Winter 2020

National Water Resources Plan – Draft Framework Plan

Natura Impact Statement

Data dislaimer: This document uses best available data at time of writing. Some sources may have been updated in the interim period. As data relating to population forecasts and trends are based on information gathered before the Covid-19 pandemic, monitoring and feedback will be used to capture any updates. The National Water Resources Plan will also align to relevant updates to data in the National Planning Framework.

Glossary

Term	Definition
Adverse Effects on Site Integrity (AESI)	Activities usually resulting from a plan or project that could result in effects on qualifying interest (Annex I habitats or Annex II species) of a European site which could have implications for the conservation objectives of the site leading to AESI.
Annex I Habitat	A habitat listed in Annex I of the Habitats Directive.
Annex II Species	A species listed in Annex II of the Habitats Directive.
Appropriate Assessment (AA)	An assessment carried out under Article 6(3) of the Habitats Directive of the implications of a plan or project, either individually or in-combination with other plans and projects, on a European site in view of the site's conservation objectives.
Barrier Assessment	BA
Bird Directive	Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds.
Boil Water Notice	BWN
CIRIA	Construction Industry Research and Information Association
Coagulation, flocculation, clarification (CFC)	Processes used when a water source contains a large amount of fine suspended matter. Coagulation is a chemical treatment typically applied prior to sedimentation and filtration to enhance the ability of a treatment process to remove particles. Flocculation is the turbulent mixing phase following the dispersion, hydrolysis, and polymerization of the coagulant in the rapid mix. Clarification provides a quiescent, low velocity (typically <0.5 ft/sec) area where the solid/floc mixture can settle from solution.
Competent authority	Public body provided for in the relevant legislation that makes statutory determinations (for example, in relation to AA).
Conservation Objectives (COs)	In the context of this report, conservation objectives are discussed in relation to European sites. Some European sites have site-specific conservation objectives (SSCOs); other European sites have generic conservation objectives. The National Parks and Wildlife Service are in the process of producing detailed conservation objectives for all European sites and their Qualifying Interests.
CRU	Commission for Regulation of Utilities
Deployable Output (DO)	Deployable Output is the output of a commissioned water supply source, group of sources or bulk supply under a given set of flow sequences as constrained by abstraction licence, environmental constraints, water treatment capacities and asset capacities
DHPLG	Department of Housing, Planning and Local Government
DMA	District Metered Area
EBSD	Economics of Balancing Supply and Demand
EPA	Environmental Protection Agency
European Commission	The Commission of the European Communities.
European site	Any Special Area of Conservation (SAC) or Special Protection Area (SPA), also referred to as Natura 2000 sites.
GDA	Greater Dublin Area
GWDTH	Groundwater Dependent Terrestrial Habitat
Habitats Directive	Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.
IFI	Inland Fisheries Ireland

Term	Definition
INNS	Invasive Non-Native Species
IROPI	Imperative Reasons of Over-Riding Public Interest
LDWMP	Lead in Drinking Water Mitigation Plan
Level of Service	LoS
Likely Significant Effects (LSEs)	Term adapted from Article 6(3) of the Habitats Directive ("likely to have a significant effect"), describing the type of effects which, if identified as potentially arising as a result of a project or plan, trigger an AA.
MCA	Multi-Criteria Analysis
MSA	Midlands Strategic Study Area
National Parks and Wildlife Service (NPWS)	The National Parks and Wildlife Service is fully integrated in the Heritage Division of the Department of Culture, Heritage and the Gaeltacht and has responsibility for the protection and conservation of Ireland's natural heritage and biodiversity at national government level.
NPF	National Planning Framework
NPO	National Planning Objective
NWSMP	National Wastewater Sludge Management Plan
Natura Impact Statement (NIS)	Term for the statutory report produced to inform the AA of a plan by the competent authority.
NPV	Net Present Value
Precautionary Principle	Implicit in the Habitats Directive is the application of the precautionary principle, which requires that the conservation objectives of Natura 2000 should prevail where there is uncertainty. This requires objectively demonstrating, with supporting evidence, that there will be no adverse effects on the integrity of the Natura 2000 site. Where this is not the case, adverse effects must be assumed.
Priority habitat	Natural habitat types on Annex I of the Habitats Directive, and indicated by an asterisk (*), which are in danger of disappearance, and for which the European Community has particular responsibility in view of the proportion of their natural range which falls within the European territory of the Member States.
Priority species	Species for the conservation of which the European Community has particular responsibility in view of the proportion of their natural range which falls within the European territory of the Member States, these priority species are indicated by an asterisk (*) in Annex II of the Habitats Directive. At present, Ireland does not have any priority species.
PCT	Project Costing Template
Qualifying Interest (QI)	One of the features (habitat or species) that are the reasons for designation of a Special Area of Conservation, identified in the Conservation Objectives for that site.
Red, Amber or Green (RAG)	A colour code using the traffic light scoring system where a red rating will assume unviability and therefore will be eliminated on this basis and assessed no further; an amber rating would not be ruled out and will be carried forward for further evaluation and a green rating will assume that there are no negative impacts and will therefore be carried forward.
RBMP	River Basin Management Plan
RWRP	Regional Water Resources Plan
Screening for AA	The screening of a plan or project to establish if an AA of the plan or project is required. An AA must be carried out unless the screening assessment can establish that there is no potential for LSEs on a European site.
Special Area of Conservation (SAC)	SACs are sites designated under the Habitats Directive. This requires the conservation of important, rare or threatened habitats and species (not birds, which

Term	Definition
	are protected by Special Protection Areas) across Europe.
Special Conservation Interest (SCI)	The term used to refer specifically to bird species for which Special Protection Areas have been designated. These are also identified in the Conservation Objectives for the site.
Special Protection Area (SPA)	SPAs are sites designated under the Birds Directive to conserve the habitats of certain migratory or rare birds.
Strategic Environmental Assessment (SEA)	A SEA is an environmental assessment of plans and programmes to ensure a high-level consideration of environmental issues in the plan preparation and adoption, and is a requirement provided for under the SEA Directive (2001/42/EC). The SEA and AA are undertaken in tandem with the drafting of a plan.
Supply Demand Balance (SDB)	The SDB is the deficit or surplus between the supply and demand both now and over the 25-year horizon.
The Framework Plan	A plan on how to provide a safe, secure and reliable water supply for the next 25 years, without causing adverse impacts on the environment.
UKTAG	UK Technical Advisory Group
UKWIR	UK Water Industry Research
WAFU	Water Available for Use
Water Framework Directive (WFD)	Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (the WFD) is an EU Directive which commits European Union member states to achieve “Good” qualitative and quantitative status of all water bodies by taking a holistic approach to managing all waters. It applies to rivers, lakes, groundwater, estuaries and coastal waters.
WRMP	Water Resources Management Plan
Water Resource Zone (WRZs)	Water Resource Zones are the units for which our SDB calculations are carried out. WRZs are made up of one or more Water Supply Zones
WHO	World Health Organisation
WSPS	Water Services Policy Statement
WSSP	Water Services Strategic Plan
Water Supply Zones (WSZs)	A Water Supply Zone typically includes one or more abstractions (from a river, lake, Impounding Reservoir or groundwater), a Water Treatment Plant, storage in reservoirs and the distribution pipe network to deliver the water to each household or business.
Water Treatment Plants (WTPs)	A facility that processes and converts wastewater into an effluent (outflowing of water to a receiving body of water) that can be returned to the water cycle with minimal impact on the environment or directly reused.
Zone of Influence (ZoI)	Term used widely in environmental assessments. The ZoI defines the spatial area over which there is potential for LSEs, taking account of the sensitivity and mobility of different QI/Special Conservation Interest, on species or habitats from a project or plan.

1 Introduction and Background

1.1 Introduction

On the 1st of January 2014, through the Water Services Act (No. 1) 2013, Irish Water assumed statutory responsibility for the provision of public water services and management of water and wastewater investment. Irish Water's role is to provide public water and wastewater services throughout the country. Irish Water is the custodian with the responsibility to manage the precious water resource and, with Local Authority partners, secure it for future generations. It is Irish Water's responsibility to ensure that all their customers receive a safe and secure supply of drinking water and have their wastewater collected, appropriately treated and returned to the environment. Irish Water support Ireland's social and economic growth in a sustainable manner through appropriate investment in water services, and to protect the environment in all their activities.

Irish Water is regulated by:

- The economic regulator, the Commission for Regulation of Utilities (CRU), which is charged with protecting the interests of the customer. The CRU also approves an appropriate funding requirement sufficient to enable the utility to deliver the required services to specified standards in an efficient manner.
- The environmental regulator, the Environmental Protection Agency (EPA), which sets standards and enforces compliance with EU and National Regulations for drinking water supply and wastewater discharge to water bodies. The EPA liaises with the Health Services Executive in matters of public health.

1.2 What is the National Water Resources Plan

Effective water services, including the delivery of a sustainable and reliable clean water supply and safe disposal of wastewater, are essential for a modern country. Being able to understand and estimate how much water is required, where it is required, and the variability of requirements over the course of the year or over time, is essential to plan appropriately for the future of the public water supply.

A Water Resources Plan is a strategic plan used to identify deficiencies and need across a water supply and to develop plan level capital and operational solutions to address these issues.

Irish Water's National Water Resources Plan (NWRP) will be the first resources plan for the public water supply in the Republic of Ireland. It will allow Irish Water to integrate Government Policy, Legislation and external factors that have the potential to impact Irish water supplies into the planning and operation of our existing and future supply asset base.

The objective of a NWRP is to manage customer and communities needs while meeting their requirements over the short, medium and long term by ensuring safe, secure, sustainable and reliable water supplies. The NWRP will:

- Enable Irish Water to address needs across our water supplies in the most effective way over time, through the regulated investment cycles;
- Ensure that there is a transparent framework to develop the most appropriate projects/programmes to meet statutory obligations in relation to water supply; and
- Provide a framework to track outcomes, allowing interventions to be prioritised to bring the water supply up to the required standards in the shortest possible timeframe.

As a basis for broad public and stakeholder engagement, the NWRP (the Plan) will be delivered in two phases. In this first Phase, the draft NWRP - Framework Plan, Irish Water will consult on the methodologies they have developed in order to identify need and find solutions to address need across

all of their supplies. Irish Water will also assess need across each of the 539 public water supplies nationally, in terms of:

- **Water Quantity** that Irish Water can provide;
- **Water Quality** that Irish Water can provide; and
- Performance of and operational efficiency of Irish Waters **Asset Base**.

Water Resources Plans are reviewed on a cyclical basis to take account of new information, data, policies and laws and are usually updated every 5 years. Irish Water know things will change over the next 25 years so within the Plan they have considered a range of possible futures, some more challenging than others. This approach is called adaptive planning, and means Irish Water are ready and flexible whatever the future holds.

1.3 Water Supply in Ireland

Water is currently abstracted from approximately 1,090 individual sources and treated in 749 Water Treatment Plants (WTPs). The size of these WTPs varies significantly across the country, with the largest 72 producing 73% of the water supplied and the smallest 500 producing on average 0.2Ml/d or about 6% of total supply available.

The WTPs feed water into supply areas known as Water Resource Zones (WRZ). Each WRZ is an independent water supply system serving a region, town or village and is also governed by topography or the extent of the water distribution network in an area. Within a WRZ most customers receive the same Level of Service (LoS), measured as a probability of interruption to services (for example one interruption to supply in 50 years). There are 539 WRZs in the Republic of Ireland. These range in size, serving populations of less than 30 people (small rural areas) up to 1.6 million people (Greater Dublin Area (GDA)).

The Republic of Ireland has a dispersed population and water supplies were historically developed in response to need in the immediate vicinity. As a result, some supplies were developed using surface or groundwater sources with limitations in terms of quantity available and/or variable raw water quality. Also, due to long term under investment in water services many of Irish Water's water supply assets (WTPs, water mains etc.) are in need of upgrades or additional infrastructure is required.

As a result, there are a number of key issues that impact the quality, sustainability and reliability of our existing water supplies.

- **Single Source Supplies:** Many WRZs rely on a single source of supply, meaning they are vulnerable to interruptions in service;
- **Inappropriate Water Sources:** Current supplies often come from small local rivers, Irish Water need to ensure that their abstractions will not adversely impact the environment;
- **Treatment Capacity:** Rapid growth in some areas has meant that some of Irish Water's WTPs are undersized and treat water in quantities that exceed the original design capacity of these facilities;
- **Water Quality:** Although 98.6% of samples passed quality tests in 2019, some of Irish Water's water treatment facilities and distribution systems do not function as effective barriers to reduce risk and may not consistently provide safe drinking water at Customer's taps. The legacy of under-investment has exacerbated the problems with the Republic of Ireland's deteriorating and poor quality water services infrastructure;

- **Network Performance**: The performance of Irish Water's distribution networks does not meet European norms and leakage and distribution losses are unacceptably high. Key issues include:
    - The average age of the water mains infrastructure in the Republic of Ireland is estimated at between 65 to 85 years. This compares to an EU average of 36 years (source: European Benchmarking Cooperation 2013).
    - Some of the cast iron mains in our cities and towns are often heavily corroded and vary in age from 50 to 140 years, giving rise to high leakage, rust discolouration and high risk of failure causing supply disruption.
    - Other pipe materials such as uPVC and Asbestos Cement laid between the 1960s and 1980s can also be problematic with high burst frequency.

- **Constrained Funding**: Due to long term underinvestment in water services many of Irish Water's assets are failing and are in need of significant capital investment. Coupled with stricter EU standards, treated water quality and the environment are driving the need to increase as opposed to reduce expenditure.

1.4 Progress to Date

Irish Water has made positive progress in improving water quality for their customers by developing policies and strategies for water supply. Irish Water have progressed projects and programmes to deliver the requirements of these policies. Irish Water's Investment periods, (known as Revenue Control periods) set out how much Irish Water can spend on projects and programmes for that period.
The first Capital Investment Plan covered the period 2014-2016. The second investment plan covered 2017 to 2019. Irish Water are currently at early implementation stages of the new investment plan for 2020-2024.

Between January 2014 and December 2019 Irish Water invested €3.9 billion in public water and wastewater infrastructure, with a further projected spend of circa €5bn by 2024. Irish Water have invested in a range of water projects and programmes that will support and enable proper planning and sustainable development at a national, regional and local level. The objective of this approach has been to deliver a balanced portfolio of investment across the three themes of Quality, Conservation and Future Proofing.

1.4.1 Water Quality

Irish Water aims to lift Boil Water Notices (BWN) through targeted investment and they have successfully achieved this for 79,507 people since 2014. Nearly 16,000 of these were on long term boil water notices. Through investment in water assets and infrastructure, Irish Water has removed 174 public water schemes from the EPA's remedial action list. Over the same period (2014-2019) an additional 86 schemes have been added, leaving 52 schemes with remedial works remaining.

Since the start of 2014, 72 WTPs have been rationalised by Irish Water by laying a water main connection to a neighbouring treatment plant. Irish Water are also delivering a range of national programmes to address high risk water supplies. Through their National Disinfection Programme they have upgraded a total of 255 WTPs and under the National Lead Programme they have replaced a total of 32,641 lead services, representing a significant investment in protecting public health.

1.4.2 Conservation

Conservation is a key focus for Irish Water. Their National Leakage Reduction Programme is reducing leaks across the Republic of Ireland by fixing or replacing old, damaged pipes and removing lead service

pipes from the network. Through this programme Irish Water have achieved total gross leakage savings of 154.2 Ml/d on the private side and 233.2 Ml/d on the public side of the water distribution network for the 2014-2019 period.

1.4.3 Future Proofing

Between 2014 and 2019 Irish Water have delivered key outcomes to support growth including constructing 11 new WTPs and upgrading 36 WTPs. They have also laid a total of 1,906km of new and rehabilitated water main. Major national strategic infrastructure water projects have also been progressed during this time, including the Vartry Water Supply Scheme and Lough Guitane WTP in Kerry. These projects are of vital importance and critical to meeting the Republic of Ireland's growing water needs.

Despite this progress, Irish Water will have further challenges to address. Therefore, it is essential that they put in place a NWRP in order to keep making progress in a strategic prioritised way for the next 25 years. This Plan will then help Irish Water inform the capital investment plans for each future investment cycle.

1.5 Future Challenges

Ireland has a temperate climate with relatively high annual average rainfall, so while it is easy to assume that there is plenty of water available for supply, this is not always the case. Rainfall is unevenly distributed across the country, with more falling in the west than the east. Figure 1.1 shows that the areas with lowest rainfall have the greatest population density, meaning resources in our most populated areas can become stressed.

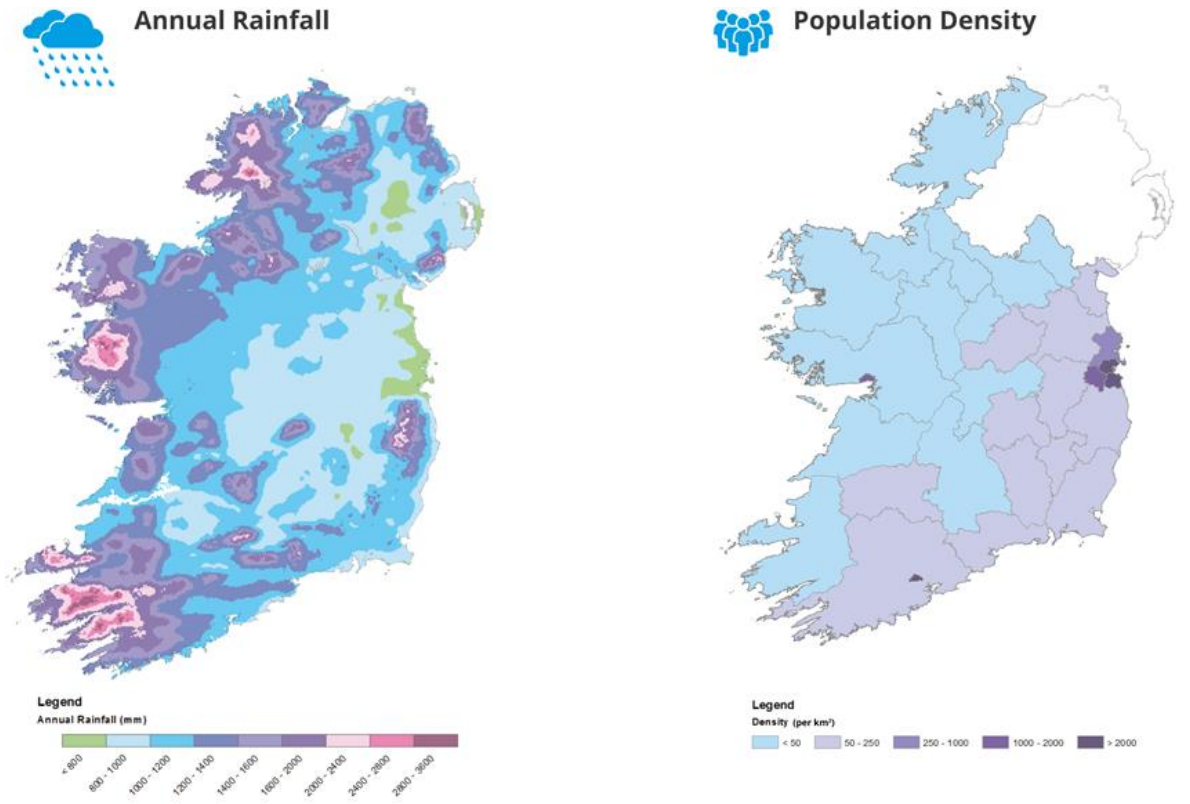

Figure 1.1 - Rainfall in Ireland compared to population density

In addition, Irish Water will also face key challenges over the coming years, which have the potential to exacerbate the current problems with their water supplies:

- **A growing population:** The country's population is expected to increase by 21% or 1.2 million people over the next 25 years, this will impact on the demand for water;
- **Changing land use and emerging contaminants:** Increasing pressures on the quality of water in the natural environment before it is treated, due to changes in land use, emerging contaminants and higher quality/supply standards required under the recast Drinking Water Directive;
- **A changing climate:** Changing weather patterns reducing available supplies and increasing the frequency of droughts and other extreme weather events that can result in interruptions to supply; and
- **An environment in need:** Irish Water currently abstract water from rivers and groundwater aquifers for the purpose of water supply. Irish Water need to make sure they leave enough water in the environment to protect the health of rivers and wildlife. Forthcoming Abstraction Legislation, required to ensure that the Republic of Ireland can meet its obligations under the Water Framework Directive, may reduce the amount of water we are able to abstract from some of our sources in the future

If Irish Water can address these challenges as part of their Plan, it will ensure that future infrastructure development is proportionate to identified need, sustainable, reliable and resilient. Further information on these keys challenges is detailed in Chapter 1 of the draft Framework Plan.

1.6 Development of the National Water Resources Plan

Water Resources Plans are standard practice for other utility companies that are involved in drinking water supply. However, Irish Water need to develop a plan that is specific to the Republic of Ireland which accounts for:

- Ireland's dispersed low-density population;
- The historical development of Irish Water's existing water supply system; and
- The condition of our infrastructural assets and the associated risks in terms of safety and security of Irish Water's existing supplies.

Irish Water must also ensure that the NWRP aligns with government policies such as: Project Ireland 2040, the second cycle of the River Basin Management Plan (RBMP) and the Climate Change Adaptation Policy.

The NWRP covers the entire state, which is a larger geographic area than most water resources plans would consider. The content of the NWRP, which is summarised below, is consistent with a 'typical' Water Resources Plan from another jurisdiction.

As this is Irish Water's first NWRP it has been split into two distinct stages, summarised as follows:

Phase 1: NWRP - Framework Plan

Phase 1 of the draft Framework Plan will include*:*

- The methodology Irish Water will use to develop the plan:
    - How Irish Water will assess quantity need: Supply Demand Balance (SDB);
    - How Irish Water assess quality and reliability need: Barrier Assessment (BA);
    - How Irish Water address sustainability by ensuring that all new options for water supply must be based on conservative approaches to protecting water sources;
    - Irish Water's Options Assessment Process; and
    - Irish Water's Preferred Approach Development Process.

Assessment of Need in terms of Quality, Quantity, Reliability and Sustainability for all of Irish Water's supplies nationally.

Phase 2: Four Regional Water Resources Plans

In order to manage the delivery of Phase 2, the public water supply will be divided into the four regional groupings shown in Figure 1.2. Irish Water will then:

- Apply the Framework Methodology to the Regional Group Areas of water supplies; and
- Develop Plan level Preferred Approaches (solutions) for all water supplies within these Group Areas.

The Regional Water Resources Plans (RWRPs) will be referred to as follows:

- **Regional Water Resources Plan:** North West (Group Area 1)
- **Regional Water Resources Plan:** South West (Group Area 2)
- **Regional Water Resources Plan:** South East (Group Area 3)
- **Regional Water Resources Plan:** Eastern and Midlands (Group Area 4)

These groupings reflect Irish Water's operational regions and water supply boundaries, with modifications to account for river catchments, as delineated by the EPA in the RBMP.

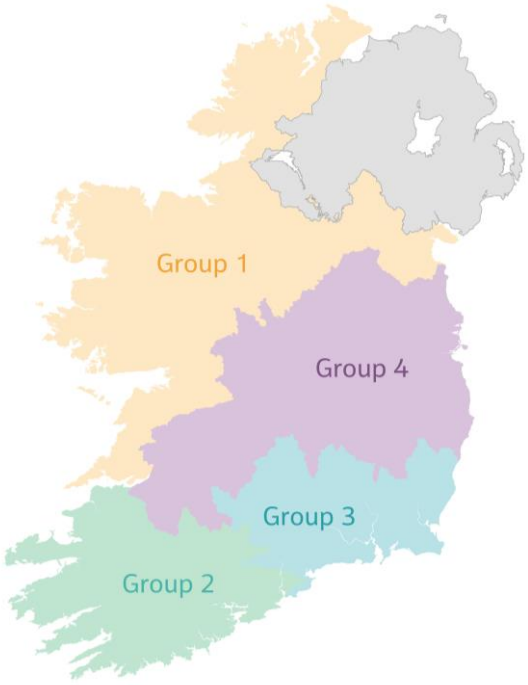

Figure 1.2 – Regional Group Areas for Phase 2

Table 1.1 – National Water Resources Plan Phases

NWRP Phases	NWRP Reports	Content
Phase 1: Framework Plan	NWRP – draft Framework Plan	Need Identification including the SDB Calculations NWRP Objectives Generic Options Types Options Assessment Methodology
	Case Study - Study Area	Test of the Options Assessment Methodology against Study Area 5 provided as an example with the draft NWRP Framework to demonstrate the methodology. The outcomes are not part of draft Framework Plan consultation.
	NWRP - final Framework Plan	Finalise and adopt NWRP Framework Plan
Phase 2: RWRPs (Regional Plans) *	Draft RWRPs (draft Regional Plans)	Application of Options Assessment Methodology and Identification of the Preferred Approach for the following regions: • North West (GA1) • South West (GA2) • South East (GA3) • Eastern and Midlands (GA4)
	Final RWRPs (final Regional Plans)	Finalise and adopt RWRP (Regional Plans)
***subject to adoption of NWRP Framework**		

Given the scale of the draft Framework Plan, the accompanying Appropriate Assessment (AA) reporting will also be presented as part of Phase 1 and Phase 2 (see Table 1.1) of the NWRP

The AA is the assessment carried out by the competent authority and the Natura Impact Statement (NIS) will provide information used as part of this assessment. This is the NIS of the draft Framework Plan. Irish Water are presenting a Case Study of the Options Assessment Methodology for Study Area 5 to give consultees visibility of how it would be applied to all WRZs. An NIS for each of the Regional Water Resources Plans will be delivered as part Phase 2.

The draft Framework Plan (and its accompanying NIS) will be formally consulted on as part of the Phase 1 consultation process which will be consulted on in late 2020. The draft Regional Plans (and their accompanying NIS) will be consulted on in 2021 as part of Phase 2.

1.7 This Report

This is the NIS which has been prepared to support the AA of the draft Framework Plan. This NIS has been prepared by Jacobs for Irish Water having regard to the requirements of the EU Habitats Directive (Directive 92/43/EEC) on the Conservation of Natural Habitats and of Wild Fauna and Flora in particular the provisions of Article 6(3), as transposed into Irish law through the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011). As the national public water authority, the responsibility for carrying out the AA of the draft Framework Plan lies with Irish Water. All NIS will be published alongside the draft Framework Plan and draft Regional Plans, with AA determinations published alongside the adopted Plans.

1.8 Legislative context for Appropriate Assessment

The Habitats Directive provides legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of community interest through the establishment and conservation of a European Union–wide network of sites known as the "Natura 2000 network" (hereafter referred to as "European sites"[1]). European sites comprise Special Areas of Conservation (SACs[2]) and Special Protection Areas (SPAs).

1.8.1 Public Authorities and Appropriate Assessment

Irish Water is the national public water authority. The duties of public authorities in relation to nature conservation are stated in the European Communities (Birds and Natural Habitats) Regulations, 2011 (as amended) (the 2011 Regulations). Irish Water is defined as a 'public authority' for the purposes of the 2011 Regulations. Specifically, Regulation 42(1) states:

"A screening for Appropriate Assessment of a plan or project for which an application for consent is received, or which a public authority wishes to undertake or adopt, and which is not directly connected with or necessary to the management of the site as a European Site, shall be carried out by the public authority to assess, in view of best scientific knowledge and in view of the conservation objectives of the site, if that plan or project, individually or in combination with other plans or projects is likely to have a significant effect on the European site.".

Significantly, the legislation states that the public authority (that is, Irish Water) shall carry out the screening for AA before a decision to undertake or adopt a plan or project is taken. Regulation 42(6) states that:

"The public authority shall determine that an Appropriate Assessment of a plan or project is required where the plan or project is not directly connected with or necessary to the management of the site as a European site and if it cannot be excluded, on the basis of objective scientific information following screening under this Regulation, that the plan or project, individually or in combination with other plans or projects, will have a significant effect on a European site".

In the context of Article 6(3), Irish Water must carry out screening for AA of the draft Framework Plan to assess whether, on the basis of objective scientific information the plan, individually or in-combination with other plans or projects, is likely to have a significant effect on a European site. The AA screening for the draft Framework Plan is provided in Appendix A of this report[3]. A summary of the screening for AA (see Chapter 5 of this report) of the draft Framework Plan concluded that there was potential for Likely Significant Effects (LSEs) from the draft Framework Plan and therefore AA of the draft Framework Plan is required. The relevant information to inform the AA determination by Irish Water as the public authority is documented in this NIS.

1.9 Overlap with Strategic Environmental Assessment

A Strategic Environmental Assessment (SEA) of the draft Framework Plan is being carried out concurrently with the AA and plan development process (see Figure 1.3). Consultation is a mandatory requirement in the SEA process under Council Directive 2001/42/EC, and responses often make specific reference to the AA process.

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[1] "European site" replaced the term "Natura 2000 site" under the European Union (Environmental Impact Assessment and Habitats) Regulations, 2011 (S.I. No. 473 of 2011).

[2] There are currently no SACs in Ireland. All remain 'candidate' Special Areas of Conservation (cSACs) until the European Commission approves and ratifies the final list of cSACs. cSACs are afforded the same protection as SACs. The process of making cSACs SACs by means of Statutory Instrument has begun. While this process is ongoing, the term SAC will be used, in conformance with nomenclature used in NPWS databases.

[3] The AA Screening report was written in 2017 and in the interim period some of the terminology has been updated in the Framework Plan. The report should therefore be read in the context of this, however the outcome of the Screening remains unchanged.

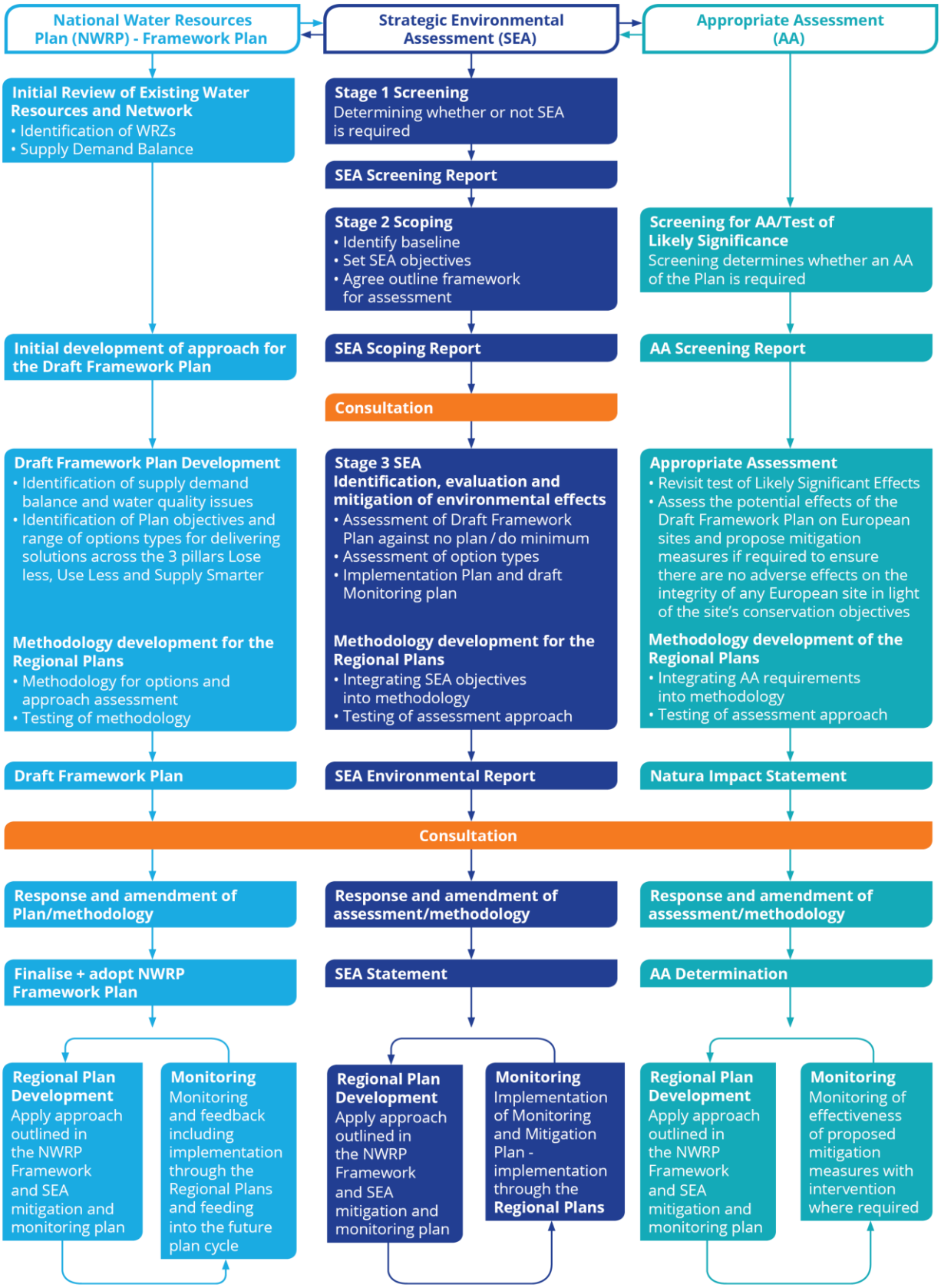


Figure 1.3 – Draft Framework Plan development with SEA and AA process

1.10 Consultation

Irish Water is presenting the draft Framework Plan for consultation alongside the draft Framework Plan NIS and SEA Environmental Report.

Irish Water is also presenting a Case Study alongside the draft Framework Plan as a worked example of the Options Assessment Methodology, to give consultees visibility of how it would be applied across WRZs and region by region. This is to support interpretation of the draft Framework Plan.

Following consultation on Phase 1, the draft Framework Plan (and accompanying NIS/SEA) will be produced considering the submissions received. The final Framework Plan will then be published alongside the SEA Statement and AA Determination.

Phase 2 of the draft Regional Plans (Group Area 1, Group Area 2, Group Area 3 and Group Area 4) will be consulted on in 2021.

2 Assessment Methodology

2.1 Stages of Appropriate Assessment

The methodology for undertaking assessment in relation to AA has evolved from, European Commission (2002) guidance and Irish guidance from the former Department of Environment, Heritage and Local Government (2010). The entire process can be broken down into four stages (European Commission, 2002), as outlined below. If at any stage in the process it is determined that there will be no implications for the European site in view of the site's conservation objectives, the process is effectively completed. The four stages are described below.

Screening for Appropriate Assessment (AA)/Test of Likely Significance: Screening determines whether an AA is required by determining if the project or plan is likely to have a significant effect(s) on any European site(s) either alone or in-combination with other plans or projects (see Figure 2.1).

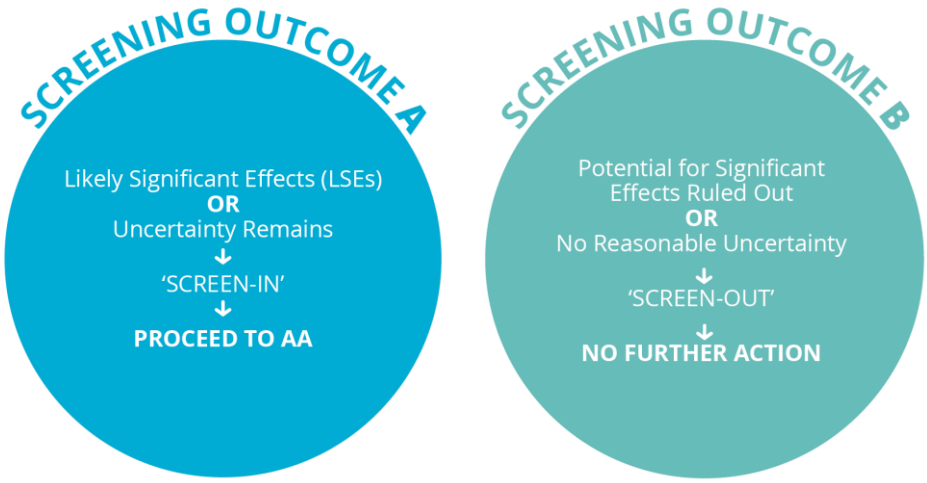


Figure 2.1 - Screening for AA

Appropriate Assessment: If the screening has determined that AA is required, the competent authority then considers the effect of the project or plan on the integrity of the European site(s). The AA considers the structure and function of European sites, their conservation objectives and effects from the project/plan both alone and in-combination with other projects or plans. Where Adverse Effects on Site Integrity (AESI) are identified, mitigation measures are proposed as required to avoid compromising the integrity and conservation objectives of the European site(s). The information and data to inform the AA process is documented within a NIS. This is provided to the competent authority to facilitate their AA of the plan or project.

Assessment of Alternative Solutions: Following AA, including mitigation proposals, if AESI remain, or uncertainty remains, an Assessment of Alternative Solutions is required under the provisions of Article 6(4) of the Habitats Directive. This process examines the alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the European site. If no alternatives exist, or all alternatives would result in adverse effects on the integrity of a European site, then either the process moves to the next stage or the project is abandoned.

Imperative Reasons of Over-Riding Public Interest (IROPI): In the unlikely event where an Assessment of Alternative Solutions fails to identify any suitable alternatives, then for a project or plan to be progressed it must meet the requirements of IROPI. IROPI implements compensatory measures to maintain the coherence of the European site network in the face of adverse effects to site(s) integrity.

2.2 Approach to AA of Water Resources Management Plans

Water Resources Management Plans (WRMPs) are required to identify specific water resource options to address predicted SDB deficits in a given WRZ. The approach to AA takes account of their strategic nature

and uses objective information to determine whether the Plan could have implications for European sites in the manner outlined in *Commission of the European Communities v United Kingdom of Great Britain and Northern Ireland* (Court of Justice of the European Union, Case C-6/04, Opinion of Advocate General Kokott)[4].

2.2.1 Application of the AA process at Plan level

In the context of AA screening, when applying the 'test of significance' the test is of the "likelihood" of effects rather than the "certainty" of effects. In accordance with the Waddenzee Judgement[5], a likely effect is one that cannot be ruled out based on objective information and is underpinned by the precautionary principle and the test of beyond reasonable scientific doubt. This test therefore sets a low bar: a plan should be considered 'likely' to have an effect if the competent authority (in this case Irish Water) is unable (on the basis of objective information) to exclude the possibility that the plan could have significant effects on any European site, either alone or in-combination with other plans or projects. An effect is considered to be 'significant' if it could undermine a European site's conservation objectives.

The methodology for undertaking screening for AA and AA as outlined in Chapter 2.1 can be applied at both a project and plan level assessment. However, the intrinsic difference between a project and plan necessitates the scale and nature for the draft Framework Plan assessment to be based on high-level best available information. The suitability of the data and information used and any decisions flowing from its use in the draft Framework Plan assessment have to meet the provisions and requirements of the Habitats Directive. The strategic assessments at the plan level will inevitably be undertaken at a higher level than would be the case for projects. However, the draft Framework Plan does not provide consent for any future projects arising from it or future iterations of the plan but, demonstrates that the protection for the European site network is suitably considered and achievable in the context of the remit of the plan. Also, any future project level AA screenings and/or NIS will have regard for the plan level NIS as the projects have been identified or specified from the draft Framework Plan. To note, all of Irish Water's projects are screened for AA. Therefore, all projects arising from the draft Framework Plan will additionally be required to go through individual environmental assessments (including AA screening and if needed AA). These will be obligatory in support of planning applications (where a project requires planning permission) or in support of licensing applications (for example, for new or increased surface or groundwater abstractions).

2.2.2 Compliance of the draft Framework Plan development process with the Habitats Directive

Phase 1 of the draft Framework Plan identifies need in terms of quantity, quality and reliability, and develops a methodology (Option Assessment Methodology – see Chapter 3.4) to develop interventions to address this need. The AA for the draft Framework Plan has assessed at a high level the Options Assessment Methodology and the option types that are likely to arise from the draft Framework Plan. The draft Framework Plan identifies option types that could be applied across the entire country. The AA focuses on the potential impacts on European site nationally from option types arising from the draft Framework Plan.

The AA for the draft Framework Plan therefore assesses the potential impacts of the draft Framework Plan at a national scale.

Applying the above approach demonstrates that the development of the draft Framework Plan is compliant with the Habitats Directive.

[4] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A62004CC0006 Accessed August 2020.
[5] [ECJ case C-127/02]

2.3 Guidance documents in relation to Appropriate Assessment

The AA requirements of Article 6 of the Habitats Directive follow a sequential approach, which is outlined in the following guidance documents:

- AA of Plans and Projects in Ireland: Guidance for Planning Authorities (Department of Environment, Heritage and Local Government, 2010);
- Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites – Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (European Commission, 2002);
- Communication from the Commission on the Precautionary Principle (European Commission, 2000);
- Guidance Document on Article 6(4) of the 'Habitats Directive' 92/43/EEC. Clarification of the concepts of: Alternative Solutions, Imperative Reasons of Overriding Public Interest, Compensatory Measures, Overall Coherence, Opinion of the Commission (European Commission, 2007);
- Marine Natura Impacts Statements in Irish Special Areas of Conservation. A working Document (Department of Arts, Heritage and the Gaeltacht, 2012); and
- Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC (European Commission, 2018).

The following circulars also outline the AA requirements:

- AA under Article 6 of the Habitats Directive: Guidance for Planning Authorities. Circular NPW 1/10 and PSSP 2/10 (Department of Environment, Heritage and Local Government, 2010);
- AA of Land Use Plans. Circular Letter SEA 1/08 & NPWS 1/08 (Department of Environment, Heritage and Local Government, 2008a);
- Compliance Conditions in respect of Developments requiring (1) Environmental Impact Assessment (EIA); or (2) having potential impacts on Natura 2000 sites. Circular Letter PD 2/07 and NPWS 1/07;
- Guidance on Compliance with Regulation 23 of the Habitats Directive. Circular Letter NPWS 2/07 (Department of Environment, Heritage and Local Government, 2007); and
- Water Services Investment and Rural Water Programmes – Protection of Natural Heritage and National Monuments. Circular L8/08 Department of Environment, Heritage and Local Government (2008b).

2.4 Guiding Principles and Case Law

A number of cases have been brought to both the national and European courts in relation to AA. Irish guidance in relation to AA was published 10 years ago. Therefore, recent case law has, in many cases, superseded this guidance. Relevant case law, ECJ rulings and EC publications (EC, 2018) have been considered in the preparation of the AA for the draft Framework Plan.

3 National Water Resources Plan

3.1 Context for the NWRP – A Plan based on Policy

The context for the NWRP lies primarily in government policy for water services, growth and development, protection of the environment and climate change adaptation. Irish Water operate under an economic regulatory regime which requires that they operate efficiently, having regard to total whole life cost. Irish Water must develop a strategic plan for their water supply infrastructure that provides a clear and transparent roadmap for how they operate, maintain, reinforce, develop and invest in their asset base aligned to national policy that ensures the best outcomes for water users.

The key policies feeding into the NWRP are:

- Water Services Policy Statement (WSPS);
- Project Ireland 2040 – National Planning Framework (NPF);
- Water Framework Directive (WFD) & RBMP for Ireland (2018-2021);
- National Adaptation Plan & Adaptation Plan for Water Quality and Water Services Infrastructure; and
- Drinking Water Directive.

Policy on the WFD (and RBMP) has a direct correlation with protection of the aquatic environment and European sites and is discussed further below. Further detail on the other policies outlined above are provided in Chapter 1 of the draft Framework Plan.

Water Framework Directive & River Basin Management Plan for Ireland

The European Union WFD (Directive 2000/60/EC) and the RBMP (a requirement under the WFD) are referenced by the draft Framework Plan as they set the framework for managing the water bodies in our natural environment from abstraction to final discharge.

The WFD contains a standard European approach for managing surface water, groundwater, coastal water and wetlands to meet common environmental objectives.

The RBMP sets out the WFD objectives for Ireland. It considers the actions Ireland will take to improve water quality and achieve “Good” ecological status in waterbodies (rivers, lakes, estuaries and coastal waters) by 2027. The RBMP drives a programme of measures to deliver a more considered and balanced approach to the water taken from the environment and any potential impacts.

The RBMP will influence from where, in what quantities and under what conditions, we can abstract water for public water supply. The RBMP will set the constraints around existing abstractions including any measures that may need to be undertaken to reduce the environmental impacts on these existing sources. It will also set the legislative framework within which any new abstractions Irish Water develop must conform.

3.1.1 How the NWRP is designed to incorporate policy

On the 1st of January 2014, through the Water Services Act (No. 1) 2013, Irish Water assumed statutory responsibility for the provision of public water services and management of water and wastewater investment. Subsequent legislation, the Water Services (No. 2) Act 2013, required that Irish Water prepare a Water Services Strategic Plan (WSSP) setting out the company’s objectives in relation to the provision of water services for the State over a 25 year period. Under the Act, the WSSP is required to address the following aspects:

- Drinking Water Quality;

- The prevention or abatement of risk to human health or environment relating to provision of water services;
- Existing and projected demand for water services;
- Existing and planned arrangements for provision of water services;
- Existing and reasonably foreseeable deficiencies in the provision of water services;
- Existing and planned water conservation measures; and
- The management of the property of Irish Water.

Work on the WSSP commenced in early 2014 and included the publication of the WSSP Issues Paper in July 2014, which was subject to public consultation for a period of five weeks. Further to responses on the WSSP Issues Paper and stakeholder engagement, statutory consultation as part of SEA on the draft WSSP was conducted between the 19 February 2015 and 17 April 2015. The final WSSP was approved by the (then) Minister of Environment Planning and Local Government in October 2015.

The adopted WSSP sets out six strategic objectives, to achieve the statutory requirements of the plan:

- Meet Customer Expectations;
- Ensure a Safe and Reliable Water Supply;
- Provide Effective Management of Wastewater;
- Protect and Enhance the Environment;
- Support Social and Economic Growth; and
- Invest in Our Future.

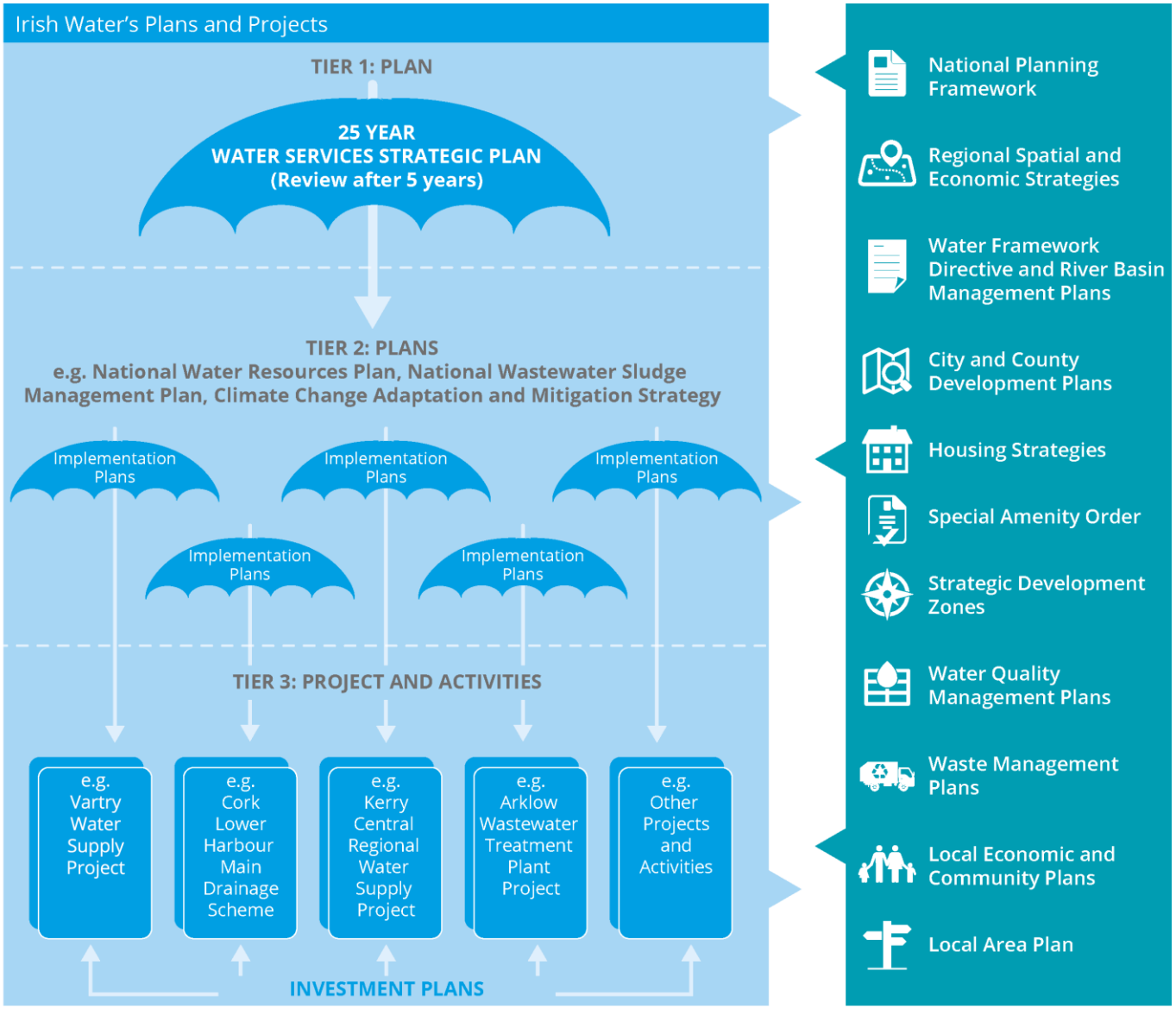
Figure 3.1 shows that the WSSP is a Tier 1 Plan, which sets out the strategic objectives for the business. It also sets the context for the Tier 2 implementation plans which are the framework by which we develop the processes, programmes and projects to meet the objectives set out in the WSSP.

The NWRP is one of Irish Water's Tier 2 Implementation Plans and was called out as a requirement within the WSSP. The NWRP focusses on water supply, particularly in relation to five of the six objectives set out in the WSSP:

- Meet Customer Expectations;
- Ensure a Safe and Reliable Water Supply;
- Protect and Enhance the Environment;
- Support Social and Economic Growth; and
- Invest in Our Future.

The NWRP will ensure that Irish Water have a transparent Framework Plan and RWRPs to allow Irish Water to provide a safe, secure, reliable and sustainable water supply now and into the future.

In line with the statutory requirements of the WSSP, once adopted, the NWRP will become Irish Water's strategic framework for the delivery of water services, which in turn will assist in planning projects and programmes to address water supply issues. These will then be prioritised and brought forward through Irish Water's regulated 5 year investment cycles. Figure 1.4 also shows that the NWRP will be the means by which we directly align government policy with Irish Water's strategic plans for water services.



It should be noted that the listing of the documents on the right of the graphic is not intended to show a hierarchy of plans or an alignment of the plans with the Irish Water Tier 1, Tier 2 and Tier 3 plans/ projects.

Figure 3.1 - How Irish Water incorporates government policy into their strategic plans

3.2 Concepts in Water Resources Planning

In England and Wales, water utilities have a statutory obligation to produce Water Resources Plans every five years. In Scotland and Northern Ireland, where water supplies are publicly owned and operated, water resources planning is recognised as best practice and plans are also developed and published every five years.

Water Resources Planning in the UK has evolved significantly since the first plans were developed in the 1990s. Comprehensive guidelines have been developed by the Environment Agency in conjunction with Defra, the Welsh Government, and Ofwat (the economic regulator for water utilities in England and Wales). A significant body of peer reviewed research on water resources planning has been produced by the UK Water Industry Research (UKWIR), of which Irish Water is a member. This provides a solid platform of research and experience for Irish Water to develop the first NWRP.

However, as highlighted in Chapter 2 of the draft Framework Plan, careful consideration must be given to the stage of development that Irish Water is at in terms of water resources planning. Irish Water asset base is in poor condition compared to other jurisdictions and their data and business intelligence

systems have not yet matured sufficiently to facilitate a transparent and regulated resource planning system. In addition, although Irish Water's asset base and approach to supplying water is similar to the UK, Irish Water public water supply includes a large number of small remote supplies due to the Republic of Ireland's dispersed low-density population. As it is difficult to move small volumes of water over large distances without compromising water quality, finding solutions to address supply need in these small areas can be difficult.

As a result of these issues, Irish Water have had to adapt long established water resources planning methodologies to reflect how they operate. This has included the use of surrogate data from other jurisdictions where available, until their data and intelligence systems have matured and become more established. Irish Water will also need to consider alternative ways to reinforce and provide resilience to small remote supplies, including careful operational incident response such as site specific enhanced plant and network management, drought and critical period plans.

While Irish Water will use the established best practice methodologies to inform their decision-making approach, they will further develop approaches and improve processes as they continue on their journey of data gathering and improvement in data quality. The models developed under this draft Framework Plan for each region will be regularly updated with both input data and output results to support planning.

The key concepts that Irish Water have used to develop the draft Framework Plan are as follows:

- WRZs;
- Weather Event Planning Scenarios;
- LoS; and
- SDB.

These are summarised below and detailed in Chapter 2 of the draft Framework Plan and accompanying Appendices (e.g. Appendix B (Planning Scenarios), Appendix C (Supply Assessment) and Appendix D (Level of Service), respectively).

3.2.1 Water Resource Zones and Water Supply Zones

WRZs are the management units at which Water Resource Planning is undertaken. WRZs represent an area where the supply and demand are largely self-contained. It is where the resources, supply infrastructure such as the WTPs, and the customers are connected. The SDB (see Chapter 3.2.4 of this report) is calculated for each WRZ.

A WRZ comprises several Water Supply Zones (WSZs). A WSZ is an area, within which all the customers receive water from the same source. WSZs are areas used to manage water quality monitoring and performance. Table 3.1 outlines the different scales and management units required to function as a regulated water service provider, and how these relate to each other.

Table 3.1 – Water Resource Spatial Management Units

Scale	Management Unit	Purpose	Regulatory Interface
National	Water Services Strategic Plan	Setting Irish Water's Business Objectives	Department of Housing, Planning and Local Government (DHPLG)
	Framework Plan	Implementing the objectives of the WSSP and applicable legislation and	CRU, EPA

Scale	Management Unit	Purpose	Regulatory Interface
		guidance	
Regional	Regional Groupings	Development of Asset Management Plans covering Irish Water's Operational Regions, for the purpose of planning investment and improving operations	CRU, EPA
Sub Regional	Catchments	Assessing Irish Water's water abstractions and wastewater discharges in relation to legislative requirements including WFD, Habitats Directive and Birds Directive	EPA, DPHLG
Sub Regional	WRZs	Identifying baseline need for Supply and Demand, forecasting future supply and demand, drought and critical period planning, adaptive planning, bulk transfer and strategic storage requirements. Identifying baseline need in relation to water quality and barrier risk, and assessing the customer base that will be impacted by a deterioration in water quality or the failure or non-performance of a water treatment plant within a complex network.	CRU, EPA
Local	WSZs	Water Resource Zones consists of multiple Water Supply Zones. Water Supply Zones are used to delineate differing areas of water quality within complex networks where multiple water types are blended. The primary function of a WSZ is to report on Drinking water compliance to our regulator the EPA.	EPA
	District Metered Area (DMAs)	Each Water Supply Zone consists of multiple District Metered Areas. These are small discrete areas of Irish Water's water distribution network which are required for leakage management and Leakage management and control, emergency network interventions, and ensuring water quality at the extremities of Irish Water's distribution networks.	CRU

WRZ boundaries are dynamic and can change over time, for example, when a new trunk mains is constructed to connect separate supplies for example. To establish a measurable baseline for the draft Framework Plan, Irish Water have defined the WRZs as they will be in 2021, which includes planned and ongoing improvement to the water supply network, as set out in Irish Water's capital investment cycle.

There are 539 WRZs in the Republic of Ireland. Each zone varies in size from small rural systems with populations of less than 30 to the Greater Dublin Area with a population of 1.6 million. A comparison with the WRZs from a number of UK water utilities is shown in Table 3.2.

Table 3.2 – UK water company Water Resource Zone comparison

Water Utility	Number of WRZs	Total number of customers
Northern Ireland Water	7	1.7 million
Welsh Water	24	3 million
United Utilities	4	7 million
Southern Water	10	3 million

Water Utility	Number of WRZs	Total number of customers
Scottish Water	approx. 220	5 million
Irish Water	539	4.2 million

The Repubic of Ireland has significantly more WRZs than our UK counterparts, which is reflective of the dispersed population in Ireland and the way that water services have developed over time.

Similar sized populations served with fewer WRZs with more connectivity can achieve economy of scale and bring resilience and reliability of supply to customers. Irish Water's current model presents challenges of efficiency, consistent maintenance and service performance. A secondary effect is that in many WRZs, we have fewer connections per unit length of pipe, a factor that impacts leakage statistics and comparisons.

Irish Water expect the number of WRZs in the Republic of Ireland to reduce as they invest in providing strategic infrastructure throughout the country. This process will be driven by the need to deliver both the required quality and quantity of water in the most efficient manner. This rationalisation will require both new sources and substantial provision of trunk mains and reservoirs, with an associated need for capital investment. However, it is likely that Irish Water will need to continue to operate a substantial number of WRZs for the foreseeable future, particularly in low density and remote areas. A staged approach to the development of a national plan is needed in light of the fact that Irish Water are at an early stage of this process, and have a far greater number of diverse WRZs than the UK counterparts.

3.2.2 Weather Event Planning Scenarios

As access to a good quality uninterrupted water supply is essential for public health, Irish Water must ensure that their water supplies can withstand variations in climatic conditions.

Although we live in a temperate climate and our proximity to the Atlantic Gulf Stream means that we do not normally experience extreme weather conditions, as global temperatures continue to rise, Ireland may experience more frequent extreme weather events, such as droughts and storms. Irish Water must plan for these events, developing a resilient water supply system to limit impacts of extreme events on their customers.

During certain years, the water supply systems in this state have experienced major stress. For example, during Storm Emma (2018), there was an increase in pipe bursts due to periods of sub-zero temperatures followed by relatively rapid warming. In contrast, summer 2018 and spring 2020 saw prolonged warm dry weather resulting in low flows and water levels in our rivers and lakes. This reduced water availability within Irish Water's public water supplies coincided with an increase in customer demand.

Table 3.3 outlines the four Weather Event Planning Scenarios considered in the draft Framework Plan. More information on Weather Event Planning and these scenarios are contained within Chapter 2 and Appendix B of the draft Framework Plan.

Table 3.3 – Weather Event Planning Scenarios

Scenario	Scenario Description and Weather Type	Feels like
Normal Year Annual Average	The normal year scenario describes the demand and supply available to Irish Water in typically average weather year.	

Scenario	Scenario Description and Weather Type	Feels like
(NYAA)		
Dry Year Annual Average (DYAA)	The dry year scenario in when there is low rainfall but no constraints on demand. Demands are based on the average daily demands experienced over the year under “dry” year weather conditions. Demands would be higher than in normal years.	
Dry Year Critical Period (DYCP)	This occurs within the dry year, generally a few weeks during the summer where demands can be significantly above the annual average.	
Winter Critical Period (WCP)	The WCP generally occurs as a result of freeze – Thaw incidents such as Storm Emma in 2018. High demands during these periods are driven by an increase in leaks from burst of pipes as a result of the very low temperatures.	

3.2.3 Level of Service

Level of Service (LoS) refers to the reliability of the supply that customers can expect to receive and is expressed as a frequency or return period of supply failure. For example, if the LoS is stated as 1 in 50, as a consumer, you would only ever expect to experience a water outage or severe limitations to your supply, on average, once every 50 years. This standard of service is particularly important in larger supplies, where the social and economic consequences of failure are significant and where mitigation measures such as tankered supplies are not feasible to scale of demand.

The current LoS in Ireland varies according to location, ranging from lower than 1 in 10 to better than 1 in 50. Figure 3.2 below shows that approximately 50% of the population are at risk of receiving a LoS of lower than 1 in 50 during normal conditions (NYAA).

In the draft Framework Plan, Irish Water have developed SDB assessments for each WRZ based on a minimum of 1 in 50 LoS. This means Irish Water will plan to address any WRZ SDB deficit, to provide a 1 in 50-year LoS. Further information on LoS is provided in Chapter 2 of the draft Framework Plan.

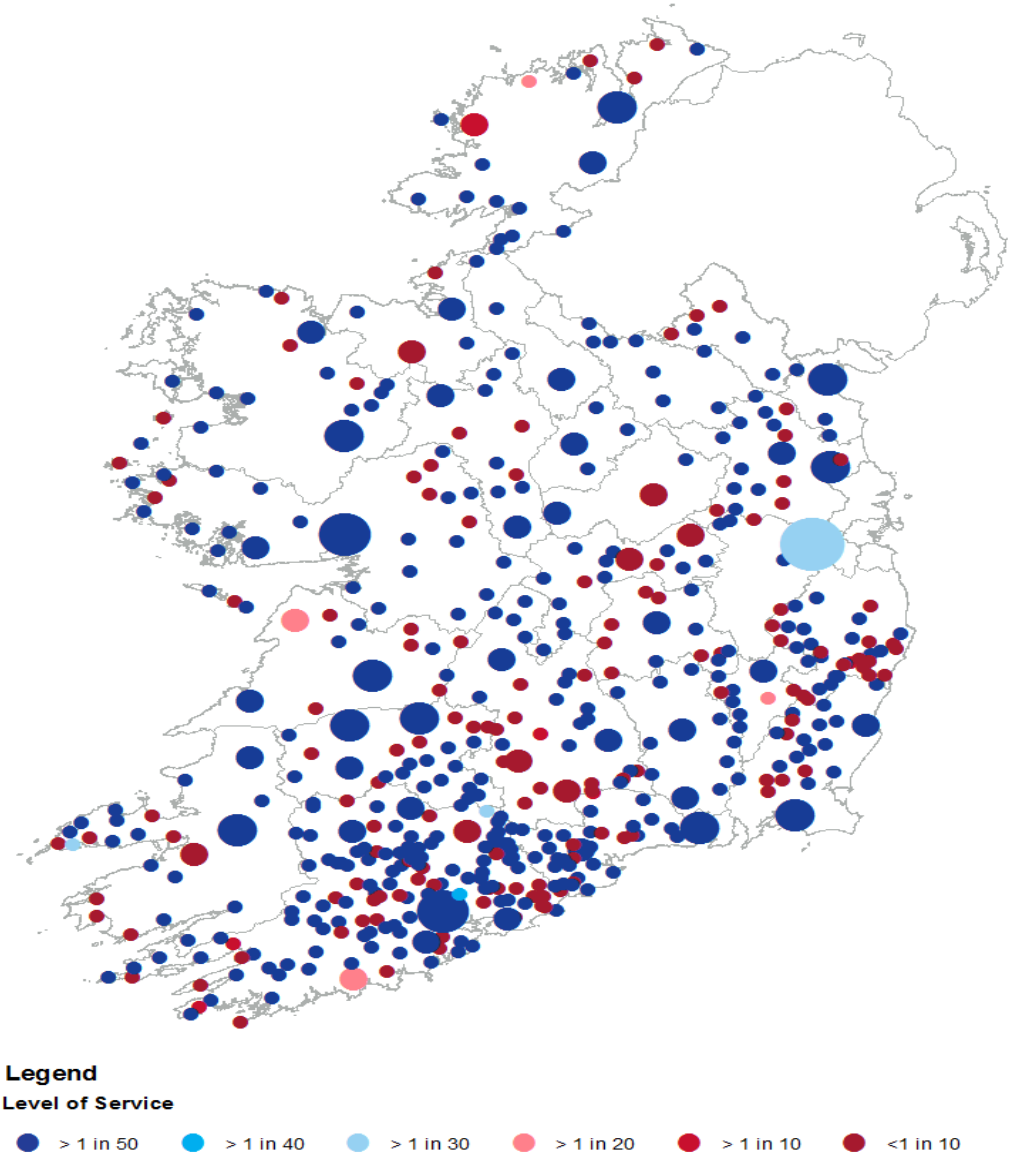


Figure 3.2 – LoS in each WRZ for a normal year (NYAA)

3.2.4 Supply Demand Balance

The SDB is the difference between the water available to use and the water demand under the planning scenario.

The SDB compares the Water Available for Use (WAFU) with the total projected demand. The draft Framework Plan examines Irish Water's current abstractions and, against demand, assesses their viability considering a growing population, climate change and other environmental constraints.

A deficit in the SDB means that the demand for water is higher than the available supply. In the event of an identified deficit, Irish Water consider what actions could be taken in response, e.g. reduce future demand, increase supply or a combination of both.

Figure 3.3 shows how Irish Water calculate the SDB. In Chapters 3 and 4 of the draft Framework Plan, Irish Water outline their calculations for each of these components.

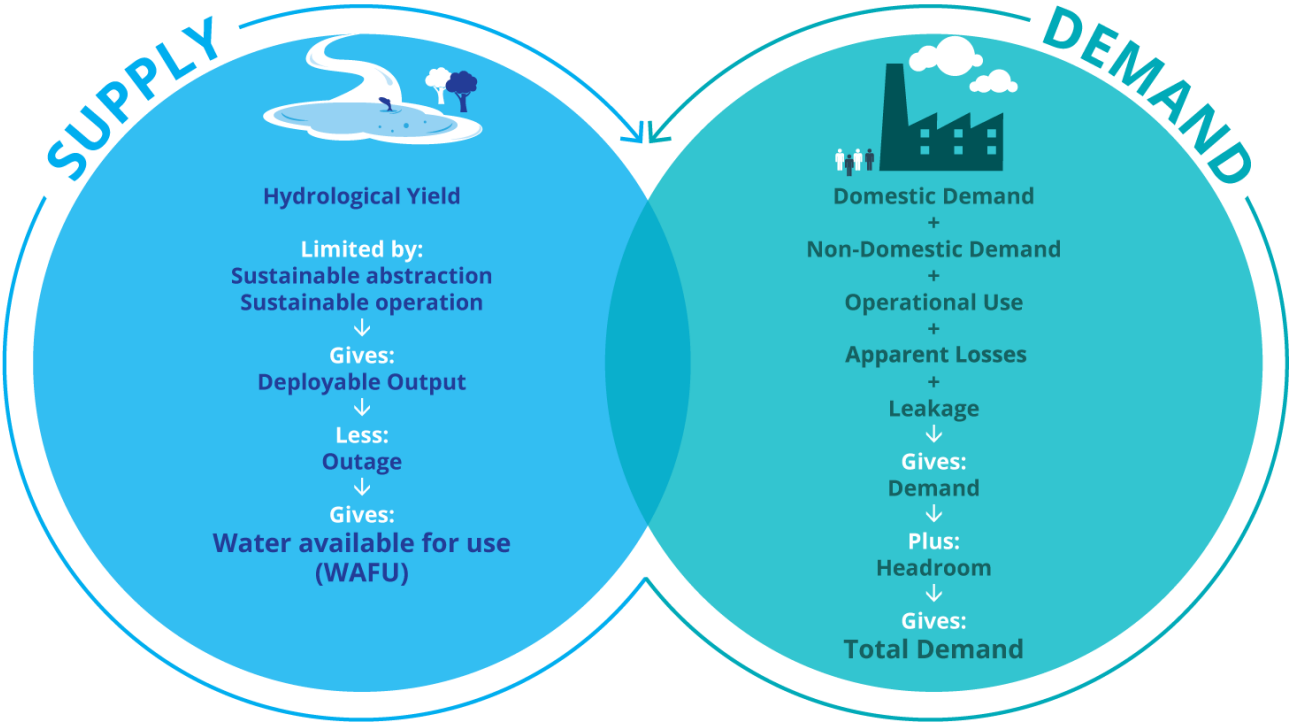


Figure 3.3 – Components of the Supply Demand balance

3.3 Developing Solutions - Irish Water's Approach

Irish Water faces significant challenges in terms of the quantity, quality, reliability and sustainability of the public supplies across the country. Primary risks identified in over 50% of Irish Water's supplies include insufficient water available for supply, water quality/compliance, and insufficient LoS to meet their customers requirements.

Irish Water must ensure that their water supplies become more sustainable over time, therefore they need to ensure that solutions to their supply issues consider the broader environment within which they operate. This means:

- Where feasible Irish Water must cater for increased growth requirements in the first instance by driving an aggressive leakage reduction programme combined with strong promotion of water conservation measures in homes and businesses, as they cannot continue to abstract more and more water from sensitive sources to meet this demand; and
- Irish Water fully adhere to the World Health Organisation (WHO) principle that the starting point for good clean drinking water is source protection, rather than relying on ever more complex and costly treatment. Irish Water will achieve this by developing and implementing Water Safety Plans across all their supplies.

In developing appropriate interventions in a sustainable manner, Irish Water have compiled the range of available solutions into three pillars; lose less, use less and supply smarter.

Figure 3.4 - Three Pillars to address the key challenges to the draft Framework Plan

- **Lose Less** - reducing water lost through leakage and improving the efficiency of Irish Water's distribution networks.
- **Use Less** - reducing water use through efficiency measures.
- **Supply Smarter** - improving the quality, resilience and security of Irish Water's supply through infrastructure improvements, operational improvements and by developing new sustainable sources of water.

Together these pillars will enable Irish Water to optimise their capital and operational interventions to achieve the best outcomes and react to emerging issues. Further information on the "three pillars" is detailed in Chapter 7 of the draft Framework Plan.

3.4 New Options Assessment Methodology

The New Options Assessment Methodology is detailed in Chapter 8 of the draft Framework Plan and SEA Environmental Report and summarised below. Consideration on how the protection of European sites was integrated into the draft Framework Plan development and options assessment process is detailed in Chapter 3.5 of this report.

The process has been applied across each of the key steps as identified in Figure 3.5 below.

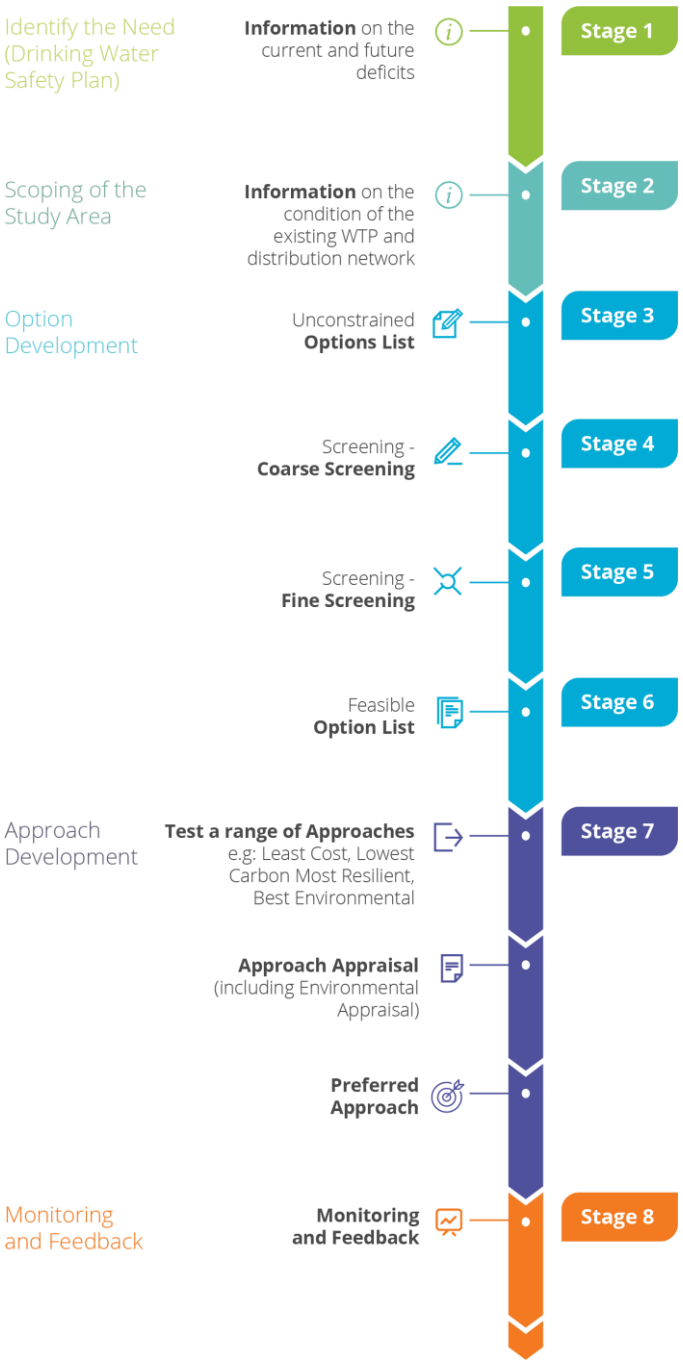


Figure 3.5 – Option and Approach Development Process

3.4.1 Supply Demand Balance

Stage 1: Identify the Need

The process starts with the 'need identification' process (both quantity and quality), as described in Chapters 3 to 6 of the draft Framework Plan. This provides context for the Options Assessment Process and informs the scale of the solutions required.

Stage 2: Scoping of the study area

Define the Study Areas

In order to manage the roll-out of the Options Assessment Methodology and delivery of Phase 2 of the NWRP, Irish Water have split the public water supply into the four regional groupings (as shown in Figure 1.2 of this report). These regional groups are based on:

- Irish Water's Regional Management Areas;
- Local Authority Boundaries;
- WRZ Boundaries; and
- WFD Catchment Boundaries.

These regional groups are further subidivded into clusters of WRZs termed Study Areas. Grouping WRZs into Study Areas means that:

- Options can be developed that address multiple problematic supplies, which allows for consideration of efficient regional solutions to resolve local needs in more than one supply; and
- Broader strategic decisions are made when looking at multiple WRZs.

The Study Area boundaries are based on WFD catchments and WRZ location and type (urban and rural). Further details on grouping WRZs into Study Areas are provided below.

Urban Areas

Urban WRZs are defined as those that comprise major settlements as defined by the National Planning Framework, Regional Assemblies and Local Authorities. The raw water sources used to supply these areas are identified and if neighbouring RWZs also abstract from the same waterbodies, they are included in the Study Area. This allows Irish Water to assess cumulative impact on waterbodies and ensures that all abstractions from the one source are coordinated. For example, if there are multiple abstractions from the same river supplying different WRZs, the combined effect of these abstractions might be missed if they were considered on a single WRZ basis.

Rural Areas

In rural areas Irish Water will strive to develop geographical groupings of small WRZs to form Study Areas. This approach allows Irish Water to consider regional solutions for these water supplies. The geographical groupings can be within an individual county or cross multiple county boundaries.

Identify Needs for the Study Area

Data is gathered for each individual Study Area including but not limited to:

- The **Water Quality** that can be supplied;
- The **Water Quantity** that can be supplied;
- The **Sustainability** of Irish Water sources or infrastructure; and
- The **Reliability** of Irish Water assets.

A detailed programme of consultation and workshops is then conducted with Local Authorities partners and stakeholders, to ensure a full and comprehensive understanding of need across the given Study Area.

This allows Irish Water to include any essential maintenance or refurbishment work required within WRZ to be considered at the options stage. If a water treatment plant in the Study Area is coming to the end of its operating life and will require a complete refurbishment within the next 10 years, the capital cost of this needs to be considered in the proposed options. The methodology also assumes that Irish Water will continue to invest in Capital Maintenance in order to ensure that viable plants are maintained at full

serviceability. These requirements are identified through the Asset Management process underpinning the Capital Maintenance Investment.

At this stage Irish Water also consider the reliability and environmental impact of their existing abstractions. This will allow Irish Water to identify sites where capacity required is not likely to be reliably available. This will also allow Irish Water to identify situations where Irish Water must reduce or remove their existing abstractions within the coming years.

As Irish Water currently have limited visibility of the proposed abstraction regulation process relating to the individual sources, they will assess the potential future reductions in these supplies and consider these within adaptive planning.

Stage 3: Unconstrained Options

The SDB and the Barrier Assessment (BA) inform the type and scale of options that Irish Water must consider. These options will be taken from the generic water resource types that are shown in Figure 3.6 and Table 3.4. Sub-variants of each option type are also considered.

Whilst options are considered individually, an approach to meet identified need may be provided from a combination of these options. For example, to meet a deficit of 10 million litres per day, the Preferred Approach could be achieved by increasing an abstraction from an existing source by 6 million litres per day, reducing leakage by 3 million litres per day and reducing consumption through demand management measures by 1 million litres per day (aligned with the Three Pillar approach).

An “Unconstrained Options” list is developed from the generic option types.

The Unconstrained Options constitute all of the possible solutions, which either fully or partly resolve a water supply deficit, regardless of cost, environmental or social constraints. In developing the Unconstrained List, Irish Water identify options that are applicable to meet the needs of the Study Area. This includes:

- A review of any options identified by Irish Water that have not been committed to in the current Investment Plan;
- A review of options previously considered by Local Authorities;
- A review of options identified in other strategy documents, approaches and projects; and
- Ideas generated at workshops with regional operational staff drawing on their knowledge and experience of the supply system and the geographical area.

Figure 3.6 - Option Types

Irish Water do not generally include options that they know will not be practicable to implement or suitable to address need.

The Unconstrained Options list can include solutions at a WRZ, Study Area, Regional Group Area or even National level.

Table 3.4 - Option types

NWRP category	NWRP sub-category	Summary
Lose Less		
Leakage Reduction		Reducing leakage from the network is a priority for Irish Water. This can involve a range of measures for actively detecting and repairing leaks such as the installation of meters to better identify customer leakage activity and advanced monitoring tools and techniques to better identify leaks. Leakage reduction will focus on targeted replacement of ageing pipes, pressure management to minimise fluctuations and excessive pressures providing more constant pressures to Irish Water customers whilst reducing bursts and the application of different leak repair approaches to minimise cost and disruption.
Use Less		
Water Efficiency	Education & Awareness	Environmental awareness/education campaigns and partnerships and distribution of educational materials to raise awareness of water shortages and encourage water conservation and efficiency.
	Water Efficiency Measures	Use of water efficient products and processes in new and refurbished housing developments and working with building standards to ensure that water efficiency measures are included in standards regulations as mandatory. Encouraging take up of water efficiency measures by domestic and non-domestic customers such as more efficient appliances, repair of leaking toilets, use of water audits. Actively pursue business customers and industry for partnerships that involve water efficiency goals. Investigate how to use water within Irish Water's existing assets more efficiently through improved treatment processes and recycling of effluent water for appropriate uses.
	Recycling and Reuse	The recycling of treated wastewater or grey water provides a critical supplementary water source for non-potable activities therefore alleviating stress on primary water sources. Grey water refers to the water used in baths, sinks, washing machines, and other kitchen appliances. In periods of drought, when potable water is in short supply, grey water can be a potential alternative water source for activities such as agricultural and landscape irrigation, industrial process, and toilet flushing.
	Metering	Domestic water metering can build a better understanding of water use and network pressures to improve water efficiency and therefore water security and identify leaks. Water meters with advanced analytics to undertake flow balances across the network can allow Irish Water to gain a better understanding of the whole network from the abstraction point to the customers
Supply Smarter – resource supply options[6]		
Surface Water	Surface Water Abstraction	Increasing the abstraction at an existing river or lake source or developing a new river or lake source from which water can be sustainably abstracted. These options would be subject to an abstraction licence.
Groundwater	Groundwater Abstraction	Increasing the abstraction at an existing groundwater source or developing a new groundwater source from which water can be

[6] It is important to note that these option types are not necessarily alternatives to each other; in the majority of the WRZs a combination of options will be selected as the preferred / recommended approach. For example, surface water and groundwater abstractions can be used in combination, this is called conjunctive use and involves the storing of surface water in groundwater basin in wet years and withdrawing it from the basin in dry years. Additionally, most new or increased abstractions will involve upgrades to or construction of new WTPs and new or upgraded transfers.

NWRP category	NWRP sub-category	Summary
		sustainably abstracted. These options would be subject to an abstraction licence.
	Aquifer Storage Recovery	Storage of treated or raw water in suitable aquifers. During times of plentiful water supply, excess water withdrawn from a river, lake or another groundwater source is injected and stored within an aquifer. This supplementary stored water can be extracted from the aquifer during periods of dry weather and/or increased demand when the primary supply sources are running low. This requires aquifers with suitable characteristics to be available as the risks of losses can be high.
Reservoirs	Storage Reservoirs	Provision of storage reservoirs which can be filled with untreated water abstracted during high flow conditions from surface waters to be drawn on during low flow periods or to provide additional resilience during droughts as a back-up supply source.
Catchment Management	Catchment management for ground or surface water sources	Activities such as agriculture, forestry, industry and waste management all have an impact on the retention of water in the catchment and the quality of the water within rivers and loughs. Pollutants in the water can lead to ecological deterioration, increased flood risk and can also create issues for water treatment. There may be scope for changes to land management through working in partnership with landowners, farmers and regulators to develop agreements and share information and resources to provide long term improvements with wide benefits including water suitable for supply from surface of groundwaters.
Effluent Reuse	Effluent Reuse	Recycling of wastewater effluent from treatment plants can produce a new supply source from wastewater which is otherwise discharged to rivers or the sea. This involves treating wastewater to a sufficiently high standard to meet supply standards relevant for the intended use for example for agricultural/horticulture/industry/water supply or for release to rivers to maintain flows.
Desalination	Desalination: Coastal or Brackish	This involves the process of removing salt and other minerals from seawater or brackish water[7] river estuaries to make it suitable for human consumption and/or industrial use. The level of treatment required is related to the salt concentration of the water.
Water Transfers	Transfers	Water transfer is the physical movement of water from one area to another usually via pipelines, although other means such as canals or aqueducts can be used. These generally refer to the transfer of treated water and can vary considerably in scale in terms of size and length from local transfers from one (WRZ to another, to regional transfers and inter-utility transfers (from Northern Ireland Water).
	Tankering	Delivery of treated water to customers via road tanker to alleviate temporary short-term water shortages in certain localised situations.
Network Improvements	Network Improvements (general)	Network improvement involves works such as upgrade, replacement or operational improvements. They are undertaken to facilitate better water distribution and avoid network limitations. Therefore, strategic network reinforcement improving connections between different sources and customer supply can significantly improve security and resilience.
	Service Reservoir Expansion	Service reservoirs store treated water. They are used to balance out the steady supply of treated water they receive from WTPs and the fluctuating variations in customer demand during a 24-hour period. They can also be used to store a backup supply in low flow events but for a limited period of time.
Water Treatment Plants	WTP Expansion / Rationalisation	Expansion of existing WTPs to facilitate the treatment of a higher volume of water. This option would be considered in-combination with an increase of a surface water or ground water abstraction or the provision

[7] Brackish water is water that has more salt than freshwater, but not as much as seawater that is generally found in estuaries.

NWRP category	NWRP sub-category	Summary
		of a new surface water our ground water source. Expansion of existing WTPs may be carried out as part of a rationalisation process which involves the merging of WTPs. Rationalisation is carried out to reduce water supply costs, take a malfunctioning WTP out of service or to cease abstraction from an unsustainable source.
	WTP Process Losses	For every litre of untreated water extracted from a source and fed through a water treatment plant to the supply distribution network, a small fraction of the water will be lost from the system as a result of the treatment losses. Generally, WTPs are designed to recover, treat and recycle as much of the waste stream as economically feasible. However, there can be opportunities to improve efficiency through the upgrading and installation of more complex treatment processes to reduce these process losses and therefore increase the WAFU.

Stage 4: Coarse Screening

The Unconstrained Options list is refined using a Coarse Screening assessment, which enables Irish Water to rule out any non-viable options. The remaining options known as “Constrained Options” can then be carried forward for more detailed Multi Criteria Assessment (MCA) at the Fine Screening stage (see Stage 5 below).

The Coarse Screening assessment uses the criteria listed in Table 3.6, with options scored against a red, amber or green traffic light system shown in Table 3.6.

Any option which scores “red” against a question has a fundamental issue that would be difficult to mitigate and is discounted on the basis that it is unlikely to ever be delivered.

An amber rating across any of the Coarse Screening criteria will not rule out an option, however, it will highlight that this option may require mitigation. For example, a surface water abstraction from a source which is designated as a European site will obtain an amber rating (assuming that it meets the allowable abstraction limits, see Chapter 3.5.1) against the Deliverability and Flexibility criterion and Sustainability (Environmental and Social impacts) criterion. However, such an option will most likely require mitigation in relation to construction related impacts, which will take time to develop. Therefore, Irish Water must allow for consideration of the likely environmental site assessments and studies that will need to be carried out within Irish Water plan level costing for an option.

A ‘Rejected Options Register’ is produced to record and explain all options that are screened out on the basis of a red rating.

Table 3.5 - Unconstrained Options Assessment criteria

Criteria	Unconstrained Option Assessment questions		Assessment Score
Resilience	**Q1**	Does the option address the supply-demand problem?	**Yes** / **Maybe** / **No**
Deliverability and Flexibility	**Q2**	Is the option technically feasible?	**Yes** / **Maybe/ No**
	Q3	Can the risks and uncertainties associated with the option be mitigated to avoid failure of the option?	**Yes** / **Maybe / No**
Sustainability (Environmental and Social impacts)	**Q4**	Can the impacts on known high level environmental constraints including at internationally designated sites be avoided? If not is mitigation likely to be possible?	**Yes** / **Maybe / No**

Table 3.6 - Red, Amber and Green decision matrix

RAG matrix	Red	Amber	Green
Resilience	Does not address the supply-demand problem at all.	May address part of the supply-demand problem (with due consideration on the size of the deficit).	Fully addresses the supply-demand problem.
Deliverability & Flexibility	Option is not technically feasible. Associated risks and uncertainties are unviable and will result in a failure of the option.	There are some risks and uncertainties associated with the option but are not considered to be insurmountable at this stage.	Option is technically feasible. There are no associated risks or uncertainties which are unacceptable.
Sustainability (Environmental and Social Impacts)	Likely significant impacts on European designated sites or WFD objectives* or important biodiversity, landscape designations, cultural heritage or community assets which cannot be avoided through design or whereby proposed mitigation is not feasible. *options that cannot meet the sustainable abstraction limits are removed/red rating (see Chapter 3.5.1.)	There are some impacts identified. However, they are not considered to be prohibitive at this stage due to the potential for improved design and/or mitigation.	No major issues or sensitivities identified at this stage.

Stage 5: Fine Screening

Fine Screening involves an analysis of the Constrained Options against a range of detailed assessment criteria, through the MCA process. The objective of the MCA and the Fine Screening process is to determine the potential benefits and impacts of the options across a range of key criteria. It involves dividing the decision into smaller, more understandable parts and analysing each part before integrating those parts to produce a meaningful solution.

The MCA process allows a combination of issues to be considered together. This can help indicate if one option will be more: cost effective, environmentally acceptable, promotable, resilient or feasible when compared to other options. This process requires a more detailed analysis of the options and their potential benefits and impacts against the key criteria. This allows Irish Water to highlight issues with options which were considered to be feasible at the Coarse Screening stage but on further review are not considered viable.

The MCA methodology has been tailored to provide a structured and transparent approach to inform the decision-making process and to remove subjectivity, as far as reasonably possible. It also recognises that both monetary and non-monetary objectives may influence decisions.

The MCA approach applies a common set of questions to determine the relative merits of each option across the key criteria. The questions are developed by dividing the criteria from the Coarse Screening stage into detailed sub-criteria against which options can be assessed. Table 3.7 lists the criteria, sub-criteria and 33 questions that are applied at the Fine Screening stage. Of relevance to AA is the question on potential impacts to European sites (see MCA criteria/sub-criteria on Sustainability (Environmental and Social Impacts) and Biodiversity, flora and fauna).

Table 3.7 – Fine Screening Questions

MCA criteria	Sub-criteria	Fine screening questions
Resilience	Outages	• Is there vulnerability due to failure/outages caused by, for example, flooding, pollution, damage, freeze-thaw, loss of power supply? • Is there provision of additional resilience (from new option) to outage events at existing sources?
	Financial uncertainty	• Is there vulnerability due to increasing energy or commodity prices?
	Regulatory changes	• Is there vulnerability to future regulatory and legislation changes including changes to environmental legislation?
	Climate change	• Is there improved resilience of Irish Water due to climate change and/or drought conditions?
Feasibility and Deliverability	Flexibility	• Are there benefits due to short lead in time to deliver the option? • Is there phased or incremental delivery of the option? • Is it possible to adapt the option once delivered, to meet any future changes? • Are there benefits due to a short ramp-up time for the option to deliver potable water into supply?
	Deliverability	• Is there experience in delivering similar solutions (technology or construction methodology known to Irish Water)? • Is there deliverability uncertainty due to land ownership or suitable land availability? • Are there construction uncertainties due to land stability or contamination risk? • Is there dependency on existing assets for successful delivery? • Are there any major issues with the Safety, Health and Welfare at Work (Construction) Regulations, 2013 that could change the scope or put at risk the successful delivery of the option? • Is the required technology tried and tested with operations department? • Is there quality and confidence of design information?
Progressibility	Acceptability	• Are there any major local planning issues that could change the scope or put at risk the successful delivery of the option? • Are there any major issues with regulatory consents or permissions that could change the scope or put at risk the successful delivery of the option?
	Synergies	• Are there synergies with other WRZs, other water companies on the island of Ireland, in the UK, or third parties?
Sustainability (Environmental and Social Impacts)	Population, health, economy & recreation	• Will the option impact public health and quality of life, during construction? • Will the option impact public health and quality of life, during operation? • What is the impact on recreational amenities?

MCA criteria	Sub-criteria	Fine screening questions
	Water environment: quality & resources	• Would the option or associated construction activities affect WFD Status of water body status, in terms of quantity and quality for surface water? • Would the option or associated construction activities affect WFD Status of water body status, in terms of quantity and quality for groundwater? • Would the option or associated construction activities affect WFD Status of water body status, in terms of hydro morphology? • Would this option reduce pressure on water environment through water savings? • Is there a potential for this option to increase flood risk – e.g. increase base flow or result in loss of flood plain? • Will navigation be affected?
	Biodiversity, flora and fauna	• Is there potential to result in adverse effects on the integrity of a European site? • Is there potential to impact on an Annex species outside designated areas? • Is there potential to impact on national designated sites? • Is there potential to impact on biodiversity in all other areas? • Is there a risk of spreading Invasive Non-Native Species (INNS)?
	Material assets	• Will the option make effective use of existing assets or reduce water abstraction? • Will this option conflict with critical infrastructure, or does the option conflict with existing business, planned land use or valuable agricultural land?
	Landscape and visual amenity	• Could this option impact the landscape character areas, townscape character areas or important views (detract or improve)?
	Climate change	• What is the level of construction and operational carbon emissions associated with the option (tonnes)?
	Cultural heritage and archaeology	• Does this option avoid direct damage to, or detract from the setting of, designated cultural heritage assets, or does this contribute to protecting them?
	Geology and soils	• Would any designated or non-designated geological features, valuable soils, or contaminated land sites be affected?

Each option is subject to an objective assessment with uniform scoring criteria, based on best publicly available datasets. Options are scored using a seven-point Likert scale, from 3 to -3, as set out in Appendix N of the draft Framework Plan.

The environmental MCA criteria are linked to the SEA objectives developed from the SEA Scoping Report through consultation with environmental stakeholders. Some criteria/screening questions may be more relevant to some options types than others, and where a criteria or sub-criteria is not relevant it is simply considered as “not-applicable” (N/A) and is discounted in the overall appraisal of the option. Where criteria are found not to be relevant for comparing between options within a particular Study Area, they can be put aside to focus the assessment.

The AA process has been integrated into the Options Assessment Methodology in particular through the MCA/Fine Screening scoring for the European sites (biodiversity) question (see Best AA approach, Table 3.8). Protection of European sites in the plan development process is discussed further in Chapter 3.5.

The screening process provides MCA scores for each of the Feasible Options which then pass through to the Approach Appraisal stage for further consideration.

Where there are a very large number of options covering a range of option types, Fine Screening can be used to identify poorly performing options. These can be removed or placed on a reserve list for future consideration should they be required. Options that passed through the constrained options stage might also be removed at Fine Screening if a more detailed assessment shows them to be unsuitable. Any options which are discounted at this stage are recorded on the Rejected Options Register. Better performing options are taken forward for further consideration in the feasible list. This method can be appropriate for large WRZs or study areas.

Only options identified as clearly not feasible, unsustainable or unviable will be removed. Where options perform poorly against specific sub-criteria, the potential for design or mitigation to address effects will be considered. If there is any doubt as to whether a particular option should be classified as feasible or not, then that option will be carried forward to the feasible list with risks identified.

Stage 6: Feasible Options List – Option Costing

The output of the Fine Screening stage is called the Feasible Options List. A Plan level outline design and estimated cost is developed for each option on the list. “Whole life” construction and operation costs (see Chapter 8 of the draft Framework Plan) are based on Irish Water’s Project Costing Template (PCT) to ensure alignment with Irish Water’s investment processes.

It should be noted that assessments at this stage are high level desk-based and plan level assessments. Environmental impacts and costing of projects are further reviewed at project level where alternatives will require to be considered as part of the environmental impact assessment process in the usual way. No statutory consent or funding consent is conferred by inclusion of any option in the RWRP. Any projects that are progressed following identification in this plan will require individual environmental assessments (including AA screening and if needed AA). These will be obligatory in support of planning applications (where a project requires planning permission) or in support of licensing applications (for example, for new or increased surface or groundwater abstractions).

As the Plan level costing is intended to be a comparative assessment between option types, Irish Water do not include detailed project level costing for “in-flight projects”. This is to ensure that the Framework Plan methodology is uniformly applied in the development of the Preferred Approach.

Stage 7: Approach Development

Test a Range of Approaches

The purpose of the RWRPs will be to examine all potential options that could be used to address identified need and then to eliminate those that are not feasible or that have identifiable environmental issues (at a desktop level).

After Fine Screening the remaining Feasible Options are assessed against a specified number of Approaches.

Irish Water apply a defined process to develop the Preferred Approach at the four spatial scales shown in Figure 3.7 and summarised below.

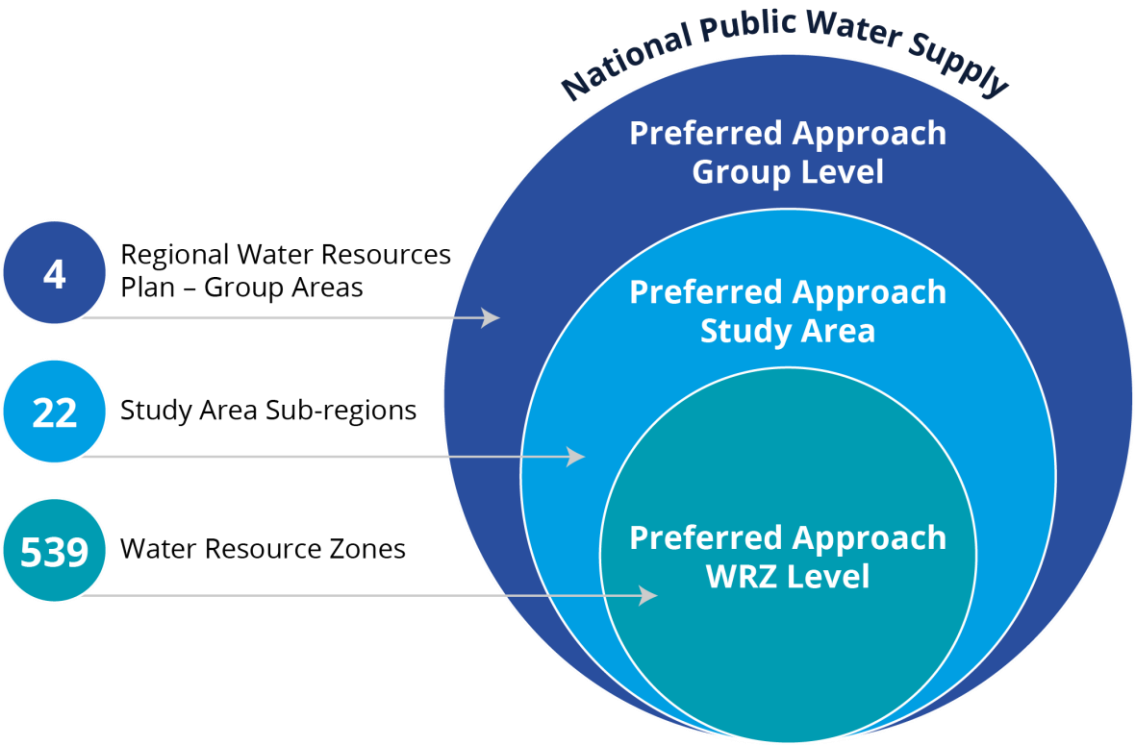


Figure 3.7 – National Water Resources Plan Spatial Scale of Assessment

Assess the Feasible Options to develop a Preferred Approach for each WRZ. This would be typically expected to result in small local options, that can resolve need solely within all or part of the WRZ.

- Assess the Feasible Options to see whether any group options are available to meet the need across multiple WRZs. This stage can yield a modified Preferred Approach at the Study Area Level.
- Assess the Feasible Options at the Regional Group level to see if there are any options that can be applied across the entire Regional Study Group and, if appropriate, adjust the Preferred Approach accordingly.
- The final stage is to assess and then develop a Preferred Approach at national level (this will be addressed in the Final RWRP Regional Plans).

Irish Water tests the Feasible Options, individually and in-combination to determine the Preferred Approach to meet the need across the four spatial scales. Irish Water test the options against six approaches which were selected to align the NWRP with all relevant Government Policy. The six approaches are summarised in Table 3.8 and discussed in further detail in Chapter 8 of the draft Framework Plan.

Table 3.8 – Range of Approaches to Test Feasible Options

Approaches Tested	Description	Policy Driver
Least Cost	Lowest Net Present Value (NPV) cost in terms of Capital, Operational, Environmental and Social and Carbon Costs.	Public Spending Code
Best Appropriate Assessment (Best AA)	Lowest score against the European Sites (Biodiversity) sub-criteria question:	Habitats Directive

Approaches Tested	Description	Policy Driver
	• **Score = 0** equates to no LSEs. If these 0 scoring options meet the deficit/ plan objectives, they are automatically picked as the Preferred Approach. • **Score = -1 or -2** equates to LSEs that can be addressed with general/standard mitigation measures (increased difficulty to mitigate identified by lower negative score). • **Score = -3** equates to LSEs that may be harder to mitigate or require significant project level assessment. Higher scoring options identified where possible.	
Quickest Delivery	Based on an estimate of the time taken to bring an option into operation (including typical feasibility, consent, construction and commissioning durations) as identified at Fine Screening. This is particularly relevant where an option might be required to address an urgent Public Health issue.	Statutory Obligations under the Water Supply Act and Drinking Water Regulations
Best SEA Environmental	This is the option or combination of options with the highest total score across the 19 No. SEA MCA sub-criteria questions.	SEA Directive and WFD
Most Resilient	This is the option or combination of options with the highest total score against the resilience criteria.	National Adaptation Plan
Lowest Carbon	This is the option or combination of options with the lowest embodied and operational carbon cost.	Sectoral Adaptation Plan

Best Appropriate Assessment (Best AA) Approach

The Best AA approach gives maximum consideration to the options with no potential for LSEs on European sites or options with LSEs that can be addressed with general/standard mitigation measures at the project level. The Plan level assessment puts avoidance of impacts on European sites at the forefront taking account of the fact that options with a high likelihood of significant effects which could lead to adverse effects on a European Site have already been removed at Coarse Screening stage.

Approach Assessment Ranking

Depending on the complexity and size of the WRZ or Study Area, the best performing Feasible Options for each of the six approached are determined using either:

- EBSD (Economics of Balancing Supply and Demand) Lite; or
- EBSD Model.

EBSD Lite

The preferred options to meet the need for each of the six approaches (Least Cost, Best AA, Lowest Carbon etc) are derived by ranking the options in order of lowest to highest total Net Present Value (NPV) cost and with regard to their applicable MCA scores for the six approaches.

This approach is generally better suited to smaller WRZs and study areas, as it allows for a simple comparison of individual options where the entire need can be met from single options. Where the assessment is required to consider a range of different and more complex combinations of options to meet a need, then the more detailed, full EBSD analysis is required.

Full EBSD Model

The Full EBSD Model evaluates the range of potential approaches comprising single or different combinations of options for a WRZ to reflect the key criteria used in the Fine Screening stage namely: resilience; deliverability and flexibility; progressibility; sustainability (environmental and social impacts)

and cost. The full EBSD Model then produces an optimised programme of investment to meet the needs of a WRZ over a defined planning period (25 years in the Plan).

The model does this by evaluating the Fine Screening criteria and determining:

- **Which** options should be selected;
- **When** the option should be implemented; and
- **What** utilisation should be made of the option within the planning period.

For each of the six approaches (Least Cost, Best AA, Lowest Carbon etc), Irish Water use the EBSD Model to derive an optimum combination of options to address the future need based on the MCA scores. The Approach development process is designed to determine the Best Value approach to meet the need and this is then identified as the Preferred Approach. Best Value is identified as the approach that provides the best performance overall, balancing across the range of NWRP and SEA objectives.

Approach Appraisal

Irish Water then compare the options identified for each of the six approaches (Least Cost, Best AA, Lowest Carbon etc) against each other to come up with a Preferred Approach that meets the objectives of the Plan and aligns with all relevant Government Policy.
The Approach Appraisal process involves:

- Identifying the option or combination of options that best conform with each of the six approach descriptions, for example, the option or combination of options that would be classified as the Least Carbon Approach, Least Cost, Best AA etc.
- Assessing the Approaches against each other, following the eight step process set out in Figure 3.8 in order to develop a Preferred Approach for each WRZ.
- Ensuring an alternative option that can meet the plan objectives is available for any option that has identified a “-3 Biodiversity” in relation to the European Sites sub-criteria question.
- Identifying interim measures that might be required in a WRZs to meet a potential immediate need.

The following rules will be used to ensure its consistent application in developing Phase 2 of the NWRP:

- If an option is identified that meets the Objectives of the Plan, and is assessed as having no potential impact on a European Site (zero or neutral score based on desktop assessment), it is automatically adopted as the Preferred Approach at WRZ level.
- As all Irish Water’s Feasible Options have all passed the Coarse and Fine Screening process, The Least Cost Option is used as Step 1 in the development of the Preferred Approach.
- The Preferred Approach must meet the Objectives of the Plan (i.e. to address the identified need).
- Although the Preferred Approach development process starts with the Least Cost approach, it must give the highest consideration to Environmental Legislation and Government Policy on climate change adaptation and public expenditure.
- Irish Water also consider at this stage any project level information available for in-flight projects to sense check them against the Preferred Approach. For example, detailed project level costings might reveal that an in-flight project identified as a Preferred Approach is more expensive than the plan level estimates, or the progress already made for an in-flight project is less than a Preferred Approach that is not an in-flight project.

- The Preferred Approach at a Plan level does not confer any consent to develop a project, nor does it preclude other options being considered subsequently at the Project Level.

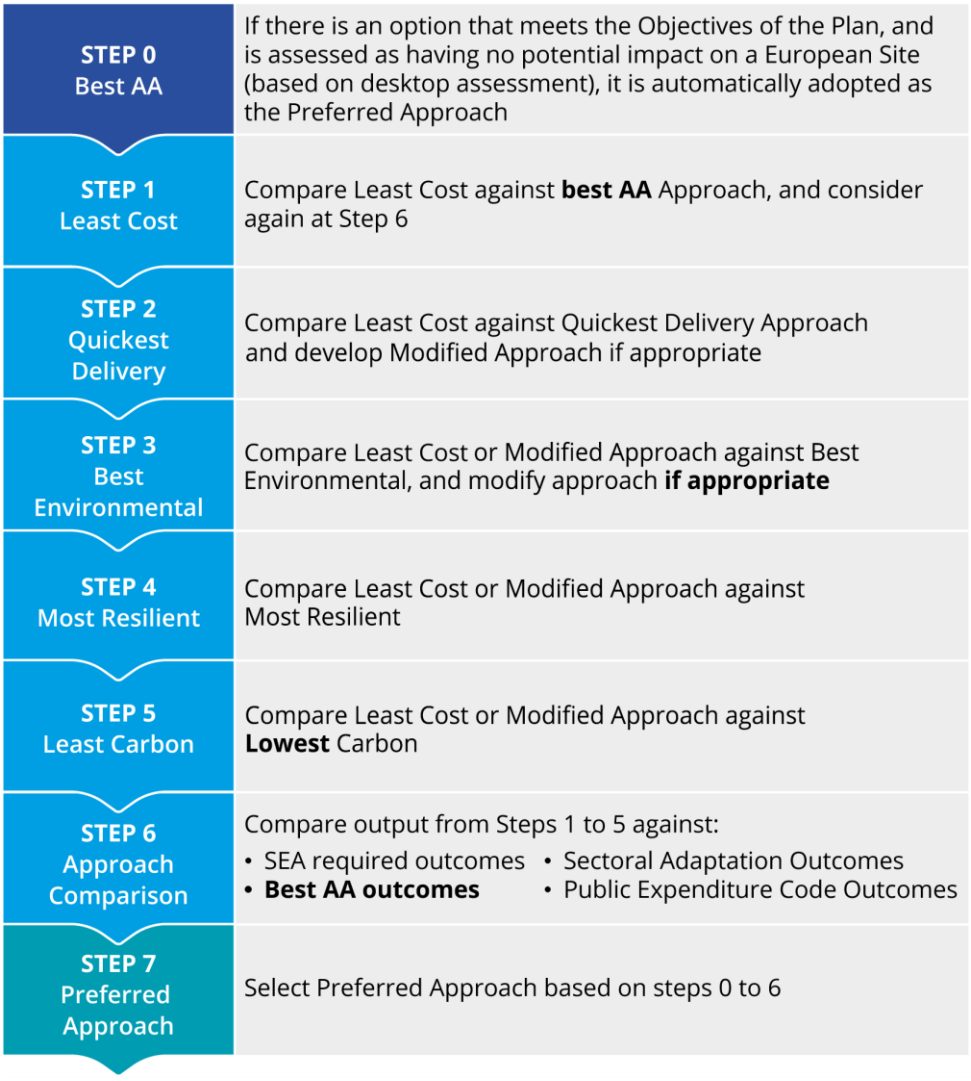


Figure 3.8 – Approach Assessment Process

Preferred Approach

The Preferred Approach to address the need for each WRZ is identified using the Approach Assessment Process set-out in Figure 3.8.

When Irish Water compare the various approaches as part of this process they are looking to identify where the approaches provide significantly better performance for some outcomes without incurring significantly worse performance against other outcomes. During the development of the draft Plan Irish Water have attempted to define this as a rules based exercise, but given the complexity of the considerations this always gave compromised solutions. Irish Water have decided to maintain this as an exercise in professional judgement for the teams involved, which is recorded as a narrative at each stage, in order to reflect the considerations of the intricacies of the approaches.

This Approach Assessment process will be conducted via workshops involving technical experts working on the Regional Water Resources Plans, including Engineers, Ecologists and Environmental Scientists. The decision-making process and outcomes will be documented for each Water Resource Zone.

The Approach Appraisal process is then repeated at the Study Area and Regional Group Area levels in order to develop the four RWRPs.

Interim Solutions

Based on the scale of need across all Irish Water's WRZs, it is likely to take numerous investment cycles, before they can address all issues across existing water supplies. Therefore, smaller, localised options may be required on an interim basis to secure priority need in existing supplies until the Preferred Approach can be delivered.

Any projects considered within the interim approach will only be progressed on the basis of urgent or priority need (such as Remedial Action List) to address critical water quality, reliability and sustainability risks. In this case they would be considered to be required irrespective of the medium or long term SDB requirements and would be regarded as an efficient use of budget.

The NWRP does not confer funding availability or statutory consent on any interim solution. If an interim option is deemed necessary, funding approval in addition to all applicable consents would need to be obtained for it to progress.

Stage 8: Monitoring and Feedback into Plan

The Public Water Supply in Ireland is a live asset base and is subject to continuous change. New assets such as water treatment plants, storage reservoirs, trunk and distribution mains are continuously developed and upgraded. Knowledge and data relating to our assets is improving and operational procedures are being standardised.

External factors can also influence the performance of Irish Water's water supplies, including:

- Changes in legislation and policy that impact the way Irish Water operate their asset base or their interface with the natural environment;
- Reductions in water supply availability due to climate disruption and environmental impacts;
- Growth in demand for water for domestic and non-domestic use; and
- Funding availability and requirements to improve LoS to water users.

All of these factors influence need in terms of Quality, Quantity, Sustainability and Reliability, therefore the SDB and Barrier Scores in the Plan represent a snapshot in time of live metrics.

Similarly, the development of Preferred Approaches as part of the forthcoming Regional Plans is influenced by evolving scientific data, understanding, and policy change in relation to the natural environment.

Irish Water must be able to continuously adapt to these changes, which may be minor or material in nature. Therefore, the draft Framework Plan commits to undertaking continuous monitoring and ensuring that there is an a feedback mechanism within the Framework Plan and Regional Plans. The Regional Plans will be subject to formal review every five years, however, this continuous monitoring process will ensure that material amendments are assessed for significant impacts on the environment.

Monitoring and Feedback

The monitoring and feedback process involves:

- Identifying the internal and external factors that may impact the Plan, mapping the areas of the plan that they will influence;

- Updating needs identification by updating the SDB, Drinking Water Safety Plans and Barrier Scores to reflect these changes;
- Assessing the impact of these changes on the Plan and Preferred Approaches Developed within the Regional Resources Plans; and
- Updating the Need Regional Plans where the changes are deemed to be material.

See Chapter 8.3 of the draft Framework for further information on monitoring and feedback.

3.5 Consideration of the protection of European sites in the Plan development process

The draft Framework Plan establishes SDBs for all WRZs identifying potential supply deficits between water available and the projected demand within each WRZ. Options are then proposed to resolve these deficits. The first objective of the draft Framework Plan must be to resolve these deficits, however, the draft Framework Plan development including the methodology for option selection has the protection of European sites and environmental considerations at the forefront. Set out below are the measures employed to ensure the protection of European sites in the draft Framework Plan development process.

3.5.1 Allowable Abstraction

Irish Water will consider the environmental impact of their existing abstractions as well as the potential resources or water quality improvements. Irish Water will consider abstraction sustainability in relation to identifying levels of allowable abstraction. WFD waterbody status will be taken into account through a review of existing abstractions and in the identification of new options, thus ensuring new options can meet allowable abstraction criteria.

Using desktop assessments, the allowable abstraction standard of 10% of Q95 has been applied with the exception of waterbodies requiring “High” status where a higher threshold of 5% of Q95 has been applied[8]. The application of these abstraction standards will help to ensure that any new or increased abstractions from rivers designated as SACs (which require “Good” and/or “High” status water quality) will align with the conservation objectives of these designated sites. Allowable abstraction standards for lakes are set at 50% of Q95 in line with the water quality standards applicable to lakes. Further information on allowable abstractions, yield assessments and supply assessments is provided in the SEA for the draft Framework Plan.

New options that are developed by Irish Water must meet those criteria and are not otherwise considered as part of the Plan. As part of the Plan, we do consider some options that are not new options, but were previously proposed. However, if these do not meet the criteria for sustainable abstraction they are eliminated at Coarse Screening stage unless we have access to site investigation or other data that shows that these proposed abstractions are sustainable and consistent with the protection of European sites. Application of these sustainable abstraction limits at initial option development and during Coarse Screening will protect European sites by eliminating many options with the potential to have adverse effects on the integrity of European sites.

However, these are Plan level assessments and will be supplemented by the comprehensive site investigations and surveys, including hydrological surveys, that will be carried out in respect of the Preferred Approaches as it progresses. Construction related impacts associated with new or upgraded

[8] Two sources: (1) UK Environmental Standards and Conditions (Phase 1), (2008). UK Technical Advisory Group on the Water Framework Directive. (2) Quinlan, C. & Quinn, R. (2018). Characterising environmental flows in Ireland and what this means for water resource management in Ireland. Irish National Hydrology Conference 2018.

infrastructure related to surface water abstractions also need to be assessed at project level. For example, for an option that has its abstraction source within a designated European site, it would need to be confirmed whether or not the conservation objectives can be met within allowable abstraction limits based on the standard rules.

3.5.2 Coarse Screening

The Coarse Screening applied as part of the Options Assessment Methodology (detailed in the draft Framework Plan) for identifying the Preferred Approach had environmental considerations at the forefront of the assessment. All options considered to have a significant impact on the environment (e.g. option that may result in waterbody not achieving “High” or “Good” status under WFD) were removed at Coarse Screening stage. Some examples of options removed on environmental grounds, which in turn could provide protection of European sites include:

- Raw water transfer to stop the spread of INNS cross catchment.
- Options where the yield assessment identified that the proposed abstraction would not be within the allowable abstraction range as set out in Chapter 3.5.1 (e.g. a quantity of water above the allowable abstraction range was required to resolve the deficit).

All options removed at Coarse Screening are detailed in a Coarse Screening rejection register. Any options removed due to potential significant impacts on the environment (including European sites) are noted as such.

3.5.3 Fine screening - MCA scoring/Identification of LSEs and integration of AA into optioneering process

Detailed information on the Option Assessment Methodology is included in Chapter 3.4 above. The MCA scoring undertaken at Fine Screening stage feeds into the process for identifying Preferred Approaches for each WRZ. Feasible options are assessed individually and in-combination to determine the Preferred Approach. Options are tested against six approaches which were selected to align the draft Framework Plan with all relevant Government Policy (see Table 3.8 above).

The Fine Screening scoring for the European sites (biodiversity) question identifies at a high-level potential for LSEs from an option (screening for AA - Stage 1 of the AA process). Any option with a score of -1 to -3 has identified LSEs and is taken forward to AA (Stage 2 of the AA process) and assessed within the NIS for the draft Framework Plan. The score essentially identifies LSEs with varying significance (see Table 3.9 for further detail on the scoring criteria applied).

Table 3.9 - MCA Scoring criteria in relation to identification of LSEs

Score	Comment
0	Those options scoring 0 are those where no LSEs on a European site have been identified (based on desktop review). During the optioneering process Irish Water identify if these 0 scoring options meet the objectives of the draft Framework Plan and if they do they are automatically picked as the Preferred Approach.
-1	Identified that the option has potential for LSE (generally construction related impacts). However, it is considered that these LSEs will not result in AESI with standard best practice and in some cases specific mitigation applied. These options are not considered to lead to AESI based on the draft Framework Plan level rules/protective measures applied (see Chapters 3.5.1-3.5.4) and desktop information available at the time of assessment. *Example of option scoring -1: Option may include works which are hydrologically linked to an SAC some distance downstream.*
-2	Identified that option has potential for LSE (generally construction related impact). However, it is considered that these LSEs, although harder to mitigate, will not result in AESI with standard best practice project and more complex specific mitigation (for example pollution control compliant with legislation to protect the general environment and not always specifically for European sites or their Qualifying Interest (QI) features). These options are not considered to lead to AESI based on the draft Framework Plan level rules/protective measures applied (see Chapters 3.5.1-3.5.4) and desktop information available at the time of assessment. *Example of option scoring -2: Option may include works which are hydrologically linked to an SAC, a direct crossing of an SAC or disturbance related impacts to an SPA.*
-3	Identified that option has potential for LSEs that may be more difficult to mitigate that -1 or -2 scoring options or where uncertainty around potential impacts remains (uncertainty may remain until site level assessments are carried out) and although deemed feasible through Stage 2, may require a higher burden of site-based proof to succeed if it is ever progressed to project level. *Example of option scoring -3: Option may include construction works within a SAC, surface water abstraction from an SAC or ground water abstraction outside an SAC but with potential hydrological links to an SAC supporting ground water dependent habitats (GWDH) or species.*

NB. Score of -1, -2 or -3 = potential LSEs have been identified at Fine Screening stage <u>in the absence of mitigation</u> (screening for AA cannot take mitigation into account). To note all of the Preferred Approaches are reviewed in the NIS to ensure that all potential LSEs have been identified at Fine Screening stage taking account of any further information that may be available when undertaking the AA.

3.5.4 Plan Level Protection of European sites

As part of the feedback loop from the NIS for the draft Framework Plan, a better approach to options with LSE i.e. -1 to -3 score for biodiversity at Fine Screening are identified where possible (especially in respect to -3 scores due to the potential complexity of implementation at the project stage e.g. an option that meets the draft Framework Plan objectives and doesn't score -3). Because it is possible that all of the potential impacts identified for even a -3 LSE option can be entirely ruled out through project level investigation and analysis or avoided through project level mitigation, the -3 LSE option for biodiversity may be progressed as the Preferred Approach. If such potential impacts cannot be ruled out or avoided,

then mitigation in the form of avoidance is provided for within the NWRP to protect European site(s). Should potential adverse effects on European sites be identified at the project level from a given option/Preferred Approach the NWRP will have identified other options[9] that could be progressed at the project level if required. Therefore, no project arising from the NWRP, with AESI identified at the project stage would be implemented.

[9] These options may not have progressed as the Preferred Approach initially as they may have scored significantly worse against other environmental, resilience or feasibility criteria (e.g. the best AA approach may identify an option that results in four times more carbon being produced or is twice as expensive).

4 Description of Baseline Environment

4.1 Overview of the European sites

Sites within the Natura 2000 Network are referred to as European sites and include Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). SACs are designated for the conservation of Qualifying Interests (QI), Annex I habitats and Annex II species (other than birds). SPAs are designated for the conservation of Special Conservation Interest (SCI) Annex I birds and other regularly occurring migratory birds and their habitats.

There are approximately 439 SACs and 165 SPAs in Ireland, covering a terrestrial area of 906, 000ha. Roughly 53% are land based designations, the remainder being marine or other aquatic environments; rivers make up just over 6% of designations (National Parks and Wildlife Service (NPWS), 2016) (see Figure 4.1). The 165 SPAs are designated for the protection of bird species and their habitats and encompass over 570,000ha of marine and terrestrial habitats (NPWS, 2016). Six offshore SACs cover 1,042,000 ha of marine habitat. Given the potential for transboundary impacts to SACs and SPAs in Northern Ireland, these sites are also considered. A full assessment of the potential for effects on European sites will be undertaken in Phase 2 (at the Regional Plan stage). All European sites in Ireland and Northern Ireland are shown in Figure 4.1 below and listed in Appendix B of this report.

Table 4.1 - Number of European sites in Republic of Ireland and Northern Ireland

Republic of Ireland[10]	Northern Ireland[11]
439 SACs	58 SACs
165 SPAs	16 SPAs

4.1.1 Special Areas of Conservation

SACs cover a variety of habitat types recognised in Annex I of the Habitats Directive, with 16 habitats designated as “priority” habitats owing to their ecological vulnerability (NPWS, 2019a). Habitats for which SACs are designated include lakes, raised bogs, blanket bogs, turloughs, sand dunes, machair, heaths, rivers, woodlands, estuaries and sea inlets. In addition, the Habitats Directive recognises 26 Annex II species. Some of the species for which SACs have been designated include, but are not limited to, Atlantic salmon (*Salmo salar*), otter (*Lutra lutra*), bottlenose dolphin (*Tursiops truncatus*), lesser horseshoe bat (*Rhinolophus hipposideros*), freshwater pearl mussel (*Margaritifera margaritifera*) and Killarney fern (*Trichomanes speciosum*). There are 433 SACs (terrestrial) in Ireland and of these 358 are water-dependent (Department of Housing, Planning and Local Government, 2018). These SACs support various habitats and species that are dependent on surface and/or groundwater sources. There are approximately 800 water bodies within European sites, all supporting water dependent habitats and species. A number of significant pressures on these water bodies have been identified (Department of Housing, Planning and Local Government, 2018), including:

- Agriculture;
- Hydromorphological pressures;
- Forestry;
- Urban wastewater;
- Anthropogenic pressures;

[10] Based on most recent data from European Environmental Agency https://www.eea.europa.eu/data-and-maps/data/natura-11 (accessed August 2020)
[11] Northern Ireland SAC and SPA list from http://jncc.defra.gov.uk/page-1404 and http://jncc.defra.gov.uk/ProtectedSites/SACselection/SAC_list.asp?Country=NI (accessed February 2019)

- Abstractions; and
- Invasive species.

Of the pressures noted above, water abstraction is of particular relevance to the draft Framework Plan. Water abstractions from both ground and surface water have been identified as being a potential threat to some Annex I habitats and Annex II species. As discussed in Chapters 3.5.1 sustainable abstraction limits (for new surfaces water abstractions) have been set as part of the draft Framework Plan to ensure the protection of these Annexed species and habitats. A full list of water dependent species and habitats is provided in Appendix C of this report.

4.1.2 Special Protection Areas

The majority of the wintering water birds and breeding seabirds occurring in Ireland are considered to be regularly occurring migratory birds. Over 60% of the 25 Annex I listed species that now occur in Ireland on a regular basis belong to the breeding seabird and wintering waterbird groups. This has in part led to the situation of the majority (> 80%) of Ireland's SPAs being designated for these two bird groups.

Some of the productive marine intertidal zones of bays and estuaries are included within SPAs and these provide vital food resources for several wintering wader species, including knot (*Calidris canutus*), dunlin (*Calidris alpina*) and bar-tailed godwit (*Limosa lapponica).* Also included in the SPA network are marine waters adjacent to breeding seabird colonies and other important areas for divers, seaducks and grebes.

Finally, a number of inland wetland sites and areas of blanket bog and upland habitats have also been designated as SPAs for wintering water birds. These sites provide important breeding and foraging areas for numerous other species including merlin (*Falco columbarius*) and golden plover (*Pluvialis apricaria*). Agricultural land is also represented within the SPA network ranging from the extensive farmland of upland areas where hedgerows, wet grassland and scrub offer feeding and/or breeding opportunities for hen harrier (*Circus cyaneus*) to the intensively farmed coastal polderland where internationally important numbers of swans and geese occur.

A list of all water dependent QI bird species is provided in Appendix D of this report.

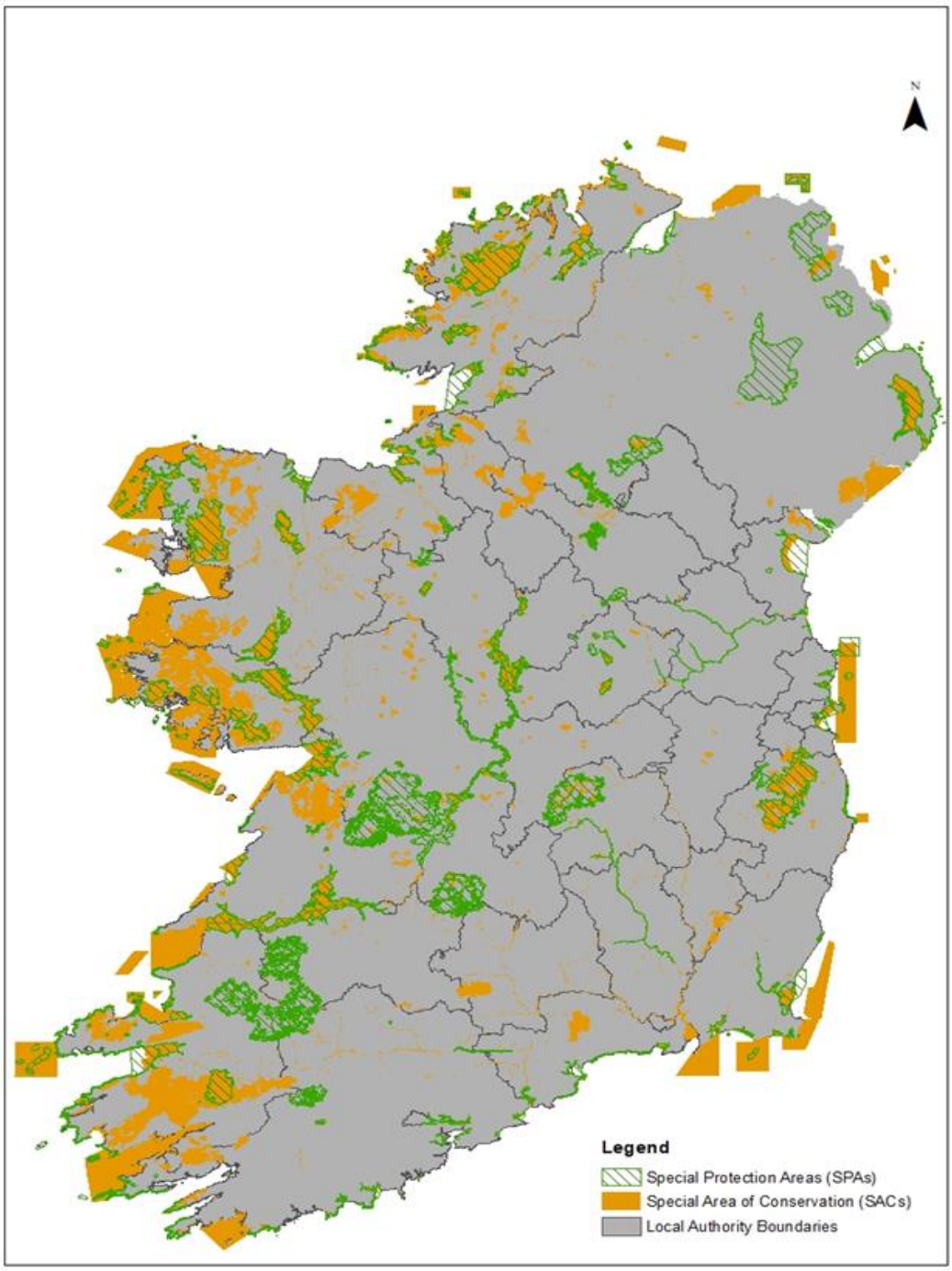


Figure 4.1 - European designated sites

4.1.3 Conservation Objectives

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of annexed habitats and annexed species of community interest for which an SAC or SPA has been designated. The Conservation Objectives (COs) for a European site are set out to ensure that the QIs/SCIs of that site are maintained or restored to a favourable conservation condition. Maintenance of favourable conservation condition of habitats and species at a site level in turn contributes to maintaining or restoring favourable conservation status of habitats and species at a national level and ultimately at the European site network level.

Detailed site synopses for each European site are also available from the NPWS website[12]. In Ireland

[12] https://www.npws.ie/protected-sites (Accessed March 2020)

'generic' COs have been prepared for all European sites, while 'site specific' COs have been prepared for a number of individual sites to take account of the specific QIs/SCIs of that site. Both the generic and the site-specific COs aim to define the requirements for favourable conservation condition for habitats and species at the site level. Generic COs which have been developed by NPWS encompass the spirit of site-specific COs in the context of maintaining and restoring favourable conservation condition as follows;

- For SACs: "*To maintain or restore the favourable conservation condition of the Annex I habitats and/or Annex II species for which the SAC has been selected*".
- For SPAs: "*To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for the SPA*".

Following on from this, favourable conservation status (or condition, at a site level) of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing;
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future; and
- the conservation status of its typical species is "favourable".

The favourable conservation status (or condition, at a site level) of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats; and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

A full list of the COs and QIs/SCIs that each European site is designated for, as well as the attributes and targets to maintain or restore the QIs/SCIs to a favourable conservation condition are available from the NPWS website[13].

[13] https://www.npws.ie/protected-sites/conservation-management-planning/conservation-objectives (Accessed March/April 2020)

5 Summary of Screening for Appropriate Assessment

5.1 Identification of European sites within the Zone of Influence

The draft Framework Plan considers the Option Assessment Methodology to be applied nationally. Therefore, all European sites within the Republic of Ireland were initially considered to be potentially within the Zone of Influence (ZoI) of the draft Framework Plan as any option types could be applied in any region of the country. Transboundary impacts to SACs and SPAs in Northern Ireland are also considered.

The actual extent of the ZoI depends on the effect pathway, as well as the specific nature of different habitats/species for which a European site is designated, and for this reason must be scientifically defined and based upon further information.

5.2 Assessment of Likely Significant Effects

The draft Framework Plan involves producing a methodology to be applied in Phase 2 (RWRPs) to identify suitable water resources management options for the various WRZs throughout the country. The water resources management option types that will come out of the draft Framework Plan will potentially result in LSEs on European sites in the absence of mitigation. Therefore, a high-level assessment of the potential LSEs of these management option types is the focus of this assessment.

Table 5.1 outlines the potential LSEs associated with the various management option types. It should be noted that a number of the options may have no effect on European sites, while others could have beneficial effects for European sites, for example options that seek to improve overall water quality (for example, surface and/or groundwater catchment management). However, the implementation of the draft Framework Plan may give rise to measures that, in the absence of mitigation, could result in a variety of possible effect pathways, including but not limited to:

- Physical loss of habitats/supporting habitat;
- Mortality;
- Habitat degradation - changes in water quality (pollution);
- Habitat degradation - hydrological/ hydrogeological changes;
- Change in hydrology - water table/availability; and
- Disturbance (including biological disturbance).

Table 5.1 - Potential LSEs in the absence of mitigation from the management option types arising from the draft Framework Plan

Option Type	Draft Framework Plan sub-category	Summary	Potential for LSEs
Lose Less			
Leakage Reduction	N/A	Assessment and repair of pipelines to reduce leakage from existing network.	**Yes**. Although for the most part this option type should have the potential for positive impacts. There is still potential for direct and indirect effects on SACs and SPAs associated with the construction or upgrade of infrastructure to address leakage reduction.
Use Less			
Water Efficiency	Education & Awareness	Environmental education, campaigns, programmes and partnerships to raise awareness of water management and to encourage savings.	**Yes**. Although for the most part this option type should have the potential for positive impacts. There is still potential for direct and indirect effects on SACs and SPAs associated with the construction or upgrade of infrastructure to ensure water efficiencies.
	Water Efficiency Measures	Methods of reducing water wastage.	
	Recycling and Reuse	Recycling and reuse of “grey water”.	
	Metering	Domestic water meters.	
Supply Smarter – resource supply options			
Surface Water	Surface Water Abstraction	Increasing the abstraction at an existing river or lake source or developing a new river or lake source from which water can be sustainably abstracted. These options would be subject to an abstraction licence.	**Yes**. Where new or increased abstractions are required there is potential for direct, indirect, construction, operational and cumulative effects on SACs and SPAs in the absence of mitigation. Aquatic and water dependent QI and their supporting habitats would be most at risk.
Groundwater	Groundwater Abstraction	Increasing existing groundwater abstraction or developing a new source from which water can be sustainably abstracted. These options would be subject to an abstraction licence.	**Yes**. Where new or increased abstractions are required there is potential for direct, indirect, construction, operational and cumulative effects on SACs and SPAs in the absence of mitigation. Aquatic and ground water dependent QI species (and their supporting habitats) and groundwater dependent terrestrial habitats (GWDTHs) would be most at risk.
	Aquifer Storage Recovery	Storing treated or raw water in suitable aquifers for extraction during increased demand periods.	

Option Type	Draft Framework Plan sub-category	Summary	Potential for LSEs
Reservoirs	Storage Reservoirs	Provision of storage reservoirs which can be filled with untreated water abstracted during high flow conditions from surface waters to be drawn on during low flow periods or to provide additional resilience during droughts as a back-up supply source	**Yes**. This option type could result, for example, in changes in hydrology potentially altering the aquatic environment. Affecting aquatic and water dependent QI and their supporting habitats would be most at risk. Potential for direct, indirect, construction, operational and cumulative effects on SACs and SPAs in the absence of mitigation.
Catchment Management	Catchment management for ground or surface water sources	Changes to land management such as forestry or agricultural practices to reduce pollution causing water treatment issues or to encourage water retention in the catchment.	None predicted. Potential for positive impacts on aquatic receptors if water quality in the catchment is improved.
Effluent Reuse	Effluent Reuse	Recycling of wastewater effluent from treatment plants can produce a new supply source from wastewater which is otherwise discharged to rivers or the sea. This involves treating wastewater to a sufficiently high standard to meet supply standards relevant for the intended use for example for agricultural/horticulture/industry/water supply or for release to rivers to maintain flows.	**Yes**. This option type could result, for example, in changes in hydrology potentially altering the aquatic environment. Affecting aquatic and water dependent QI and their supporting habitats would be most at risk. Potential for direct, indirect, construction, operational and cumulative effects on SACs and SPAs in the absence of mitigation.
Desalination	Desalination: Coastal or Brackish	This involves the process of removing salt and other minerals from seawater or brackish water[14] river estuaries to make it suitable for human consumption and/or industrial use.	**Yes**. Potential for direct, indirect, construction, operational and cumulative effects on SACs and SPAs in the absence of mitigation. In particular, there is a risk from toxic effects associated with elevated salinity and desalination waste brine. Aquatic and water dependent QI and their supporting habitats would be most at risk.
Water Transfers	Transfers	Water transfer is the physical movement of water from one area to another usually via pipelines, although other means such as use of canals or aqueducts can be used. These generally refer to transfer of treated water and can vary considerably in scale in terms of size and length from local transfers from WRZ to another to regional transfers and inter-company	**Yes**. Potential for direct, indirect, construction, operational and cumulative effects on SACs and SPAs in the absence of mitigation. Note: the transfer of invasive species from one catchment to another is not considered a risk as

[14] Brackish water is water that has more salt than freshwater, but not as much as seawater generally located in estuaries.

Option Type	Draft Framework Plan sub-category	Summary	Potential for LSEs
		transfers (from Northern Ireland).	Irish Water do not allow cross catchment raw water transfers.
	Tankering	Delivery of treated water to customers via road tanker to alleviate temporary short-term water shortages for certain localised situations.	
Network Improvements	Network Improvements (general)	Network improvement involves infrastructural improvements such as upgrade or replacement or operational improvements.	**Yes**. Although for the most part this option type should have the potential for positive impacts. There is still potential for direct and indirect effects on SACs and SPAs associated with the construction or upgrade of infrastructure for network improvements, reservoir expansion and to address leakage reduction.
	Service Reservoir Expansion	Service reservoirs store treated water.	
Water Treatment Plants	WTP Expansion / Rationalisation	Expansion of existing WTPs to facilitate the treatment of a higher volume of water.	**Yes**. Where new or increased abstractions are required there is potential for direct, indirect, construction, operational and cumulative effects on SACs and SPAs in the absence of mitigation. Aquatic and water dependent QI and their supporting habitats would be most at risk.
	WTP Process Losses	Improving the water treatment works efficiency to reduce water losses.	

5.3 Conclusion

In the absence of finalised controls or mitigation measures at the preliminary stage of preparing the draft Framework Plan, as well as the remaining unknowns in relation to the application of the management options on the ground, it was concluded that there may be LSEs on one or more European sites resulting from the implementation of the draft Framework Plan. Given the nature of this national plan covering all of Ireland, all European sites would be brought forward to AA and a NIS prepared to fully inform the AA of the draft Framework Plan. A full listing of the European sites considered is included in Appendix B.

6 Assessment of Adverse Effects on Site Integrity

6.1 Introduction

Phase 1 of the NWRP (draft Framework Plan) involves the production of a methodology that Irish Water can apply in Phase 2 of the NWRP (Regional Plans) to identify suitable water resources management options for various WRZs throughout the country. Water resources management option types that will arise from the draft Framework Plan will potentially result in LSEs on European sites in the absence of mitigation. Therefore, an assessment of these option types is the focus of this assessment. This stage of the assessment process evaluates the potential of the draft Framework Plan (and water management option types arising from the draft Framework Plan) to affect the integrity of a European site, taking account of the potential for direct, indirect and cumulative impacts alone or in-combination with other plans and projects.

The nature and scale of the draft Framework Plan is set out in Chapter 3 of this report. Chapter 6.3 below details the methodology applied for option selection for each WRZ. Other proposed or existing plans and projects which could lead to an in-combination effect are presented in Chapter 7.

Information on European sites within the Republic of Ireland and Northern Ireland potentially impacted by the draft Framework Plan is provided in Chapter 4. This includes information on the number and type of designations, conservation objectives and the range of habitats and species that could potentially be impacted by the draft Framework Plan.

6.2 Identification of potential impacts and pathways for effect

The draft Framework Plan does not include information on location or project-specific detail of future activities. Consequently, the assessment will concern itself with the potential impacts of a high level strategy which will be implemented through future plans and projects which can only be developed with the consent of another competent authority (See *Commission v UK* (Case C-6/04, Opinion of Advocate General Kokott). It is acknowledged that this iteration of the draft Framework Plan will detail a methodology to identify future water resource options across the country and that these will likely culminate in projects in the future. There is the potential for these future proposals to have an impact on European sites. This NIS considers, at a high level, the potential effect pathways of management option types arising from the draft Framework Plan as shown in Table 6.1 below.

Table 6.1 - Potential effect pathways of option types arising from the draft Framework Plan

Broad categories of potential impacts on European sites	Potential effect pathways *(distance assumptions shown in italics)*
Physical loss of habitats/supporting habitat	Development of built infrastructure associated with the various options, for example pipelines, WTPs, temporary weirs and access routes, could result in direct loss of QI habitat (terrestrial or aquatic) in a European site (for example, smothering of gravel beds). *Physical loss of habitat is only likely to be significant if it is within the boundary of a European site, or within an area of supporting habitat outside of the European site (for example, off-site area of known foraging, roosting, breeding habitat for a QI for which a European site is designated).*
Mortality	Mortality of some species could occur through an increase in wildlife casualty incidents, for example entrapment/entrainment of fish on/in screens (during the abstraction process). Mortality may also occur as a result of pollution events to habitats that support QI animal or plant species during construction, in particular aquatic QI species.
Habitat degradation – changes in water quality (pollution)	Water quality can be affected by oil, chemicals, heavy metals and so on, or through chronic runoff of such materials. Water quality can also be affected by sedimentation through runoff from construction

Broad categories of potential impacts on European sites	Potential effect pathways *(distance assumptions shown in italics)*
	sites. Construction of new infrastructure as a result of options taken forward could result in both acute and chronic runoff of sediments. Changes in water quality could directly affect QI species or habitats, or affect them indirectly through loss of aquatic prey species, or through changes in their habitat. *Pollution effects can occur outside of a European site and at a distance from works (for example, via hydrological link).*
Habitat degradation – hydrological/ hydrogeological changes	Construction impacts related to tunnelling and deep excavations affecting groundwater quality and/or quantity and thereby the existing hydrological regime. Changes in hydrology can alter geomorphological processes which can affect the deposition of shingle or other material potentially impacting on QI fish species amongst others. Changes in these processes can impact aquatic/riparian/terrestrial habitats and species either directly or indirectly.
Water table/availability	Changes to water levels and flows due to water abstraction from ground or surfaces waters. *These effects are only likely to be significant where the boundary of the scheme extends within the same ground or surface water catchment as the European site.*
Disturbance (including biological disturbance)	Development associated with any potential option taken forward could result in disturbance of QI species. This disturbance may include, but not be limited to, noise, vibration, movement (of people and/or vehicles) and lighting. Disturbance may lead to the abandonment of habitats or resting sites by QI species, which could include designated or supporting habitats outside of a European site[15] Creation of new pathway of non-native invasive species.

6.3 Assessment of effects

A high-level assessment of potential effect pathways of the various management option types proposed in the draft Framework Plan is provided below. These potential effect pathways can only occur where an option is either progressed within a European site (for example, surface water abstraction from a SAC or within the ZoI (for example, an option that is hydrologically linked to an SAC or SPA. Potential effect pathways were identified for all but one option types (see Table 5.1), namely catchment management, which if implemented properly, should only have a positive effect on aquatic receptors through improved water quality in the catchment. Therefore, this option is not discussed further.

6.3.1 Leakage Reduction

This option, for the most part, would promote actions that would have overall positive implications for the environment as a reduction in leakage could subsequently result in less water needing to be abstracted from ground or surface water sources. Although much of the network is located in existing road there is still potential for direct and indirect negative effects on SACs and SPAs from construction related activities associated with upgrading the network. This could impact on Annex I habitats or Annex II species if works are required within or near a European site.

[15] The need to consider use of habitat areas outside of an SPA by SCI bird species is set out in the Conservation Objectives Supporting Documents for a number of SPAs. For example, the North Bull Island and South Dublin Bay and River Tolka Estuary SPA Conservation Objectives Supporting Documents Version 1 (NPWS, 2014) states: "*Ex-situ factors: several of the listed waterbird species may at times use habitats situated within the immediate hinterland of the SPA or in areas outside of the SPA but ecologically connected to it. The reliance on these habitats will vary from species to species and from site to site*." Where SPAs do not have site specific conservation objectives, this is the approach taken. Furthermore, this document notes that brent geese from this and surrounding SPAs in the Dublin area feed at inland (terrestrial grassland) sites but roost within the SPA.

6.3.2 Water Efficiency/Effluent Reuse

These options, for the most part, would promote actions that would have overall positive implications for the environment, including education and awareness around water savings and management, identifying options for reducing water use and the re-use of grey water.

Effluent reuse refers to the recycling of wastewater effluent from treatment plants which can then produce a new supply source from wastewater which is otherwise discharged to rivers or the sea. This involves treating wastewater to a sufficiently high standard to meet supply standards relevant for the intended use for example for agricultural/horticulture/industry/water supply or for release to rivers to maintain flows. Although discharging back to the river may have a positive impact in terms supporting river flow, the construction of a new outfall could have a direct or indirect negative impact on aquatic QI species associated with construction of the outfall but also by altering the flow regime within the river, potentially changing supporting habitat, in particular for fish.

6.3.3 Surface water

Surface water options may include the extension/increase of existing abstractions or the provision of new surface water abstractions. Both rivers and lakes provide a source for surface water abstractions. The EPA has identified that in Ireland, 3% of rivers and 9% of lakes have been identified as potentially at risk of over-abstraction (DHPLG, 2018), although it is noted that at a national level this is a relatively low level of risk in comparison with some other pressures assessed (e.g. forestry and agricultural practices). However, at a localised level, the effects of abstraction on water dependent species and habitats (see Appendix C for a full list of water dependent habitats and species) can be far more significant.

Table 6.2 below lists those Annex I lake habitats that have been identified by the NPWS as being at threat from surface water abstractions (NPWS, 2019b). Surface water abstractions from both rivers and lakes can alter water levels and water quality, potentially impacting on various species associated with these environments. Fluctuations in lake water levels are typical in Ireland but can be amplified by activities such as abstraction (NPWS, 2017). It is important that the hydrological regime within lakes is maintained so that the area, distribution and depth of the lake habitat and its constituent/characteristic vegetation zones and communities are not permanently altered. This is particularly important to ensure compliance with the WFD status and/or for those lakes that fall within or overlap with European sites and their QI species/habitats. In lakes, increased water level fluctuations can increase turbidity and alter the substratum, the latter can lead to the release of nutrients from the sediment. Abstractions can also reduce the water depth in the near-shore areas, increasing the risk that wave action will uproot young plants or cause resuspension of the fine marl sediment which may deposit and smother young Chara plants (King and Champ, 2000 cited in CDM, 2009).

Table 6.2 - Annex I habitats at threat from surface water abstractions for public water supply (NPWS, 2019a; 2019b)

Annex I habitat	Code	Threat importance	Habitat status
Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)	3110	Low	Bad
Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.	3140	Low	Bad
Natural eutrophic lakes with *Magnopotamion or Hydrocharition* — type vegetation	3150	Low	Inadequate

Table 6.3 below lists those Annex II species that have been identified by the NPWS (NPWS, 2019a) as being at threat from surface water abstractions. For example, abstractions can alter the hydrological regime of a water body resulting in reduced/low flows and or reduced water levels which, for example, could lead to loss of habitat for aquatic QI species (e.g. exposing of spawning gravels), barriers to fish migration (inward and outward migration) and changes to water quality, in particular downstream of an abstraction point. Furthermore, the impacts of abstraction are likely to be greater during times of drought/low flow conditions. Depending on the nature of the abstraction and the sensitivity of the catchment (e.g. a Freshwater Pearl Mussel catchment) the scale of effects may extend to the catchment level.

Table 6.3 - Annex II species sensitive to water abstractions from surface water (NPWS, 2019a)

Annex II species	Code	Threat importance	Species status
Freshwater Pearl Mussel	1029	Medium	Bad
Geyer's whorl snail	1013	Low	Bad
Atlantic salmon	1106	Medium	Inadequate

Furthermore, rivers and lakes can have complex interactions with surrounding ground water environments and therefore it is important to understand and assess the catchment of a lake, or a river catchment where it is lake-fed, to fully assess potential implications for surrounding groundwater water dependent habitats and species. For example, lakes can form part of the water levels feeding into surrounding groundwater habitats. Abstractions from such lakes may have implications for habitats and species, particularly in drought conditions (Moorkens, 2016).

6.3.4 Groundwater

Groundwater options may include the storage of water in groundwater aquifers, extension/increase of existing abstractions or new groundwater abstractions. The EPA has identified that in Ireland 4% of groundwater bodies have been identified as potentially at risk of over-abstraction (Department of Housing, Planning and Local Government, 2018). A full list of water dependent habitats is provided in Appendix C; Table 6.4 below lists those Annex I habitats that the NPWS have identified as being at threat from groundwater abstractions (NPWS, 2019b). For example, Alkaline fen habitats are extremely sensitive to changes in groundwater, requiring high groundwater levels (that is, water levels at or above the ground surface) for a large proportion of the year. Fen groundwater levels are controlled by regional groundwater levels in the contributing catchment area (which sustain the hydraulic gradients of the fen groundwater table). Regional abstraction of groundwater may affect fen groundwater levels (NPWS, 2018).

Table 6.4 - Annex I habitats sensitive to water abstractions from groundwater (NPWS, 2019a; 2019b)

Annex I habitat	Code	Threat importance	Habitat status
Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)	3110	High	Bad
Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea*	3130	High	Inadequate

Annex I habitat	Code	Threat importance	Habitat status
Natural dystrophic lakes and ponds	3160	High	Inadequate
Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)	6410	High	Bad
Active raised bogs (* in Ireland)	7110	High	Bad
Degraded raised bogs still capable of natural regeneration	7120	High	Bad
Depressions on peat substrates of the *Rhynchosporion*	7150	High	Bad
Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*	7210	High	Inadequate
Alkaline fens	7230	High	Bad
Transition mires and quaking bogs	7140	Medium	Bad
Petrifying springs with tufa formation (*Cratoneurion*)	7220	Medium	Inadequate
Blanket bogs (* if active bog)	7130	Medium	Bad
Machairs (* in Ireland)	21A0	Medium	Inadequate
Northern Atlantic wet heaths with *Erica tetralix*	4010	Low	Bad
Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* — type vegetation	3150	Low	Inadequate

There are also a number of Annex II species that are also groundwater dependent. Table 6.5 lists the Annex II species that the NPWS consider at threat from groundwater abstraction (NPWS, 2019a).

Table 6.5 - Annex II species sensitive to water abstractions from groundwater (NPWS, 2019a)

Annex II species	Code	Threat importance	Species status
Freshwater Pearl Mussel	1029	High	Bad
Nore Freshwater Pearl Mussel	1990	High	Bad
Geyer's whorl snail	1013	Medium	Bad
Slender Naiad	1833	High	Inadequate

There is some overlap of these species occurring within groundwater dependent Annex I habitats as noted above, for example Geyer's whorl snail (*Vertigo geyeri*) is associated with microhabitats within the following Annex I habitats (Office of Public Works, 2009):

- Annex I habitat 7140 (Transition mires, but not quaking bogs)
- Annex I habitat 7210 (Calcareous fens)
- Annex I habitat 7220 (Petrifying springs with tufa formation)
- Annex I habitat 7230 (Alkaline fens)

6.3.5 Aquifer Storage Recovery

This option combines the use of both surface and groundwater abstraction to allow periods for aquifer recovery and avoid surface water abstraction in low flow periods. Potential effects discussed for surface water and groundwater options would similarly apply to this option. The potential for in-combination effects would need to be considered within and potentially across catchments as groundwater bodies can cross a surface water catchment boundary.

6.3.6 Reservoirs

Storage reservoirs can come in a number of forms. For example, bankside storage would divert water from the main river channel in times of high flows with the supply stopped in times of low flows. Alternatively, water may be pumped from a river to a storage reservoir further inland. Extraction of water to supply a reservoir could have similar implications as those outlined in Chapter 6.3.3 above. Furthermore, diverting water could affect flows and the hydrogeomorphology in the immediate vicinity, potentially altering QI habitat, for example by exposing spawning gravels. There are potential impacts associated with the construction and land take for the reservoir itself.

6.3.7 Desalination

Desalination refers to the removal of salts and minerals, in this instance referring to the production of potable water. Desalination treatment plants are located in coastal areas. Potential impacts from this option type are associated with the water intake and outfall discharges to sea. As such, marine QI species and habitats, as well as seabirds, are at risk from this option type. For example, brine (an output of the process) which is discharged from the plant, could affect surrounding QI marine habitats and species. Typically, the discharge is twice as saline as seawater (Cooley *et al*., 2013). The intake of seawater can also result in impingement and entrainment of fish and other marine life. Large losses of, for example, fish and fish eggs could reduce food sources locally, having an indirect impact on seabirds and other marine mammals in addition to reducing fish populations.

6.3.8 Water transfers

Water transfer options may include the transfer of water from/to WRZs, transfer of water on a regional scale, national bulk transfers and tankering to small WSZs. For the most part, transferred water would first be treated. The risk associated with the transfer of water is mainly associated with the transfer of raw water from one catchment to another, as this increases the risk of transferring aquatic invasive species across catchments. Currently, transfer of raw water from one catchment to another is unlikely to be a viable option.

6.3.9 Network Improvements

This option would seek to improve the overall resilience of the network and supply by upgrading existing infrastructure including providing an increase in service reservoir storage capacity. There is the potential for direct and indirect effects on SACs and SPAs from construction related activities associated with upgrading the network and expanding existing service reservoirs. This option could impact on Annex I habitats or Annex II species if works are required within or near to a European site.

6.3.10 Water Treatment Plant

This option type aims to upgrade WTPs, which will increase Deployable Output (DO) and reduce water losses both in the WTP and within the network. This option may also seek to expand an existing WTP which could result in increased abstractions (effects discussed for surface water and groundwater options would similarly apply to this option). Construction related impacts associated with WTP expansions and upgrades, if located within or near a European site, could impact on various QI species

and habitats.

7 In-combination Effects

7.1 Assessment of In-combination Effect

Under Article 6(3) of the Habitats Directive, an assessment of in-combination effects with other plans and projects is required. The assessment encompasses projects or plans that have been completed, approved but not completed or proposed (but not yet approved). The assessment used the best available information at the time of writing. Effects can include, but are not limited to, multiple effects of the same or similar type from a number of developments on the same receptor/resource.

In line with the relevant guidance (European Commission, 2000b), considering of in-combination effects was undertaken using a stepwise approach, as follows:

- Identify plans/projects that might act in-combination.
- Identify the types of LSEs that might occur.
- Define boundaries of the assessment.
- Identify pathways for effects.
- Prediction and assessment.

Given the strategic nature of a national level plan such as the NWRP, the assessment of in-combination effects focused on the key areas as listed below. However, it is still possible to exclude any AESI arising from the combination of the draft Framework Plan with those projects, because its methodology requires the RWRPs to take account of in-combination effects with those projects in identifying management options and their respective locations. Instead, the in-combination assessment for the purposes of this NIS, focuses on:

- Other Irish Water plans (Table 7.1); and
- Other related plans (Table 7.2).

Table 7.1 - In-combination assessment with other Irish Water plans

Plan/Project	Potential impacts key types	In-combination Likely Significant Effects? (Y/N)	Potential for in-combination effects and mitigation	In-combination adverse effects on site integrity? (Y/N)
Water Services Strategic Plan (WSSP)[16] The WSSP is the highest tier Irish Water asset management plan. It sets the overarching framework for detailed Implementation Plans including the draft Framework Plan and specific water services projects over the next 25 years.	• Habitat loss and disturbance from new/upgraded infrastructure • Species disturbance/ mortality • Changes to water quality or quantity	Y	A screening for AA[17] was undertaken for the WSSP which concluded that there was potential for significant effects on European sites from the implementation of the plan. The WSSP is the highest tier (Tier 1) Irish Water asset management plan. The WSSP is a high level plan with no location-specific information. The AA screening for both the WSSP and the draft Framework Plan identify potential LSEs from impacts of a similar nature, and therefore a potential for in-combination effects was identified. The NIS for the WSSP highlighted the need for additional plan/project environmental assessments to be carried out at the Tier 2 and Tier 3 level. Page xii of the WSSP sets out a summary of the strategic objectives and aims of the plan. In particular, Chapter 6 presents overarching strategies (EN1 to EN3) that aim to protect and enhance the environment. Strategy EN2 is of particular relevance: *"Operate our water services infrastructure in a manner that supports the achievement of water body objectives under the Water Framework Directive and our obligations under the Birds and Habitats Directives"…"projects are designed and developed in accordance with statutory planning processes and environmental regulations from the outset. We will comply with the statutory processes relevant to our programmes and projects, including Strategic Environmental Assessment (SEA), Environmental Impact Assessment (EIA) and Appropriate Assessment (AA) under the Habitats Directive, ensuring the avoidance of potential significant adverse effects on biodiversity (including protected sites), human health, water, air quality, cultural heritage (including archaeology), soil and landscape and visual amenity as a result of the upgrade to/construction of new infrastructure, including potential transboundary effects".* The NIS for the draft Framework Plan has highlighted the need for additional project level environmental assessments, while high-level mitigation measures have been outlined in Chapter 8 of this NIS. Mitigation required will be developed	N

[16] https://www.water.ie/docs/WSSP_Final.pdf (Accessed, June 2018)
[17] https://www.water.ie/docs/WSSP-AA-Natura-Impact-Statement-(Web).pdf (Accessed, June 2018)

Plan/Project	Potential impacts key types	In-combination Likely Significant Effects? (Y/N)	Potential for in-combination effects and mitigation	In-combination adverse effects on site integrity? (Y/N)
			and delivered as options are advanced which will protect European sites from in-combination effects that could lead to AESI. Given the overarching strategies and objectives within the WSSP to protect the environment, and with the implementation of mitigation measures, including project level AA, no AESI in light of European sites' conservation objectives are predicted as a result of in-combination effects.	
National Wastewater Sludge Management Plan (NWSMP) 2016-2021[18] The NWSMP is a Tier 2 plan which sets out the long-term strategy for the management of wastewater sludge produced at Waste WTPs under the control of Irish Water.	• Habitat loss and disturbance from new/upgraded infrastructure • Changes in water quality (increased phosphorous in receiving waters) • Loss of or disturbance to habitats or species or their supporting features, for example water quality through inappropriate	Y	The AA screening for the NWSMP concluded that the NWSMP could lead to significant effects on European sites. This is a high level (Tier 2) plan with no location-specific information. However, the AA screenings for both the NWSMP and the draft NWRP Framework identify potential LSEs from impacts of a similar nature, and therefore a potential for in-combination effects has been identified. For example, siting of new wastewater sludge infrastructure has the potential to impact the same receptors as new infrastructure under the draft Framework Plan. A number of mitigation measures have been outlined in Table 6-1 of the NIS for the NWSMP which includes a number of policies, actions and research initiatives which all aim to protect the environment, including European sites. One such action states: *"Irish Water will also ensure that in carrying out its activities associated with management of wastewater sludge, that we are in compliance with our obligations under the Birds and Natural Habitats Regulations 2011-2015".* Research actions included: "Irish Water will record how the existing standards for monitoring of wastewater sludge and soil samples comply with EU and international practice. This will provide a benchmark which can be used to determine what changes need to be made going forward". Given the mitigation measures set out in the NIS for the NWSMP and the	N

[18] https://www.water.ie/projects-plans/our-plans/wastewater-sludge-management/Final-NWSMP.pdf (Accessed, June 2018)

Plan/Project	Potential impacts key types	In-combination Likely Significant Effects? (Y/N)	Potential for in-combination effects and mitigation	In-combination adverse effects on site integrity? (Y/N)
	siting of new infrastructure.		mitigation measures in Chapter 8 of this NIS, and with the requirement for project level assessments for any project arising from the plans, no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects. Given the mitigation measures outlined in both the NWSMP and this NIS, no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.	
Lead in Drinking Water Mitigation Plan (LDWMP)[19]	• Changes to water quality • Increased phosphorous in receiving waters leading to nutrient enrichment and proliferation of plant growth (eutrophication)	Y	The AA screening[20] for the LDWMP concluded that the LDWMP could lead to significant effects on European sites. This is a high level (Tier 2) plan with no location-specific information. Both the LDWMP and the draft Framework Plan identify potential LSEs from impacts of a similar nature, and therefore a potential for in-combination effects has been identified. As part of the LDWMP, Irish Water developed a model to facilitate specific environmental risk assessment of any proposed orthophosphate treatment and provide a methodology to determine the risk to the receiving environment of this corrective water treatment. Mitigation measures have been outlined in Chapter 7 of the NIS for the LDWMP and states that, "*Where the EAM (Environmental Assessment Methodology) and NIS (if required) indicate an adverse effect on European site integrity in view of the site's conservation objectives, orthophosphate treatment will not be applied*". Given the mitigation measures set out in Chapter 7 of the NIS for the NWSMP and the mitigation measures in Chapter 8 of this NIS, and with the requirement for project level assessments for any project arising from the plans, no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.	N

[19] https://www.water.ie/docs/Lead-in-Drinking-Water-Mitigation-Plan.pdf (Accessed, June 2018)
[20] https://www.water.ie/projects-plans/national-projects/lead-mitigation-plan/public-consultation/Lead-in-Drinking-Water-Mitigation-Plan-Natura-Impact-Statement.pdf (Accessed, June 2018)

Plan/Project	Potential impacts key types	In-combination Likely Significant Effects? (Y/N)	Potential for in-combination effects and mitigation	In-combination adverse effects on site integrity? (Y/N)
In 2015, the Government published the National Strategy with the aim to ensure the protection of human health and achieve a solution to the issue of lead in drinking water. As the national public water utility, Irish Water developed the Lead in Drinking Water Mitigation Plan in order to address the risk of failure to comply with the drinking water quality standard for lead due to lead pipework serving properties connected to the public water network. The plan identified that Orthophosphate treatment would be required at the Water Supply Zone where lead replacement is not feasible.				

Table 7.2 - In-combination assessment with other relevant plans

Plan	Potential impacts - key types	In-combination Likely Significant Effects? (Y/N)	Potential for in-combination effects and mitigation	In-combination adverse effects on site integrity? (Y/N)
National Planning Framework (NPF)[21] The purpose of the long-term strategy is to provide a framework for the growth of Ireland's cities and towns over the next 20 years in an environmentally sustainable way. It is envisaged that the NPF will be detailed in Regional Spatial and Economic Strategies to ensure proper planning and sustainable development in the long term, at local, regional and national levels.	• Loss of habitat • Changes to hydrology/ water quality • Disturbance/ disruption resulting in a reduction of key specie/species density during construction and operation • Invasive species introduction	Y	The NPF, including a Strategic Flood Risk Assessment, was subject to screening for AA. The screening was undertaken at an early stage of plan development, which promotes sustainable development, and considers European sites. For example, National Planning Objective (NPO) 59 centres on the enhancement and conservation of European sites. Potential LSEs were identified from land use change from development and an increase in jobs and associated work force. The NPF identified that a key priority is *"Ensuring that water supply and waste-water needs are met by new national projects"*. The conclusion of the screening for AA was that, given the uncertainty as to what the policy objectives may include, the potential for LSEs could not be ruled out and a Stage 2 AA was undertaken[22]. Therefore, there is potential for in-combination effects from the NPF and the draft Framework Plan. The NPF is a strategic plan which sets the framework for, and relies to a significant degree on, other policy, strategy and plan initiatives to achieve its objectives. These other plans have been or will be subject to AA and will have identified mitigation measures to ensure no AESI. The measures committed to in these other plans will be essential to ensuring that the objectives of the NPF are met and that the NPF does not have adverse effects on any European site. Given the mitigation measures set out in Chapter 7, Table 7-1 of the NPF NIS and Chapter 8 of this NIS, and with the requirement for project level assessments for any project arising from the plans, no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.	N
Regional Spatial and Economic Strategies The Regional Spatial and Economic Strategies is a policy document which seeks to focus future	• Loss of habitat • Provision of new/upgraded infrastructure • Changes to	Y	All Regional Spatial and Economic Guidelines are subject to screening for AA. By their very nature, such plans will promote sustainable development which also feeds into the NPF, including the provision of sustainable and clean water sources. However, there is potential for in-combination effects with the draft Framework Plan. As with all projects arising from the draft Framework Plan, all projects arising from	N

[21] http://npf.ie/wp-content/uploads/Project-Ireland-2040-NPF.pdf (Accessed May, 2018)
[22] http://npf.ie/wp-content/uploads/2017/09/Natura-Impact-Statement-%E2%80%93-Ireland-2040.pdf (Accessed May, 2018)

Plan	Potential impacts - key types	In-combination Likely Significant Effects? (Y/N)	Potential for in-combination effects and mitigation	In-combination adverse effects on site integrity? (Y/N)
growth patterns through a strategic planning framework as required under the NPF. Each of the Regional Assemblies has a role to play in identifying regional policies and coordinating initiatives that support the delivery and implementation of national planning policy. The regions are as follows: • Northern and Western Region; • Eastern and Midland Region; and • Southern Region.	hydrology • Changes in water quality • Disturbance to species • Species mortality		Regional Spatial and Economic Strategies will be subject to project level assessments. Given the mitigation measures set out in Chapter 8 of this NIS, and with the requirement for project level assessments for any project arising from the plans, no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.	
River Basin Management Plan (RBMP) (2018 -2021)[23] This plan by the Department of Housing, Planning and Local Government sets out an integrated approach to the protection, improvement and	• Provision of new/upgraded infrastructure • Land use changes • Changes to water quality or quantity improvement	Y	The AA[24] screening for the RBMP concluded that the RBMP could lead to significant effects on European sites. Although this is a strategic plan with an overarching aim of improving the water environment across the country, a potential for LSEs was identified from the provision of new/upgraded infrastructure required to improve water (for example, upgrade or construction of WTPs). Therefore, there is potential for in-combination effects with the draft Framework Plan. The RBMP sets out a number of measures and objectives to address pressures on the aquatic environment from, for example, agriculture, forestry and invasive species with an overall aim of improving the water environment. Overall, this will have a positive impact on European sites and associated aquatic habitats and species. As	N

[23] http://www.housing.gov.ie/sites/default/files/publications/files/rbmp_full_reportweb.pdf (Accessed June, 2018)
[24] http://www.housing.gov.ie/sites/default/files/publications/files/rbmp_natura_impact_statement_0.pdf (Accessed June, 2018)

Plan	Potential impacts - key types	In-combination Likely Significant Effects? (Y/N)	Potential for in-combination effects and mitigation	In-combination adverse effects on site integrity? (Y/N)
sustainable management of the water environment in Ireland.			with the draft Framework Plan, any projects arising as a result of the RBMP will be subject to project level AA assessments. Given the mitigation measures set out in Chapter 8, Table 8-1 of the RBMP and Chapter 8 of this NIS, including the requirement for project level assessments, no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.	
Forestry Programme 2014 – 2020: IRELAND[25] The objective of the programme is to develop a 100% State funded sustainable and competitive forest sector to provide a full range of benefits to society, environmental, economic and social, which aligns with the Forest Europe definition of forest management in a sustainable manner.	• Changes to water quality • Loss/ fragmentation of habitats and species • Increase in pollution from sediment and nutrients entering watercourses • Acidification	Y	All activities funded under the programme must adhere to the principles of Sustainable Forest Management, that is foresters and forest owners must adhere to the 'Code of Best Forest Practice – Ireland'[26] and the suite of environmental guidelines (currently under review). Forestry is not listed as a key threat to protected habitats or annex species but is identified as a pressure on both. This programme was subject to screening for AA[27] which concluded that there was potential for significant effects on European sites from the implementation of the programme. Both the Forestry Programme and the draft Framework Plan identify potential LSEs from impacts of a similar nature, and therefore a potential for in-combination effects was identified. A number of mitigation measures are proposed as part of the Forestry Programme as set out in Chapter 6.1 of the NIS. A key measure as set out in Chapter 7.1.1 is that all proposed forestry projects should be subject to an assessment of their impacts, and the proximity of European sites and their associated habitats and species should be taken into account when proposals are generated. Given the mitigation measures set out in Chapter 8 of this NIS and Chapter 6 and 7 of the Forestry Programme NIS, including the requirement for project level assessments, no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.	N
Water Resource and Supply Resilience Plan – Habitats Regulation	• Physical loss – Destruction (including offsite effects, e.g.	Y	Three water resource options and five resilience options comprising the WR & SR Plan and 13 potentially impacted internationally/European important nature conservation sites within the study area were subject to Stage 1 HRA screening. For four of the resilience options, LSEs could be confidently discounted, as no, or only	N

[25] https://www.agriculture.gov.ie/media/migration/forestry/forestryprogramme2014-2020/IRELANDForestryProgramme20142020230215.pdf (Accessed May, 2018)
[26] https://www.agriculture.gov.ie/media/migration/forestry/publications/codeofbestforestpractice/Code%20of%20Best%20Forest%20Prac%20Part%201.pdf (Accessed June, 2018)
[27] https://www.agriculture.gov.ie/media/migration/forestry/publicconsultation/newforestryprogramme2014-2020/nis/ForestryProgrammeNaturalImpactStatement290914.pdf (Accessed May, 2018)

Plan	Potential impacts - key types	In-combination Likely Significant Effects? (Y/N)	Potential for in-combination effects and mitigation	In-combination adverse effects on site integrity? (Y/N)
Assessment[28] The Plan by Northern Ireland Water (NI Water) aims to have a secure, resilient water supply network that will provide protection against drought and emergency situations.	foraging habitat) and smothering • Physical damage – sedimentation/ silting etc. • Non-physical disturbance – noise, visual presence, human presence, light pollution • Water table/availability – drying. Flooding/storm water, changes to surface water levels and flows, changes in groundwater levels and flows, changes to coastal water movement • Toxic contamination – water pollution, soil contamination,		very weak source-receptor-pathways were identified. For the remaining resilience option and all three water resource options, it was determined that standard mitigation (such as noise and vibration management plans, best practice pollution prevention control guidelines and timing restrictions) would be needed to discount LSE. These options could not be screened out from further assessment and these options were therefore identified as requiring Stage 2 AA. Both the Water Resource and Supply Resilience Plan and the draft Framework Plan identify potential LSEs from impacts of a similar nature, and therefore a potential for in-combination effects was identified. Given the mitigation measures set out in Chapter 8 of this NIS and with the standard good practice construction methods, and sensitive siting of the works based on baseline survey information as detailed in the Water Resource and Supply Resilience Plan, it anticipated that the potential for adverse effects on the internationally/European important nature conservation sites would be avoided/eliminated. No AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.	

[28] https://www.niwater.com/sitefiles/resources/pdf/2020/wrm/wrsrplanhabitatregulationsassessment.pdf Accessed August 2020

Plan	Potential impacts - key types	In-combination Likely Significant Effects? (Y/N)	Potential for in-combination effects and mitigation	In-combination adverse effects on site integrity? (Y/N)
	air pollution • Non-toxic contamination – nutrient enrichment etc.			

8 Mitigation

8.1 Mitigation

Set out in Chapter 3.5 of this report are a number of measures employed to ensure the protection of European sites in the plan development process, while mitigation measures specific to the option types arising from the draft Framework Plan are detailed below.

8.1.1 Avoidance

The setting of sustainable abstraction limits (as outlined in Chapter 3.5.1) for any new or increased abstractions arising as a result of the draft Framework Plan have been set to ensure impacts on aquatic QI species and habitats requiring high status water quality are avoided.

The Option Assessment Methodology has aimed to identify options that avoid or minimise impacts on European sites (as outlined in Chapter 3.5.3). The best AA approach gives maximum consideration to those options with no potential for impacts on European Sites or options with LSEs that can be addressed with general/standard mitigation measures at the project level (based on desktop study). It puts avoidance of impacts on European sites at the forefront taking account for the fact that options with a high likelihood of having adverse effects on a European site have already been removed at Coarse Screening stage. Taking this approach any Feasible Option that meets the objectives of the draft Framework Plan and scores neutral or zero against the European Sites (Biodiversity) question is automatically picked as the Preferred Approach (this is in line with the provisions of Article 6(3) of the Habitats Directive to ensure the protection of European Sites).

As outlined in Chapter 3.5.4 no option arising from the draft Framework Plan with the potential for AESI identified at project level will be progressed as the draft Framework Plan will have identified other options that could be progressed at the project level if required. Such protective measures have been built into the plan to ensure AESI are avoided as a result of adopting the draft Framework Plan.

8.1.2 General Mitigation Measures and Principles

Overview

The various measures that may be applied to options include:

- **General Measures** (established construction best-practice, etc.) which will be applied to all options.
- **Option-specific Measures** (established and reliable measures identified to avoid specific potential effects on European sites, in particular for highly sensitive species incl. freshwater pearl mussel).
- **Further assessments and data.**

These measures will be applied unless project-level AAs or project-specific environmental assessments demonstrate that they are not required (i.e. the predicted effect will not occur), not appropriate, or that alternative or additional measures are necessary or more appropriate.

Note that these measures are not exhaustive or exclusive and must be reviewed at the RWRP level and project stages, taking into account any changes in best-practice as well as project-specific survey information or studies.

General Mitigation Measures

Scheme Design and Planning

All options will be subject to project-level environmental assessment as and when they are brought forward, which will include assessments of their potential to affect European sites during their construction or operation. These assessments will consider or identify (*inter alia*):

- potential for avoiding effects on European sites through design (e.g. alternative pipeline routes; micro siting; etc.);
- best practice construction measures that need to be incorporated into scheme design and/or planning to avoid or mitigate potential effects, for example, ensuring that sufficient working area is available for pollution prevention measures to be installed, such as sediment traps; and
- operational regimes required to ensure no adverse effects occur (e.g. compensation flow releases or reduced abstraction rates [seasonal restrictions].

Note that these measures could only be identified through detailed site assessments and agreed through the abstraction licensing process when in place).

Pollution Prevention

Best practice construction methods are likely to be applicable to all of the proposed options and can be relied on (at this level) to prevent significant or adverse effects on a European site occurring as a result of construction related impacts (e.g. pollutants). Pollution control measures will be detailed in project specific construction and environmental management plans. The following guidance documents detail the current industry best-practices in construction that are likely to be relevant to all options:

- Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters; and
- Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes[29].

Construction Industry Research and Information Association (CIRIA) guidance:

- CIRIA C532: Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors;
- CIRIA C692: Environmental Good Practice on Site;
- CIRIA C648: Control of Water Pollution from Linear Construction Projects: Technical Guidance; and
- CIRIA C648: Control of Water Pollution from Linear Construction Projects: Site Guide.

The best-practice procedures and measures detailed in these documents will be followed for all construction works arising from the draft Framework Plan as a minimum standard, unless project-specific investigations identify additional measures and/or more appropriate non-standard approaches for dealing with potential site-derived pollutants.

General measures for species and habitats

Most species-specific avoidance or mitigation measures can only be determined at the project level, following detailed project-specific surveys. Detailed species-specific mitigation measures will vary according to a range of factors that cannot be determined at the strategic draft Framework Plan level. In addition, some general 'best-practice' measures may not be appropriate to the QI of the European sites concerned (for example, clearing vegetation in winter is usually proposed to avoid impacts on nesting birds; however, this is unlikely to be necessary to avoid effects on some SPA species (such as overwintering estuarine birds) and the removal of vegetation in winter might actually have a negative effect on these species through disturbance). However, the following general measures will be followed to minimise the potential for impacts on QI species unless project level environmental assessments or

[29] https://www.tii.ie/tii-library/environment/construction-guidelines/Guidelines-for-the-Crossing-of-Watercourses-during-the-Construction-of-National-Road-Schemes.pdf

project level AA indicate that they are not required or not appropriate, or that alternative or additional measures are more appropriate/necessary:

Works Programme: The works programme and requirements for each option will be determined at the earliest opportunity to allow surveys and mitigation to be appropriately scheduled and to provide sufficient time for consultations with bodies such as the National Parks and Wildlife Service (NPWS), Environment Protection Agency (EPA) and Inland Fisheries Ireland (IFI).

Scheme Design: Will aim to minimise the environmental effects by 'designing to avoid' potential impacts.

Habitat Loss and Supporting Habitats Loss: Pipelines are usually (where practical) constructed within existing public roads, therefore limiting or avoiding the potential for habitat loss within European sites. Where possible all new infrastructure such as WTPs will be cited outside of European sites. Where European sites cannot be avoided altogether, detailed surveys of habitats within the affected area will be undertaken to locate and avoid sensitive habitats to ensure there is no loss of QI Annex I habitats or Annex II species. Similarly, any upgrade of existing infrastructure within or adjacent to European sites will aim to avoid impacts on these species or habitats through appropriate scheme design.

Habitat features that may be used by QI species (supporting habitat) when outside the European site boundary will be avoided through project specific studies and appropriate scheme design. Surveys focusing on mobile QI species will ensure any significant areas of supporting habitat (for example, foraging areas for QI birds very near but outside of an SPA, otter holts outside an SAC boundary) will be identified and avoided or appropriate mitigation measures put in place to protect them.

Invasive Species: There is the potential for both terrestrial and aquatic non-native invasive species to be present across the country. If present, these could potentially be spread to habitats within SACs/SPAs during construction works/operation (for example, maintenance works to WTPs and pipelines). The introduction of invasive species into a European site can affect the conservation objectives for QI habitats or species, potentially adversely affecting the integrity of the European site (for example, affecting vegetation composition of an Annex I QI habitat, affecting species distribution and abundance and/or out-competing native species). Invasive species surveys (for species listed on Schedule 3 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011)) will be undertaken for any future projects that may arise from the draft Framework Plan. If invasive species are found to be present, an Invasive Species Management Plan will be prepared to outline the control and or removal measures. These measures will ensure such species are not spread during construction or operation of any future projects that may arise from option types outlined within the draft Framework Plan. All works relating to invasive species will be implemented in line with relevant national guidelines as well as those relevant guidelines produced by Irish Water including:

- Biosecurity protocols in relation to water quality and biological sampling.
- Invasive Species Management Guidelines for Japanese knotweed (*Reynoutria japonica*), Himalayan balsam (*Impatiens glandulifera*) and giant hogweed (*Heracleum mantegazzianum*).

Pre-construction Surveys/Seasonal Restrictions/Ecological Clerk of Works: To ensure appropriate protection of QI habitats and species, pre-construction surveys will be undertaken for all future projects (where required). Additionally, the implementation of seasonal working restrictions may be required. Furthermore, works in sensitive areas will be supervised by an experienced ecologist/Ecological Clerk of Works (ECoW) with appropriate qualifications to manage the risks associated with the specific conservation interests of the affected European Site.

8.2 Further assessments and data to inform potential impacts

As discussed in Chapter 6.3 the management option types could have an effect on European sites and their water dependent QI species or habitats. Applying sustainable abstraction limits of 10% and 5% of Q95 will provide protection for European sites. However, as with all management option types arising from the Plan further assessments will be required at the project level to ensure the most robust data is used to inform any environmental assessment in support of planning applications/ abstraction licences etc.

Further detailed site-specific hydrological assessments will be required for a number of the options relating to new or increased ground or surface water abstractions. These will be required to fully understand the potential impacts (if any) on European sites, this is particularly important for new ground water abstractions where there is very limited information or knowledge on allowable abstraction limits or potential zones of contribution (the area over which effects may occur). Outlined below are some of the assessments that may be required at the project level:

Potential effects include, but are not limited to, changes in water quality and/or water levels, habitat loss and disturbance. Prior to progressing any new management option, the following assessments will be required:

- **Measure 8.2a: Yield assessment**: This assessment will identify the amount of water that can be sustainably abstracted from a given water body, taking account of, for example, low flows and climate change. This data will be interpreted alongside field data on the QI(s) in question.
- **Measure 8.2b: Hydrological modelling**: This will indicate what change in water levels would result from a given abstraction. This data would need to be interpreted alongside field data on the QI(s) in question (for example fish habitat assessment undertaken at low flows). Modelling may also include potential changes in salinity associated with desalination plants.
- **Measure 8.2c: Hydrogeological modelling**: This will indicate the distribution and movement of groundwater sources. This data will need to be interpreted alongside field data on the QI(s) in question (for example. how the groundwater abstraction may interact with groundwater dependent QI habitats or species).
- **Measure 8.2d: Examining lake/groundwater catchment (for abstractions)**: To determine if the lake is a hydraulic sink or part of groundwater flow-through systems or linked to surrounding GWDTHs.

Note that this list of assessment is non-exhaustive and must be reviewed at the project stage, taking into account project-specific survey information or studies.

Table 8.1 - Summary of mitigation measures and further assessments/data required for each option type

Option Type	Relevant Mitigation Measures	Further assessments/data required
Leakage Reduction	All standard mitigation measures outlined in Chapter 8.1.2 would apply to this option.	The following further assessments may be required depending on the nature of the QI species or habitats concerned: • 8.1.2 (General Mitigation Measures) • 8.2b (Hydrological modelling)

Option Type	Relevant Mitigation Measures	Further assessments/data required
Water Efficiency/ Effluent Reuse	All standard mitigation measures outlined in Chapter 8.1.2 would apply to this option	The following further assessments may be required depending on the nature of the QI species or habitats concerned: • 8.1.2 (General Mitigation Measures)
Surface Water Abstraction	All standard mitigation measures outlined in Chapter 8.1.2 would apply to this option.	All or some of the following further assessments may be required depending on the QI species or habitats concerned: • 8.1.2 (General Mitigation Measures) • 8.2a (Yield assessment) • 8.2b (Hydrological modelling) • 8.2c (Hydrogeological modelling) • 8.2d (Examining lake/groundwater catchment (for abstractions)
Groundwater	All standard mitigation measures outlined in Chapter 8.1.2 would apply to this option.	All or some of the following further assessments may be required depending on the QI species or habitats concerned: • 8.1.2 (General Mitigation Measures) • 8.2a (Yield assessment) • 8.2b (Hydrological modelling) • 8.2c (Hydrogeological modelling) • 8.2d (Examining lake/groundwater catchment (for abstractions)
Reservoirs	All standard mitigation measures outlined in Chapter 8.1.2 would apply to this option	The following further assessments may be required depending on the nature of the QI species or habitats concerned: • 8.1.2 (General Mitigation Measures) • 8.2a (Yield assessment) • 8.2b (Hydrological modelling) • 8.2c (Hydrogeological modelling)
Desalination	All standard mitigation measures outlined in Chapter 8.1.2 would apply to this option.	The following further assessments may be required depending on the nature of the QI species or habitats concerned: • 8.1.2 (General Mitigation Measures) • 8.2b (Hydrological modelling)
Water Transfers	All standard mitigation measures outlined in Chapter 8.1.2 would apply to this option.	Strict biosecurity measures will be implemented to prevent the introduction of INNS through water transfer (i.e. sources from locations where there are no INNS). Currently, transfer of raw water from one catchment to another is unlikely to be a viable option. The following further assessments may be required depending on the nature of the QI species or habitats concerned: • 8.1.2 (General Mitigation Measures)
Network Improvements	All standard mitigation measures outlined in Chapter 8.1.2 would apply to this option.	The following further assessments (may be required depending on the nature of the QI species or habitats concerned: • 8.1.2 (General Mitigation Measures)
Water Treatment Plant (WTP)	All standard mitigation measures outlined in Chapter 8.1.2 would apply to this option.	All or some of the following further assessments may be required depending on the QI species or habitats concerned: • 8.1.2 (General Mitigation Measures)

Option Type	Relevant Mitigation Measures	Further assessments/data required
		• 8.2a (Yield assessment) • 8.2b (Hydrological modelling) • 8.2c (Hydrogeological modelling) • 8.2d (Examining lake/groundwater catchment (for abstractions)

9 Conclusion

9.1 Conclusion

It is considered that the development of a NWRP will contribute to the sustainable use of Irelands water resources over the next 25 years. The protection of European sites has been integrated into the Plan development process and the options assessment methodology. Options at the Coarse Screening stage which will have AESIs will be eliminated at this stage. All other options will be classified according to the extent of mitigation likely to be required to address AESI. Options that, in Irish Water's opinion will satisfy the Plan objectives and have no potential for impact on European sites will automatically be the Preferred Approach. Where it is uncertain that an option can be effectively mitigated, the Plan will have identified alternatives that can be mitigated. Therefore, the draft Framework Plan will not result in adverse effects on the integrity of any European site either alone or in-combination with other plans or projects.

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