of the final Recommended Approach considers a wide range of factors including environmental and sustainability aspects such as water quality, biodiversity and carbon emissions along with whole-life costs (CAPEX and OPEX) and deliverability.

This Appendix to the SEA Environmental Report, focuses on how environmental considerations have been integrated into the options appraisal process and presents the findings for each WwTP and agglomeration served and in terms of the relevant connections and dependencies within a sub catchment. The assessment is based on how the options perform against the SEA objectives and this covers each stage in the decision-making process. This involves comparing alternatives options to determine the Recommended Approach. Mitigation measures are identified for each option and sub catchment taking account of the potential for in combination and cumulative effects for all options within the sub catchment are considered. Mitigation measures address potential for significant environmental effects in terms of support or conflict with the SEA objectives. This is summarised for each step in the process in Table 1-1 below and is set out in more detail in Section 1.2. Consideration of reasonable alternative options for meeting CWS objectives is a requirement for the SEA process.

Table 1-1 Options Appraisal and Environmental Assessment Methodology Overview

Options appraisal stages	Plan development	Environmental and sustainability integration in the options appraisal process
Stage 1 Identifying the need	Considering 2030, 2055 and 2080 timelines - understanding current and future treatment and network capacity needs addressing population growth and environmental discharge requirements	Developing an understanding of environmental constraints and opportunities over the over time of the plan taking account of the likely evolution of the baseline environment without the CWS in place. Water Quality Modelling, GIS mapping, site visits and performance information, EPA compliance reports, the baseline environmental data and policy context informed this stage.
Stage 2 Long list of unconstrained options	Wide range of options for WwTP, inter catchment options and network solutions	Consideration of SEA Scoping, AA screening and Issues Paper consultation comments and review of long list options and methodology development for the environmental assessment. Feedback on opportunities on potential to incorporate NBS and catchment management measures through identification as measures to taken forward in stage 5.
Stage 3 Coarse Screening of Longlist options	Technical Feasibility assessment followed by initial environmental assessment to remove options not considered technically or environmentally feasible – using a red, green and amber (RAG) scoring and the following criteria: 1. Resilience 2. Deliverability/flexibility 3. Sustainability (environmental and social)	High level environmental assessment part of iterative process to identify issues of concern and where impacts would be difficult to mitigate. In addition, the level of uncertainty and need for additional information to inform the next stage assessment were identified and where there was a need to amend options or identify variants to address potential issues.
Stage 4 Fine screening Shortlisting of options	Multi-Criteria Analysis (MCA) Covering Feasibility, deliverability, resilience, planning, environmental and sustainability, customer and community criteria. These	The criteria were mapped against the SEA objectives and WSSP objectives and each potential 2080 option was scored against the range of criteria as part of the MCA. Scoring and ranking against the SEA objectives influenced the overall ranking. Ranking for SEA objectives only was also compared to the overall

Options appraisal stages	Plan development	Environmental and sustainability integration in the options appraisal process
	were scored on a 7-point scale and weighted.	rankings. The highest ranked options were then taken forward as potential feasible approaches for the sub catchment group consideration.
Stage 5 Final assessment of shortlisted options and option combinations	Potential feasible approaches were compared for the highest ranking 2080 options and considering the implementation steps through 2030 and 2055 to 2080 and the combined sub catchment and inter catchment interaction.	Environmental assessments from stage 4 were used to inform comparison of the Feasible Approach combinations of options. A summary of the key differences between the approaches is provided with their related impacts. The overall Recommended Approach was considered alongside deliverability and cost criteria. Recommended approaches were then assessed against the SEA objective for each WwTP, including network proposals. In combination and cumulative effects within each sub catchment were assessed and mitigation recommendations to address potential impacts and support meeting SEA objectives were identified. These assessments and recommendations were then taken forward for consideration of the overall CWS approach in the SEA Environmental Report.

1.2 Environmental assessment and options appraisal stages

1.2.1 Stage 1 – Identifying the Need

The initial stage of the Optioneering and Solutions Development process for the CMA focused on understanding the unique drivers and constraints specific to each wastewater catchment. This included:

- Understanding the current treatment and flow capacity and infrastructure status and WWDL and SWO spill compliance.
- Population projections for three horizon years: 2030, 2055, and 2080. These projections were used to estimate population growth and therefore the flow and loads for each of the study horizon years for each wastewater catchment.
- Future WWDL compliance based on water quality modelling of requirements to meet WFD waterbody ecological status objectives and the environmentally sustainable discharge limits (ESDLs) that need treatment would need to achieve.

In addition the works required on the network and all SWOs were identified in order to take account of the need to meet relevant criteria and limit annual SWO spills from each agglomeration to (i) be no more than 1 % of the annual collected urban wastewater load in 2025 calculated in dry weather conditions, and (ii) an average of ≤10 significant (>50m^3) spill events per annum from each SWO.

1.2.2 Stage 2 – Long List of Unconstrained Options

The unconstrained options considered encompassed 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.

This resulted in a list of generic option types capable of addressing future network and wastewater treatment constraints and provided a starting point for the appraisal process applied to each wastewater catchment.

A "Do Nothing" scenario (essentially 'do nothing more' or continuation of the current situation) is included as the counterfactual, providing a baseline against which other options can be compared. This has also been used for considering the evolution of the baseline environment without the CWS being implemented.

For the WwTP Assessment, the list of unconstrained options developed is outlined in Table 1-2.

Table 1-2 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)	Capacity Upgrade; Additional Treatment Requirements/Alternative Technologies
Option A3 - Reuse Existing Plant and Upgrade (Alternative Discharge)	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 – Untreated Wastewater Load Transfer Solution	Considers the transfer of untreated wastewater from existing site only i.e. does not include network diversion

A separate unconstrained list of network option types is presented in Table 1-3 below.

Table 1-3 Networks Unconstrained List of Options

Option	Description
1 – Do Nothing	Current situation continued
2 – Storm Separation	Impermeable and permeable contributing area separation from foul and combined network

Option	Description
3 – SuDS (including NbS)	Managing runoff to minimise the impacts on the network and local watercourse whilst maximising the benefits of amenity
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 Optimization	Optimize 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.

A total of **714 Unconstrained Options** were identified for WwTPs. The options were then refined through the Coarse and Fine Screening stages (stages 3 and 4). The process for the network options is set out in draft CWS Appendix 6).

1.2.3 Stage 3 – Coarse Screening of Long List of Options

This stage involved evaluation of options, considering several key factors: resilience, deliverability, flexibility and sustainability.

Environmental criteria were incorporated into the coarse screening considering Strategic Environmental Assessment (SEA) objectives and Habitats Directive Appropriate Assessment (AA) requirements. Environmental considerations included the characterisation of the baseline environment, likely trends over the plan period, the modelling of water quality ESDL requirements for existing and potential discharge locations. This approach aimed to identify options could support WFD waterbody objectives and comply with expected discharge requirements. This stage also aimed to identify options likely to have significant environmental impacts with limited potential for mitigation so that these were not taken forward. The assessment undertaken for coarse screening provided a basis for supporting the next stage of the assessment, for example to identify additional options/variants/amendments for consideration, identify uncertainty where further information would be required.

Technical and Environmental Screening

Options were evaluated to first screen in terms of the technical feasibility, considering factors such as engineering viability, technological requirements, and implementation challenges. Then the remaining options were subject to an environmental screening.

The aim for environmental assessment at coarse screening was therefore to identify:

- options that should not be considered further as environmental impacts were expected to significant and potential for mitigation limited.
- amendments to options that could address environmental impacts.
- uncertainties and the information required to address these to assess the potential effects of the options further as preparation for the next stage.

The impacts on protected habitats, water quality, biodiversity and compliance with environmental regulations were the key areas considered at this first stage with limited option information. This approach aimed to ensure that environmental considerations are integrated early in the decision-making process, aligning with SEA and AA principles while identifying potentially environmentally sustainable options for further evaluation. Table 1-4 below sets out the RAG scoring applied for each option for Environmental Coarse Screening.

All Unconstrained Options are evaluated using a Red-Amber-Green (RAG) matrix (environmental assessment of the technically screened in options.

Table 1-4 Environmental Coarse screening RAG

N	No – not acceptable/high risk - as not addressing the need/ clearly conflicting with objectives and unlikely to be addressed through mitigation
Y	Yes – likely to be acceptable/ low risk- take forward for further consideration
Y	Amber – possible/ uncertain/moderate risk some issues or more information required
Y*	Amber – considered but discounted after further assessment
N/A	Not applicable – not environmentally assessed

Following the initial screening process, options receiving green and amber scores advance to the next stage of fine screening for further evaluation. Conversely, options scored as during the coarse screening process are deemed non-viable and are consequently removed from further consideration at this stage.

237 Constrained options progressed to fine screening.

The Optioneering report (draft CWS, Appendix 6) notes that for the 2030 and 2055 time scenarios shorter term options such as A1, A2 and A3 tended to be favoured while the 2080 scenario favoured options A4, A5, and A6. The analysis highlighted the need for adaptive strategies that can meet both immediate needs and long-term sustainability goals in wastewater treatment infrastructure development.

1.2.4 Stage 4 – Fine Screening Criteria & Methodology

This stage involved a more comprehensive desktop assessment of the options passed through Coarse screening. The primary tool used in this process was 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.

Fine Screening is a desktop assessment of options that have passed initial Coarse Screening. This is based on a Multi Criteria Assessment (MCA) approach to evaluate a range of potential benefits and impacts across key criteria. The MCA process:

- Allows simultaneous consideration of multiple issues;

- Enables relative assessment of options; and
- Indicates comparative cost-effectiveness, environmental impacts and benefits, promotability, resilience, and feasibility.

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. The Criteria Scoring Description and its weighting can be found in Draft CWS Appendix 6.

SEA objectives and how they relate to the fine screening categories are mapped in Table 1-5. In addition, a cross check against the overarching Water Services Strategic Plan (WSSP) 2050 objectives and strategic aims was undertaken with the relevant objectives included in Table 1-5.

Table 1-5 Fine Screening MCA Environmental Assessment Criteria and SEA Objectives

Fine Screening Objectives	Fine Screening Criteria Category	Fine Screening Criteria Sub-Category	Key linked SEA Objectives	WSSP 2050 Objectives
Addressing the Need	Treatment Capacity Network capacity Final Effluent Compliance	N/A	Population, economy, tourism Water environment	Support our Customers, Communities & the Economy. Protect and Restore the Environment
Deliverability: Considering feasibility of proposed option, planning constraints and delivery aspects and alignment with UÉ objectives	Planning & Regulation	Flood risk zones (risk to option) Conflict with existing/planned uses eg recreation, landscape, Archaeological Architectural, Geological designations	Water Environment-flood risk Material Assets Cultural Heritage Landscape Geology and soils Population, economy, tourism and recreation	Support our Customers, Communities & the Economy

Fine Screening Objectives	Fine Screening Criteria Category	Fine Screening Criteria Sub-Category	Key linked SEA Objectives	WSSP 2050 Objectives
Customer and Stakeholder Support: What is the overall impact on customers (positive or negative) and how does the option support the community and reciprocate support for the option/Uisce Éireann.	Impact on Customers	Odour, Nuisance issues	Population, Economy, Tourism and Recreation Human Health Air Quality	Support our Customers, Communities & the Economy
	Community Support, Health and Wellbeing	Bathing waters Shellfish Waters	Population, Economy, Tourism and Recreation, Human Health	Support our Customers, Communities & the Economy. Protect and Restore the Environment
Environmental & Sustainability: What are the overall environmental and sustainability benefits or disbenefits of the option? Considering a wide range of E&S factors such as water environment, biodiversity, GHG Emissions, energy efficiency, climate resilience and circular economy.	Water environment	Waterbody Impact (Existing and New (if applicable))	Water Environment	Protect and Restore the Environment
		Waterbody Flood Risk (risk change from option)	Water Environment	Protect and Restore the Environment
	Biodiversity	AA-Natura 2000 Sites	Biodiversity	Protect and Restore the Environment
		Aquatic Biodiversity	Biodiversity	Protect and Restore the Environment
		Terrestrial Biodiversity (BNG)	Biodiversity	Protect and Restore the Environment

Fine Screening Objectives	Fine Screening Criteria Category	Fine Screening Criteria Sub-Category	Key linked SEA Objectives	WSSP 2050 Objectives
	GHG Emissions	Embodied Carbon	Climate Change mitigation	Sustainable Services Fit for the Future
		Operational Carbon	Climate Change mitigation	Sustainable Services Fit for the Future
	Energy Efficiency	N/A	Climate Change mitigation	Sustainable Services Fit for the Future
	Climate Resilience	N/A	Climate Change adaptation	Sustainable Services Fit for the Future
	Circular Economy	N/A	Economy Climate change mitigation Material Assets	Sustainable Services Fit for the Future

The scoring used a seven-point Likert scale, ranging from -3 to 3 for each criterion, as set out in Table 1-6. This scale provides a nuanced approach to evaluation, allowing for an assessment of both positive and negative aspects of each Option.

Table 1-6 MCA Grading System

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

The scoring system provides a quantitative basis for comparison alongside qualitative assessments and expert judgment to provide a holistic evaluation of each Option.

Options which initially passed the coarse screening stage could still be eliminated or amended during fine screening if a more thorough assessment reveals unsuitability.

Where options performed poorly against specific criteria, the potential for design modifications or mitigation measures to address these shortcomings was considered. This supported the iterative process and allowed options modification including to address environmental impacts identified through the assessment process. High-scoring options from the fine screening process were subsequently advanced for further scrutiny in the final assessment of the feasible approaches.

Fine Screening process produced **211 Feasible Options** for the WwTPs in the CMA.

1.2.5 Stage 5 – Final Assessment of Short List

The final stage of the Optioneering and Strategy Development process was to develop the feasible approaches and assess them against bespoke criteria and including SEA objectives.

Integrated process

This stage considered long-term strategic plans and identified of potential option combinations. The process aimed to select options that 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, smaller, interconnected sub-catchments, each comprising of multiple WwTPs are considered in the development of Feasible Approaches

For each Feasible Approach, an outline design is produced along with associated high level cost estimates. 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.

This final stage of the optioneering process combined the detailed technical assessments, cost estimations, and environmental and social assessments and provided 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.

30 Feasible Approach combinations were identified across **11 Sub catchments** and a Recommended Approach was identified for each sub catchment and these together comprise the overall CWS Recommended Approach

SEA alternatives and recommended approach assessment

As part of the SEA input to options appraisal and consideration of alternatives, the environmental assessments against the criteria as mapped against the SEA objectives and used in the fine screening were also used to inform assessment and comparison of Feasible Approaches. A final assessment of each of the Recommended Approaches for each WwTP was undertaken against the SEA objectives in terms of construction and operational phases and recording potential beneficial and adverse effects separately and across the 2030, 2055 and 2080 time horizons. These were compared to a 'do nothing' scenario as the continuation of current situation. The SEA topics and objectives are set out in the Table 1-7 below.

Table 1-7 SEA Objectives

SEO topic	Objective
Water Environment	*Water quality and quantity* Prevent deterioration of the WFD status of waterbodies with regard to 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 related to the provision of wastewater services. *Flood risk* Protect and, where possible, reduce risk from flooding as a result of Uisce Éireann's provision of wastewater services.
Population, Economy, Tourism and Recreation, and Human Health	Protect and contribute to enhancement of human health and wellbeing and support sustainable economic and population growth, with (i) preventing restrictions to recreation and amenity facilities and (ii) protecting and enhancing freshwater and marine fisheries and shellfish protected areas.
Climate Change	*Climate change mitigation* Minimise contributions to climate change emissions to air (including greenhouse gas emissions) through energy efficiency, consideration of ecosystem services including carbon sequestration, water reuse and conservation - related to the provision of wastewater services. *Climate change adaptation* Take account of additional pressures on the environment due to climate change and promote measures supportive of climate change resilience related to provision of wastewater services. Take account of additional risks to wastewater services and infrastructure due to climate change and improve resilience to the effects of climate change such as to extreme weather events.
Biodiversity	Protect and enhance terrestrial, aquatic and soil biodiversity and habitat connectivity, with particular regard for European and nationally designated sites (including proposed and candidate sites and protected species). Achieve BAP commitments to No Net Loss of habitats related to provision of wastewater services.
Material Assets	*Resource use and waste management* Minimise resource use and waste generation from new or upgraded wastewater infrastructure and the management of sludge and residuals from treatment processes. Seek to apply circular economy principles across lifecycle decision making for resources and wastes. *Asset use* Minimise impacts on other material assets and infrastructure. Optimise use of existing wastewater assets including through capacity and upgrades of existing wastewater sites.

SEO topic	Objective
Landscape, Townscape and Seascape	Protect and enhance designated and valued landscapes/townscapes and seascapes and visual amenity in relation to the provision wastewater services.
Cultural Heritage – Archaeological and Architectural	Protect and enhance designated and undesignated cultural heritage assets and archaeological interest, including their condition, settings and access related to the provision of wastewater services.
Geology and Soils	Protect soils and geological heritage sites and contribute towards the appropriate management of soil quality and quantity related to wastewater services.
Air Quality	Identify and seek to apply wastewater treatment improvements, higher design standards and operation practices to minimise odour from wastewater plants.
Noise and Vibration	Scoped out - as CWS unlikely to have significant effects related to noise and vibration (see SEA Environmental Report)

The assessment scoring guide for Recommended Approaches is presented in Table 1-8 below. The assessment included the network proposals as part of this assessment. This WwTP/Network Recommended Approach assessment was used to identify mitigation measures required and informed the in combination and cumulative effects assessment between the options within the overall Sub Catchment Recommended Approach.

Table 1-8 Assessment Scoring for Recommended Approaches

Description of comparison of effect	Effect score	Description of comparison of effect	Effect score
Plan approach/alternative is likely to make a considerable positive contribution to SEA objectives or greatly improve likelihood of delivery of positive effects and reduce risk of adverse effects.	+++	Plan approach/alternative has potential to conflict to a greater extent with SEA objectives or high risk of significant adverse effects.	---
Plan approach/alternative is likely to make a moderate positive contribution to SEA objectives or greatly improve likelihood of delivery of positive effects and reduce risk of adverse effects.	++	Plan approach/alternative has moderate potential to conflict to a greater extent with SEA objectives or increase risk of adverse effects.	--
Plan approach/alternative has potential to provide a minor positive contribution to SEA objectives or improve likelihood of delivery of positive effects and reduce risk of adverse effects.	+	Plan approach/alternative has moderate potential to conflict to a greater extent with SEA objectives or increase risk of adverse effects.	-

Description of comparison of effect	Effect score	Description of comparison of effect	Effect score
Plan approach/alternative has negligible of contribution or conflict with SEA objectives or low risk of effects or uncertainty of effects.	0		

SEA in combination and cumulative effects assessment

In combination and cumulative effects for the construction and operation of the individual WwTP and networks proposals together were identified in terms of potential beneficial or adverse effects on SEA objectives in addition to the individual WwTP/Network assessments. The need for additional mitigation measures was then identified.

The overall in combination and cumulative effects of all the sub catchments approaches implemented together for the CWS are considered in the SEA Environmental Report.

1.2.6 Limitations and assumptions

The Recommended Approaches represent the most suitable approaches for implementation and lay the groundwork for future detailed planning and execution stages. The environmental assessment was based on desk based of available information and on high level outline of option proposals. This included only indicative transfer and outfall pipeline routes and locations for new outfall or sites/ site expansion requirements. Location and route options as well as process technology options will need to be determined through detailed project level assessments and appropriate site surveys and consultation. This includes consideration of the potential to incorporate Nature Based Solutions to support treatment processes, improve discharge water quality at WwTPs or as part of network solutions or supporting wide environmental benefits for water quality at a catchment level.

1.3 Structure for options and approaches environmental assessment

The environmental assessments for the individual options, feasible and recommended approaches are set out in Sections 2-12 of this report and organised as described below.

1.3.1 WwTPs and Sub Catchments

The environmental assessments are presented by Sub catchments within the CWS Study Area as listed in Table 1-9 and location indicated on Figure 1-1 below.

Table 1-9 Sub-catchments within the CWS Study Area

Sub Catchment	Agglomerations	Report section reference
Sub Catchment 1	Blarney WwTP	Section 2
	Courtbrack WwTP	
	Dripsey WwTP	
	Inniscarra WwTP	

Sub Catchment	Agglomerations	Report section reference
Sub Catchment 2	Kileens WwTP	Section 3
	Monard	
Sub Catchment 3	Carrignavar WwTP	Section 4
	Grenagh WwTP	
	Whitechurch WwTP	
Sub Catchment 4	Knockraha WwTP	Section 5
	Watergrasshill WwTP	
Sub Catchment 5	Carrigrennan WwTP	Section 6
Sub Catchment 6	Ballygarvan WwTP	Section 7
	Halfway WwTP	
	Minane Bridge (River Valley) WwTP	
Sub Catchment 7	Ballincollig WwTP	Section 8
	Killumney WwTP	
Sub Catchment 8	Cork Lower Harbour WwTP	Section 9
Sub Catchment 9	Carrigtwohill WwTP	Section 10
	Midleton WwTP	
Sub Catchment 10	Ballymore	Section 11
	Cloyne WwTP	
	North Cobh WwTP	
	Saleen WwTP	
	Whitegate – Aghada WwTP	
Sub Catchment 11	Ballincurrig WwTP	Section 12
	Leamlara	
	Lisgoold South WwTP	

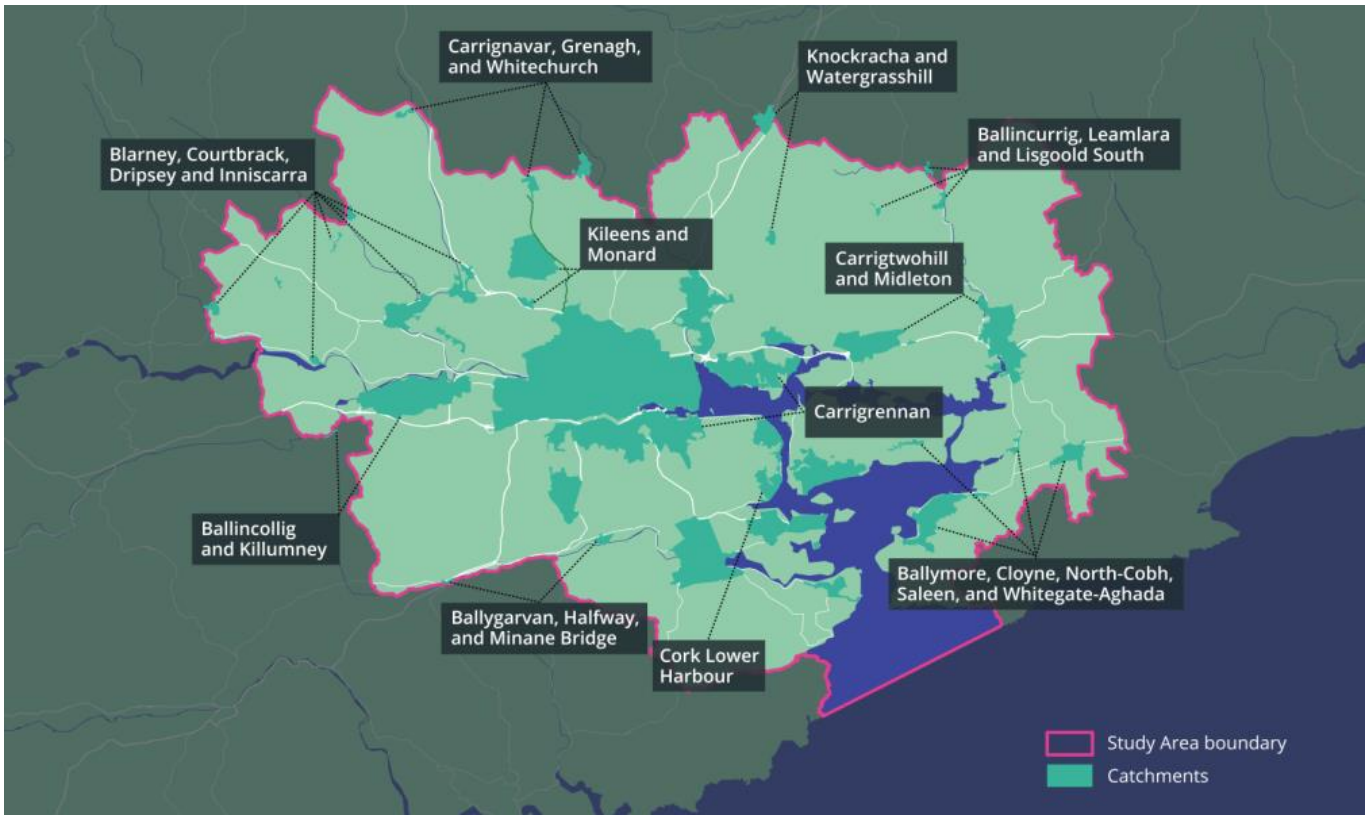

Figure 1-1 Location of Sub catchments within the Study Area

1.3.2 Individual WwTP environmental assessments

The WwTP environmental assessments are presented in the following sections as follows:

- **WwTP Site location** – description of site location and figure presenting WwTP site boundary and UÉ land boundary;
- **Environmental baselin**e – environmental constraints for the WwTP and associated discharge location including designations (where relevant), public drinking water abstractions Water Framework Directive (WFD) water body status and key water quality and biodiversity baseline information for the current discharge location;
- **WwTP existing and future capacity and projected compliance** - current and future loading, existing treatment capacity covering the 2030, 2055 and 2080 timelines assuming continuation with the current treatment and network infrastructure and operation.
- **Water quality modelling (WQM) on future ESD**L requirements for the wastewater discharge meet WFD objectives for waterbodies to meet either Good or High ecological status;
- Coarse screening – long list options assessment with summary of SEA coarse screening
- **Fine screening – SEA** fine screening assessment of options summary table and results for each WwTP
- **Ranked options for WwTP** agglomerations and network upgrade proposals taken forward to Feasible Approach assessments

1.3.3 Sub catchment options environmental assessments

The high ranked options from the individual WwTP assessments were then combined as Feasible Approaches for each Sub Catchment. The environmental assessments undertaken alongside technical and cost assessments covet the following:

- **Feasible Approach comparison** – identification of differences between approaches and associated combined environmental impacts and benefits and overall ranking of approaches;
- **Recommended Approach selection** - description of Recommended Approach and the proposed outline timeline implementation across 2030, 2055 and 2080;
- **Recommended Approach assessment**- assessment of recommended approaches for each WwTP for 2030, 2055 and 2080, compared to continuation of current situation, against the SEA objectives and considering construction and operation phases
- **In combination and cumulative effects assessment** – potential for interaction between agglomeration options in the same sub catchment and additional mitigation required;
- **Mitigation and enhancement –** recommended measures to avoid and minimise adverse effects and also for enhancements to support SEA objectives.

2 Sub catchment 1: Blarney, Courtbrack, Dripsey and Inniscarra

2.1 Blarney

2.1.1 Blarney WwTP location

Blarney WwTP is located approximately 9.5 km northwest of Cork City and provides wastewater services to the town of Blarney (Figure 2-1). However, available space for site expansion is limited due to a proposed solar panel installation within the site. The site is also located close to residential and recreational areas.

Figure 2-1 Blarney WwTP Site Location

2.1.2 Blarney Environmental baseline

The environmental constraints at Blarney WwTP are presented in Figure 2-2.

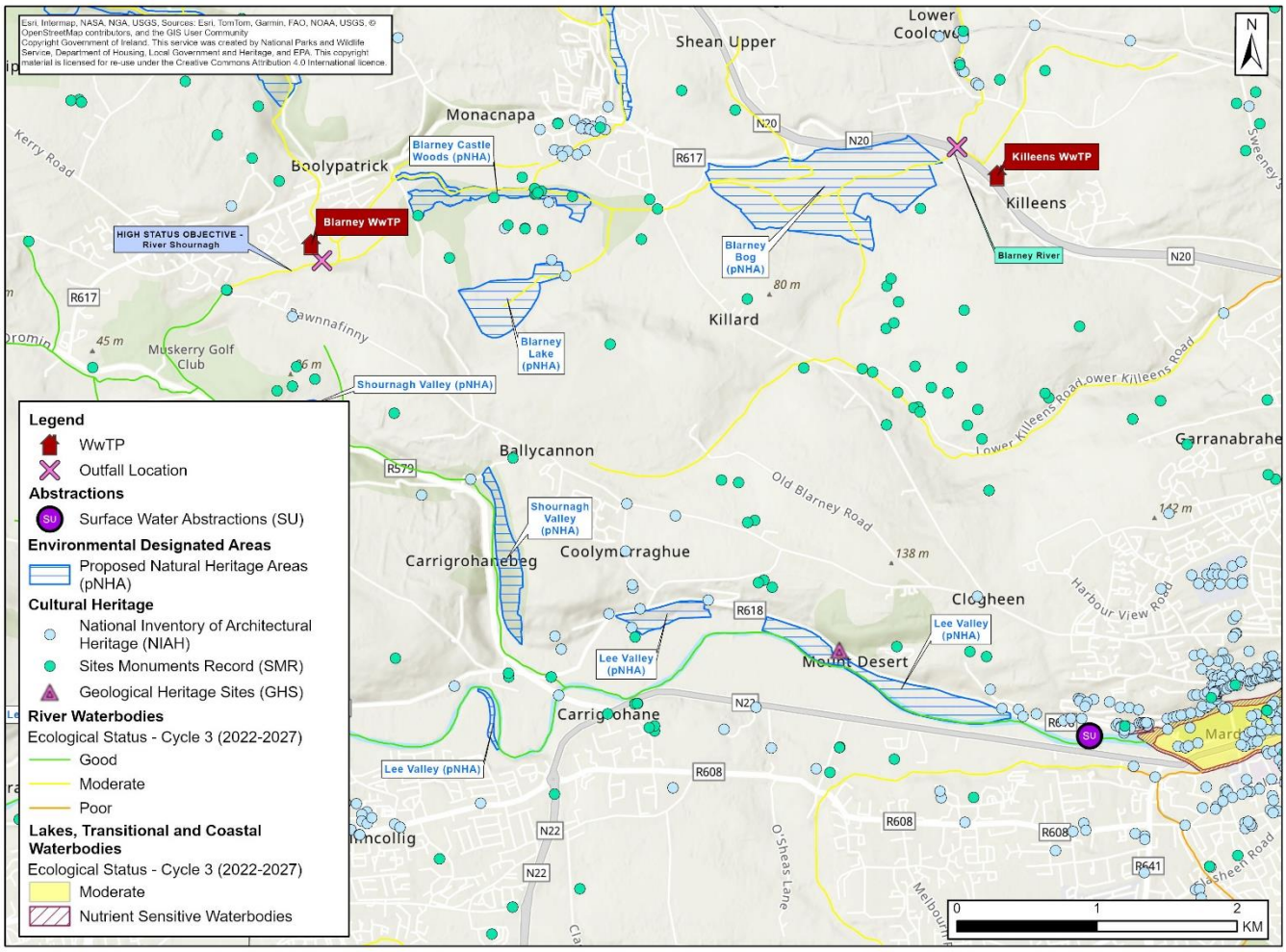

Figure 2-2 Environmental constraints for the Blarney WwTP

Water Framework Directive water quality and biodiversity baseline information for the current discharge location is summarised in Table 2-1.

Table 2-1 Blarney WwTP Current Discharge Location Environmental Baseline Summary

Topic	Baseline environment
Discharge Waterbody Type	River waterbody
Discharge Waterbody Name	Shournagh_030 (River Shournagh)
Discharge Waterbody Code	IE_SW_19S010300
Water Body Ecological Status (cycle 3 2016-2021)	Moderate
Waterbody Risk Status and Category (2022)	At Risk: Urban Run-off
High Status Objective List	Yes

Topic	Baseline environment
Length of river from discharge to estuary	10.50 km
Proximity to public water abstractions including regulated and unregulated GWS	Cork City Water Supply (Abstract River Lee): 10.10 km downstream from discharge location
Priority Areas for Action list RBMP	Confirmed AFA Category: Restoration, Sub-Category: Prioritised Areas for Action LAWPRO
Proximity to Shellfish Waters	No designated Shellfish Waters located in the direct pathway/downstream of the discharge
Proximity to Bathing Waters	No designated Bathing Waters located in the proximity/direct pathway of the discharge.
Proximity to European Designated Sites (SPA, SAC)	No SPA nor SAC sites in proximity/direct pathways to current site and discharge (more than 10 km away from nearest SPA/SAC)
Potential to affect National (NHA, pNHA)/Ramsar designated sites and/or freshwater pearl mussel catchment?	Shournagh Valley pNHA: 1.5 km downstream from the discharge. The site includes two lower sections of the Shournagh River[1]. Lee Valley pNHA: at approximately 3.5 km downstream from the plant and the discharge. The site occupies five separate sections of the valley of the River Lee.
Proximity of WwTP to residential areas/sensitive community sites	Close proximity to residential areas (within 150 m)

2.1.3 Blarney WwTP existing and future capacity and compliance

The current treatment and hydraulic capacity of the existing WwTP have been compared the actual current loading and the expected future requirements based on population growth consideration and in terms of population equivalents (PE). For Blarney WwTP, these are presented as the current and future organic and hydraulic loading with existing treatment capacity in Table 2-2.

[1] The National Parks and Wildlife Service (NPWS). 2009. Shournagh Valley Site Synopsis. Accessed: July 2025. Available from: https://www.npws.ie/protected-sites/nha

Table 2-2 Blarney WwTP Current and Projected Loading and Existing Treatment Capacity

Parameter	Existing Capacity	Current Loading	2030 Projected Loading	2055 Projected Loading	2080 Projected Loading
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

The Water Quality Modelling (WQM) outputs (Draft CWS Appendix 5) identify the current and future predicted (2030, 2055 and 2080) assimilative capacity of the current discharge waterbody taking account of the WFD status and objectives and are presented in Table 2-3. The plant is currently non-compliant with the Wastewater Discharge Licence (WWDL). The existing discharge location ESDL are expected to be more stringent in the future (Table 2-3).

Table 2-3 Blarney WwTP Current WWDL Emission Limit Values (ELVs) and Projected Environmentally Sustainable Discharge Limits (ESDL)

Parameter	Existing WWDL ELVs	2030 Projected ESDL	2055 Projected ESDL	2080 Projected ESDL
BOD (mg/l)	20	4	3	2
Ammonia (mg/l)	1.5	0.2	0.2	0.1
OrthoP (mg/l)	0.8	0.1	0.1	0.1
More Stringent?	-	Y	Y	Y

In addition, the network assessment (Draft CWS Appendix 4) has identified flooding and surcharging in the main trunk of the network under both current and all future scenarios, based on modelled results. Future scenarios show a worsening trend, with increased levels of network flooding and surcharging.

Currently, three SWOs are non-compliant. By 2080, these same SWOs remain non-compliant, with an additional SWO also failing to meet compliance standards.

2.1.4 Blarney Coarse screening

Blarney WwTP SEA coarse screening assessment of options summary is presented in Table 2-4.

Table 2-4 Blarney WwTP Coarse Screening Assessment Summary

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
A0 Do Nothing - Counterfactual	N	N	N	Option has been screened out at technical stage as the existing WwTP is currently over capacity and is not achieving the discharge requirements as set in the WWDL.
A1 Minimal Upgrade - Process Optimisation	Y	N/A	N/A	Works confirmed to be limited and within site so construction impact are likely to be mitigated with standard measures, and no site expansion would be required but short-term only.
A2 Reuse Existing Plant and Upgrade - Existing Discharge	Y*	Y*	N/A	Option has since been discounted with further consideration at the technical stage as the existing assets will have exceeded their design life.
A3 Reuse Existing Plant and Upgrade - Alternative Discharge	Y	Y	N/A	An alternative discharge location is proposed to reduce treatment intensity need—specifically, a site downstream of the Ballincollig WwTP within the River Lee. Uncertainties around ESDLs in this location as they are likely to be stringent and need to consider the downstream water abstraction.
A4 New Treatment Process/Plant Upgrade on Existing Site	N/A	N/A	Y	A plant with new discharge location (to existing Carrigrennan outfall) and similar issues as A3 for the new discharge with uncertainties around discharge location and impacts.
A5 New Greenfield Site	N/A	N/A	Y	Large uncertainty with the relocation of new plant and uncertainties around new discharge location to the River Lee (same as for A3).
A6 Untreated Wastewater Load Transfer Solution	Y	Y	Y	Pipeline work to Carrigrennan WwTP running along an existing road likely to have minimal impacts and standard mitigation measures would apply. However, part of the pipeline goes

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
				near the border of a pNHA, detailed alignment will be required.

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening
- N/A – Not environmentally assessed

2.1.5 Blarney Fine screening scoring

Blarney WwTP options SEA objective related fine screening assessment is presented in Table 2-5. This provides the scoring against each criteria relevant to the SEA objectives and how each option ranks overall across these objectives compared to the overall score including the technical and deliverability criteria. The option selection is initially based on consideration of the 2080 scenario.

Table 2-5 Blarney WwTP 2080 Fine Screening Assessment Scores

Criteria	A0 Do Nothing - Counterfactual	A4 New Treatment Process/Plant Upgrade on Existing Site	A5 New Greenfield Site with New Discharge Location	A6 Untreated Wastewater Load Transfer Solution
Planning & Regulation	0	-1	-2	-1
Impact on Customers	-2	1	1	3
Community Support, Health and Wellbeing	-3	-1	-1	2
Water environment	-3	2	2	3
Biodiversity	-2	-1	-2	-1
GHG Emissions	0	-0.5	0	1
Energy efficiency	-3	2	2	3
Climate resilience	0	2	2	3
Circular economy	0	-1	-1	1

Criteria	A0 Do Nothing - Counterfactual	A4 New Treatment Process/Plant Upgrade on Existing Site	A5 New Greenfield Site with New Discharge Location	A6 Untreated Wastewater Load Transfer Solution
Environmental ranking	Worst			Best
Overall combined score	N/A	2.27	1.86	3.00
Overall	N/A	2nd	3rd	1st

2.1.6 Blarney Fine screening results

Table 2-6 presents options that ranked highest using the MCA fine screening process for 2080.

Table 2-6 Blarney WwTP 2080 Implementation Fine Screening 1st, 2nd and 3rd Ranked Options

Design Horizon	1st Ranked Option	2nd Ranked Option	3rd Ranked Option
2080	Option A6: Untreated wastewater load transfer to Carrigrennan (dedicated pipeline). Best environmental and overall score due to removal of discharge from river and addressing network issues. Benefiting approx. 10 km of High Status Objective river downstream.	Option A4: New treatment process/plant upgrade on existing site with new discharge location (River Lee).	Option A5: New greenfield site with new discharge (River Lee).

2.1.7 Blarney Wastewater network upgrade proposals

The network proposals include works to address SWO compliance to minimise potential for untreated spills to the environment and avoiding network surcharging and flooding. The upgrades are proposed for the 2055 strategy horizon unless otherwise stated. The works are detailed in Appendix 4 to the CWS and include for the Blarney:

- Improvements to storage at existing pumping station sites,
- Network upgrades to the existing sewage system to increase capacity
- Infiltration reduction
- WwTP storm tank enhancement

These works are expected to be undertaken within existing the sites or along existing pipeline networks.

2.2 Courtbrack

2.2.1 Courtbrack WwTP location

Courtbrack WwTP is located approximately 16.5km northwest of Cork City, opposite the Drom Slí housing estate in Courtbrack village (Figure 2-3). The area west of the site boundary is located within Flood Zone A and B, which minimises any potential to expand the site to the West.

Figure 2-3 Courtbrack WwTP Site Location

2.2.2 Courtbrack Environmental baseline

The environmental constraints for Courtbrack WwTP are presented in Figure 2-4.

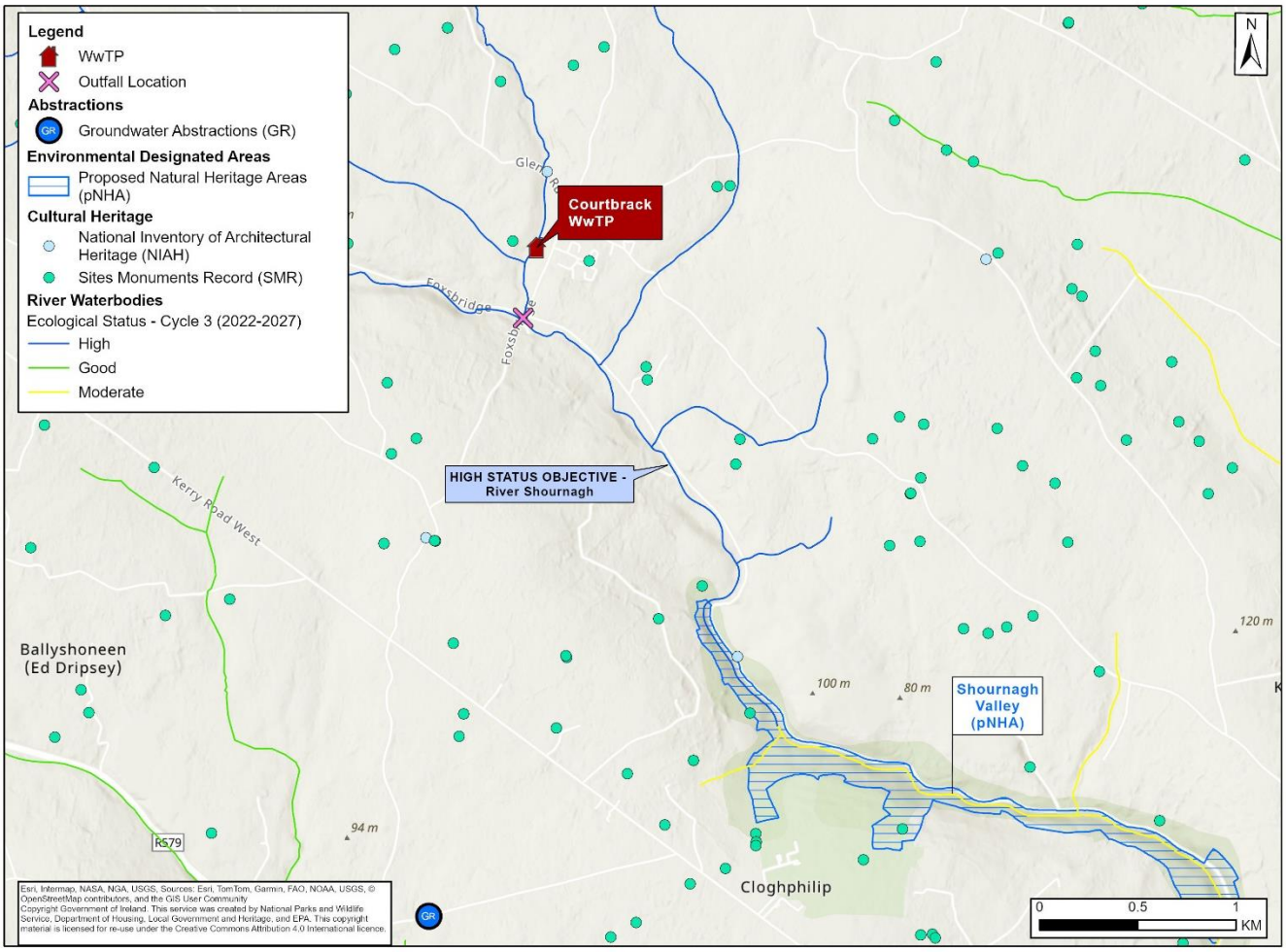

Figure 2-4 Environmental constraints for the Courtbrack WwTP.

Water Framework Directive water quality and biodiversity baseline information for the current discharge location is summarised in Table 2-7.

Table 2-7 Current Courtbrack WwTP discharge location summary

Topic	Baseline environment
Discharge Waterbody Type	River Waterbody
Discharge Waterbody Name	Shournagh_020 (River Shournagh)
Discharge Waterbody Code	IE_SW_19S010200
Water Body Ecological Status (cycle 3 2016-2021)	High
Waterbody Risk Status and Category (2022)	At Risk: Hydromorphology
High Status Objective List	Yes

Topic	Baseline environment
Length of river from discharge to estuary (approximate)	17.70 km
Proximity to public water abstractions including regulated and unregulated GWS	Cork City Water Supply (Abstraction River Lee) – approximately 17.30 km downstream from discharge location. Discharge located upstream from Blarney discharge.
Priority Areas for Action list RBMP	Confirmed AFA Category: Restoration, Sub-Category: Prioritised Areas for Action LAWPRO.
Proximity to Shellfish Waters	No shellfish waters located in the direct pathway/downstream of the discharge.
Proximity to Bathing Waters	No bathing waters located in the proximity/direct pathway of the discharge.
Proximity to European Designated Sites (SPA, SAC)	No SPA nor SAC sites in proximity/direct pathways to current site and discharge (more than 17 km away from nearest SPA/SAC)
Potential to affect National (NHA, pNHA)/Ramsar designated sites and/or freshwater pearl mussel catchment?	Shournagh Valley pNHA – 1.5 km downstream from the discharge. The site includes two lower sections of the Shournagh River[1].
Proximity of WwTP to residential areas/sensitive community sites	Close proximity to residential areas (within 100 m)

2.2.3 Courtbrack WwTP existing and future capacity and compliance

The current treatment and hydraulic capacity of the existing WwTP have been compared to the actual current loading and the expected future requirements based on population growth consideration in terms of population equivalents (PE). For Courtbrack WwTP, these are presented as the population equivalent of current and future organic and hydraulic loadings as well as existing treatment capacity in Table 2-8.

Table 2-8 Courtbrack WwTP Current and Projected Loading and Existing Treatment Capacity

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

The Water Quality Modelling (WQM) outputs of the current and future predicted (2030, 2055 and 2080) assimilative capacity of the current discharge waterbody are presented in Table 2-9 The plant is currently compliant with the Wastewater Discharge Licence (WWDL). The existing discharge location ESDL are expected to be more stringent in the future (Table 2-9).

Table 2-9 Courtbrack WwTP Current WWDL Emission Limit Values (ELVs) and Projected Environmentally Sustainable Discharge Limits (ESDL)

Parameter	Existing WWDL ELVs	2030 Projected ESDL	2055 Projected ESDL	2080 Projected ESDL
BOD (mg/l)	25	25	25	25
Ammonia (mg/l)	10	3.8	3.2	2.9
OrthoP (mg/l)	2	1.6	1.3	1.4
More Stringent?	-	Y	Y	Y

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.

2.2.4 Courtbrack Coarse screening

Courtbrack WwTP SEA coarse screening assessment of options summary is presented in Table 2-10.

Table 2-10 Courtbrack WwTP Coarse Screening Assessment Summary

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
A0 Do Nothing - Counterfactual	N	N	N	Option has been screened out at technical stage, as both organic and hydraulic capacities will be exceeded by 2030, and the existing assets are expected to reach the end of their service life by 2055.
A1 Minimal Upgrade - Process Optimisation	N/A Option screened out at technical assessment stage.			
A2 Reuse Existing Plant and Upgrade - Existing Discharge	Y	Y	N/A	Works confirmed to be limited and within site so construction impact are likely to be mitigated with standard measures, and no site expansion would be required.
A3 Reuse Existing Plant and Upgrade - Alternative Discharge	Y*	Y*	N/A	Option has been discounted at technical stage as less sensitive discharge location is not required.
A4 New Treatment Process/Plant Upgrade on Existing Site	N/A	N/A	Y	Option proposes using the existing discharge location, however there are uncertainties around site expansion.
A5 New Greenfield Site	N/A	N/A	Y	A new site with existing discharge location: uncertainty given relocation of new plant.
A6 Untreated Wastewater Load Transfer Solution	Y	Y	Y	Pipeline work (Carrigrennan via Blarney) running along an existing road likely to have minimal impacts and standard mitigation measures would apply. However, part of pipeline runs through pNHA although it follows a road - detailed alignment is needed to avoid habitat loss.

- Y – Advances to Fine Screening

- N – Does not advance to Fine Screening
- N/A – Not environmentally assessed

2.2.5 Courtbrack Fine screening scoring

Courtbrack WwTP SEA fine screening assessment of options scores are presented in Table 2-11.

Table 2-11 Courtbrack WwTP 2080 Fine Screening Assessment Scores

Criteria	A0 Do Nothing - Counterfactual	A4 New Treatment Process/Plant Upgrade on Existing Site	A5 New Greenfield Site with Existing Discharge	A6 Untreated Wastewater Load Transfer Solution
Planning & Regulation	0	-1	-1	-1
Impact on Customers	-2	-1	1	2
Community Support, Health and Wellbeing	-2	2	1	3
Water environment	-3	2	1	3
Biodiversity	-2	2	1	3
GHG Emissions	0	0	-0.5	-0.5
Energy efficiency	-3	1	2	3
Climate resilience	0	1	2	3
Circular economy	0	-1	-2	1
Environmental combined score	Worst			Best
Overall combined score	N/A	3.20	2.70	3.40
Overall rank	N/A	2nd	3rd	1st

2.2.6 Courtbrack Fine screening results

Table 2-12 presents options that ranked highest using the MCA fine screening process.

Table 2-12 Courtbrack WwTP Implementaion 2080 Fine Screening 1st, 2nd and 3rd Ranked Options

Design Horizon	1st Ranked Option	2nd Ranked Option	3rd Ranked Option
2080	Option A6: Untreated Wastewater Load Transfer to Carrigrennan via Blarney (Dedicated Pipeline to Blarney TPS). Best environmental and overall score due to removal of discharge from river and addressing network issues. Benefiting approx. 17 km of High Status Objective river downstream.	Option A4: New Treatment Process/Plant Upgrade on Existing Site	Option A5: New Greenfield Site with Existing Discharge

2.2.7 Courtbrack Wastewater network upgrade proposals

Courtbrack wastewater network proposals include works to address SWO compliance to minimise potential for untreated spills to the environment and avoiding network surcharging and flooding. The upgrades are proposed for the 2030 strategy horizon unless otherwise stated. The works are detailed in Appendix 4 to the CWS and include for Courtbrack:

- Improvements to storage at existing pumping station sites,
- Network upgrades to the existing sewage system to increase capacity
- WwTP storm tank enhancement

These works are expected to be undertaken within existing sites or along existing pipeline networks.

2.3 Dripsey

2.3.1 Dripsey WwTP location

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 (Figure 2-5). The planning assessment identified no map-based objectives or zoning constraints affecting expansion at the existing site. However, the northwestern portion of the site lies within Flood Zones A and B, which may necessitate an FRA.

Figure 2-5 Dripsey WwTP Site

2.3.2 Dripsey Environmental baseline

The environmental constraints for Dripsey WwTP are presented in Figure 2-6.

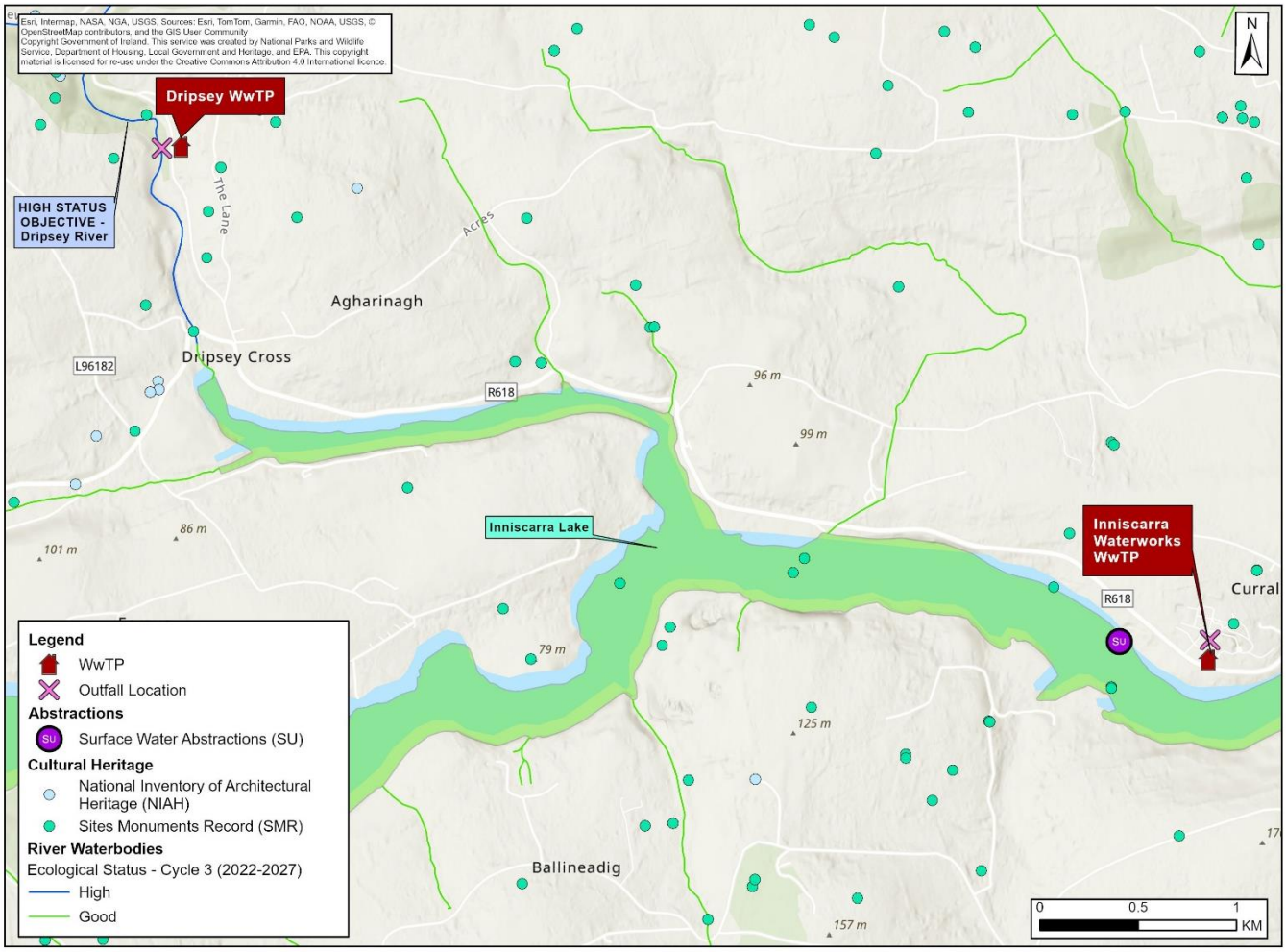

Figure 2-6 Environmental constraints for Dripsey WwTP.

Water Framework Directive water quality and biodiversity baseline information for the current discharge location is summarised in Table 2-13.

Table 2-13 Dripsey WwTP Current Discharge Location Environmental Baseline Summary

Topic	Baseline environment
Discharge Waterbody Type	River Waterbody
Discharge Waterbody Name	Dripsey_020 (Dripsey River)
Discharge Waterbody Code	IE_SW_19D060400
Water Body Ecological Status (cycle 3 2016-2021)	High
Waterbody Risk Status and Category (2022)	At Risk: Hydromorphology
High Status Objective List	Yes

Topic	Baseline environment
Length of river from discharge to estuary (approximate)	1.30 km to Lake Inniscara (21.50 km total length)
Proximity to public water abstractions including regulated and unregulated GWS	Zone2 Cork Harbour & City (Abstract Inniscarra lake) – 6.60 km downstream from discharge location.
Priority Areas for Action list RBMP	No
Proximity to Shellfish Waters	No shellfish waters located in the direct pathway/downstream of the discharge.
Proximity to Bathing Waters	No bathing waters located in the proximity/direct pathway of the discharge.
Proximity to European Designated Sites (SPA, SAC)	No SPA nor SAC sites in proximity/direct pathways to current site and discharge (more than 20 km away from nearest downstream SPA/SAC)
Potential to affect National (NHA, pNHA)/Ramsar designated sites and/or freshwater pearl mussel catchment?	No NHA/pNHA sites in proximity/direct pathways to current site and discharge (more than 7 km away from nearest downstream pNHA) - Lee Valley pNHA (sections of valley of the River Lee) is located approximately 6 km downstream from the discharge.
WwTP proximity to residential areas/sensitive community sites	Close proximity to residential areas (within 200 m)

2.3.3 Dripsey WwTP existing and future capacity and compliance

The current treatment and hydraulic capacity of the existing WwTP have been compared to the actual current loading and the expected future requirements based on population growth consideration in terms of population equivalents (PE). For Dripsey WwTP these are presented as the current and future organic and hydraulic loadings with existing treatment capacity in Table 2-14.

Table 2-14 Dripsey WwTP Current and Projected Loading and Existing Treatment Capacity

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

The Water Quality Modelling (WQM) outputs of the current and future predicted (2030, 2055 and 2080) assimilative capacity of the current discharge waterbody are presented in Table 2-15. The plant is currently not compliant with the Wastewater Discharge Licence (WWDL). The existing discharge location ESDLs are expected to be more stringent in the future (Table 2-15).

Table 2-15 Dripsey WwTP Current WWDL Emission Limit Values (ELVs) and Projected Environmentally Sustainable Discharge Limits (ESDL)

Parameter	Existing WWDL ELVs	2030 Projected ESDL	2055 Projected ESDL	2080 Projected ESDL
BOD (mg/l)	25	25	21	19
Ammonia (mg/l)	10	3.5	3.0	2.7
OrthoP (mg/l)	5	1.6	1.4	1.2
More Stringent?	-	Y	Y	Y

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. Future projections indicate a worsening trend, with increased levels of flooding and surcharging across the network.

While the two stormwater overflows (SWOs) are currently compliant, one WwTP-associated SWO becomes non-compliant in the 2080 period.

2.3.4 Dripsey Coarse screening

Dripsey WwTP SEA coarse screening assessment of options summary is presented in Table 2-16.

Table 2-16 Dripsey WwTP Coarse Screening Assessment Summary

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
A0 Do Nothing - Counterfactual	N	N	N	Option has been screened out at technical stage as organic capacity is exceeded by more than 10%, and the existing assets are nearing the end of their service life.
A1 Minimal Upgrade - Process Optimisation	Y	N/A	N/A	Works confirmed to be limited and within site so construction impact are likely to be mitigated with standard measures, and no site expansion would be required.
A2 Reuse Existing Plant and Upgrade - Existing Discharge	Y	Y	N/A	
A3 Reuse Existing Plant and Upgrade - Alternative Discharge	N/A	Y*	N/A	Option has been discounted at technical stage as less stringent discharge location is not required.
A4 New Treatment Process/Plant Upgrade on Existing Site	N/A	N/A	Y	Option proposes using the existing discharge location, however there are uncertainties around site expansion as full replacement of the current infrastructure is required.
A5 New Greenfield Site	N/A	N/A	Y	Large uncertainty with the relocation of new plant.
A6 Untreated Wastewater Load Transfer Solution	N/A	Y	Y	Transfer route (to Carrigrennan WwTP via Inniscarra & Blarney Transfer) runs along roads as is likely to have minimal impacts and standard mitigation measures would apply.

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening
- N/A – Not environmentally assessed

2.3.5 Dripsey Fine screening scoring

Dripsey WwTP SEA fine screening assessment of options scores are presented in Table 2-17.

Table 2-17 Dripsey WwTP 2080 Fine Screening Assessment Scores

Criteria	A0 Do Nothing - Counterfactual	A4 New Treatment Process/Plant Upgrade on Existing Site	A5 New Greenfield Site with Existing Discharge	A6 Untreated Wastewater Load Transfer Solution
Planning & Regulation	0	-1	-2	-2
Impact on Customers	-2	1	2	1
Community Support, Health and Wellbeing	-3	1	0	2
Water environment	-3	2	2	3
Biodiversity	-3	1	0	2
GHG Emissions	0	0	-0.5	-0.5
Energy efficiency	-3	1	2	3
Climate resilience	0	1	3	3
Circular economy	0	0	-2	2
Environmental combined score	Worst			Best
Overall combined score	N/A	3.43	3.20	3.29
Overall rank	N/A	1st	3rd	2nd

2.3.6 Dripsey Fine screening results

Table 2-18 presents options that ranked highest using the MCA fine screening process.

Table 2-18 Dripsey WwTP Implementaion 2080 Fine Screening 1st, 2nd and 3rd Ranked Options

Design Horizon	1st Ranked Option	2nd Ranked Option	3rd Ranked Option
2080	Option A4: New treatment process/plant upgrade on existing site (existing discharge location) Overall best as most cost-effective and aligns with maximising the reusing existing assets where feasible with assets only recently installed at Dripsey.	Option A6: Untreated wastewater load transfer to Carrigrennan via Inniscarra & Blarney Best environmental score as removes discharge from river benefiting 1.30 km (to Lake Inniscara) High Status Objective river.	Option A5: New greenfield site with existing discharge

2.3.7 Dripsey Wastewater network upgrade proposals

The Dripsey wastewater network proposals include works to address SWO compliance to minimise potential for untreated spills to the environment and avoiding network surcharging and flooding. The upgrades are proposed for the 2030 strategy horizon unless otherwise stated. The works are detailed in Appendix 4 to the CWS and include for Dripsey:

- Network upgrades to the existing sewage system to increase capacity
- WwTP storm tank enhancement

These works are expected to be undertaken within existing the sites or along existing pipeline networks.

2.4 Inniscarra

2.4.1 Inniscarra WwTP location

Inniscarra WwTP serves the Inniscarra waterworks and 3 domestic bungalows adjacent to the WwTP. (Figure 2-7). The planning assessment does not identify any map-based objectives. The waterworks is located approximately 5 km west of the town of Ballincollig. A planning assessment did not identify any map-based objectives. 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.

Figure 2-7 Inniscarra WwTP Site

2.4.2 Inniscarra Environmental baseline

The environmental constraints for Inniscarra WwTP are presented in Figure 2-8.

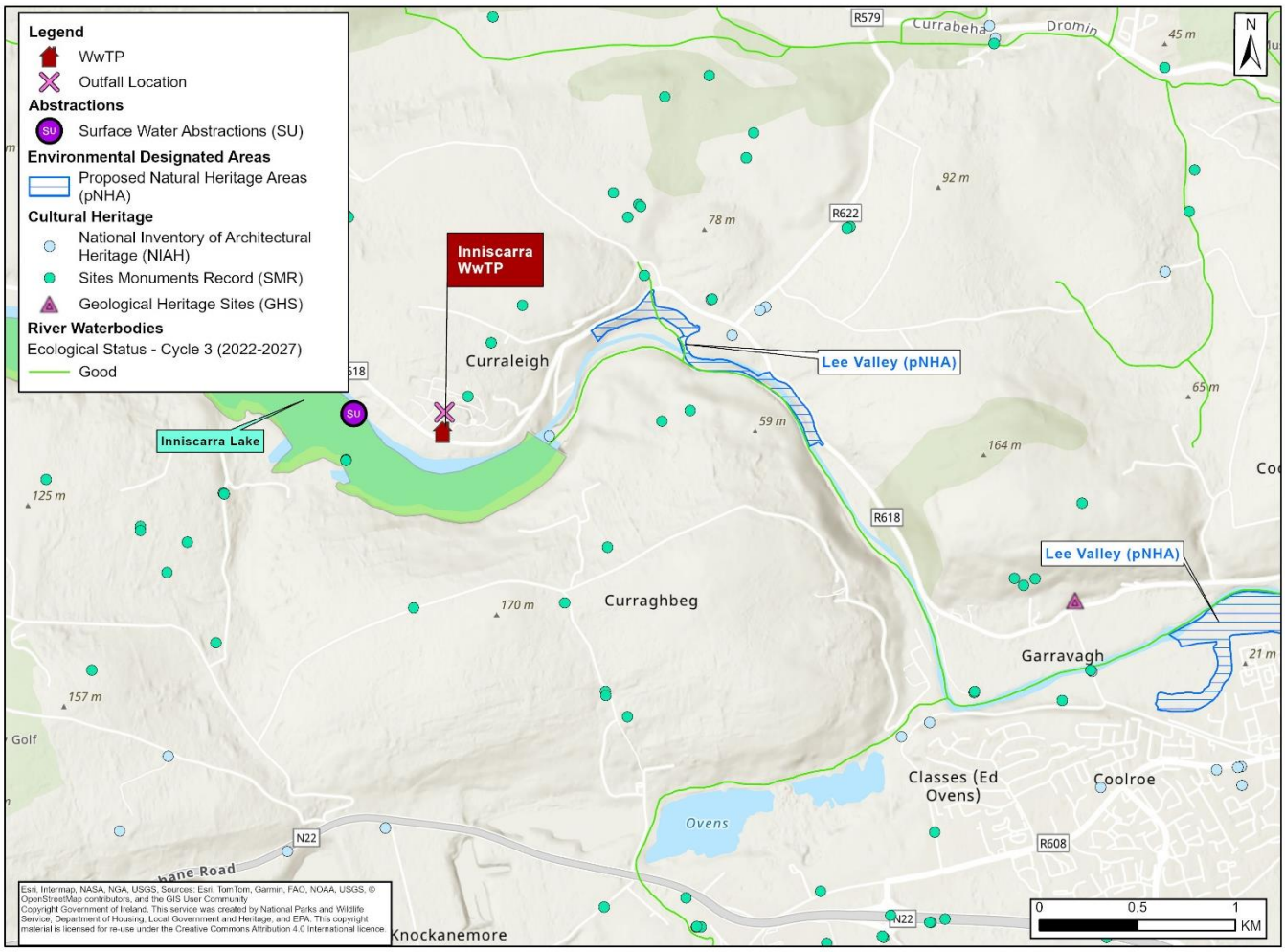

Figure 2-8 Environmental constraints for Inniscarra WwTP.

Water Framework Directive water quality and biodiversity baseline information for the current discharge location is summarised in Table 2-19.

Table 2-19 Inniscarra WwTP Current Discharge Location Environmental Baseline Summary

Topic	Baseline environment
Discharge Waterbody Type	Soakaway (final destination Inniscarra Lake)
Discharge Waterbody Name	Treated effluent from Inniscarra WwTP is discharged to the Ballinhassig East Groundwater Body (soakaway) - destination Inniscarra Lake
Discharge Waterbody Code	IE_SW_19_138
Water Body Ecological Status (cycle 3 2016-2021)	Good
Waterbody Risk Status and Category (2022)	At Risk - Anthropogenic Pressure

Topic	Baseline environment
High Status Objective List	No
Length of river from discharge to estuary (approximate)	14.20 km
Proximity to public water abstractions including regulated and unregulated GWS	Zone2 Cork Harbour & City (Abstract Inniscarra lake) – less than 0.5 km from discharge location. Cork City Water Supply (Abstract River Lee) – approximately 13.70 km downstream from discharge location.
Priority Areas for Action list RBMP	No
Proximity to Shellfish Waters	No shellfish waters located in the direct pathway/downstream of the discharge
Proximity to Bathing Waters	No bathing waters located in the proximity/direct pathway of the discharge.
Proximity to European Designated Sites (SPA, SAC)	No SPA nor SAC sites in proximity/direct pathways to current site and discharge - more than 15 km away from nearest SPA/SAC. Article 17 Terrestrial Species 1213 Common frog (in direct line 1 km from site). Article 17 Terrestrial habitats 91E0 Alluvial woodland (in direct line 3.5 km from site).
Potential to affect National (NHA, pNHA)/Ramsar designated sites and/or freshwater pearl mussel catchment?	Lee Valley pNHA – at approximately 1.5 km downstream from the plant and the discharge. The site occupies five separate sections of the valley of the River Lee.
WwTP proximity to residential areas/sensitive community sites	Close proximity to residential areas (within 400 m).

2.4.3 Inniscarra WwTP existing and future capacity and compliance

The current treatment and hydraulic capacity of the existing WwTP have been compared to the actual current loading and the expected future requirements based on population growth consideration in terms of population equivalents (PE). For Inniscarra these are presented as the current and future organic and hydraulic loadings with existing treatment capacity in Table 2-20.

Table 2-20 Inniscarra WwTP Current and Projected Loading and Existing Treatment Capacity

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

The Water Quality Modelling (WQM) outputs of the current and future predicted (2030, 2055 and 2080) assimilative capacity of the current discharge waterbody are presented in Table 2-21. The plant is currently compliant with the Wastewater Discharge Licence (WWDL). The existing discharge location ESDL are not expected to be more stringent in the future (Table 2-21).

Table 2-21 Inniscarra WwTP Current WWDL Emission Limit Values (ELVs) and Projected Environmentally Sustainable Discharge Limits (ESDL)

Parameter	Existing WWDL ELVs	2030 Projected ESDL	2055 Projected ESDL	2080 Projected ESDL
BOD (mg/l)	25	25	25	25
Ammonia (mg/l)	10	10	10	10
OrthoP (mg/l)	5	5	5	5
More Stringent?	-	N	N	N

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.

2.4.4 Inniscarra Coarse screening

Inniscarra Waterworks WwTP SEA coarse screening assessment of options summary is presented in Table 2-22.

Table 2-22 Inniscarra WwTP Coarse Screening Assessment Summary

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
A0 Do Nothing - Counterfactual	N	N	N	Option has been screened out at technical stage as both organic and hydraulic capacities will be exceeded by 2030, and the existing assets are nearing end of asset life by 2055.
A1 Minimal Upgrade - Process Optimisation	N/A Option screened out at technical assessment stage.			
A2 Reuse Existing Plant and Upgrade - Existing Discharge	Y	N/A	N/A	Works confirmed to be limited and within site so impacts likely to be mitigated with standard measures.
A3 Reuse Existing Plant and Upgrade - Alternative Discharge	N/A Option screened out at technical assessment stage.			
A4 New Treatment Process/Plant Upgrade on Existing Site	N/A	Y	Y	Option proposes using the existing discharge location, however there are uncertainties around site expansion as the existing assets will require upgrades to accommodate increased capacity demands.
A5 New Greenfield Site	N/A Option screened out at technical assessment stage.			
A6 Untreated Wastewater Load Transfer Solution	Y	Y	Y	Pipeline work (to Carrigrennan via Blarney) running along an existing road likely to have minimal impacts and standard mitigation measures would apply.

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening
- N/A – Not environmentally assessed

2.4.5 Inniscarra Fine screening scoring

Inniscarra WwTP SEA fine screening assessment of options scores are presented in Table 2-23.

Table 2-23 Inniscarra WwTP 2080 Fine Screening Assessment Scores

Criteria	A0 Do Nothing - Counterfactual	A4 New Treatment Process/Plant Upgrade on Existing Site	A6 Untreated Wastewater Load Solution
Planning & Regulation	0	-1	1
Impact on Customers	-2	1	2
Community Support, Health and Wellbeing	-2	1	1
Water environment	-2	1	2
Biodiversity	-1	-1	2
GHG Emissions	0	0	-0.5
Energy efficiency	-3	1	3
Climate resilience	0	1	3
Circular economy	0	-1	1
Environmental combined score	Worst		Best
Overall combined score	N/A	3.00	3.49
Overall rank	N/A	2nd	1st

2.4.6 Inniscarra Fine screening results

Table 2-24 presents options that ranked highest using the MCA fine screening process.

Table 2-24 Inniscarra WwTP Implementaion 2080 Fine Screening 1st and 2nd Ranked Options

Design Horizon	1st Ranked Option	2nd Ranked Option
2080	Option A6: Untreated Wastewater Load Transfer to Carrigrennan via Inniscarra & Blarney Best overall and environmental score as removes discharge from Good Status Objective waterbody.	Option A4: New Treatment Process/Plant Upgrade on Existing Site

2.4.7 Inniscarra Wastewater network upgrade proposals

The network proposals include works to address SWO compliance to minimise potential for untreated spills to the environment and avoiding network surcharging and flooding. The upgrades are proposed for the 2030 strategy horizon unless otherwise stated. The works are detailed in Appendix 4 to the CWS and for Inniscarra include improvements to storage at existing pumping station sites. These works are expected to be undertaken within existing the sites or along existing pipeline networks.

2.5 Sub catchment 1: Feasible Approach selection and implementation

A list of Feasible Approaches for Sub Catchment 1: Blarney WwTP, Courtbrack WwTP, Dripsey WwTP and Inniscarra WwTP is presented in Table 2-25.

Table 2-25 Feasible Approaches for Sub catchment 1

Site	Horizon	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
Blarney WwTP	2030	Optimise WwTP to bring to compliance.	Upgrade WwTP by 2,000 PE. Construct Final Effluent Transfer to Carrigrennan WwTP via Ballyvolane PS (26km).	Upgrade WwTP by 1,100 PE. Construct Final Effluent Transfer to Carrigrennan WwTP via Ballyvolane PS (26km).
	2055	Decommission WwTP. Construct Final Effluent Transfer to Carrigrennan WwTP via Ballyvolane PS (26km).	Upgrade WwTP by additional 10,500 PE.	Upgrade WwTP by additional 10,000 PE.
	2080	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.
Courtbrack WwTP	2030	Upgrade WwTP by additional 600 PE	Decommission WwTP and transfer to	Upgrade WwTP by additional 600 PE

Site	Horizon	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
		utilising existing discharge.	Blarney WwTP (10.5km).	utilising existing discharge.
	2055	Continue to operate WwTP.	Continue to operate WwPS.	Continue to operate WwTP.
	2080	Capital replacement of 250 PE of WwTP.	Continue to operate WwPS.	Capital replacement of 250 PE of WwTP.
Dripsey WwTP	2030	Optimise WwTP for additional 60 PE.	Optimise WwTP for additional 60 PE.	Upgrade WwTP by additional 700 PE utilising existing discharge.
	2055	Upgrade WwTP by an additional 250 PE utilising existing discharge.	Decommission WwTP and transfer to Blarney WwTP via Inniscarra (6.7km).	Continue to operate WwTP.
	2080	Continue to operate WwTP	Continue to operate WwPS.	Continue to operate WwTP.
Inniscarra WwTP	2030	Decommission WwTP and transfer to Blarney WwTP (5.9km) and associated PS.	Decommission WwTP and Transfer to Blarney WwTP (5.9km) and associated PS.	Decommission WwTP and transfer to Dripsey WwTP (6.7km) and associated PS.
	2055	Continue to operate WwPS.	Continue to operate WwPS.	Continue to operate WwPS.
	2080	Continue to operate WwPS.	Continue to operate WwPS.	Continue to operate WwPS.
Overall Feasible Approach **environmental assessment** summary		**Ranked 3rd** Blarney: River discharge brought to compliance (2030) after which the transfer (2055) will require a construction of 26 km final effluent pipeline. Removal of the discharge will benefit 21.5 km of High Status Objective river. Courtbrack: Current river discharge location remains with WwTP upgrades (2030) to accommodate the	**Ranked 1st** Blarney: The transfer (2030) will require a construction of a 26 km final effluent pipeline. Removal of the discharge will benefit 10.5 km of High Status Objective river. Courtbrack: The transfer (2030) will require a construction of 10.5 km effluent pipeline. Removal of the discharge will benefit 17.7 km of High Status Objective river.	**Ranked 2nd** Blarney: The transfer (2030) will require a construction of a 26 km final effluent pipeline. Removal of the discharge will benefit 10.5 km of High Status Objective river. Courtbrack: Current river discharge location remains with WwTP upgrades (2030) to accommodate the current and future loads.

Site	Horizon	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
		current and future loads. Dripsey: Current river discharge location remains with WwTP upgrades (2030) to bring to WWDL compliance and accommodate the current and future loads. Inniscarra: The transfer (2030) will require a construction of 5.9 km effluent pipeline. Removal of the discharge will benefit 14.2 km of Good Status Objective river.	Dripsey: River discharge brought to WWDL compliance (2030) after which the transfer (2055) will require a construction of 6.7 km effluent pipeline. Removal of the discharge will benefit 21.5 km of High Status Objective river. Inniscarra: The transfer (2030) will require a construction of 5.9 km effluent pipeline. Removal of the discharge will benefit 14.2 km of Good Status Objective river.	Dripsey: Current river discharge location remains with WwTP upgrades (2030) to bring to WWDL compliance and accommodate the current and future loads. Inniscarra: The transfer (2030) will require a construction of 6.7 km effluent pipeline. Removal of the discharge will benefit 14.2 km of Good Status Objective river.
Overall recommended approach		**Ranked 1st** Overall best deliverability and cost. Environmentally similar to Approach 3 but slightly smaller pipeline construction impacts and later Blarney discharge removal.	**Ranked 3rd** Overall highest cost. Environmentally due to earlier decommissions of WwTPs and greater length of river benefiting long term from removal of discharges from 4 WwTPs. Transfer is to marine environment but with benefits of Quaternary treatment. Greater short term pipeline construction impacts.	**Ranked 2nd** Environmentally this approach is ranked 2nd with slightly greater pipeline transfer construction impact to Approach 1 but benefits from earlier Blarney discharge removal. All discharges meeting WFD requirements and further river ecology benefits.

Overall the operational environmental benefits from all three approaches, and potentially the greatest benefit for river water environment and biodiversity would be from Feasible Approach 2 but this is the also the highest lifetime cost approach. Feasible Approach 1 is selected as the lowest cost with environmental benefits including supporting water quality improvements to meet WFD objectives.

Figure 2-9 presents Recommended Approach environmental constraints for Sub catchment 1

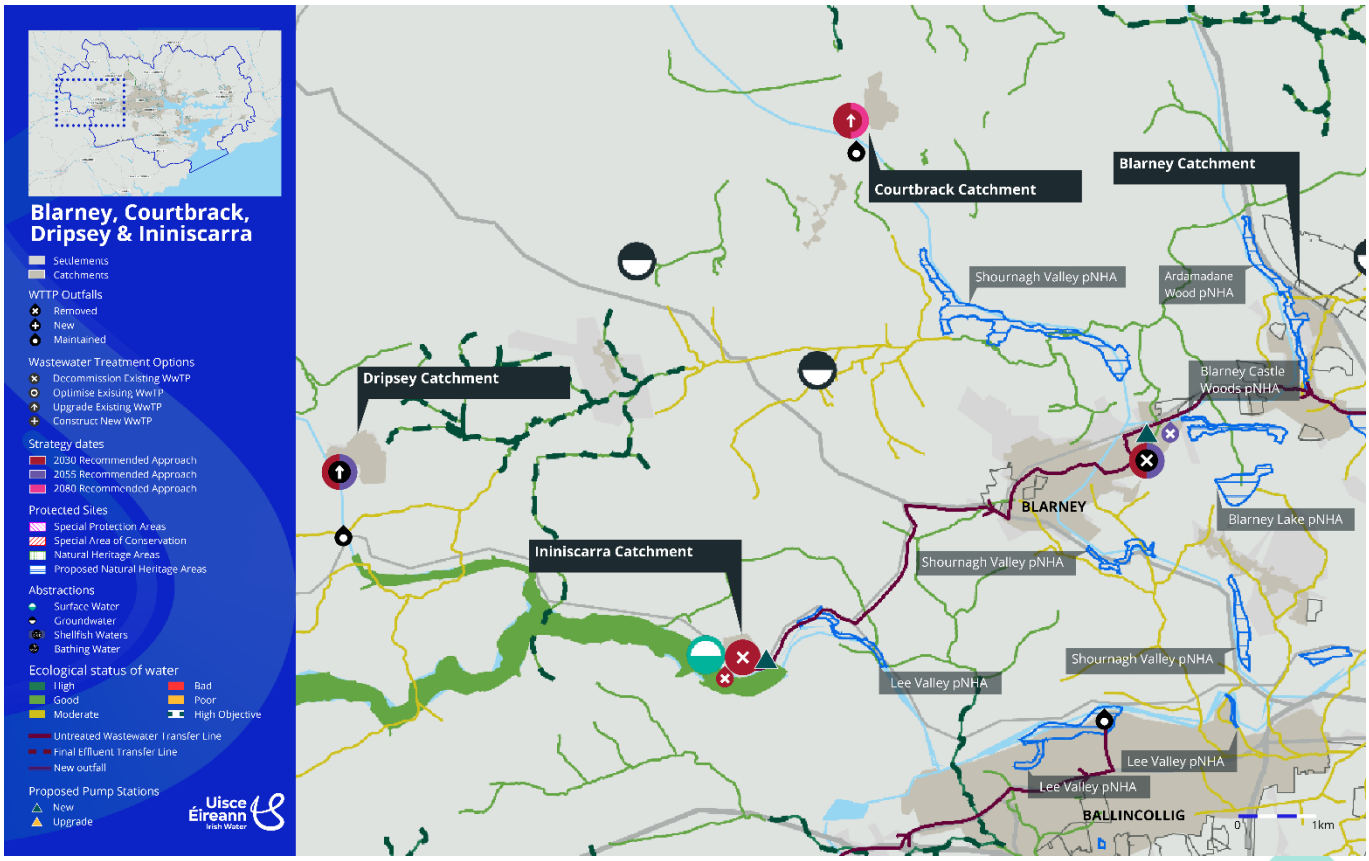

Figure 2-9 Recommended Approach Environmental Constraints for Sub catchment 1

Figure 2-10 presents implementation strategy for the Recommended Approach for Blarney WwTP, Courtbrack WwTP, Dripsey WwTP and Inniscarra WwTP.

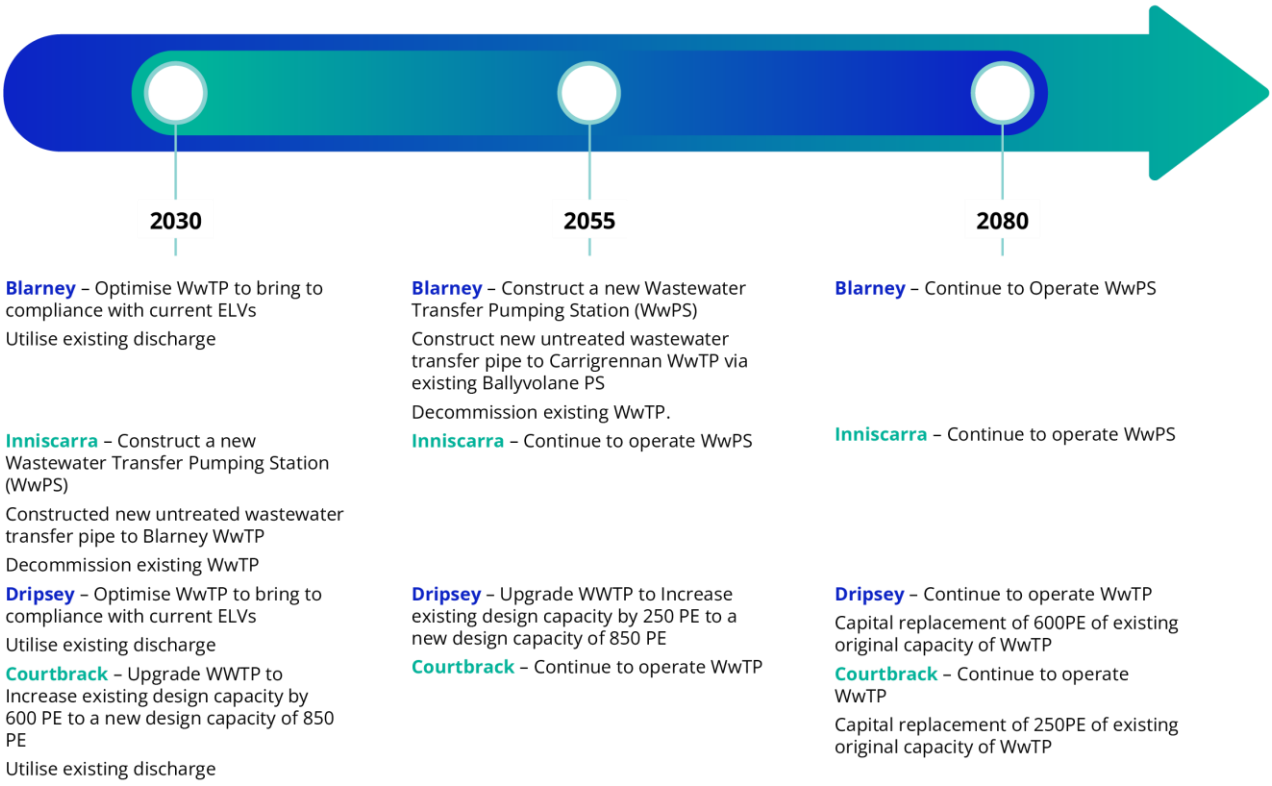

Figure 2-10 Implementation strategy for Blarney WwTP, Courtbrack WwTP, Dripsey WwTP and Inniscarra WwTP.

2.6 Sub catchment 1: SEA Assessment of Recommended Approach

2.6.1 Blarney WwTP

Table 2-26 presents Environmental Assessment of Recommended Approach for Blarney WwTP and network.

Table 2-26 Blarney WwTP Recommended Approach Assessment Summary

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec, Health	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
Current (A0)	Operation	+ve	0	0	0	0	0	0	0	0	0
		-ve	---	---	0	--	0	0	0	0	--
	Construction	+ve	0	0	0	0	0	0	0	0	0

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec, Health	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
2030 (A1)		-ve	0	-	-	0	-	0	0	0	-
	Operation	+ve	+	+	+	0	+	0	0	0	0
		-ve	--	0	0	--	0	0	0	0	0
2055 (A6)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	-	--	--	0	--	-	--	-	0
	Operation	+ve	+++	++	0	++	+	+	0	0	++
		-ve	0	0	0	0	0	0	0	0	0
2080 (A6)	Same as 2055 - continue to operate pumping station. No additional works or change to operation compared to 2055.										

+ve = potential beneficial or positive effects/risk
-ve = potential negative or adverse effects/risk

Optimisation of the plant (Option A1) in the interim period (2030) will bring plant into compliance before the A6 option start. However, as optimisation may not address the non-compliant SWOs as larger storm tank would not be constructed if the ultimate option is to pump away. Network upgrades to address SWO compliance would be implemented but may worsen issues at the WwTP, therefore the SWO spills may continue to have negative effects on aquatic biodiversity. Construction of the final effluent transfer (Option A6) and decommissioning of the Blarney WwTP will have a positive effect on the Water Environment and Biodiversity due to decommissioning of the plant and removal of discharge to the river. This may contribute to achieving waterbody High Status and have a positive effect on aquatic biodiversity including benefiting from removal of non-compliant SWOs. The proposed transfer pipeline (Option A6) is relatively long at 26 km having moderate negative effect in terms of construction disturbance, material assets and associated greenhouse gas emissions. Additionally, decommissioning of the plant may have minor negative effects due to 'abandonment' of infrastructure, however this can be potentially addressed by applying a circular economy approach, materials should be reused and recycled. The transfer route is running along a NIAH Bridge (20906315); through two SMR zones (R112724 and R180365) and along three bridges crossing watercourses. Assuming existing infrastructure can be used, and standard good practice assessment and mitigation would be applied as part of construction design, negative effects on water environment and cultural heritage could be minimised or fully avoided. Removal of the discharge may have a positive effect by reducing risk and

treatment inputs for the downstream freshwater abstraction and will be supportive for protecting drinking water supply and removal of the WwTP will provide local community benefits with the removal of odour issues.

2.6.2 Courtbrack WwTP

Table 2-27 presents Environmental Assessment of Recommended Approach for Courtbrack WwTP.

Table 2-27 Courtbrack WwTP Recommended Approach Assessment Summary

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water	PopN, Econ, Rec,	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
Current (A0)	Operation	+ve	0	0	0	0	0	0	0	0	0
		-ve	---	--	0	--	0	0	0	0	--
2030 (A4)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	-	-	-	-	-	0	0	-	-
	Operation	+ve	+	++	0	+	+	0	0	0	+
		-ve	0	0	0	--	0	-	0	-	0
2055	Continue to operate WwTP. No additional change works or change to operation compared to 2030.										
2080 (A4)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	-	-	-	-	-	0	0	-	-
	Operation	+ve	++	++	0	+	+	0	0	0	+
		-ve	0	0	0	--	0	-	0	-	0

+ve = potential beneficial or positive effects/risk

-ve = potential negative or adverse effects/risk

Upgrade of the plant (Option A4) will contribute to maintaining the watercourse at High Ecological Status meeting its objective. However, currently there are no SWOs on site and installation of one is not proposed for this option. Considering close proximity of the watercourse and housing estate to the site, construction works related to the upgrades (2030 and further upgrade 2080) may have negative effects on the Population

and human health and wellbeing due to construction disturbance and pollution risk, however these are expected to be address through standard good practice construction environmental management.

2.6.3 Dripsey WwTP

Table 2-28 presents Environmental Assessment of Recommended Approach for Dripsey WwTP.

Table 2-28 Dripsey WwTP Recommended Approach Assessment Summary

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec, Health	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
Current (A0)	Operation	+ve	0	0	0	0	0	0	0	0	0
		-ve	---	---	0	---	0	0	0	0	--
2030 (A1)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	0	-	-	0	-	0	0	0	-
	Operation	+ve	+	+	+	0	+	0	0	0	0
		-ve	0	0	0	0	0	0	0	0	0
2055 (A4)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	-	-	-	-	-	0	0	-	-
	Operation	+ve	++	++	0	++	+	0	0	0	+
		-ve	0	0	0	0	0	-	0	-	0
2080	Same as 2055 - continue to operate WwTP. No additional works or change to operation compared to 2055.										

+ve = potential beneficial or positive effects/risk

-ve = potential negative or adverse effects/risk

Optimisation of the plant (Option A1) in the interim period (2030) will bring plant into compliance before works on the Option A4 start. Option A4 proposes a full replacement of the current infrastructure, along with an upgrade to meet increased capacity demands. This along with an additional storm storage tank at the

WwTP will resolve SWO compliance and will have a positive effect on aquatic biodiversity by reducing number and volume of future spills. Bringing the WwTP and SWO into compliance and ensuring future compliance may contribute to keeping the waterbody at High Status. Construction works may have some negative effects on Population, Economy, Tourism and Recreation, and Human Health; Biodiversity and Air Quality, and these should be managed with standard mitigation methods if contained to current site. However, there is a risk of loss of some woodland habitat if site expansion is required. Ensuring discharge future compliance may have positive effect on the downstream freshwater abstraction, ensuring protection of the drinking water supply.

2.6.4 Inniscarra WwTP

Table 2-29 presents Environmental Assessment of Recommended Approach for Inniscarra WwTP.

Table 2-29 Inniscarra WwTP Recommended Approach Assessment Summary

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec, Health	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
Current (A0)	Operation	+ve	0	0	0	0	0	0	0	0	0
		-ve	--	--	0	-	0	0	0	0	--
2030 (A6)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	-	-	--	--	-	-	-	-	0
	Operation	+ve	+	+	0	+	+	+	0	0	+
		-ve	0	0	0	0	0	0	0	0	0
2055 and 2080	Same as 2030 - continue to operate WwPS. No additional works or change to operation compared to 2030.										

+ve = potential beneficial or positive effects/risk

-ve = potential negative or adverse effects/risk

Construction of the final effluent transfer (Option A6) and decommission of the Inniscarra WwTP will have a positive effect on the Water Environment and Biodiversity due to decommissioning of the plant and removal of discharge. However, as the plant discharges into a soakaway and the plant serves a very small agglomeration the benefits to the waterbody would be small. Similarly, removal of the discharge may have some positive effect on the lake Inniscarra abstraction, ensuring protection of the drinking water supply but reduces risk. The option ensures future compliance of current SWOs which will have some benefits to the

aquatic biodiversity due to reduction of spills. The proposed transfer pipeline is relatively short at 5.9 km. Additionally, approximately 500 metres of pipeline is currently indicated as routed through a 'Broadleaved Forest and Woodland' and 'Wet grassland' habitats causing potential habitat disturbance and/or loss having negative effect on terrestrial biodiversity. The transfer route runs along a road and crosses SHOURNAGH_040 watercourse in three locations. Assuming existing infrastructure can be used, and mitigation would be applied as part of construction design, negative effects on water environment and cultural heritage could be minimised or fully avoided.

2.7 Sub catchment 1: Cumulative assessment

Potential for cumulative or in combination adverse or beneficial effects are identified in Table 2-30. These aim to identify where a receptor could be affected by more than one of the WwTP and network proposals within the overall sub catchment such as works being undertaken in close proximity at the same time or discharges or decommissioning affecting the same waterbody.

Table 2-30 Potential cumulative or in combination effects within Sub-catchment 1

Site/ Potential Interaction	Blarney WwTP	Courtbrack WwTP	Dripsey WwTP
Inniscarra WwTP	Not in proximity for construction and no pathways for combined operational effects.	Not in proximity for construction and no pathways for combined operational effects.	Not in proximity for construction. Potential beneficial effects on Inniscarra Lake and freshwater abstraction through removal of Inniscarra discharge and Dripsey upgrade.
Dripsey WwTP	Not in proximity for construction and no pathways for combined operational effects.	Not in proximity for construction and no pathways for combined operational effects.	
Courtbrack WwTP	Not in proximity for construction. Potential beneficial effects on River Shournagh status and freshwater abstraction through removal of Blarney discharge and Courtbrack upgrade.		

Key	No interaction or negligible cumulative effects		Potential for beneficial cumulative effects	
	Potential for adverse cumulative effects		Potential for mixed beneficial and adverse effects	

No significant cumulative effects identified for the options in the catchment requiring additional mitigation to that required for individual options. There could be potential for network and pipeline transfers to create combined traffic disruption where works are undertaken in the same period but affecting the local road network or requiring diversions.

2.8 Sub catchment1: Mitigation and enhancement

General mitigation and enhancement measures include:

- Supporting awareness campaigns on challenges for WwTPs and water pollution to encourage appropriate use, and to understand the improvement works proposed and long-term benefits compared to temporary disruption
- Water quality modelling identified the influence of other sources of pollution affecting water quality and aquatic biodiversity including in relation to BOD, ammonia and phosphates. Therefore, support for catchment management measures aimed at reducing these sources can provide wider environmental benefits as well environmental enhancement for biodiversity and flood management. These can include measures to improve water retention, reducing nutrient run off and soil erosion. These measures can only be delivered through collaboration with other parties and landowner involvement.
- WwTP and network upgrades will need to consider in detail potential to include NbS as part of detailed design including NBS that provide additional water quality enhancement benefits.

Specific measures for Sub catchment 1 options are set out in Table 2-31 below.

Table 2-31 Mitigation and enhancement measures identified for Sub Catchment 1

Agglomeration	Potential issues/risks	Mitigation Measures
Blarney WwTP	Site construction works for optimisation and then decommissioning works and construction of 26km of pipeline for transfer potential for habitat loss and disruption/ disturbance.	Standard good construction including circular economy principles and traffic management for pipeline and network construction. Detailed transfer route alignment and assessment to minimise habitat loss. Surveys and assessments depending on routing such as ecology, contaminated land, cultural heritage/archaeological interest.

Agglomeration	Potential issues/risks	Mitigation Measures
		Application of biodiversity net gain to address any pipeline habitat losses – consider also final use of decomissioned site.
Courtbrack WwTP	Land take requirement likely to include some habitat loss and potentially within flood plain. Site construction for works upgrade	Environmental surveys and assessments including ecology, planning, cultural heritage/archaeology, and flood risk assessment. Application of Biodiversity net gain to address losses – consider potential to include enhancement on site. Consider scope for NbS use as part of design. Opportunities for NbS measures include: Sludge Drying Reed Beds
Dripsey WwTP	Land take requirement for upgrade -likely to include some habitat loss and potentially within flood plain. Site construction for works upgrade.	Environmental surveys and assessments including ecology, planning, cultural heritage/archaeology, and flood risk assessment. Application of Biodiversity net gain to address losses – consider potential to include enhancement on site. Consider scope for NbS use as part of design. Opportunities for NbS measures with acceptable discharge requirements where the projected PE does not exceed 2,500 PE include: • Wetland, Reedbed • Sludge Drying Reed Beds • SWO Storm Management Lagoon
Inniscarra WwTP	Decommissioning works.	Standard good construction management including circular economy principles.
Sub catchment common measures	Receiving water bodies influenced by pollution from other source and hence use of notionally clean basis for water quality modelling.	• Identify opportunities to support Upper Lee catchment management measures to reduce nutrient pollution to the Shournagh, Dripsey rivers – including engagement with business and farmers- such as changes to

Agglomeration	Potential issues/risks	Mitigation Measures
		cropping/cultivation, reducing runoff and including using NbS. • Include renewable energy sources such as solar panels in upgrade designs, • Consider potential for biodiversity enhancement and net gain as part of any site based NbS use.

3 Sub catchment 2: Kileens and Monard

3.1 Kileens

3.1.1 Kileens WwTP location

Kileens WwTP is located approximately 1.5km to the west of Cork City (Figure 3-1). 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. The site is also bordered by woodland and scrub and grassland habitats. Any site expansion or upgrade would require pre-planning consultation with the local authority to consider address constraints and potential community and biodiversity impacts.

Figure 3-1 Kileens WwTP Site

3.1.2 Kileens Environmental baseline

The environmental constraints at Kileens WwTP are presented in Figure 3-2.

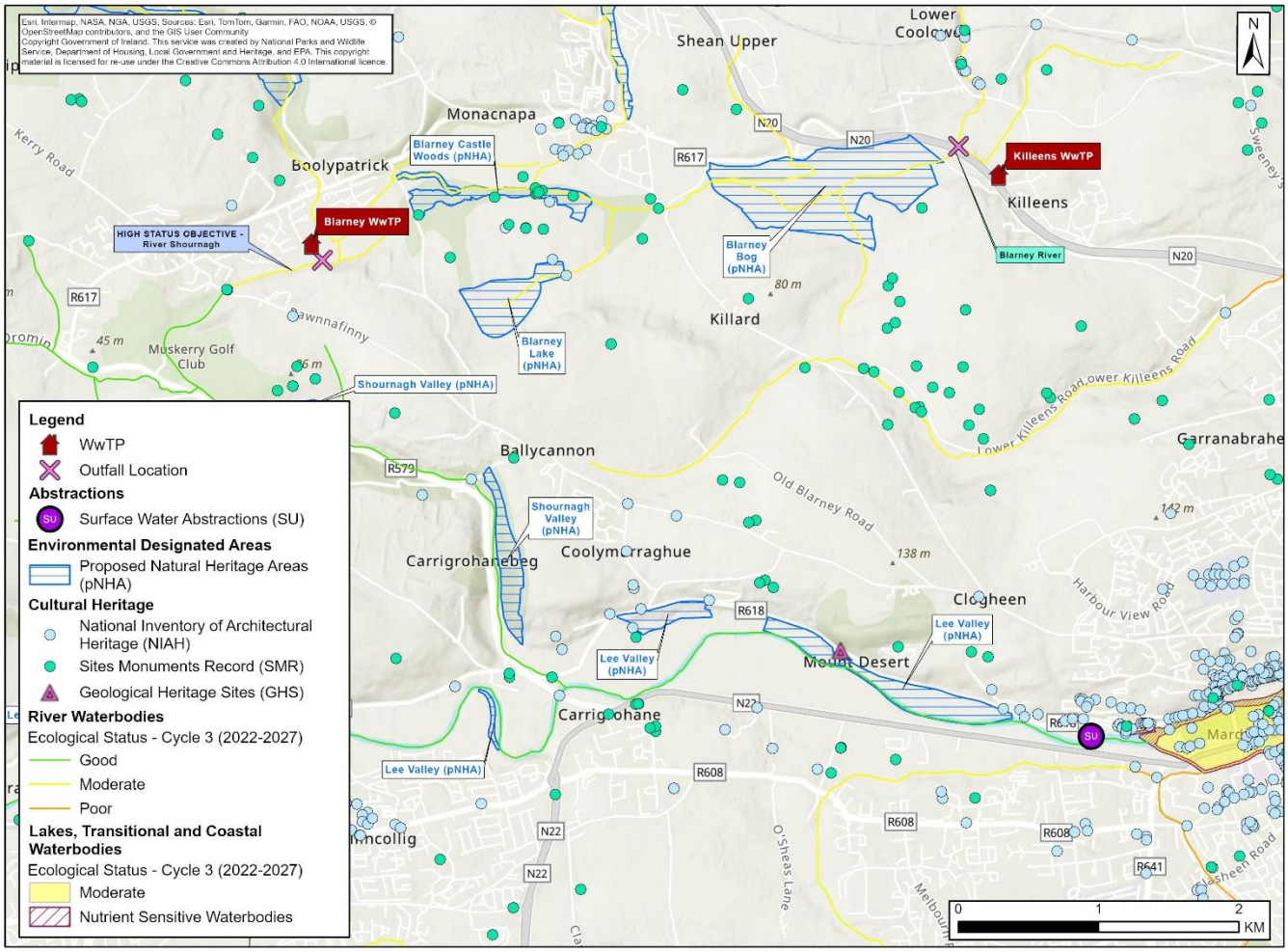

Figure 3-2 Environmental constraints at the Kileens WwTP.

Water Framework Directive water quality and biodiversity baseline information for the current discharge location is summarised in Table 3-1.

Table 3-1 Current Kileens WwTP discharge location summary

Topic	Baseline environment
Discharge Waterbody Type	River waterbody
Discharge Waterbody Name	Blarney_010 (Blarney River)
Discharge Waterbody Code	IE_SW_19B020500
Water Body Ecological Status (cycle 3 2016-2021)	Moderate
Waterbody Risk Status and Category (2022)	At Risk: Agriculture
High Status Objective List	No

Topic	Baseline environment
Length of river from discharge to estuary (approximate)	15.80 km
Proximity to public water abstractions including regulated and unregulated GWS	Cork City Water Supply (Abstract River Lee) – approximately 15.30 km downstream from discharge location.
Priority Areas for Action list RBMP	Confirmed AFA Category: Restoration, Sub-Category: LA Areas for Restoration Local Authorities.
Proximity to Shellfish Waters	No shellfish waters located in the direct pathway/downstream of the discharge
Proximity to Bathing Waters	No bathing waters located in the proximity/direct pathway of the discharge.
Proximity to European Designated Sites (SPA, SAC)	No SPA nor SAC sites in proximity/direct pathways to current site and discharge (more than 8 km away from nearest SPA/SAC).
Potential to affect National (NHA, pNHA)/Ramsar designated sites and/or freshwater pearl mussel catchment?	Blarney Bog pNHA: 0.20 km downstream from the discharge. Blarney Castle Woods pNHA: 2.5 km downstream from plant and discharge. Shournagh Valley pNHA: 6 km downstream from the discharge.
Proximity of WwTP to residential areas/sensitive community sites	Close proximity to residential areas (within 100 m).

3.1.3 Kileens WwTP existing and future capacity and compliance

The current treatment and hydraulic capacity of the existing WwTP have been compared to the actual current loading and the expected future requirements based on population growth consideration in terms of population equivalents (PE). For Kileens WwTP these are presented as the current and future organic and hydraulic loadings with existing treatment capacity in Table 3-2.

Table 3-2 Kileens WwTP Current and Projected Loading and Existing Treatment Capacity

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

The Water Quality Modelling (WQM) outputs of the current and future predicted (2030, 2055 and 2080) assimilative capacity of the current discharge waterbody are presented in Table 3-3. The plant is currently not compliant with the Wastewater Discharge Licence (WWDL). The existing discharge location ESDL are expected to be more stringent in the future (Table 3-3).

Table 3-3 Kileens WwTP current WWDL Emission Limit Values (ELVs) and Projected Environmentally Sustainable Discharge Limits (ESDL)

Parameter	Existing WWDL ELVs	2030 Projected ESDL	2055 Projected ESDL	2080 Projected ESDL
BOD (mg/l)	25	4	3	3
Ammonia (mg/l)	28.4	0.6	0.4	0.4
OrthoP (mg/l)	1	0.3	0.2	0.2
More Stringent?	-	Y	Y	Y

In addition, the network assessment identified potential flooding and surcharging conditions under current and future scenarios within the main trunk sewer within the Killens 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.

Currently, there is a SWO present within the system which is non-compliant and is projected to remain at risk of non-compliance by 2080.

3.1.4 Kileens Coarse screening

Kileens WwTP SEA coarse screening assessment of options summary is presented in Table 3-4.

Table 3-4 Kileens WwTP Coarse Screening Assessment Summary

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening assessment summary comments
A0 Do Nothing - Counterfactual	N	N	N	N/A
A1 Minimal Upgrade - Process Optimisation	N/A Option screened out at technical assessment stage.			
A2 Reuse Existing Plant and Upgrade - Existing Discharge	Y	N/A	N/A	Works confirmed to be limited and within site so construction impacts are likely to be mitigated with standard measures, and no site expansion would be required.
A3 Reuse Existing Plant and Upgrade - Alternative Discharge	N/A Option screened out at technical assessment stage.			
A4 New Treatment Process/Plant Upgrade on Existing Site	N/A Option screened out at technical assessment stage.			
A5 New Greenfield Site	N/A	Y	Y	High level of uncertainty (relocation of new plant and new discharge location – River Lee).
A6 Untreated Wastewater Load Transfer Solution	Y	Y	Y	Majority of the transfer route (to Carrigrennan via Cork City) runs along roads, however part of the pipeline goes near a border of SPA and pNHA, detailed alignment will be required.

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening
- N/A – Not environmentally assessed

3.1.5 Kileens Fine screening scoring

Carrignavar WwTP SEA fine screening assessment of 2080 options scores are presented in Table 3-5.

Table 3-5 Kileens WwTP 2080 Fine Screening Assessment Scores

Criteria	A0 Do Nothing - Counterfactual	A5 New Greenfield Site with New Discharge	A6 Untreated Wastewater Load Transfer Solution
Planning & Regulation	0	-1	2
Impact on Customers	-2	2	3
Community Support, Health and Wellbeing	-3	1	3
Water environment	-3	2	3
Biodiversity	-3	-2	2
GHG Emissions	0	0	1
Energy efficiency	-3	2	3
Climate resilience	-3	3	3
Circular economy	0	-1	1
Environmental combined score	Worst		Best
Overall combined score	N/A	2.10	4.06
Overall rank	N/A	2nd	1st

3.1.6 Kileens Fine screening results

Table 3-6 presents options that ranked highest using the MCA fine screening process.

Table 3-6 Kileens WwTP 2080 Implementation Fine Screening 1st, 2nd and 3rd Ranked Options

Design Horizon	1st Ranked Option	2nd Ranked Option	3rd Ranked Option
2080	Option A6: Untreated Wastewater Load Transfer to Carrigrennan via Cork City. Best environmental and overall score due to removal of discharge from river and addressing network issues. Benefiting approx. 15 km of Good Status Objective river downstream.	Option A5: New Greenfield Site with New Discharge Location at River Lee	N/A

3.1.7 Kileens Wastewater network upgrade proposals

The network proposals include works to address SWO compliance to minimise potential for untreated spills to the environment and avoiding network surcharging and flooding. The upgrades are proposed for the 2030 strategy horizon unless otherwise stated. The works are detailed in Appendix 4 to the CWS and include for Kileens:

- Improvements to storage at existing pumping station sites;
- New storage at Monard for treated final effluent transfer.

These works are expected to be undertaken within existing the sites or along existing pipeline networks.

3.2 Monard

Monard is an agglomeration not currently served by a WwTP but it is incorporated into the overall strategy. 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 by 2055 and 13,500 by 2080. The existing catchment does not have a significant wastewater network and as a result does not have an existing wastewater treatment process that is operated by Uisce Éireann.

The CWS aims to identify optimal wastewater solutions for this area by 2080. 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 – Construct untreated wastewater transfer and associated PS to connect to Blarney untreated wastewater transfer to Ballyvolane PS

3.3 Sub catchment 2: Feasible Approach selection and implementation

A list of Feasible Approaches is presented in Table 3-7.

Table 3-7 Feasible Approaches for Sub catchment 2

Site	Horizon	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
Kileens WwTP	2030	Decommission Existing WwTP. Construct Untreated Transfer to Cork City Network at Northpoint Business Park and associated PS.	Decommission Existing WwTP. Construct Untreated Transfer and connect to Blarney Untreated Transfer to Ballyvolane PS.	Decommission Existing WwTP. Construct Untreated Transfer to Cork City Network at Northpoint Business Park.
	2055	Continue to operate WwPS.	Continue to operate WwPS.	Continue to operate WwPS.
	2080	Continue to operate WwPS.	Continue to operate WwPS.	Continue to operate WwPS.
Monard WwTP	2030	Construct untreated wastewater transfer and associated PS to connect to Blarney untreated wastewater transfer to Ballyvolane PS.	Construct untreated wastewater transfer and associated PS to connect to Blarney untreated wastewater transfer to Ballyvolane PS.	Construct new WwTP (5,000PE). Construct final effluent transfer to Ballyvolane PS.
	2055	Continue to operate WwPS.	Upsize Untreated Wastewater Transfer.	Upgrade WwTP by 15,000PE.
	2080	Continue to operate WwPS.	Continue to operate WwPS.	Continue to operate WwTP.
Overall Feasible Approach environmental assessment summary		**Ranked 1st** Kileens: The transfer (2030) will require a construction of a 2.2 km untreated effluent pipeline. Discharge removal (2030) will benefit 15.80km of Good Status Objective river. Monard: Construction of (2030) untreated effluent transfer pipeline (2030).	**Ranked 2nd** Kileens: The transfer (2030) will require a construction of a 24.1 km untreated effluent pipeline. Discharge removal (2030) will benefit 15.80km of Good Status Objective river. Monard: Construction of (2030) untreated effluent transfer pipeline (2030).	**Ranked 3rd** Kileens: The transfer (2030) will require a construction of a 2.2 km untreated effluent pipeline. Discharge removal (2030) will benefit 15.80km of Good Status Objective river. Monard: Construction of a new Monard WwTP (2030) and final effluent transfer pipeline.
Overall recommended approach		**Ranked 1st** Overall lowest cost. Environmentally best due to removal of discharge at Kileens benefiting the river and providing wastewater	**Ranked 2nd** Similar to Approach 1, but greater pipeline construction impacts due to the longer transfer pipelines required.	**Ranked 3rd** Overall highest costs and construction impacts from a pipeline transfer and the new Monard WwTP.

Site	Horizon	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
		network for Monard benefiting the population and avoiding negative effects of building a new WwTP.		

3.4 Sub catchment 2: Recommended Approach implementation strategy

Figure 3-3 presents Recommended Approach graphic including environmental constraints.

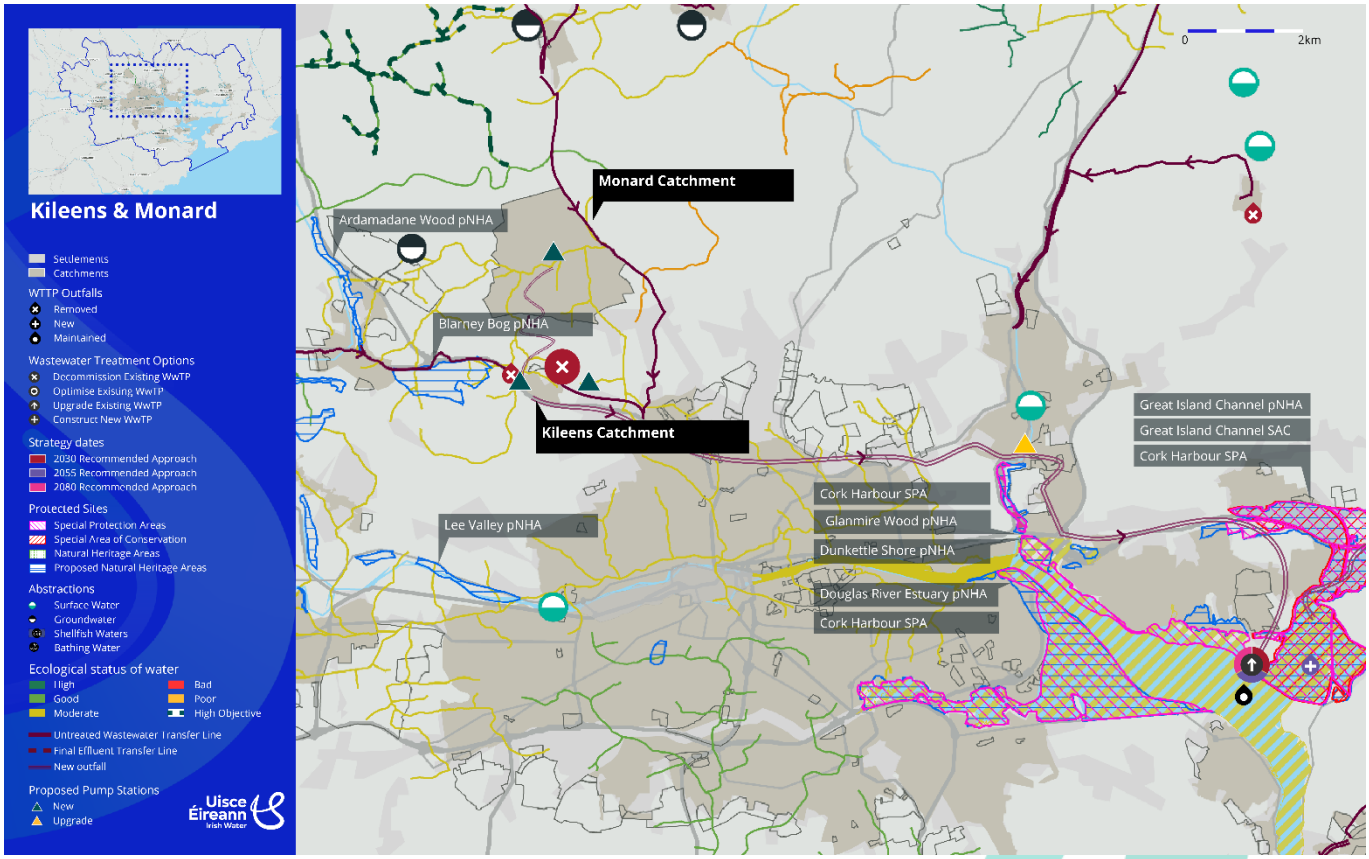

Figure 3-3 Recommended Approach Environmental Constraints for Sub catchment 2

Figure 3-4 presents implementation strategy for the Recommended Approach for Kileens WwTP and Monard WwTP.

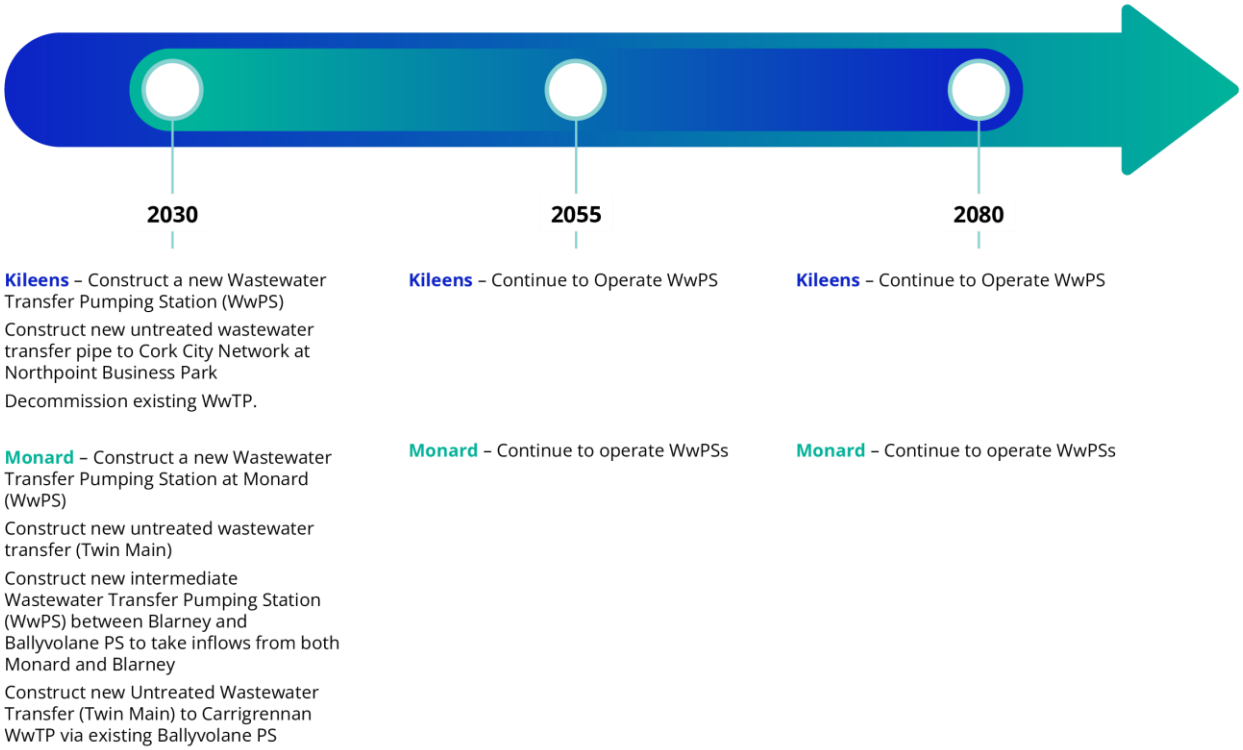

Figure 3-4 Implementation strategy for Kileens WwTP and Monard WwTP

3.5 Sub catchment 2: SEA Assessment of Recommended Approaches

3.5.1 Kileens WwTP

Table 3-8 presents Environmental Assessment of the Recommended Approach for Killeens WwTP.

Table 3-8 Kileens WwTP Recommended Approach Assessment Summary

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec,	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
Current (A0)	Operation	+ve	0	0	0	0	0	0	0	0	0
		-ve	--	--	0	-	0	0	0	0	--
2030 (A6)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	-	-	--	--	-	-	0	-	0

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec,	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
	Operation	+ve	++	+	0	++	+	0	0	0	++
		-ve	0	0	0	0	0	0	0	0	0
2055 and 2080	Same as 2030 - continue to operate WwPS. No additional works or change to operation compared to 2030.										

+ve = potential beneficial or positive effects/risk

-ve = potential negative or adverse effects/risk

The decommissioning and consequently the removal of the discharge at Kileens WwTP and the construction of the untreated wastewater transfer (Option A6) into the Cork City Network in the interim period (2030) will have a positive effect on the Water Environment and Biodiversity due to the removal of the discharge into Blarney River. The removal of a non-compliant SWO should have a positive effect on aquatic biodiversity and potentially on downstream pNHAs where they include aquatic habitat and associated species:

- Blarney Bog pNHA.
- Blarney Castle Woods pNHA.
- Shournagh Valley pNHA.
- Lee Valley pNHA.

These positive effects should continue through to the 2080 horizon, with the Kileens WwPs to remain in operation through 2055 to 2080. The decommissioning of the plant could have minor negative effects with risk of stranded assets, however this can potentially be addressed through full decommissioning and by applying a circular economy approach, materials should be reused and recycled. The site could be redeveloped for alternative uses. The transfer route runs alongside New Mallow Road (N20) and crosses a tributary to the River Bride before it joins the Cork City Network (W 66297 74706). Assuming the existing infrastructure can be used, and mitigation would be applied as part of the construction design, negative effects on the water environment could be minimised or fully avoided.

3.5.2 Monard WwTP

Table 3-9 presents Environment Assessment of Recommended Approach for Monard catchment.

Table 3-9 Monard catchment Recommended Approach Assessment Summary

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec,	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
Current (A0)	Operation	+ve	0	0	0	0	0	0	0	0	0
		-ve	0	0	0	0	0	0	0	0	0
2030 (A6)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	0	-	--	--	-	-	0	-	0
	Operation	+ve	+	++	0	+	+	0	0	0	+
		-ve	0	0	0	0	0	0	0	0	0
2055 and 2080	Same as 2030 - continue to operate WwPS. No additional works or change to operation compared to 2030.										

+ve = potential beneficial or positive effects/risk

-ve = potential negative or adverse effects/risk

The proximity of the pipeline to residential houses could cause minimal negative effects during the construction of an untreated wastewater transfer pipeline (Option A6), However, the operation stage should have some benefits as more discrete wastewater removal will be introduced into the catchment. The construction of the pipeline would contribute to greenhouse gas emissions and could cause local short term traffic and community disruption and disturbance. In the long term operation should positively support the Water Environment and Biodiversity SEA objectives and accommodate the proposed population growth and new development.

3.6 Sub catchment 2: Cumulative assessment

The potential cumulative or in combination adverse or beneficial effects for the Kileens and Monard sub catchment are identified below in Table 3-10. This assessment aims to identify where a receptor could be affected by more than one of the WwTP and network proposals within the overall sub catchment, such as works being undertaken in proximity at the same time or discharges or decommissioning affecting the same waterbody.

Table 3-10 Potential cumulative or in combination effects within Sub-catchment 2

Site/ Potential Interaction	Monard	
Kileens WwTP	Decommission of Killens WwTP and construction of wastewater transfer at Monard may have potential beneficial cumulative effects due to removal of discharges and providing adequate wastewater services to the population of these catchments.	Simultaneous construction of untreated wastewater transfer pipelines to Carrigrennan WwTP has the potential to cause some short term minor negative effects including disruption to the Kileens settlement, R112724 SMR zone, New Mallow Road (N20) and two watercourses at pipeline crossings (Blarney River and the River Bride) but providing longer term benefits

Key				
	No interaction or negligible cumulative effects		Potential for beneficial cumulative effects	
	Potential for adverse cumulative effects		Potential for mixed beneficial and adverse effects	

No significant cumulative effects have been identified for the Recommended Approach across the sub catchment which would require additional mitigation to that already identified for the Recommended Approach at an individual site scale. There could be potential traffic disruption within the Kileens area in the event of simultaneous construction of the untreated wastewater transfer pipelines from the Kileens and Monard sites to Carrigrennan WwTP. However, with standard good construction practice these effects can be minimised.

3.7 Sub catchment 2: Mitigation and enhancement

General measures include;

- Supporting awareness campaigns on challenges for WwTPs and water pollution to encourage appropriate use, and to understand the improvement works proposed and long term benefits compared to temporary disruption
- Water quality modelling identified the influence of other sources of pollution affecting water quality and aquatic biodiversity including in relation to BOD, ammonia and phosphates and support for catchment management measures aimed at reducing these sources can provide wider environmental benefits as well environmental enhancement for biodiversity and flood management. These can include measures to improve water retention, reducing nutrient run off and soil erosion. These measures can only be delivered through collaboration with other parties and landowner involvement.

- WwTP and network upgrades will need to consider in detail potential to include NBS as part of detailed design including NBS that provide additional water quality enhancement benefits.

Specific measures for Sub catchment 2 options are set out in Table 3-11 below.

Table 3-11 Mitigation and enhancement measures identified for Sub Catchment 2

Agglomeration	Potential issues / risks	Mitigation Measures
Kileens WwTP	Decommissioning works.	Standard good construction including circular economy principles.
Monard WwTP	N/A	N/A
Sub catchment common measures	Site construction works for the pumping stations and untreated wastewater pipeline transfers from both Kileens and Monard into the Carrigrennan WwTP has the potential for habitat loss and disruption/ disturbance.	Standard good construction including traffic management for pipeline and network construction. Detailed pipeline transfer route alignment and assessment to minimise habitat loss. Surveys and assessments depending on routing such as ecology, contaminated land, cultural heritage/archaeological interest. Application of biodiversity net gain to address any losses.

4 Sub catchment 3: Carrignavar, Grenagh and Whitechurch

4.1 Carrignavar

4.1.1 Carrignavar WwTP location

Carrignavar WwTP is located approximately 8km north of Cork City and 2km east of Whitechurch in the Cloghnagashee Minane Bridge (Figure 4-1). A planning assessment did not identify any major constraints, however it did highlight 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.

Figure 4-1 Carrignavar WwTP Site

4.1.2 Carrignavar Environmental baseline

The environmental constraints at Carrignavar WwTP are presented in Figure 4-2.

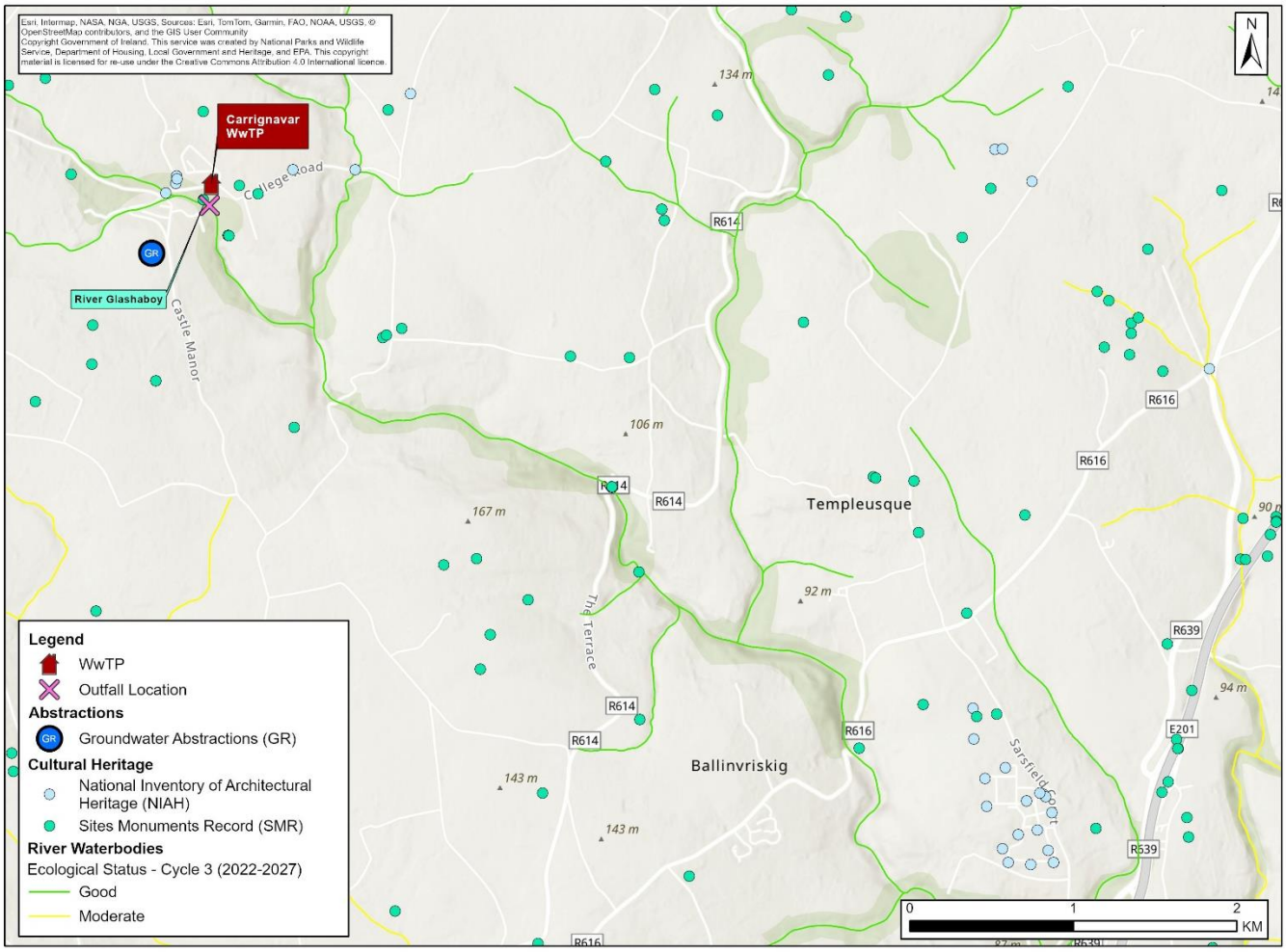

Figure 4-2 Environmental constraints at the Carrignavar WwTP.

Water Framework Directive water quality and biodiversity baseline information for the current discharge location is summarised in Table 4-1.

Table 4-1 Carrignavar WwTP Current Discharge Location Environmental Baseline Summary

Topic	Baseline environment
Discharge Waterbody Type	River Waterbody
Discharge Waterbody Name	Glashaboy (Lough Mahon)_020 (River Glashaboy)
Discharge Waterbody Code	IE_SW_19G010400
Water Body Ecological Status (cycle 3 2016-2021)	Good
Waterbody Risk Status and Category (2022)	Under Review
High Status Objective List	No

Topic	Baseline environment
Length of river from discharge to estuary (approximate)	11.80 km
Proximity to public water abstractions including regulated and unregulated GWS	Zone3 Glashaboy (Abstract Glashaboy River) – approximately 11.10 km downstream from discharge location.
Priority Areas for Action list RBMP	No
Proximity to Shellfish Waters	No shellfish waters located in the direct pathway/downstream of the discharge.
Proximity to Bathing Waters	No bathing waters located in the proximity/direct pathway of the discharge.
Proximity to European Designated Sites (SPA, SAC)	No SPA nor SAC sites in close proximity/direct pathways to current site and discharge (more than 9 km away from nearest SPA/SAC downstream)
Potential to affect National (NHA, pNHA)/Ramsar designated sites and/or freshwater pearl mussel catchment?	No NHA/pNHA sites in proximity/direct pathways to current site and discharge. Glanmire Wood pNHA (the closest) – at more than 9 km downstream from the plant and from the discharge.
Proximity of WwTP to residential areas/sensitive community sites	Close proximity to residential areas (within 100 m) and recreational/community areas (within 500 m).

4.1.3 Carrignavar WwTP existing and future capacity and compliance

The current treatment and hydraulic capacity of the existing WwTP have been compared to the actual current loading and the expected future requirements based on population growth consideration in terms of population equivalents (PE). For Carrignavar WwTP these are presented as the current and future organic and hydraulic loadings with existing treatment capacity in Table 4-2.

Table 4-2 Carrignavar WwTP Existing Treatment Capacity and Current and Projected Future Loading

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

The Water Quality Modelling (WQM) outputs of the current and future predicted (2030, 2055 and 2080) assimilative capacity of the current discharge waterbody are presented in Table 4-3. The plant is currently not compliant with the current Wastewater Discharge Licence (WWDL) requirements. The existing discharge location ESDLs are expected to be more stringent in the future (Table 4-3).

Table 4-3 Carrignavar WwTP Current WWDL Emission Limit Values (ELVs) and Projected Environmentally Sustainable Discharge Limits (ESDL)

Parameter	Existing WWDL ELVs	2030 Projected ESDL	2055 Projected ESDL	2080 Projected ESDL
BOD (mg/l)	25	14	11	10
Ammonia (mg/l)	2	0.8	0.6	0.6
OrthoP (mg/l)	1.5	0.4	0.3	0.3
More Stringent?	-	Y	Y	Y

The network assessment has identified potential flooding and surcharging conditions under current and future scenarios within the main trunk sewer within the Carrignavar 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.

There are no storm tanks at Carrignavar WwTP.

4.1.4 Carrignavar Coarse screening

Carrignavar WwTP SEA coarse screening assessment of options summary is presented in Table 4-4.

Table 4-4 Carrignavar WwTP Coarse Screening Assessment Summary

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
A0 Do Nothing - Counterfactual	N	N	N	Option has been screened out at technical stage as the existing WwTP is currently over capacity and is not achieving the discharge requirements as set in the WWDL.
A1 Minimal Upgrade - Process Optimisation	N/A Option screened out at technical assessment stage.			
A2 Reuse Existing Plant and Upgrade - Existing Discharge	Y	N/A	N/A	Works confirmed to be limited and within site so impacts likely to be mitigated with standard measures, confirmed no site expansion required.
A3 Reuse Existing Plant and Upgrade - Alternative Discharge	Y	N/A	N/A	Uncertainty related to the new discharge location.
A4 New Treatment Process/Plant Upgrade on Existing Site	N/A	Y	Y	An alternative discharge location has been proposed (River Glashaboy). Uncertainties around ESDLs in this location but WQM indicated potentially less stringent ESD limits.
A5 New Greenfield Site	N/A	N/A	Y	Large uncertainty related to relocation of new plant and new discharge location - River Glashaboy.
A6 Untreated Wastewater Load Transfer Solution	Y	Y	Y	Pipeline work (to Carrigrennan WwTP via Whitechurch) running along an existing road likely to have minimal impacts and standard mitigation measures would apply.

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening
- N/A – Not environmentally assessed

4.1.5 Carrignavar Fine screening scoring

Carrignavar WwTP SEA fine screening assessment of 2080 options scores are presented in Table 4-5.

Table 4-5 Carrignavar WwTP 2080 Fine Screening Assessment Scores

Criteria	A0 Do Nothing - Counterfactual	A4 New Treatment Process/Plant Upgrade on Existing Site	A5 New Greenfield Site with New Discharge	A6 Untreated Wastewater Load Transfer solution
Planning & Regulation	0	-1	-2	-1
Impact on Customers	-2	1	1	2
Community Support, Health and Wellbeing	-3	1	1	2
Water environment	-3	1	1	3
Biodiversity	-3	0	-1	3
GHG Emissions	0	0.5	-0.5	0
Energy efficiency	-3	1	2	3
Climate resilience	0	-1	1	3
Circular economy	0	0	-1	1
Environmental combined score	Worst			Best
Overall combined score	N/A	2.22	1.82	3.77
Overall rank	N/A	2nd	3rd	1st

4.1.6 Carrignavar Fine screening results

Table 4-6 presents options that ranked highest using the MCA fine screening process.

Table 4-6 Carrignavar WwTP 2080 Implementation Fine Screening 1st, 2nd and 3rd Ranked Options

Design Horizon	1st Ranked Option	2nd Ranked Option	3rd Ranked Option
2080	Option A6: Untreated Wastewater Load Transfer to Carrigrennan via Whitechurch. Best environmental and overall score due to removal of discharge from river and addressing network issues. Benefiting approx. 11 km of Good Status Objective river downstream.	Option A4: New Treatment Process/Plant Upgrade on Existing Site with new discharge location.	Option A5: New Greenfield Site with New Discharge location (River Glashaboy).

4.1.7 Carrignavar Wastewater network upgrade proposals

The network proposals include works to address SWO compliance to minimise potential for untreated spills to the environment and avoiding network surcharging and flooding. The upgrades are proposed for the 2030 strategy horizon unless otherwise stated. The works are detailed in Appendix 4 to the CWS and include for Carrignavar:

- Improvements to storage at existing pumping station site;
- Upgrade to the sewer system to increase capacity.

These works are expected to be undertaken within existing the sites or along existing pipeline networks.

4.2 Grenagh

4.2.1 Grenagh WwTP location

Grenagh WwTP is located approximately 16km north of Cork City at Grenagh, County Cork. (Figure 4-3). The planning assessment has found no site boundary constraints or noted zonings that may hinder future development.

Figure 4-3 Grenagh WwTP Site

4.2.2 Grenagh Environmental baseline

The environmental constraints for Grenagh WwTP are presented in Figure 4-4.

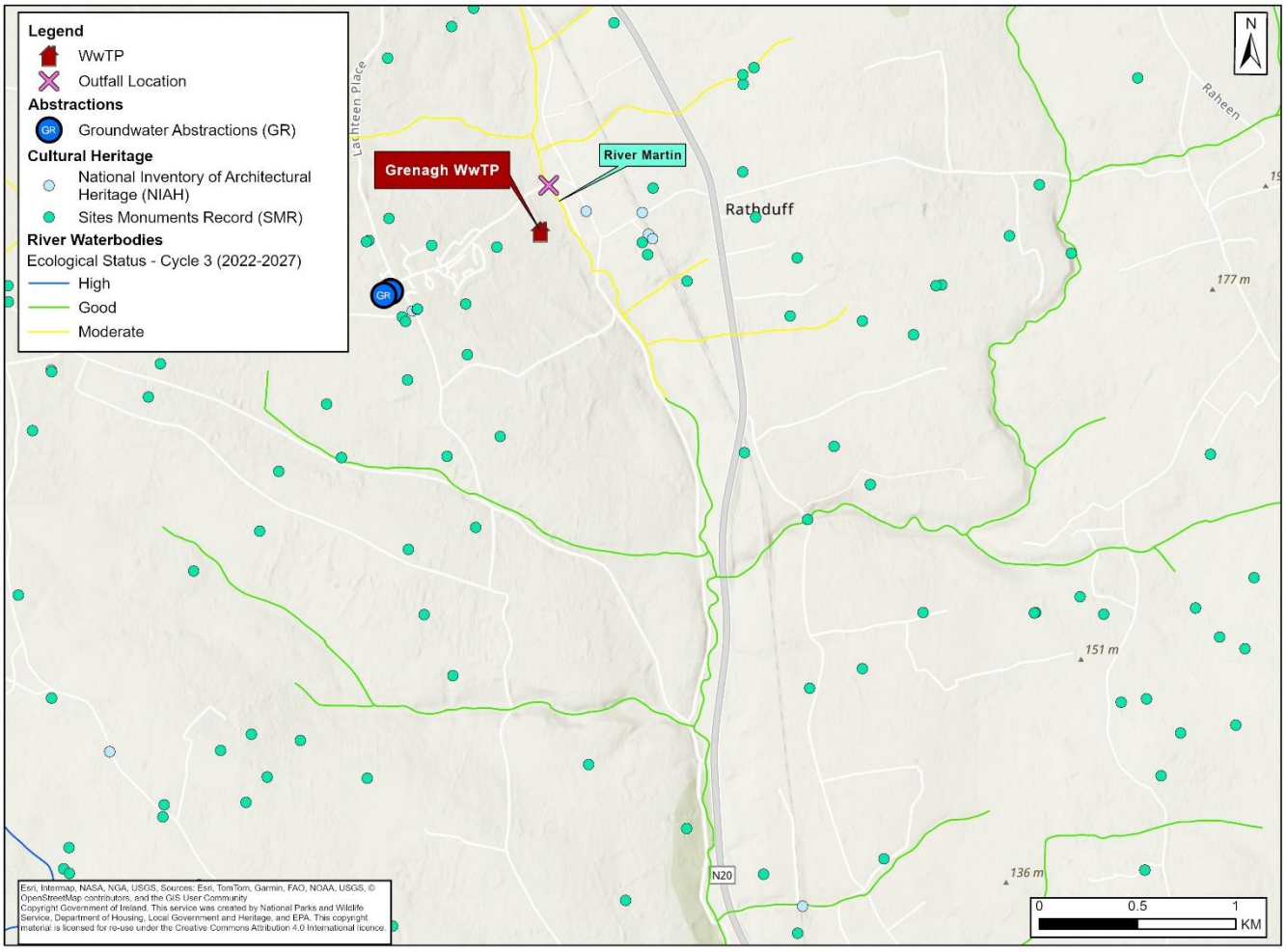

Figure 4-4 Environmental constraints for Grenagh WwTP.

Water Framework Directive water quality and biodiversity baseline information for the current discharge location is summarised in Table 4-7.

Table 4-7 Grenagh WwTP Current Discharge Location Environmental Baseline Summary

Topic	Baseline environment
Discharge Waterbody Type	River waterbody
Discharge Waterbody Name	Martin_010 (River Martin)
Discharge Waterbody Code	IE_SW_19M010200
Water Body Ecological Status (cycle 3 2016-2021)	Moderate
Waterbody Risk Status and Category (2022)	At Risk: Hydromorphology
High Status Objective List	No

Topic	Baseline environment
Length of river from discharge to estuary (approximate)	23.20 km
Proximity to public water abstractions including regulated and unregulated GWS	Cork City Water Supply (Abstract River Lee) – approximately 22.10 km downstream from discharge location.
Priority Areas for Action (AFA) list RBMP	Confirmed AFA Category: Restoration, Sub-Category: Prioritised Areas for Action LAWPRO.
Proximity to Shellfish Waters	No shellfish waters located in the direct pathway/downstream of the discharge.
Proximity to Bathing Waters	No bathing waters located in the proximity/direct pathway of the discharge.
Proximity to European Designated Sites (SPA, SAC)	No SPA nor SAC sites in proximity/direct pathways to current site and discharge.
Potential to affect National (NHA, pNHA)/Ramsar designated sites and/or freshwater pearl mussel catchment?	ArdaESDane Wood pNHA (the closest) – at more than 7 km away downstream from the plant and discharge (includes section of River Martin).
Proximity to public water abstractions including regulated and unregulated GWS	Cork City Water Supply (Abstract River Lee) – approximately 15 km downstream from discharge location.
Proximity of WwTP to residential areas/sensitive community sites	Close proximity to residential and community areas (within 500 m).

4.2.3 Grenagh WwTP existing and future capacity and compliance

The current treatment and hydraulic capacity of the existing WwTP have been compared to the actual current loading and the expected future requirements based on population growth consideration in terms of population equivalents (PE). For Grenagh WwTP these are presented as current and future organic and hydraulic loadings with existing treatment capacity in Table 4-8.

Table 4-8 Grenagh WwTP Existing Treatment Capacity and Current and Projected Future Loading

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

The Water Quality Modelling (WQM) outputs of the current and future predicted (2030, 2055 and 2080) assimilative capacity of the current discharge waterbody are presented in Table 4-9. The plant is currently compliant with the current Wastewater Discharge Licence (WWDL) requirements, however the final effluent does not meet the Total Nitrogen ELV consistently. The existing discharge location ESDLs are expected to be more stringent in the future (Table 4-9).

Table 4-9 Grenagh WwTP Current WWDL Emission Limit Values (ELVs) and Projected Environmentally Sustainable Discharge Limits (ESDL)

Parameter	Existing WWDL ELVs	2030 Projected ESDL	2055 Projected ESDL	2080 Projected ESDL
BOD (mg/l)	25	2.7	2.3	2
Ammonia (mg/l)	3	0.6	0.5	0.5
OrthoP (mg/l)	1.65	0.3	0.3	0.2
More Stringent?	-	Y	Y	Y

The network assessment has identified that modelled results indicate flooding and surcharging of the main trunk of the network under both current and all projected future scenarios. Future scenarios show an increase in the extent of overall network flooding and surcharging.

4.2.4 Grenagh Coarse screening

Grenagh WwTP SEA coarse screening assessment of options summary is presented in Table 4-10.

Table 4-10 Grenagh WwTP Coarse Screening Assessment Summary

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
A0 Do Nothing - Counterfactual	Y	N	N	Plant is currently WWDL compliant and ESDLs are not expected to be more stringent in the 2030 horizon, however

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
				it is projected that the existing WwTP capacity will be exceeded and the existing assets will have exceeded their design life for the 2055 and 2080 horizons.
A1 Minimal Upgrade - Process Optimisation	Y	Y	N/A	Works confirmed to be limited and within site so impacts likely to be mitigated with standard measures.
A2 Reuse Existing Plant and Upgrade - Existing Discharge	N/A	Y	N/A	
A3 Reuse Existing Plant and Upgrade - Alternative Discharge	N/A	Y	N/A	Works are within site, but greater level of construction work required. Works within site likely to be mitigatable. Uncertainty related to the new discharge location.
A4 New Treatment Process/Plant Upgrade on Existing Site	N/A	N/A	Y	The need for a new treatment process on site has been identified due to both the organic and hydraulic capacities projected to be exceeded. Uncertainty related to the new discharge location (River Martin).
A5 New Greenfield Site	N/A	N/A	Y	Large uncertainty due to relocation of new plant and new discharge location (River Martin).
A6 Untreated Wastewater Load Transfer Solution	Y	Y	Y	Pipeline work (Carrigrennan WwTP via Whitechurch WwTP) running along an existing road likely to have minimal impacts and standard mitigation measures would apply.

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening
- N/A – Not environmentally assessed

4.2.5 Grenagh Fine screening scoring

Grenagh WwTP SEA fine screening assessment of options scores are presented in Table 4-11.

Table 4-11 Grenagh WwTP 2080 Fine Screening Assessment Scores

Criteria	A0 Do Nothing - Counterfactual	A4 New Treatment Process/Plant Upgrade on Existing Site	A5 New Greenfield Site with New Discharge	A6 Untreated Wastewater Load Transfer Solution
Planning & Regulation	0	-1	-2	-1
Impact on Customers	-2	1	1	2
Community Support, Health and Wellbeing	-3	1	1	2
Water environment	-3	2	2	3
Biodiversity	-2	-2	-2	2
GHG Emissions	0	0.5	-0.5	0
Energy efficiency	-3	1	2	3
Climate resilience	0	-1	1	3
Circular economy	0	0	-1	1
Environmental combined score	Worst			Best
Overall combined score	N/A	2.30	1.96	3.42
Overall rank	N/A	2nd	3rd	1st

4.2.6 Grenagh Fine screening results

Table 4-12 presents options that ranked highest using the MCA fine screening process.

Table 4-12 Grenagh WwTP 2080 Implementation Fine Screening 1st, 2nd and 3rd Ranked Options

Design Horizon	1st Ranked Option	2nd Ranked Option	3rd Ranked Option
2080	A6: Untreated Wastewater Load Transfer to Carrigrennan WwTP via Whitechurch WwTP. Best environmental and overall score due to removal of discharge from river and addressing network issues. Benefiting approx. 23 km of Good Status Objective river downstream.	A4: New Treatment Process/Plant Upgrade on Existing Site (River Martin).	A5: New Greenfield Site with New Discharge (River Martin).

4.2.7 Grenagh Wastewater network upgrade proposals

The network proposals include works to address SWO compliance to minimise potential for untreated spills to the environment and avoiding network surcharging and flooding. The upgrades are proposed for the 2030 strategy horizon unless otherwise stated. The works are detailed in Appendix 4 to the CWS and include for Grenagh:

- Improvements to storage at existing pumping station sites;
- Upgrade to the sewer system to increase capacity.

These works are expected to be undertaken within existing the sites or along existing pipeline networks.

4.3 Whitechurch

4.3.1 Whitechurch WwTP location

Whitechurch WwTP is located at Farranstig, Whitechurch, County Cork, approximately 11km north of Cork city. (Figure 4-5). 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 affect the WwTP site.

Figure 4-5 Whitechurch WwTP Site

4.3.2 Whitechurch Environmental baseline

The environmental constraints for Whitechurch WwTP are presented in Figure 4-6.

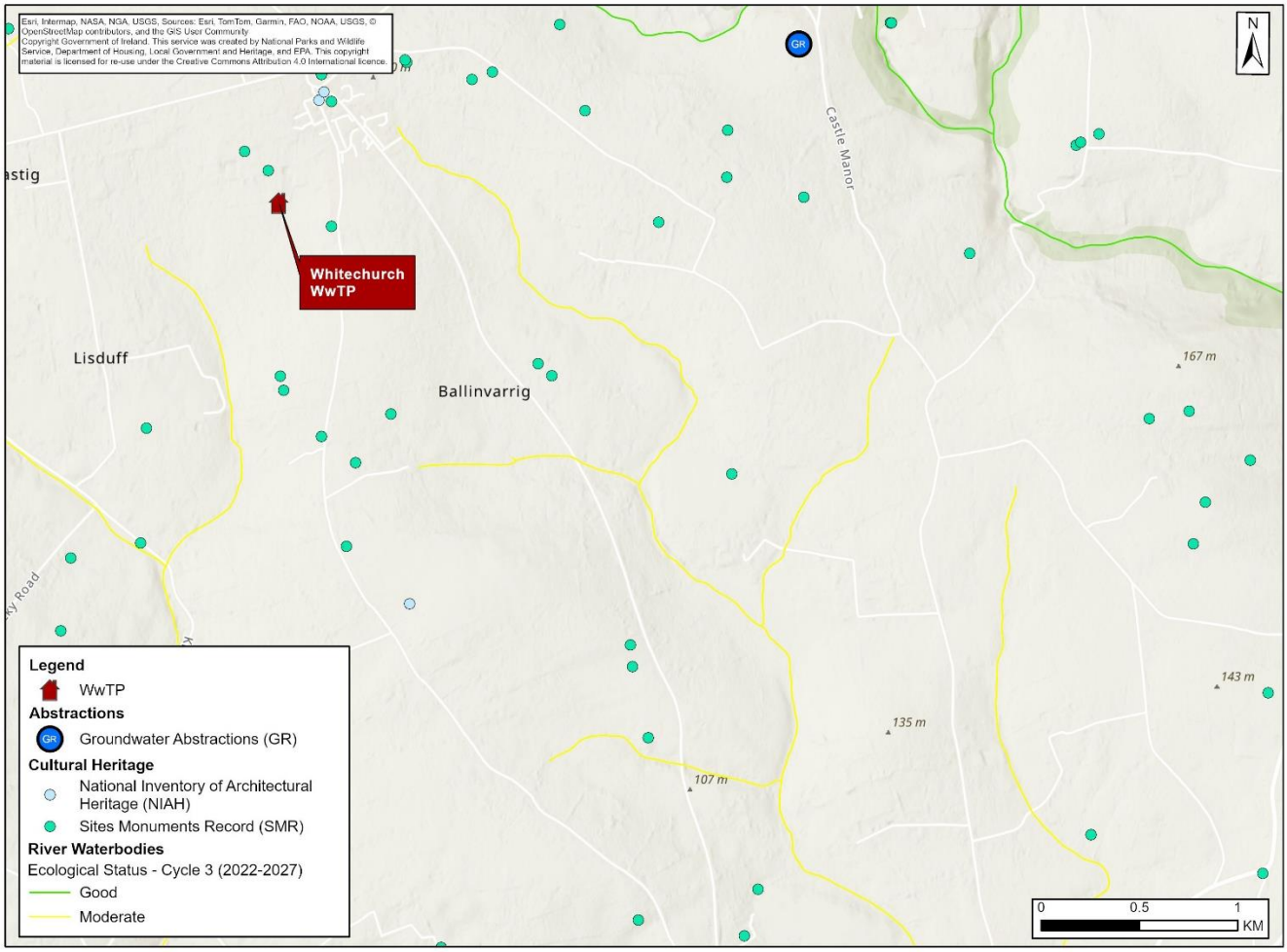

Figure 4-6 Environmental constraints for Whitechurch WwTP.

Water Framework Directive water quality and biodiversity baseline information for the current discharge location is summarised in Table 4-13.

Table 4-13 Whitechurch WwTP Current Discharge Location Environmental Baseline Summary

Topic	Baseline environment
Discharge Waterbody Type	Whitechurch WwTP discharges to Cork City Network so there is no discharge point. Treatment on site, discharges to Carrigrennan via Cork City Network.
Discharge Waterbody Name	N/A
Discharge Waterbody Code	N/A
Water Body Ecological Status (cycle 3 2016-2021)	N/A
Waterbody Risk Status and Category (2022)	N/A

Topic	Baseline environment
High Status Objective List	N/A
Length of river from discharge to estuary (approximate)	N/A
Proximity to public water abstractions including regulated and unregulated GWS	N/A
Priority Areas for Action list RBMP	N/A
Proximity to Shellfish Waters	No Shellfish Waters located in the direct pathway/downstream of the discharge
Proximity to Bathing Waters	No Bathing Waters located in the proximity of the discharge.
Proximity to European Designated Sites (SPA, SAC)	No SPA nor SAC sites in proximity/direct pathways to current site or discharge - more than 10 km away from nearest SPA/SAC.
Potential to affect National (NHA, pNHA)/Ramsar designated sites and/or freshwater pearl mussel catchment?	ArdaESDane Wood pNHA located approximately 4 km from the site.
Proximity to public water abstraction?	N/A
Proximity of WwTP to residential areas/sensitive community sites	Close proximity to residential (within 300 m) and recreational/community areas (within 500 m).

4.3.3 Whitechurch WwTP existing and future capacity and compliance

The current treatment and hydraulic capacity of the existing WwTP have been compared to the actual current loading and the expected future requirements based on population growth consideration in terms of population equivalents (PE). For Whitechurch WwTP these are presented as current and future organic and hydraulic loadings with existing treatment capacity in Table 4-14.

Table 4-14 Withechurch WwTP Current and Projected Loading and Existing Treatment Capacity

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

There is no discharge license for Whitechurch WwTP as it discharges to the Cork City network. The Water Quality Modelling (WQM) was conducted at the Blarney River adjacent to the WwTP with a view of utilising this reach as a potential future discharge point. The environmentally sustainable discharge limits for these scenarios have been summarised Table 4-15. The potential discharge location ESDLs are expected to be more stringent in the future (Table 4-15).

Table 4-15 Whitechurch WwTP Current WWDL Emission Limit Values (ELVs) and Projected Environmentally Sustainable Discharge Limits (ESDL)

Parameter	Existing WWDL ELVs	2030 Projected ESDL	2055 Projected ESDL	2080 Projected ESDL
BOD (mg/l)	-	3	3	3
Ammonia (mg/l)	-	0.2	0.2	0.2
OrthoP (mg/l)	-	0.1	0.1	0.1
More Stringent?	-	Y	Y	Y

There is storm management system on site.

4.3.4 Whitechurch Coarse screening

Whitechurch WwTP SEA coarse screening assessment of options summary is presented in Table 4-16.

Table 4-16 Whitechurch WwTP Coarse Screening Assessment Summary

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
A0 Do Nothing - Counterfactual	N	N	N	Option has been screened out at technical stage as it is projected that the existing WwTP assets will have exceeded their design life.

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
A1 Minimal Upgrade - Process Optimisation	Y	Y	Y	Limited works within existing site likely not to have impact on surrounding area and standard mitigation measures would apply.
A2 Reuse Existing Plant and Upgrade - Existing Discharge	N/A Option screened out at technical assessment stage.			
A3 Reuse Existing Plant and Upgrade - Alternative Discharge	N/A Option screened out at technical assessment stage.			
A4 New Treatment Process/Plant Upgrade on Existing Site	N/A Option screened out at technical assessment stage.			
A5 New Greenfield Site	N/A Option screened out at technical assessment stage.			
A6 Untreated Wastewater Load Transfer Solution	Y	Y	Y	Transfer to Carrigrennan via Cork City Network which is an existing network route. Uncertainties around location and extent of the upgrades.

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening
- N/A – Not environmentally assessed

4.3.5 Whitechurch Fine screening scoring

Whitechurch WwTP SEA fine screening assessment of options scores are presented in Table 4-17.

Table 4-17 Whitechurch WwTP 2080 Fine Screening Assessment Scores

Criteria	A0 Do Nothing - Counterfactual	A1 Minimal Upgrade - Process Optimisation	A6 Untreated Wastewater Load Transfer Solution
Planning & Regulation	0	3	3
Impact on Customers	-1	1	3
Community Support, Health and Wellbeing	-1	1	3
Water environment	0	0	0
Biodiversity	0	0	0
GHG Emissions	1.5	2	0.5
Energy efficiency	0	1	2
Climate resilience	0	0	3
Circular economy	0	-1	1
Environmental combined score	Worst		Best
Overall combined score	N/A	1.02	1.33
Overall rank	N/A	2nd	1st

4.3.6 Whitechurch Fine screening results

Table 4-18 presents options that ranked highest using the MCA fine screening process.

Table 4-18 Whitechurch WwTP 2080 Implementation Fine Screening 1st and 2nd Ranked Options

Design Horizon	1st Ranked Option	2nd Ranked Option
2080	A6: Untreated Wastewater Load Transfer to Carrigrennan via Cork City Network. Best environmental and overall score due to Community Support, Health and Wellbeing benefits.	A1: Minimal Upgrade - Process Optimisation.

4.4 Sub catchment 3: Feasible Approach selection and implementation

A list of Feasible Approaches is presented in Table 4-19.

Table 4-19 Feasible Approaches for Sub catchment 3

Site	Horizon	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
Carrignavar WwTP	2030	Decommission WwTP. Construct transfer to Whitechurch WwTP (3.8km). WwPS to be sized for 1,250 PE to meet future demand. 910 PE transferred to Whitechurch WwTP.	Upgrade WwTP by an additional 1,000 PE. Discharge to new location, downstream on River Glashaboy).	Upgrade WwTP by an additional 1,000 PE. Discharge to new location, downstream on River Glashaboy).
	2055	Continue to operate WwPS.	Continue to operate WwTP.	Continue to operate WwTP.
	2080	Continue to operate WwPS.	Capital replacement of 1,300 PE of WwTP.	Capital replacement of WwTP.
Grenagh WwTP	2030	Optimise WwTP to bring to compliance with ESDLs	Optimise WwTP to bring to compliance with ESDLs	Optimise WwTP to bring to compliance with ESDLs.
	2055	Decommission WwTP and construct transfer to Whitechurch WwTP (9km). WwPS to be sized for 1,450 PE to meet future demand. 1,250 PE transferred to Whitechurch WwTP.	Decommission WwTP and construct transfer to Whitechurch WwTP (9km). WwPS to be sized for 1,450 PE to meet future demand. 1,250 PE transferred to Whitechurch WwTP.	Capital replacement of 1,200 PE of WwTP with further upgrade of 250 PE. Discharge to new location, downstream on River Martin).
	2080	Continue to operate WwPS.	Continue to operate WwPS.	Continue to operate WwTP.

Site	Horizon	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
Whitechurch WwTP	2030	Continue to operate WwTP.	Continue to operate WwTP.	Continue to operate WwTP.
	2055	Decommission / convert WwTP. Construct terminal WwPS (4,200 PE capacity). Utilise existing pipeline to Cork City network.	Continue to operate WwTP.	Continue to operate WwTP.
	2080	Continue to operate WwPS.	Decommission / convert WwTP. Construct terminal WwPS (3,000 PE capacity).	Decommission / convert WwTP. Construct terminal WwPS (3,000 PE capacity).
Overall Feasible approach environmental assessment summary		**Ranked 1st** Carrignavar: The transfer (2030) will require a construction of a 3.8 km effluent pipeline. Removal of the discharge will benefit 11.8 km of Good Status Objective river. Grenagh: The transfer (2055) will require a construction of a 9 km effluent pipeline. Removal of the discharge will benefit 23.2 km of Good Status Objective river. Whitechurch: Decommissioning of WwTP (2055) and conversion into PS. The existing transfer main will be retained to be used for untreated wastewater.	**Ranked 2nd** Carrignavar: River discharge to be moved approximately 6.4 km downstream benefiting 5.4 km of Good Status Objective river. Construction of a final effluent transfer pipeline to the new discharge location. Grenagh: The transfer (2055) will require a construction of a 9 km effluent pipeline. Removal of the discharge will benefit 23.2 km of Good Status Objective river. Whitechurch: Decommissioning of WwTP (2080) and conversion into PS. The existing transfer main will be retained to be used for untreated wastewater.	**Ranked 3rd** Carrignavar: River discharge to be moved further downstream (approximately 6.4 km) benefiting 5.4 km of Good Status Objective river. Construction of a final effluent transfer pipeline to the new discharge location. Carrignavar: River discharge to be moved approximately 12 km downstream benefiting 11.2 km of Good Status Objective river. Construction of a final effluent transfer pipeline to the new discharge location. Whitechurch: Decommissioning of WwTP (2080) and conversion into PS. The existing transfer main will be retained to be used for untreated wastewater.

Site	Horizon	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
Overall recommended approach		**Ranked 1st** Overall most cost effective. Environmentally best due to decommission of Carrignavar WwTP benefiting longest length of river and earlier decommission of Whitechurch.	**Ranked 2nd** Shorter length of river benefiting from Carrignavar WwTP discharge moved downstream and later Whitechurch decommission.	**Ranked 3rd** Shortest length of river benefiting from Carrignavar WwTP and Grenagh WwTp discharges moved downstream and later Whitechurch decommission.

*Capacity expansion at Carrigrennan WwTP has been factored into the evaluation and assessment of Carrigrennan WwTP.

4.5 Sub catchment 3: Recommended Approach implementation strategy

Figure 4-7 presents Recommended Approach graphic including environmental constraints.

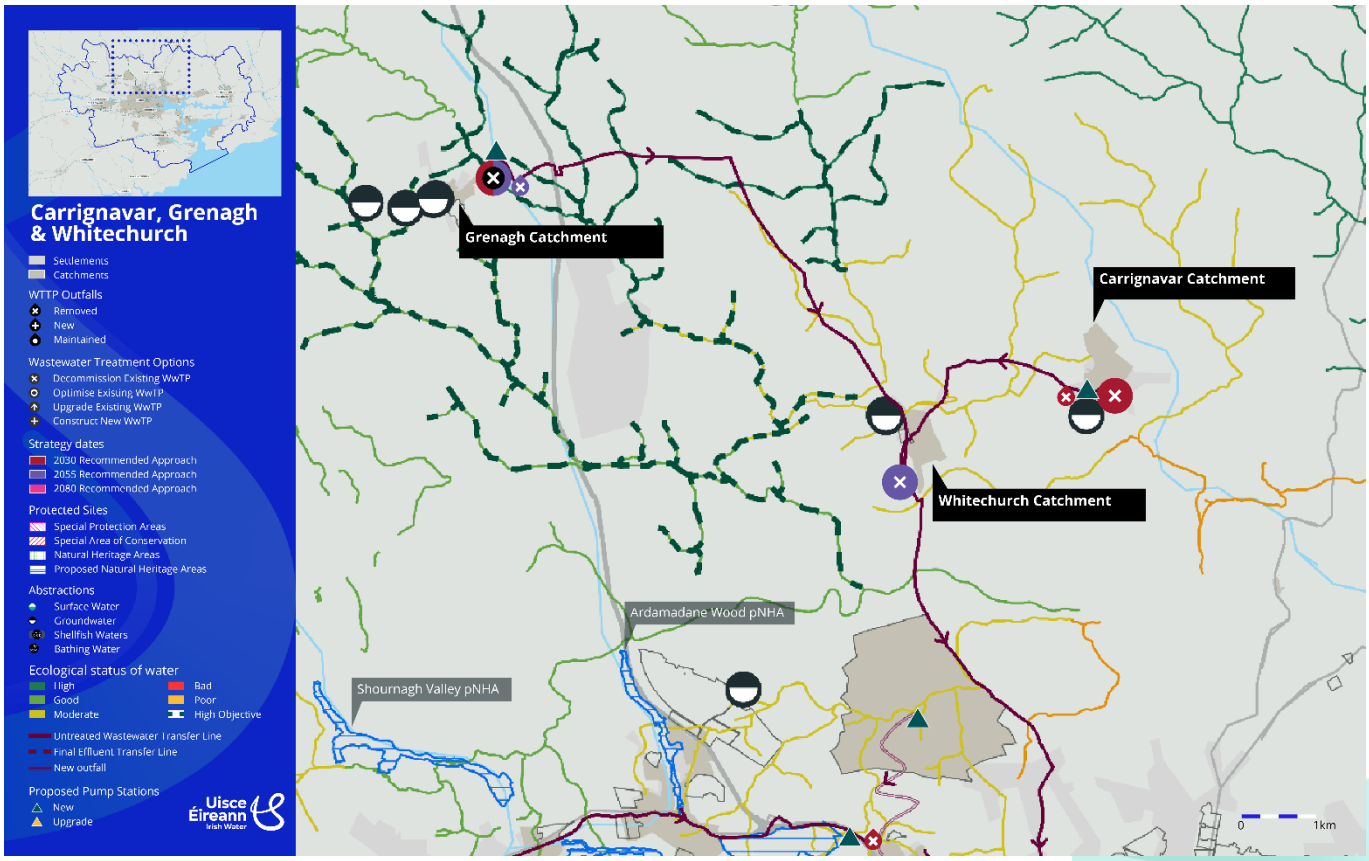

Figure 4-7 Recommended Approach Environmental Constraints for Sub catchment 3

Figure 4-8 presents the implementation strategy for the Recommended Approach for Carrignavar WwTP, Grenagh WwTP, and Whitechurch WwTP.

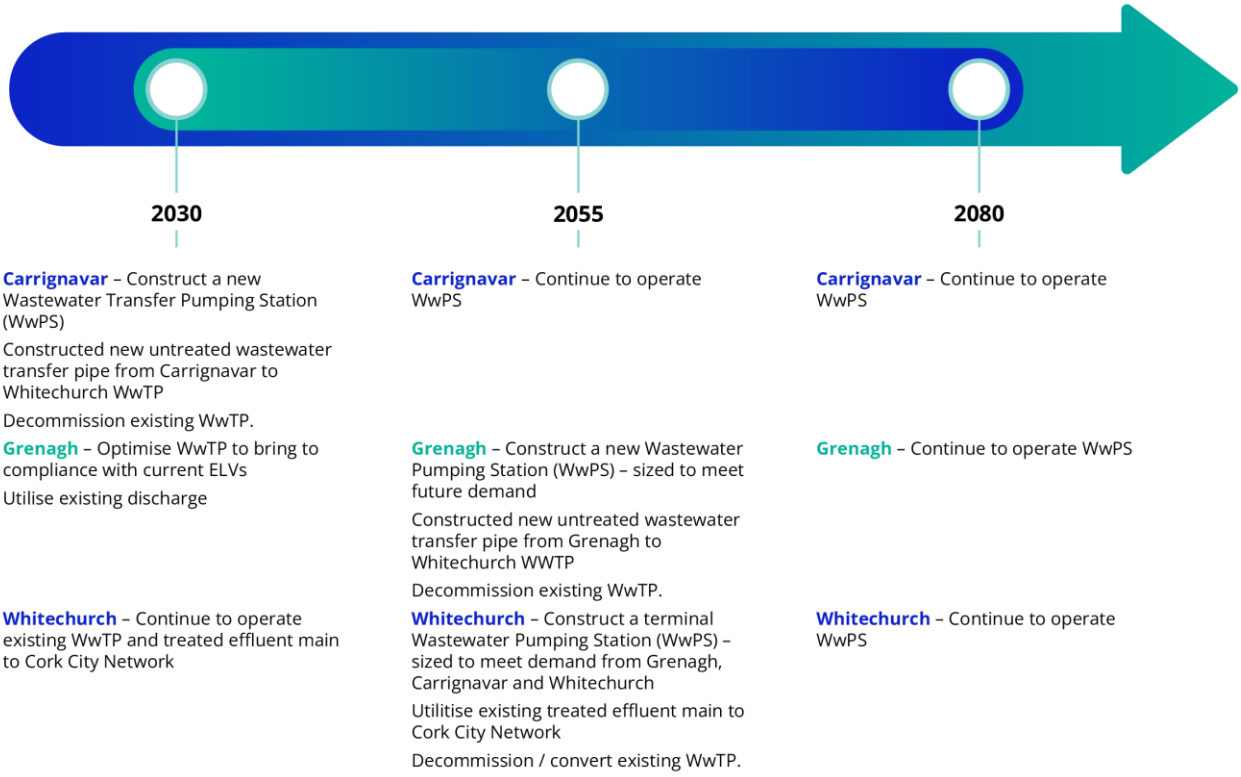

Figure 4-8 Implementation Strategy for Carrignavar WwTP, Grenagh WwTP and Whitechurch WwTP.

4.6 Sub catchment 3: SEA Assessment of Recommended Approach

Carrignavar WwTP

Table 4-20 presents Environmental Assessment of Recommended Approach for Carrignavar WwTP.

Table 4-20 Carrignavar WwTP Recommended Approach Assessment Summary

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec, Health	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
Current (A0)	Operation	+ve	0	0	0	0	0	0	0	0	0
		-ve	---	---	0	---	0	0	0	0	--
	Construction	+ve	0	0	0	0	0	0	0	0	0

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec, Health	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
2030 (A6)		-ve	-	-	-	0	--	-	--	-	0
	Operation	+ve	+++	++	0	++	+	+	0	0	++
		-ve	0	0	0	0	0	0	0	0	0
2055 and 2080	Same as 2030 - continue to operate pumping station. No additional works or change to operation compared to 2030.										

+ve = potential beneficial or positive effects/risk

-ve = potential negative or adverse effects/risk

Construction of the final effluent transfer (Option A6) and decommissioning of the Carrignavar WwTP will have a positive effect on the Water Environment and Biodiversity due to decommissioning of the plant and removal of discharge into the river. This may contribute to waterbody maintaining WFD Good Status. The transfer route runs along Carrignavar Bridge NIAH (20905211) and another bridge at Church Road crossing GLASHABOY (LOUGH MAHON)_020 watercourse. Assuming existing infrastructure can be used, and mitigation would be applied as part of construction design, negative effects on water environment and cultural heritage could be minimised or fully avoided. The proposed transfer pipeline is relatively short at 3.8 km. Decommissioning of the plant could have minor negative effects due to 'abandonment' of infrastructure, however this can be potentially addressed by applying a circular economy approach, materials should be reused and recycled.

Grenagh WwTP

Table 4-21 presents Environmental Assessment of Recommended Approach for Grenagh WwTP.

Table 4-21 Grenagh WwTP Recommended Approach Assessment Summary

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec,	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
Current (A0)	Operation	+ve	0	0	0	0	0	0	0	0	0
		-ve	---	---	--	---	0	0	0	0	--
2030 (A1)	Construction	+ve	0	0	0	0	+	0	0	0	0
		-ve	0	0	-	0	0	0	0	0	-
	Operation	+ve	0	0	0	0	0	0	0	0	0
		-ve	+++	++	0	+++	0	0	0	0	--
2055 (A6)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	-	-	--	0	--	-	-	-	0
	Operation	+ve	+++	++	0	++	+	+	0	0	++
		-ve	0	0	0	0	0	0	0	0	0
2080 (A6)	Same as 2055 - continue to operate pumping station. No additional works or change to operation compared to 2055.										

+ve = potential beneficial or positive effects/risk

-ve = potential negative or adverse effects/risk

Optimisation of Grenagh WwTP (Option A1) will bring the plant into compliance with the projected ESDLs by 2030. This should have significant positive effects supporting the Water Environment and Biodiversity SEA objectives, and may contribute to the waterbody achieving Good status.

The decommissioning of the WwTP and construction of a 9km pipeline to transfer untreated wastewater flows to the Whitechurch WwTP by 2055 (Option A6) could cause negative effects related to the SEA Climate Change and Materials objectives and could result in the 'abandonment' of infrastructure. However this can be potentially addressed by applying a circular economy approach, materials should be reused and recycled.

Construction works are likely to be within the vicinity of the following watercourses and protected sites which could be negatively impacted:

- MARTIN_020 watercourse crossing via a bridge
- MARTIN_010 watercourse crossing via bridge
- NIAHs:
- 559268 – Humpback bridge in Rathduff
- 558982 – Rathduff Creamery

However more detailed assessment, routing, design and mitigation measures should avoid or minimise effects. The decommissioning of the river discharge and SWOs associated with the plant should have substantial benefits on the Water Environment and the Biodiversity SEA objectives.

Whitechurch WwTP

Table 4-22 presents Environmental Assessment of Recommended Approach for Whitechurch WwTP.

Table 4-22 Whitechurch WwTP Recommended Approach Assessment Summary

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec,	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
Current (A0)	Operation	+ve	0	0	0	0	0	0	0	0	0
		-ve	--	--	0	-	0	0	0	0	--
2030 (A0)	Operation	+ve	0	0	0	0	0	0	0	0	0
		-ve	--	--	0	-	0	0	0	0	--
2055 (A6)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	-	-	--	0	-	-	-	-	0
	Operation	+ve	+	++	0	++	+	0	0	0	+
		-ve	0	0	0	0	0	0	0	0	0
2080	Same as 2055 - continue to operate pumping station. No additional works or change to operation compared to 2055.										

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec,	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality

+ve = potential beneficial or positive effects/risk

-ve = potential negative or adverse effects/risk

Continuation of the plant operation in the interim period (2030) will mean that negative effects on the water environment, biodiversity and population are likely to continue due to potential flooding and surcharging conditions for the network under current and future scenarios within the main trunk sewer. There is storm management system on site which could continue to have a negative impact on aquatic biodiversity until decommissioning of the plant and may have a positive effect on aquatic biodiversity. Decommissioning of the plant may have minor negative effects due to 'abandonment' of infrastructure, however this can be potentially addressed by applying a circular economy approach, materials should be reused and recycled.

4.7 Sub catchment 3: Cumulative assessment

The potential cumulative or in combination adverse or beneficial effects for the Carrignavar, Grenagh and Whiteschurch sub catchment are identified below in Table 4-23. These aim to identify where a receptor could be affected by more than one of the WwTP and network proposals within the overall sub catchment, such as proximity to works being undertaken at the same or discharges or decommissioning affecting the same waterbody.

Table 4-23 Potential cumulative or in combination effects within Sub-catchment 3

Site/ Potential Interaction	Whitechurch WwTP	Carrignavar WwTP
Grenagh WwTP	Not in proximity for construction and no pathways for combined operational effects.	Not in proximity for construction and no pathways for combined operational effects.
Carrignavar WwTP	Not in proximity for construction and no pathways for combined operational effects.	

Key	No interaction or negligible cumulative effects		Potential for beneficial cumulative effects	

	Potential for adverse cumulative effects		Potential for mixed beneficial and adverse effects

No significant cumulative effects have been identified for the Recommended Approach across the sub catchment which would require additional mitigation. The decommissioning of both Carrignavar and Grenagh WwTPs will be staggered, occurring by 2030 and 2055, respectively. Furthermore, the elevated discharges experienced at Whitechurch WwTP will be into the existing Cork City Network, and when converted into a pumping station the existing pipeline infrastructure will be utilised to transfer flows from Whitechurch WwTP to Carrigrennan WwTP. This will further minimise cumulative effects on local settlements and road networks.

4.8 Sub catchment 3: Mitigation and enhancement

General measures include;

- Supporting awareness campaigns on challenges for WwTPs and water pollution to encourage appropriate use, and to understand the improvement works proposed and long term benefits compared to temporary disruption
- Water quality modelling identified the influence of other sources of pollution affecting water quality and aquatic biodiversity including in relation to BOD, ammonia and phosphates and support for catchment management measures aimed at reducing these sources can provide wider environmental benefits as well environmental enhancement for biodiversity and flood management. These can include measures to improve water retention, reducing nutrient run off and soil erosion. These measures can only be delivered through collaboration with other parties and landowner involvement.
- WwTP and network upgrades will need to consider in detail potential to include NBS as part of detailed design including NBS that provide additional water quality enhancement benefits.

Specific measures for Sub catchment 3 options are set out in Table 4-24.

Table 4-24 Mitigation and enhancement measures for Sub Catchment 3

Agglomeration	Potential	Mitigation Measures
Carrignavar WwTP	Construction works of a 3.8km untreated wastewater transfer pipeline to Whitechurch WwTP.	Standard good construction including circular economy principles and traffic management for pipeline construction. Detailed pipeline transfer route alignment and assessment to minimise habitat loss. Surveys and assessments depending on routing such as ecology, contaminated land, cultural heritage/archaeological interest. Application of biodiversity net gain to address any losses.

Agglomeration	Potential	Mitigation Measures
		Opportunities for NbS measures with acceptable discharge requirements and when discharge ESDLs are too stringent of the wastewater treatment NbS, include: • Sludge Drying Reed Beds
Grenagh WwTP	Site construction works for optimisation and then construction works of a 9km untreated wastewater transfer pipeline to Whitechurch WwTP.	Standard good construction including circular economy principles and traffic management for pipeline construction. Detailed pipeline transfer route alignment and assessment to minimise habitat loss. Surveys and assessments depending on routing such as ecology, contaminated land, cultural heritage/archaeological interest. Opportunities for NbS measures include Sludge Drying Reed Beds
Whitechurch WwTP	Decommission and new pumping station	Detailed pumping station design and assessment to minimise habitat loss. Surveys and assessments such as ecology, contaminated land, cultural heritage/archaeological interest. Consider potential renewable energy sources Standard measures as above -
Sub catchment/ common measures	Decommissioning works and then site construction of a pumping station.	Application of biodiversity net gain to address any losses – consider use of decommissioned sites.

5 Sub catchment 4: Knockraha and Watergrasshill

5.1 Knockraha

5.1.1 Knockraha WwTP location

Knockraha WwTP is located at Gogganstown, Knockraha, Northeast of Cork City (Figure 5-1). A planning assessment identified no site boundary constraints, with no map-based objectives or zonings currently in place. There are habitats within and around the site that are likely to have some ecological value.

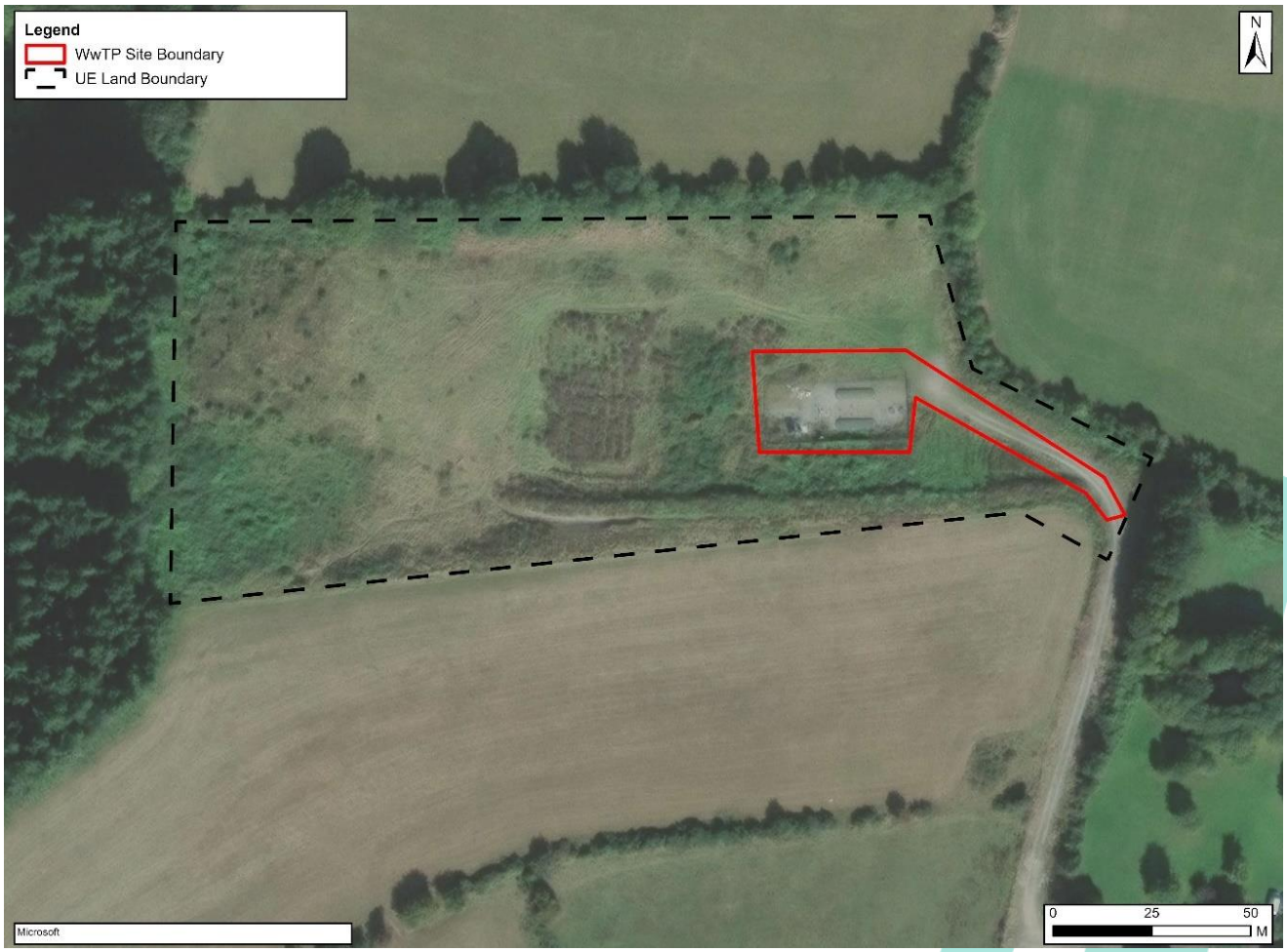

Figure 5-1 Knockraha WwTP Site

5.1.2 Knockraha Environmental baseline

The environmental constraints for Knockraha WwTP are presented in Figure 5-2.

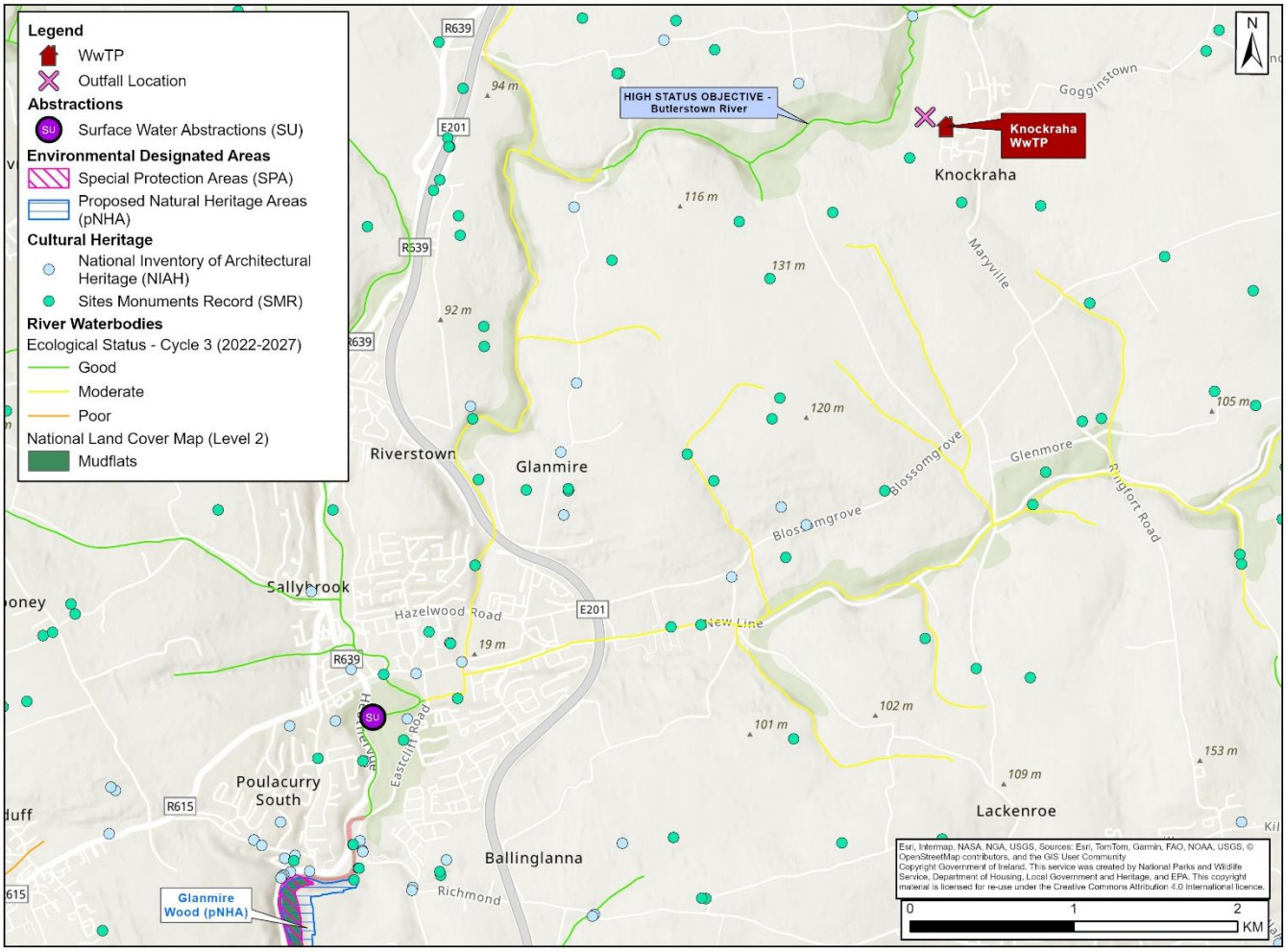

Figure 5-2 Environmental constraints for Knockraha WwTP.

Water Framework Directive water quality and biodiversity baseline information for the current discharge location is summarised in Table 5-1.

Table 5-1 Current Knockraha WwTP discharge location summary

Topic	Baseline environment
Discharge Waterbody Type	Discharging into a soakaway (ground) 0.5 km from River waterbody
Discharge Waterbody Name	Butlerstown_020 (Butlerstown River)
Discharge Waterbody Code	IE_SW_19B060500
Water Body Ecological Status (cycle 3 2016-2021)	Good
Waterbody Risk Status and Category (2022)	Not At Risk

Topic	Baseline environment
High Status Objective List	Yes
Length of river from discharge to estuary (approximate)	8.00 km
Proximity to public water abstractions including regulated and unregulated GWS	Zone3 Glashaboy (Abstract Glashaboy River) – more than 7.30 km downstream from discharge location.
Priority Areas for Action list RBMP	No
Proximity to Shellfish Waters	No shellfish waters located in the direct pathway/downstream of the discharge. Cork Great Island North Channel Shellfish Waters, at approximately 9 km downstream from the plant and the discharge.
Proximity to Bathing Waters	No bathing waters located in the proximity/direct pathway of the discharge.
Proximity to European Designated Sites (SPA, SAC)	Cork Harbour SPA, at more than 6 km downstream from the plant and discharge. Great Island Channel SAC, at more than 5 km downstream from the plant and the discharge.
Potential to affect National (NHA, pNHA)/Ramsar designated sites and/or freshwater pearl mussel catchment?	Glanmire Wood pNHA (the closest), at more than 5 km downstream from the plant and discharge. (includes section of Glashaboy River)
Proximity of WwTP to residential areas/sensitive community sites	Close proximity to residential areas (within 100 m).

5.1.3 Knockraha WwTP existing and future capacity and compliance

The current treatment and hydraulic capacity of the existing WwTP have been compared to the actual current loading and the expected future requirements based on population growth consideration in terms of population equivalents (PE). For Knockraha WwTP these are presented as current and future organic and hydraulic loadings with existing treatment capacity in Table 5-2.

Table 5-2 Knockraha WwTP Current and Projected Loading and Existing Treatment Capacity

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

The Water Quality Modelling (WQM) outputs of the current and future predicted (2030, 2055 and 2080) assimilative capacity of the current discharge waterbody are presented in Table 5-3. The plant is currently compliant with the Wastewater Discharge Licence (WWDL). The existing discharge location ESDL are expected to be more stringent in the future (Table 5-3).

Table 5-3 Knockraha WwTP Current WWDL Emission Limit Values (ELVs) and Projected Environmentally Sustainable Discharge Limits (ESDL)

Parameter	Existing WWDL ELVs	2030 Projected ESDL	2055 Projected ESDL	2080 Projected ESDL
BOD (mg/l)	25	24	21	19
Ammonia (mg/l)	5	1.0	0.9	0.8
OrthoP (mg/l)	1.5	0.5	0.4	0.4
More Stringent?	-	Y	Y	Y

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.

5.1.4 Knockraha Coarse screening

Knockraha WwTP SEA coarse screening assessment of options summary is presented in Table 5-4.

Table 5-4 Knockraha WwTP Coarse Screening Assessment Summary

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
A0 Do Nothing - Counterfactual	N	N	N	Option has been screened out at technical stage as both organic and hydraulic capacities will be exceeded by 2030, and the existing assets are nearing end of asset life by 2055.
A1 Minimal Upgrade - Process Optimisation	N/A Option screened out at technical assessment stage.			
A2 Reuse Existing Plant and Upgrade - Existing Discharge	Y	Y	N/A	Works limited and within site so impacts likely to be mitigated with standard measures.
A3 Reuse Existing Plant and Upgrade - Alternative Discharge	Y	Y	N/A	Both existing (A4) and alternative (A3 and A4) discharge locations have been considered. Uncertainties around ELVs in this location, however they are expected to have less stringent ESDLs limits.
A4 New Treatment Process/Plant Upgrade on Existing Site	N/A	N/A	Y	
A5 New Greenfield Site	N/A	N/A	Y	Option has been shortlisted as a counterfactual to provide additional evidence in support of the preferred optioneering. Large uncertainty due to relocation of new plant and new discharge location.
A6 Untreated Wastewater Load Transfer Solution	Y	Y	Y	Pipeline work (to Carrigrennan via Glanmire) running along an existing road likely to have minimal impacts and standard mitigation measures would apply.

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening
- N/A – Not environmentally assessed

5.1.5 Knockraha Fine screening scoring

Knockraha WwTP SEA fine screening assessment of options scores are presented in Table 5-5.

Table 5-5 Knockraha WwTP 2080 Fine Screening Assessment Scores

Criteria	A0 Do Nothing - Counterfactual	A4 New Treatment Process/Plant Upgrade on Existing Site – Existing Discharge	A4 New Treatment Process/Plant Upgrade on Existing Site – Alternative Discharge	A5 New Greenfield Site with New Discharge	A6 Untreated Wastewater Load Transfer Solution
Planning & Regulation	0	-1	-1	-3	2
Impact on Customers	-1	3	3	1	3
Community Support, Health and Wellbeing	-2	-1	-1	1	3
Water environment	-3	1	1	1	3
Biodiversity	-2	-1	-1	-1	3
GHG Emissions	0	0.5	-0.5	-0.5	0.5
Energy efficiency	-3	2	1	1	3
Climate resilience	0	2	2	2	3
Circular economy	0	-1	-1	-1	1
Environmental combined score	Worst				Best
Overall combined score	N/A	2.73	2.48	2.09	3.95
Overall rank	N/A	2nd	3rd	4th	1st

5.1.6 Knockraha Fine screening results

Table 5-6 presents options that ranked highest using the MCA fine screening process.

Table 5-6 Knockraha WwTP 2080 Implementation Fine Screening 1st, 2nd, 3rd and 4th Ranked Options

Design Horizon	1st Ranked Option	2nd Ranked Option	3rd Ranked Option	4th Ranked Option
2080	A6: Untreated Wastewater Load Transfer to Carrigrennan via Glanmire. Best environmental and overall score due to removal of discharge from river and addressing network issues. Benefiting approx. 8 km of High Status Objective river downstream.	A4: New Treatment Process/Plant Upgrade on Existing Site – Existing Discharge.	A4: New Treatment Process/Plant Upgrade on Existing Site – Alternative Discharge (Butlerstown River).	A5: New Greenfield Site with New Discharge (Butlerstown River).

5.1.7 Knockraha Wastewater network upgrade proposals

The network proposals include works to address SWO compliance to minimise potential for untreated spills to the environment and avoiding network surcharging and flooding. The upgrades are proposed for the 2030 strategy horizon unless otherwise stated. The works are detailed in Appendix 4 to the CWS and include for Knockraha:

- Improvements to storage at existing pumping station sites.

These works are expected to be undertaken within existing the sites or along existing pipeline networks.

5.2 Watergrasshill

5.2.1 Watergrasshill WwTP location

Watergrasshill WwTP lies approximately 22km north of Cork city and serves the Watergrasshill catchment. (Figure 5-3). The planning assessment has identified no recorded zoning issues or map-based objectives. However, it notes that there is limited space available for upgrades within the existing site boundary. There also habitats around the site that are likely to have some ecological value.

Figure 5-3 Watergrasshill WwTP Site

5.2.2 Watergrasshill Environmental baseline

The environmental constraints for Watergrasshill WwTP are presented in Figure 5-4.

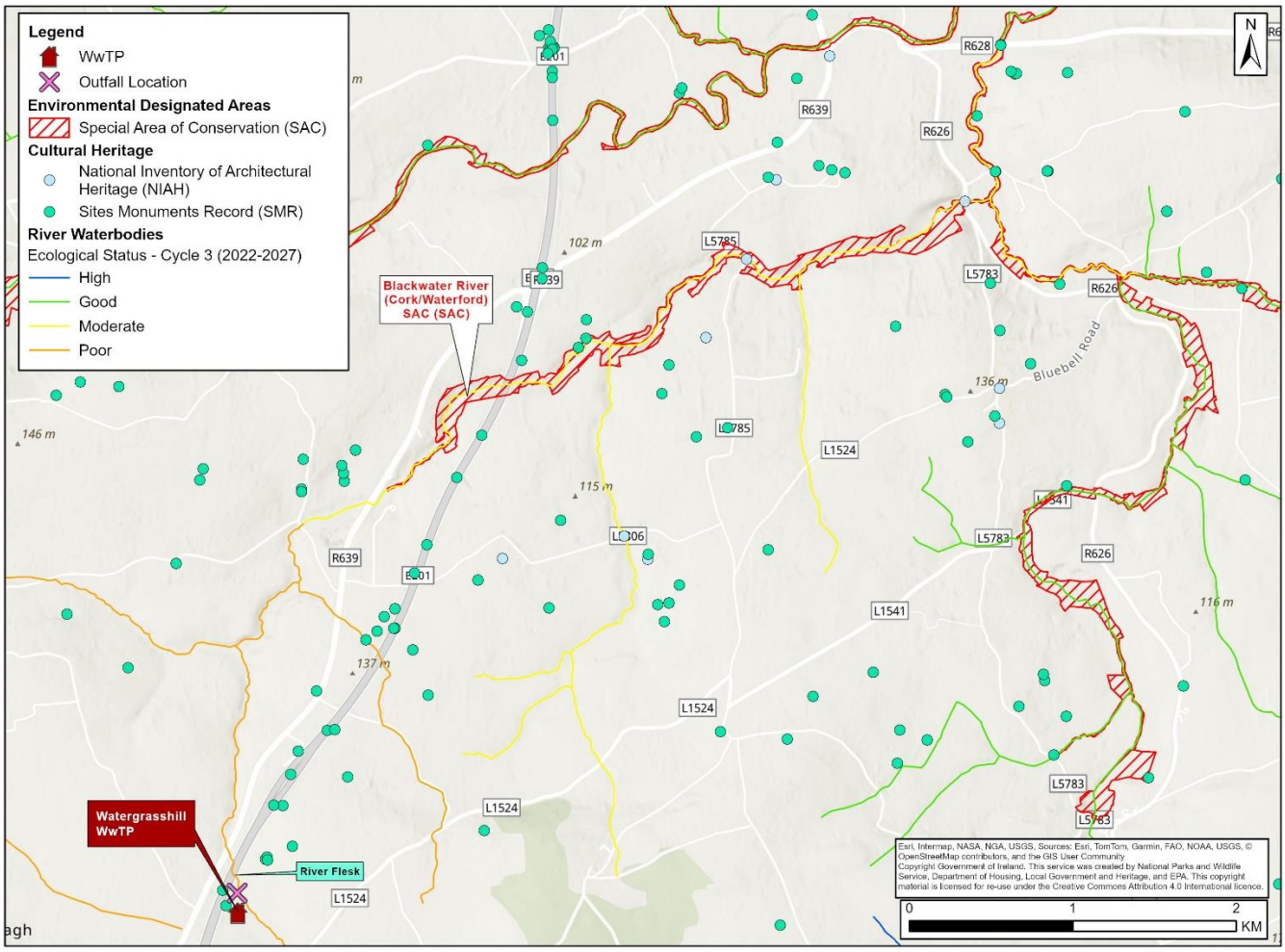

Figure 5-4 Environmental constraints for the Watergrasshill WwTP.

Water Framework Directive water quality and biodiversity baseline information for the current discharge location is summarised in Table 5-7.

Table 5-7 Current Watergrasshill WwTP discharge location summary

Topic	Baseline environment
Discharge Waterbody Type	River waterbody
Discharge Waterbody Name	Flesk (Bride)_010 (River Flesk)
Discharge Waterbody Code	IE_SW_18F040500
Water Body Ecological Status (cycle 3 2016-2021)	Poor
Waterbody Risk Status and Category (2022)	At Risk: Industry
High Status Objective List	No

Topic	Baseline environment
Length of river from discharge to estuary (approximate)	46.00 km
Proximity to public water abstractions including regulated and unregulated GWS	N/A
Priority Areas for Action list RBMP	Confirmed AFA Category: Restoration, Sub-Category: Prioritised Areas for Action LAWPRO
Proximity to Shellfish Waters	No Shellfish Waters located in the direct pathway/downstream of the discharge.
Proximity to Bathing Waters	No Bathing Waters located in the proximity/direct pathway of the discharge.
Proximity to European Designated Sites (SPA, SAC)	Blackwater River SAC at more than 2.5 km downstream from the plant and from the discharge.
Potential to affect National (NHA, pNHA)/Ramsar designated sites and/or freshwater pearl mussel catchment?	No NHA/pNHA sites in proximity/direct pathways to current site and discharge.
Proximity of WwTP to residential areas/sensitive community sites	Close proximity to recreational/community areas (within 500 m).

5.2.3 Watergrasshill WwTP existing and future capacity and compliance

The current treatment and hydraulic capacity of the existing WwTP have been compared to the actual current loading and the expected future requirements based on population growth consideration in terms of population equivalents (PE). For Watergrasshill WwTP these are presented as current and future organic and hydraulic loadings with existing treatment capacity in Table 5-8.

Table 5-8 Watergrasshill WwTP Current and Projected Loading and Existing Treatment Capacity

Parameter	Existing Capacity	Current Loading	2030 Projected Loading	2055 Projected Loading	2080 Projected Loading
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

The Water Quality Modelling (WQM) outputs of the current and future predicted (2030, 2055 and 2080) assimilative capacity of the current discharge waterbody are presented in Table 5-9. The plant is currently not compliant against stringent Wastewater Discharge Licence (WWDL) requirements with to ammonia. The existing discharge location ESDL are expected to be more stringent in the future (Table 5-9).

Table 5-9 Watergrasshill WwTP Current WWDL Emission Limit Values (ELVs) and Projected Environmentally Sustainable Discharge Limits (ESDL)

Parameter	Existing WWDL ELVs	2030 Projected ESDL	2055 Projected ESDL	2080 Projected ESDL
BOD (mg/l)	10	Not available	Not available	Not available
Ammonia (mg/l)	1	Not available	Not available	Not available
OrthoP (mg/l)	1	Not available	Not available	Not available
More Stringent?	-	Not available	Not available	Not available

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.

5.2.4 Watergrasshill Coarse screening

Watergrasshill WwTP SEA coarse screening assessment of options summary is presented in Table 5-10.

Table 5-10 Watergrasshill WwTP Coarse Screening Assessment Summary

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
A0 Do Nothing - Counterfactual	N	N	N	Option has been screened out at technical stage as both organic and hydraulic capacities will be exceeded by 2055, and the existing assets are nearing end of asset life by 2055.
A1 Minimal Upgrade - Process Optimisation	Y	N/A	N/A	Works within existing site likely not to have impacts and standard mitigation measures would apply.
A2 Reuse Existing Plant and Upgrade - Existing Discharge	N/A Option screened out at technical assessment stage.			

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
A3 Reuse Existing Plant and Upgrade - Alternative Discharge	N/A Option screened out at technical assessment stage.			
A4 New Treatment Process/Plant Upgrade on Existing Site	N/A Option screened out at technical assessment stage.			
A5 New Greenfield Site	N/A	Y	Y	Large uncertainty due to relocation of new plant and new discharge location (Butlerstown River).
A6 Untreated Wastewater Load Transfer Solution	Y	Y	Y	Pipeline work (to Carrigrennan WwTP via Glanmire TPS) running along an existing road likely to have minimal impacts and standard mitigation measures would apply

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening
- N/A – Not environmentally assessed

5.2.5 Watergrasshill Fine screening scoring

Watergrasshill WwTP SEA fine screening assessment of options scores are presented in Table 5-11.

Table 5-11 Watergrasshill WwTP 2080 Fine Screening Assessment Scores

Criteria	A0 Do Nothing - Counterfactual	A5 New Greenfield Site with New Discharge	A6 Untreated Wastewater Load Transfer Solution
Planning & Regulation	0	-2	2
Impact on Customers	-2	1	3
Community Support, Health and Wellbeing	-2	2	2
Water environment	-3	3	3

Criteria	A0 Do Nothing - Counterfactual	A5 New Greenfield Site with New Discharge	A6 Untreated Wastewater Load Transfer Solution
Biodiversity	-3	-2	2
GHG Emissions	0	-0.5	0
Energy efficiency	-3	2	3
Climate resilience	0	2	3
Circular economy	0	-1	1
Environmental combined score	Worst		Best
Overall combined score	N/A	1.86	3.09
Overall rank	N/A	2nd	1st

5.2.6 Watergrasshill Fine screening results

Table 5-12 presents options that ranked highest using the MCA fine screening process.

Table 5-12 Watergrasshill WwTP 2080 Implementation Fine Screening 1st and 2nd Ranked Options

Design Horizon	1st Ranked Option	2nd Ranked Option
2080	A6: Untreated Wastewater Load Transfer to Carrigrennan via Cork City Network. Best environmental and overall score due to removal of discharge from river and addressing network issues. Benefiting approx. 46 km of Good Status Objective river downstream.	A5: New Greenfield Site with New Discharge (Butlerstown River).

5.2.7 Watergrasshill Wastewater network upgrade proposals

The network proposals include works to address SWO compliance to minimise potential for untreated spills to the environment and avoiding network surcharging and flooding. The upgrades are proposed for the 2030 strategy horizon unless otherwise stated. The works are detailed in Appendix 4 to the CWS and include for Watergrasshill:

- Improvements to storage at existing pumping station sites;

- Storm area separation to provide additional capacity;
- An upgrade of the existing sewer system to increase the network's capacity.

These works are expected to be undertaken within existing the sites or along existing pipeline networks.

5.3 Sub catchment 4: Feasible Approach selection and implementation

A list of Feasible Approaches is presented in Table 5-13.

Table 5-13 Feasible Approaches for Sub catchment 4

Site	Horizon	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
Knockraha WwTP	2030	Decommission WwTP Construct Untreated Wastewater Transfer to Glanmire Bridge PS (7km via roads) and associated PS.	Upgrade Existing WwTP by 500PE Construct Final Effluent Transfer to Glanmire Bridge PS (7km via roads).	Upgrade Existing WwTP by 500PE Construct Final Effluent Transfer to Butlerstown River via Watergrasshill Transfer (4km via roads).
	2055	Continue to Operate WwPS.	Continue to Operate WwTP.	Continue to Operate WwTP.
	2080	Continue to Operate WwPS.	Capital Replacement (350PE) and Upgrade Existing WwTP by 100PE.	Capital Replacement (350PE) and Upgrade Existing WwTP by 100PE.
Watergrasshill WwTP	2030	Optimise WwTP to meet ESDLs.	Optimise WwTP to meet ESDLs.	Construct Final Effluent Transfer to Butlerstown River (12km via roads).
	2055	Decommission WwTP. Construct Untreated Wastewater Transfer to Glanmire Bridge PS (10km via roads) and associated PS.	Construct New Brownfield WwTP (3,900PE). Construct Final Effluent Transfer to Glanmire Bridge PS (10km via roads).	Construct New WwTP (3,900PE).
	2080	Continue to Operate WwPS.	Continue to Operate WwTP + FE Transfer.	Continue to Operate WwTP.
Overall Feasible approach environmental assessment summary		**Ranked 1st** Knockraha: The transfer (2030) will require a construction of a 7 km untreated effluent pipeline. Removal of the	**Ranked 2nd** Knockraha: The transfer (2030) will require a construction of a 7 km final effluent pipeline. Further	**Ranked 2nd** Knockraha: The transfer (2030) will require a construction of a 4 km final effluent pipeline. Further

Site	Horizon	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
		discharge will benefit 10.5 km of High Status Objective river. Watergrasshill: The transfer (2055) will require a construction of a 10 km untreated effluent pipeline. Removal of the discharge will benefit 46 km of Good Status Objective river.	upgrade (2080) to accommodate growth. Watergrasshill: The transfer (2055) will require a construction of a 10 km untreated effluent pipeline. Construction of new Greenfield site (2055).	upgrade (2080) to accommodate growth. Watergrasshill: The transfer (2030) will require a construction of a 12 km untreated effluent pipeline. Construction of new Greenfield site (2055).
Overall recommended approach		**Ranked 1st** Overall most cost effective and does not require construction of a new Greenfield plant, providing most benefit to the rivers.	**Ranked 3rd** Overall highest cost. Similar to approach 2 with later construction of the Greenfield site at Watergrasshill.	**Ranked 2nd** Requires construction of a new Greenfield WwTP and does not remove Knockraha discharge.
*This approach requires an upgrade to Carrigrennan WwTP which has been factore into the evaluation and assessment of Carrigrennan WwTP.				

5.4 Sub catchment 4: Recommended Approach implementation strategy

Figure 5-5 presents Recommended Approach graphic including environmental constraints.

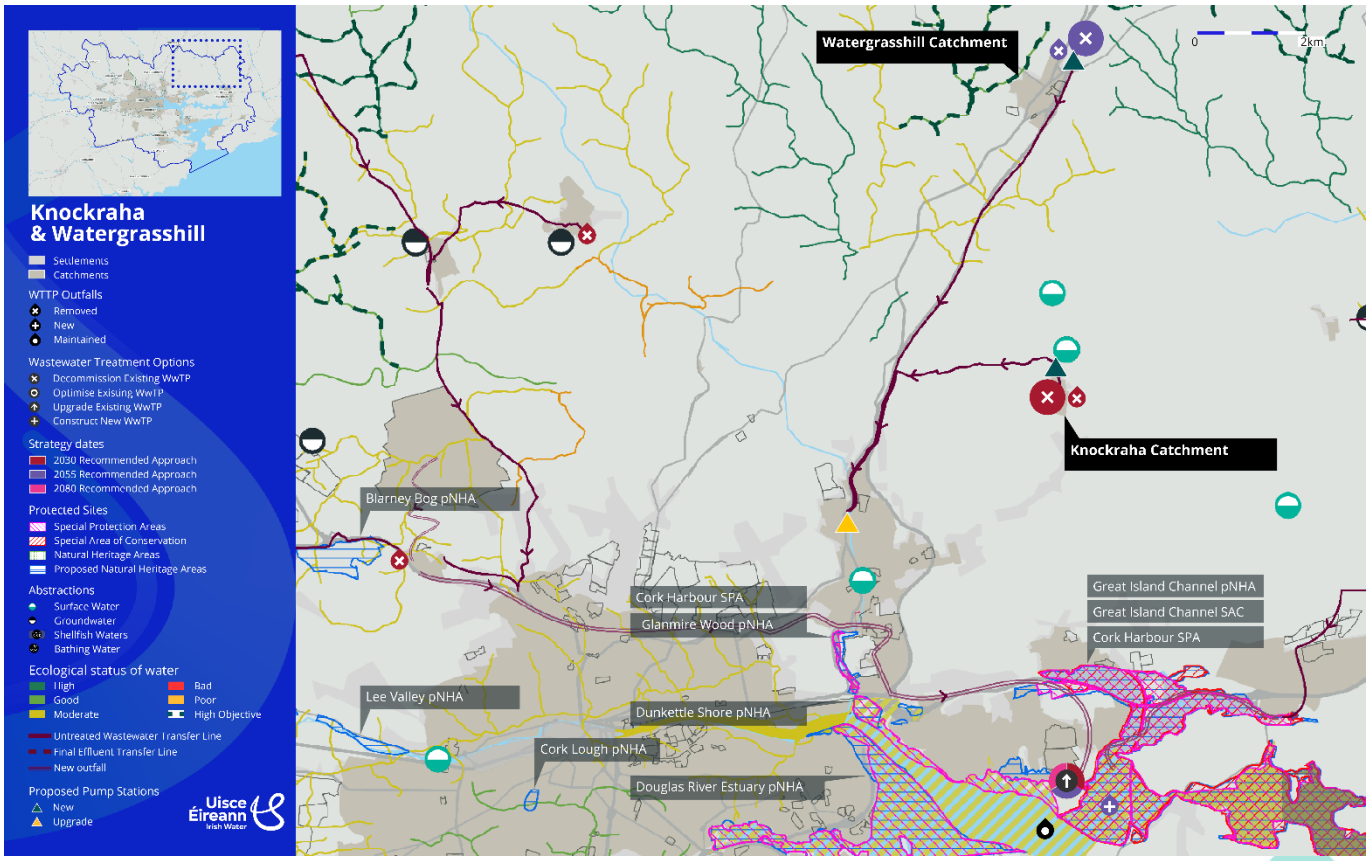

Figure 5-5 Recommended Approach Environmental Constraints for Sub catchment 4

Figure 5-6 presents the implementation strategy for the Recommended Approach for Knockraha WwTP and Watergrasshill WwTP.

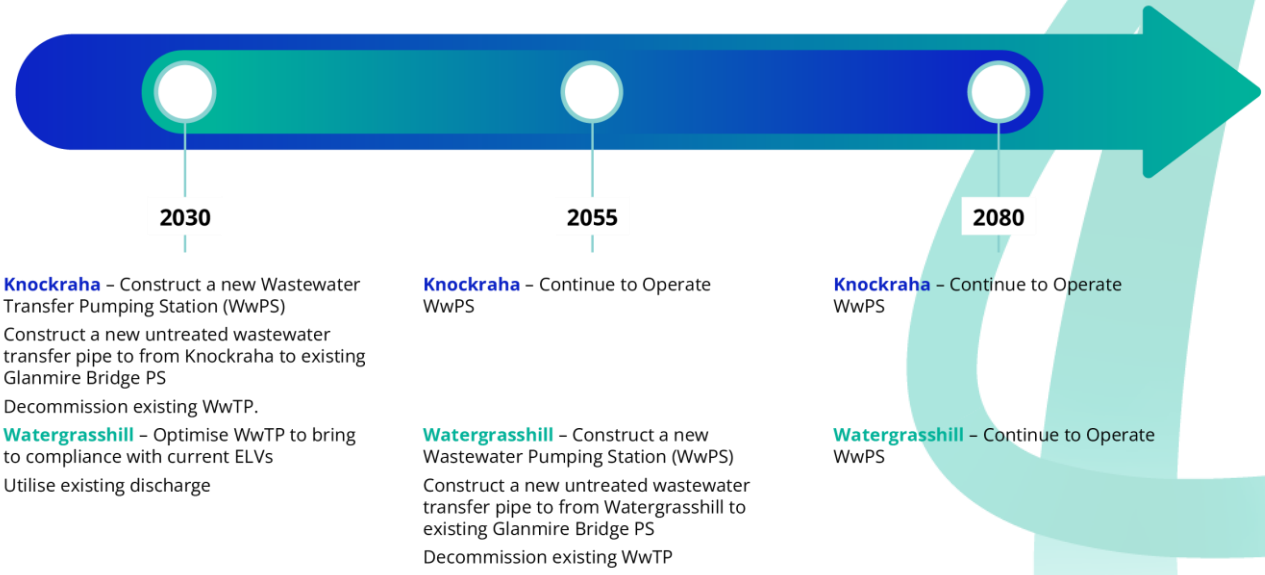

Figure 5-6 Implementation Strategy for Knockraha WwTP and Watergrasshill WwTP

5.5 Sub catchment 4: SEA Assessment of Recommended Approach

Knockraha WwTP

Table 5-14 presents Environmental Assessment of Recommended Approach for Knockraha WwTP.

Table 5-14 Knockraha WwTP Recommended Approach Assessment Summary

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec,	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
Current (A0)	Operation	+ve	0	0	0	0	0	0	0	0	0
		-ve	--	---	0	---	0	0	0	0	--
2030 (A6)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	-	-	-	0	--	-	--	-	0
	Operation	+ve	++	++	0	++	+	+	0	0	++
		-ve	0	0	0	0	0	0	0	0	0
2055 and 2080	Same as 2030 - continue to operate pumping station. No additional works or change to operation compared to 2030.										

+ve = potential beneficial or positive effects/risk

-ve = potential negative or adverse effects/risk

Construction of the final effluent transfer (Option A6) and decommission of the Knockraha WwTP will have a positive effect supporting the Water Environment and Biodiversity SEA objectives due to decommissioning of the plant and removal of discharges into the river and this may contribute to waterbody achieving High Status objective in the future. The transfer route is passed along Ballingohig BridgeNIAH (20906406) crossing BUTLERSTOWN_020 watercourse and another bridge crossing BUTLERSTOWN_030 watercourse. Assuming existing infrastructure can be used, and mitigation would be applied as part of construction design, negative effects on water environment and cultural heritage could be minimised or fully avoided. The proposed transfer pipeline is 7 km long. On the 3 km portion of the transfer route alongside the M8 road there are several sites listed on Sites and monuments record (see Watergrasshill WwTP SEA assessment summary). Detailed assessment and route alignment will be required to avoid impacts on cultural heritage assets. Decommissioning of the plant could result in 'abandonment' of infrastructure, however this can be addressed

by applying a circular economy approach, materials should be reused and recycled. Removal of the discharge could also support protection of the drinking water supply.

Watergrasshill WwTP

Table 5-15 presents Environmental Assessment of Recommended Approach for Watergrasshill WwTP.

Table 5-15 Watergrasshill WwTP Recommended Approach Assessment Summary

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec, Health	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
Current (A0)	Operation	+ve	0	0	0	0	0	0	0	0	0
		-ve	--	---	0	---	0	0	0	0	--
2030 (A1)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	0	-	-	0	-	0	0	0	-
	Operation	+ve	+	+	+	0	+	0	0	0	0
		-ve	--	0	0	--	0	0	0	0	0
2055 (A6)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	-	--	--	0	--	-	--	-	0
	Operation	+ve	+++	++	0	++	+	+	0	0	++
		-ve	0	0	0	0	0	0	0	0	0
2080	Same as 2055 - continue to operate pumping station. No additional works or change to operation compared to 2055.										

+ve = potential beneficial or positive effects/risk

-ve = potential negative or adverse effects/risk

Optimisation of the plant (Option A1) in the interim period (2030) will bring plant into compliance works before works on Option A6 start. However, optimisation may not address the non-compliant SWO as storm water storage would not be constructed given the ultimate option is to pump away, therefore the SWO could continue to have negative effect on aquatic biodiversity. Construction of the final effluent transfer (Option A6)

and decommissioning of the Watergrasshill WwTP and removal of the river discharge and a non compliant SWO will have a positive effect supporting the Water Environment and Biodiversity SEA objectives. This may contribute to achieving waterbody Good Status and have a positive effect on aquatic biodiversity. The proposed transfer pipeline (Option A6) is 10 km n of which 3km is shared with the Knockraha transfer. Decommissioning of the plant could result in 'abandonment' of infrastructure, however this can be potentially addressed by applying a circular economy approach, materials should be reused and recycled. The transfer route runs along the M8 road where there are several sites listed on Sites and monuments record (SMR) (CO19012, CO19021, CO19079, CO19002, CO18986, CO18949, CO18950, CO18945, CO18946, CO18947, CO19001, CO19000, CO19003, CO18999, CO18997, CO18998) and detailed assessment and routing will be required to avoid impacts where possible. Assuming existing infrastructure can be used, and mitigation would be applied as part of construction design, negative effects on water environment and cultural heritage could be minimised or fully avoided.

5.6 Sub catchment 4: Cumulative assessment

The potential cumulative or in combination adverse or beneficial effects for the Knockraha and Watergrasshill sub catchment are identified below in Table 5-16. These aim to identify where a receptor could be affected by more than one of the WwTP and network proposals within the overall sub catchment, such as proximity to works being undertaken at the same or discharges or decommissioning affecting the same waterbody.

Table 5-16 Potential cumulative or in combination effects within Sub-catchment 4

Site/ Potential Interaction	Watergrasshill WwTP
Knockraha WwTP	Not in proximity for construction and no pathways for combined operational effects.

Key	No interaction or negligible cumulative effects		Potential for beneficial cumulative effects	
	Potential for adverse cumulative effects		Potential for mixed beneficial and adverse effects	

No significant cumulative effects have been identified for the Recommended Approach across the sub catchment which would require additional mitigation. The decommissioning of both Knockraha and Watergrasshill WwTPs will be staggered, occurring in the 2030 and 2055 time horisons, respectively. The construction of the respective pumping stations and transfer pipelines for flows to Carrigrennan WwTP from each of the sites will also be staggered, and with good practice, construction effects on neighbouring settlements and the road network are not expected to be significant.

5.7 Sub catchment 4: Mitigation and enhancement

General measures include;

- Supporting awareness campaigns on challenges for WwTPs and water pollution to encourage appropriate use, and to understand the improvement works proposed and long-term benefits compared to temporary disruption.
- Water quality modelling identified the influence of other sources of pollution affecting water quality and aquatic biodiversity including in relation to BOD, ammonia and phosphates and support for catchment management measures aimed at reducing these sources can provide wider environmental benefits as well environmental enhancement for biodiversity and flood management. These can include measures to improve water retention, reducing nutrient run off and soil erosion. These measures can only be delivered through collaboration with other parties and landowner involvement.
- WwTP and network upgrades will need to consider in detail potential to include NBS as part of detailed design including NBS that provide additional water quality enhancement benefits.

Specific measures for Sub catchment 4 options are set out in Table 5-17.

Table 5-17 Mitigation and enhancement measures identified for Sub Catchment 4

Agglomeration	Potential issues/ risk	Mitigation Measures
Knockraha	Decommission and transfer pipeline construction	Standard good construction including traffic management for pipeline construction. Detailed pipeline transfer route alignment and assessment to minimise habitat loss. Surveys and assessments depending on routing such as ecology, contaminated land, cultural heritage/archaeological interest.
Watergrasshill	Site construction works for optimisation. Ambient receiving water quality risks. Then later decommission and transfer.	Consider support for catchment management measures/initiatives to improve receiving river water quality for 2030-2055 period. Standard good construction measures as above
Sub catchment/ common measures	Site construction works with potential for habitat loss and disruption/ disturbance.	Application of biodiversity net gain to address any losses – consider use of decommissioned sites.

6 Sub catchment 5: Carrigrennan

6.1 Carrigrennan

6.1.1 Carrigrennan WwTP location

Carrigrennan WwTP is located at Little Island 11km east of Cork city centre (Figure 6-1). The planning assessment for the wastewater treatment plant identified that the site, provides space for potential upgrades or expansions. The site is set within a larger area of land within the Uisce Éireann land boundary. The northern part of the Uisce Éireann around the site includes an area designated as Cork Harbour SPA, Great Island Channel SAC/pNHA). The designated sites also border the Uisce Éireann land to the east, and south as shown on Figure 6.2. The Cork Harbour SPA is also located to the west of the site with the Rockfarm Quarry, Little Island pNHA to the north west. Some areas within the site and surrounding Uisce Éireann land outside the designated areas also support habitats that are likely to have some ecological value which will need to be assessed further.

Figure 6-1 Carrigrennan WwTP Site

6.1.2 Carrigrennan Environmental baseline

The environmental constraints for Carrigrennan WwTP are presented in Figure 6-2.

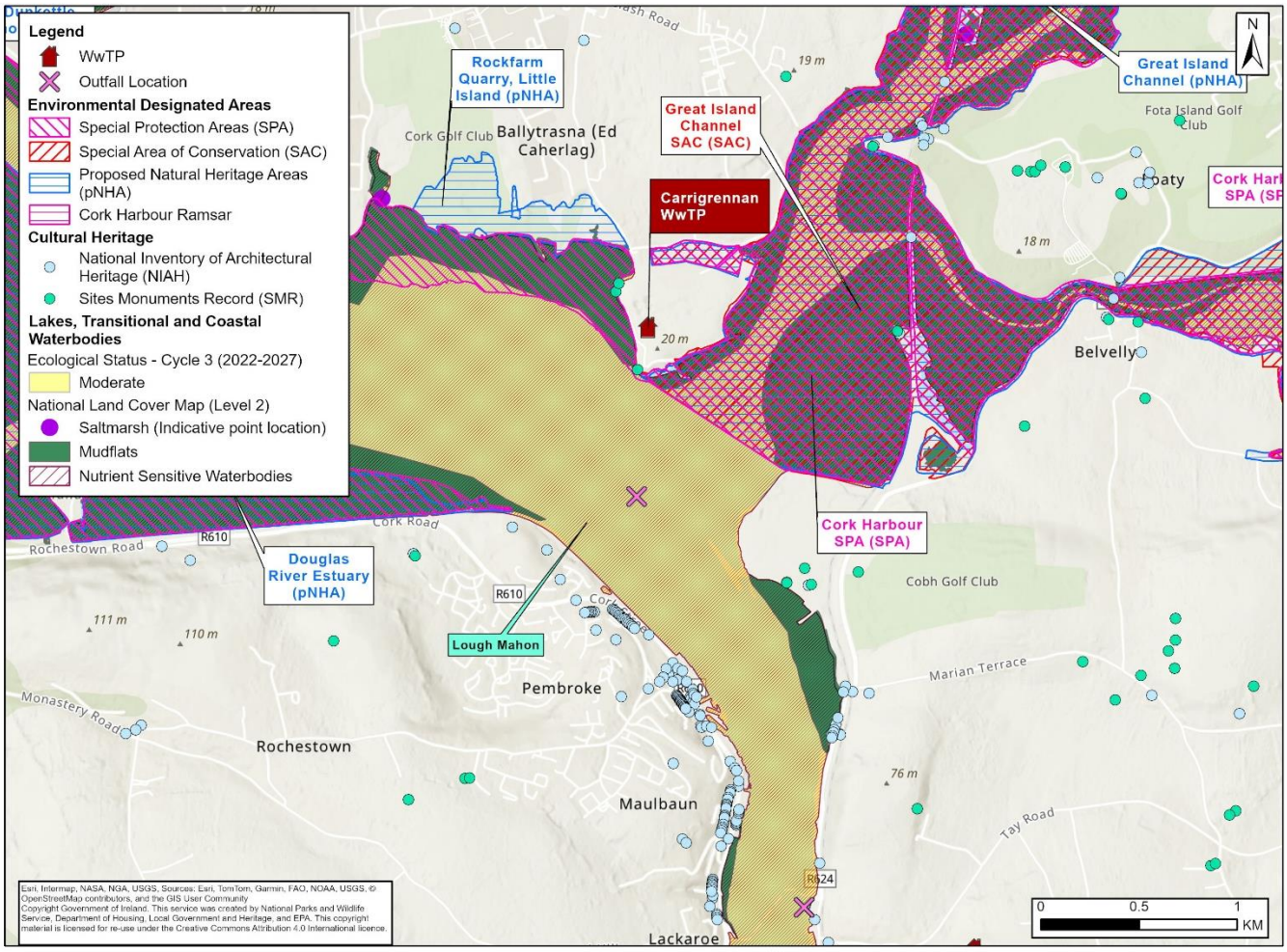

Figure 6-2 Environmental constraints for the Carrigrennan WwTP.

Water Framework Directive water quality and biodiversity baseline information for the current discharge location is summarised in Table 6-1.

Table 6-1 Current Carrigrennan WwTP discharge location summary

Topic	Baseline environment
Discharge Waterbody Type	Transitional waterbody
Discharge Waterbody Name	Lough Mahon
Discharge Waterbody Code	SW_060_0750
Water Body Ecological Status (cycle 3 2016-2021)	Moderate
Waterbody Risk Status and Category (2022)	At Risk: Urban Waste Water

Topic	Baseline environment
High Status Objective List	No
Length of river from discharge to estuary (approximate)	N/A
Proximity to public water abstractions including regulated and unregulated GWS	N/A
Priority Areas for Action list RBMP	No
Proximity to Shellfish Waters	No shellfish waters located in the direct pathway/downstream of the discharge
Proximity to Bathing Waters	No bathing waters located in the proximity of the discharge - discharge located approximately 14 km upstream of the nearest Bathing Water (Fountainstown Blue Flag and Green Coast Beach).
Proximity to European Designated Sites (SPA, SAC)	Cork Harbour SPA downstream location is more than 4 km from the discharge and in terms of proximity to WwTP part of the SPA is 0.30 km from the site). Great Island Channel SAC (located more than 0.5 km upstream from the discharge and less than 0.30 km from the WwTP site).
Potential to affect National (NHA, pNHA)/Ramsar designated sites and/or freshwater pearl mussel catchment?	Great Island Channel pNHA (located less than 0.30 km from the WwTP site). Rockfarm Quarry, Little Island pNHA (located less than 0.50 km from the WwTP site). Monkstown Creek pNHA (is located more than 4 km downstream from the discharge). Cork Harbour Ramsar site downstream location is more than 4 km from the discharge.
Proximity of WwTP to residential areas/sensitive community sites	Close proximity to residential areas (within 300 m) and recreational/community areas (within 100 m).

6.1.3 Carrigrennan WwTP existing and future capacity and compliance

The current treatment and hydraulic capacity of the existing WwTP have been compared to the actual current loading and the expected future requirements based on population growth consideration in terms of population equivalents (PE). For Carrigrennan WwTP these are presented as the current and future organic and hydraulic loadings with existing treatment capacity in Table 6-2.

Table 6-2 Carrigrennan WwTP Current and Projected Loading and Existing Treatment Capacity

Parameter	Existing Capacity	Current Loading	2030 Projected Loading	2055 Projected Loading	2080 Projected Loading
Organic Loading (PE)	413,200	296,001	390,857	465,286	500,415
Hydraulic Loading (m^3/d)	358,592	158,269	303,961	359,535	385,765

The Water Quality Modelling (WQM) outputs of the current and future predicted (2030, 2055 and 2080) assimilative capacity of the current discharge waterbody are presented in Table 6-3. The plant is currently compliant with the Wastewater Discharge Licence (WWDL). The expected 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 (Table 6-3).

Table 6-3 Carrigrennan WwTP Current WWDL Emission Limit Values (ELVs) and Projected Environmentally Sustainable Discharge Limits (ESDL)

Parameter	Existing ELVs	2030 Projected ESDL	2055 Projected ESDL	2080 Projected ESDL
BOD (mg/l)	25	25	25	25
TN (mg/l)	25	25	8	8
TP (mg/l)	2.5	2.5	0.5	0.5
More Stringent?	-	Y	Y	Y

The network assessment has identified that the current network is experiencing surcharging and flooding across. 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.

6.1.4 Carrigrennan Coarse screening

Carrigrennan WwTP SEA coarse screening assessment of options summary is presented in Table 6-4.

Table 6-4 Carrigrennan WwTP Coarse Screening Assessment Summary

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening assessment summary comments
A0 Do Nothing - Counterfactual	N	N	N	Option has been screened out at technical stage as the WwTP would be over hydraulic and organic capacity.
A1 Minimal Upgrade - Process Optimisation	Y	N/A	N/A	Works are limited and within site so impacts likely to be mitigated with standard measures.
A2 Reuse Existing Plant and Upgrade - Existing Discharge	Y	Y	N/A	
A3 Reuse Existing Plant and Upgrade - Alternative Discharge	N/A Option screened out at technical assessment stage.			
A4 New Treatment Process/Plant Upgrade on Existing Site	N/A	N/A	Y	Uncertainty as greater level of construction work required due to the need for a new treatment process on site. Site is surrounded by SAC, SPA and pNHA, however potential impacts are likely to be mitigatable.
A5 New Greenfield Site	N/A	N/A	Y	Large uncertainty around new location due to the site being second largest in Ireland and surrounded by SAC, SPA and pNHA. Option unlikely to be feasible from planning, cost and environmental perspectives.
A6 Untreated Wastewater Load Transfer Solution	N/A Option screened out at technical assessment stage.			

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening
- N/A – Not environmentally assessed

6.1.5 Carrigrennan Fine screening scoring

Carrigrennan WwTP SEA fine screening assessment of options scores are presented in Table 6-5.

Table 6-5 Carrigrennan WwTP 2080 Fine Screening Assessment Scores

Criteria	A0 Do Nothing - Counterfactual	A4 New Treatment Process/Plant Upgrade on Existing Site	A5 New Greenfield Site
Planning & Regulation	0	0	-3
Impact on Customers	-3	1	-1
Community Support, Health and Wellbeing	-3	2	3
Water environment	-3	2	2
Biodiversity	-3	-1	-3
GHG Emissions	0	-1	-0.5
Energy efficiency	-3	1	2
Climate resilience	0	1	3
Circular economy	0	3	-1
Environmental combined score	Worst	Best	
Overall combined score	N/A	2.03	0.68
Overall rank	N/A	1st	2nd

6.1.6 Carrigrennan Fine screening results

Table 6-7 presents options that ranked highest using the MCA fine screening process.

Table 6-6 Carrigrennan WwTP 2080 Implementation Fine Screening 1st, 2nd and 3rd Ranked Options

Design Horizon	1st Ranked Option	2nd Ranked Option	3rd Ranked Option
2080	A4: New Treatment Process/Plant Upgrade on Existing Site Best overall and environmental score as upgrades will contribute to plant being compliant.	A5: New Greenfield Site (existing discharge)	N/A

6.1.7 Carrigrennan Wastewater network upgrade proposals

The network proposals include works to address SWO compliance to minimise potential for untreated spills to the environment and avoiding network surcharging and flooding. The upgrades are proposed for the 2030 strategy horizon unless otherwise stated. The works are detailed in Appendix 4 to the CWS and include for Carrigrennan:

- Improvements to storage at existing pumping station sites;
- Storm area separation to enhance capacity;
- Reduction in tidal infiltration across South Cork to enhance capacity.

These works are expected to be undertaken within existing the sites or along existing pipeline networks.

6.2 Sub catchment 5: Feasible Approach selection and implementation

A list of Feasible Approaches for Carrigrennan WwTP is presented in Table 6-7.

Table 6-7 Feasible Approaches for Carrigrennan WwTP.

Site	Horizon	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
Carrigrennan WwTP	2030	Upgrade existing WwTP to provide tertiary treatment to meet Cork City growth demand and wastewater transfers from Blarney, Carrignavar, Whitechuch, Knockraha and Monard.	Upgrade existing WwTP to provide tertiary treatment to meet Cork City growth demand and wastewater transfers from Blarney, Carrignavar, Whitechuch, Knockraha and Monard.	Upgrade existing WwTP to provide tertiary treatment to meet Cork City growth demand and wastewater transfers from Blarney, Carrignavar, Whitechuch, Knockraha and Monard.
	2055	89,000PE upgrade of existing tertiary WwTP. Construct new 537,000PE quaternary treatment plant	91,000PE upgrade of existing tertiary WwTP. Construct new 532,500PE quaternary treatment plant	Divert south Cork City to Cork Lower Harbour via the Southern Orbital Sewer.

Site	Horizon	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
		Upsize existing final effluent discharge outfall.	Upsize existing final effluent discharge outfall.	26,750PE upgrade of existing tertiary WwTP. Construct new 435,000PE quaternary treatment plant Upsize existing final effluent discharge outfall.
	2080	Increase treatment capacity by 41,000PE.	Increase treatment capacity by 40,000PE.	Continue to operate WwTP.
Overall Feasible approach environmental assessment summary		**Ranked 2nd** 2030 upgrade to provide tertiary treatment and accommodate wastewater transfers from five WwTPs. 2055 upgrade to provide quaternary treatment and upsize existing final effluent discharge outfall. 2080 treatment capacity increase.	**Ranked 2nd** 2030 upgrade to provide tertiary treatment and accommodate wastewater transfers from five WwTPs. 2055 upgrade to provide quaternary treatment and upsize existing final effluent discharge outfall. 2080 treatment capacity increase.	**Ranked 1st** 2030 upgrade to provide tertiary treatment and accommodate wastewater transfers from five WwTPs. 2055 upgrade to provide quaternary treatment; upsize existing final effluent discharge outfall and divert some untreated effluent to Cork Lower Harbour WwTP. 2080 continue to operate WwTP.
Overall recommended approach		**Ranked 1st** Overall best approach. Environmentally ranked joint 2nd as the upgrades required for both options are similar in terms of environmental impacts	**Ranked 2nd** Similar approach to Approach 1, however the capacity upgrades required at the treatment plant are greater than Approach 3.	**Ranked 3rd** Environmentally ranked 1st due to partial diversion of untreated effluent with less discharge into the waterbody and reduced level of upgrades.

6.3 Sub catchment 5: Recommended Approach implementation strategy

Figure 6-3 presents Recommended Approach graphic including environmental constraints.

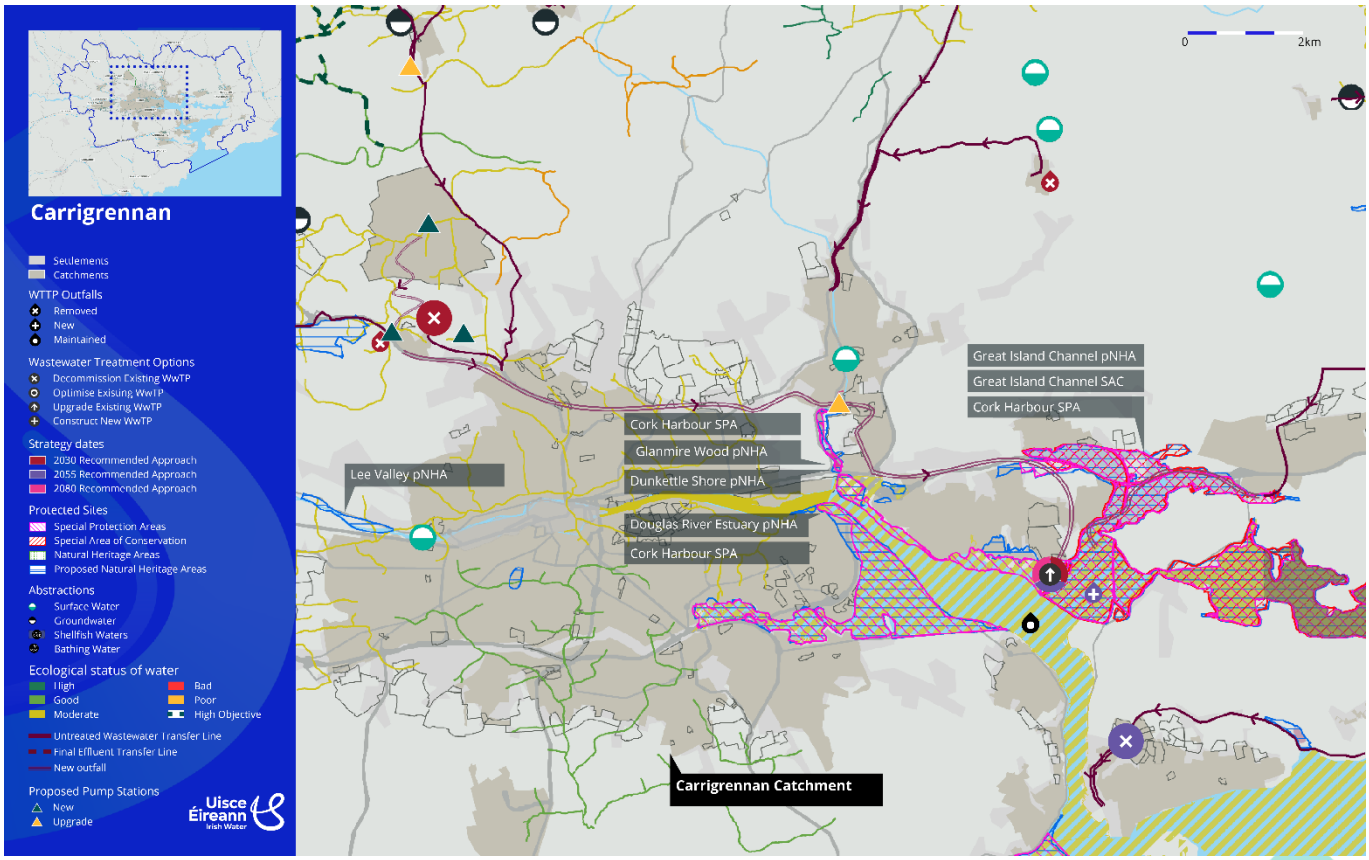

Figure 6-3 Recommended Approach Environmental Constraints for Sub catchment 5

Figure 6-4 presents the implementation strategy for the Recommended Approach for Carrigrennan WwTP.

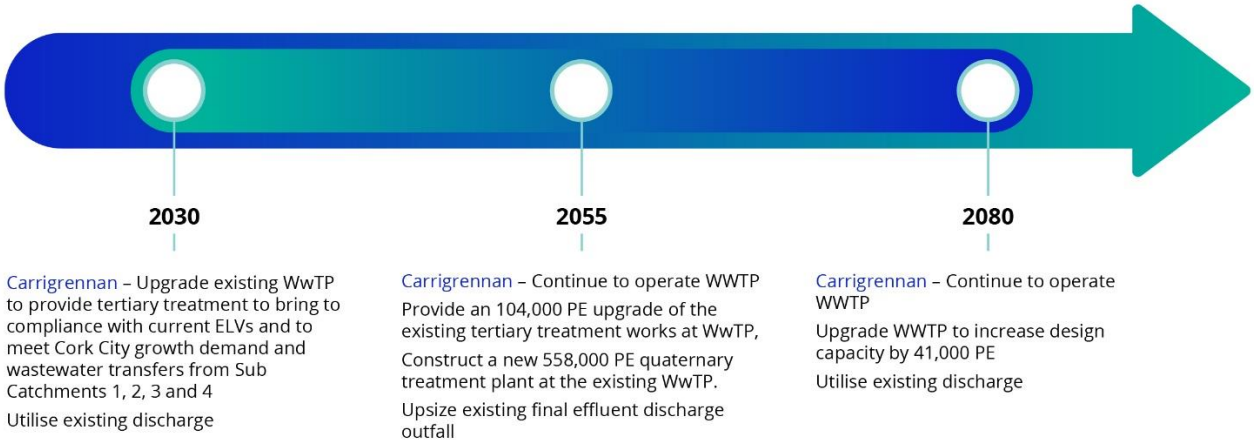

Figure 6-4 Implementation strategy for Carrigrennan WwTP.

6.4 Sub catchment 5: SEA Assessment of Recommended Approach

Table 6-8 presents the Environmental Assessment of the Recommended Approach for Carrigrennan WwTP.

Table 6-8 Carrigrennan WwTP Recommended Approach Assessment Summary

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec,	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
Current (A0)	Operation	+ve	0	0	0	0	0	0	0	0	0
		-ve	---	---	--	---	--	---	0	0	--
2030 (A2)	Construction	+ve	0	0	0	0	+	0	0	0	0
		-ve	0	0	--	0	0	0	0	0	-
	Operation	+ve	++	+	0	++	+	+	0	0	0
		-ve	0	0	-	0	0	-	0	0	-
2055 (A4)	Construction	+ve	0	0	0	0	+	0	0	0	0
		-ve	0	0	--	--	0	-	0	--	--
	Operation	+ve	+++	++	0	+++	+	+++	0	0	0
		-ve	0	0	-	0	0	-	0	0	-
2080 (additional capacity upgrades)	Construction	+ve	0	0	0	0	+	0	0	0	0
		-ve	0	0	0	0	0	0	0	0	0
	Operation	+ve	+++	++	0	+++	+	+++	0	0	0
		-ve	0	0	-	0	0	-	0	0	-

+ve = potential beneficial or positive effects/risk

-ve = potential negative or adverse effects/risk

To maintain compliance with the projected loads for the growth of Cork City and transfers from Sub-Catchments across Cork into the Carrigrennan WwTP by 2030 the plant will undergo capacity upgrades including the provision of tertiary treatment at the plant (Option A2). The construction of these upgrades and

tertiary treatment is likely to have some short term negative effects in relation to the Climate Change and Air Quality SEA objectives; however treatment upgrades and compliance for the discharge and network upgrades are expected to have positive effects supporting the Water Environment and Biodiversity SEA objectives compared to the current situation.

The construction of a quaternary treatment at the existing site by 2050 (Option A4) has potential to cause some disturbance with potential for negative effects for the Biodiversity, Geology and Soils SEA Objectives and have some short term temporary negative effects on the Air Quality objective..

Further capacity upgrades will enable the plant to accommodate projected loads through to 2080 whilst still being compliant and therefore benefitting numerous objectives including the Water Environment, Biodiversity and Population SEA Objectives.

European and Nationally designated sites are located around the north, south, west and east boundaries of the site. Potential for adverse effects on the adjacent European and Nationally designated sites from all the proposed work will need to be avoided and the mitigation measures as outlined in the Natura Impact Statement (NIS) will need to be applied to avoid impacts through, loss, disturbance or pollution to those sites.

6.5 Sub catchment 5: Cumulative assessment

The potential cumulative or in combination adverse or beneficial effects for the Carrigrennan sub catchment aims to identify where a receptor could be affected by more than one WwTP and network proposals within the overall sub catchment, such as proximity to works being undertaken at the same time or discharges or decommissioning affecting the same waterbody.

Carrigrennan is assessed as the only WwTP within its sub catchment, and therefore the potential for adverse or beneficial cumulative effects are limited. The recommended approach for the Carrigrennan sub catchment includes the Carrigrennan WwTP receiving untreated wastewater flows from the following plants, which has been accounted for in the Sub catchment 5: SEA Assessment of Recommended Approach:

- Blarney
- Carrignavar
- Knockraha
- Monard
- Whitechurch

It should be noted that the new outfall proposed for Carrigtwohill WwTP (Section 10.4) could result in some short term minor negative effects on the receiving waterbody, Lough Mahon during construction. The combined water quality impacts have been taken into account in the modelling of the discharges and the environmental sustainable discharge limits required for the respective treatment plants.

6.6 Sub catchment 5: Mitigation and enhancement

General measures include;

- Supporting awareness campaigns on challenges for WwTPs and water pollution to encourage appropriate use, and to understand the improvement works proposed and long-term benefits compared to temporary disruption
- Water quality modelling identified the influence of other sources of pollution affecting water quality and aquatic biodiversity including in relation to BOD, ammonia and phosphates and support for catchment management measures aimed at reducing these sources can provide

wider environmental benefits as well environmental enhancement for biodiversity and flood management. These can include measures to improve water retention, reducing nutrient run off and soil erosion. These measures can only be delivered through collaboration with other parties and landowner involvement.

- WwTP and network upgrades will need to consider in detail potential to include NBS as part of detailed design including NBS that provide additional water quality enhancement benefits.

Specific measures for Sub catchment 5 options are set out in Table 6-9 below.

Table 6-9 Mitigation and enhancement measures for Sub Catchment 5

Agglomeration	Potential issues /risks	Mitigation Measures
Carrigrennan WwTP	Site boundary adjacent to SAC/SPA/pNHA Capacity for expansion within site. Potential for tree and habitat loss within site. Site construction for WwTP upgrade and the upsize of the treated effluent discharge outfall.	Site has capacity for expansion without need to extend into designated areas. Further project level environmental assessment will need to identify any additional measures to avoid impacts on adjacent designated sites and from upsizing discharge outfall. Potential for loss of trees planted within site and loss of other habitat- where possible loss should be avoided/ minimised. Within site habitat losses will need to be assessed using the biodiversity net gain approach and may require off site enhancements. Consider scope for NBS use as part of design.

7 Sub catchment 6: Ballygarvan, Halfway and Minane Bridge

7.1 Ballygarvan

7.1.1 Ballygarvan WwTP location

Ballygarvan WwTP is located in Ballygarvan village in County Cork, 9 km south of Cork City (Figure 7-1). No map-based zoning issues have been identified. However, the site is surrounded by Flood Zones A and B which could restrict the area available for potential expansion and the ecological value of the land and features would need to be assessed further.

Figure 7-1 Ballygarvan WwTP Site

7.1.2 Ballygarvan Environmental baseline

The environmental constraints at Ballygarvan WwTP are presented in Figure 7-2.

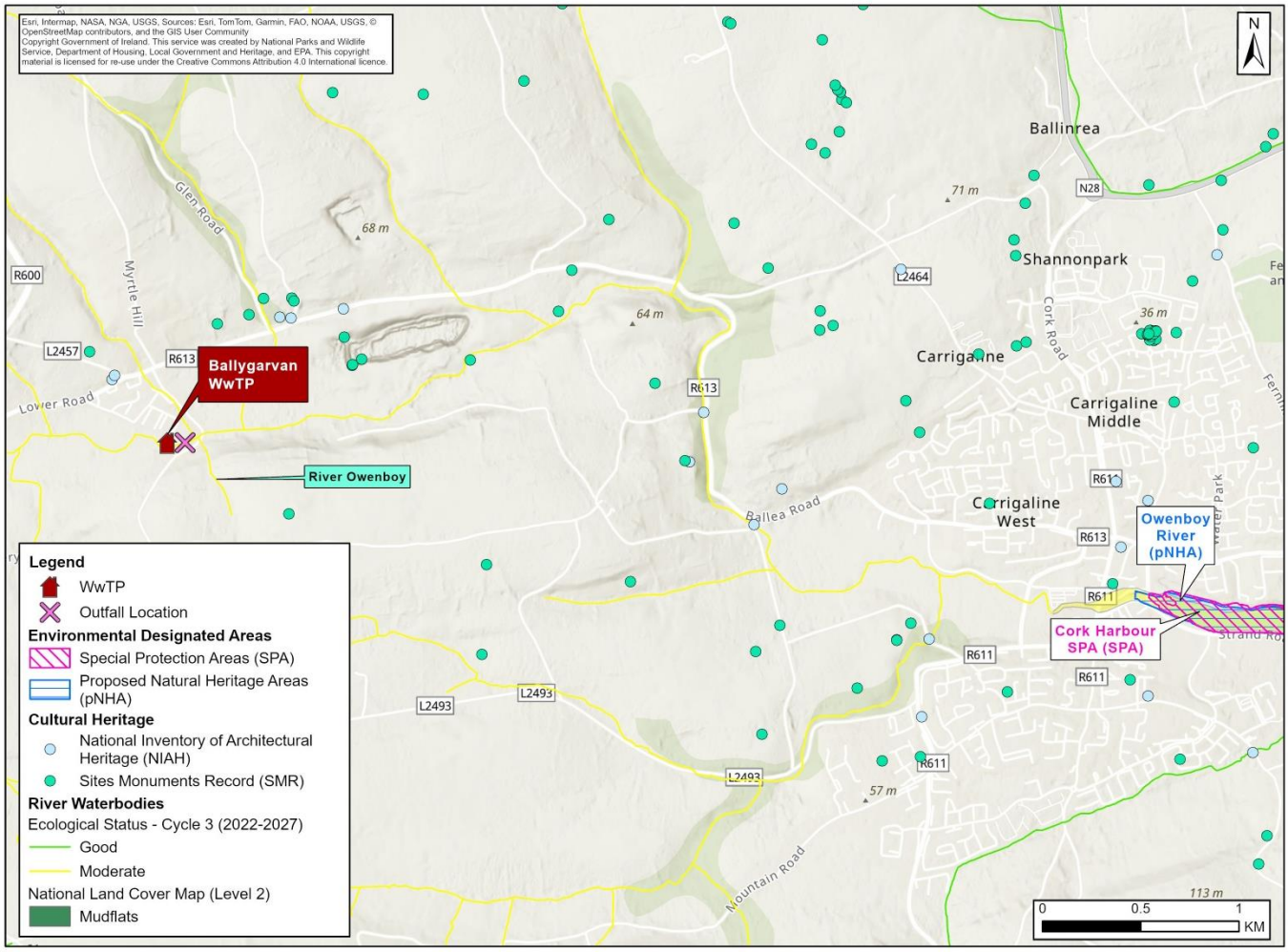

Figure 7-2 Environmental constraints for the Ballygarvan WwTP.

Water Framework Directive water quality and biodiversity baseline information for the current discharge location is summarised in Table 7-1.

Table 7-1 Ballygarvan WwTP current discharge location environmental baseline summary

Topic	Baseline environment
Discharge Waterbody Type	River waterbody
Discharge Waterbody Name	Owenboy (Cork)_030 (River Owenboy)
Discharge Waterbody Code	IE_SW_19O011000
Water Body Ecological Status (cycle 3 2016-2021)	Moderate
Waterbody Risk Status and Category (2022)	Under Review
High Status Objective List	No

Topic	Baseline environment
Length of river from discharge to estuary (approximate)	6.40 km
Proximity to public water abstractions including regulated and unregulated GWS	N/A
Priority Areas for Action list RBMP	Confirmed AFA Category: Restoration, Sub-Category: Prioritised Areas for Action LAWPRO.
Proximity to Shellfish Waters	No shellfish waters located in the direct pathway/downstream of the discharge.
Proximity to Bathing Waters	No bathing waters located in the proximity/direct pathway of the discharge.
Proximity to European Designated Sites (SPA, SAC)	The discharge is located approximately 5 km upstream of a section of Cork Harbour SPA.
Potential to affect National (NHA, pNHA)/Ramsar designated sites and/or freshwater pearl mussel catchment?	The discharge is located approximately 5 km upstream of a section of Owenboy pNHA.
Proximity of WwTP to residential areas/sensitive community sites	Close proximity to residential areas (within 100 m), school (within 400 m) and recreational/community areas (within 500 m).

7.1.3 Ballygarvan WwTP existing and future capacity and compliance

The current treatment and hydraulic capacity of the existing WwTP have been compared to the actual current loading and the expected future requirements based on population growth consideration in terms of population equivalents (PE). For Ballygarvan WwTP these are presented as the current and future organic and hydraulic loadings with existing treatment capacity in Table 7-2.

Table 7-2 Ballygarvan WwTP Current and Projected Loading and Existing Treatment Capacity

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

The Water Quality Modelling (WQM) outputs of the current and future predicted (2030, 2055 and 2080) assimilative capacity of the current discharge waterbody are presented in Table 7-3. The plant is currently not compliant with the Wastewater Discharge Licence (WWDL). The existing discharge location ESDL are expected to be more stringent in the future (Table 7-3).

Table 7-3 Ballygarvan WwTP Current WWDL Emission Limit Values (ELVs) and Projected Environmentally Sustainable Discharge Limits (ESDL)

Parameter	Existing WWDL ELVs	2030 Projected ESDL	2055 Projected ESDL	2080 Projected ESDL
BOD (mg/l)	25	25	25	25
Ammonia (mg/l)	5	4.1	3.6	3.1
OrthoP (mg/l)	3	3	3	2.7
More Stringent?	-	Y	Y	Y

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.

While the WwTP Storm Water Overflow (SWO) is currently compliant, it is projected to become non-compliant in the 2080 scenario.

7.1.4 Ballygarvan Coarse screening

Ballygarvan WwTP SEA coarse screening assessment of options summary is presented in Table 7-4.

Table 7-4 Ballygarvan WwTP Coarse Screening Assessment Summary

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
A0 Do Nothing - Counterfactual	N	N	N	Option has been screened out at technical stage as the existing WwTP is currently over capacity and is not achieving the discharge requirements as set in the WWDL.

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
A1 Minimal Upgrade - Process Optimisation	N/A Option screened out at technical assessment stage.			
A2 Reuse Existing Plant and Upgrade - Existing Discharge	Y	Y	N/A	Limited works within existing site likely not to have impacts and standard mitigation measures would apply.
A3 Reuse Existing Plant and Upgrade - Alternative Discharge	N/A Option screened out at technical assessment stage.			
A4 New Treatment Process/Plant Upgrade on Existing Site	N/A	N/A	Y	Full replacement of existing assets and increase in treatment capacity is proposed. Greater level of construction work required, however if within site works likely to be mitigatable.
A5 New Greenfield Site	N/A	N/A	Y*	Option has since been discounted with further consideration at the technical stage due to identification of potential flood risk assessment requirements. Option therefore has not been advanced to fine screening.
A6 Untreated Wastewater Load Transfer Solution	Y	Y	Y	New pipeline (to Cork Lower Harbour via Carrigaline PS) running along an existing road likely to have minimal impacts and standard mitigation measures would apply.

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

- N/A – Not environmentally assessed

7.1.5 Ballygarvan Fine screening scoring

Ballygarvan WwTP SEA fine screening assessment of options scores are presented in Table 7-5.

Table 7-5 Ballygarvan WwTP 2080 Fine Screening Assessment Scores

Criteria	A0 Do Nothing - Counterfactual	A4 New Treatment Process/Plant Upgrade on Existing Site	A6 Untreated Wastewater Load Transfer Solution
Planning & Regulation	0	-2	-1
Impact on Customers	-2	2	3
Community Support, Health and Wellbeing	-2	1	2
Water environment	-3	2	3
Biodiversity	-3	1	2
GHG Emissions	0	0.5	0
Energy efficiency	-3	2	3
Climate resilience	-3	1	3
Circular economy	0	0	2
Environmental combined score	Worst		Best
Overall combined score	N/A	2.95	3.86
Overall rank	N/A	2nd	1st

7.1.6 Ballygarvan Fine screening results

Table 7-6 presents options that ranked highest using the MCA fine screening process.

Table 7-6 Ballygarvan WwTP 2080 Implementation Fine Screening 1st and 2nd Ranked Options

Design Horizon	1st Ranked Option	2nd Ranked Option
2080	Option A6: Untreated transfer to Cork Lower Harbour WwTP via Carrigaline PS. Best environmental and overall score due to removal of discharge from river and addressing network issues. Benefiting approx. 6 km of Good Status Objective river downstream.	Option A4: Upgrade existing site and discharge to existing location

7.1.7 Ballygarvan Wastewater network upgrade proposals

The network proposals include works to address SWO compliance to minimise potential for untreated spills to the environment and avoiding network surcharging and flooding. The upgrades are proposed for the 2030 strategy horizon unless otherwise stated. The works are detailed in Appendix 4 to the CWS and include for Ballygarvan:

- Improvements to storage at existing pumping station sites;
- An upgrade of the existing sewer system to increase the network's capacity.

These works are expected to be undertaken within existing the sites or along existing pipeline networks.

7.2 Halfway

7.2.1 Halfway WwTP location

Halfway WwTP is located approximately 12 kilometres southwest of Cork City and 13 kilometres northeast of Bandon (Figure 7-3). Expansion has been identified as not possible due to no available land. Additionally, a Flood Zone A is located immediately to the south, further limiting development options.

Figure 7-3 Halfway WwTP Site

7.2.2 Halfway Environmental baseline

The environmental constraints for Halfway WwTP are presented in Figure 7-4.

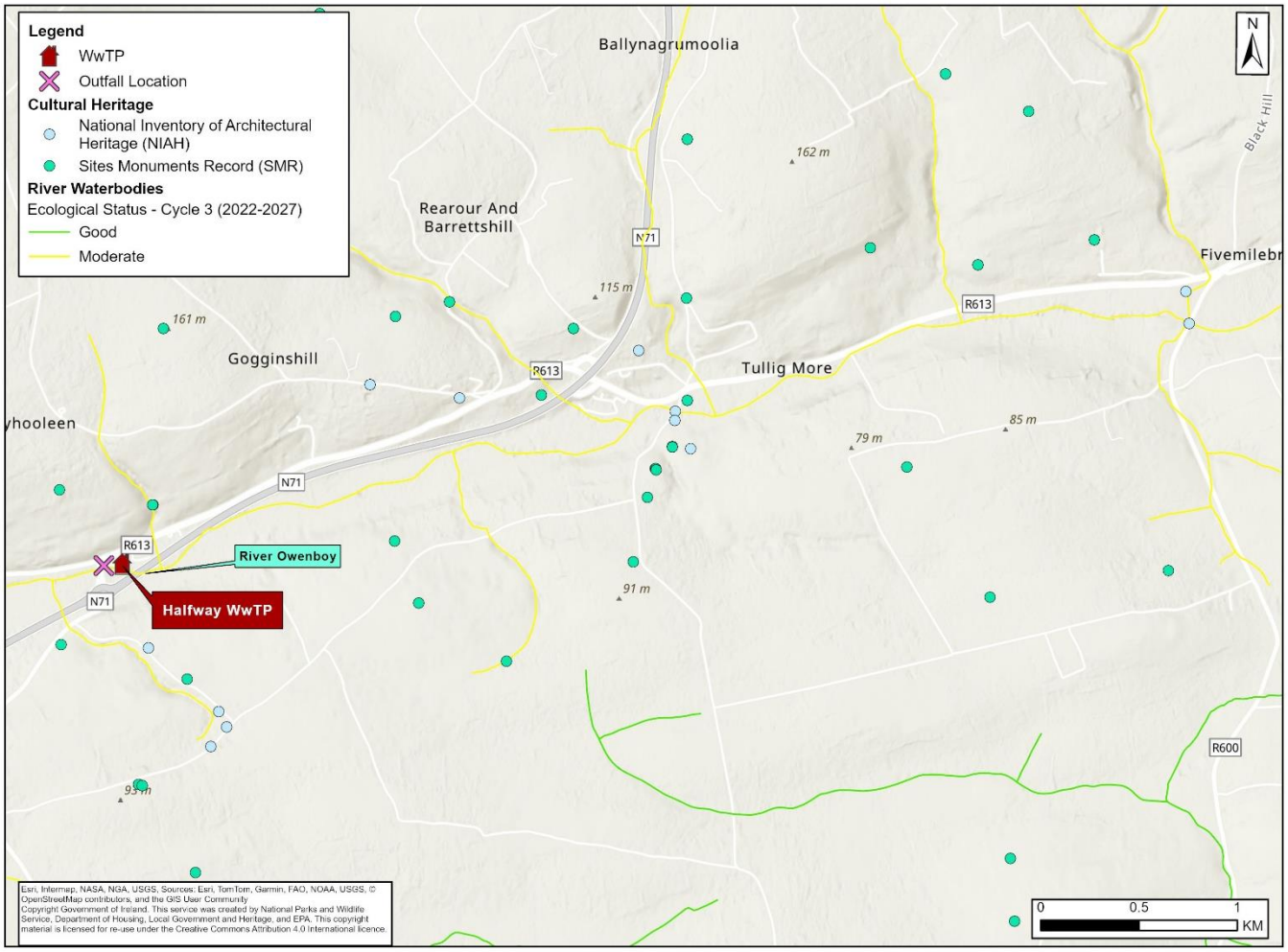

Figure 7-4 Environmental constraints for Halfway WwTP.

Water Framework Directive water quality and biodiversity baseline information for the current discharge location is summarised in Table 7-7.

Table 7-7 Halfway WwTP current discharge location environmental baseline summary

Topic	Baseline environment
Discharge Waterbody Type	River Waterbody
Discharge Waterbody Name	Owenboy (Cork)_020 (River Owenboy)
Discharge Waterbody Code	IE_SW_19O010800
Water Body Ecological Status (cycle 3 2016-2021)	Moderate
Waterbody Risk Status and Category (2022)	At Risk: Agriculture
High Status Objective List	No

Topic	Baseline environment
Length of river from discharge to estuary (approximate)	15.10 km
Proximity to public water abstractions including regulated and unregulated GWS	N/A
Priority Areas for Action list RBMP	Confirmed AFA Category: Restoration, Sub-Category: Prioritised Areas for Action LAWPRO.
Proximity to Shellfish Waters	No Shellfish waters located in the direct pathway/downstream of the discharge
Proximity to Bathing Waters	No Bathing waters located in the proximity/direct pathway of the discharge
Proximity to European Designated Sites (SPA, SAC)	No SPA nor SAC sites in proximity/direct pathways to current site and discharge (more than 12 km away from nearest SPA – Cork Harbour).
Potential to affect National (NHA, pNHA)/Ramsar designated sites and/or freshwater pearl mussel catchment?	No NHA/pNHA sites in proximity/direct pathways to current site and discharge (more than 12 km away from nearest pNHA – Owenboy River).
Proximity of WwTP to residential areas/sensitive community sites	Close proximity to residential areas (within 100 m).

7.2.3 Halfway WwTP existing and future capacity and compliance

The current treatment and hydraulic capacity of the existing WwTP have been compared to the actual current loading and the expected future requirements based on population growth consideration in terms of population equivalents (PE). For Halfway WwTP these are presented as the current and future organic and hydraulic loadings with existing treatment capacity in Table 7-8.

Table 7-8 Halfway WwTP Current and Projected Loading and Existing Treatment Capacity

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

The Water Quality Modelling (WQM) outputs of the current and future predicted (2030, 2055 and 2080) assimilative capacity of the current discharge waterbody are presented in Table 7-9. The plant is currently compliant with the Wastewater Discharge Licence (WWDL). The existing discharge location ESDL are not expected to be more stringent in the future (Table 7-9).

Table 7-9 Halfway WwTP Current WWDL Emission Limit Values (ELVs) and Projected Environmentally Sustainable Discharge Limits (ESDL)

Parameter	Existing WWDL ELVs	2030 Projected ESDL	2055 Projected ESDL	2080 Projected ESDL
BOD (mg/l)	5	5	5	5
Ammonia (mg/l)	2	2	2	2
OrthoP (mg/l)	1	1	1	1
More Stringent?	-	N	N	N

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.

Based on current and projected future conditions, the existing Storm Water Overflow (SWO) infrastructure is deemed non-compliant.

7.2.4 Halfway Coarse screening

Halfway WwTP SEA coarse screening assessment of options summary is presented in Table 7-10.

Table 7-10 Halfway Coarse Screening Assessment Summary

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
A0 Do Nothing - Counterfactual	N	N	N	Option has been screened out at technical stage as the existing WwTP is projected to be over capacity and is not achieving ELVs with respect to Total P.
A1 Minimal Upgrade - Process Optimisation	Y	Y	Y	Works confirmed to be limited and within site (no site expansion required) so impacts likely to be mitigated with standard measures.
A2 Reuse Existing Plant and Upgrade - Existing Discharge	N/A Option screened out at technical assessment stage.			
A3 Reuse Existing Plant and Upgrade - Alternative Discharge	N/A Option screened out at technical assessment stage.			
A4 New Treatment Process/Plant Upgrade on Existing Site	N/A Option screened out at technical assessment stage.			
A5 New Greenfield Site	N/A	N/A	Y	Large uncertainty due to relocation of new plant (existing discharge location).
A6 Untreated Wastewater Load Transfer Solution	Y	Y	Y	Pipeline (to Cork Lower Harbour WwTP via Ballygarvan) running along an existing road likely to have minimal impacts and standard mitigation measures would apply.

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening
- N/A – Not environmentally assessed

7.2.5 Halfway Fine screening scoring

Halfway WwTP SEA fine screening assessment of options scores are presented in Table 7-11.

Table 7-11 Halfway WwTP 2080 Fine Screening Assessment Scores

Option Reference	A0 Do Nothing - Counterfactual	A1 - Do Minimum Process Optimisation	A5 - New Greenfield Site	A6 – Untreated Wastewater Load Transfer Solution
Planning & Regulation	0	0	-1	-1
Impact on Customers	-3	-1	1	3
Community Support, Health and Wellbeing	-3	-2	2	3
Water environment	-3	-2	1	3
Biodiversity	-3	-2	1	3
GHG Emissions	0	2	-0.5	0
Energy efficiency	-3	1	2	3
Climate resilience	0	0	2	3
Circular economy	0	1	-1	1
Environmental combined score	Worst			Best
Overall combined score	N/A	2.55	2.96	3.74
Overall rank	N/A	3rd	2nd	1st

7.2.6 Halfway Fine screening results

Table 7-12 presents options that ranked highest using the MCA fine screening process.

Table 7-12 Halfway WwTP 2080 Implementation Fine Screening 1st, 2nd and 3rd Ranked Options

Design Horizon	1st Ranked Option	2nd Ranked Option	3rd Ranked Option
2080	Option A6: Untreated Transfer to Cork Lower Harbour WwTP via New Ballygarvan TPS.	Option A5: New Greenfield Plant (existing discharge).	Option A1: Do Minimum - Process Optimisation

Design Horizon	1st Ranked Option	2nd Ranked Option	3rd Ranked Option
	Best environmental and overall score due to removal of discharge from river and addressing network issues. Benefiting approx. 15 km of Good Status Objective river downstream.		

7.2.7 Halfway Wastewater network upgrade proposals

The network proposals include works to address SWO compliance to minimise potential for untreated spills to the environment and avoiding network surcharging and flooding. The upgrades are proposed for the 2030 strategy horizon unless otherwise stated. The works are detailed in Appendix 4 to the CWS and include for Halfway:

- Improvements to storage at existing pumping station sites;
- An upgrade of the existing sewer system to increase the network's capacity.

These works are expected to be undertaken within existing the sites or along existing pipeline networks.

7.3 Minane Bridge (River Valley)

7.3.1 Minane Bridge WwTP location

The Minane Bridge WwTP is located approximately 7km south of Carrigaline, adjacent to the Minane Bridge housing estate (Figure 7-5). The planning 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. Additionally, the presence of a proposed Natural Heritage Area (pNHA) to the south could necessitate an Appropriate Assessment (AA) and potentially trigger the requirement for a Natura Impact Statement (NIS). 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.

Figure 7-5 Minane Bridge WwTP Site

7.3.2 Minane Bridge Environmental baseline

The environmental constraints for Minane Bridge (Minane Bridge) WwTP are presented in Figure 7-6.

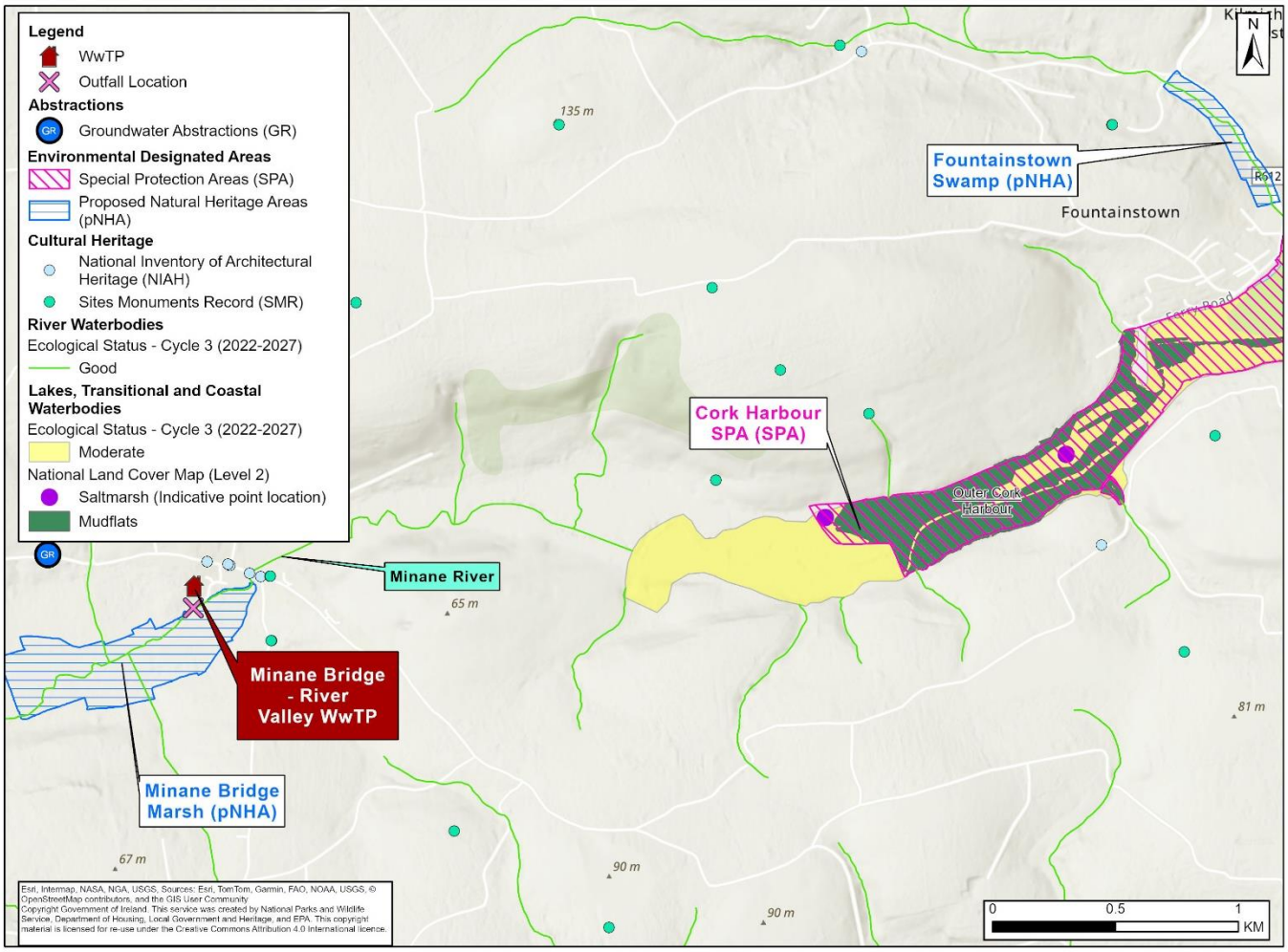

Figure 7-6 Environmental constraints for Minane Bridge (Minane Bridge) WwTP.

Water Framework Directive water quality and biodiversity baseline information for the current discharge location is summarised in Table 7-13.

Table 7-13 Minane Bridge WwTP current discharge location environmental baseline summary

Topic	Baseline environment
Discharge Waterbody Type	River Waterbody
Discharge Waterbody Name	Minane (Cork)_010 (Minane River)
Discharge Waterbody Code	IE_SW_20M010200
Water Body Ecological Status (cycle 3 2016-2021)	Good
Waterbody Risk Status and Category (2022)	Under Review
High Status Objective List	No

Topic	Baseline environment
Length of river from discharge to estuary (approximate)	2.20 km
Proximity to public water abstractions including regulated and unregulated GWS	N/A
Priority Areas for Action list RBMP	No
Proximity to Shellfish Waters	No shellfish waters located in the direct pathway/downstream of the discharge
Proximity to Bathing Waters	Discharge located approximately 5 km upstream of the nearest Bathing Water (Fountainstown Blue Flag and Green Coast Beach - excellent water quality) of which approximately 3 km are a coastal waterbody.
Proximity to European Designated Sites (SPA, SAC)	Cork Harbour SPA (coastal) approximately 3 km downstream from the WwTP and from discharge.
Potential to affect National (NHA, pNHA)/Ramsar designated sites and/or freshwater pearl mussel catchment?	Discharge is located within the Minane Bridge Marsh pNHA.
Proximity of WwTP to residential areas/sensitive community sites	Close proximity to residential areas (within 100 m) and recreational/community areas (within 200 m).

7.3.3 Minane Bridge WwTP existing and future capacity and compliance

The current treatment and hydraulic capacity of the existing WwTP have been compared to the actual current loading and the expected future requirements based on population growth consideration in terms of population equivalents (PE). For Minane Bridge (Minane Bridge) WwTP these are presented as the current and future organic and hydraulic loadings with existing treatment capacity in Table 7-14.

Table 7-14 Minane Bridge (Minane Bridge) WwTP Current and Projected Loading and Existing Treatment Capacity

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

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

The Water Quality Modelling (WQM) outputs of the current and future predicted (2030, 2055 and 2080) assimilative capacity of the current discharge waterbody are presented in Table 7-15. The plant is currently compliant with the Wastewater Discharge Licence (WWDL). The existing discharge location ESDL are not expected to be more stringent in the future (Table 7-15).

Table 7-15 Minane Bridge (Minane Bridge) WwTP Current WWDL Emission Limit Values (ELVs) and Projected Environmentally Sustainable Discharge Limits (ESDL)

Parameter	Existing WWDL ELVs	2030 Projected ESDL	2055 Projected ESDL	2080 Projected ESDL
BOD (mg/l)	25	25	25	25
Ammonia (mg/l)	15	15	15	15
OrthoP (mg/l)	2.5	2.5	2.5	2.5
More Stringent?	-	N	N	N

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 SWO present in the system which discharges directly to the Minane River, along with all treated effluent.

7.3.4 Minane Bridge Coarse screening

Minane Bridge (Minane Bridge) WwTP SEA coarse screening assessment of options summary is presented in Table 7-16.

Table 7-16 Minane Bridge (Minane Bridge) Coarse Screening Assessment Summary

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
A0 Do Nothing - Counterfactual	N	N	N	Option has been screened out at technical stage as the existing WwTP is projected to exceed capacity and is not achieving the discharge requirements as set in the WWDL.

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
A1 Minimal Upgrade - Process Optimisation	N/A Option screened out at technical assessment stage.			
A2 Reuse Existing Plant and Upgrade - Existing Discharge	Y	Y	N/A	Works confirmed to be limited and within site so impacts likely to be mitigated with standard measures,
A3 Reuse Existing Plant and Upgrade - Alternative Discharge	N/A	Y	N/A	Uncertainly around the greater level of construction work required as site in close proximity to Minane Bridge Marsh pNHA. Works within site likely to be mitigatable.
A4 New Treatment Process/Plant Upgrade on Existing Site	N/A	N/A	Y*	Option has since been discounted with further consideration at the technical stage due to the existing site is located within flood zones and an area of the site is partial zoned. Option therefore has not been advanced to fine screening.
A5 New Greenfield Site	N/A	N/A	Y	Large uncertainty due to relocation of new plant (existing discharge)
A6 Untreated Wastewater Load Transfer Solution	Y	Y	Y	Pipeline (to Cork Lower Harbour WwTP via Carrigaline) work running along an existing road likely to have minimal impacts and standard mitigation measures would apply.

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening
- N/A – Not environmentally assessed

7.3.5 Minane Bridge Fine screening scoring

Minane Bridge (Minane Bridge) WwTP SEA fine screening assessment of options scores are presented in Table 7-17.

Table 7-17 Minane Bridge WwTP 2080 Fine Screening Assessment Scores

Option Reference	A0 Do Nothing - Counterfactual	A5 - New Greenfield Plant	A6 - Untreated Wastewater Load Transfer Solution
Planning & Regulation	0	-1	2
Impact on Customers	-2	2	3
Community Support, Health and Wellbeing	-2	3	3
Water environment	-3	1	3
Biodiversity	-2	-2	2
GHG Emissions	0	-0.5	0.5
Energy efficiency	-3	2	3
Climate resilience	0	2	3
Circular economy	0	-1	1
Environmental combined score	Worst		Best
Overall combined score	N/A	2.50	4.09
Overall rank	N/A	2nd	1st

7.3.6 Minane Bridge Fine screening results

Table 7-18 presents options that ranked highest using the MCA fine screening process.

Table 7-18 Minane Bridge WwTP 2080 Implementation Fine Screening 1st and 2nd Ranked Options

Design Horizon	1st Ranked Option	2nd Ranked Option
2080	Option A6: Untreated Wastewater Load Transfer to Cork Lower Harbour WwTP via Carrigaline. Best environmental and overall score due to removal of discharge from river and addressing network issues. Benefiting approx. 2 km of Good Status Objective river downstream.	Option A5: New Greenfield Plant with Existing Discharge

7.3.7 Minane Bridge Wastewater network upgrade proposals

The network proposals include works to address SWO compliance to minimise potential for untreated spills to the environment and avoiding network surcharging and flooding. The upgrades are proposed for the 2030 strategy horizon unless otherwise stated. The works are detailed in Appendix 4 to the CWS and include for Halfway:

- Improvements to storage at existing pumping station sites;
- An upgrade of the existing sewer system to increase the network's capacity.

These works are expected to be undertaken within existing the sites or along existing pipeline networks.

7.4 Sub catchment 6: Feasible Approach selection and implementation

A list of Feasible Approaches is presented in Table 7-19.

Table 7-19 Feasible Approaches for Ballygarvan WwTP, Halfway WwTP, and Minane Bridge WwTP.

Strategy horizon	Catchment	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
Ballygarvan WwTP	2030	Decommission WwTP. Construct untreated WW transfer and associated WWPS to Cork Lower Harbour WwTP via Carrigaline PS (5.4km).	Upgrade WwTP by additional 500 PE.	Decommission WwTP. Construct untreated WW transfer and associated WWPS to Cork Lower Harbour WwTP via Carrigaline PS (5.4km).
	2055	Continue to operate WwPS.	Continue to operate WwTP.	Continue to operate WwPS.
	2080	Continue to operate WwPS.	Capital Replacement (634 PE) and Upgrade Existing WwTP by 750 PE.	Continue to operate WwPS.
Halfway WwTP	2030	Optimise WwTP to meet ESDLs.	Optimise WwTP to meet ESDLs.	Optimise WwTP to meet ESDLs.
	2055	Continue to operate WwTP.	Continue to operate WwTP.	Continue to operate WwTP.
	2080	Decommission WwTP. Construct untreated WW transfer and associated PS to Cork Lower Harbour WwTP via Ballygarvan PS (8.4km).	Decommission WwTP and transfer to Ballygarvan WwTP (8.4km).	Capital replacement and upgrade of additional 500 PE.

Strategy horizon	Catchment	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
Minane Bridge WwTP	2030	Decommission WwTP. Construct untreated WW transfer to Cork Lower Harbour WwTP via Carrigaline PS (5km) and associated WwPS	Upgrade WwTP by additional 300 PE.	Decommission WwTP. Construct untreated WW transfer to Cork Lower Harbour WwTP via Carrigaline PS (5km).
	2055	Continue to operate WwPS.	Continue to operate WwTP.	Continue to operate WwPS.
	2080	Continue to operate WwPS.	Capital replacement of 300 PE.	Continue to operate WwPS.
Overall Feasible approach environmental assessment summary		**Ranked 1st** Ballygarvan: The transfer (2030) will require a construction of a 5.4 km effluent pipeline. Removal of the discharge will benefit 6.4 km of Good Status Objective river. Halfway: Discharge remains with upgrade to bring to WWDL compliance (2080). Followed by decommission and transfer (2080) which will require a construction of a 8.4 km effluent pipeline. Removal of the discharge will benefit 15.5 km of Good Status Objective river. Minane Bridge: The transfer (2030) will require a construction of a 5 km effluent pipeline. Removal of the	**Ranked 3rd** Ballygarvan: Current discharge remains, with two upgrades of the plant (2030 and 2080). Halfway: Discharge remains with upgrade to bring to WWDL compliance (2030). Followed by decommission and transfer (2080) which will require a construction of a 8.4 km effluent pipeline. Removal of the discharge will benefit 15.5 km of Good Status Objective river. Minane Bridge: Discharge remains with two upgrades to accommodate demand (2030 and 2080).	**Ranked 2nd** Blarney: The transfer (2030) will require a construction of a 26 km final effluent pipeline. Removal of the discharge will benefit 10.5 km of High Status Objective river. Halfway: Discharge remains with two upgrades to bring to WWDL compliance (2030 and 2080). Minane Bridge: The transfer (2030) will require a construction of a 5 km effluent pipeline. Removal of the discharge will benefit 2.2 km of Good Status Objective river.

Strategy horizon	Catchment	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
		discharge will benefit 2.2 km of Good Status Objective river.		
	Overall recommended approach	**Ranked 1st** Overall best option as cheapest cost. Environmentally best as all WwTPs to be decommissioned providing greater benefit to rivers.	**Ranked 3rd** Overall most expensive. Environmentally ranked 3rd as only one WwTPs to be decommissioned providing least benefit to rivers.	**Ranked 2nd** Environmentally ranked 2nd as two WwTPs to be decommissioned providing less benefit to rivers than Approach 1.

*The upgrades required to Cork Lower Harbour WwTP for this feasible approach have been factored into the evaluation and assessment of Cork Lower Harbour WwTP.

7.5 Sub catchment 6: Recommended Approach implementation strategy

Figure 7-7 presents Recommended Approach graphic including environmental constraints.

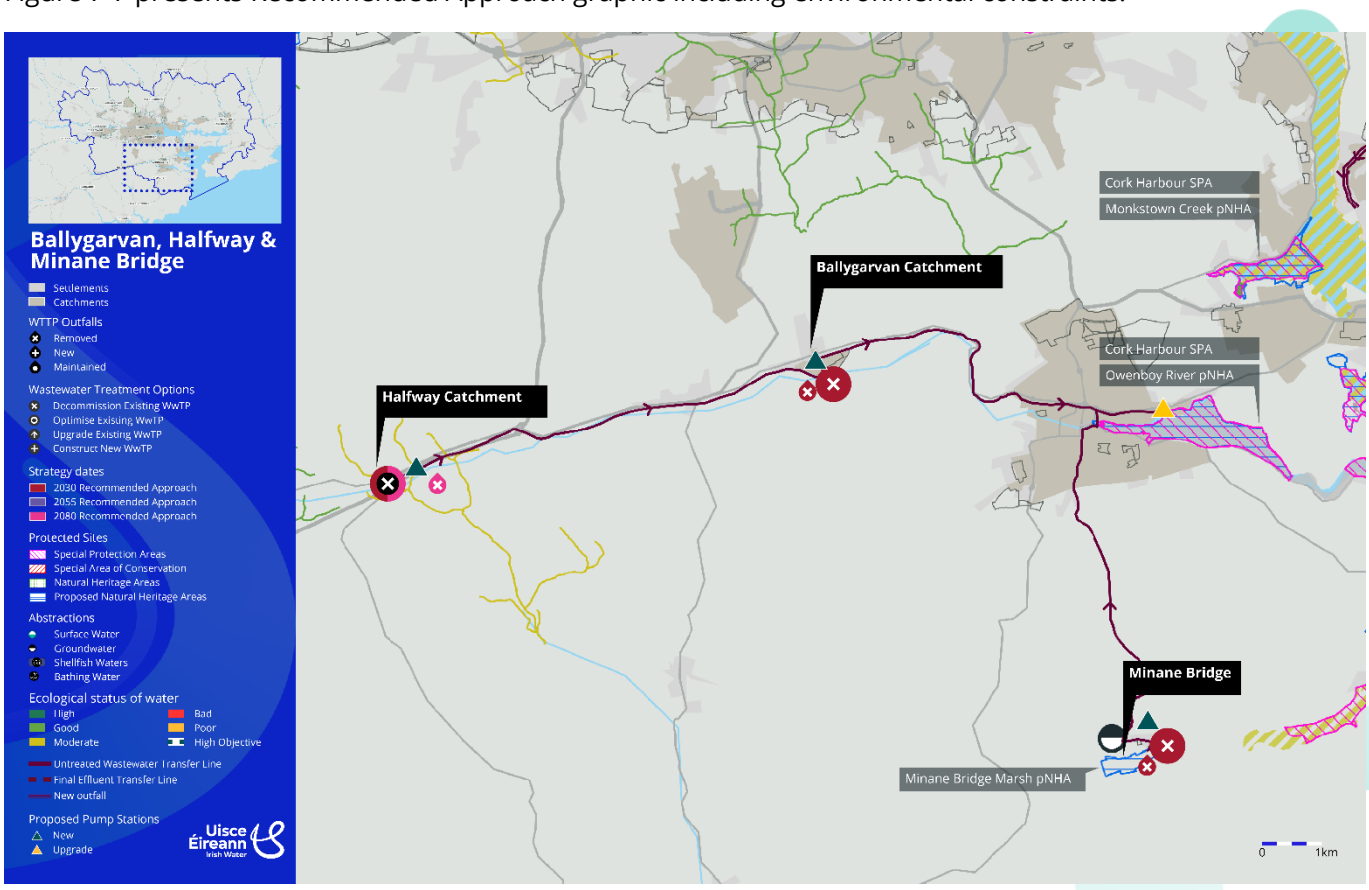

Figure 7-7 Recommended Approach Environmental Constraints for Sub catchment 6

Figure 7-8 presents the implementation strategy for the Recommended Approach for Ballygarvan WwTP, Halfway WwTP, and Minane Bridge WwTP.

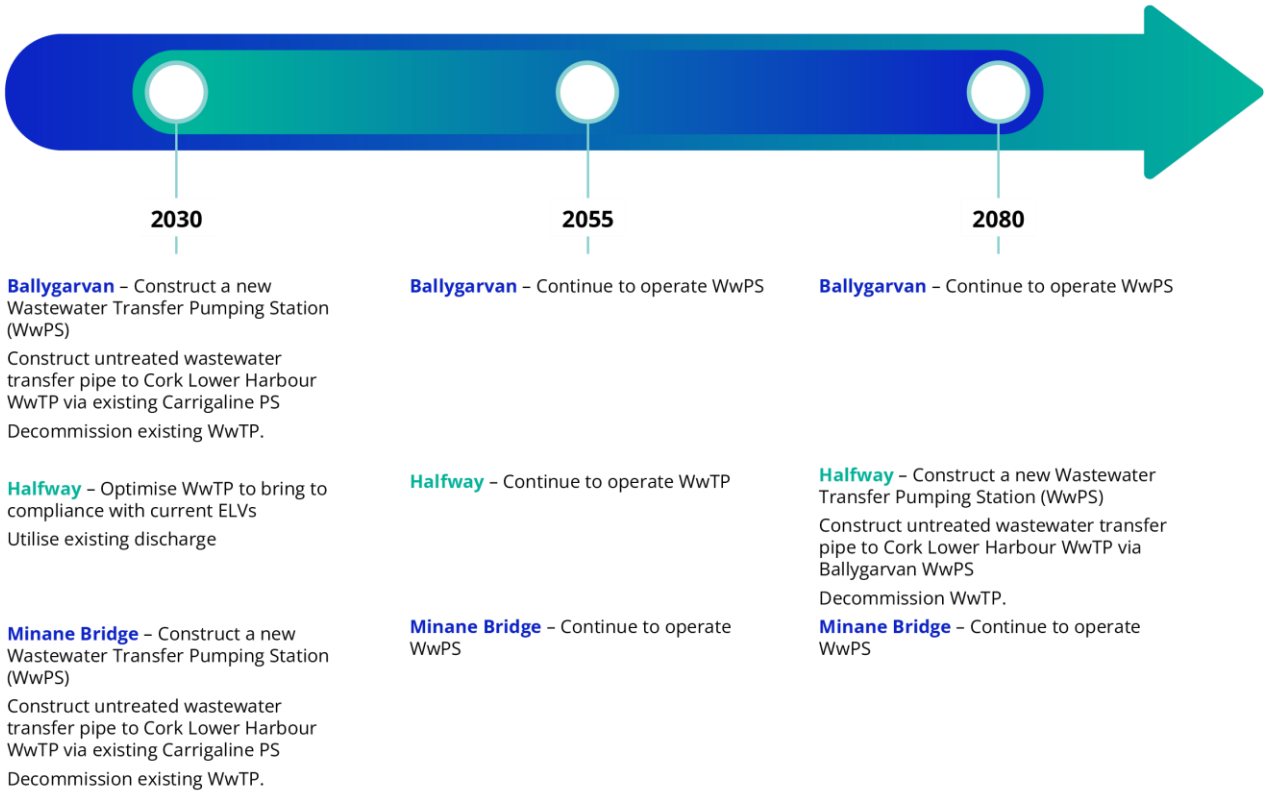

Figure 7-8 Implementation Strategy for Ballygarvan WwTP, Halfway WwTP, and Minane Bridge WwTP.Sub catchment 6: SEA Assessment of Recommended Approach

Ballygarvan WwTP

Table 7-20 presents Environmental Assessment of Recommended Approach for Ballygarvan WwTP.

Table 7-20 Ballygarvan WwTP Recommended Approach Assessment Summary

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Res Health	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
Current (A0)	Operation	+ve	0	0	0	0	0	0	0	0	0
		-ve	---	---	0	---	0	0	0	0	--
2030 (A6)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	--	-	-	--	--	-	--	-	0

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Pop Health	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
	Operation	+ve	+++	++	0	+	+	+	0	0	++
		-ve	0	0	0	0	0	0	0	0	0
2055 and 2080	Same as 2030 - continue to operate pumping station. No additional works or change to operation compared to 2030.										

+ve = potential beneficial or positive effects/risk
-ve = potential negative or adverse effects/risk

Construction of the final effluent transfer (Option A6) and decommission of the Ballygarvan WwTP will have a positive effect on the Water Environment and Biodiversity SEA Objectives due to decommissioning of the WwTP and the removal of the discharge into the river. This can potentially contribute to the waterbody maintaining WFD Good Status. Currently there is one SWOs and although currently compliant, it is projected to become non-compliant in the 2080 scenario. Therefore, decommissioning the SWO may also have a positive effect on aquatic biodiversity in the future scenarios. The proposed transfer route is aligned through two SMR Zones along R613 road (R108909) and Church Road (R108767). Approximately 100 m of the transfer routes passes through hedgerows. Detailed alignment along existing road infrastructure should aim to avoid loss of habitats or cultural heritage sites. The route is aligned along and crosses OWENBOY (CORK)_030 (no existing infrastructure). Therefore there is a risk of disturbance and loss of habitat associated with the pipeline construction and including a new river crossing with potential negative effects for the water environment and biodiversity. The pipeline also crosses watercourses in three points along road R613. Assuming existing infrastructure and appropriate measures for minimising impacts from new crossing, mitigation would be need to be applied as part of construction design, and negative effects on the water environment, biodiversity and cultural heritage could be minimised or fully avoided. Decommissioning of the plant may could result in 'abandonment' of infrastructure, however this can be addressed by applying a circular economy approach and materials should be reused and recycled.

Halfway WwTP

Table 7-21 presents Environmental Assessment of Recommended Approach for Blarney WwTP.

Table 7-21 Halfway WwTP Recommended Approach Assessment Summary

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec, Health	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
Current (A0)	Operation	+ve	0	0	0	0	0	0	0	0	0
		-ve	---	---	0	--	0	0	0	0	--
2030 (A1)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	0	-	-	0	-	0	0	0	-
	Operation	+ve	+	+	+	0	+	0	0	0	0
		-ve	--	0	0	--	0	0	0	0	0
2055 (A1)	Same as 2030 - continue to operate pumping station. No additional works or change to operation compared to 2055.										
2080 (A6)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	-	--	--	0	--	-	--	-	0
	Operation	+ve	+++	++	0	++	+	+	0	0	++
		-ve	0	0	0	0	0	0	0	0	0

+ve = potential beneficial or positive effects/risk

-ve = potential negative or adverse effects/risk

Optimisation of the plant (Option A1) in the interim period (2030) will bring the plant into compliance. Construction of the final effluent transfer (Option A6) and decommissioning of the Halfway WwTP will have a positive effect on the Water Environment and Biodiversity due to decommission of the plant and removal of discharge into the river. This may contribute to achieving waterbody Good Status and have a positive effect on aquatic biodiversity due to removal of the existing untreated spills. The proposed transfer pipeline (Option A6 – assessment covers 8.4 km portion of the route halfway to Ballygarvan PS. Ballygarvan to Cork Lower Harbour is assessed under Ballygarvan WwTP) is 8.4 km with impacts for the Materials and Climate Change/Carbon SEA Objective Additionally, decommissioning of the plant may result in 'abandonment' of infrastructure, however this can be addressed by applying a circular economy approach and materials should be reused and recycled. The Transfer route crosses watercourses at five points along the existing

infrastructure route. Assuming existing infrastructure can be used, and mitigation would be applied as part of construction design, negative effects on water environment, biodiversity and cultural heritage can be minimised or fully avoided.

Minane Bridge WwTP

Table 7-22 presents Environmental Assessment of Recommended Approach for Minane Bridge WwTP.

Table 7-22 Minane Bridge WwTP Recommended Approach Assessment Summary

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec, Health	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
Current (A0)	Operation	+ve	0	0	0	0	0	0	0	0	0
		-ve	---	---	0	---	0	0	0	0	--
2030 (A6)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	--	-	-	--	--	-	--	-	0
	Operation	+ve	+++	++	0	+	+	+	0	0	++
		-ve	0	0	0	0	0	0	0	0	0
2055 and 2080 (A6)	Same as 2030 - continue to operate pumping station. No additional works or change to operation compared to 2030.										

+ve = potential beneficial or positive effects/risk
-ve = potential negative or adverse effects/risk

Construction of the final effluent transfer (Option A6) and decommissioning of the Minane Bridge WwTP will have a positive effect supporting the Water Environment and Biodiversity SEA Objectives due to decommissioning of the plant and removal of discharge into the river which may contribute to waterbody keeping Good Status. Currently there is one SWO present in the system which discharges directly to the Minane River and although currently compliant, decommissioning can have a positive effect on aquatic biodiversity. The transfer route is aligned through one SMR Zone along (R108767). Approximately 100 m of the transfer routes passes through hedgerows (as for the Ballygarvan transfer route). Detailed alignment to use existing road infrastructure can minimise potential negative effects on the habitats. The pipeline crosses waterbodies at two points (Owenboy Estuary and KILNAGLERY_010). Where the pipeline crosses Owenboy estuary along L2491 road it is within Owenboy River pNHA and borders Cork Harbour SPA. Assuming existing

infrastructure can be used, and mitigation would be applied as part of construction design, negative effects on water environment, biodiversity and cultural heritage could be minimised or fully avoided. The proposed transfer pipeline is relatively short at 5 km and considered to have minor negative effect in relation to the Materials and Climate Change/Carbon SEA Objective. Additionally, decommissioning of the plant could result in 'abandonment' of infrastructure, however this can be addressed by applying a circular economy approach and materials should be reused and recycled.

7.6 Sub catchment 6: Cumulative assessment

The potential cumulative or in combination adverse or beneficial effects for the Ballygarvan, Halfway and Minane Bridge (Minane Bridge) sub catchment are identified below in Table 7-23. These aim to identify where a receptor could be affected by more than one of the WwTP and network proposals within the overall sub catchment, such as proximity to works being undertaken at the same time or discharges or decommissioning affecting the same waterbody.

Table 7-23 Potential cumulative or in combination effects within Sub-catchment 6

Site/ Potential Interaction	Minane Bridge (Minane Bridge)	Ballygarvan
Halfway	Not in proximity for construction and no pathways for combined operational effects.	Combined beneficial effects on the Owenboy River due to the removal river discharge by 2055 at the two plants.
Ballygarvan	Construction of the pipeline to the Carrigaline PS, through Carrigaline East could have minor negative effects on Church Road (the R613) and on the R108767 SMR zone.	

Key				
	No interaction or negligible cumulative effects		Potential for beneficial cumulative effects	
	Potential for adverse cumulative effects		Potential for mixed beneficial and adverse effects	

No significant cumulative effects have been identified for the Recommended Approach across the sub catchment which would require additional mitigation to the mitigation that would be required for the Recommended Approach at an individual site scale. The simultaneous decommissioning of the Ballygarvan and Minane Bridge (Minane Bridge) plants and construction of pipeline transfers to the Cork Lower Harbour WwTP could cause some minor negative effects around the Carrigaline East area. This construction could cause some combined traffic disruptions along Church Road (the R613) and neighbouring road networks, as well as to the R108767 SMR zone. However, with application of good practice construction environmental management measures, these effects can be minimised.

The decommissioning of and subsequent river discharge removals at both Ballygarvan and Minane Bridge (Minane Bridge) WwTPs by 2030 should have combined beneficial effects on the receiving water body, the Owenboy River.

7.7 Sub catchment 6: Mitigation and enhancement

General measures include;

- Supporting awareness campaigns on challenges for WwTPs and water pollution to encourage appropriate use, and to understand the improvement works proposed and long term benefits compared to temporary disruption
- Water quality modelling identified the influence of other sources of pollution affecting water quality and aquatic biodiversity including in relation to BOD, ammonia and phosphates and support for catchment management measures aimed at reducing these sources can provide wider environmental benefits as well environmental enhancement for biodiversity and flood management. These can include measures to improve water retention, reducing nutrient run off and soil erosion. These measures can only be delivered through collaboration with other parties and landowner involvement.
- WwTP and network upgrades will need to consider in detail potential to include NBS as part of detailed design including NBS that provide additional water quality enhancement benefits.

Specific measures for Sub Catchment 6 options are set out in Table 7-24 below.

Table 7-24 Mitigation and enhancement measures for Sub Catchment 6

Agglomeration	Potential	Mitigation Measures
Ballygarvan WwTP	Decommission and transfer pipeline construction	Standard good construction including traffic management for pipeline and network construction. Detailed pipeline transfer route alignment and assessment to minimise habitat loss. Surveys and assessments depending on routing such as ecology, contaminated land, cultural heritage/archaeological interest
Halfway WwTP	Site construction works for optimisation then decommission and construct transfer pipeline for 2080 Receiving river quality influenced by other sources potentially could affect Recommended Approach selection	Consider support for catchment management measures/initiatives to improve receiving river water quality for period up to 2080. Review of existing and best available treatment technologies to ensure future compliance. Consider use of NbS if relocation/larger site is part of consideration. Standard construction/ decommissioning measures and detailed routing assessments above.
Minane Bridge (Minane Bridge) WwTP	Decommission and transfer pipeline construction	Standard construction/ decommissioning measures and detailed routing assessments above.

Sub catchment/ common measures	Combined impacts from above	Application of biodiversity net gain to address any losses - consider use of decommissioned sites.

8 Sub catchment 7: Ballincollig and Killumney

8.1 Ballincollig

8.1.1 Ballincollig WwTP location

Ballincollig WwTP is located at Ballincollig/Cork (Figure 8-1). There are recreation uses for land adjacent to the site to the east and west, a map-based planning objective to north for walkway/cycleway and a protected structure to the north. The site is close to residential areas. Site land availability for the possibility of expansion is limited.

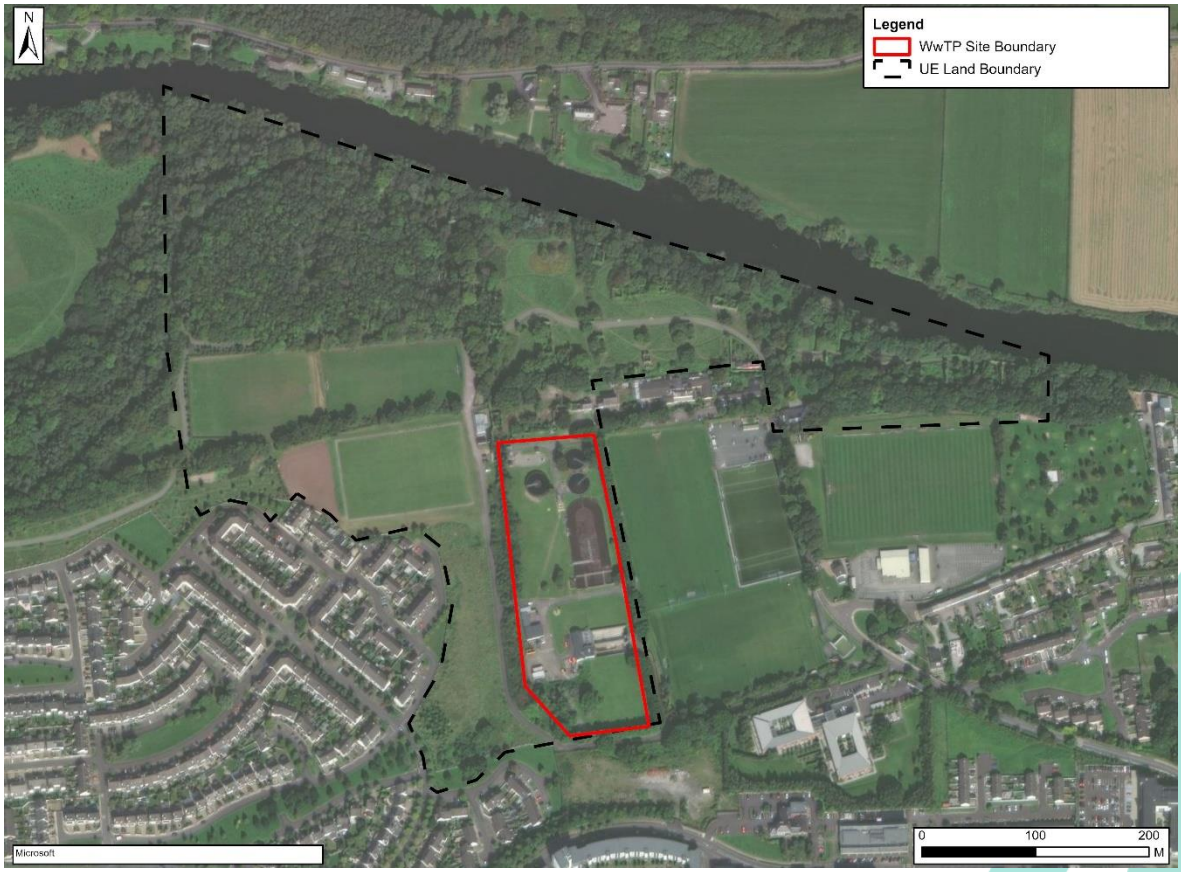

Figure 8-1 Balincollig WwTP Site

8.1.2 Ballincollig Environmental baseline

The environmental constraints at Ballincollig WwTP are presented in Figure 8-2.

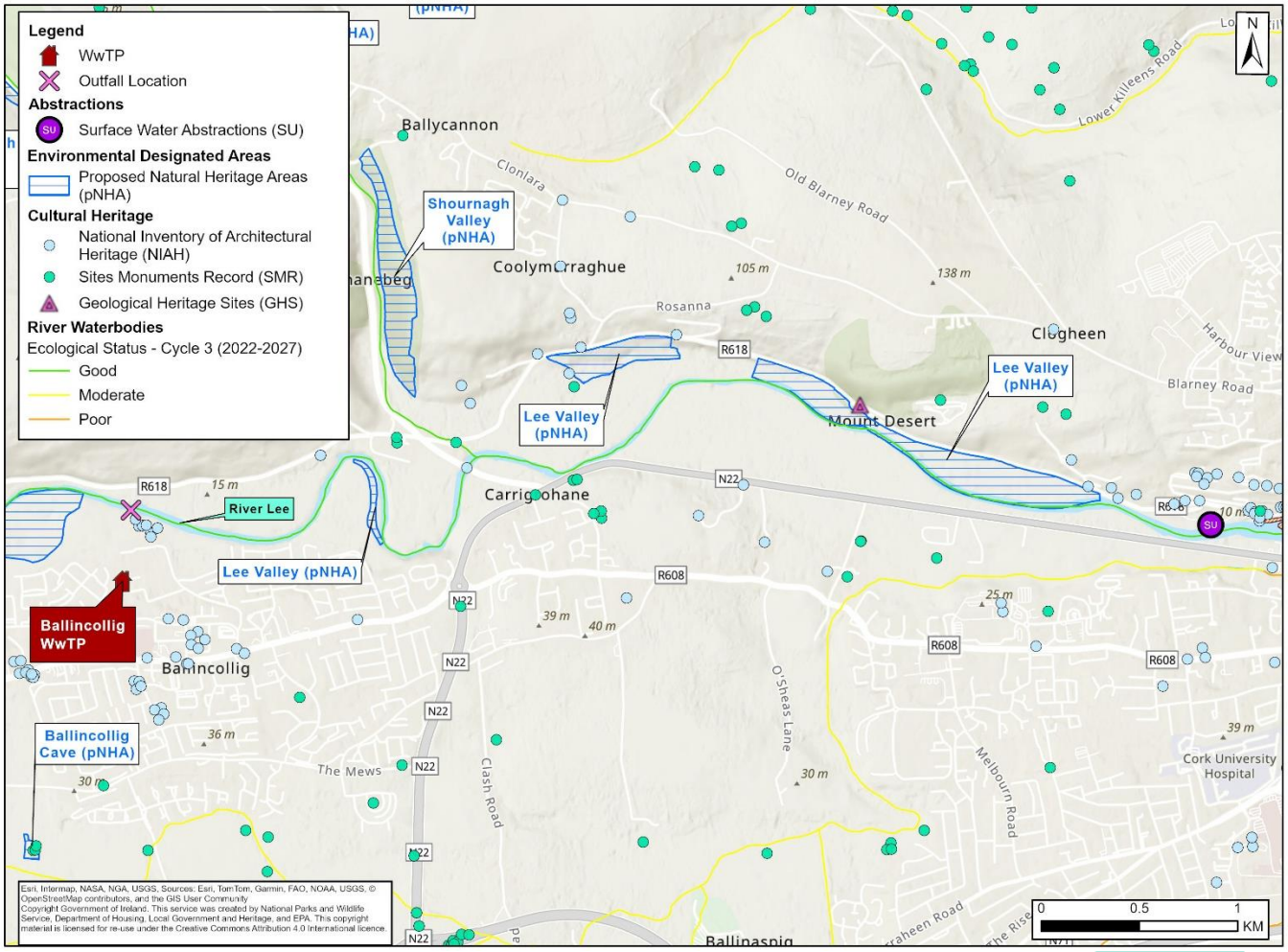

Figure 8-2 Environmental constraints for the Ballincollig WwTP.

Water Framework Directive water quality and biodiversity baseline information for the current discharge location is summarised in Table 8-1.

Table 8-1 Current Ballincollig WwTP discharge location summary

Topic	Baseline environment
Discharge Waterbody Type	River Waterbody
Discharge Waterbody Name	Lee (Cork)_090 (River Lee)
Discharge Waterbody Code	IE_SW_19L030800
Water Body Ecological Status (cycle 3 2016-2021)	Good
Waterbody Risk Status and Category (2022)	At Risk: Anthropogenic Pressures
High Status Objective List	No

Topic	Baseline environment
Length of river from discharge to estuary (approximate)	7.30 km
Proximity to public water abstractions including regulated and unregulated GWS	Cork City Water Supply (Abstract River Lee) – approximately 6.90 km downstream from discharge location.
Priority Areas for Action list RBMP	Confirmed AFA Category: Restoration, Sub-Category: Prioritised Areas for Action LAWPRO
Proximity to Shellfish Waters	No shellfish waters located in the direct pathway/downstream of the discharge
Proximity to Bathing Waters	No bathing waters located in the proximity/direct pathway of the discharge.
Proximity to European Designated Sites (SPA, SAC)	No SPA nor SAC sites in proximity/direct pathways to current site and discharge (more than 10 km away from nearest SPA)
Potential to affect National (NHA, pNHA)/Ramsar designated sites and/or freshwater pearl mussel catchment?	Lee Valley pNHA (includes sections of valley of the River Lee) (approximately 1 km downstream from discharge location.)
Proximity of WwTP to residential areas/sensitive community sites	Close proximity to residential areas (within 100 m), healthcare facilities (within 300 m) and recreational/community areas (within 500 m).

8.1.3 Ballincollig WwTP existing and future capacity and compliance

The current treatment and hydraulic capacity of the existing WwTP have been compared to the actual current loading and the expected future requirements based on population growth consideration in terms of population equivalents (PE). For Ballincollig WwTP these are presented as the current and future organic and hydraulic loadings with existing treatment capacity in Table 8-2.

Table 8-2 Ballincollig WwTP Current and Projected Loading and Existing Treatment Capacity

Parameter	Existing Capacity	Current Loading	2030 Projected Loading	2055 Projected Loading	2080 Projected Loading
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

*WWCR

The Water Quality Modelling (WQM) outputs of the current and future predicted (2030, 2055 and 2080) assimilative capacity of the current discharge waterbody are presented in Table 8-3. The plant is currently compliant with the Wastewater Discharge Licence (WWDL). The existing discharge location ESDLs are expected to be more stringent in the future (Table 8-3).

Table 8-3 Ballincollig WwTP Current WWDL Emission Limit Values (ELVs) and Projected Environmentally Sustainable Discharge Limits (ESDL)

Parameter	Existing WWDL ELVs	2030 Projected ESDL	2055 Projected ESDL	2080 Projected ESDL
BOD (mg/l)	25	20	13	12
Ammonia (mg/l)	5	1.1	0.7	0.7
OrthoP (mg/l)	2	0.6	0.4	0.4
More Stringent?	-	Y	Y	Y

The network assessment has identified that the current network is experiencing surcharging and flooding, which is expected to increase in future scenarios.

The current model has all SWOs compliant, however between 1 and 2 SWOs are expected to become non-compliant in the future.

8.1.4 Ballincollig Coarse screening

Ballincollig WwTP SEA coarse screening assessment of options summary is presented in Table 8-4.

Table 8-4 Ballincollig Coarse Screening Assessment Summary

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
A0 Do Nothing - Counterfactual	N	N	N	Option has been screened out at technical stage as the existing WwTP is currently over capacity and is not achieving the discharge requirements as set in the WWDL.
A1 Minimal Upgrade - Process Optimisation	N/A Option screened out at technical assessment stage.			
A2 Reuse Existing Plant and Upgrade - Existing Discharge	Y	N/A	N/A	Works limited and within site so impacts likely to be mitigated with standard measures.
A3 Reuse Existing Plant and Upgrade - Alternative Discharge	Y	N/A	N/A	Uncertainty relating to new discharge location and potentially greater level of construction required.
A4 New Treatment Process/Plant Upgrade on Existing Site	N/A	Y	Y	Uncertainty related to potentially greater level of construction required as the existing site has limited for potential for expansion.
A5 New Greenfield Site	N/A	Y	Y	Large uncertainty due to relocation to new site (existing discharge).
A6 Untreated Wastewater Load Transfer Solution	Y	Y	N/A	Pipeline work running along an existing road likely to have minimal impacts and standard mitigation measures would apply.

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening
- N/A – Not environmentally assessed

8.1.5 Ballincollig Fine screening scoring

Ballingcollig WwTP SEA fine screening assessment of options scores are presented in Table 8-5.

Table 8-5 Ballingcollig Fine Screening Assessment Scores

Option Reference	A0 Do Nothing – Counterfactual	A4 - New Treatment Process/Plant Upgrade on Existing Site	A5 – New Greenfield Site
Planning & Regulation	0	-2	-1
Impact on Customers	-3	-2	1
Community Support, Health and Wellbeing	-3	0	-1
Water environment	-3	2	1
Biodiversity	-2	1	0
GHG Emissions	0	-1	-1
Energy efficiency	-3	2	1
Climate resilience	0	3	1
Circular economy	0	1	-1
Environmental combined score	Worst	Best	
Overall combined score	N/A	1.51	2.01
Overall rank	N/A	2nd	1st

8.1.6 Ballincollig Fine screening results

Table 8-6 presents options that ranked highest using the MCA fine screening process.

Table 8-6 Ballincollig WwTP 2080 Implementation Fine Screening 1st and 2nd Ranked Options

Design Horizon	1st Ranked Option	2nd Ranked Option
2080	Option A5: New Greenfield Plant w/ Existing Discharge Best overall score due to the decommissioning of the current works and construction of a new plant with tertiary treatment.	Option A4: Existing Plant Upgrade w/ New Discharge (Cork Lower Harbour Outfall) Best environmental score due to the continued use of the existing infrastructure.

8.1.7 Ballicollig Wastewater network upgrade proposals

The network proposals include works to address SWO compliance to minimise potential for untreated spills to the environment and avoiding network surcharging and flooding. The upgrades are proposed for the 2030 strategy horizon unless otherwise stated. The works are detailed in Appendix 4 to the CWS and include for Ballincollig:

- Improvements to storage at existing pumping station sites;
- Development of rising main route;
- Existing sewer system to be upsized to to provide additional network capacity and mitigate flooding;
- Reduction in network infiltration to provide additional capacity;
- Additional storage at Harrington Street too mitigate flooding caused by existing hydraulic constraints and proposed new developments;
- Storm tank enhancement, providing storm storage at the WwTP.

These works are expected to be undertaken within existing the sites or along existing pipeline networks.

8.2 Killumney

8.2.1 Killumney WwTP location

Killumney WwTP is located at in the centre of the Killumney village. The plant is situated adjacent to the River Bride and approximately 5.8km Southwest of Ballincollig (Figure 8-3). 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 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 8-3 Killumney WwTP Site

8.2.2 Killumney Environmental baseline

The environmental constraints for Killumney WwTP are presented in Figure 8-4.

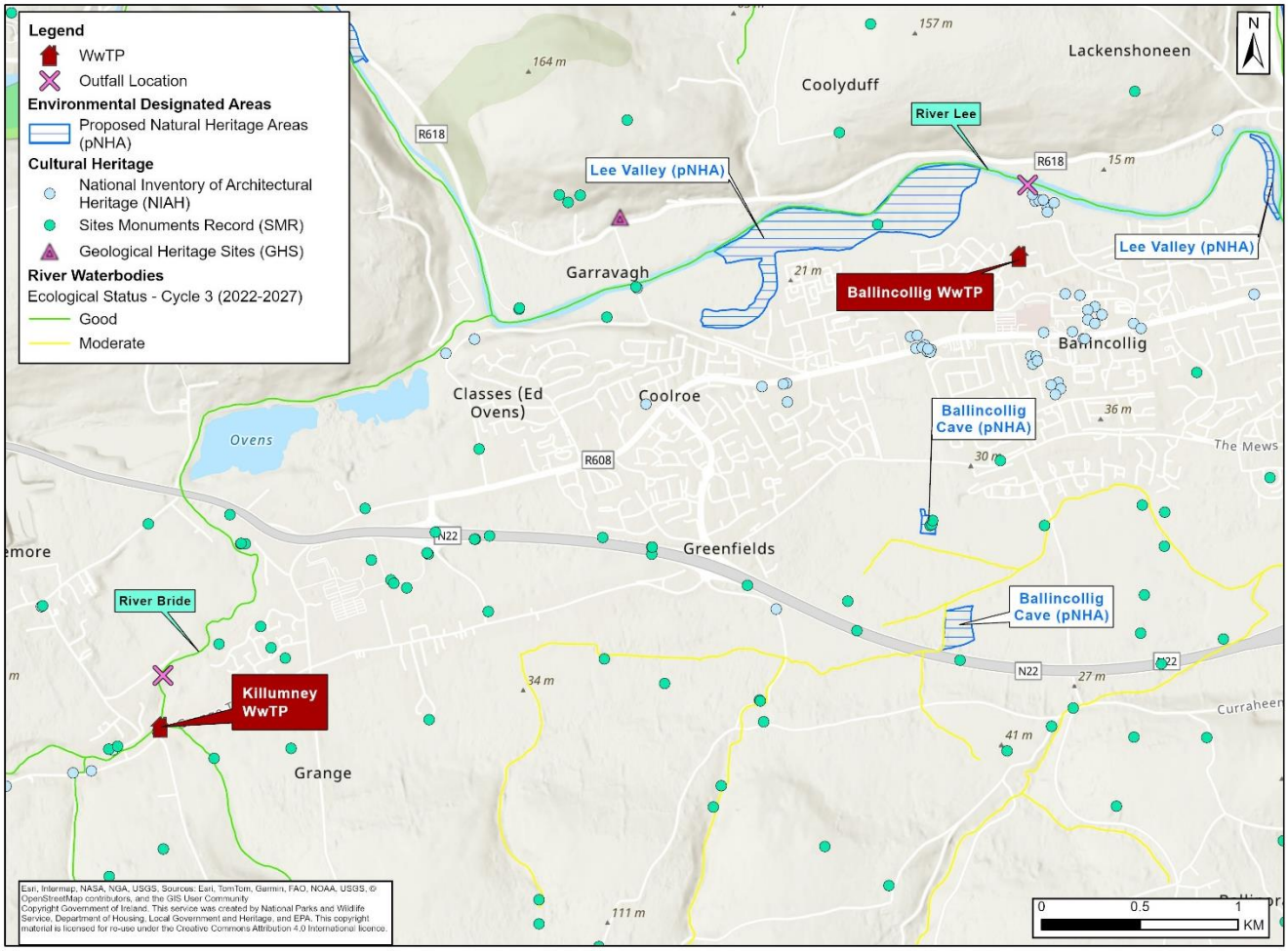

Figure 8-4 Environmental constraints for Killumney WwTP.

Water Framework Directive water quality and biodiversity baseline information for the current discharge location is summarised in Table 8-7.

Table 8-7 Current Killumney WwTP discharge location summary

Topic	Baseline environment
Discharge Waterbody Type	River Waterbody
Discharge Waterbody Name	Bride (Lee) (River Bride)
Discharge Waterbody Code	050 IE_SW_19B041600
Water Body Ecological Status (cycle 3 2016-2021)	Good
Waterbody Risk Status and Category (2022)	Not At Risk
High Status Objective List	No

Topic	Baseline environment
Length of river from discharge to estuary (approximate)	13.80 km
Proximity to public water abstractions including regulated and unregulated GWS	Cork City Water Supply (Abstract River Lee) – approximately 13.40 km downstream from discharge location.
Priority Areas for Action list RBMP	No
Proximity to Shellfish Waters	No shellfish waters located in the direct pathway/downstream of the discharge
Proximity to Bathing Waters	No bathing waters located in the proximity/direct pathway of the discharge.
Proximity to European Designated Sites (SPA, SAC)	No SPA nor SAC sites in proximity/direct pathways to current site and discharge (more than 14 km away from nearest SPA/SAC)
Potential to affect National (NHA, pNHA)/Ramsar designated sites and/or freshwater pearl mussel catchment?	No NHA/pNHA sites in proximity/direct pathways to current site and discharge (more than 3 km away from nearest pNHA)
Proximity of WwTP to residential areas/sensitive community sites	Close proximity to residential areas (within 150 m) and recreational/community areas (within 300 m).

8.3 Sub catchment 7: Feasible Approach selection and implementation

A list of Feasible Approaches is presented in Table 8-8.

Table 8-8 Feasible Approaches for Sub catchment 7

Approach	Horizon	Feasible Approach 1	Feasible Approach 2
Ballincollig WwTP	2030	Construct New Greenfield 64,000PE Tertiary WwTP north of Lee River. Includes construction of untreated wastewater transfer across river. Decommission Existing WwTP when New Plant Constructed.	10,000PE upgrade of existing WwTP.
	2055	Upgrade new WwTP by 8,000PE. Construct new 72,000PE quaternary WwTP.	19,000PE upgrade of existing WwTP.

Approach	Horizon	Feasible Approach 1	Feasible Approach 2
			33,000PE WwTP capital replacement. Construct FE transfer to Cork Lower Harbour WwTP (for quaternary treatment) (~24km via roads)
	2080	Continue to operate WwTP.	Continue to operate WwTP.
Killumney WwTP	2030	Construct untreated WW transfer to Ballincollig WwTP (ongoing).	Construct untreated WW transfer to Ballincollig WwTP (ongoing).
	2055	Continue to operate WwPS.	Continue to operate WwPS.
	2080	Continue to operate WwPS.	Continue to operate WwPS.
Overall Feasible approach environmental assessment summary		**Ranked 2nd** Ballincollig: 2030 New Greenfield plant with transfer across river. Decommission existing plant. 2055 upgrade to provide quaternary treatment. Killumney: The ongoing transfer (2030) will require a construction of an effluent pipeline. Removal of the discharge will benefit 13.8 km of Good Status Objective river.	**Ranked 1st** Ballincollig: Discharge remains with two upgrades accommodate for demand (2030 and 2055). Transfer to Cork Lower Harbour (2055) for quaternary treatment will require a construction of a 24 km pipeline. Killumney: The ongoing transfer (2030) will require a construction of an effluent pipeline. Removal of the discharge will benefit 13.8 km of Good Status Objective river.
Overall recommended approach		**Ranked 1st** Overall best due to limited space for expansion and need for tertiary treatment in order to achieve ESDLs requiring a new location and this being preferred compared to length of pipeline required for transfer to Cork Lower Harbour and additional treatment capacity there. Environmentally ranked 2nd due to introduction of a relocated discharge on the river and impacts associated with building a new plant on a greenfield site.	**Ranked 2nd** Environmentally ranked 1st due to the removal of the Ballincollig discharge, benefiting approximately 7.30km of Good Status Objective River.

8.4 Sub catchment 7: Recommended Approach implementation strategy

Figure 8-5 presents Recommended Approach graphic including environmental constraints.

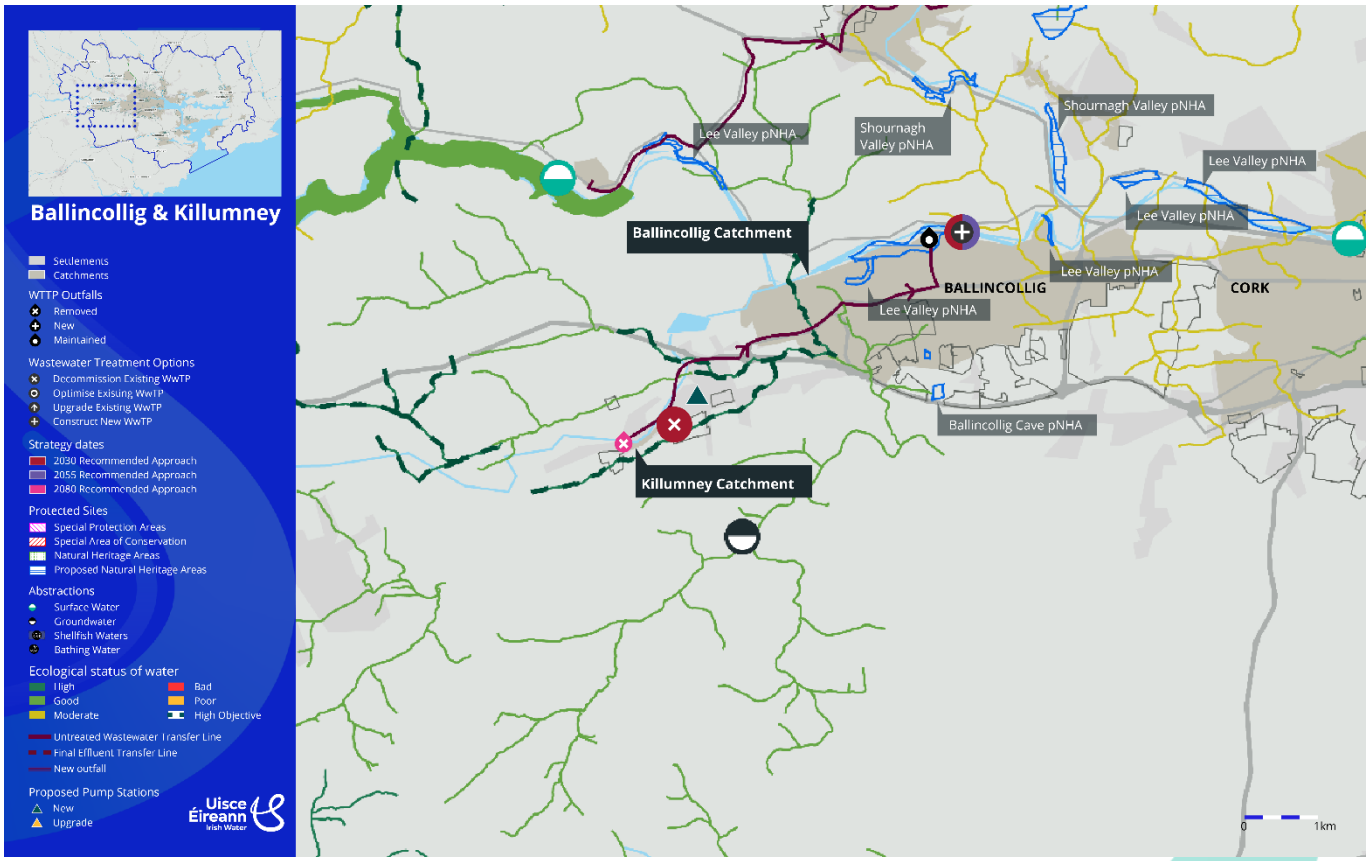

Figure 8-5 Recommended Approach Environmental Constraints for Sub catchment 7

Figure 8-6 presents the implementation strategy for the Recommended Approach for Ballincollig WwTP and Killumney WwTP.

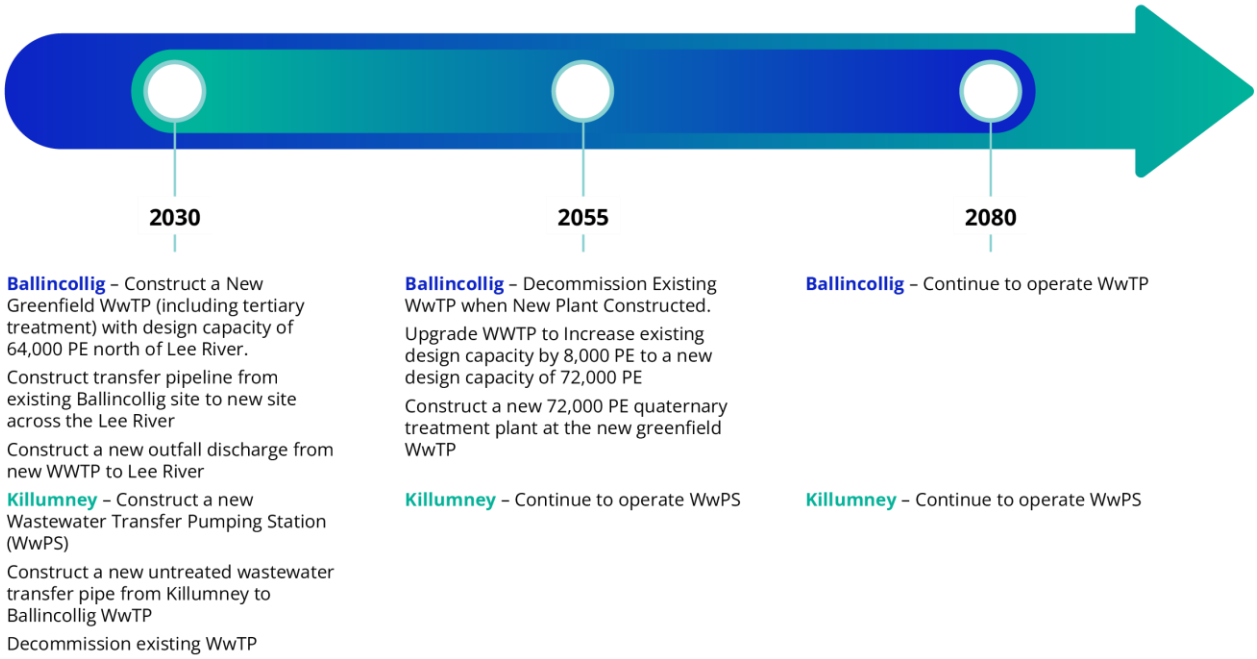

Figure 8-6 Implementation Strategy for Ballincollig WwTP and Killumney WwTP.

8.5 Sub catchment 7: SEA Assessment of Recommended Approach

Ballincollig WwTP

Table 8-9 presents the Environmental Assessment of the Recommended Approach for Ballincollig WwTP.

Table 8-9 Ballincollig WwTP Recommended Approach Assessment Summary

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec,	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
Current (A0)	Operation	+ve	0	0	0	0	0	0	0	0	0
		-ve	---	0	--	---	--	---	0	0	-
2030 (A5)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	--	0	--	--	-	-	--	--	--
	Operation	+ve	++	0	0	++	0	0	0	0	0

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec,	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
		-ve	0	0	-	0	-	-	0	0	-
2055 (A2)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	0	0	--	0	0	0	0	0	-
	Operation	+ve	++	+	0	++	+	0	0	0	0
		-ve	0	0	0	0	0	0	0	0	0
2080 (A2)	Same as 2055 - continue to operate WwTP. No additional works.										

+ve = potential beneficial or positive effects/risk
-ve = potential negative or adverse effects/risk

The construction of a new greenfield WwTP along the northern side of the River Lee (site location to be determined) and associated untreated wastewater pipeline transfer (Option A5) will bring the Ballincollig WwTP into compliance by 2030 and should also ensure the three SWOs are compliant in the future. Construction of the new WwTP with associated land take and infrastructure including a river crossing has potential for negative effects in relation to Biodiversity, Landscape, Cultural Heritage, Geology and Soils and the Water Environment SEA Objectives. The Ballincollig WwTP is situated between the upstream (approx. 250m) and downstream (approx. 1.3km) sites of the Lee Valley pNHA which could be impacted by construction works. Decommissioning of the plant (Option A5) could result in the 'abandonment' of infrastructure, however this can be addressed by applying a circular economy approach and materials should be reused and recycled. Potential reuse of the current site should also be considered. Future compliance of the WwTP with projected environmentally sustainable discharge limits will provide positive effects supporting the Water Environment and Biodiversity SEA Objectives although potential for impacts on the downstream sensitive site (Lee Valley pNHA) will need to be considered further.

The upgrade of the new WwTP capacity including the potential construction of new quaternary treatment (Option A2) at Ballincollig WwTP should ensure compliance until the 2080 horizon and this level of treatment will also support reducing risk for downstream abstraction and drinking water treatment. During the implementation of these upgrades there could be some negative effects in relation to the Air Quality and Climate Change SEA Objectives however, these are likely to be reduced compared to the current site operation. Overall the upgrades will provide continued positive effects supporting both the Water Environment, Biodiversity and Population SEA Objectives.

Killumney WwTP

Table 8-10 presents the Environmental Assessment of the Recommended Approach for Killumney WwTP.

Table 8-10 Killumney WwTP Recommended Approach Assessment Summary

Design Horizon	SEA Objective								
	Water Environment	PopN, Econ, Rec, Health	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
2030, 2055 and 2080 (A0)	Currently ongoing decommission. Continue to operate WwPS. No additional works or change to operation compared to current operation. Site in the process of being decommissioned.								

8.6 Sub catchment 7: Cumulative assessment

The potential cumulative or in combination adverse or beneficial effects for Sub catchment 7 are identified below in Table 8-11. These aim to identify where a receptor could be affected by more than one of the WwTP and network proposals within the overall sub catchment, such as proximity to works being undertaken at the same time or discharges or decommissioning affecting the same waterbody.

Table 8-11 Potential cumulative or in combination effects within Sub-catchment 7

Site/ Potential Interaction	Ballincollig
Killumney	Construction of the pipeline from Killumney PS to Ballincollig WwTP and new tertiary treatment at Ballincollig WwTP could have minor negative effects on communities with traffic disruption in the surrounding area.

Key	No interaction or negligible cumulative effects		Potential for beneficial cumulative effects	

	Potential for adverse cumulative effects		Potential for mixed beneficial and adverse effects

No significant cumulative effects have been identified for the Recommended Approach across the sub catchment which would require additional mitigation. The simultaneous construction of the untreated wastewater transfer pipeline from the Killumney PS to the Ballincollig WwTP and new tertiary treatment at Ballincollig WwTP by 2030 could have some minor negative effects, such as traffic disruptions, around the northern Ballincollig area. However, with the application of good construction environmental practice, these effects could be minimised.

8.7 Sub catchment 7: Mitigation and enhancement

General measures include;

- Supporting awareness campaigns on challenges for WwTPs and water pollution to encourage appropriate use, and to understand the improvement works proposed and long term benefits compared to temporary disruption
- Water quality modelling identified the influence of other sources of pollution affecting water quality and aquatic biodiversity including in relation to BOD, ammonia and phosphates and support for catchment management measures aimed at reducing these sources can provide wider environmental benefits as well environmental enhancement for biodiversity and flood management. These can include measures to improve water retention, reducing nutrient run off and soil erosion. These measures can only be delivered through collaboration with other parties and landowner involvement.
- WwTP and network upgrades will need to consider in detail potential to include NBS as part of detailed design including NBS that provide additional water quality enhancement benefits.

Specific measures for Sub Catchment 7 options are set out in Table 8-12 below.

Table 8-12 Mitigation and enhancement measures identified for Sub Catchment 7

Agglomeration	Potential	Mitigation Measures
Ballincollig WwTP	New plant upstream of public water abstraction – site specific risk assessment under the rUWWTD will be required. Land take and construction of new plant	Include quaternary treatment considerations within project stage optioneering and design Detailed site selection assessments and optioneering to confirm Recommended Approach compared to alternative options. Site selection to aim to minimise valuable habitat/amenity/ loss, landscape/visual impacts for local community, odour and archaeological risk and WFD and aquatic ecology impacts from new outfall location. Standard construction/decommissioning good practice measures and for pipeline routing and river crossing.

Agglomeration	Potential	Mitigation Measures
	Decommission existing works and the construction of an untreated wastewater pipeline transfer and river crossing to the new WwTP.	Application of biodiversity net gain to address habitat losses.
Killumney WwTP	Decommission works and the construction of an untreated wastewater pipeline transfer Ballincollig WwTP could cause habitat loss and disruption/ disturbance.	Standard good construction /decommissioning including circular economy principles and traffic management for pipeline construction and routing assessment. . Application of biodiversity net gain to address any losses.
Sub catchment/ common measures	N/A	No additional measures

9 Sub catchment 8: Cork Lower Harbour

9.1 Cork Lower Harbour

9.1.1 Cork Lower Harbour WwTP location

Cork Lower Harbour WwTP is located approximately 12 km southeast of Cork city centre (Figure 9-1). No site boundary constraints or planning permission restrictions were identified and is surrounded by agricultural land. The 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.

Figure 9-1 Cork Lower Harbour WwTP Site

9.1.2 Cork Lower Harbour Environmental baseline

The environmental constraints for Cork Lower Harbour WwTP are presented in Figure 9-2.

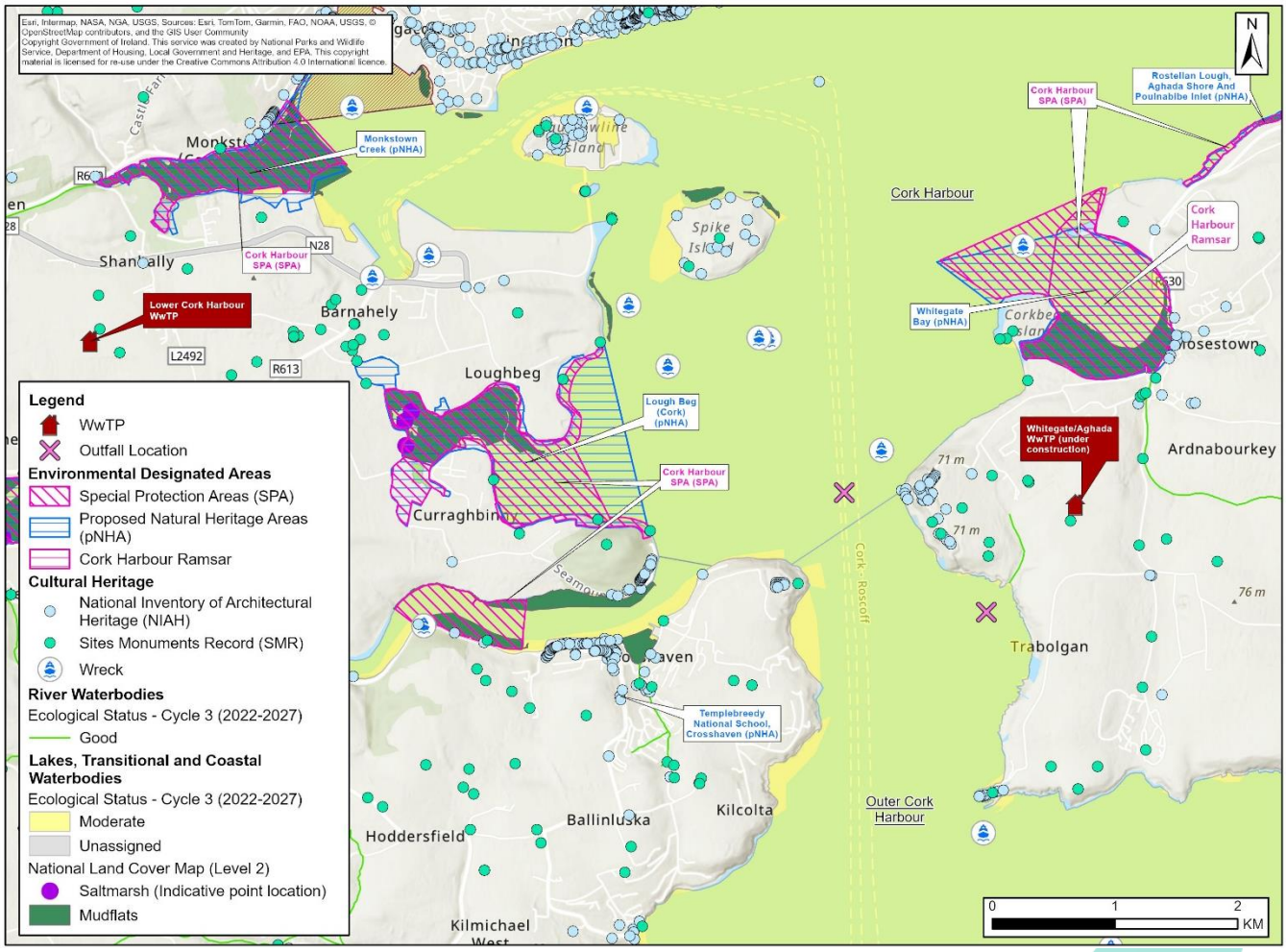

Figure 9-2 Environmental constraints for Cork Lower Harbour WwTP.

Water Framework Directive water quality and biodiversity baseline information for the current discharge location is summarised in Table 9-1.

Table 9-1 Current Cork Lower Harbour WwTP discharge location summary

Topic	Baseline environment
Discharge Waterbody Type	Coastal Waterbody
Discharge Waterbody Name	Cork Harbour
Discharge Waterbody Code	IE_SW_060_0000
Water Body Ecological Status (cycle 3 2016-2021)	Moderate
Waterbody Risk Status and Category (2022)	Waterbody At Risk: Urban Run-off
High Status Objective List	No

Topic	Baseline environment
Length of river from discharge to estuary (approximate)	N/A
Proximity to public water abstractions including regulated and unregulated GWS	N/A
Priority Areas for Action list RBMP	No
Proximity to Shellfish Waters	No shellfish waters located in the direct pathway/downstream of the discharge.
Proximity to Bathing Waters	No bathing waters located in the proximity of the discharge - discharge located approximately 7 km upstream of the nearest Bathing Water (Fountainstown, a Blue Flag Beach).
Proximity to European Designated Sites (SPA, SAC)	Cork Harbour SPA (in direct line approximately 1 km north of site, approximately 0.8 km south of site and approximately 2.5 km east of site)
Potential to affect National (NHA, pNHA)/Ramsar designated sites and/or freshwater pearl mussel catchment?	Monkstown Creek pNHA (in direct line approximately 1 km north of site). Owenboy River pNHA (In direct line approximately 0.8 km south of site). Lough Beg (Cork) pNHA (In direct line approximately 2 km east of site). Discharges into Cork Harbour which is a Ramsar site.
Proximity of WwTP to residential areas/sensitive community sites	Close proximity to residential areas (within 300 m), school (within 500 m) and recreational/community areas (within 300 m).

9.1.3 Cork Lower Harbour WwTP existing and future capacity and compliance

The current treatment and hydraulic capacity of the existing WwTP have been compared to the actual current loading and the expected future requirements based on population growth consideration in terms of population equivalents (PE). For Cork Lower Harbour WwTP these are presented as the current and future organic and hydraulic loadings with existing treatment capacity in Table 9-2.

Table 9-2 Cork Lower Harbour WwTP Current and Projected Loading and Existing Treatment Capacity

Parameter	Existing Capacity	Current Loading	2030 Projected Loading	2055 Projected Loading	2080 Projected Loading
Organic Loading (PE)	65,000	48,990	66,955	81,307	92,431
Peak Hydraulic Loading (m^3/d)	43,875	16,696	57,808	67,495	75,004

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 (Table 9-3). The environmentally sustainable discharge limits for the future horizons are not more stringent than the current WWDL requirements.

Table 9-3 Cork Lower Harbour WwTP Current WWDL Emission Limit Values (ELVs) and Projected Environmentally Sustainable Discharge Limits (ESDL)

Parameter	Existing WWDL ELVs	2030 Projected ESDL	2055 Projected ESDL	2080 Projected ESDL
BOD (mg/l)	245	245	245	245
DIN (mg/l)	95	95	95	95
TP (mg/l)	2	2	2	2
More Stringent?	-	N	N	N

The network assessment has identified that most of the Cork Lower Harbour network has capacity for both current and 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 most of it was in the areas of new development.

All SWOs are compliant at present, but 7 network SWOs will become non-compliant in the 2080 scenario.

9.1.4 Cork Lower Harbour Coarse screening

Cork Lower Harbour WwTP SEA coarse screening assessment of options summary is presented in Table 9-4.

Table 9-4 Cork Lower Harbour Coarse Screening Assessment Summary

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
A0 Do Nothing - Counterfactual	N	N	N	Option has been screened out at technical stage.
A1 Minimal Upgrade - Process Optimisation	Y	N/A	N/A	Works limited and within site so impacts likely to be mitigated with standard measures.
A2 Reuse Existing Plant and Upgrade - Existing Discharge	Y	Y	N/A	
A3 Reuse Existing Plant and Upgrade - Alternative Discharge	N/A Option screened out at technical assessment stage.			
A4 New Treatment Process/Plant Upgrade on Existing Site	N/A	N/A	Y	Uncertainty around a greater level of construction work required as the need for a new treatment process on site.
A5 New Greenfield Site	N/A	N/A	Y	Large uncertainty due to location of new plant and new discharge location).
A6 Untreated Wastewater Load Transfer Solution	N/A Option screened out at technical assessment stage.			

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening
- N/A – Not environmentally assessed

9.1.5 Cork Lower Harbour Fine screening scoring

Cork Lower Harbour WwTP SEA fine screening assessment of options scores are presented in Table 9-5.

Table 9-5 Cork Lower Harbour WwTP 2080 Fine Screening Assessment Scores

Criteria	A0 Do Nothing - Counterfactual	A4 New Treatment Process/Plant Upgrade on Existing Site	A5 New Greenfield Site
Planning & Regulation	0	0	-2
Impact on Customers	-3	1	2
Community Support, Health and Wellbeing	-3	2	2
Water environment	-3	2	2
Biodiversity	-2	-1	-2
GHG Emissions	0	0	-0.5
Energy efficiency	-3	1	2
Climate resilience	0	0	2
Circular economy	0	-1	-2
Environmental combined score	Worst	Best	
Overall combined score	N/A	2.70	2.08
Overall rank	N/A	1st	2nd

9.1.6 Cork Lower Harbour Fine screening results

Table 9-6 presents options that ranked highest using the MCA fine screening process.

Table 9-6 Cork Lower Harbour WwTP 2080 Implementation Fine Screening 1st and 2nd Ranked Options

Design Horizon	1st Ranked Option	2nd Ranked Option
2080	Option A4: New Treatment Process on Existing Site with Existing Discharge Location	Option A5: New Greenfield Plant with New Discharge Location

Design Horizon	1st Ranked Option	2nd Ranked Option
	Best overall and environmental score due to circular economy and treatment upgrades.	

9.1.7 Cork Lower Harbour Wastewater network upgrade proposals

The network proposals include works to address SWO compliance to minimise potential for untreated spills to the environment and avoiding network surcharging and flooding. The upgrades are proposed for the 2030 strategy horizon unless otherwise stated. The works are detailed in Appendix 4 to the CWS and include for Cork Lower Harbour:

- Improvements to storage at existing pumping station sites;
- Network infiltration reduction;
- Existing sewer system to be upsized to provide additional network capacity.

These works are expected to be undertaken within existing the sites or along existing pipeline networks.

9.2 Sub catchment 8: Feasible Approach selection and implementation

A list of Feasible Approaches is presented in

Table 9-7 Feasible Approaches for Sub catchment 8

Approach	Horizon	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
Cork Lower Harbour WwTP	2030	5,000PE upgrade of existing WwTP *. Install tertiary treatment requirements.	5,000PE upgrade of existing WwTP *. Install tertiary treatment requirements.	5,000PE upgrade of existing WwTP *. Install tertiary treatment requirements.
	2055	14,000PE upgrade of existing WwTP*.	14,000PE upgrade of existing WwTP*. Construct new marine outfall to discharge Cork Lower Harbour WwTP and Ballincollig FE.	75,000PE upgrade of existing WwTP‡. Construct new 235,000PE quaternary WwTP (including Ballincollig WwTP FE treatment). Construct new marine outfall.
	2080	11,000PE upgrade of existing WwTP†. 65,000PE WwTP capital replacement.	11,000PE upgrade of existing WwTP†. 65,000PE WwTP capital replacement.	18,000PE upgrade of existing WwTP††. 65,000PE WwTP capital replacement.

Approach	Horizon	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
Overall Feasible approach environmental assessment summary		**Ranked 1st** 2030 and 2055 upgrades to provide tertiary treatment and accommodate wastewater transfers from two WwTPs. 2080 upgrade to accommodate wastewater transfers from three WwTPs.	**Ranked 2nd** 2030 and 2055 upgrades to provide tertiary treatment and accommodate wastewater transfers from two WwTPs. 2055 construct new marine outfall. 2080 upgrade to accommodate wastewater transfers from three WwTPs.	**Ranked 3rd** 2030 and 2055 upgrades to provide tertiary treatment and accommodate wastewater transfers from two WwTPs. 2055 upgrade to provide quaternary treatment and construct new marine outfall. 2080 upgrade to accommodate wastewater transfers from three WwTPs.
Overall recommended approach		**Ranked 1st** Overall best as cheapest approach. Environmentally best ensuring future compliance and accommodation for demand. Does not require construction of a new site or outfall avoiding negative impacts on the water environment.	**Ranked 2nd** Similar to Approach 1 but requires construction of a new outfall.	**Ranked 3rd** Similar to Approach 2 but requires additional large upgrade to accommodate for quaternary treatment of Ballincollig loads increasing discharge to the waterbody.

*To address existing Cork Lower Harbour WwTP load and Sub Catchment 6 (Ballygarvan and Minane Bridge) loads.

†To address existing Cork Lower Harbour WwTP load and Sub Catchment 6 (Ballygarvan, Halfway and Minane Bridge) loads.

‡To address existing Cork Lower Harbour WwTP load, Sub Catchment 6 (Ballygarvan, and Minane Bridge) and South Cork City untreated WW diversion (61,000PE).

††To address existing Cork Lower Harbour WwTP load, Sub Catchment 6 (Ballygarvan, Halfway and Minane Bridge) and South Cork City untreated WW diversion (68,000PE).

9.3 Sub catchment 8: Recommended Approach implementation strategy

Figure 9-3 presents Recommended Approach graphic including environmental constraints.

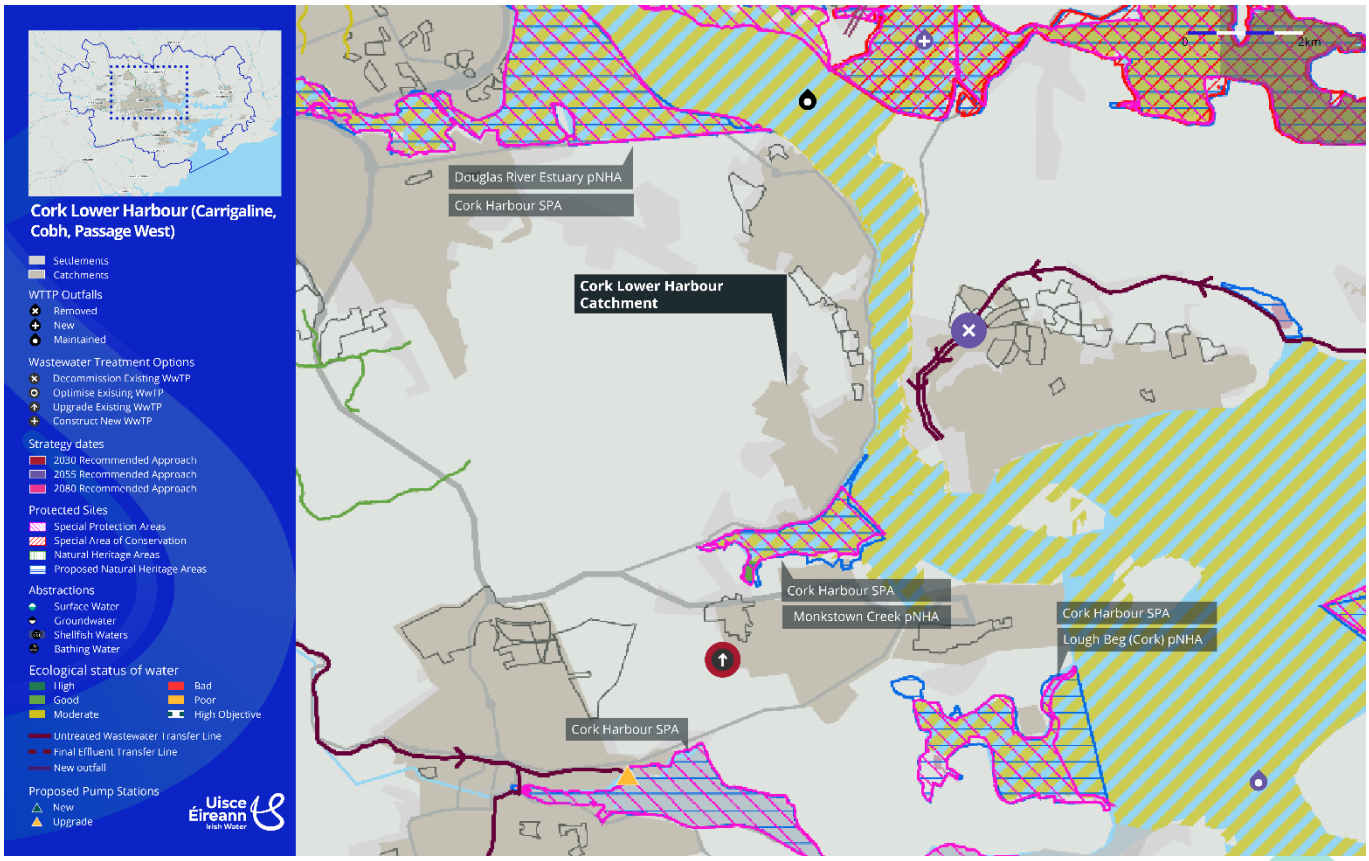

Figure 9-3 Recommended Approach Environmental Constraints for Sub catchment 8

Figure 9-4 presents the implementation strategy for the Recommended Approach for Cork Lower Harbour WwTP.

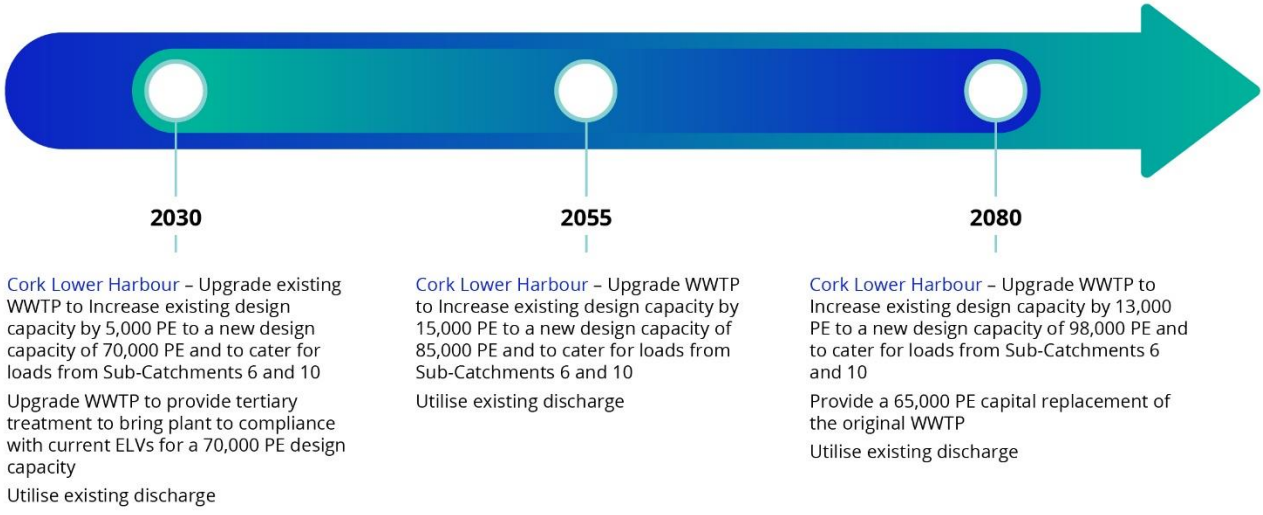

Figure 9-4 Implementation Strategy for Cork Lower Harbour WwTP.

9.4 Sub catchment 8: SEA Assessment of Recommended Approach

Table 9-8 presents the Environmental Assessment of the Recommended Approach for Cork Lower Harbour WwTP.

Table 9-8 Cork Lower Harbour WwTP Recommended Approach Assessment Summary

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec, [illegible]	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
Current (A0)	Operation	+ve	0	0	0	0	0	0	0	0	0
		-ve	--	--	-	--	0	0	0	0	-
2030 (A2)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	0	0	-	0	0	0	0	0	-
	Operation	+ve	++	+	0	++	++	0	0	0	0
		-ve	-	0	-	-	0	0	0	0	0
2055 (A2)	Same as 2030 - Continue to operate WwTP. No additional works or change to operation compared to 2030.										
2080 (A4)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	-	0	--	0	-	0	0	0	--
	Operation	+ve	0	+	0	+	+	0	0	0	0
		-ve	0	0	-	0	0	0	0	0	0

+ve = potential beneficial or positive effects/risk

-ve = potential negative or adverse effects/risk

The upgrades to the Cork Lower Harbour WwTP capacity (Option A2) proposed by 2030 will enable the plant to accommodate the projected capacity loads for 2030 from Cork Lower Harbour as well as those from other plants such as Ballygarvan and Minane Bridge, whilst maintaining compliance with the WWDLs. The continued discharge to Cork Harbour could have some minor negative effects on the Water Environment and Biodiversity SEA Objectives, however, as the plant remains compliant, these are likely to be negligible. The capacity upgrades by 2030 and 2080 (full capital replacement of 65,000 PE due to ageing asset life (Option A4)) should have positive effects both on the populations served by the Cork Lower Harbour WwTP, and the material assets at the site which are being reused. There could be some continued minor negative effects from the operation of the plant in relation to the Climate Change/carbon objective.

9.5 Sub catchment 8: Cumulative assessment

The potential cumulative or in combination adverse or beneficial effects for the Cork Lower Harbour Sub catchment aims to identify where a receptor could be affected by more than one WwTP and network proposals within the overall sub catchment, such as proximity to works being undertaken at the same time or discharges or decommissioning affecting the same waterbody.
Cork Lower Harbour is assessed as the only WwTP within its Sub catchment, and therefore the potential for adverse or beneficial cumulative effects are limited. The recommended approach for the Cork Lower Harbour sub catchment includes the Cork Lower Harbour WwTP receiving untreated wastewater flows from the following plants (see Section Sub catchment 5: SEA Assessment of Recommended Approach):

- Ballygarvan
- Halfway
- Minane Bridge

9.6 Sub catchment 8: Mitigation and enhancement

General measures include:

- Supporting awareness campaigns on challenges for WwTPs and water pollution to encourage appropriate use, and to understand the improvement works proposed and long term benefits compared to temporary disruption.
- Water quality modelling identified the influence of other sources of pollution affecting water quality and aquatic biodiversity including in relation to BOD, ammonia and phosphates and support for catchment management measures aimed at reducing these sources can provide wider environmental benefits as well environmental enhancement for biodiversity and flood management. These can include measures to improve water retention, reducing nutrient run off and soil erosion. These measures can only be delivered through collaboration with other parties and landowner involvement.
- WwTP and network upgrades will need to consider in detail potential to include NBS as part of detailed design including NBS that provide additional water quality enhancement benefits.

Specific measures for Sub Catchment 7 options are set out in Table 9-9 below.

Table 9-9 Mitigation and enhancement measures identified for Sub Catchment 7

Agglomeration	Potential	Mitigation Measures
Cork Lower Harbour WwTP	Site construction for works upgrades including the installation of tertiary treatment.	Standard good construction including circular economy principles. Application of biodiversity net gain to address any losses – consider potential to include enhancement on site.
Sub catchment/ common measures	N/A	N/A

10 Sub catchment 9: Carrigtwohill and Midleton

10.1 Carrigtwohill

10.1.1 Carrigtwohill WwTP location

Carrigtwohill WwTP is located at Tullagreen to the south of Carrigtwohill, County Cork (Figure 10-1). No zoning constraints or planning restrictions were identified surrounding the site boundary. 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. The existing site is also within Flood Zone A.

Figure 10-1 Carrigtwohill WwTP Site

10.1.2 Carrigtwohill Environmental baseline

The environmental constraints at Carrigtwohill WwTP are presented in Figure 10-2.

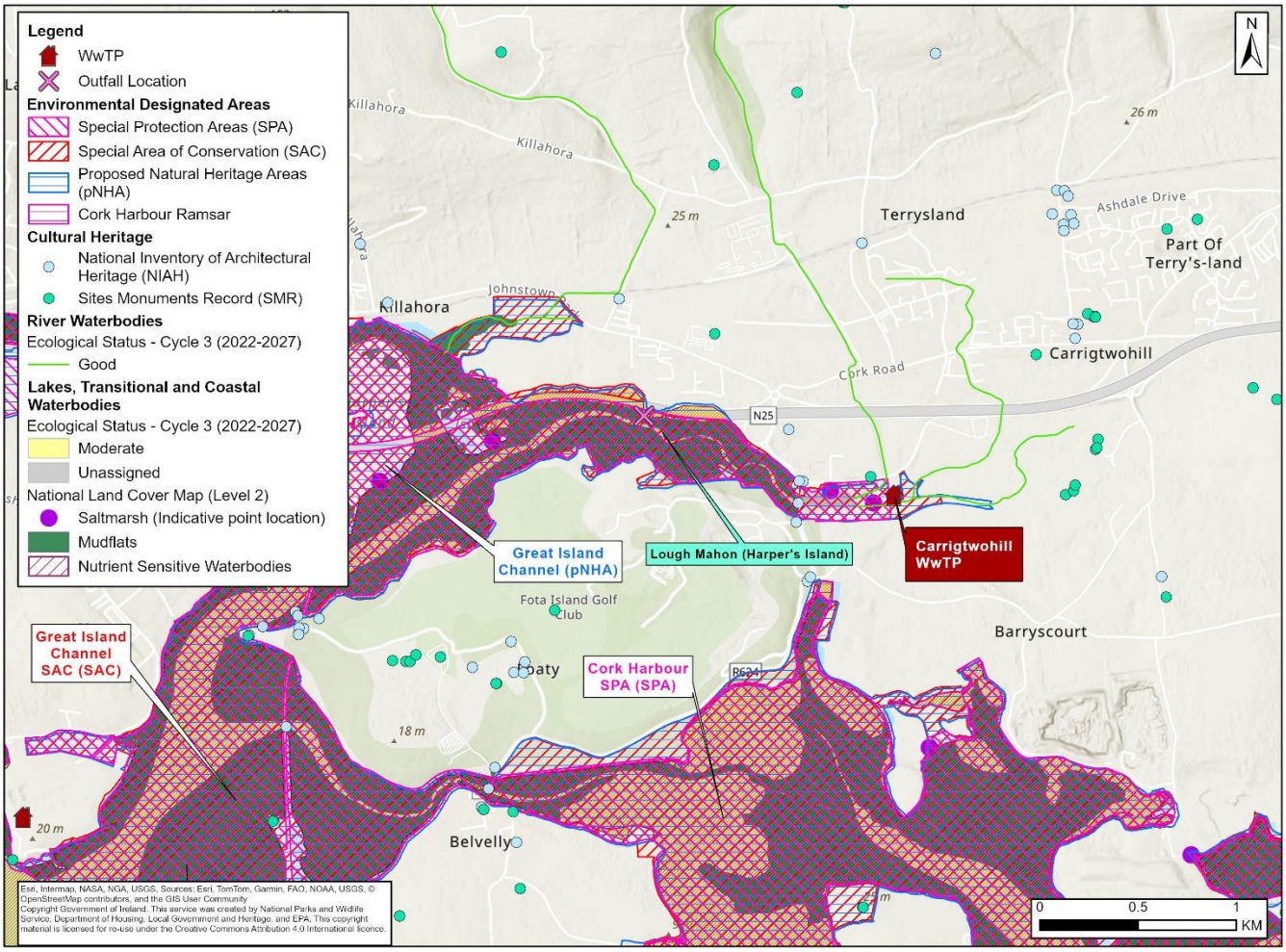

Figure 10-2 Environmental constraints at Carrigtwohill WwTP.

Water Framework Directive water quality and biodiversity baseline information for the current discharge location is summarised in Table 10-1.

Table 10-1 Carrigtwohill WwTP Current Discharge Location Environmental Baseline Summary

Topic	Baseline environment
Discharge Waterbody Type	Transitional waterbody
Discharge Waterbody Name	Lough Mahon (Harper's Island) (Slatty Water)
Discharge Waterbody Code	IE_SW_060_0700
Water Body Ecological Status (cycle 3 2016-2021)	Moderate
Waterbody Risk Status and Category (2022)	At Risk: Urban Run-off
High Status Objective List	No

Topic	Baseline environment
Length of river from discharge to estuary (approximate)	N/A
Proximity to public water abstractions including regulated and unregulated GWS	N/A
Priority Areas for Action list RBMP	No
Proximity to Shellfish Waters	No shellfish waters located in the direct pathway/downstream of the discharge
Proximity to Bathing Waters	No bathing waters located in the proximity of the discharge.
Proximity to European Designated Sites (SPA, SAC)	Current site and discharge within Cork Harbour SPA and Great Island Channel SAC. The discharge is located within mudflats and upstream of Atlantic Salt Meadows which are an EU Protected Habitat with inadequate status and declining trend.
Potential to affect National (NHA, pNHA)/Ramsar designated sites and/or freshwater pearl mussel catchment?	Current site and discharge within Great Island Channel pNHA.
Proximity of WwTP to residential areas/sensitive community sites	Close proximity to residential areas (within 300 m) and schools (within 500 to 800 m).

10.1.3 Carrigtwohill WwTP existing and future capacity and compliance

The current treatment and hydraulic capacity of the existing WwTP have been compared to the actual current loading and the expected future requirements based on population growth consideration in terms of population equivalents (PE). For Carrigtwohill WwTP these are presented as the current and future organic and hydraulic loadings with existing treatment capacity in Table 10-2.

Table 10-2 Carrigtwohill WwTP Current and Projected Loading and Existing Treatment Capacity

Parameter	Existing Capacity	Current Loading	2030 Projected Loading	2055 Projected Loading	2080 Projected Loading
Organic Loading (PE)	30,000	9,293	25,517 (42,167)*	28,547 (45,197)*	30,340 (46,990)*

Parameter	Existing Capacity	Current Loading	2030 Projected Loading	2055 Projected Loading	2080 Projected Loading
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

The Water Quality Modelling (WQM) outputs of the current and future predicted (2030, 2055 and 2080) assimilative capacity of the current discharge waterbody are presented in Table 10-3. Based on the report values, Carrigtwohill WwTP has insufficient hydraulic and organic capacity to treat current and future flow/loads. The existing wastewater treatment process is currently performing but may need additional chemical dosing to meet the total P ELV limit. The existing discharge location ESDL are expected to be more stringent in the future 2055 and 208 scenarios (Table 10-3).

Table 10-3 Carrigtwohill WwTP Current WWDL Emission Limit Values (ELVs) and Projected Environmentally Sustainable Discharge Limits (ESDL)

Parameter	Existing WWDL ELVs	2030 Projected ESDL	2055 Projected ESDL	2080 Projected ESDL
BOD (mg/l)	25	25	25	25
TN (mg/l)	25	25	10	10
TP (mg/l)	2.5	2.5	0.7	0.7
More Stringent?	-	N	Y	Y

The network assessment has identified that the current network is experiencing surcharging and flooding, which is expected to increase in future scenarios.

The current model has all SWOs compliant in both the current and future scenarios.

10.1.4 Carrigtwohill Coarse screening

Carrigtwohill WwTP SEA coarse screening assessment of options summary is presented in Table 10-4.

Table 10-4 Carrigtwohill WwTP Coarse Screening Assessment Summary

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
A0 Do Nothing - Counterfactual	N	N	N	Option has been screened out at technical stage as the existing WwTP will be over capacity and will not

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
				achieving the discharge requirements as set in the WWDL.
A1 Minimal Upgrade - Process Optimisation	Y	N/A	N/A	Uncertainty over impacts on SAC/SPA/pNHA as plant located within the designated sites.
A2 Reuse Existing Plant and Upgrade - Existing Discharge	Y	Y	N/A	
A3 Reuse Existing Plant and Upgrade - Alternative Discharge	N/A Option screened out at technical assessment stage.			
A4 New Treatment Process/Plant Upgrade on Existing Site	N/A	N/A	Y	Uncertainty over need for additional land for new works at the site. Potential loss of SAC could also include SPA (and pNHA) depending on the location of the land-take. The existing plant (building) is fully within SPA/SAC/pNHA. New discharge location beyond Slatty Waters.
A5 New Greenfield Site	N/A	N/A	Y*	Option was screened in, but not shortlisted, only as an alternative option to A4 for the 2080 scenario.
A6 Untreated Wastewater Load Transfer Solution	N/A Option screened out at technical assessment stage.			

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening
- N/A – Not environmentally assessed

10.1.5 Carrigtwohill Fine screening scoring

Carrigtwohill WwTP SEA fine screening assessment of options scores are presented in Table 10-5.

Table 10-5 Carrigtwohill WwTP 2080 Fine Screening Assessment Scores

Criteria	A0 Do Nothing - Counterfactual	A4 New Treatment Process/Plant Upgrade on Existing Site (existing discharge location)	A4 New Treatment Process/Plant Upgrade on Existing Site (new discharge location beyond Slatty Waters)
Planning & Regulation	0	-2	-2
Impact on Customers	-2	1	1
Community Support, Health and Wellbeing	-2	2	2
Water environment	-3	-1	1
Biodiversity	-3	-3	-1
GHG Emissions	0	0.5	0
Energy efficiency	-3	2	2
Climate resilience	0	1	2
Circular economy	0	1	1
Environmental combined score	Worst		Best
Overall combined score	N/A	2.43	2.68
Overall rank	N/A	2nd	1st

10.1.6 Carrigtwohill Fine screening results

Table 10-6 presents options that ranked highest using the MCA fine screening process.

Table 10-6 Carrigtwohill WwTP 2080 Implementation Fine Screening 1st and 2nd Ranked Options

Design Horizon	1st Ranked Option	2nd Ranked Option
2080	Option A4: New Treatment Process on Site w/ Extended Discharge Beyond Slatty Waters Best environmental and overall score due to circular economy and the move of the current discharge approximately 3.5km downstream.	Option A4: New Treatment Process on Existing w/ Existing Discharge

10.1.7 Carrigtwohill Wastewater network upgrade proposals

The network proposals include works to address SWO compliance to minimise potential for untreated spills to the environment and avoiding network surcharging and flooding. The upgrades are proposed for the 2030 strategy horizon unless otherwise stated. The works are detailed in Appendix 4 to the CWS and include for Carrigtwohill:

- Improvements to storage at existing pumping station site;
- Flow treatment upgrade and proposed a new extended outfall discharge of 3.5km from the plant;
- Existing sewer system to be upsized to provide additional network capacity.

These works are expected to be undertaken within existing the sites or along existing pipeline networks.

10.2 Midleton

10.2.1 Midleton WwTP location

Midleton WwTP is located south-west of Midleton town (Figure 10-3). A planning assessment identified no zoning constraints or planning restrictions surrounding the site boundary. There are European, Ramsar and National designated sites in proximity of the WwTP separated from the WwTP by the N25 to the East of the site. There are habitats within the site area which are likely to have some ecological value and will need to be assessed prior. The existing site is located within Flood Zone A, while the land to the south lies outside this zone.

Figure 10-3 Midleton WwTP Site

10.2.2 Midleton Environmental baseline

The environmental constraints for Midleton WwTP are presented in Figure 10-4.

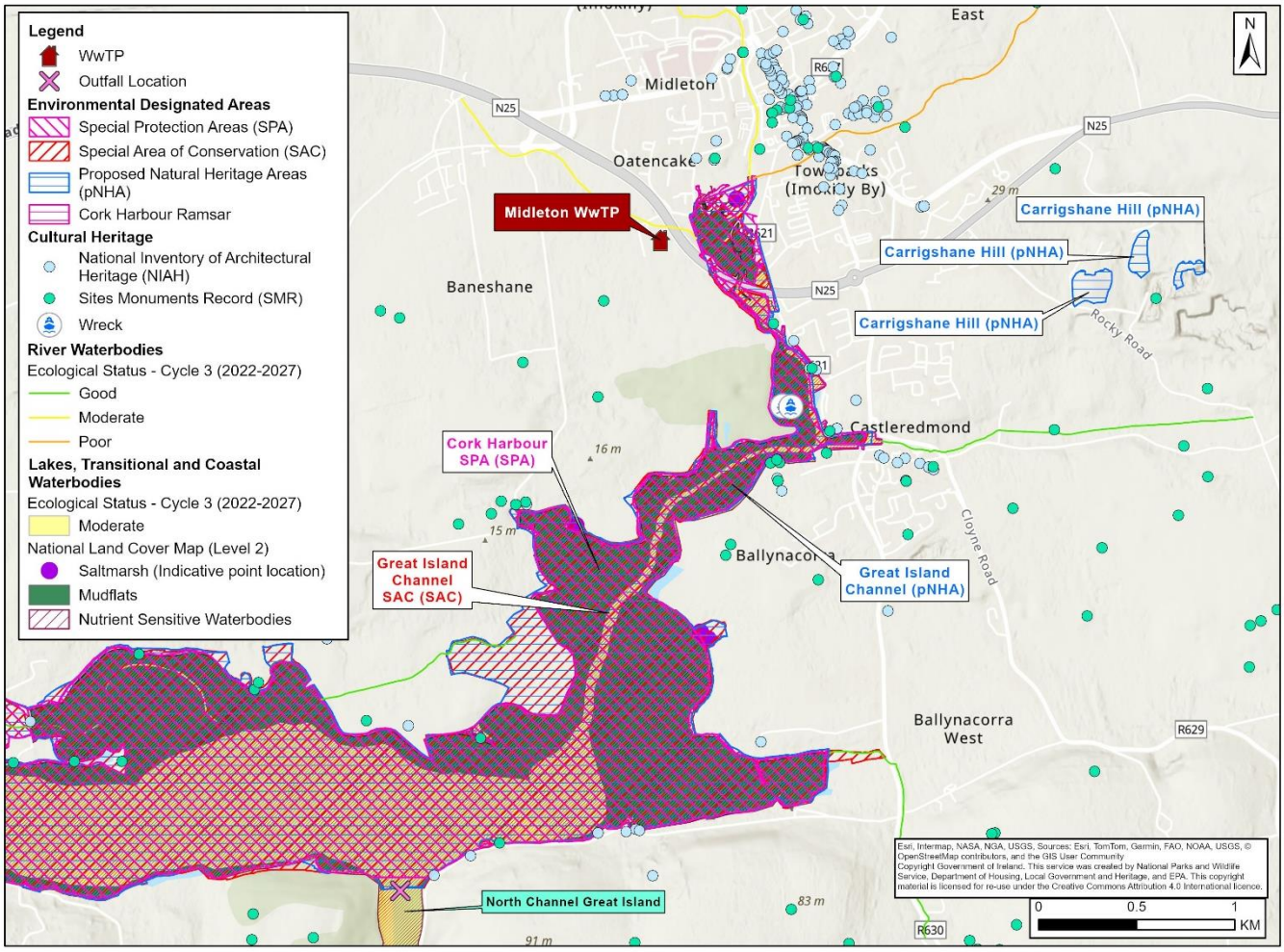

Figure 10-4 Environmental constraints for Midleton WwTP.

Water Framework Directive water quality and biodiversity baseline information for the current discharge location is summarised in Table 10-7.

Table 10-7 Current Midleton WwTP discharge location summary

Topic	Baseline environment
Discharge Waterbody Type	Transitional waterbody
Discharge Waterbody Name	North Channel Great Island
Discharge Waterbody Code	IE_SW_060_0300
Water Body Ecological Status (cycle 3 2016-2021)	Moderate
Waterbody Risk Status and Category (2022)	At Risk: Agriculture
High Status Objective List	No

Topic	Baseline environment
Length of river from discharge to estuary (approximate)	N/A
Proximity to public water abstractions including regulated and unregulated GWS	N/A
Priority Areas for Action list RBMP	No
Proximity to Shellfish Waters	No shellfish waters located in the direct pathway/downstream of the discharge.
Proximity to Bathing Waters	No bathing waters located in the proximity of the discharge.
Proximity to European Designated Sites (SPA, SAC)	Cork Harbour SPA and Great Island Channel SAC on the east side of the road (in direct line approximately 0.16 km from WwTP); discharge is just outside and downstream of designated sites' borders.
Potential to affect National (NHA, pNHA)/Ramsar designated sites and/or freshwater pearl mussel catchment?	Great Island Channel pNHA on the east side of the road (in direct line approximately 0.16 km from WwTP); discharge is outside and downstream of pNHA 's borders.
Proximity of WwTP to residential areas/sensitive community sites	Close proximity to residential areas (within 200 to 600 m).

10.2.3 Midleton WwTP existing and future capacity and compliance

The current treatment and hydraulic capacity of the existing WwTP have been compared to the actual current loading and the expected future requirements based on population growth consideration in terms of population equivalents (PE). For Midleton WwTP these are presented as the current and future organic and hydraulic loadings with existing treatment capacity in Table 10-8.

Table 10-8 Midleton WwTP Current and Projected Loading and Existing Treatment Capacity

Parameter	Existing Capacity	Current Loading	2030 Projected Loading	2055 Projected Loading	2080 Projected Loading
Organic Loading (PE)	15,000	17,361	27,441 (10,941)*	33,969 (17,469)*	38,867 (22,367)*
Peak Hydraulic Loading (m^3/d)	10,368	9,355	18,876 (7,526)*	23,366 (12,017)*	26,735 (15,386)*

*() accounting for Midleton load transfer

The Water Quality Modelling (WQM) outputs of the current and future predicted (2030, 2055 and 2080) assimilative capacity of the current discharge waterbody are presented in Table 10-9. The existing wastewater treatment process is currently performing very poorly and is failing to achieve the discharge requirements specified within its WWDL. The existing discharge location ESDL are expected to be more stringent in the future 2055 and 2080 scenarios (Table 10-9).

Table 10-9 Midleton WwTP Current WWDL Emission Limit Values (ELVs) and Projected Environmentally Sustainable Discharge Limits (ESDL)

Parameter	Existing WWDL ELVs	2030 Projected ESDL	2055 Projected ESDL	2080 Projected ESDL
BOD (mg/l)	25	25	25	25
TN (mg/l)	15	15	10	10
TP (mg/l)	2	2	0.7	0.7
More Stringent?	-	N	Y	Y

The network assessment indicates that modelled results consistently show flooding and surcharging in the same areas across both current and future scenarios. Future projections reveal an overall increase in network flooding and surcharging, with only a few additional areas affected.

Currently, three SWOs are non-compliant. By 2080, this number increases to four non-compliant SWOs in Midleton.

10.2.4 Midleton Coarse screening

Midleton WwTP SEA coarse screening assessment of options summary is presented in Table 10-10

Table 10-10 Midleton WwTP Coarse Screening Assessment Summary

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
A0 Do Nothing - Counterfactual	N	N	N	Option has been screened out at technical stage as the existing WwTP is currently over capacity and is not achieving the discharge requirements as set in the WWDL.
A1 Minimal Upgrade - Process Optimisation	N/A Option screened out at technical assessment stage.			
A2 Reuse Existing Plant and Upgrade - Existing Discharge	N/A Option screened out at technical assessment stage.			
A3 Reuse Existing Plant and Upgrade - Alternative Discharge	N/A Option screened out at technical assessment stage.			
A4 New Treatment Process/Plant Upgrade on Existing Site	N/A	Y	Y	Uncertainties related to a greater level of construction as full replacement of the current infrastructure is assumed, along with increased capacity requirements.
A5 New Greenfield Site	N/A	N/A	Y*	Option has since been discounted with further consideration at the technical stage.
A6 Untreated Wastewater Load Transfer Solution	Y	Y	Y	Existing infrastructure.

10.2.5 Midleton Fine screening scoring

Midleton WwTP SEA fine screening assessment of options scores are presented in Table 10-11.

Table 10-11 Midleton WwTP 2080 Fine Screening Assessment Scores

Criteria	A0 Do Nothing - Counterfactual	A4 New Treatment Process/Plant Upgrade on Existing Site	A6 Untreated Wastewater Load Transfer Solution
Planning & Regulation	0	2	3
Impact on Customers	-2	2	3
Community Support, Health and Wellbeing	-2	2	3
Water environment	-2	2	3
Biodiversity	-2	-1	2
GHG Emissions	0	0	1
Energy efficiency	-3	2	3
Climate resilience	0	2	3
Circular economy	0	-1	1
Environmental combined score	Worst		Best
Overall combined score	N/A	3.52	4.07
Overall rank	N/A	**2nd**	**1st**

10.2.6 Midleton Fine screening results

Table 11-12 presents options that ranked highest using the MCA fine screening process.

Table 10-12 Midleton WwTP 2080 Implementation Fine Screening 1st and 2nd Ranked Options

Design Horizon	1st Ranked Option	2nd Ranked Option
2080	Option A6: Untreated Wastewater Load Transfer Solution (to Carrigtwohill WwTP) Best environmental and overall score due to the removal of final discharge.	Option A4: New Treatment Process/Plant Upgrade on Existing Site (existing discharge location)

10.2.7 Midleton Wastewater network upgrade proposals

The network proposals include works to address SWO compliance to minimise potential for untreated spills to the environment and avoiding network surcharging and flooding. The upgrades are proposed for the 2030 strategy horizon unless otherwise stated. The works are detailed in Appendix 4 to the CWS and include for Midleton:

- Improvements to storage at existing pumping station site;
- Address flooding cause by new development upstream;
- Decommission of spill pipes to address flooding issues and facilitate flows;

These works are expected to be undertaken within existing the sites or along existing pipeline networks.

10.3 Sub catchment 9: Feasible Approach selection and implementation

A list of Feasible Approaches is presented in Table 10-13.

Table 10-13 Feasible Approaches for Carrigtwohill WwTP and Midleton WwTP.

Approach	Horizon	Feasible Approach 1
Carrigtwohill WwTP	2030	Optimise Carrigtwohill WwTP.
	2055	Upgrade WwTP by 15,000 PE and extend the existing 710mm outfall by approximately 3.5km.
	2080	Capital replacement of 30,000 PE of WwTP and construct an additional 2,000 PE upgrade.
Midleton WwTP	2030	Upgrade WwTP by 7,500 PE. Continue to operate WwPS to transfer 5,100 PE to Carrigtwohill WwTP.
	2055	Continue to operate WwPS to transfer 11,600 PE to Carrigtwohill WwTP.
	2080	Capital replacement of 22,500 PE of WwTP and continue to operate WwPS to transfer 16,500 PE to Carrigtwohill WwTP.
Overall Feasible environmental approach assessment summary		**Ranked 1st (only approach)** Carrigtwohill: 2030 upgrade to bring into compliance. 2055 and 2080 upgrades to accommodate demand and extend existing outfall by 3.5 km (2055). Midleton: 2030 and 2080 upgrades to accommodate demand and transfer some loads to Carrigtwohill (existing pipeline).
Overall recommended approach		**Ranked 1st (only approach)** Only proposed approach for Sub catchment 9. This approach, particularly extension of the outfall pipeline ensures removal of current discharge from designated site and therefore protection of sensitive habitats.

10.4 Sub catchment 9: Recommended Approach implementation strategy

Figure 10-5presents Recommended Approach graphic including environmental constraints.

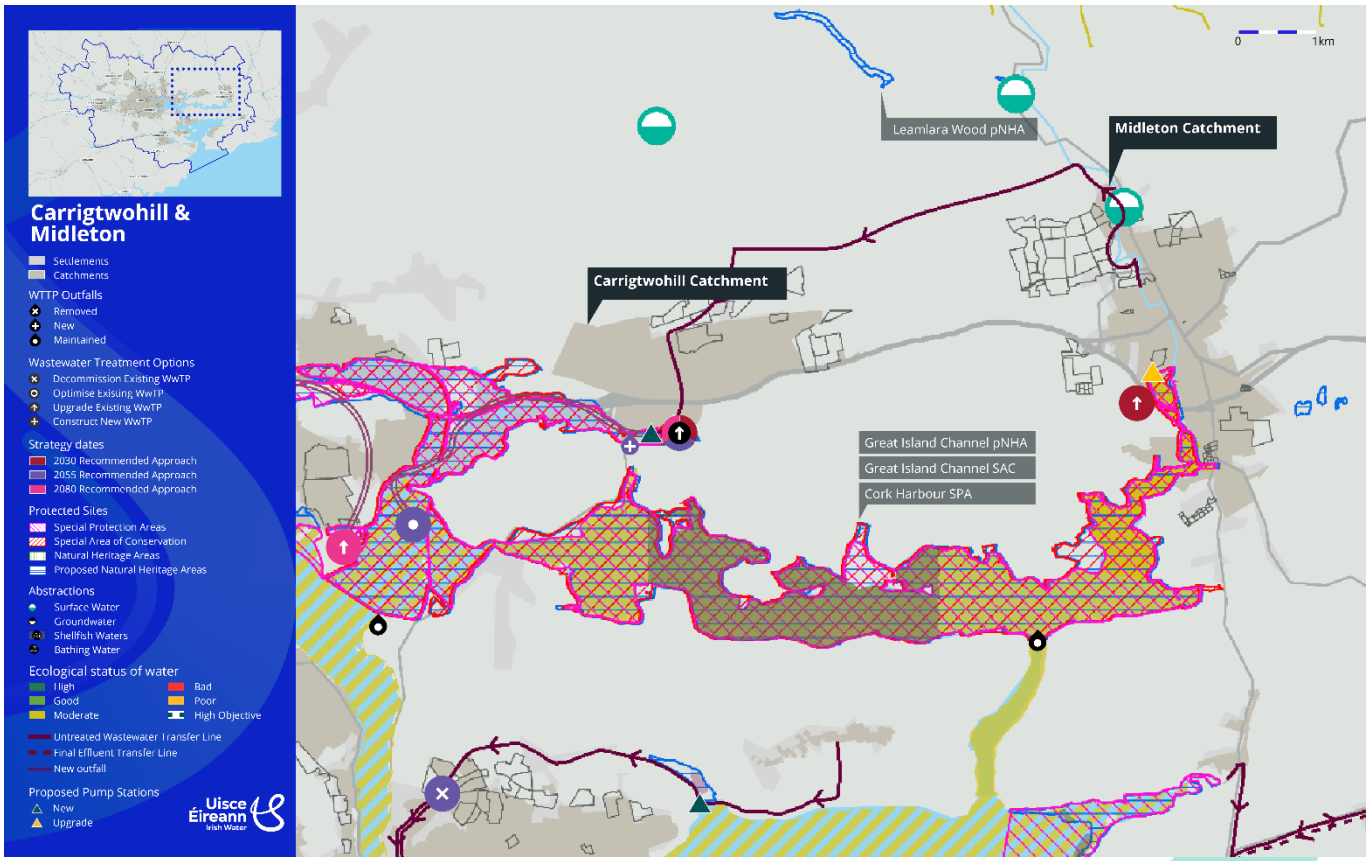

Figure 10-5 Recommended Approach Environmental Constraints for Sub catchment 9

Figure 10-6 presents the implementation strategy for the Recommended Approach for Carrigtwohill WwTP and Midleton WwTP.

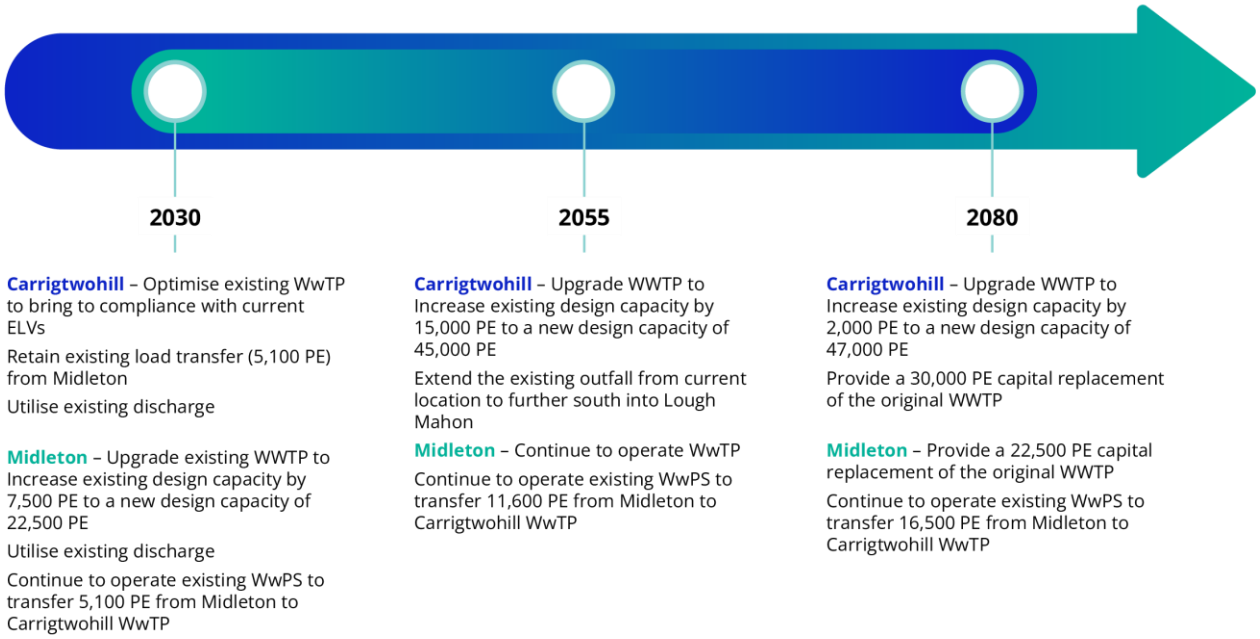

Figure 10-6 Implementation Strategy for Carrigtwohill WwTP and Midleton WwTP

10.5 Sub catchment 9: SEA Assessment of Recommended Approach

Carrigtwohill WwTP

Table 10-14 presents the Environmental Assessment of the Recommended Approach for Carrigtwohill WwTP.

Table 10-14 Carrigtwohill WwTP Recommended Approach Assessment Summary

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec,	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
Current (A0)	Operation	+ve	0	0	0	0	0	0	0	0	0
		-ve	---	---	0	---	0	---	0	0	--
2030 (A1)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	0	-	-	0	-	0	0	0	-
	Operation	+ve	+	+	+	+	+	+	0	0	0

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec, Health	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
		-ve	0	0	0	0	0	--	0	0	0
2055 (A4)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	--	--	-	--	-	--	-	--	--
	Operation	+ve	++	++	0	++	+	+	0	0	+
		-ve	0	0	0	0	-	--	0	-	0
2080 (A4 upgrade)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	-	--	-	--	-	0	0	0	--
	Operation	+ve	++	++	0	++	+	+	0	0	+
		-ve	0	0	0	0	0	-	0	0	0

+ve = potential beneficial or positive effects/risk

-ve = potential negative or adverse effects/risk

Optimisation of the plant (Option A1) will bring plant into compliance with the projected ESDLs at the discharge location in the interim period (2030) before works on the Option A3 start. This may contribute to the waterbody achieving Good status. Option A3 proposes a capacity upgrade and extension of the existing outfall by approximately 3.5km by 2055. This would transfer the outfall downstream into Lough Mahon which is also part of the Great Island Channel pNHA. The discharge would need to comply with more stringent discharge limits. The construction of the outfall could result in potential short term temporary negative effects on the designated area including in relation to the Water Environment, Biodiversity and Landscape SEA Objectives. However a long term benefit is expected from removal of the current discharge and its impacts on the water environment and sensitive habitats within the European designated sites providing positive contribution to the Water Environment and Biodiversity SEA Objectives and relocation to an location providing better assimilative capacity.

The proposed route of the 3.5km pipeline passes across the following cultural heritage (NIAH) sites which could be impacted during construction:

- 580643 – Slatty Bridge along the R624

- 578207 – Railway bridge

Due to ageing asset life, and to address the projected loads the plant will require further capacity upgrades in addition to a capital replacement of 30,000 PE by 2080 (Option A4) with some additional potential construction related impacts.

Midleton WwTP

Table 10-15 presents Environmental Assessment of Recommended Approach for Midelton WwTP.

Table 10-15 Midelton WwTP Recommended Approach Assessment Summary

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec,	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
Current (A0)	Operation	+ve	0	0	0	0	0	0	0	0	0
		-ve	---	---	0	---	0	--	0	0	--
2030 (A2)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	0	0	-	0	0	0	0	0	-
	Operation	+ve	++	+	+	++	+	0	0	0	0
		-ve	0	0	-	0	0	0	0	0	0
2055 (A2)	Same as 2030 - continue to operate WwTP and pumping station. No additional works or change to operation compared to 2030.										
2080 (A4)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	-	0	--	0	-	0	0	0	--
	Operation	+ve	++	+	+	++	+	0	0	0	0
		-ve	0	0	-	0	0	0	0	0	0

+ve = potential beneficial or positive effects/risk

-ve = potential negative or adverse effects/risk

The upgrades to the Midleton WwTP capacity (Option A2) proposed by 2030 will enable the plant to accommodate the projected capacity loads for 2030 and to bring into compliance with the WWDL, whilst continuing its transfer of untreated wastewater loads to Carrigtwohill via an existing pipeline. Some negative effects could be experienced for local Air Quality and on the Climate during the capacity upgrade construction. During operation, the treatment of increased loads into the plant could increase energy use an carbon emissions, however these could be mitigated if energy-saving techniques and processes are included within the upgrades proposed for 2030 and 2080. Due to ageing asset life, the plant will require a full capital replacement of 22,500 PE by 2080 (Option A4).

The discharge for Midleton is just downstream of the border of the following designated sites:

- Great Island Channel SAC
- Great Island Channel pNHA

Overall benefits for the Water Environment and Biodiversity are expected from the treatment and capacity improvements to bring the plant into compliance with existing and future more stringent discharge limits.

10.6 Sub catchment 9: Cumulative assessment

The potential cumulative or in combination adverse or beneficial effects for the Carrigtwohill and Midleton sub catchment are identified below in Table 10-16. These aim to identify where a receptor could be more affected by more than one of the WwTP and network proposals within the overall sub catchment, such as proximity to works being undertaken at the same time or discharges or decommissioning affecting the same waterbody.

Table 10-16 Cumulative assessment of the effects of the Recommended Approach on receptors within the Carrigtwohill and Midleton Sub catchment.

Site/ Potential Interaction	Midleton	
Carrigtwohill	Combined beneficial effects on the Water Environment and Biodiversity from the extension of the outfall downstream and compliance with environmentally sustainable discharge limits – used by Carrigtwohill and the partial transfer from Midleton	No additional negative effects as construction of outfall is required for Carrigtwohill

Key				
	No interaction or negligible cumulative effects		Potential for beneficial cumulative effects	
	Potential for adverse cumulative effects		Potential for mixed beneficial and adverse effects	

Overall there likely to be combined beneficial effects on the Water Environment and Biodiversity with both Midleton and Carrigtwohill meeting higher discharge requirements and a new location for the Carrigtwohill discharge avoiding sensitive water environment and habitats.

10.7 Sub catchment 9: Mitigation and enhancement

General measures include;

- Supporting awareness campaigns on challenges for WwTPs and water pollution to encourage appropriate use, and understand the improvement works proposed and long term benefits compared to temporary disruption
- Water quality modelling identified the influence of other sources of pollution affecting water quality and aquatic biodiversity including in relation to BOD, ammonia and phosphates and support for catchment management measures aimed at reducing these sources can provide wider environmental benefits as well environmental enhancement for biodiversity and flood management. These can include measures to improve water retention, reducing nutrient run off and soil erosion. These measures can only be delivered through collaboration with other parties and landowner involvement.
- WwTP and network upgrades will need to consider in detail potential to include NBS as part of detailed design including NBS that provide additional water quality enhancement benefits.

Specific measures for Sub Catchment 8 options are set out in Table 10-17 below.

Table 10-17 Mitigation and enhancement measures for Sub Catchment 9

Agglomeration	Potential	Mitigation Measures
Carrigtwohill WwTP	Carrigtwohill existing site partly within SAC/SPA/pNHA designation	Detailed site assessment of project area to determine ecological importance to SPA/SAC habitats and species Project-level design to microsite new infrastructure to locations outwith the SPA/SAC/pNHA site boundary Detailed site assessment of project area to determine ecological importance to SPA/SAC habitats and species including potential areas of Atlantic saltmarsh habitat, and identify areas of invasive alien species.
	Current discharge located within SAC with risks to Atlantic Salt Marsh. New discharge pipeline may have construction impacts on habitats within the SAC.	Update baseline mapping of sensitive habitats to inform pipeline routing and construction approach. Project-level design to microsite new infrastructure to locations outside any newly identified areas of saltmarsh and ensure no surface structures which would cause physical obstruction to normal sediment/tidal flows. Undertake construction works outside the overwintering period for qualifying interests. Biosecurity management plan to control risk of common cord-grass colonisation. Outfall assessments to consider also cultural heritage/archaeological interest and pollution risks Application of biodiversity net gain to address habitat losses.

Midleton WwTP	WwTP upgrade and Additional transfer to Carrigtwohill and continued WwTP and discharge	Standard good construction measures. Application of biodiversity net gain to address any losses.
Sub catchment/ common measures	NA	No additional measures identified

11 Sub catchment 10: Ballymore, Cloyne, Saleen, North Cobh and Whitegate-Aghada

11.1 Ballymore

Ballymore is a small existing agglomeration with a population of 295 according to the latest CSO 2022. 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 Uisce Éireann. The future wastewater load for the strategy horizons was projected and is summarised in Table 11-1 below.

Table 11-1 Projected Organic (PE) Demand of Ballymore

Parameter	2030	2055	2080
Organic Loading (PE)	450	500	550

The CWS aims to identify optimal wastewater solutions for this area by 2080. As a result, 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.

11.2 Cloyne

11.2.1 Cloyne WwTP location

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 (Figure 11-1). A planning assessment identified no map-based objectives directly affecting the site. However, the site is zoned for "Existing Residential and Other Uses" under the current development plan, and a WwTP is not listed as a compatible use within this zoning designation. 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. There are also habitats likely to have some ecological value within and around the existing site which will need to be assessed. The area to the north of the site lies within Flood Zones A and B.

Figure 11-1 Cloyne WwTP Site

11.2.2 Cloyne Environmental baseline

The environmental constraints for Cloyne WwTP are presented in Figure 11-2.

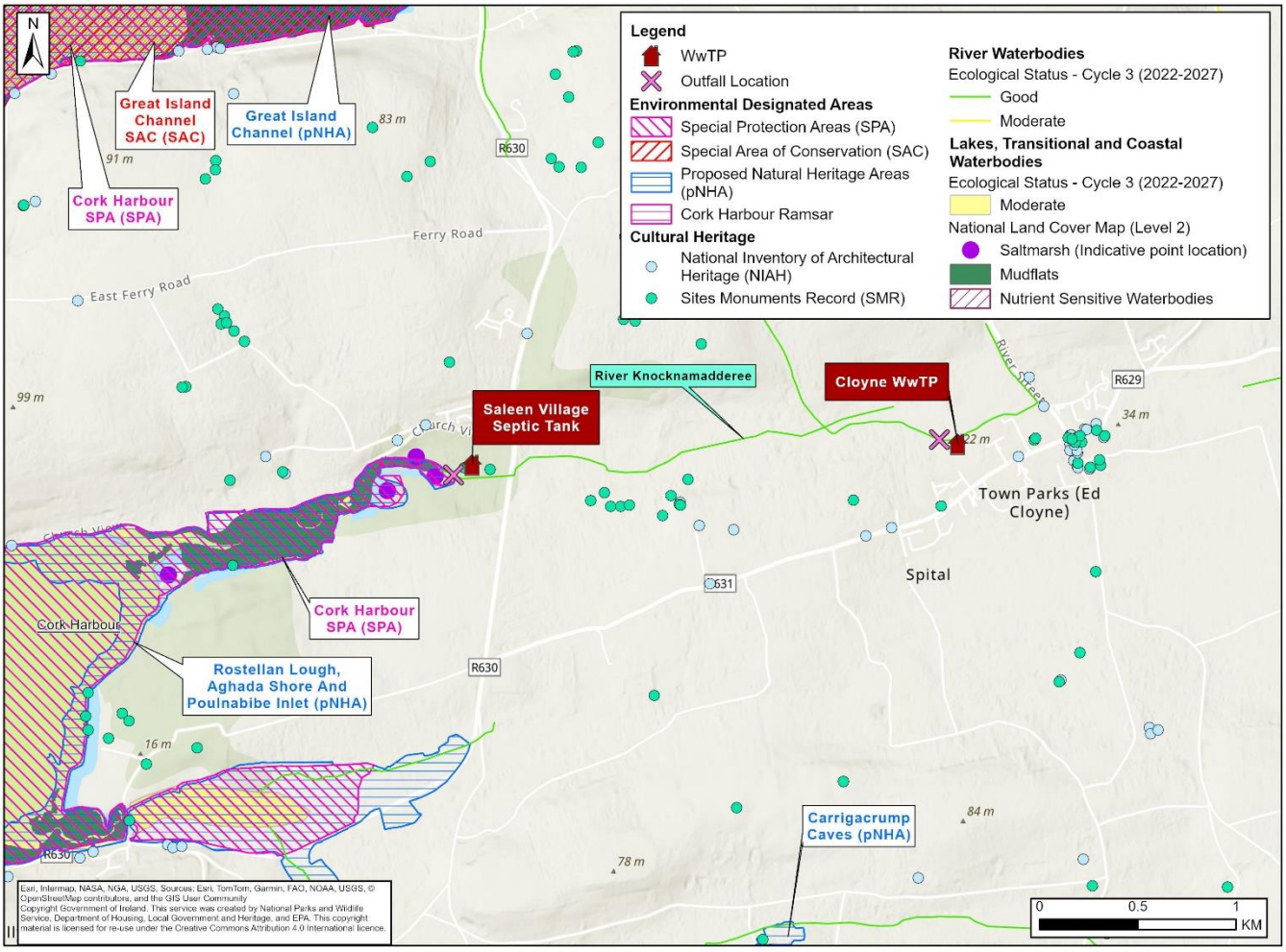

Figure 11-2 Environmental constraints for Cloyne WwTP.

Water Framework Directive water quality and biodiversity baseline information for the current discharge location is summarised in Table 11-2.

Table 11-2 Current Cloyne WwTP discharge location summary

Topic	Baseline environment
Discharge Waterbody Type	River Waterbody
Discharge Waterbody Name	KnocknaESDderee_010 (KnocknaESDderee River)
Discharge Waterbody Code	IE_SW_19K630910
Water Body Ecological Status (cycle 3 2016-2021)	Good
Waterbody Risk Status and Category (2022)	Not At Risk
High Status Objective List	No

Topic	Baseline environment
Length of river from discharge to estuary (approximate)	2.70 km
Proximity to public water abstractions including regulated and unregulated GWS	N/A
Priority Areas for Action list RBMP	No
Proximity to Shellfish Waters	Rostellan South Shellfish Waters at more than 4 km south west, downstream from the plant and discharge. Rostellan North Shellfish Waters at more than 4.5 km west, downstream from the plant and discharge.
Proximity to Bathing Waters	No designated Bathing Waters located in the proximity to the discharge.
Proximity to European Designated Sites (SPA, SAC)	Cork Harbour SPA 2.5 km downstream from the plant and discharge.
Potential to affect National (NHA, pNHA)/Ramsar designated sites and/or freshwater pearl mussel catchment?	Rostellan Lough, Aghada Shore and Poulnabibe Inlet pNHA, 2.5 km downstream from the plant and discharge.
Proximity of WwTP to residential areas/sensitive community sites	Close proximity to residential areas (within 150 m).

11.2.3 Cloyne WwTP existing and future capacity and compliance

The current treatment and hydraulic capacity of the existing WwTP have been compared to the actual current loading and the expected future requirements based on population growth consideration in terms of population equivalents (PE). For Cloyne WwTP these are presented as the current and future organic and hydraulic loadings with existing treatment capacity in Table 11-3

Table 11-3 Cloyne WwTP Current and Projected Loading and Existing Treatment Capacity

Parameter	Existing Capacity	Current Loading	2030 Projected Loading	2055 Projected Loading	2080 Projected Loading
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

The Water Quality Modelling (WQM) outputs of the current and future predicted (2030, 2055 and 2080) assimilative capacity of the current discharge waterbody are presented in Table 11-4. Furthermore, the WwTP will become non-compliant if it begins receiving flows from Saleen without corresponding upgrades. The existing wastewater treatment process is currently performing poorly and is failing to achieve the discharge requirements specified within its WWDL. The existing discharge location ESDL are not expected to be more stringent in the future (Table 11-4).

Table 11-4 Cloyne WwTP Current WWDL Emission Limit Values (ELVs) and Projected Environmentally Sustainable Discharge Limits (ESDL)

Parameter	Existing ELVs	2030 Projected ESDL	2055 Projected ESDL	2080 Projected ESDL
BOD (mg/l)	25	25	25	25
TN (mg/l)	45	45	45	45
TP (mg/l)	2.5	2.5	2.5	2.5
More Stringent?	-	N	N	N

The network assessment has identified flooding and surcharging in the main trunk sewer of the network under both 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.

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.

11.2.4 Cloyne Coarse screening

Cloyne WwTP SEA coarse screening assessment of options summary is presented in Table 11-5.

Table 11-5 Cloyne Coarse Screening Assessment Summary

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
A0 Do Nothing - Counterfactual	N	N	N	Option has been screened out at technical stage as the existing WwTP is currently over capacity and is not achieving the discharge requirements as set in the WWDL.

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
A1 Minimal Upgrade - Process Optimisation	N/A Option screened out at technical assessment stage.			
A2 Reuse Existing Plant and Upgrade - Existing Discharge	Y	N/A	N/A	Limited works within existing site likely not to limited environmental effects and standard mitigation measures would apply.
A3 Reuse Existing Plant and Upgrade - Alternative Discharge	N/A Option screened out at technical assessment stage.			
A4 New Treatment Process/Plant Upgrade on Existing Site	N/A	Y	Y	Uncertainties around the scale of works needed for a new treatment process on site and extent of associated impacts and potential for a new discharge location.
A5 New Greenfield Site	N/A Option screened out at technical assessment stage.			
A6 Untreated Wastewater Load Transfer Solution	Y	Y	Y	Pipeline (to Whitegate/Aghada WwTP) work along an existing road likely to have minimal impacts and standard mitigation measures would apply. However, pipeline partially runs through pNHA and a border of a SPA, requiring a detailed assessment and route alignment.

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening
- N/A – Not environmentally assessed

11.2.5 Cloyne Fine screening scoring

Cloyne WwTP SEA fine screening assessment of options scores are presented in Table 11-6.

Table 11-6 Cloyne WwTP 2080 Fine Screening Assessment Scores

Criteria	A0 Do Nothing - Counterfactual	A4 New Treatment Process/Plant Upgrade on Existing Site	A6 Untreated Wastewater Load Transfer Solution
Planning & Regulation	0	1	1
Impact on Customers	-2	1	2
Community Support, Health and Wellbeing	-3	1	2
Water environment	-3	2	3
Biodiversity	-3	2	2
GHG Emissions	0	0.5	0.5
Energy efficiency	-3	2	2
Climate resilience	0	1	1
Circular economy	0	-1	1
Environmental combined score	Worst		Best
Overall combined score	N/A	2.79	2.56
Overall rank	N/A	1st	2nd

11.2.6 Cloyne Fine screening results

Table 11-7 presents options that ranked highest using the MCA fine screening process.

Table 11-7 Cloyne WwTP 2080 Implementation Fine Screening 1st and 2nd Ranked Options

Design Horizon	1st Ranked Option	2nd Ranked Option
2080	A4: New Treatment Process on Site w/ New Discharge Location with New Marine Outfall Best overall score due to circular economy.	A6: Untreated Wastewater Load Transfer to Whitegate- Aghada

Design Horizon	1st Ranked Option	2nd Ranked Option
		Best environmental score due to removal of discharge to benefit approximately 2.70km of Good Status river.

11.2.7 Cloyne Wastewater network upgrade proposals

The network proposals include works to address SWO compliance to minimise potential for untreated spills to the environment and avoiding network surcharging and flooding. The upgrades are proposed for the 2030 strategy horizon unless otherwise stated. The works are detailed in Appendix 4 to the CWS and include for Cloyne:

- Improvements to storage at existing pumping station sites;
- Storm tank enhancement to improve storage capacity;
- Existing sewer system upgrade to provide additional network capacity.

These works are expected to be undertaken within existing the sites or along existing pipeline networks.

11.3 Saleen

11.3.1 Saleen WwTP location

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 (Figure 11-3). A planning assessment identified map-based objectives to the northeast and southwest of the site, though there are no zoning constraints and the the site is close to Flood Zones A and B. The site is located approximately 100m from the Cork Harbour SPA and Rostellan Lough, Aghada Shore And Poulnabibe Inlet pNHA and upstream of mudflat and salt marsh habitats.

Figure 11-3 Saleen WwTP Site

11.3.2 Saleen Environmental baseline

The environmental constraints for the Saleen Village septic tank are presented in Figure 11-4.

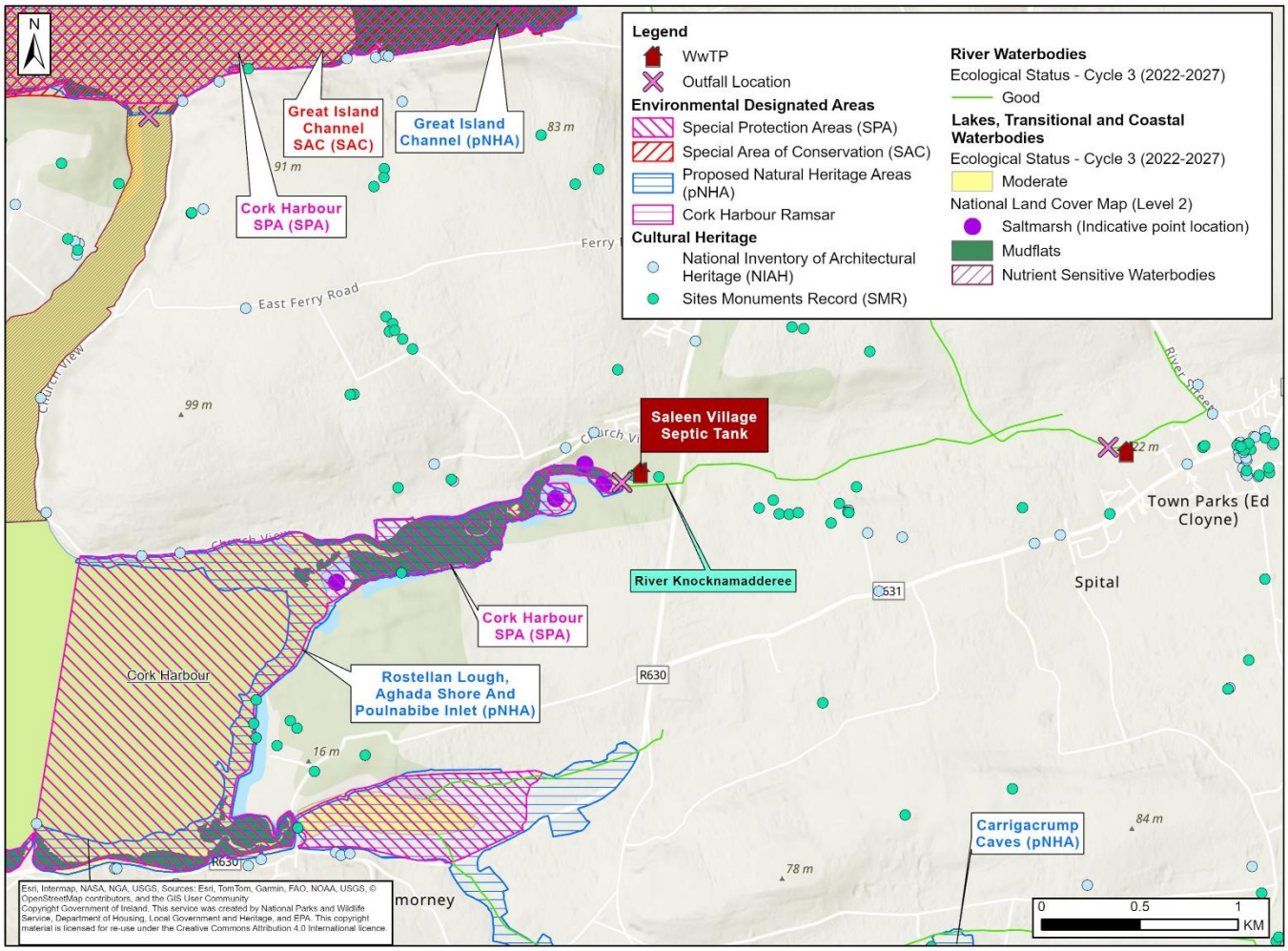

Figure 11-4 Environmental constraints for Saleen WwTP

Water Framework Directive water quality and biodiversity baseline information for the current discharge location is summarised in Table 11-8.

Table 11-8 Current Saleen WwTP discharge location summary

Topic	Baseline environment
Discharge Waterbody Type	River waterbody, which after 70 m changes into transitional/coastal Cork Harbour
Discharge Waterbody Name	KnocknaESDderee_010/Cork Harbour
Discharge Waterbody Code	IE_SW_19K630910/IE_SW_060_0000
Water Body Ecological Status (cycle 3 2016-2021)	Good/Moderate
Waterbody Risk Status and Category (2022)	Not At Risk / At Risk Urban run-off
High Status Objective List	No

Topic	Baseline environment
Length of river from discharge to estuary (approximate)	0.07 km
Proximity to public water abstractions including regulated and unregulated GWS	N/A
Priority Areas for Action list RBMP	No
Proximity to Shellfish Waters	Rostellan South Shellfish Waters at approximately 2 km south west, downstream from the plant and discharge. Rostellan North Shellfish Waters 2 km downstream from the plant and discharge.
Proximity to Bathing Waters	No bathing waters located in the proximity of the discharge. Fountainstown Blue Flag and Green Coast Beach – at approximately 14 km south west, downstream from the plant and discharge.
Proximity to European Designated Sites (SPA, SAC)	Plant discharges into Cork Harbour SPA and is located at 0.1 km east from the SPA Plant is located 80 m upstream of mudflat and salt marsh habitats.
Potential to affect National (NHA, pNHA)/Ramsar designated sites and/or freshwater pearl mussel catchment?	Plant discharges into Rostellan Lough, Aghada Shore And Poulnabibe Inlet pNHA and is located 0.1 km from the pNHA.
Proximity of WwTP to residential areas/sensitive community sites	Close proximity to residential areas (within 200 m), schools (within 600 m) and recreational/community areas (within 500 m).

11.3.3 Saleen WwTP existing and future capacity and compliance

The current treatment and hydraulic capacity of the existing WwTP have been compared to the actual current loading and the expected future requirements based on population growth consideration in terms of population equivalents (PE). For Saleen WwTP these are presented as the current and future organic and hydraulic loadings with existing treatment capacity in Table 11-9.

Table 11-9 Saleen WwTP Current and Projected Loading and Existing Treatment Capacity

Parameter	Existing Capacity	Current Loading	2030 Projected Loading	2055 Projected Loading	2080 Projected Loading
Organic Loading (PE)	40	605	891	1,032	1,158
Peak Hydraulic Loading (m^3/d)	-	-	512	593	666

The Water Quality Modelling (WQM) outputs of the current and future predicted (2030, 2055 and 2080) assimilative capacity of the current discharge waterbody are presented in Table 11-9. Saleen WwTP is currently served by a small septic tank which has become overloaded as the population of Saleen has increased. Although the plant is achieving the discharge requirements specified within its WWDL, the existing wastewater treatment process is currently performing very poorly. The existing discharge location ESDLs are not expected to be more stringent in the future (Table 11-9).

Table 11-10 Saleen WwTP Current WWDL Emission Limit Values (ELVs) and Projected Environmentally Sustainable Discharge Limits (ESDL)

Parameter	Existing WWDL ELVs	2030 Projected ESDL	2055 Projected ESDL	2080 Projected ESDL
BOD (mg/l)	25	25	25	25
TN (mg/l)	30	30	30	30
TP (mg/l)	2.5	2.5	2.5	2.5
More Stringent?	-	N	N	N

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. Future scenarios show a worsening trend, with increased levels of network flooding and surcharging.

There are no emergency overflows upstream (or within) the WwTP.

11.3.4 Saleen Coarse screening

Saleen WwTP SEA coarse screening assessment of options summary is presented in Table 11-11.

Table 11-11 Saleen WwTP Coarse Screening Assessment Summary

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments

A0 Do Nothing - Counterfactual	N	N	N	Option has been screened out at technical stage as the existing WwTP is currently over capacity.
A1 Minimal Upgrade - Process Optimisation	N/A Option screened out at technical assessment stage.			
A2 Reuse Existing Plant and Upgrade - Existing Discharge	N/A Option screened out at technical assessment stage.			
A3 Reuse Existing Plant and Upgrade - Alternative Discharge	N/A Option screened out at technical assessment stage.			
A4 New Treatment Process/Plant Upgrade on Existing Site	N/A Option screened out at technical assessment stage.			
A5 New Greenfield Site	Y	Y	Y	Uncertainty due to relocation of new plant and site not identified (but with existing discharge).
A6 Untreated Wastewater Load Transfer Solution	Y	Y	Y	Option considers two transfers: to Cloyne WwTP and to Whitegate & Agahda WwTP. Pipeline is indicated as routed largely along an existing road and likely to have minimal impacts and standard mitigation measures would apply. However, pipeline also partly passed close to the boundary of an SPA and through pNHA requiring a detailed assessment and alignment.

11.3.5 Saleen Fine screening scoring

Saleen WwTP SEA fine screening assessment of options scores are presented in Table 11-12.

Table 11-12 Saleen WwTP 2080 Fine Screening Assessment Scores

Criteria	A0 Do Nothing - Counterfactual	A5 New Greenfield Site With Existing Discharge Location	A6 Untreated Wastewater Load Transfer Solution (to Cloyne WwTP)	A6 Untreated Wastewater Load Transfer Solution (to Whitegate & Agahda WwTP)
Planning & Regulation	0	-1	-1	-1
Impact on Customers	-3	1	3	3
Community Support, Health and Wellbeing	-3	1	3	3
Water environment	-3	1	2	3
Biodiversity	-3	-2	-1	-1
GHG Emissions	0	-1	0	0
Energy efficiency	0	2	3	3
Climate resilience	0	1	2	2
Circular economy	0	-2	-1	-1
Environmental combined score	Worst			Best
Overall combined score	N/A	2.59	3.38	3.31
Overall rank	N/A	3rd	1st	2nd

11.3.6 Saleen Fine screening results

Table 11-13 presents options that ranked highest using the MCA fine screening process.

Table 11-13 Saleen WwTP 2080 Implementation Fine Screening 1st, 2nd and 3rd Ranked Options

Design Horizon	1st Ranked Option	2nd Ranked Option	3rd Ranked Option
2080	Option A6: Untreated Wastewater Load Transfer to Cloyne WwTP Best overall score due to whole life and CAPEX costs.	Option A6: Untreated Wastewater Load Transfer to Whitegate & Aghada WwTP Best environmental score due to the discharge transfer to the marine discharge at Whitegate & Aghada as it's a large coastal waterbody with large dilution effects.	Option A5: New Greenfield Site With Existing Discharge Location

11.3.7 Saleen Wastewater network upgrade proposals

The network proposals include works to address SWO compliance to minimise potential for untreated spills to the environment and avoiding network surcharging and flooding. The upgrades are proposed for the 2030 strategy horizon unless otherwise stated. The works are detailed in Appendix 4 to the draft CWS and include for Saleen:

- Improvements to storage at existing pumping station sites;
- Existing sewer system upgrade to provide additional network capacity.

These works are expected to be undertaken within existing the sites or along existing pipeline networks.

11.4 North Cobh

11.4.1 North Cobh WwTP location

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 existing wastewater treatment process is achieving the discharge requirement specified within the WWDL.

Figure 11-5 North Cobh WwTP Site

11.4.2 North Cobh Environmental baseline

The environmental constraints for the North Cobk WvTP are presented in Figure 11-6.

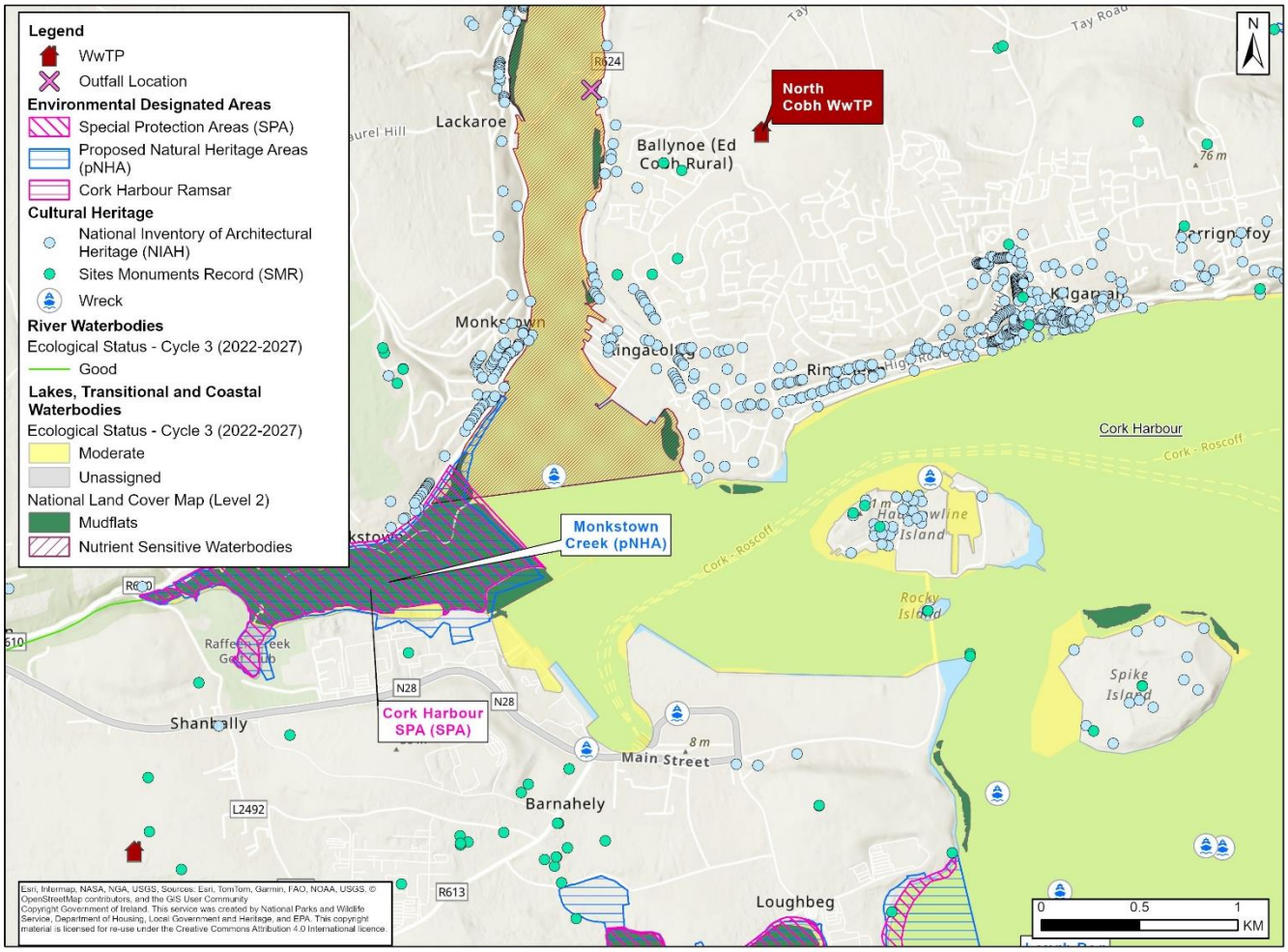

Figure 11-6 Environmental constraints for North Cobh WwTP

Water Framework Directive water quality and biodiversity baseline information for the current discharge location is summarised in Table 11-14.

Table 11-14 Current North Cobh WwTP discharge location summary

Topic	Baseline environment
Discharge Waterbody Type	Transitional waterbody
Discharge Waterbody Name	Lough Mahon
Discharge Waterbody Code	IE_SW_060_0750
Water Body Ecological Status (cycle 3 2016-2021)	Moderate
Waterbody Risk Status and Category (2022)	At Risk: Urban Waste Water
High Status Objective List	No

Topic	Baseline environment
Length of river from discharge to estuary (approximate)	N/A
Proximity to public water abstractions including regulated and unregulated GWS	N/A
Priority Areas for Action list RBMP	No
Proximity to Shellfish Waters	No Shellfish Waters downstream from the plant and discharge.
Proximity to Bathing Waters	No designated Bathing Waters located in the proximity of the discharge. Fountainstown Blue Flag and Green Coast Beach – at approximately 10 km , downstream from the discharge.
Proximity to European Designated Sites (SPA, SAC)	Cork Harbour SPA 2.4 km downstream from the discharge. Cork Harbour Ramsar site at more than 4 km downstream from the discharge.
Potential to affect National (NHA, pNHA)/Ramsar designated sites and/or freshwater pearl mussel catchment?	Monkstown Creek pNHA 1.6 km downstream from the discharge. Lough Beg (Cork) pNHA site more than 4 km downstream from the discharge.
Proximity of WwTP to residential areas/sensitive community sites	WwTP is in close proximity to residential areas (within 160 m), schools (within 500 m) and recreational/community areas (within 400 m).

11.4.3 North Cobh WwTP existing and future capacity and compliance

The current treatment and hydraulic capacity of the existing WwTP have been compared to the actual current loading and the expected future requirements based on population growth consideration in terms of population equivalents (PE). For North Cobh WwTP these are presented as the current and future organic and hydraulic loadings with existing treatment capacity in Table 11-15.

Table 11-15 North Cobh WwTP Current and Projected Loading and Existing Treatment Capacity

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

The Water Quality Modelling (WQM) outputs of the current and future predicted (2030, 2055 and 2080) assimilative capacity of the current discharge waterbody are presented in Table 11-16. Although the plant is achieving the discharge requirements, the existing WwTP will be over capacity in the future and not achieving the discharge requirements as set in the WWDL. The existing discharge location ESDLs are not expected to be more stringent in the future (Table 11-16).

Table 11-16 North Cobh WwTP Current WWDL Emission Limit Values (ELVs) and Projected Environmentally Sustainable Discharge Limits (ESDL)

Parameter	Existing WWDL ELVs	2030 Projected ESDL	2055 Projected ESDL	2080 Projected ESDL
BOD (mg/l)	25	25	25	25
TN (mg/l)	25	25	25	25
MRP (mg/l)	2.5	2.5	2.5	2.5
More Stringent?	-	N	N	N

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.

11.4.4 North Cobh Coarse screening

North Cobh WwTP SEA coarse screening assessment of options summary is presented in Table 11-17.

Table 11-17 North Cobh WwTP Coarse Screening Assessment Summary

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
A0 Do Nothing - Counterfactual	N/A Option screened out at technical assessment stage.			
A1 Minimal Upgrade - Process Optimisation	Y	Y	N	Limited works within existing site likely not to have impacts and standard mitigation measures would apply.

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
A2 Reuse Existing Plant and Upgrade - Existing Discharge	N	Y	N	Limited works within existing site likely not to have impacts and standard mitigation measures would apply.
A3 Reuse Existing Plant and Upgrade - Alternative Discharge	N/A Option screened out at technical assessment stage.			
A4 New Treatment Process/Plant Upgrade on Existing Site	N	N	Y	Uncertainties around the scale of works needed for a new treatment process on site and new discharge location.
A5 New Greenfield Site	N	N	Y	Uncertainty due to relocation of new plant and new discharge location.
A6 Untreated Wastewater Load Transfer Solution	Y	Y	Y	Pipeline (to Lower Cork harbour WwTP) work running along an existing road likely to have minimal impacts and standard mitigation measures would apply.

11.4.5 North Cobh Fine screening scoring

North Cobh WwTP SEA fine screening assessment of options scores are presented in Table 11-18.

Table 11-18 North Cobh WwTP 2080 Fine Screening Assessment Scores

Criteria	A0 Do Nothing - Counterfactual	A4 New Treatment Process on Current Site	A5 New Greenfield Plant	A6 Untreated Wastewater Load Transfer to Cork Lower Harbour WwTP via existing Cobh wastewater network
Planning & Regulation	0	1	-1	2

Criteria	A0 Do Nothing - Counterfactual	A4 New Treatment Process on Current Site	A5 New Greenfield Plant	A6 Untreated Wastewater Load Transfer to Cork Lower Harbour WwTP via existing Cobh wastewater network
Impact on Customers	-2	-2	2	3
Community Support, Health and Wellbeing	-2	-2	1	3
Water environment	-2	2	3	3
Biodiversity	-3	-1	-2	2
GHG Emissions	0	0	-0.5	1
Energy efficiency	-3	2	2	3
Climate resilience	0	2	1	3
Circular economy	0	-1	-1	1
Environmental combined score				
Overall combined score	1.31	2.56	2.09	3.36
Overall rank	N/A	2nd	3rd	1st

11.4.6 North Cobh Fine screening results

Table 11-19 presents options that ranked highest using the MCA fine screening process.

Table 11-19 North Cobh WwTP 2080 Implementation Fine Screening 1st, 2nd and 3rd Ranked Options

Design Horizon	1st Ranked Option	2nd Ranked Option	3rd Ranked Option
2080	A6 Untreated Wastewater Load Transfer to Cork Lower Harbour WwTP via existing Cobh wastewater network	A4 New Treatment Process on Current Site	A5 New Greenfield Plant

11.4.7 North Cobh Wastewater network upgrade proposals

The upgrades are proposed for the 2055 strategy horizon unless otherwise stated. The works are detailed in Appendix 4 to the CWS and include for North Cobh:

- Proposed WwTP decommissioning and flow diversion
- Proposed new WwPS with an approx. 2 km rising main to Cobh Village and a new storage arrangement

These works are expected to be undertaken within existing the sites or along existing pipeline networks.

11.5 Whitegate and Aghada

11.5.1 Whitegate & Aghada WwTP location

The town of Whitegate & Aghada is located in East County Cork (Figure 11-7). The agglomeration is currently sub-divided into four drainage areas and does not have a sewage treatment works in place. The area consists of four settlements: Whitegate, Upper Aghada, Lower Aghada and Rostellan, which are located along the east coast of Cork Harbour. The performance of the Whitegate-Aghada WwTP has not been evaluated at this stage, as the facility is currently undergoing significant redevelopment, with a new treatment plant in the design and construction phase.

Figure 11-7 Whitegate and Aghada WwTP Site

11.5.2 Whitegate & Aghada Environmental baseline

The environmental constraints for the Whitegate and Aghada WwTP are presented in Figure 11-8.

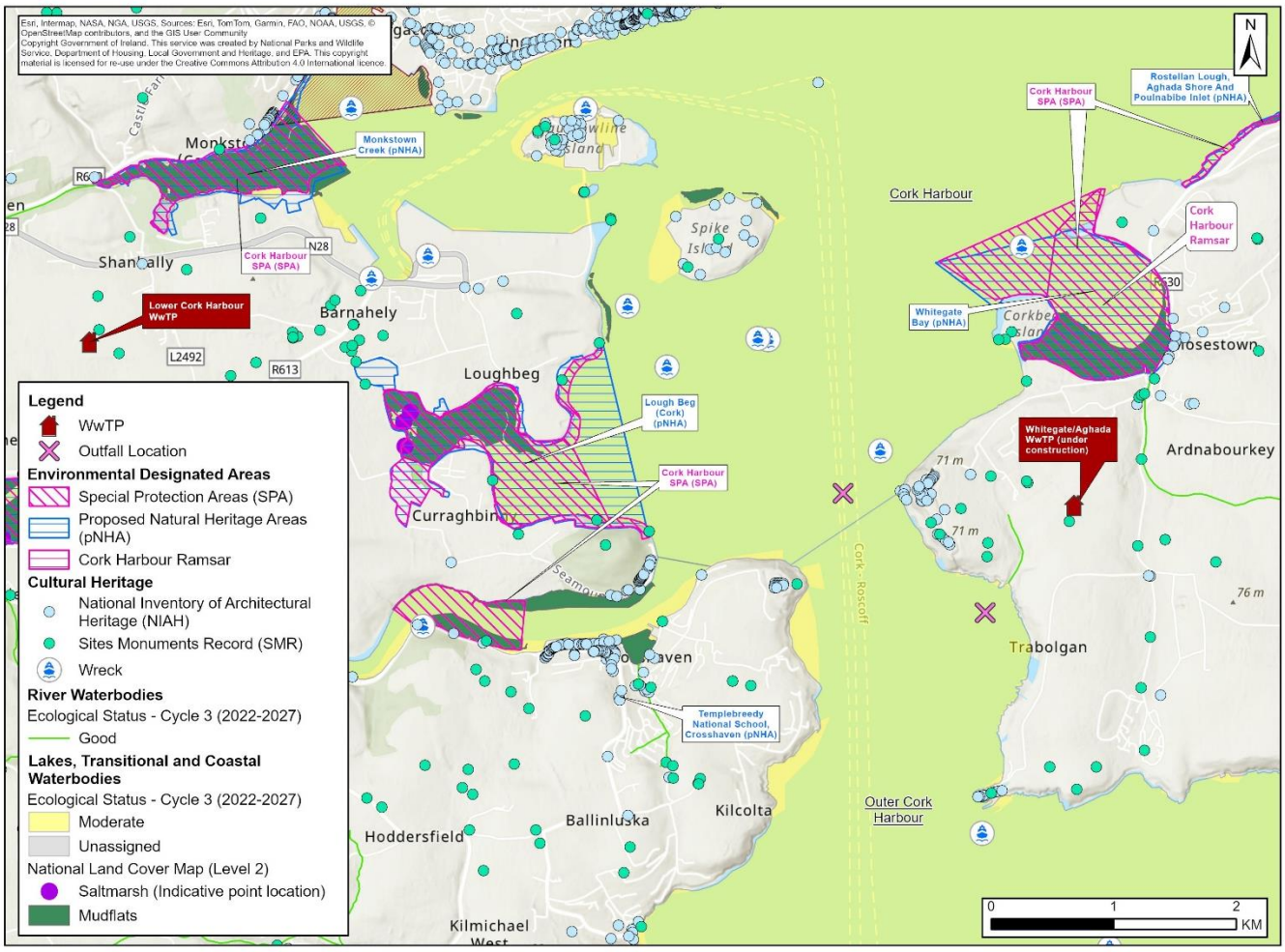

Figure 11-8 Environmental constraints for the Whitegate and Aghada WwTP.

Water Framework Directive water quality and biodiversity baseline information for the current discharge location is summarised in Table 11-20 .

Table 11-20 Current Whitegate and Aghada WwTP discharge location summary

Topic	Baseline environment
Discharge Waterbody Type	Coastal waterbody
Discharge Waterbody Name	Outer Cork Harbour
Discharge Waterbody Code	IE_SW_050_0000
Water Body Ecological Status (cycle 3 2016-2021)	Moderate
Waterbody Risk Status and Category (2022)	Not At Risk
High Status Objective List	No

Topic	Baseline environment
Length of river from discharge to estuary (approximate)	N/A
Proximity to public water abstractions including regulated and unregulated GWS	N/A
Priority Areas for Action list RBMP	No
Proximity to Shellfish Waters	No Shellfish Waters located in the direct pathway/downstream of the discharge
Proximity to Bathing Waters	No Bathing Waters located in the proximity/direct pathway of the discharge.
Proximity to European Designated Sites (SPA, SAC)	No SPA nor SAC sites in proximity/direct pathways to current site and discharge. (closest Cork Harbour SPA 1 km north of plant).
Potential to affect National (NHA, pNHA)/Ramsar designated sites and/or freshwater pearl mussel catchment?	No NHA/pNHA sites in proximity/direct pathways to current site and discharge (closest Whitegate Bay pNHA 1 km north of plant).
Proximity of WwTP to residential areas/sensitive community sites	Close proximity to residential areas (within 400 m).

11.5.3 Whitegate & Aghada WwTP existing and future capacity and compliance

The current treatment and hydraulic capacity of the existing WwTP have been compared to the actual current loading and the expected future requirements based on population growth consideration in terms of population equivalents (PE). For Whitegate and Aghada WwTP these are presented as the current and future organic and hydraulic loadings with existing treatment capacity in Table 11-21.

Table 11-21 Whitegate and Aghada WwTP Current and Projected Loading and Existing Treatment Capacity

Parameter	Existing Capacity	Current Loading	2030 Projected Loading	2055 Projected Loading	2080 Projected Loading
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

The Water Quality Modelling (WQM) outputs of the current and future predicted (2030, 2055 and 2080) assimilative capacity of the current discharge waterbody are presented in Table 11-22. The existing discharge location ESDLs are not expected to be more stringent in the future (Table 11-22).

Table 11-22 Strategy Water Quality Modelling (WQM) outputs

Parameter	Existing WWDL ELVs	2030 Projected ESD	2055 Projected ESD	2080 Projected ESD
BOD (mg/l)	25	25	25	25
TN (mg/l)	54	54	54	54
TP (mg/l)	2.5	2.5	2.5	2.5
More Stringent?	-	N	N	N

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.

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.

11.5.4 Whitegate & Aghada Coarse screening

Whitegate and Aghada WwTP SEA coarse screening assessment of options summary is presented in Table 11-23.

Table 11-23 Whitegate and Aghada Coarse Screening Assessment Summary

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
A0 Do Nothing - Counterfactual	N	N	N	Option has been screened out at technical stage the existing WwTP is currently over capacity and the existing process treatment type is insufficient to meet the requirements of the future strategy.
A1 Minimal Upgrade - Process Optimisation	N/A Option screened out at technical assessment stage.			
A2 Reuse Existing Plant and Upgrade - Existing Discharge	Y	Y	N	Works limited and within site so impacts likely to be mitigated with standard measures.
A3 Reuse Existing Plant and Upgrade - Alternative Discharge	N/A Option screened out at technical assessment stage.			
A4 New Treatment Process/Plant Upgrade on Existing Site	N/A	N/A	Y	Uncertainties around the scale of works needed for a new treatment process on site.
A5 New Greenfield Site	N/A Option screened out at technical assessment stage.			
A6 Untreated Wastewater Load Transfer Solution	N/A Option screened out at technical assessment stage.			

11.5.5 Whitegate & Aghada Fine screening scoring

Fine screening was not 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. Option A2 was not considered as the current treatment process is unlikely

to provide the required treatment efficiency requirements to meet projected ESD limits. Consequently, a fine screening using the Multi-Criteria Analysis (MCA) approach was not conducted.

11.5.6 Whitegate & Aghada Wastewater network upgrade proposals

The network proposals include works to address SWO compliance to minimise potential for untreated spills to the environment and avoiding network surcharging and flooding. The upgrades are proposed for the 2030 strategy horizon unless otherwise stated. The works are detailed in Appendix 4 to the CWS and include for Whitegate & Aghada:

- Improvements to storage at existing pumping station sites;
- Additional storage and storm tank;
- Existing sewer system upgrade to provide additional network capacity.

These works are expected to be undertaken within existing the sites or along existing pipeline networks.

11.6 Sub catchment 10: Feasible Approach selection and implementation

A list of Feasible Approaches is presented in Table 11-24.

Table 11-24 Feasible Approaches for Ballymore WwTP, Cloyne WwTP, Saleen WwTP, North Cobh WwTP and Whitegate and Aghada WwTP.

Approach	Horizon	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
Ballymore WwTP	2030	Construct untreated wastewater transfer to Cobh network (4km) and associated Pumping Station	Construct untreated wastewater transfer to Cobh network (4km) and associated Pumping Station	Construct new 500 PE WwTP and new FE discharge to Cork Harbour (0.5km land and 0.5km outfall).
	2055	Continue to operate WwPS.	Continue to operate WwPS.	Continue to operate WwTP.
	2080	Continue to operate WwPS.	Continue to operate WwPS.	500PE WwTP capital replacement with additional 50PE upsizing.
Cloyne WwTP	2030	3,600PE upgrade of existing WwTP. Construct new FE transfer and outfall to Rostellan.	Construct untreated WW transfer to Whitegate-Aghada WwTP (6.2km).	3,600PE upgrade of existing WwTP. Construct new FE transfer and outfall to Rostellan.
	2055	Continue to operate WwTP.	Continue to operate WwPS.	Continue to operate WwTP.
	2080	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.

Approach	Horizon	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
Saleen WwTP	2030	Decommission existing WwTP. Construct untreated WW transfer to Cloyne WwTP (4.5km) and associated PS.	Construct untreated WW transfer and connect to Cloyne to Whitegate-Aghada WwTP transfer line (1.1km)	Decommission existing WwTP. Construct untreated wastewater transfer to Cloyne WwTP (4.5km)
	2055	Continue to operate WwPS.	Continue to operate WwPS.	Continue to operate WwPS.
	2080	Continue to operate WwPS.	Continue to operate WwPS.	Continue to operate WwPS.
North Cobh WWTP	2030	Continue to operate WwTP	Continue to operate WwTP	Continue to operate WwTP
	2055	Option A6: Decommission existing WwTP, construct new WwPS to connect to Cobh wastewater network (for treatment at Cork Lower Harbour WwTP)	Option A6: Decommission existing WwTP, construct new WwPS to connect to Cobh wastewater network (for treatment at Cork Lower Harbour WwTP)	Option A6: Decommission existing WwTP, construct new WwPS to connect to Cobh wastewater network (for treatment at Cork Lower Harbour WwTP)
	2080	Continue to operate WwPS	Continue to operate WwPS	Continue to operate WwPS
Whitegate and Aghada WwTP	2030	1,500 PE upgrade of existing WwTP.	5,000 PE upgrade of existing WwTP.	1,500 PE upgrade of existing WwTP.
	2055	Continue to operate WwTP.	Upgrade WwTP by an additional 2,500 PE.	Continue to operate WwTP.
	2080	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.
Overall Feasible approach environmental assessment summary		**Ranked 2nd** Ballymore: The transfer (2030) will require a construction of a 4 km untreated effluent pipeline. Cloyne: Upgrade (2030 and construction of a final effluent transfer (2055) with continued	**Ranked 1st** Ballymore: The transfer (2030) will require a construction of a 4 km untreated effluent pipeline. Cloyne: The transfer (2030) will require a construction of a 6.2 km untreated effluent	**Ranked 3rd** Ballymore: New plant and new discharge (2030) with further plant upgrade (2080). Cloyne: Upgrade (2030 and construction of a final effluent transfer (2055) with continued

Approach	Horizon	Feasible Approach 1	Feasible Approach 2	Feasible Approach 3
		WwTP operation and further upgrade in 2080. Saleen: Upgrade (2030 and construction of a 4.5 km final effluent transfer (2055) will remove discharge from SPA and pNHA. North Cobh: : The transfer (2055) will require to construct a new WwPS to connect to Cobh wastewater network. Whitegate&Aghada: Two upgrades (2030 and 2080) to accommodate for demand.	pipeline which will benefit 2.7 km of Good Status Objective River. Saleen: The transfer (2030) will require a construction of a 6.2 km untreated effluent pipeline which will remove discharge from SPA and pNHA. North Cobh: : The transfer (2055) will require to construct anew WwPS to connect to Cobh wastewater network. Whitegate&Aghada: Three upgrades (2030, 2055 and 2080) to accommodate for demand.	WwTP operation and further upgrade in 2080. Saleen: Upgrade (2030 and construction of a 4.5 km final effluent transfer (2055) will remove discharge from SPA and pNHA. North Cobh: : The transfer (2055) will require to construct a new WwPS to connect to Cobh wastewater network. Whitegate&Aghada: Two upgrades (2030 and 2080) to accommodate for demand.
Overall recommended approach		**Ranked 1st** Overall best as most cost effective. Environmentally ranked second as removes two discharges from rivers and continues operation at Cloyne WwTP.	**Ranked 2nd** Environmentally ranked 1st as removes three discharges from rivers.	**Ranked 3rd** Highest cost due to construction of a new plant and. Environmentally ranked 3rd impacts associated with building a new plant.

11.7 Sub catchment 10: Recommended Approach implementation strategy

Figure 11-9 presents Recommended Approach graphic including environmental constraints.

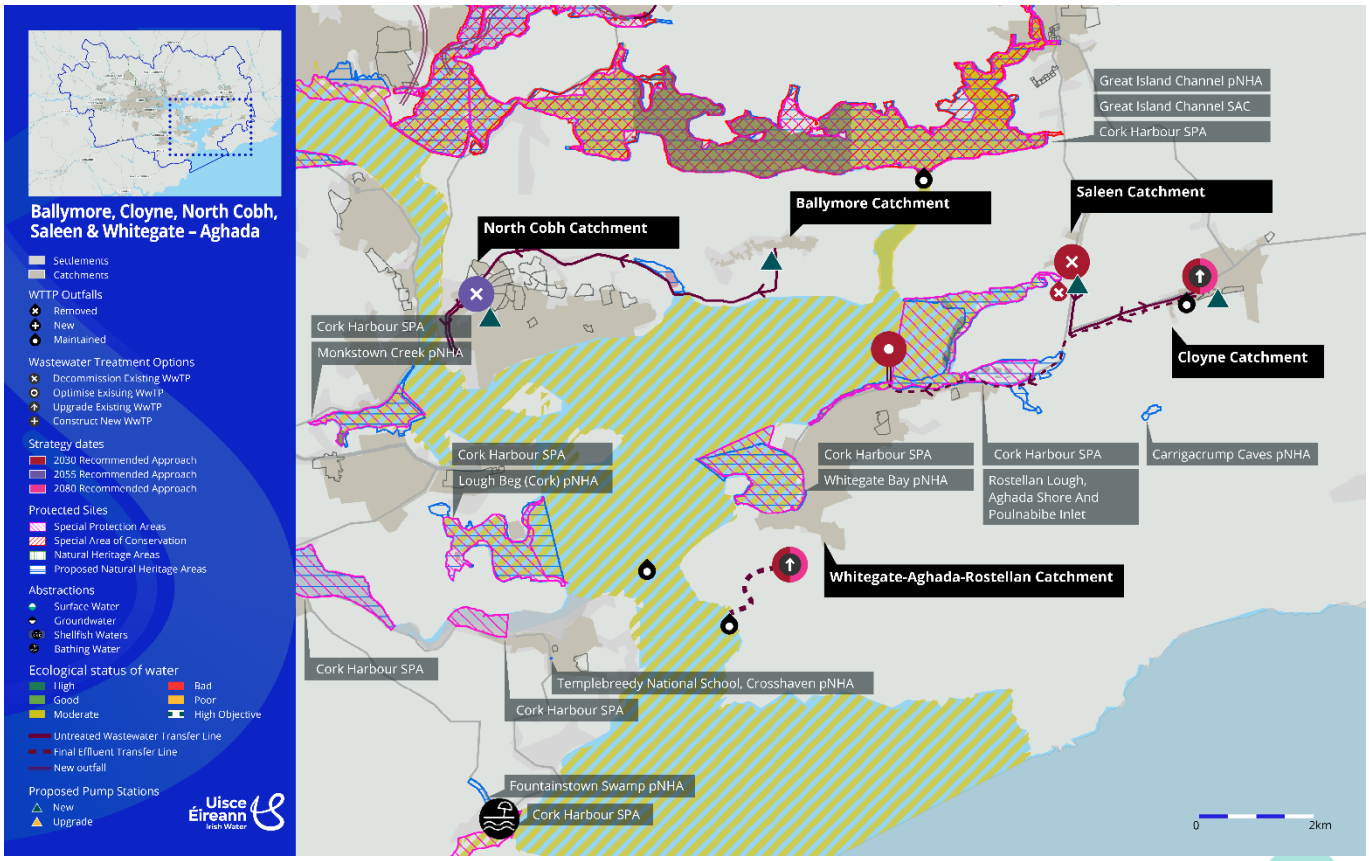

Figure 11-9 Recommended Approach Environmental Constraints for Sub catchment 10

Figure 11-10 presents the implementation strategy for the Recommended Approach for Ballymore WwTP, Cloyne WwTP, Saleen WwTP, North Cobh WvTP and Whitegate & Aghada WwTP.

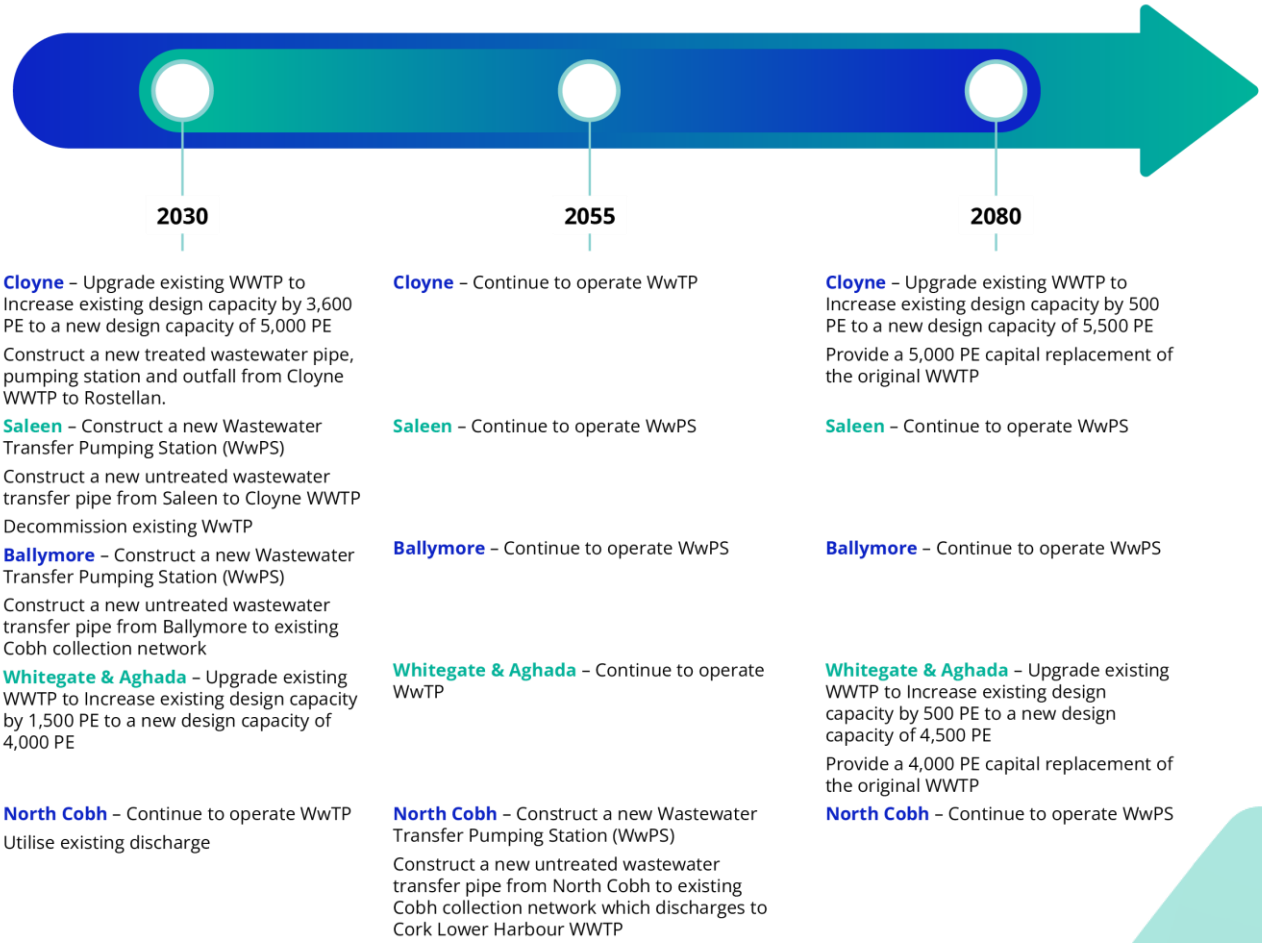

Figure 11-10 Implementation strategy for Ballymore WwTP, Cloyne WwTP, Saleen WwTP, North Cobh WvTP and Whitegate & Aghada WwTP.

11.8 Sub catchment 10: SEA Assessment of Recommended Approach

Ballymore WwTP

Table 11-25 presents the Environmental Assessment of the Recommended Approach for the Ballymore catchment.

Table 11-25 Ballymore catchment Recommended Approach Assessment Summary

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec, Health	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
	Operation	+ve	0	0	0	0	0	0	0	0	0

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec, Health	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
Current (A0)		-ve	--	--	0	--	--	0	0	0	0
2030 (A6*)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	0	0	--	--	0	--	0	--	-
	Operation	+ve	+	++	0	+	0	0	0	++	0
		-ve	0	0	0	0	-	-	0	0	0
2055 and 2080 (A6)	Same as 2030 - continue to operate pumping station. No additional works or change to operation compared to 2030.										

+ve = potential beneficial or positive effects/risk

-ve = potential negative or adverse effects/risk

*There is no existing WwTP to be decommissioned (Section 11.1), only includes the construction of the Ballymore pumping station and 4km of pipeline to the Cobh network.

The construction of the Ballymore pumping station and 4km pipeline to transfer untreated wastewater to the Cobh network (Option A6) by 2030 could have temporary short term negative impacts from construction activities in relation to the Climate Change, Geology and Soils and the Air Quality SEA Objectives. The pipeline is routed alongside the Cuskinny Marsh pNHA (001987) which could be negatively impacted and will require assessment, detailed routing and mitigation to avoid impacts. However, the long term operation of the pumping station with the decommissioning of the current wastewater management approach at Ballymore could potentially benefit the Water Environment, Biodiversity and Geology and Soils compared to continuation of the current situation. The proposed transfer to the Cork Lower Harbour (Option A6) will also provide better treatment efficiency and provide both circular economy and resource recovery benefits.

Cloyne WwTP

Table 11-26 presents the Environmental Assessment of the Recommended Approach for Cloyne WwTP.

Table 11-26 Cloyne WwTP Recommended Approach Assessment Summary

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec,	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
Current (A0)	Operation	+ve	0	0	0	0	0	0	0	0	0
		-ve	---	0	0	---	0	0	0	0	0
2030 (A3)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	--	0	--	--	0	0	-	-	-
	Operation	+ve	+	+	0	+	+	0	0	+	0
		-ve	--	-	0	--	-	-	0	-	0
2055 (A3)	Same as 2030 - continue to operate pumping station. No additional works or change to operation compared to 2030.										
2080 (A4)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	-	0	--	0	-	0	0	0	--
	Operation	+ve	+	+	0	+	+	0	0	0	0
		-ve	0	0	-	0	0	0	0	0	0

+ve = potential beneficial or positive effects/risk

-ve = potential negative or adverse effects/risk

The upgrades to the Cloyne WwTP and the construction of a new final effluent outfall at Rostellan (Option A3) to keep the plant compliant could have short term negative effects on the Water Environment and the Biodiversity with potential construction impacts. The operation of the new outfall is expected to overall have will have a positive contribution to Water Environment and Biodiversity SEA objectives as although the location is in the Rostellan Lough, Aghada Shore and Poulnabibe Inlet pNHA (001076) the discharge can meet the ESDLs at this location will replace the current Cloyne WwTP discharge location with the associated existing impacts on water quality and biodiversity and risk within the Aghada public water supply source protection area.

The transfer pipeline is routed close to a number of Cultural Heritage sites:

- 590767, freestanding cast-iron twentieth-century road sign.
- 590636, private residential property.
- 589844, private residential property.
- SMR Zone R130261 for Leper Hospital.

Saleen WwTP

Table 11-27 presents the Environmental Assessment of the Recommended Approach for Saleen WwTP.

Table 11-27 Saleen WwTP Recommended Approach Assessment Summary

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec, Health	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
Current (A0)	Operation	+ve	0	0	0	0	0	0	0	0	0
		-ve	---	-	0	---	--	---	0	--	0
2030 (A6)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	0	-	--	--	-	-	0	--	-
	Operation	+ve	++	++	0	++	+	+++	0	0	0
		-ve	0	0	-	0	-	0	0	0	0
2055 and 2080 (A6)	Same as 2030 - continue to operate pumping station. No additional works or change to operation compared to 2030.										

+ve = potential beneficial or positive effects/risk

-ve = potential negative or adverse effects/risk

The decommissioning of the septic tank at Saleen WwTP and the transfer of untreated wastewater via a newly constructed pumping station and 4.5km pipeline to Cloyne WwTP (Option A6) should ensure compliance with the projected ESDLs and improve the treatment process for wastewater originating from Saleen. The 4.5km wastewater pipeline could have negative effects on Biodiversity, Geology and Soils, and construction design and management should take account of the Aghada public water supply source protection area at Cloyne. Furthermore, the pipeline could interact with the following SMR zones and NIAHs:

- SMR zone R130280 for a church.
- SMR Zone R130261 for Leper Hospital
- NIAHs:
  - 590767, freestanding cast-iron twentieth-century road sign.
  - 590636, private residential property.
  - 589844, private residential property.

The gravity drains from the septic tank will be decommissioned benefitting the Water Environment and Biodiversity, particularly the Rostellab Lough, Aghada Shore and Poulnabibe Inlet pNHA and downstream from the effluent from the septic tank at Saleen WwTP.

North Cobh WwTP

Table 11-28 presents the Environmental Assessment of the Recommended Approach for North Cobh WwTP.

Table 11-28 North Cobh WwTP Recommended Approach Assessment Summary

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec, Health	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
Current (A0)	Operation	+ve									
		-ve	--	--		---	--			---	-
2030 (A0)	Operation	+ve									
		-ve	--	--		---	--			---	-
2055 (A6)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	-	-	--	--	-	-	0	-	0
	Operation	+ve	++	+	0	++	+	0	0	0	++
		-ve									
2080 (A6)	Same as 2055 - continue to operate pumping station. No additional works or change to operation compared to 2055.										

+ve = potential beneficial or positive effects/risk

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec, Health	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality

-ve = potential negative or adverse effects/risk

Decommissioning of the North Cobh WwTP with the removal of the discharge and the construction of the untreated wastewater transfer (Option A6) into the Cobh wastewater network in the interim period (2055) can have a positive effect supporting Water Environment and Biodiversity SEA Objectives.

These positive effects should continue through to the 2080 horizon, with the North Cobh WwPs to remain in operation through 2055 to 2080. The decommissioning of the plant could have minor negative effects with risk of stranded assets, however this can potentially be addressed through full decommissioning and by applying a circular economy approach, materials should be reused and recycled. The site could be redeveloped for alternative uses. The transfer route is indicative and will require further route alignment and assessment. Assuming that existing infrastructure can be used for crossing waterbodies and mitigation would be applied as part of the construction design, negative effects on the water environment could be minimised or fully avoided.

Whitegate and Aghada WwTP

Table 11-29 presents the Environmental Assessment of the Recommended Approach for the Whitegate and Aghada sub-catchment.

Table 11-29 Whitegate and Aghada Recommended Approach Assessment Summary

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec, Health	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
Current (A0)	Operation	+ve	0	0	0	0	0	0	0	0	0
		-ve	---	--	0	---	--	0	0	---	-
2030 (A2)	Construction	+ve	0	0	0	0	+	0	0	0	0
		-ve	0	0	--	0	0	0	0	0	-

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec, Health	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
	Operation	+ve	++	+	0	++	+	0	0	+	0
		-ve	0	0	-	0	-	0	0	0	0
2055 (A2)	Same as 2030 - continue to operate WwTP. No additional works or change to operation compared to 2030.										
2080 (A4)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	-	0	--	0	-	0	0	0	--
	Operation	+ve	++	+	0	++	+	0	0	+	0
		-ve	0	0	-	0	0	0	0	0	0

+ve = potential beneficial or positive effects/risk

-ve = potential negative or adverse effects/risk

The upgrades to the capacity at the recently constructed Whitegate and Aghada WwTP (Option A2) should ensure compliance with the projected ESDLs for the 2030 scenario with benefits for the Water Environment and Biodiversity. Due to ageing asset life, the plant will require a full capital replacement of 4,000 PE and capacity upgrade by 2080 to accommodate the projected flows (Option A4).

11.9 Sub catchment 10: Cumulative assessment

The potential cumulative or in combination adverse or beneficial effects for the Ballymore, North Cobh, Cloyne, Saleen and Whitegate and Aghada sub catchment are identified below in Table 11-30. These aim to identify where a receptor could be affected by more than one of the WwTP and network proposals within the overall sub catchment, such as proximity to works being undertaken at the same time or discharges or decommissioning affecting the same waterbody.

Table 11-30 Potential cumulative or in combination effects within Sub-catchment 10

Site/ Potential Interaction	Whitegate and Aghada	Ballymore	Cloyne

Saleen	Not in proximity for construction and no pathways for combined operational effects.	Not in proximity for construction and no pathways for combined operational effects.	Possible construction cumulative effects from the construction of the new outfall and the transfer pipeline and combined operational benefits for the water environment and biodiversity with the replacement of existing discharge locations.
Cloyne	Not in proximity for construction and no pathways for combined operational effects.	Not in proximity for construction and no pathways for combined operational effects.	
Ballymore	Not in proximity for construction and no pathways for combined operational effects.		

Key				
	No interaction or negligible cumulative effects		Potential for beneficial cumulative effects	
	Potential for adverse cumulative effects		Potential for mixed beneficial and adverse effects	

No significant cumulative effects have been identified for the Recommended Approach across the sub catchment which would require additional mitigation. The simultaneous construction of a new outfall from Cloyne to Rostellan, and a 4.5km untreated wastewater transfer pipeline from Saleen WwTP to Cloyne WwTP could have some minor negative effects such as traffic disturbance along the R630 and R631 in the Cloyne and Saleen area. However, with the application of good construction environmental practice, these effects can be minimised.

11.10 Sub catchment 10: Mitigation and enhancement

General measures include;

- Supporting awareness campaigns on challenges for WwTPs and water pollution to encourage appropriate use, and to understand the improvement works proposed and long term benefits compared to temporary disruption
- Water quality modelling identified the influence of other sources of pollution affecting water quality and aquatic biodiversity including in relation to BOD, ammonia and phosphates and support for catchment management measures aimed at reducing these sources can provide wider environmental benefits as well environmental enhancement for biodiversity and flood management. These can include measures to improve water retention, reducing nutrient run off and soil erosion. These measures can only be delivered through collaboration with other parties and landowner involvement.
- WwTP and network upgrades will need to consider in detail potential to include NBS as part of detailed design including NBS that provide additional water quality enhancement benefits.

Specific measures for Sub Catchment 9 options are set out in Table 11-31 below.

Table 11-31 Mitigation and enhancement measures for Sub Catchment 10

Agglomeration	Potential	Mitigation Measures
Ballymore WwTP	Site construction for a new pumping station and 4.5km untreated wastewater transfer pipeline to Cobh WwTP.	Standard good construction management including traffic management for pipeline construction. Detailed pipeline transfer route alignment and assessment to minimise habitat loss. Surveys and assessments depending on routing such as ecology, contaminated land, cultural heritage/archaeological interest.
Cloyne WwTP	Site construction for works upgrades and new final effluent outfall.	Standard good construction management for upgrade. Detailed outfall design and assessment to minimise habitat loss. Surveys and assessments depending on design such as ecology, contaminated land, cultural heritage/archaeological interest. Application of biodiversity net gain to address any habitat losses.
Saleen WwTP	Decommissioning septic tanks - site construction for a new pumping station and 4.5km untreated wastewater transfer pipeline to Cloyne WwTP.	Standard good construction including circular economy principles and traffic management for pipeline construction. Detailed pipeline transfer route alignment and assessment to minimise habitat loss. Surveys and assessments depending on routing such as ecology, contaminated land, cultural heritage/archaeological interest. Application of biodiversity net gain to address any losses.

Agglomeration	Potential	Mitigation Measures
North Cobh	Decommissioning WwTP and construction of new PS	Standard good construction including circular economy principles. Detailed PS design and assessment to minimise habitat loss. Surveys and assessments depending on design such as ecology, contaminated land, cultural heritage/archaeological interest. Application of biodiversity net gain to address habitat losses.
Whitegate-Aghada WwTP	Site construction for works upgrades.	Standard good construction including circular economy principles. Application of biodiversity net gain to address any habitat losses – consider potential to include enhancement on site.
Sub catchment/ common measures	N/A	N/A

12 Sub catchment 11: Ballincurrig, Leamlara and Lisgoold

12.1 Ballincurrig

12.1.1 Ballincurrig WwTP location

Ballincurrig WwTP is located approximately 1.5 km northwest of Lisgoold North WwTP (Figure 12-1). Ballincurrig is 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 process units are considered insufficient for reuse.

Therefore, Ballincurrig is to be decommissioned, and the flows are to be diverted and intercepted on the main road. A section of new gravity sewer laid along public road is proposed for the new pumping station located near Ballincurrig Bridge where flows will be pumped from Ballincurrig to Lisgoold South for treatment.

Figure 12-1 Ballincurrig WwTP Site

12.1.2 Ballincurrig Environmental Baseline

The environmental constraints at Ballincurrig are presented in Figure 12-2.

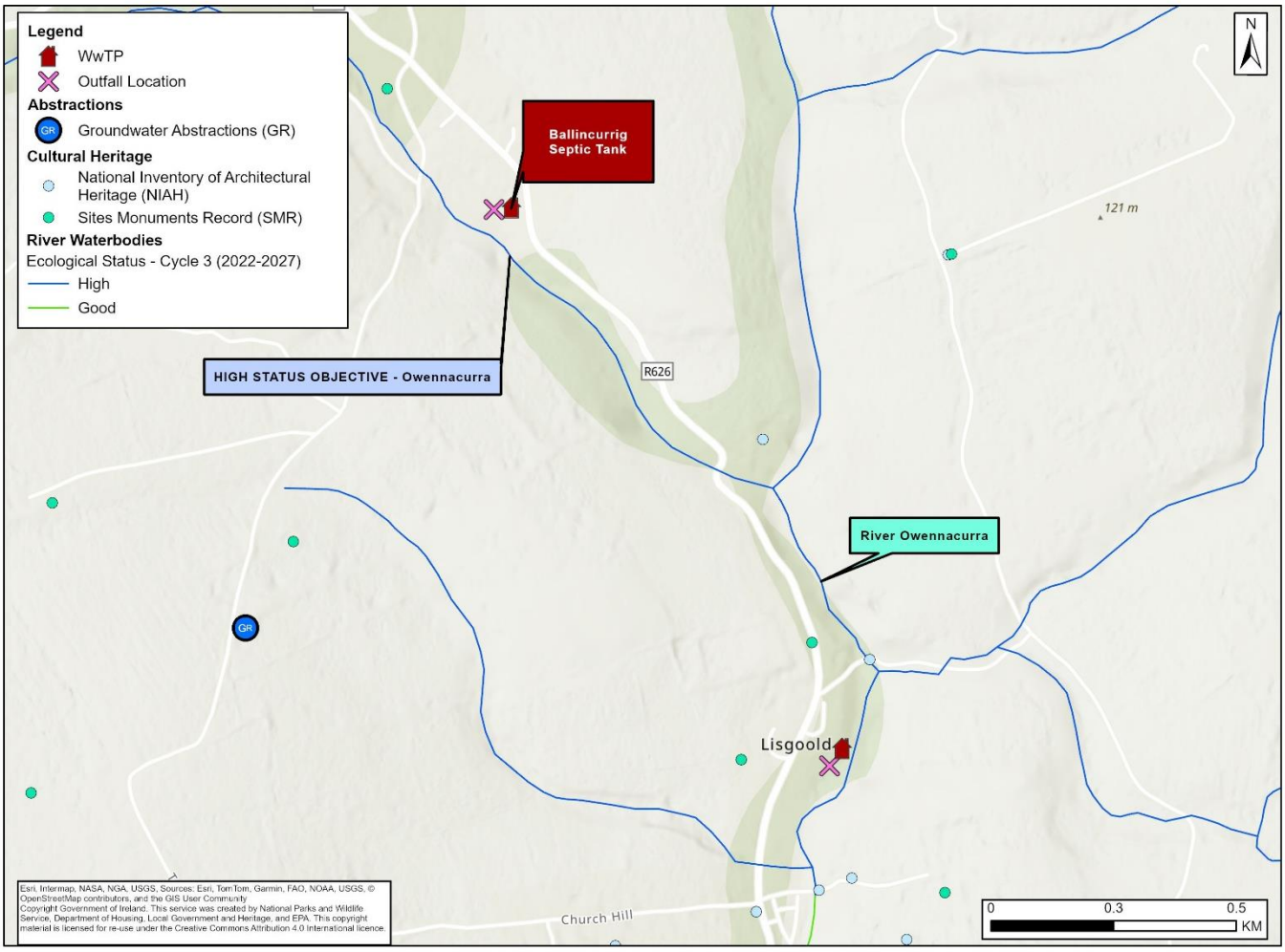

Figure 12-2 Environmental constraints for Ballincurrig.

12.2 Leamlara

Leamlara is an agglomeration not currently served by a WwTP but it is incorporated into the overall strategy. The Feasible Approaches and Recommended Approach for this sub-catchment include options and solutions for Leamlara agglomeration.

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 12-1.

Table 12-1 Projected Organic (PE) Demand of Leamlara

Parameter	2030	2055	2080
Organic Loading (PE)	685	823	930

Leamlara Option Screening

The CWS aims to identify optimal wastewater solutions for this area by 2080. As a result, only two options were identified during the coarse screening process:

- Option A5 – New Greenfield WwTP with treated effluent transfer and discharge to the Owenacurra River (at Lisgoold South WwTP);

- Option A6 – Untreated Wastewater Transfer to Lisgoold WwTP via the dedicated transfer pipeline.

Both options have gone through a technical assessment 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 UE 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.

12.3 Lisgoold North

12.3.1 Lisgoold North WwTP location

Lisgoold North WwTP is located in the northern half of the village of Lisgoold and is approximately 550m north of Lisgoold South WwTP, along the edge of an embankment, behind a housing estate in the Owenacurra Minane Bridge area (Figure 12-3). There is insufficient capacity at Lisgoold North WwTP for current loadings and the process units are considered insufficient for reuse. 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.

Figure 12-3 Lisgoold North WwTP Site

12.3.2 Lisgoold North Environmental Baseline

The environmental constraints for Lisgoold North WwTP are presented in Figure 12-4.

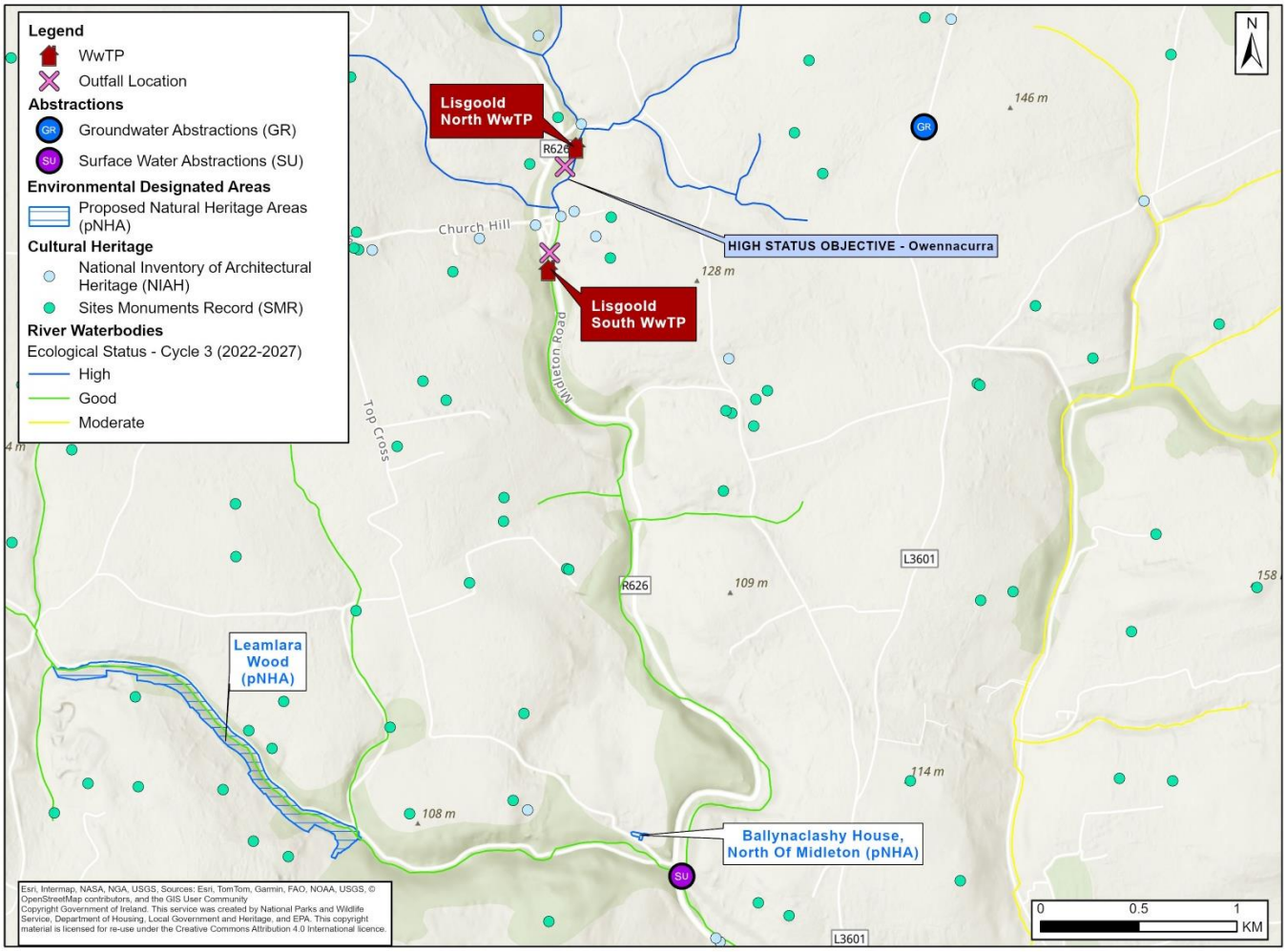

Figure 12-4 Environmental constraints for Lisgoold North WwTP.

12.4 Lisgoold South

12.4.1 Lisgoold South WwTP location

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.

Figure 12-5 Lisgoold South WwTP Site

12.4.2 Lisgoold South Environmental baseline

The environmental constraints for Lisgoold South WwTP are presented in Figure 12-6.

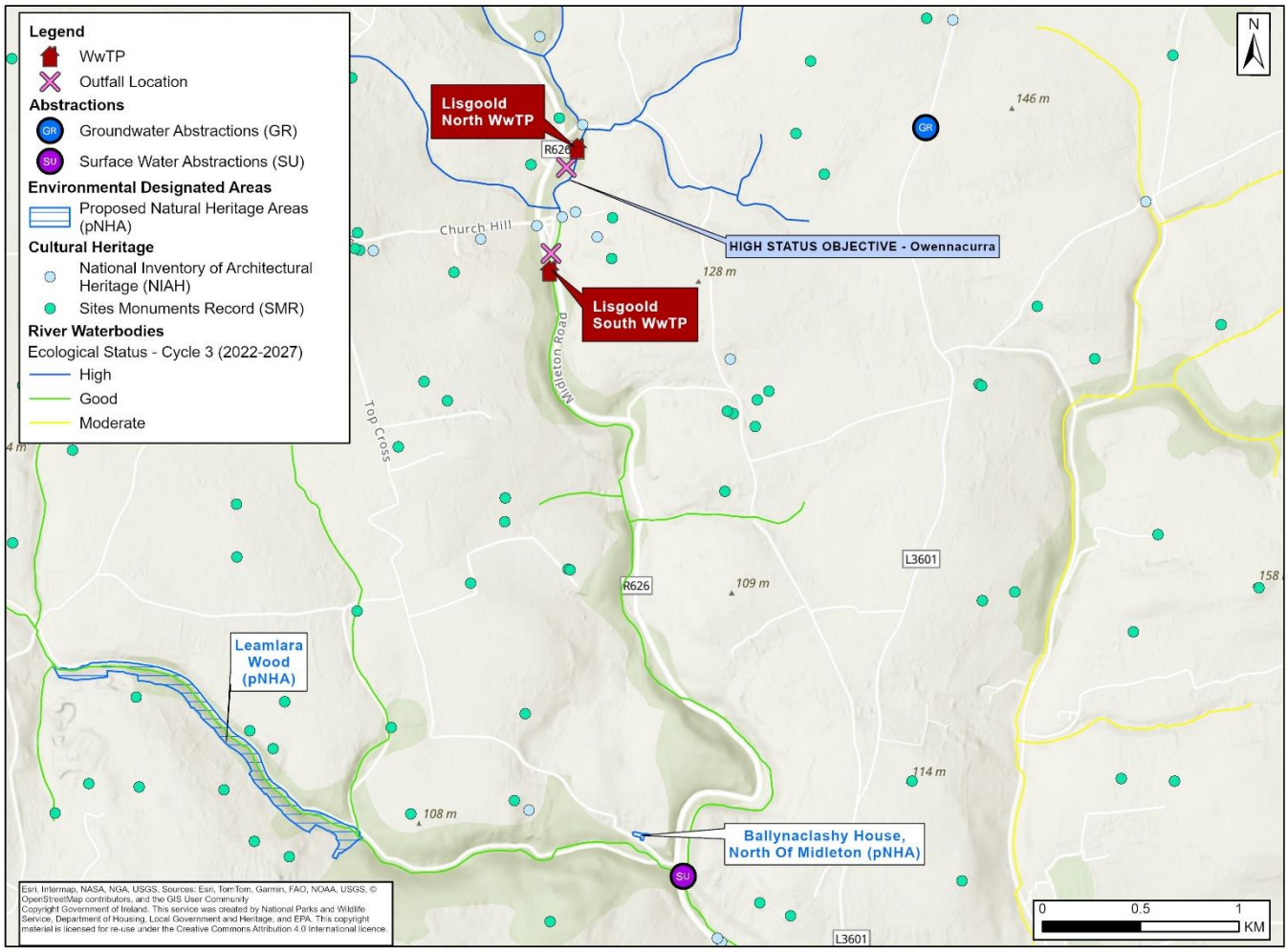

Figure 12-6 Environmental constraints for Lisgoold South WwTP.

Water Framework Directive water quality and biodiversity baseline information for the current discharge location is summarised in Table 12-2.

Table 12-2 Current Lisgoold South WwTP discharge location summary

Topic	Baseline environment
Discharge Waterbody Type	River waterbody
Discharge Waterbody Name	Owennacurra_030 (Owencurra River)
Discharge Waterbody Code	IE_SW_19O030400
Water Body Ecological Status (cycle 3 2016-2021)	Good
Waterbody Risk Status and Category (2022)	Not At Risk
High Status Objective List	No

Topic	Baseline environment
Length of river from discharge to estuary (approximate)	10.50 km
Proximity to public water abstractions including regulated and unregulated GWS	Zone3 Tibbotstown (Owenacurra River - Over Pump) – approximately 4.60 km downstream from discharge location. Zone3 Midleton (Owenacurra River) – approximately 2.70 km from Tibbotstown abstraction.
Priority Areas for Action list RBMP	No
Proximity to Shellfish Waters	No Shellfish Waters located in the direct pathway/downstream of the discharge.
Proximity to Bathing Waters	No Bathing Waters located in the proximity/direct pathway of the discharge.
Proximity to European Designated Sites (SPA, SAC)	No SPA nor SAC sites in proximity/direct pathways to current site and discharge - more than 10 km away from nearest SPA/SAC.
Potential to affect National (NHA, pNHA)/Ramsar designated sites and/or freshwater pearl mussel catchment?	No NHA/pNHA sites in proximity/direct pathways to current site and discharge.
Proximity of WwTP to residential areas/sensitive community sites	Close proximity to residential areas (within 250 m), and recreational/community areas (within 500 to 800 m).

12.4.3 Lisgoold South WwTP existing and future capacity and compliance

The current treatment and hydraulic capacity of the existing WwTP have been compared to the actual current loading and the expected future requirements based on population growth consideration in terms of population equivalents (PE). For Lisgoold South WwTP these are presented as current and future organic and hydraulic loadings with treatment capacity in Table 12-3.

Table 12-3 Lisgoold South WwTP Current and Projected Loading and Existing Treatment Capacity

Parameter	Existing Capacity	Current Loading	2030 Projected Loading	2055 Projected Loading	2080 Projected Loading
Organic Loading (PE)	500	Unknown	532	649	733
Hydraulic Loading (m^3/d)	Unknown	Unknown	632	764	863

The Water Quality Modelling (WQM) outputs of the current and future predicted (2030, 2055 and 2080) assimilative capacity of the current discharge waterbody are presented in Table 12-4. 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. The existing discharge location ESDLs are expected to be more stringent in the future (Table 12-4).

Table 12-4 Lisgoold South WwTP Current WWDL Emission Limit Values (ELVs) and Projected Environmentally Sustainable Discharge Limits (ESDL)

Parameter	Existing WWDL ELVs	2030 Projected ESDL	2055 Projected ESDL	2080 Projected ESDL
BOD (mg/l)	25	25	25	25
Ammonia (mg/l)	30	3.9	3.2	2.9
OrthoP (mg/l)	3	2.8	2.3	2.0
More Stringent?	-	Y	Y	Y

12.4.4 Lisgoold South Coarse screening

Lisgoold South WwTP SEA coarse screening assessment of options summary is presented in Table 12-5.

Table 12-5 Lisgoold South WwTP Coarse Screening Assessment Summary

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
A0 Do Nothing - Counterfactual	N	N	N	Option has been screened out at technical stage.
A1 Minimal Upgrade - Process Optimisation	N/A Option screened out at technical assessment stage.			

Option Reference	Option acceptable in 2030?	Option acceptable in 2055?	Option acceptable in 2080?	Coarse Screening environmental assessment - summary comments
A2 Reuse Existing Plant and Upgrade - Existing Discharge	Y	Y	Y	Works confirmed to be limited and within site so impacts likely to be mitigated with standard measures.
A3 Reuse Existing Plant and Upgrade - Alternative Discharge	N/A Option screened out at technical assessment stage.			
A4 New Treatment Process/Plant Upgrade on Existing Site	N/A Option screened out at technical assessment stage.			
A5 New Greenfield Site	N/A	N/A	Y	Large uncertainty due to relocation of new plant (existing discharge).
A6 Untreated Wastewater Load Transfer Solution	Y*	Y*	N	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. Indicative routing is not available at this stage and so environmental assessment on the route has not been carried out.

- Y – Advances to Fine Screening
- N – Does not advance to Fine Screening
- N/A – Not environmentally assessed

12.4.5 Lisgoold South Fine screening scoring

Lisgoold South WwTP SEA fine screening assessment of options scores are presented in Table 12-6.

Table 12-6 Lisgoold South WwTP 2080 Fine Screening Assessment Scores

Criteria	A0 Do Nothing - Counterfactual	A2 Reuse Existing Plant and Upgrade - Existing Discharge	A5 New Greenfield Site
Planning & Regulation	0	0	-1
Impact on Customers	-3	1	2
Community Support, Health and Wellbeing	-2	2	1
Water environment	-2	1	1
Biodiversity	-2	0	-1
GHG Emissions	0	1	-1
Energy efficiency	-3	1	2
Climate resilience	0	0	1
Circular economy	0	1	-2
Environmental combined score	Worst	Best	
Overall combined score	N/A	2.74	2.53
Overall rank	N/A	1st	2nd

12.4.6 Lisgoold South Fine screening results

Table 12-7 presents options that ranked highest using the MCA fine screening process.

Table 12-7 Lisgoold South WwTP 2080 Implementation Fine Screening 1st and 2nd Ranked Options

Design Horizon	1st Ranked Option	2nd Ranked Option
2080	Option A2 Reuse Existing Plant and Upgrade with the Existing Discharge. Best overall and environmental score due to circular economy and treatment upgrades.	Option A5 New Greenfield Site utilising the existing discharge location.

12.4.7 Lisgoold South Wastewater network upgrade proposals

The network proposals include works to address SWO compliance to minimise potential for untreated spills to the environment and avoiding network surcharging and flooding. The upgrades are proposed for the 2030 strategy horizon unless otherwise stated. The works are detailed in Appendix 4 to the CWS and include for Lisgoold South:

- Improvements to storage at existing pumping station sites;
- An upgrade of the existing sewer system to increase the network's capacity;
- Storm tank enhancement has been proposed at the South Lisgoold WwTP.

These works are expected to be undertaken within existing the sites or along existing pipeline networks.

12.5 Sub catchment 11: Feasible Approach selection and implementation

A list of Feasible Approaches is presented in Table 12-8.

Table 12-8 Feasible Approaches for Ballincurrig WwTP, Leamlara WwTP, and Lisgoold WwTP.

Approach	Horizon	Feasible Approach 1	Feasible Approach 2
Ballincurrig WwTP	2030	Continue to operate WwPS to transfer flows to Lisgoold South (ongoing project)	Continue to operate WwPS to transfer flows to Lisgoold South (ongoing project)
	2055	Continue to operate WwPS.	Continue to operate WwPS.
	2080	Continue to operate WwPS.	Continue to operate WwPS.
Leamlara WwTP	2030	Construct untreated wastewater transfer to Lisgoold South WwTP (3.7km) and associated PS.	Construct new WwTP (950 pe) AT Leamlara. Construct a final effluent transfer to Owenacurra River (3.7km).
	2055	Continue to operate WwPS.	Continue to operate WwTP.
	2080	Continue to operate WwPS.	Continue to operate WwTP.
Lisgoold South WwTP	2030	Upgrade existing WwTP by additional 1,700 PE.	Continue to operate WwTP.
	2055	Continue to operate WwTP.	Continue to operate WwTP.

Approach	Horizon	Feasible Approach 1	Feasible Approach 2
	2080	Capital replacement of 2,200 PE and upgrade of an additional 200 PE.	Capital replacement of 1,500 PE.
Lisgoold North WwTP	2030	Decommission WwTP and transfer flows to Lisgoold South via gravity sewer (Ongoing project)	Decommission WwTP and transfer flows to Lisgoold South via gravity sewer (Ongoing project)
Overall Feasible approach environmental assessment summary		**Ranked 1st** Ballincurrig WwPS to remain in operation through to the 2080 horizon. Leamlara: The transfer (2030) will require a construction of a 3.7 km untreated effluent pipeline. Lisgoold South: Two upgrades (2030 and 2080) to accommodate demand and transfer.	**Ranked 2nd** Ballincurrig WwPS to remain in operation through to the 2080 horizon. Leamlara: New plant and new discharge (2030). Lisgoold South: Upgrade (2080) to accommodate demand.
Overall recommended approach		**Ranked 1st** Overall best as most cost effective. Environmentally ranked 1st as does not require construction of a new plant avoiding potential impacts on the environment.	**Ranked 2nd** Highest cost due to construction of a new plant and. Environmentally ranked 2nd impacts associated with building a new plant.

12.6 Sub catchment 11: Recommended Approach implementation strategy

Figure 12-7 presents Recommended Approach graphic including environmental constraints.

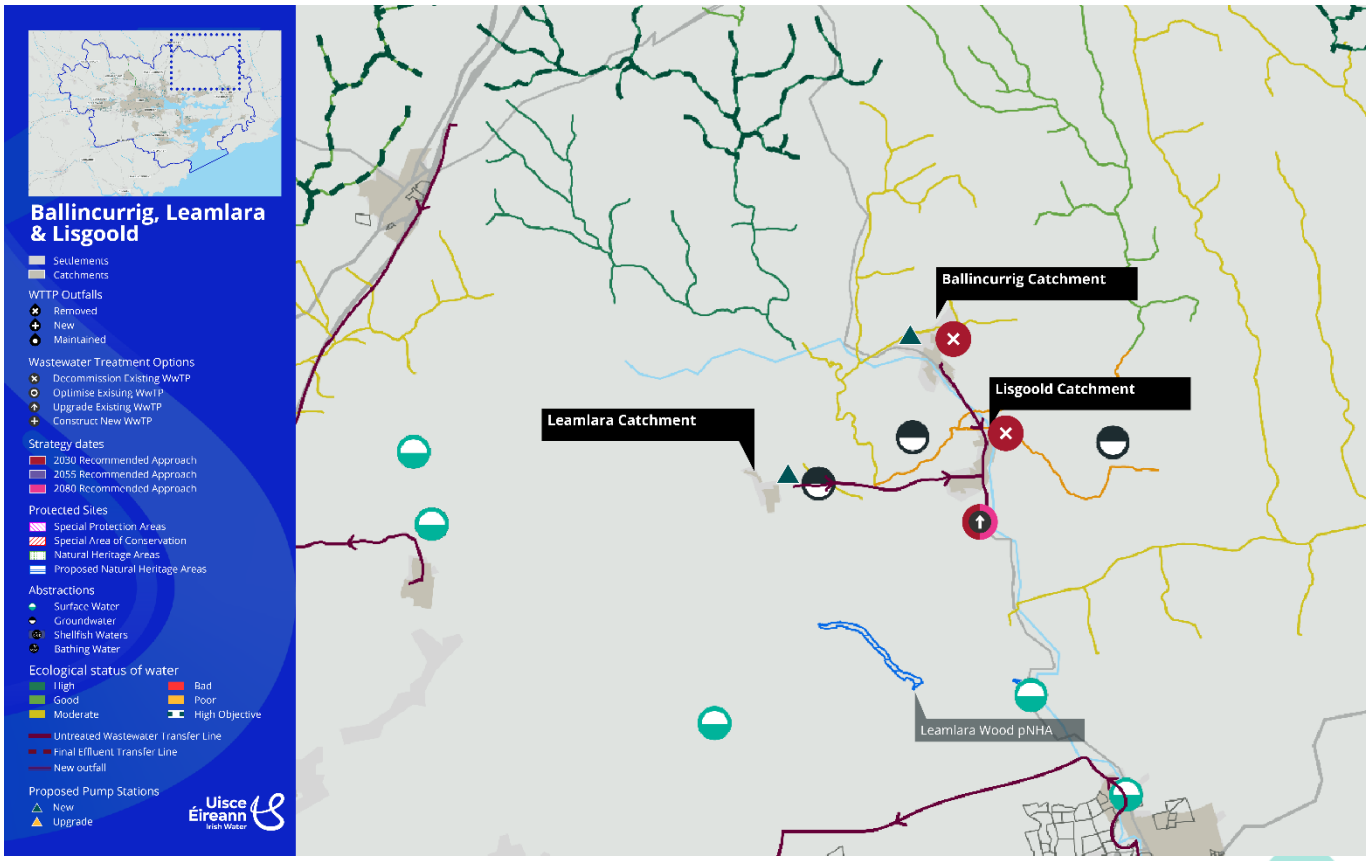

Figure 12-7 Recommended Approach Environmental Constraints for Sub catchment 11

Figure 12-8 presents the implementation strategy for the Recommended Approach for Ballincurrig WwTP, Leamlara WwTP and Lisgoold South WwTP.

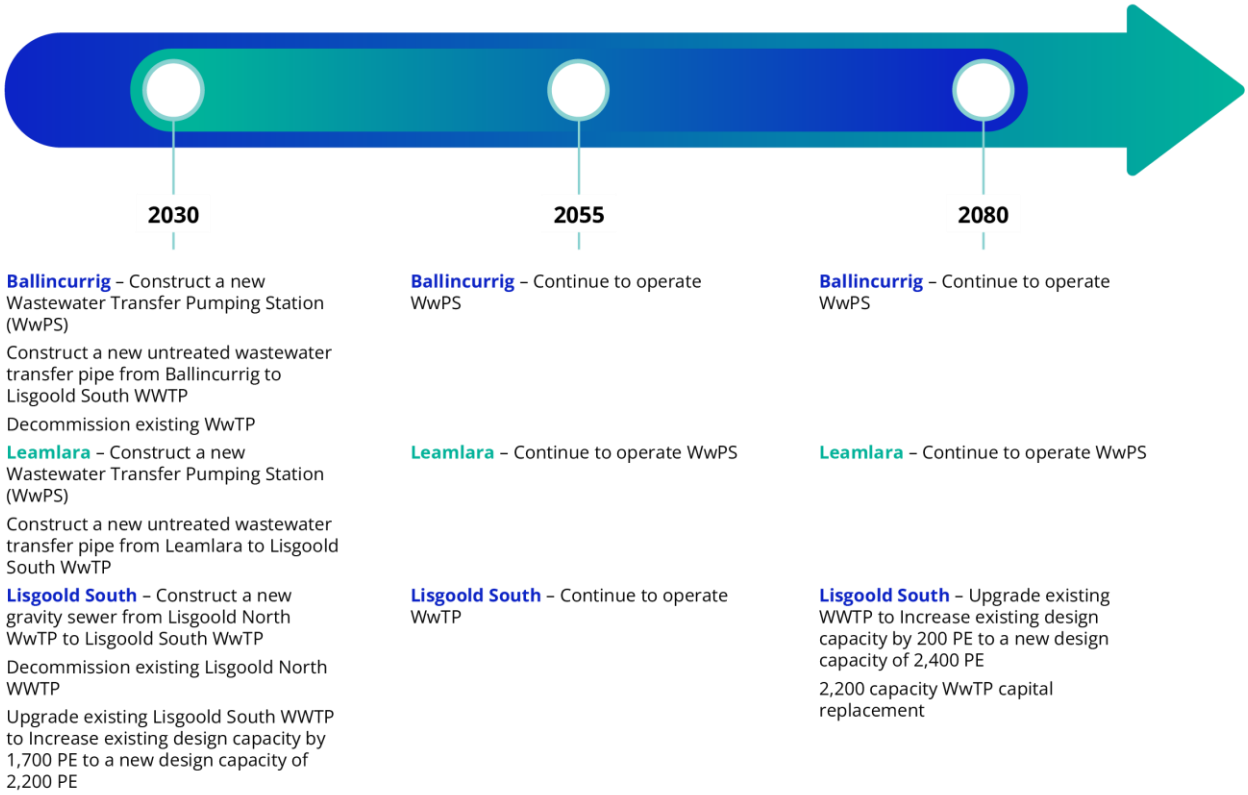

Figure 12-8 Implementation strategy for Ballincurrig WwTP, Leamlara WwTP, and Lisgoold South WwTP.

12.7 Sub catchment 11: SEA Assessment of Recommended Approach

Ballincurrig WwTP

Table 12-9 presents the Environmental Assessment of the Recommended Approach for Ballincurrig WwTP.

Table 12-9 Ballincurrig WwTP Recommended Approach Assessment Summary

Design Horizon	SEA Objective								
	Water Environment	PopN, Econ, Rec, Health	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
2030, 2055 and 2080 (A0)	Continue to operate WwPS. No additional works or change to operation compared to current operation. Site is in the process of being decommissioned.								

Operation of the Ballincurrig WwPS as it is currently being operated is proposed to continue through to the 2080 horizon (Option A0). With flows being diverted away from the site, and no discharge into the river being

introduced or maintained, there are unlikely to be negative effects on the local Water Environment or Biodiversity. Furthermore, there will be no disruptions to the site to make any necessary changes and therefore negative effects on the other SEA Objectives (Table 12-9), including the population, are unlikely.

Leamlara WwTP

Table 12-10 presents the Environment Assessment of the Recommended Approach for the Leamlara catchment.

Table 12-10 Leamlara catchment Recommended Approach Assessment Summary

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec, Health	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
Current (A0)	Operation	+ve	0	0	0	0	0	0	0	0	0
		-ve	---	---	0	---	0	0	0	--	--
2030 (A6)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	0	-	--	--	-	-	0	-	0
	Operation	+ve	+	+	0	+	+	0	0	+	+
		-ve	0	0	0	0	0	0	0	0	0
2055 and 2080 (A6)	Sames as 2030 – continue to operate WwPS. No additional works or change to operation compared to 2030.										

+ve = potential beneficial or positive effects/risk

-ve = potential negative or adverse effects/risk

As Leamlara is an agglomeration, septic tanks with soakaways into the local groundwater are currently assumed to be used within the Leamlara catchment. The proximity of the proposed transfer pipeline to residential areas could cause minor temporary and short term negative effects from disruption during the construction of the pipeline and pumping station (Option A6). However, the operation stage should provide s benefits to the local community with the connection to the wastewater system with use of the existing soakaway discontinued. Overall the transfer should positively support Population, Water Environment and Biodiversity and Geology and Soils SEA Objectives.

Lisgoold North WwTP

Table 12-11 presents the Environment Assessment of the Recommended Approach for Lisgoold North WwTP.

Table 12-11 Lisgoold North WwTP Recommended Approach Assessment Summary

Design Horizon	SEA Objective								
	Water Environment	PopN, Econ, Rec, Health	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
2030, 2055 and 2080 (A0)	Continue to operate WwPS. No additional works or change to operation compared to current operation. Site in the process of being decommissioned.								

Lisgoold North WwTP is currently being decommissioned with flows diverted to Lisgoold South WwTP (see Section 12.3.1). The continue of this operation is proposed to continue through to the 2080 horizon (Option A0). With flows being diverted away from the site, and no discharge into the river being introduced or maintained, there are unlikely to be negative effects on the local Water Environment or Biodiversity. Furthermore, there will be no disruption to the site to make any necessary changes and therefore negative effects on the other SEA Objectives are unlikely.

Lisgoold South WwTP

Table 12-12 presents the Environmental Assessment of the Recommended Approach for Lisgoold South WwTP.

Table 12-12 Lisgoold South WwTP Recommended Approach Assessment Summary

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec, Health	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
Current (A0)	Operation	+ve	0	0	0	0	0	0	0	0	0
		-ve	---	---	0	---	0	0	0	0	--
	Construction	+ve	0	0	0	0	0	0	0	0	0

Design Horizon	Phase	Effects/Risk	SEA Objective								
			Water Environment	PopN, Econ, Rec, Health	Climate Change	Biodiversity	Material Assets	Landscape	Cultural Heritage	Geology and Soils	Air Quality
2030 (A2)		-ve	0	0	--	0	0	0	0	0	-
	Operation	+ve	+	0	+	0	+	0	0	0	0
		-ve	-	-	-	-	0	0	0	0	-
2055 (A2)	Same as 2030 – continue to operate WwTP. No additional works or change to operation compared to 2030.										
2080 (A4)	Construction	+ve	0	0	0	0	0	0	0	0	0
		-ve	-	0	--	0	-	0	0	0	-
	Operation	+ve	++	+	0	++	+	0	0	0	0
		-ve	0	0	-	0	0	0	0	0	0

+ve = potential beneficial or positive effects/risk

-ve = potential negative or adverse effects/risk

Site performance at Lisgoold South 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. The 2030 and 2080 upgrades will have a positive effect on the water environment and biodiversity through with treatment of discharges meeting ESDLs. Short term temporary effects from construction activities can be expected for example related to carbon emissions and the Climate Change SEA Objective. The two surface water abstraction sites downstream of Lisgoold South WwTP are also downstream of major tributaries to the Owenacurra River and therefore, given the current and continued compliance of the WwTP, the impacts from the increased discharges into the channel will be diluted and assumed to have negligible effects on these abstractions and treatment.

12.8 Sub catchment 11: Cumulative assessment

The potential cumulative or in combination adverse or beneficial effects for the Ballincurrig, Leamlara and Lisgoold sub catchment are identified below in Table 12-13. These aim to identify where a receptor could be affected by more than one of the WwTP and network proposals within the overall sub catchment, such as proximity to works being undertaken at the same time or discharges or decommissioning affecting the same waterbody.

Table 12-13 Potential cumulative or in combination effects within Sub-catchment 11

Site/ Potential Interaction	Lisgoold South	Ballincurrig	Leamlara
Lisgoold North	Possible construction cumulative effects from the construction of the transfer pipeline and capacity upgrades	Possible construction cumulative effects from the construction of multiple transfer pipelines.	Possible construction cumulative effects from the construction of multiple transfer pipelines.
Leamlara	Possible construction cumulative effects from the construction of the transfer pipeline and capacity upgrades.	Possible construction cumulative effects from the construction of multiple transfer pipelines.	
Ballincurrig	Possible construction cumulative effects from the construction of the transfer pipeline and capacity upgrades.		

Key				
	No interaction or negligible cumulative effects		Potential for beneficial cumulative effects	
	Potential for adverse cumulative effects		Potential for mixed beneficial and adverse effects	

No significant cumulative effects have been identified for the Recommended Approach across the sub catchment which would require additional mitigation. The simultaneous construction of a capacity upgrade at Lisgoold South WwTP, along with the installation of numerous untreated wastewater transfer pipelines from the following treatment plants – Ballincurrig, Leamlara and Lisgoold North – into Lisgoold South WwTP by 2030 could cause some minor negative effects in the south Lisgoold area, particularly along Midleton Road and Cois na Curra. However, with the application of good construction environmental practice, these potential negative effects can be minimised.

12.9 Sub catchment 11: Mitigation and enhancement

General measures include:

- Supporting awareness campaigns on challenges for WwTPs and water pollution to encourage appropriate use, and to understand the improvement works proposed and long term benefits compared to temporary disruption
- Water quality modelling identified the influence of other sources of pollution affecting water quality and aquatic biodiversity including in relation to BOD, ammonia and phosphates and support for catchment management measures aimed at reducing these sources can provide wider environmental benefits as well environmental enhancement for biodiversity and flood

management. These can include measures to improve water retention, reducing nutrient run off and soil erosion. These measures can only be delivered through collaboration with other parties and landowner involvement.

- WwTP and network upgrades will need to consider in detail potential to include NBS as part of detailed design including NBS that provide additional water quality enhancement benefits.

Specific measures for Sub Catchment 11 options are set out in Table 12-14 below.

Table 12-14 Mitigation and enhancement measures for Sub Catchment 11

Agglomeration	Potential	Mitigation Measures
Ballincurrig WwTP	N/A	N/A
Leamlara WwTP	Site construction for pumping station and untreated wastewater transfer pipeline to Lisgoold South WwTP.	Standard good construction including circular economy principles and traffic management for pipeline construction. Detailed pipeline transfer route alignment and assessment to minimise habitat loss. Surveys and assessments depending on routing such as ecology, contaminated land, cultural heritage/archaeological interest. Application of biodiversity net gain to address any losses.
Lisgoold South WwTP	Site construction for works upgrades.	Standard good construction including circular economy principles. Consider support for catchment management measures to improve water quality. Application of biodiversity net gain to address any losses – consider potential to include enhancement on site. Opportunities for NbS measures with acceptable discharge requirements where the projected PE does not exceed 2,500 PE include: • Wetland, Reedbed • Sludge Drying Reed Beds • CSO Storm Management Lagoon
Sub catchment/ common measures	N/A	N/A