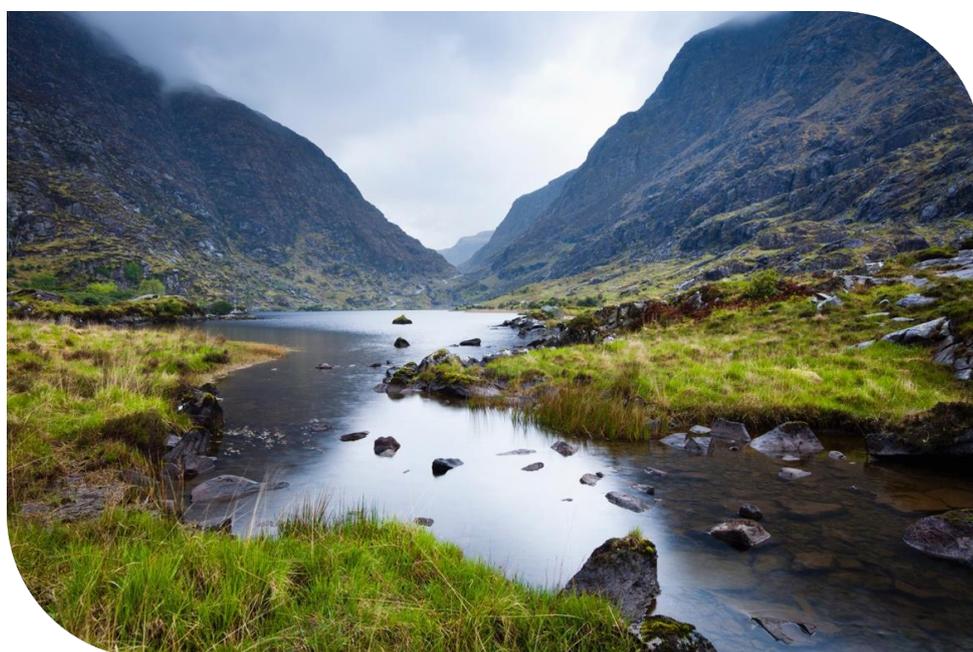


Autumn 2022



Draft Regional Water Resources Plan–North West

Natura Impact Statement



Tionscadal Éireann
Project Ireland
2040

Data disclaimer: 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 in applicable policy documentation.

Baseline data included in the draft RWRP-NW has been incorporated from numerous sources including but not limited to; National Planning Framework, Central Statistics Office, Regional Spatial and Economic Strategies, Local Authority data sets, Regional Assembly data sets and Irish Water data sets. Data sources will be detailed in the relevant sections of the draft RWRP-NW. 2019 was selected as the base year to align with the planning period (2019-2025) of the NWRP.

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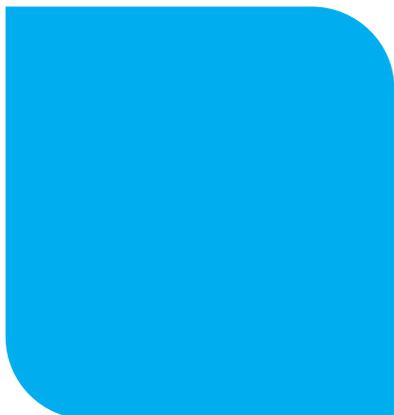
Glossary

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.
Best AA	The approach that following a desktop assessment has the Least Impact on European Sites (without consideration of mitigation measures)
BA	Barrier Assessment
Birds Directive	Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds.
CIRIA	Construction Industry Research and Information Association
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 licences, environmental constraints, water treatment capacities and asset capacities
DHLGH	Department of Housing, Local Government and Heritage
DMA	District Metered Area
DWSP	Drinking Water Safety Plan
DYCP	Dry Year Critical Period
EBSD	Economics of Balancing Supply and Demand
ECJ	European Court of Justice
Environmental Impact Assessment (EIA)	EIA is the process where potential environmental effects of a proposed project are examined.
EPA	Environmental Protection Agency
European Commission	The Commission of the European Union.

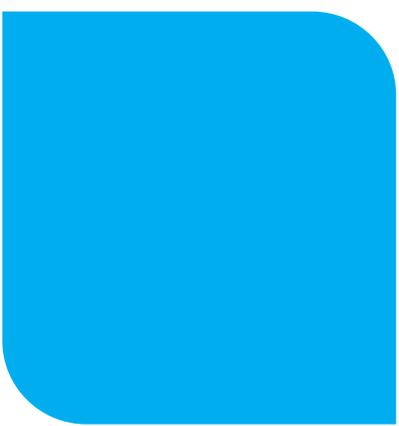
Term	Definition
EU	European Union
European site	Any Special Area of Conservation (SAC) or Special Protection Area (SPA), also referred to as Natura 2000 sites.
Framework Plan	The component of the NWRP that sets out a description of the methodology that Irish Water proposes to use for water resources planning, and an assessment of Need across Irish Water's asset base in terms of quality, quantity, reliability and sustainability.
GDA	Greater Dublin Area
Groundwater (GW)	Groundwater is the water held underground in the soil or in pores and crevices in rock.
Groundwater Body (GWB)	A distinct volume of groundwater within an aquifer or system of aquifers, which is hydraulically isolated from nearby groundwater bodies.
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
INNS	Invasive Non-Native Species
IROPI	Imperative Reasons of Over-Riding Public Interest
LDWMP	Lead in Drinking Water Mitigation Plan
LoS	Level of Service
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.
LWB	Lake Waterbody
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.
National Water Resources Plan (NWRP)	Irish Water's plan to identify how it will provide a safe, sustainable, secure and reliable water supply to its customers for now and into the future whilst safeguarding the environment. It will set out how Irish Water will balance the supply and demand for drinking water over the short, medium and long term. It is a 25-year strategy to ensure we have a safe, sustainable, secure and reliable drinking water supply for everyone.
NPF	National Planning Framework
NPO	National Planning Objective

Term	Definition
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 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.

Term	Definition
Study Area (SA)	The Regional Groups are subdivided into Study Areas which are clusters of Water Resource Zones.
Surface Water (SW)	Surface water is any body of water above ground, including streams, rivers, lakes, wetlands and reservoirs.
Supply Demand Balance (SDB)	The SDB is the deficit or surplus between the supply and demand both now and over the 25-year horizon.
UKTAG	UK Technical Advisory Group
UKWIR	UK Water Industry Research
WAB	Water Abstraction
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 the 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 (Zol)	Term used widely in environmental assessments. The Zol 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.



Introduction and Background



1.1 Introduction

Irish Water assumed statutory responsibility for the provision of public water services and management of water and wastewater investment for Ireland on the 1st January 2014. Its role is to ensure that all its customers and communities receive a safe and secure supply of drinking water and have their wastewater collected, appropriately treated and returned to the environment. Irish Water supports Ireland's social and economic growth in a sustainable manner through appropriate investment in water services and strives to protect the environment in all our 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 funding to enable Irish Water 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 European Union (EU) and national regulations for drinking water supply and wastewater discharge to water bodies. The EPA liaises with the Health Service Executive in matters of public health.

1.2 Regional Water Resources Plans

The Regional Water Resources Plan – North West (RWRP-NW) is one of four regional plans that, along with the NWRP Framework Plan published in Spring 2021, comprise Ireland's first NWRP. Irish Water's NWRP will be the first such plan for the entire public water supply in Ireland. It will allow Irish Water to integrate government policy, legislation and external factors, including climate change, that have the potential to impact our demand for water and water supplies, into the planning and operation of our existing and future supply asset base and the way we all use water. The objectives of the NWRP are to:

- Enable Irish Water to address needs across 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;
- 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; and
- Deliver a plan to ensure that all of our customers have access to safe, secure, reliable and sustainable water supplies, wherever they live.

The NWRP also aims to support balanced regional development, as outlined in the National Planning Framework (NPF) and the supporting Regional Spatial and Economic Strategies (RSES), by assessing water supply needs across our growing communities.

The four regional plans will include:

- Regional Water Resources Plan-North West (RWRP-NW) (Group Area 1)
- Regional Water Resources Plan-South West (RWRP-SW) (Group Area 2)
- Regional Water Resources Plan-South East (RWRP-SE) (Group Area 3)
- Regional Water Resources Plan-Eastern and Midlands (RWRP-EM) (Group Area 4)

Each RWRP will identify deficiencies and need across the water supplies within the region and develop regional plan-level solutions to address these issues. The combined regional solutions will be prioritised collectively at a national level through Irish Water’s planning and investment cycles and form the basis of the NWRP.

The groupings (as seen in Figure 1.1) reflect Irish Water’s operational regions and water supply boundaries, with modifications to account for river catchments, as delineated by the EPA in the River Basin Management Plan (RBMP).



Figure 1.1 – Regional Groupings for Phase 2

The development of four RWRPs is a mechanism for efficient delivery of the NWRP. The outputs of the four RWRPs will be combined for prioritisation and progression through the future cycles of capital investment planning. The Strategic Environmental Assessment (SEA) Environmental Reports and Natura Impact Statement (NIS) for each subsequent Regional Plan will consider the cumulative impacts and in-combination effects with the preceding Regional Plan/Plans and adjustments can be made to address any cumulative impacts identified.

1.3 Structure of the Plan

Phase 1 of the NWRP (the Framework Plan) set out a new Option Assessment Methodology that Irish Water will use to develop a national programme of preferred projects for delivery over the next 25 years to meet the identified need across the public water supply.

The Options Assessment Methodology, as presented in the Framework Plan, will ensure that Irish Water develops appropriate and sustainable interventions, that align with Irish Water’s overarching three pillar approach (see Figure 1.2) to:

- **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 its 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 Framework Plan.



Figure 1.2 – Three Pillar Approach

The Options Assessment Methodology is outlined in Chapter 9 of the Framework Plan. The methodology is based around an option development process which is being rolled out as part of the Regional Plans. The process aligns with the seven standard steps set out in the Department of Public Expenditure and Reform (2019) guidance document “*Public Spending Code: A Guide to Evaluating, Planning and Managing Current Expenditure*”. The key stages of the Framework Plan Options Assessment Methodology process is illustrated in Figure 1.3 and summarised below.

1. Identify need - based on SDB and/or Drinking Water Safety Plan Barrier Assessment.
2. Scoping of the Study Area (Water Resource Zones (WRZs)) – understanding the Study Area and the existing conditions of assets, supply and demand issues as well as environmental constraints and opportunities.
3. Unconstrained Options – identifying potential options for consideration relevant to the Study Area.
4. Coarse Screening – assess the unconstrained options and eliminate any that will not be viable.
5. Further option definition, information collection and preliminary costing.

6. Fine Screening – options assessment and scoring against the key criteria with further removal of options identified as unviable and development of feasible options for costing (including environmental and social costs) and scoring assessment update.
7. Approach development – comparison and assessment of combinations of options identified to meet the predicted supply demand deficit at WRZ, Study Area and Regional Group Area level using Multi-Criteria Analysis (MCA) to determine the Preferred Approach. Approaches tested will include:
 - Least Cost
 - Best Appropriate Assessment (Best AA)
 - Quickest Delivery
 - Best Environmental
 - Most Resilient
 - Lowest Carbon
8. Monitoring and feedback into Plan – a feedback mechanism to ensure that the Framework Plan continuously adapts to changes such as evolving scientific data, understanding, and policy change in relation to the natural environment.

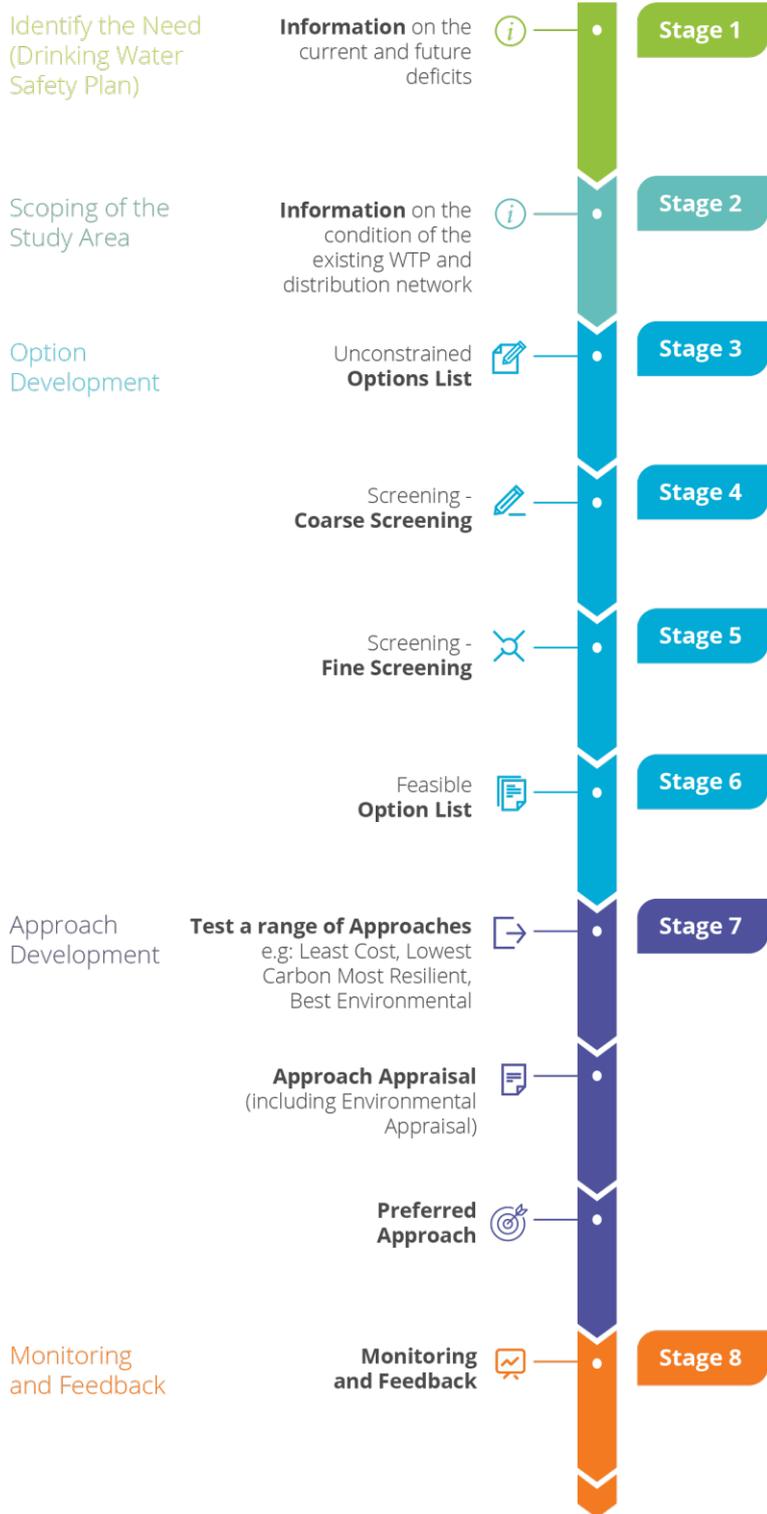


Figure 1.3 – Option Assessment Methodology Process

Table 1.1 - National Water Resources Plan Phases

NWRP Phases	NWRP Reports	Content
Phase 1: NWRP – Framework Plan	NWRP – draft Framework Plan	Need identification including the SDB Calculations NWRP Objectives Generic Option 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 Framework Plan 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 RWRP (draft Regional Plans)	Application of Options Assessment Methodology and Identification of the Preferred Approach for the following regions: <ul style="list-style-type: none"> • RWRP-NW (Group Area 1) • RWRP-SW (Group Area 2) • RWRP-SE (Group Area 3) • RWRP-EM (Group Area 4)
	Final RWRPs (final Regional Plans)	Regional Plans for each of the Group Areas (1 to 4) will be published, finalised and adopted in succession.

The screening for Appropriate Assessment (AA) of the Framework Plan identified that all management option types arising from the NWRP had the potential to give rise to Likely Significant Effects (LSEs) on European sites. Therefore, all Regional Group Areas (1, 2, 3 and 4) and the management option types selected for same, are all subject to Appropriate Assessment with the LSEs identified for the Framework Plan further assessed and their implications for European site integrity identified in the context of potential impact pathways, their implications for the conservation objectives of European site(s), and the identification of any mitigation that might be required to protect site integrity. Given the scale of the NWRP the accompanying NISs to support AA reporting will be presented as part of Phase 1 and Phase 2 (see Table 1.1 above) of the NWRP; Phase 1 of the process having been completed. For Phase 2 of the NWRP the Regional Plans for each of the Group Areas (1 to 4) will be published in succession. The draft RWRP-EM was the first of the RWRPs to be published, this was followed by the draft RWRP-SW, next will be the draft RWRP-NW and finally, the draft RWRP-SE. Consultation for each of the draft Regional Plans, and their accompanying NIS, will be undertaken sequentially in 2022. This position was confirmed in the Regional Plan-specific screening for AA that Irish Water carried out in relation to the RWRP-NW, which again concluded that the management option types arising from the RWRP-NW had the potential to give rise to LSEs on European sites, in view of the sites' conservation objectives. Accordingly, AA of the RWRP-NW was considered to be required. The AA Screening Report for the RWRP-NW is provided at Appendix A to this NIS.

1.4 This Report

This is the NIS which has been prepared to support the AA of the draft RWRP-NW. This NIS has been prepared by Jacobs for Irish Water having regard to the requirements of the EU Habitats Directive (Directive 92/43/EEC) (the Habitats Directive) 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 RWRP-NW lies with Irish Water. The NIS for the RWRP-NW is being released for public consultation along with the draft RWRP-NW and other supporting documentation. The NIS will also be published alongside the final RWRP-NW and an AA Determination, which will set out the conclusions of the Appropriate Assessment carried out by Irish Water, as informed by the NIS, public consultation and other prescribed matters as appropriate.

1.5 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 (SACs²) and Special Protection Areas (SPAs).

1.5.1 Public Authorities and Appropriate Assessment

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.

The first step of the AA process is to carry out a screening to establish whether, in relation to a particular plan or project, there is potential for likely significant effects (LSEs) to any European site(s). Specifically, Regulation 42(1) states:

“Subject to Regulation 42A 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.”

Regulation 42A applies to situations where the Minister for Housing, Local Government and Heritage is the person responsible for making or adopting the relevant plan or project, so is not applicable in respect of NWRP.

Regulation 42(6) states that:

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 In Ireland there are both SACs and ‘candidate’ SACs (cSACs). The ‘candidate’ Special Areas of Conservation (cSACs) are considered candidates 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.

“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 RWRP-NW 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. If this screening determines that it cannot be excluded, on the basis of objective scientific information, that the Plan, individually or in combination with other plans or projects, will have a significant effect on a European site, then Irish Water must determine that an Appropriate Assessment of the plan is required.

To assist Irish Water in carrying out any Appropriate Assessment that may be required following screening, Irish Water must prepare a Natura Impact Statement (NIS), which is a report comprising the scientific examination of a plan or project and the relevant European Site or European Sites, to identify and characterise any possible implications of the plan or project individually or in combination with other plans or projects in view of the conservation objectives of the site or sites, and any further information including, but not limited to, any plans, maps or drawings, scientific information or data required to enable the carrying out of an Appropriate Assessment.

In carrying out the Appropriate Assessment, the Habitats Regulations 2011 require Irish Water to take into account:

- The NIS;
- Any other plans or projects that may, in combination with the plan or project under consideration, adversely affect the integrity of a European site;
- Any supplemental information furnished in relation to any such report or statement;
- If appropriate, any additional information furnished in relation to the NIS;
- Any information or advice obtained by Irish Water;
- If appropriate, any written submissions or observations made to Irish Water in relation to the application for consent for the Plan; and
- Any other relevant information.

Following the Appropriate Assessment process, Irish Water must then only adopt the RWRP-NW after having determined that the Plan shall not adversely affect the integrity of a European site.

1.6 Overlap with Strategic Environmental Assessment

A Strategic Environmental Assessment (SEA) of the draft RWRP-NW is being carried out concurrently with the AA process. SEA is required under the EU Council Directive 2002/42/EC on the Assessment of the Effects of Certain Plans and Programmes on the Environment (the SEA Directive) as transposed into Irish Regulations³. The purpose of SEA is to enable plan-making authorities to incorporate environmental

³ In Ireland, the SEA Directive has been transposed into national legislation through S.I. No. 435 of 2004 (European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations 2004, as amended by S.I. No. 200 of 2011 (European Communities (Environmental Assessment of Certain Plans and Programmes) (Amendment) Regulations 2011). Also, S.I. No. 436 of 2004 (Planning and Development (Strategic Environmental Assessment) Regulations 2004, as amended by S.I. No. 201 of 2011 (Planning and Development (Strategic Environmental Assessment) (Amendment) Regulations 2011).

considerations into decision-making at an early stage and in an integrated way throughout the plan making process and to:

- Identify, evaluate and describe the potential significant environmental effects of implementing the draft RWRP-NW;
- Ensure that identified significant effects are communicated, mitigated and that the effectiveness of mitigation is monitored;
- Identify beneficial (and neutral) effects, and to ensure these are communicated; and
- Provide an opportunity for stakeholder and public involvement.

There is a degree of overlap between the requirements of the SEA and AA and in accordance with best practice, an integrated process has been carried out between the development of the draft RWRP–NW, the SEA and the AA, such as sharing of baseline data where relevant, cohesive assessment of the potential ecological effects of the draft RWRP–NW on European sites, their qualifying features, and clarification on more technical aspects of the RWRP. These processes together will inform and shape the development of the draft RWRP–NW. Irish Water has prepared an Environmental Report for the purposes of SEA, which is being published for consultation along with this NIS and the draft RWRP-NW.

Figure 1.4 below outlines the SEA and AA Stages and how they align with the development of the draft RWRP–NW.

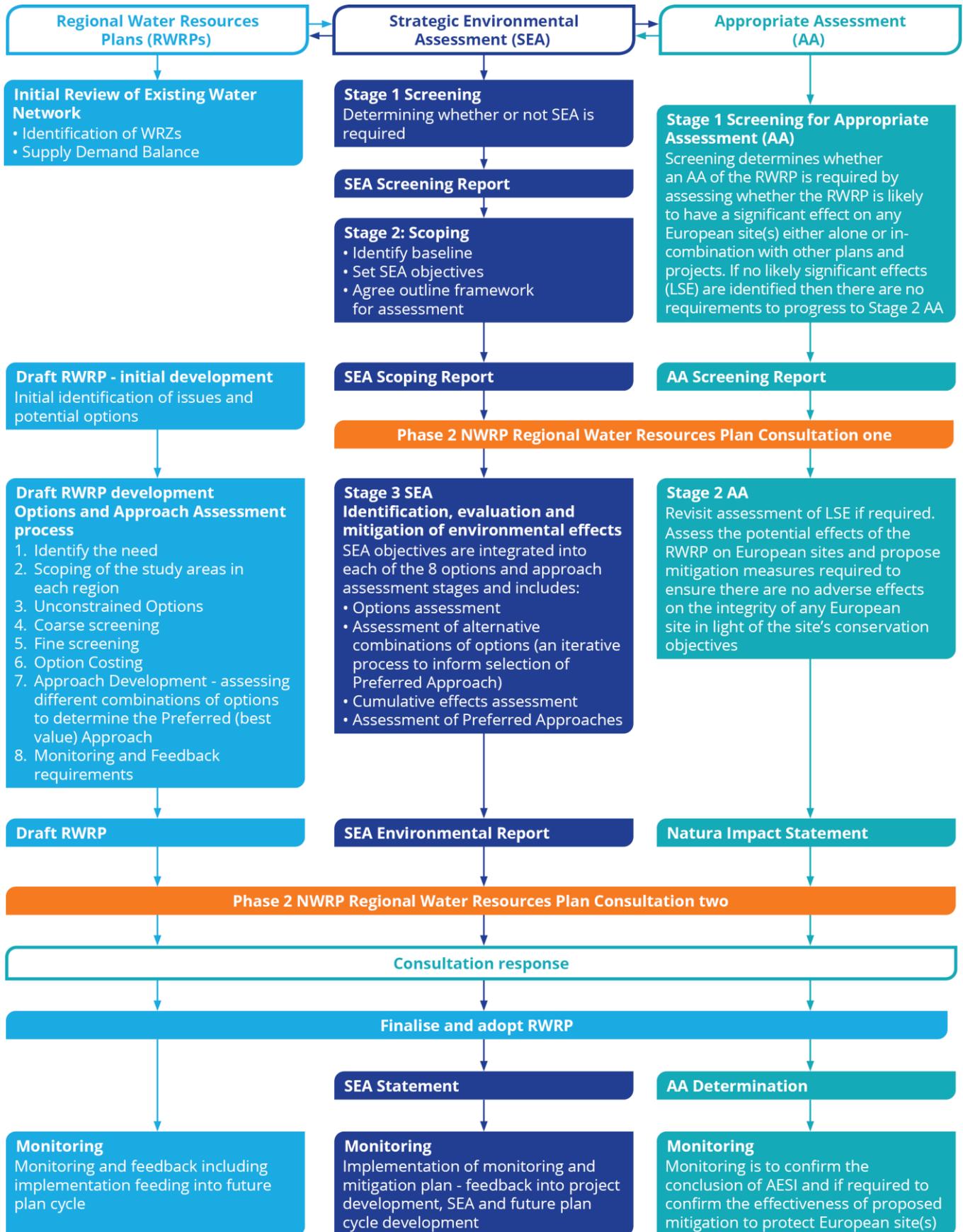


Figure 1.4 - Draft RWRP development with SEA and AA process

1.7 Consultation

Irish Water is presenting the draft RWRP-NW for consultation alongside this NIS and the SEA Environmental Report. Irish Water will take into account submissions and observations relevant to Appropriate Assessment (AA) matters as part of the overall AA process. The AA Determination to be issued alongside the final RWRP-NW will record how those submissions have informed the overall AA.

Consultation on the draft RWRP-NW will be during the period 22nd November 2022 through to the 21st February 2023. Submissions in relation to AA can be made by email or post by Tuesday 21st February 2023.

Email: nwrp@water.ie

Post: National Water Resources Plan, Irish Water, PO Box 13216, Glenageary, Co Dublin.

Freephone: 1800 46 36 76

All feedback received will be reviewed by the NWRP team and our responses will be published.

Following the consultation, we will publish a final version of the RWRP-NW on www.water.ie/nwrp

Irish Water will then commence the drafting and consultation on the draft RWRP for the remaining region of South East. Irish Water will apply the Options Assessment and Preferred Approach Methodology set out in the adopted Framework Plan to each water supply. This will allow Irish Water to develop a nationwide programme of short, medium and long-term options that we will present for consultation within the Regional Plans. The Regional Plans once adopted will be used to inform future regulated capital investment plans and operational plans.

Consultation on the remaining Regional Water Resources Plan including the corresponding SEA Environmental Report and Natura Impact Statement will be undertaken during 2023.

2

2

Assessment Methodology

2.1 Stages of Appropriate Assessment

The methodology for undertaking assessment in relation to AA has evolved from European Commission guidance "Commission Notice Assessment of plans and projects in relation to Natura 2000 sites - Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC 2021/C 437/01" (September, 2021) and Irish guidance from the former Department of Environment, Heritage and Local Government "Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities" (Revised December 2010). The entire process can be broken down into four stages (Article 42/43 of the Habitats Regulations 2011), 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.

Stage 1 - 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, in light of the site's conservation objectives (see Figure 2.1).

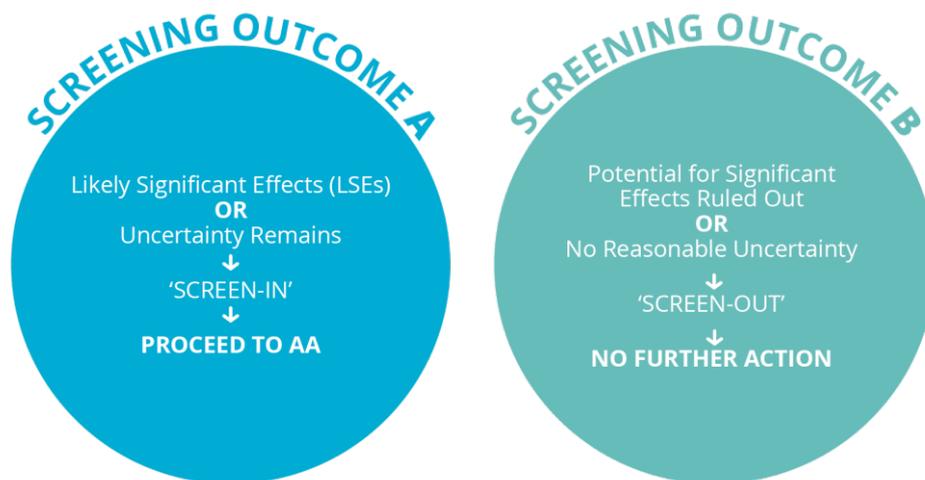


Figure 2.1 - Screening for Appropriate Assessment

Stage 2 - 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 an NIS. This is provided to the competent authority to facilitate its AA of the plan or project (along with other factors including submissions and observations received through public consultation, as detailed above).

Stage 3 - Assessment of Alternative Solutions: Following AA, including mitigation proposals, if AESI remain, or uncertainty remains and the project/plan is to be progressed, 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.

Stage 4 - 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. In this case the provisions of Article 6(3) cannot be met and therefore, the provisions of Article 6(4) are used. If in the light of an assessment of imperative reasons of overriding public interest (IROPI), it is deemed that the project or plan should proceed, thus compensatory measures are implemented to maintain the coherence of the European site network in the face of adverse effects to the integrity of the site(s).

2.2 Approach to AA of Regional Water Resource Plans

RWRPs are required to identify specific water resource options to address predicted SDB deficits in a given WRZ within a defined region. The approach to this AA takes consideration of their strategic nature and uses objective information to determine whether the Plan, in this case the RWRP-NW, have LSEs 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 and the Waddenzee case (Court of Justice of the European Union, C-127/02).

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 Judgement⁵, 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 can be applied at both a project and plan level assessment. The suitability of the data and information used and any decisions flowing from its use in the draft RWRP-NW 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 RWRP-NW 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 AA screening as the projects have been identified or specified from the draft RWRP-NW. To note, all of Irish Water’s projects are screened for AA. Therefore, all projects arising from the draft RWRP-NW 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

⁴ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A62004CC0006> (Accessed, January 2022)

⁵ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:62002CJ0127> (Accessed, January 2022)

support of licensing applications (for example, for new or increased surface or groundwater abstractions).

2.2.2 Compliance of the draft RWRP-NW with the Habitats Directive

The draft RWRP-NW identifies needs in terms of quantity, quality and reliability, and uses a methodology (Option Assessment Methodology) to develop interventions to address this need. The AA Screening Report for the draft RWRP-NW is provided in Appendix A, and at a high level, assessed the option types that were likely to arise from the draft RWRP-NW; that is because not all of the Preferred Approaches (PAs) were fixed at the time the AA screening was undertaken. The AA screening for the draft RWRP-NW concluded that the management option types arising from the RWRP-NW had the potential to give rise to LSEs on European sites, in view of the sites' conservation objectives. Accordingly, AA of the draft RWRP-NW was considered to be required. All of the PAs once fixed (following MCA analysis) were subsequently considered for their potential for LSE as part of this NIS for the draft RWRP-NW (see Appendix C).

2.3 Guidance documents in relation to Appropriate Assessment

The requirements of Article 6 of the Habitats Directive for the draft RWRP-NW have been applied having regard to the following guidance documents:

- AA of Plans and Projects in Ireland: Guidance for Planning Authorities (Department of Environment, Heritage and Local Government, 2010a);
- Appropriate Assessment Screening for Development Management. OPR Practice Note PN01. (Office of the Planning Regulator, 2021).
- Assessment of Plans and Projects in Relation to Natura 2000 Sites – Methodological Guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC (European Commission, 2021);
- 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 have also been used:

- 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, 2010b);
- 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 (Department of Environment, Heritage and Local Government, 2007a);
- Guidance on Compliance with Regulation 23 of the Habitats Directive. Circular Letter NPWS 2/07 (Department of Environment, Heritage and Local Government, 2007b); 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 Guidance Principles and Case Law

A number of cases have been brought to both the national and European courts in relation to the AA process. Irish departmental guidance (Department of Environment, Heritage and Local Government, 2010a)⁶ in relation to AA was published over 10 years ago. Therefore, recent case law has, in many cases, superseded this guidance. However, recent guidance from the OPR (2021)⁷ in relation to AA screening has now been published and considered in this assessment. European Court of Justice (ECJ) rulings and European Commission (EC) publications have also been considered in the preparation of the NIS for the draft RWRP-NW.

2.5 Consideration of the protection of European sites

The draft RWRP-NW 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.

2.5.1 Sustainable Abstraction

The Government is currently developing new legislation dealing with water abstractions, with the Water Environment (Abstractions and Associated Impoundments) Bill 2022 being published in September 2022. As this legislation is still undergoing the legislative process, and the associated regulations and guidance are not yet available, Irish Water does not yet have full visibility of the future regulatory regime. In addition, the exact level of abstraction at each source will depend on future licensing processes, with the EPA as the relevant adjudicator. As the objective of the plan is to achieve safe, secure, reliable and sustainable supplies, any new abstractions proposed to be developed by Irish Water as part of this plan will be based on conservative assessments of sustainable abstraction. This will ensure that water supplies continually improve in terms of environmental sustainability.

Based on initial desk-based assessments, Irish Water developed an initial list of unconstrained options for new supplies, increases and upgrades to existing supplies. An Unconstrained Options review workshop was held with Irish Water's Local Authority Water Services Partners to identify any additional unconstrained options that might be available based on local knowledge.

Irish Water has taken a conservative approach in identifying sustainable abstractions for new options and considered the environmental impact of its existing abstractions as well as the potential resources or water quality improvements. Irish Water considered abstraction sustainability in relation to identifying levels of sustainable abstraction. Irish Water understands that the protection of the aquatic environment/habitat not only requires the protection of water quality but also necessitates the protection and maintenance of physical habitat, hydrological processes and regimes and broader biological diversity which in the context of this NIS support the conservation objectives of European sites. WFD waterbody

⁶ https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2009_AA_Guidance.pdf (Accessed, January 2022)

⁷ <https://www.opr.ie/wp-content/uploads/2021/03/9729-Office-of-the-Planning-Regulator-Appropriate-Assessment-Screening-booklet-15.pdf> (Accessed, January 2022)

status has been taken into account through a review of existing abstractions and in the identification of new options, thus ensuring new options can meet sustainable abstraction criteria.

Using desktop assessments, the sustainable 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 applied⁸. 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 sites. Sustainable abstraction standards for lakes are similarly set at 5% (for lakes requiring “High” status e.g. oligotrophic waterbodies) and 10% of Q50.

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, Irish Water 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 access to site investigation or other data 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 delivery of the individual projects from the NWRP progresses. Construction related impacts associated with new or upgraded 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 protected within sustainable abstraction limits based on the standard rules.

2.5.2 Coarse Screening

The Coarse Screening applied as part of the Options Assessment Methodology (detailed in the 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. options 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 not provide protection of European sites include:

- Raw water transfer, which was rejected to avoid the risk of spread of Invasive Non-Native Species (INNS) cross catchment; and
- Options where the yield assessment identified that the proposed abstraction would not be within the sustainable abstraction range as set out above in Section 2.5.1 (e.g. a quantity of water above the sustainable abstraction range was required to resolve the deficit).

All options removed at Coarse Screening are detailed in the individual Study Area Technical Reports, these are provided in Appendix 1-7 of the draft RWRP-NW. Any options removed due to potential

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.

significant impacts on the environment (including European sites) are summarised in Chapter 4 of this report within each Study Area overview (see Sections 4.2.2, 4.3.2, 4.4.2, 4.5.2, 4.6.2, 4.7.2 and 4.8.2).

2.5.3 MCA scoring/Identification of LSEs and integration of AA into optioneering process

Detailed information on the Option Assessment Methodology is included in Chapter 3, Section 3.4 of the Framework Plan NIS. The Multi-Criteria Analysis (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 then tested against six approaches which were selected to align the Framework Plan and Regional Plans with all relevant government policy. The six approaches are summarised in Table 2.1 below.

Table 2.1 - 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)	<p>Lowest score against the European Sites (Biodiversity) sub-criteria question:</p> <ul style="list-style-type: none"> • 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. 	Habitats Directive
Quickest Delivery	<p>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.</p> <p>This is particularly relevant where an option might be required to address an urgent Public Health issue.</p>	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

The Fine Screening scoring for the European sites (biodiversity) question identifies at a high-level potential for LSEs from an option. 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. The score essentially identifies

LSEs with varying implications for European sites (see Table 2.2 for further detail on the scoring criteria applied).

Table 2.2 - 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 RWRP-NW 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 RWRP-NW level rules/protective measures applied (see sections 2.5.1 and 2.5.2 above) and desktop information available at the time of assessment. <i>Example of option scoring -1: Option may include works which are hydrologically linked to an SAC some distance downstream.</i>
-2	Identified that the 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 detailed 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 RWRP-NW level rules/protective measures applied (see sections 2.5.1 and 2.5.2 above) and desktop information available at the time of assessment. <i>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.</i>
-3	Identified that the option has potential for LSEs that may be more complex to mitigate than -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. <i>Example of option scoring -3: Option may include construction works within an SAC, surface water abstraction from an SAC or groundwater abstraction outside an SAC but with potential hydrological links to an SAC supporting groundwater dependent habitats (GWDHs) or species.</i>

NB. Score of -1, -2 or -3 = potential LSEs have been identified at Fine Screening stage in the absence of mitigation (screening for AA cannot take mitigation into consideration). 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 assessment to inform AA.

Screening for AA of the Preferred Approaches for the NW region is provided in Appendix A and the LSEs are in Appendix C. A list of the European designated sites within the NW region is listed within Appendix B of this report.

2.5.4 Plan Level Protection of European sites

Plan level protection of European sites has been provided for within the draft RWRP-NW. As outlined in Section 2.5.2 of this NIS, options with potential for significant impacts on the environment, including options that could result in AESI are removed at coarse screening. Furthermore, as part of the feedback loop from the NIS for the Plan, a better approach to options with LSE i.e. options with -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 RWRP-NW objectives and doesn't score -3). Because it is possible that all of the potential impacts identified for even a -3 scoring option can be entirely ruled out through project level investigation and analysis or avoided through project level mitigation, the -3 scoring option for biodiversity may be progressed as the Preferred Approach. General and option specific mitigation has been provided for within the Plan (see Section 6.3.1-6.3.5 of this NIS).

2.6 Assessment Methodology

2.6.1 “Source-pathway-receptor” model

The “source-pathway-receptor” model was used to assess the Preferred Approach for the NW region (various Preferred Approaches identified at both WRZ and Study Area level). This assessment was undertaken in consideration of all potential impact pathways connecting elements of the draft RWRP-NW to European sites in view of their conservation objectives.

2.6.2 Transboundary Effects

The draft RWRP–NW solely covers Irish Water’s operational area for the North West, parts of which lie along the boundary between the Republic of Ireland and Northern Ireland (NI). An assessment was undertaken to determine if there was a source-pathway between European sites in NI and the NW region. The assessment took cognisance of marine sites that may be at a considerable distance (up to 100km), but which are designated for mobile marine species such as seals and porpoise which may travel over great distances and therefore have the potential to be affected by the works within the draft RWRP-NW.

2.6.3 Desktop study

The following data sources were consulted for background environmental information in producing this NIS:

- Online data available on European sites as held by the NPWS from www.npws.ie – including site synopsis, conservation objectives and other relevant supporting documentation;
- GIS data for European site boundaries obtained in digital format online from the NPWS;
- Article 17 Overview Report Volume 1 (NPWS, 2019a);
- Article 17 Habitat Conservation Assessments Volume 2 (NPWS, 2019b);
- Article 17 Species Conservation Assessment Volume 3 (NPWS, 2019c);
- Evaluating the Influence of Groundwater Pressures on Groundwater-Dependent Wetlands STRIVE Report (EPA, 2013);

- National Biodiversity Action Plan 2017-2021 (Department of Culture, Heritage and the Gaeltacht, 2017);
- Draft Ireland's 4th National Biodiversity Action Plan 2023-2027 (Department of Housing, Local Government and Heritage, 2022);
- Environmental Protection Agency (EPA) rivers and water quality data online at <https://gis.epa.ie/EPAMaps/>;
- The Environmental Sensitivity Mapping (ESM) online at <https://enviromap.ie/>;
- Online data available on SACs and SPAs in Northern Ireland as held by the Department of Agriculture, Environment and Rural Affairs (DAERA) from <https://www.daera-ni.gov.uk/> – including conservation objectives and other relevant supporting documentation;
- Online data available on SACs and SPAs in Northern Ireland as held by the Joint Nature Conservation Committee (JNCC) from <https://jncc.gov.uk/> – including site synopsis and other relevant supporting documentation;
- Northern Ireland Environment Agency (NIEA) Natural Environment Map Viewer online at <https://apps.d.aera-ni.gov.uk/nedmapviewer/>;
- Draft River Basin Management Plan for Ireland 2022 – 2027 (Department of Housing, Local Government and Heritage, 2022); and
- Data from the Geological Survey Ireland (GSI).

2.6.4 Option comprising existing groundwater abstraction

Site specific data is available in some cases, however, location, abstraction rate(s) and site configuration are often the minimum information available. The operational data provides useful information on the yield, and assumptions can be made around the average production from each site. It can be assumed the average abstraction value is an initial estimate of the yield. Most local authorities in the case of development of groundwater sources would likely have drilled and sought the maximum yield possible through 72 hours pumping tests. This provides an initial yield. Additional information on performance in prolonged dry weather periods provides supporting information on yields. Data collected on site is used to improve the yield and impact estimates.

2.6.5 Option comprising new groundwater abstraction

As part of the desk-based assessment specific buffers will be used to identify the Zone of Influence (Zol) of an option on European sites as outlined below.

Irish departmental guidance on the Zone of Influence (Zol) considered during the AA process states the following:

“A distance of 15km is currently recommended in the case of plans, and derives from UK guidance (Scott Wilson et al., 2006). For projects, the distance could be much less than 15km, and in some cases less than 100m, but this must be evaluated on a case-by-case basis with reference to the nature, size and location of the project, and the sensitivities of the ecological receptors, and the potential for in combination effects”.

However, the actual extent of the Zol depends on the effect pathway, as well as the specific nature of different habitats/species for which a European site is designated including functional and supporting habitat (OPR, 2021). Therefore, for these reasons the Zol must be scientifically defined and based upon the “source-pathway-receptor” model.

As part of the desk-based assessment specific buffers will be used to identify the Zol in relation to groundwater abstraction. As outlined below however, these buffers represent typical groundwater flow distances and only serve as a guide, and where appropriate site-specific information is used instead. To assist with the high-level assessments, the catchment area to the abstraction is also considered. The Zone of Contribution (ZOC) is defined 'as the area needed to support an abstraction from long-term groundwater recharge' (Groundwater Protection Scheme DELG *et al*, 1999). The ZOC is defined and delineated as a means to protect the source, and guide decision making. Long term recharge and abstraction rates dictate the size of the ZOC. As such the ZOC, recharge and abstraction rate enable a water balance. It can be used to assess if a deficit can be potentially met with the existing abstraction or if an alternative solution is required i.e. (i) new well could be drilled nearby (ii) new location needs to be sought, or (iii) alternative solution altogether is required whether it be groundwater or surface water. Typical groundwater flow distances are provided for the various aquifer category types⁹. The domain size associated with these flow systems are considered to be 5km in Karstic aquifers, 3km in Productive Fissured bedrock, 1km in Gravel aquifers and 600m in Poorly Productive aquifers. These are the potential domains that will be used when assessing the potential impacts of groundwater abstractions on European Designated sites and/or surface waters within European sites. As this is a conservative consideration, the buffers act as a guide only. They may flag sites within a 'buffer' for further monitoring etc., but where appropriate are overruled by site specific data. Where available, site specific data (pump test results, borehole construction information, geological constraints etc.) can be used for sites within a 'buffer' to suggest no direct linkage between abstraction and GWDTE. In relation to qualifying interests where specific information was available (e.g. detailed conservation objective mapping etc.) this was used in conjunction with ZOC data from hydrologists to inform the assessment. Where detailed information was lacking, a precautionary approach was taken and potential impacts considered and mitigation provided.

2.6.6 All other options

When assessing likely Zol for all other options the "source-pathway-receptor" model will be applied. European sites with a hydrological link to any given option/Study Area will be considered to be within the Zol. As such, sites that are outside the boundary of the regional group may also be included in the assessment where there is an effects pathway.

The draft RWRP-NW covers the North West region of the Republic of Ireland. Therefore, all European sites within this region (core baseline area – see Section 3.5 of the RWRP-NW SEA Scoping Report) and European sites with potential effects pathways located outside the region were initially considered to be potentially within the Zol of the draft RWRP-NW.

⁹ Daly, D., Fitzsimons, V., Hunter Williams, T. & Wright, G. (2005). "ROCK TYPE VERSUS FRACTURES" – CURRENT UNDERSTANDING OF IRISH AQUIFERS. International Association of Hydrogeologists (IAH) Irish group.

3

Overview of European Sites within the NW Region

3.1 Special Areas of Conservation

SACs cover a variety of habitat types recognised in Annex I of the Habitats Directive. Within the Republic of Ireland, there are 439 SACs, in which 16 habitats designated as “priority” habitats owing to their ecological vulnerability (NPWS, 2019a). There are a further 57 SACs in Northern Ireland. Habitats for which SACs are designated include lakes, raised bogs, blanket bogs, sand dunes, machair, heaths, rivers, woodlands, estuaries and sea inlets. In addition, the Habitats Directive recognises 28 Annex II species that occur in the Republic of Ireland. Some of the species for which SACs have been designated include, but are not limited to, Atlantic salmon (*Salmo salar*), otter (*Lutra lutra*), lesser horseshoe bat (*Rhinolophus hipposideros*), freshwater pearl mussel (*Margaritifera margaritifera*) and Killarney fern (*Trichomanes speciosum*). All 16 of the 16 priority habitats can be found in the NW region. There are 215 SACs within the NW region, and additional SACs are found outside of the NW region but bordering it, including a number of SACs in Northern Ireland. Some of these SACs support various habitats and species that are dependent on surface and/or groundwater sources. 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;
- Abstractions; and
- Invasive species.

Of the pressures noted above, water abstraction is of particular relevance to the draft RWRP-NW. 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 Chapter 2.5.1 sustainable abstraction limits have been set as part of the draft RWRP-NW to ensure the protection of these Annexed species and habitats. A full list of water dependent species and habitats in the NW region is provided in Appendix F.

3.2 Special Protection Areas

SPAs are designated for the conservation of Special Conservation Interest (SCI)¹⁰ Annex I birds and other regularly occurring migratory birds and their habitats. There are 165 SPAs in the Republic of Ireland, and 65 SPAs within the NW region. There are a further 16 SPAs in Northern Ireland, some of which border the NW region. The majority of the SPAs located within the NW region are designated for wintering water birds and breeding seabirds/birds of prey with the majority considered to be regularly occurring migratory birds. Over 90% of the Annex I listed species that occur in the NW region on a regular basis belong to the breeding seabird and wintering waterbird groups.

The habitats within these SPA sites include bogs, loughs, estuaries, callows, rivers and reservoirs. Several of these habitats are dependent on surface and/or groundwater sources. Some of the productive marine intertidal zones of bays and estuaries within the NW region are included within SPAs and these

¹⁰ The term Special Conservation Interest (SCI) and Qualifying Interest (QI) have been used interchangeably throughout the document when referring to Annex I bird species for which an SPA has been designated.

provide vital food resources for several wintering wader species, including knot (*Calidris canutus*), dunlin (*Calidris alpina*) and bar-tailed godwit (*Limosa lapponica*).

Finally, a number of inland wetland sites and areas of blanket bog and upland habitats within the NW region 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*), peregrine (*Falco peregrinus*) and golden plover (*Pluvialis apricaria*). Agricultural land is also represented within the NW region 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 in the NW region is provided in Appendix G.

3.3 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 website¹¹. In Ireland '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

¹¹<https://www.npws.ie/protected-sites> (Accessed, January 2022)

- 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 website¹².

3.4 Overview of European Sites within the North West region

As discussed in Chapter 2, all European sites within the North West region boundary were initially considered to be potentially within the Zol of the draft RWRP-NW, therefore potential LSEs on the conservation objectives for these sites will be considered. There is a total of 215 SACs and 65 SPAs within the NW region boundary. There are a further five marine SACs and 19 marine SPAs that are not within the NW region boundary but are hydrologically linked to it. These sites are Inishtrahull SAC, Rathlin O’Birne Island SAC, Duvillaun Islands SAC, Inishkea Islands SAC, Hempton’s Turbot Bank SAC, Inishkea Islands SPA, Inishmurray SPA, Stags of Broad Haven SPA, Inishbofin, Inishdooney and Inishbeg SPA, Inishglora and Inishkeeragh SPA, Inishtrahull SPA, Duvillaun Islands SPA, Inishduff SPA, Inishkeel SPA, Rathlin O’Birne Island SPA, Roaninish SPA, Illancrone and Inishkeeragh SPA, Ardboline Island and Horse Island SPA, High Island, Inishshark and Davillaun SPA, Slyne Head To Ardmore Point Islands SPA, Cruagh Island SPA, Bills Rocks SPA, West Donegal Islands SPA and Illaunonearaun SPA.

There are a further 57 SACs and 16 SPAs in Northern Ireland, some of which border the NW region boundary, however none of these sites are within the NW region boundary. There are 15 SACs and five SPAs in Northern Ireland that are hydrologically linked to the NW region. They are Cladagh (Swanlinbar) River SAC, Cuilcagh Mountain SAC, Largalinny SAC, Lough Melvin SAC, Magheraveely Marl Loughs SAC, Magilligan SAC, Moneygal Bog SAC, Moninea Bog SAC, Pettigoe Plateau SAC, River Foyle and Tributaries SAC, Rostrevor Wood SAC, Slieve Beagh SAC, Slieve Gullion SAC, Upper Lough Erne SAC, West Fermanagh Scarplands SAC, Carlingford Lough SPA, Lough Foyle SPA, Pettigoe Plateau SPA, Slieve Beagh-Mullaghfad-Lisnaskea SPA, and Upper Lough Erne SPA.

Table 3.1 below provides a breakdown of European sites within each Study Area boundary within the NW region boundary. A summary of the European sites within the NW region boundary are shown in Figure 3.1 below.

Table 3.1 - Number of European Sites within each Study Area¹³ within the NW region boundary

Study Area	No. of SACs	No. of SPAs
A (Donegal)	41	17
B (Cavan and Monaghan)	13	4
C (Mayo and Sligo)	44	16
D (Galway and Mayo)	73	16

¹² <https://www.npws.ie/protected-sites/conservation-management-planning/conservation-objectives> (Accessed, January 2022)

¹³ Some SACs or SPAs fall within more than one study area.

Study Area	No. of SACs	No. of SPAs
E (Louth)	3	3
F (Roscommon and Leitrim)	35	7
G (Clare)	33	9

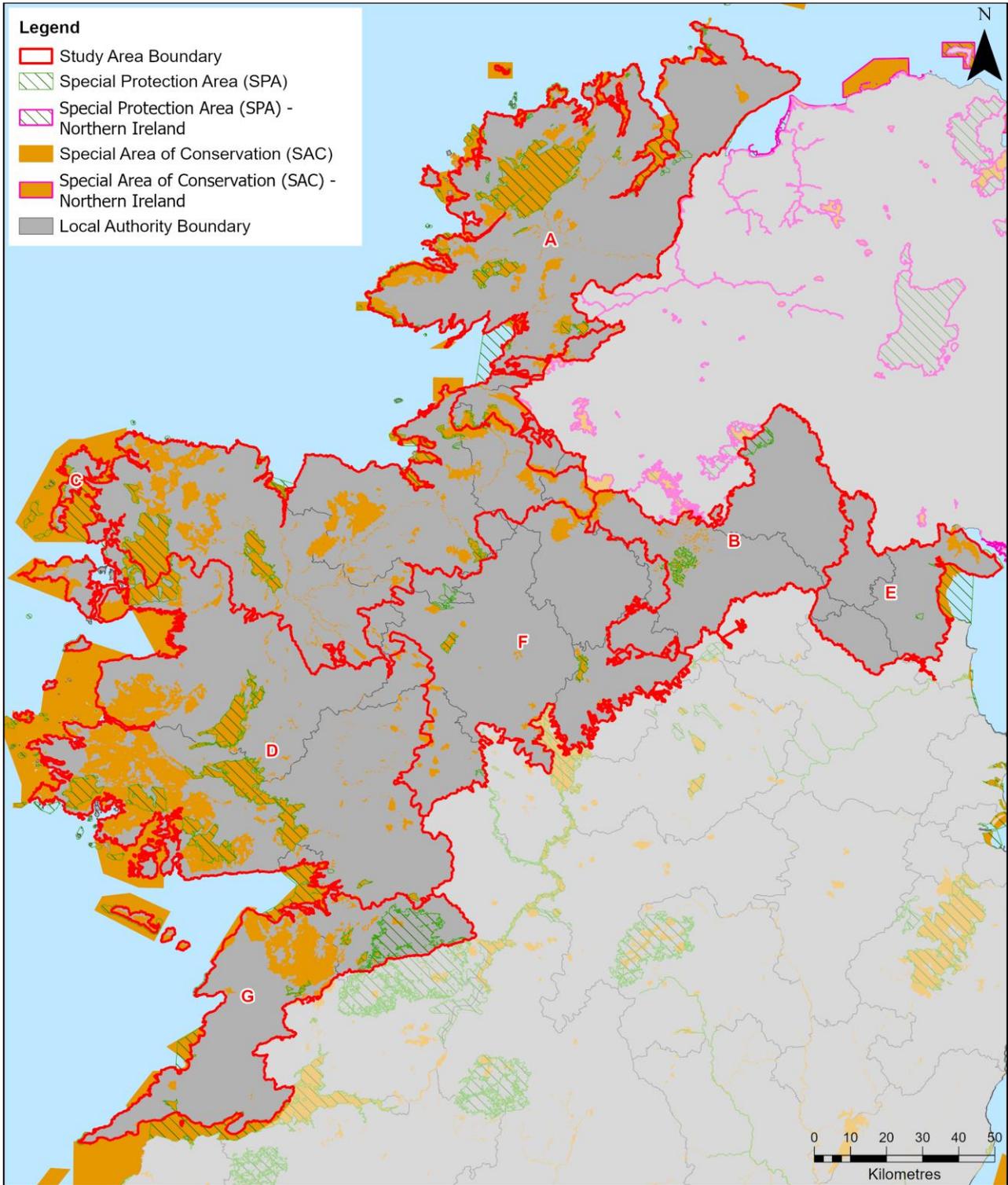
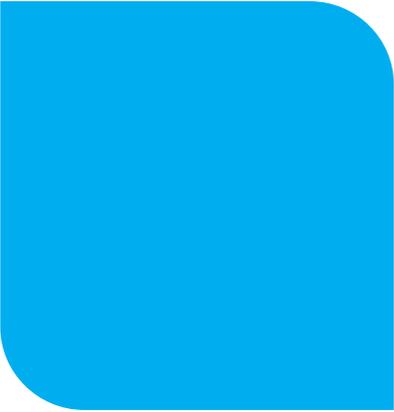


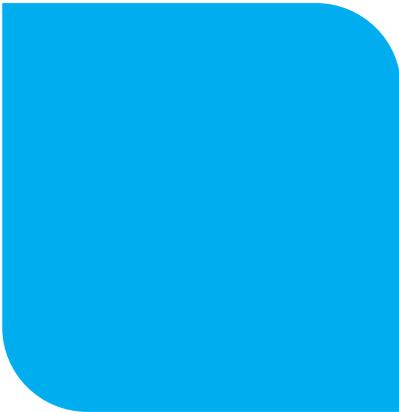
Figure 3.1 - European sites within the North West region boundary



4



**North West –
Preferred
Approach**



4.1 Overview of North West

The North West Region includes thirteen counties: Galway City, Galway, Leitrim, Mayo, Roscommon, Sligo, Cavan, Donegal, Monaghan, Longford, Louth, Meath and Clare. It covers approximately 26,900km² (representing about 40% of the Republic of Ireland) and extends from the Shannon Estuary on the Southern boundary of County Clare to County Donegal, which borders Northern Ireland. Galway City is located in the south west of the region lying on the River Corrib between Lough Corrib and Galway Bay and comprises 19% of the regional population. The area also includes eight islands off the coast of Ireland, namely Inishmore, Inishmean, Inishere, Inisboffin, Inishturk, Clare Island, Achill Island and Arranmore Island.

The draft RWRP-NW has identified the Preferred Approach for the NW region. The North West Region is subdivided into seven study areas (see Figure 4.1 below) based on factors such as:

- Groundwater body boundaries;
- Surface water sub-catchments;
- Geographical features;
- WRZ boundaries;
- Local authority functional areas; and
- Appropriate size for an efficient reporting structure.

The NIS has assessed the Preferred Approach options for the seven Study Areas and the NW region as a whole.

For ease of assessment each Study Area and the Preferred Approach options for same is discussed in detail in Sections 4.2 to 4.8 below. Detailed information on the Preferred Approach (and how it was reached) for each Study Area is provided in the Study Area reports accompanying the draft RWRP-NW Plan and summarised in the relevant chapters below.

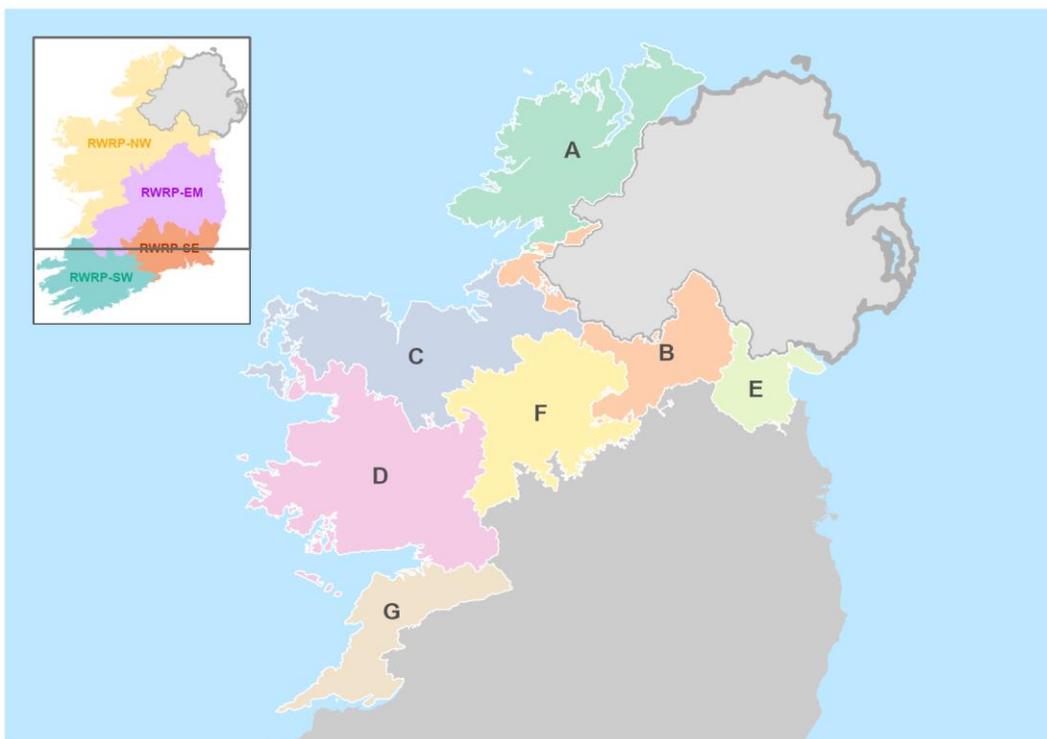


Figure 4.1 - Group Area 1 Study Areas

4.1.1 Solution Types considered across all Study Areas

When identifying the solutions that might be used to address need within a Study Area, Irish Water have compiled the range of available solutions across three pillars; lose less (leakage reduction), use less (water conservation) and supply smarter (rationalisation etc.).

This enables Irish Water to identify the short, medium- and long-term solutions, and the best combination of options. For each Study Area as part of the Unconstrained Options, measures around leakage reduction, water conservation and supplying smarter are looked at and taken into consideration in the SDB deficit although that is not yet possible for water conservation (see section 4.1.2 below). Any specific measures in relation to leakage reduction and supplying smarter is detailed in the various Study Area reports which are accompanying the draft RWRP-NW.

4.1.2 Water Conservation

At present, Irish Water is conducting pilot studies in relation to water conservation stewardship in businesses and is actively progressing water conservation messaging campaigns. During drought conditions in 2018 a Water Conservation Order was implemented, in order to protect water supplies and reduce pressure on the natural environment during this period.

In order to measure the benefit of Water Conservation Activities, Irish Water will need to collect and monitor data over a number of years. Due to these data limitations, as part of this NWRP, Irish Water has not been able to apply reductions in demand due to water conservation to the Supply Demand Balance deficit.

4.1.3 Transboundary Effects

There may be transboundary effects as source-pathways have been identified between the NW region and designated sites in Northern Ireland. There may also be transboundary effects on the basis that there are shared groundwater WFD units, possible marine effects and shared hydrometric areas.

4.2 Overview of Study Area A – Donegal

The location of Study Area A (SAA) in relation to the NW region is shown in Figure 4.1 above. The Study Area extends across the whole of County Donegal including Arranmore Island as the Study Area and County boundaries are aligned. The total area of SAA is approximately 4,632 km² and it lies within the Donegal County. The principal settlement (with a population of over 10,000) within SAA is Letterkenny (Central Statistics Office, 2016).

There are forty-one SACs and seventeen SPAs within the SAA boundary as shown in Table 4.1. European sites within SAA where there is potential for LSE are discussed further in Section 6.2.1.

Table 4.1 - Number of European Sites within the SAA boundary

Study Area	No. of SACs	No. of SPAs
A (Donegal)	41	17

4.2.1 Existing Water Supplies

SAA consists of 21 WRZs supplying a population of approximately 149,598 people via approximately 4,012km of distribution network. Donegal is the most rural / least urbanised county in Ireland, with only around a third of the population living in urban areas. The town of Letterkenny is the largest demand centre, with other towns elsewhere including Buncrana, Ballybofey/Stranorlar and Donegal Town. The sources of water supply consist of 31 surface water abstractions and four groundwater sites (nine sources). The Study Area is summarised in Figure 4.2 below.

Past glaciation processes have carved out a rugged landscape criss-crossed with mountains, blanket bog land and a deeply indented coastline with large sea inlets. Regarding surface water availability in SAA, the mountainous landscape and wet North Atlantic climate has formed a huge number of natural lake and river sources, mainly located around the Derryveagh Mountains and Blue Stack Mountains, two mountain ranges which dominate large parts of the Study Area. In the north of the Study Area, some larger lakes surrounding the Derryveagh Mountains include Lough Beagh (Veagh) and Glen Lough in the River Lackagh sub-catchment, Gartan Lough and Lough Fern in the Leannan River sub-catchment, and Lough Nacung in the River Clady sub-catchment which has been impounded as part of an ESB hydro scheme. In the south of the Study Area, the huge cross border River Erne catchment travels through SAA for a small distance as the Erne flows through Assaroe Lake, another reservoir created by ESB with their hydro scheme at Kathleen Falls dam, before entering the sea at Ballyshannon. Whilst in the east of the Study Area, the landscape is dominated by the large cross border River Foyle catchment as the tributary rivers Finn, Mourne and Deel flow east to join the Foyle along the Northern Ireland border before turning north out to sea at the Lough Foyle estuary. Over the last 50 years, many of the smaller natural lake sources around the Study Area have been impounded and raised to provide secure water supply sources for the region. With twenty-one registered impounding reservoir supply sources, SAA has far more than any other Study Area in the country.

SAA has an expansive network of designated areas including forty SACs and Ireland's second biggest National Park, Glenveagh. Notable SACs include Cloghernagore Bog and Glenveagh National Park SAC, River Finn SAC, and Leannan River SAC. Furthermore, SAA has several waterbodies with High Status Objectives, including six freshwater pearl mussel SAC catchments designated for the protection of the species by the NPWS.

Regarding the surface water supplies, around 95% of the total water supplies for SAA come from surface water sources with the majority being from small lake sources, both natural and impounding reservoirs. The largest abstraction in the Study Area is the Eddie Fullerton Pollan Dam source on Inishowen peninsula, which feeds the Illies WTP to supply the Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam WRZ which is by far the largest zone in the Study Area. The Eddie Fullerton Pollan Dam reservoir was created from impounding Crana River, currently supplying up to 14MI/d but has an existing water abstraction order allowing up to 20.5MI/d when in conjunction with maintaining compensation flow releases from the dam to the downstream. Also supplying this large Letterkenny zone, is the Goldrum Letterkenny WTP, which can supply up to 12MI/d by abstracting from three small reservoir sources – Lough Salt, Keel and Greenan. Elsewhere in the Study Area, there is another significant surface water abstraction at the Lough Mourne source, which feeds the Lough Mourne (Meencrumlin) WTP to supply up to 9.2MI/d to the Lough Mourne WRZ – the second largest zone in the Study Area.

Regarding groundwater availability, the predominant aquifer type of the area is made up of poorly productive bedrock (91%), followed by, productive fissured (3%), karstic (2%) and sand and gravel (0.5%). Surface water abstractions dominate the total water supply for the region, highlighting the vast areas underlain by poorly productive aquifers with lower potential.

The geology of County Donegal most closely resembles that of County Mayo, with Dalradian age metamorphic rocks dominant. These rocks were metamorphosed or altered into gneiss, schists and quartzites during the Grenvillian Orogeny and gave rise to some of the areas more mountainous regions, including Errigal Mountain. Around 405 million years ago, six granite masses were injected into the older rocks, with the main Donegal Granite being the largest. There are no Ordovician or Silurian rocks in Donegal and only a small patch of Devonian sandstones along the northern shore of Donegal Bay. The Precambrian rocks and Granites are characterised by the absence of an intergranular permeability and the presence of low fissure permeability. The marbles may contain some enhanced permeability zones which could provide a domestic or farm supply or small group scheme. Yields are lowest in the fine-grained schists (pelites) where wells may fail to provide even a domestic yield. Well yields are greater in the coarser grained rocks such as the quartzites, but even in these rocks yields greater than 0.1MI/d would be unusual.

Overall, nine groundwater sources (across four sites) are managed by Irish Water in the region, with the majority of the larger abstractions (0.1-0.4MI/d) taking place from boreholes either sited in sand and gravels or from karstic bedrock. The karst, although considered a regionally important aquifer, represents less than 2% of the Study Area. These Dinantian Pure Bedded Limestones are largely unexplored in Donegal. Locating high yielding wells in Regionally Important Karstified Bedrock type aquifers can be difficult due to the uneven distribution of permeability; failed and high yielding wells can occur close together. Aquifer storage is low, and rapid flow-through means that the conduit karst aquifers are typified by erratic and unpredictable groundwater supplies. Where the development of karst has resulted in a more diffuse network of flow pathways, the distribution of permeability, and hence yield, is more homogenous. This is observed further south near Ballyshannon, which consists of a spring and two boreholes, used to augment the spring supply at times of low flow. The scheme abstracts in the region of 0.45MI/d. The gravels at Letterkenny are classified as a locally important aquifer, with the scheme originally able to supply upwards of 2.2MI/d. It should be noted the local classification here, which would suggest long term resilience from these relatively small gravels may pose a risk. A relatively large abstraction does take place at Culdaff, which consists of a borehole sited in the generally poorly productive Precambrian marbles. The scheme abstracts in the region of 0.55MI/d, however a large fracture/cavity zone is likely providing significant pathways for groundwater movement.

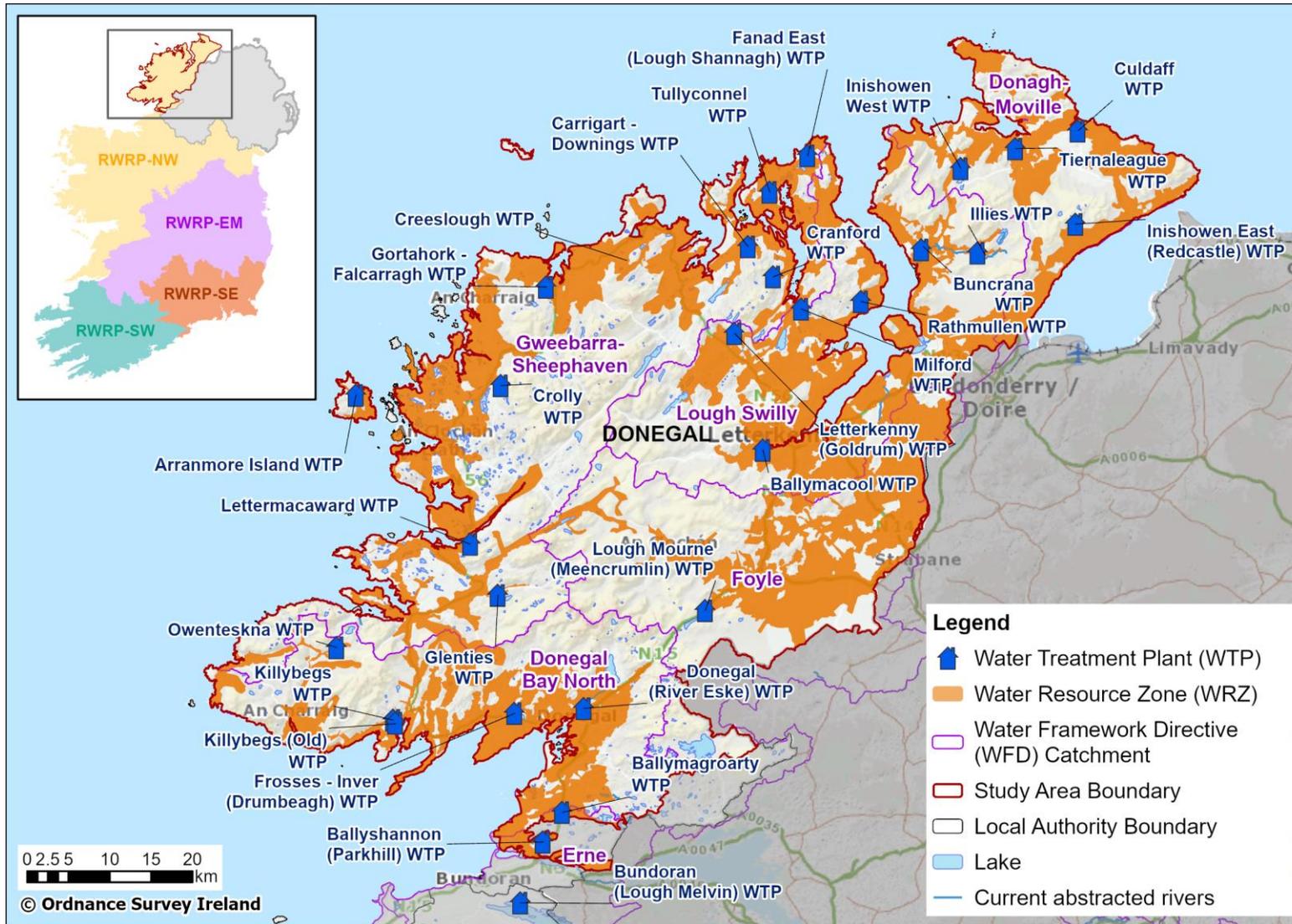


Figure 4.2 - Study Area A Donegal Summary

4.2.2 SAA Options Removed at Coarse Screening

The options detailed in Table 4.2 below were removed at Coarse Screening on environmental grounds.

Table 4.2 - SAA – Options removed at Coarse Screening on environmental grounds

Option Reference	Option Description	Rejection Reasoning
SAA-002a	Rationalise Culdaff WRZ to Illies WTP (Letterkenny 25-year plan).	Abstracting the volume of water required is considered unfeasible.
SAA-003	Rationalise Culdaff WRZ to Inishowen East.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-004	Increase existing SW abstraction from Lough Fad.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-005	New SW source to supply deficit at Inishowen West/Carndonagh/Culdaff WRZ - source TBC.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-006a	Rationalise Inishowen West WSZ to Illies WTP.	Abstracting the volume of water required is considered unfeasible.
SAA-007	Rationalise Inishowen West WSZ to Lough Mourne WRZ (Letterkenny 25-year plan).	Abstracting the volume of water required is considered unfeasible.
SAA-010a	Rationalise Carndonagh WSZ to Illies WTP (Letterkenny 25-year plan).	Abstracting the volume of water required is considered unfeasible.
SAA-011	Rationalise Carndonagh WSZ to Lough Mourne WRZ (Letterkenny 25-year plan).	Abstracting the volume of water required is considered unfeasible.
SAA-012	Increase SW abstraction from Lough Doo.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-013a	Interconnect Bunrana and Cardonagh and supply deficit from Carndonagh.	Upgrades are to be considered for Inishowen West/Carndonagh/ Culdaff only, not as part of larger regional group as this option is unlikely to be able cover deficit based on allowable abstraction limits.
SAA-013b	Interconnect Bunrana and Cardonagh and supply deficit from Carndonagh.	Upgrades are to be considered for Inishowen West/Carndonagh/ Culdaff only, not as part of larger regional group as this option is unlikely to be able cover deficit based on allowable abstraction limits.

SAA-014a	Rationalise Buncrana to Cardonagh.	Upgrades are to be considered for Inishowen West/Carndonagh/ Culdaff only, not as part of larger regional group as this option is unlikely to be able cover deficit based on allowable abstraction limits.
SAA-014b	Rationalise Buncrana to Cardonagh.	Upgrades are to be considered for Inishowen West/Carndonagh/ Culdaff only, not as part of larger regional group as this option is unlikely to be able cover deficit based on allowable abstraction limits.
SAA-015a	Rationalise Slavery WTP to Illies WTP.	Abstracting the volume of water required is considered unfeasible.
SAA-016	Rationalise Slavery WTP to Lough Mourne WRZ (Letterkenny 25-year plan).	Abstracting the volume of water required is considered unfeasible.
SAA-017a	Increase existing SW abstraction from Crana River and increase capacity of Illies WTP.	Abstracting the volume of water required is considered unfeasible.
SAA-017c	Increase existing SW abstraction from Crana River and increase capacity of Illies WTP.	Abstracting the volume of water required is considered unfeasible.
SAA-018a	Increase existing SW abstraction from Lough Fad.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-018b	Increase existing SW abstraction from Lough Fad.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-019a	Rationalise Inishowen East to Illies WTP.	Abstracting the volume of water required is considered unfeasible.
SAA-020	Rationalise Inishowen East to Lough Mourne WRZ (Letterkenny 25-year plan).	Abstracting the volume of water required is considered unfeasible.
SAA-021b	Increase existing SW abstraction from Lough Mourne. It would require significant increase to impoundment.	Abstracting the volume of water required is considered unfeasible.
SAA-024	New SW abstraction from Lough Finn and new WTP.	The option also requires a significant length of mains. Transferring small quantities of water over long distances can affect the quality of water.
SAA-027	Rationalise Lough Mourne WRZ to Illies WTP supply.	Abstracting the volume of water required is considered unfeasible.
SAA-030	New GW abstraction (poorly productive bedrock) at Alt Raws.	Abstracting the volume of water required is considered unfeasible.

SAA-033	New GW abstraction (poorly productive bedrock) at Meeneragh/ Cronalaghey.	Abstracting the volume of water required is considered unfeasible.
SAA-034	Increase existing SW abstraction from Lough Naglea.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-037	Rationalise Fanad East to Lough Mourne WRZ (Letterkenny 25-year plan).	Abstracting the volume of water required is considered unfeasible.
SAA-040	Rationalise Fanad to Cranford.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-043a	Increase existing SW abstraction from Lough Salt and increase capacity of new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-043b	Increase existing SW abstraction from Lough Salt and increase capacity of new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-043c	Increase existing SW abstraction from Lough Salt and increase capacity of new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-043d	Increase existing SW abstraction from Lough Salt and increase capacity of new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-043e	Increase existing SW abstraction from Lough Salt and increase capacity of new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-045a	Increase existing SW abstraction from Lough Greenan and increase capacity of new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-045b	Increase existing SW abstraction from Lough Greenan and increase capacity of new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-045c	Increase existing SW abstraction from Lough Greenan and increase capacity of new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.

SAA-045d	Increase existing SW abstraction from Lough Greenan and increase capacity of new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-045e	Increase existing SW abstraction from Lough Greenan and increase capacity of new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-046	Increase existing SW abstraction from Lough Keel for new Letterkenny WTP and increase capacity of new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-048a	New SW abstraction from Lough Reelan to supplement new Letterkenny WTP and increase capacity of new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-048b	New SW abstraction from Lough Reelan to supplement new Letterkenny WTP and increase capacity of new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-050a	New SW abstraction from Lough Fern to supplement new Letterkenny WTP and increase capacity of new Letterkenny WTP.	The overall WFD status of the ground waterbody in this location is classified as poor status and the lake is 'at risk'. There are problems associated with urban wastewater, a nearby landfill site, geomorph issues with shallowness and bank stability issues.
SAA-050b	New SW abstraction from Lough Fern to supplement new Letterkenny WTP and increase capacity of new Letterkenny WTP.	The overall WFD status of the ground waterbody in this location is classified as poor status and the lake is 'at risk'. There are problems associated with urban waste water, a nearby landfill site, geomorph issues with shallowness and bank stability issues.
SAA-051	Increase existing SW abstraction from Lough Columbkille.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-052	New SW abstraction and new WTP at Lough Fern and abandon Milford WTP.	The overall WFD status of the ground waterbody in this location is classified as poor status and the lake is 'at risk'. There are problems associated with urban wastewater, a nearby landfill site, geomorph issues with shallowness and bank stability issues.
SAA-053	Rationalise Milford to Goldrum Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.

SAA-054	Rationalise Milford to Cranford.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-055	Increase existing SW abstraction from Gort Lough.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-057	Rationalise Milford to new Letterkenny WTP. New SW abstraction from Lough Reelan to supplement new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-059	Rationalise Milford to new Letterkenny WTP. New SW abstraction from Lough Fern to supplement new Letterkenny WTP.	The overall WFD status of the ground waterbody in this location is classified as poor status and the lake is 'at risk'. There are problems associated with urban wastewater, a nearby landfill site, geomorph issues with shallowness and bank stability issues.
SAA-061	Rationalise Rathmullen to Goldrum Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-063	Rationalise Rathmullen to new Letterkenny WTP. New SW abstraction from Lough Reelan to supplement new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-065	Rationalise Rathmullen to new Letterkenny WTP. New SW abstraction from Lough Fern to supplement new Letterkenny WTP.	The overall WFD status of the ground waterbody in this location is classified as poor status and the lake is 'at risk'. There are problems associated with urban wastewater, a nearby landfill site, geomorph issues with shallowness and bank stability issues.
SAA-067c	Increase GW abstraction from existing BHs to partly supply Letterkenny, Inishowen East & Pollan Dam deficit. Recent work has shown potential to get 1-3MLD more from this supply.	Abstracting the volume of water required is considered unfeasible.
SAA-067d	Increase GW abstraction from existing BHs to partly supply Letterkenny, Inishowen East & Pollan Dam WRZ deficit. Recent work has shown potential to get 1-3MLD more from this supply.	Abstracting the volume of water required is considered unfeasible.
SAA-069	Rationalise Letterkenny Mixed to Lough Mourne WRZ (Letterkenny 25-year plan).	Abstracting the volume of water required is considered unfeasible.
SAA-070	Increase existing SW abstraction from Lough Nambraddan.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.

SAA-071	Increase existing SW abstraction from Lough Nameeltoge.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-074	Rationalise Carrigart-Downings to Goldrum Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-076	Rationalise Carrigart-Downings to new Letterkenny WTP. New SW abstraction from Lough Reelan to supplement new Letterkeny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-078	Rationalise Carrigart-Downings to new Letterkenny WTP. New SW abstraction from Lough Fern to supplement new Letterkeny WTP.	The overall WFD status of the ground waterbody in this location is classified as poor status and the lake is 'at risk'. There are problems associated with urban wastewater, a nearby landfill site, geomorph issues with shallowness and bank stability issues.
SAA-079	Rationalise Carrigart-Downings to Ballymacool WTP.	Abstracting the volume of water required is considered unfeasible.
SAA-080	Rationalise Carrigart-Downings to Lough Mourne WRZ (Letterkenny 25-year plan).	Abstracting the volume of water required is considered unfeasible.
SAA-081a	Increase existing SW abstraction from Lough Nacreaght.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-081b	Increase existing SW abstraction from Lough Nacreaght.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-081c	Increase existing SW abstraction from Lough Nacreaght.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-083	Rationalise Cranford to Goldrum Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-085	Rationalise Cranford to new Letterkenny WTP. New SW abstraction from Lough Reelan to supplement new Letterkeny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-087	Rationalise Cranford to new Letterkenny WTP. New SW abstraction from Lough Fern to supplement new Letterkeny WTP.	This option is associated with a large contributing source but the overall WFD status of the ground waterbody in this location is classified as poor status and the lake is 'at risk'. There are problems associated with urban wastewater, a nearby landfill site, geomorph issues with shallowness and bank stability issues.

SAA-088	Rationalise Cranford to Ballymacool WTP.	Abstracting the volume of water required is considered unfeasible.
SAA-089	Rationalise Cranford WSZs to Lough Mourne WRZ (Letterkenny 25-year plan).	Abstracting the volume of water required is considered unfeasible.
SAA-094a	New SW abstraction and WTP on Lough Veagh and supplement Letterkenny/ Milford.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-094b	New SW abstraction and WTP on Lough Veagh and supplement Letterkenny & Inishowen RWSS.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-096	Increase existing SW abstraction from stream from Muckish Mountain.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-097	Increase existing SW abstraction from Lough Agher.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-101	Rationalise Creeslough Dunfanaghy WRZ to Lough Mourne WRZ (Letterkenny 25-year plan).	Abstracting the volume of water required is considered unfeasible.
SAA-103	Rationalise Creeslough Dunfanaghy WRZ to Letterkenny WRZ - Lough Veagh source.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-107	Rationalise Creeslough Dunfanaghy to Rossess WRZ - new WTP at Dunlewy Lough.	A better alternative to this option is to abstract from larger Lough Nacung directly downstream.
SAA-109	Increase existing SW abstraction from Lough Lagha.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-113	Rationalise Gortahork-Falcarragh to Rossess WRZ - new WTP at Dunlewy Lough.	A better alternative to this option is to abstract from larger Lough Nacung directly downstream.
SAA-115	Rationalise Gortahork-Falcarragh WRZ to Lough Mourne WRZ.	Abstracting the volume of water required is considered unfeasible.
SAA-116a	Increase existing SW abstraction from Lough Keel.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-116b	Increase existing SW abstraction from Lough Keel.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.

SAA-117	Increase existing SW abstraction from river leaving Lough Keel.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-118b	New SW abstraction from Loch an Luir and new WTP.	Abstracting the volume of water required is considered unfeasible.
SAA-120a	New WTP on ESB impoundment at Dunlewy Lough.	A better alternative to this option is to abstract from larger Lough Nacung directly downstream.
SAA-120b	New WTP on ESB impoundment at Dunlewy Lough.	A better alternative to this option is to abstract from larger Lough Nacung directly downstream.
SAA-122	Rationalise Rosses WRZ to Lough Mourne WRZ.	Abstracting the volume of water required is considered unfeasible.
SAA-123	Rationalise Royssees to Killybegs and decommission existing source.	Abstracting the volume of water required is considered unfeasible.
SAA-124	Interconnect Rosses with Glenties-Ardara WRZ (rationalise Lettermacaward WRZ to Glenties-Ardara WRZ) and supply deficit from new WTP at Lough Finn.	Abstracting the volume of water required is considered unfeasible.
SAA-129	Interconnect Lettermacaward WRZ and Glenties WRZ and supply deficit from Glenties.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-130	Rationalise Lettermacaward WRZ to Lough Mourne WRZ.	Abstracting the volume of water required is considered unfeasible.
SAA-132	Rationalise Lettermacaward to Killybegs and decommission existing source.	Abstracting the volume of water required is considered unfeasible.
SAA-133	Rationalise Lettermacaward to Glenties-Ardara WRZ (new WTP at Lough Finn) and decommission existing source.	Abstracting the volume of water required is considered unfeasible.
SAA-134a	Increase existing impoundment at Lough Anna and increase existing SW abstraction.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-134b	Increase existing impoundment at Lough Anna and increase existing SW abstraction.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-135b	New SW abstraction from Lough Finn and new WTP. Supply Glenties-Ardara and Lettermacaward WRZs. Supply deficit to Rosses WRZ.	Abstracting the volume of water required is considered unfeasible.

SAA-137	Rationalise Glenties-Ardara WRZ to Lough Mourne WRZ.	Abstracting the volume of water required is considered unfeasible.
SAA-140	Rationalise Glenties-Ardara to Killybegs and decommission existing source.	Abstracting the volume of water required is considered unfeasible.
SAA-146	Rationalise Arranmore Island to mainland - Rosses WRZ (Lough Keel).	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-147	Rationalise Arranmore Island to mainland - Rosses WRZ (Lough Anure).	Abstracting the volume of water required is considered unfeasible.
SAA-148	Rationalise Arranmore Island to mainland - Rosses WRZ (Dunlewy Lough).	A better alternative to this option is to abstract from larger Lough Nacung directly downstream.
SAA-150	Increase existing SW abstraction from Lough Nalughraman.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-154	Increase existing SW abstraction from Lough Aderry. Rationalise Lettermacaward, Rosses and Glenties-Ardara WRZs (decommission existing sources) to Killybegs and create a single WRZ.	Abstracting the volume of water required is considered unfeasible.
SAA-156	Increase existing SW abstraction from St. Peters Lough.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-157	Increase existing SW abstraction from Glencoagh Lough.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-163	Interconnect Frosses-Inver and Donegal (River Eske source) supply deficit from Donegal (River Eske) WRZ.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-164	Interconnect Frosses-Inver and Donegal (River Eske & Lough Eske source) supply deficit from Donegal (River Eske) WRZ.	Abstracting the volume of water required is considered unfeasible.
SAA-167a	Increase existing SW abstraction from River Eske.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-167b	Increase existing SW abstraction from River Eske.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.

SAA-167c	Increase existing SW abstraction from River Eske.	Abstracting the volume of water required is considered unfeasible.
SAA-167d	Increase existing SW abstraction from River Eske.	Abstracting the volume of water required is considered unfeasible.
SAA-167e	Increase existing SW abstraction from River Eske.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-167f	Increase existing SW abstraction from River Eske.	Abstracting the volume of water required is considered unfeasible.
SAA-168a	New SW abstraction from Lough Eske and new WTP. To supplement existing river abstraction. Operate two sources conjunctively, applying compensation flow release requirements from lake to river.	Abstracting the volume of water required is considered unfeasible.
SAA-168b	New SW abstraction from Lough Eske and new WTP. To supplement existing river abstraction. Operate two sources conjunctively, applying compensation flow release requirements from lake to river.	Abstracting the volume of water required is considered unfeasible.
SAA-168c	New SW abstraction from Lough Eske and new WTP. To supplement existing river abstraction. Operate two sources conjunctively, applying compensation flow release requirements from lake to river.	Abstracting the volume of water required is considered unfeasible.
SAA-173	Increase existing SW abstraction from Lough Gorman.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-174	New SW abstraction from lake (source TBC) and new WTP in Ballyshannon & Bundoran WRZ.	There are no other suitable new lake sources associated with this option.
SAA-179	Rationalise Ballyshannon/Ballymagroarty to Donegal (River Eske) WRZ.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-180	Rationalise Ballyshannon/Ballymagroarty to Donegal (River Eske & Lough Eske source) WRZ.	Abstracting the volume of water required is considered unfeasible.
SAA-184	Rationalise Fanad West WSZs to Lough Mourne WRZ (Letterkenny 25-year plan).	Abstracting the volume of water required is considered unfeasible.

SAA-017e	Increase existing SW abstraction from Crana River and increase capacity of Illies WTP.	Abstracting the volume of water required is considered unfeasible.
SAA-210	Increase existing SW abstraction from Lough Unshin.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-216	New SW abstraction from Lough Altan and new WTP.	Abstracting the volume of water required is considered unfeasible.
SAA-108	Rationalise Creeslough Dunfanaghy to Rossess WRZ - new WTP at Lough Nacung.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-112	New SW abstraction from Lough Nacung.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAA-114	Rationalise Gortahork-Falcarragh to Rossess WRZ - new WTP at Lough Nacung.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status.
SAA-119a	New WTP on ESB impoundment at Lough Nacung.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status.
SAA-119b	New WTP on ESB impoundment at Lough Nacung.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status.
SAA-119c	New WTP on ESB impoundment at Lough Nacung.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status.
SAA-149	Rationalise Arranmore Island to mainland - Rosses WRZ (Lough Nacung).	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status.
SAA-211	New WTP on ESB impoundment at Lough Nacung.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status.
SAA-212	Interconnect Lettermacaward WRZ to Rosses WRZ - new WTP at Lough Nacung.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status.
SAA-213	Interconnect Glenties-Ardara WRZ to Rosses WRZ - new WTP at Lough Nacung.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status.
SAA-219	New WTP on ESB impoundment at Lough Nacung.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status.
SAA-275	Rationalise Gortahork-Falcarragh to Rossess WRZ - new WTP at Lough Nacung.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status. criteria.

SAA-276	New WTP on ESB impoundment at Lough Nacung.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status.
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4.2.3 Preferred Approach for SAA

Full details of the Preferred Approach (and how it was reached) are included in the SAA Technical Report in Appendix 1 of the draft RWRP-NW. The final Preferred Approach for SAA is shown in Table 4.3 below. The findings of the Preferred Approach Development for SAA Donegal at WRZ level, include the following:

- There are no options that score a 0 in relation to potential impact on a designated European site.
- There is one -3 score against designated European sites within the Preferred Approach; Group option SAA-566.
- The remaining options within the Preferred Approach have either a -1 or a -2 score against European sites.

In summary, the Preferred Approach for SAA is the Combination 12 approach which consists of local WRZ supplies solutions for Rosses, Arranmore Island, Gortahork-Falcarragh, Alt Raws and Meeneragh/Cronalaghey WRZs. The Preferred Approach for Inishowen West & Carndonagh, Killybegs, Donegal (River Eske), Culdaff, Owenteskiny, Lough Mourne, Letterkenny/Milford & Inishowen RWSS & Inishowen East, Ballyshannon & Bundoran, Glenties-Ardara, Frosses-Inver, Lettermacaward, Creeslough Dunfanaghy, Carrigart-Downings & Cranford, Buncrana, Fanad West and Fanad East involve transfers from a number of existing surface water abstractions in the study area.

Delivery of the Preferred Approach will secure all of the supplies in the area in terms of Quality, Quantity, Sustainability and Resilience. The Preferred Approach for SAA Donegal also includes for demand side (**Loose Less** and **Use Less**) measures, including:

- Ongoing leakage management including active leakage control, pressure management and find and fix activities to offset Natural Rate of Leakage Rise (NRR).
- Nett leakage reduction, amounting to 0.634 Ml/d (applied to SDB Deficit) to move towards achieving the National SELL Target by 2034
- Continuation of Irish Water household and business water conservation campaigns, initiatives and education programmes.
- The option to implement legally enforceable Water Conservation Orders in drought periods in order to protect the environment and our public water supplies.

The Preferred Approach provides benefits for the environment and European sites through decommissioning existing abstractions at a number of WTPs (for example Fanad East WTP and Glenties WTP) which currently extract from European sites including Ballyhoorisky Point to Fanad Head SAC, Lough Nillan Bog (Carrickatlieve) SAC and Lough Nillan Bog SPA.

All of the options that make up the Preferred Approach and assessed as part of this NIS are listed in Table 4.3 and shown in Figure 4.3.

Table 4.3 - Final Preferred Approach for SAA – Options

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
<p>SAA-262 (Part of Grouped Option SAA-566) 0600SC0001 Inishowen West & Carndonagh</p>	<p>-3</p>	<p>Interconnect Inishowen West/Carndonagh/ Culdaff to new sources developed near Letterkenny</p> <ul style="list-style-type: none"> • Inishowen West & Carndonagh WRZ in deficit so interconnect to Letterkenny, Inishowen East & Pollan Dam WRZ • Inishowen West & Carndonagh WRZ current WAFU DYCP 2044 = 2.683ML/d, DYCP 2044 demand = 5.89ML/d so additional 3.207ML/d required to meet WRZ deficit • Existing SW abstraction maintained • Existing sources: (Pollan Dam) WFD status 2013-2018 – Good and (Fad Meendoran Lake WB) WFD status 2013-2018 – Good • New sources: (Glen LWB - WFD status 2013-2018 – ‘Good’ and ‘Not at Risk’) (Gartan LWB – WFD status 2013-2018 – ‘Good’ and ‘At Risk’)
<p>SAA-118a 0600SC0006 Rosses</p>	<p>-2</p>	<p>New SW abstraction from Loch an Luir and New WTP</p> <ul style="list-style-type: none"> • Rosses WRZ in deficit so new SW abstraction to meet WRZ future deficit • Rosses WRZ current WAFU DYCP 2044 = 3.458ML/d, DYCP 2044 demand = 6.825ML/d so additional 3.458ML/d required to meet WRZ deficit • Existing SW abstraction maintained • Existing source (Keel Crotty LWB) WFD status 2013-2018 – Moderate • New source (Anure) WFD status 2013-2018 – Good
<p>SAA-141 0600SC0007 Arranmore Island</p>	<p>-1</p>	<p>Increase existing SW abstraction from Lough Shore. Involves rebuilding dam structure to increase operational lake storage volume</p> <ul style="list-style-type: none"> • Arranmore Island WRZ in deficit so increase existing SW abstraction to meet WRZ future deficit • Arranmore Island WRZ current WAFU DYCP 2044 = 0.356ML/d, DYCP 2044 demand = 0.608ML/d so additional 0.252ML/d required to meet WRZ deficit • Existing SW abstraction maintained • Existing source (Shore LWB) WFD status 2013-2018 – Unassigned
<p>SAA-273</p>	<p>-2</p>	<p>Increase existing SW abstraction from Lough Aderry</p> <ul style="list-style-type: none"> • Killybegs WRZ in projected surplus so WTP upgrade works only

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
<p>(Part of Grouped Option SAA-567) 0600SC0009 Killybegs</p>		<ul style="list-style-type: none"> • Killybegs WRZ current WAFU DYCP 2044 = 6.233MI/d, DYCP 2044 demand = 4.623MI/d so surplus of 1.610MI/d • Existing SW abstraction maintained • Aderry Reservoir WFD status 2013-2018 – Unassigned • Dirkmere Lough WFD status 2013-2018 – Unassigned
<p>SAA-193 (Part of Grouped Option SAA-542) 0600SC0010 Donegal (River Eske)</p>	-2	<p>Interconnect Donegal (River Eske) WRZ with new Ballyshannon WTP at Knaddar on River Erne/ESB Dam-Kathleen Falls and supply deficit</p> <ul style="list-style-type: none"> • Donegal (River Eske) WRZ in deficit so interconnect with Ballyshannon & Bundoran WRZ to meet WRZ future deficit • Donegal (River Eske) WRZ current WAFU DYCP 2044 = 2.750MI/d, DYCP 2044 demand = 4.899MI/d so additional 2.149MI/d required to meet WRZ deficit • Existing SW abstraction maintained. Existing source (Eske RWB) WFD status 2013-2018 – Good • New SW source (Assaroe LWB) WFD status 2013-2018 unassigned
<p>SAA-261 (Part of Grouped Option SAA-566) 0600SC0012 Culdaff</p>	-3	<p>Rationalise Culdaff to new sources developed near Letterkenny</p> <ul style="list-style-type: none"> • Culdaff WRZ in deficit so rationalise to Letterkenny, Inishown East & Pollan Dam WRZ to meet WRZ future full demand • Culdaff WRZ current WAFU DYCP 2044 = 0.458MI/d, DYCP 2044 demand = 0.994MI/d so additional 0.535MI/d required to meet WRZ deficit • Existing GW abstraction to be abandoned • New sources: (Glen LWB - WFD status 2013-2018 – ‘Good’ and ‘Not at Risk’) (Gartan LWB – WFD status 2013-2018 – ‘Good’ and ‘At Risk’)
<p>SAA-274 (Part of Grouped Option SAA-567) 0600SC0013 Owenteskiny</p>	-2	<p>Interconnect Owenteskiny and Killybegs to meet deficit from Lough Aderry</p> <ul style="list-style-type: none"> • Owenteskiny WRZ in deficit so interconnect Owenteskiny WRZ to Killybegs WRZ • Owenteskiny WRZ current WAFU DYCP 2044 = 1.494MI/d, DYCP 2044 demand = 3.878MI/d so additional 2.384MI/d required to meet WRZ deficit • Existing SW abstraction maintained • Aderry Reservoir WFD status 2013-2018 – Unassigned • Dirkmere Lough WFD status 2013-2018 – Unassigned

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
<p>SAA-111a 0600SC0026 Gortahork-Falcarragh</p>	-2	<p>New SW abstraction from Lough Altan and new WTP</p> <ul style="list-style-type: none"> • Gortahork-Falcarragh WRZ in deficit so new SW abstraction to meet WRZ future deficit • Gortahork-Falcarragh WRZ current WAFU DYCP 2044 = 2.090MI/d, DYCP 2044 demand = 2.836MI/d so additional 0.746MI/d required to meet WRZ deficit • Existing SW abstraction maintained. Existing source (Lagha LWB) WFD status 2013-2018 – Unassigned • New source (Altan LWB) WFD status 2013-2018 – ‘High’ and ‘Not at Risk’
<p>SAA-026a (Part of Grouped Option SAA-542) 0600SC0028 Lough Mourne</p>	-2	<p>Interconnect Lough Mourne with new WTP at Knaddar, Ballyshannon on River Erne/Kathleen Falls (ESB) and supply deficit</p> <ul style="list-style-type: none"> • Lough Mourne WRZ in deficit so interconnect with Ballyshannon & Bundoran WRZ to meet WRZ future deficit • Lough Mourne WRZ current WAFU DYCP 2044 = 6.689MI/d, DYCP 2044 demand = 12.191MI/d so additional 5.503MI/d required to meet WRZ deficit • Existing SW abstraction maintained • Existing source (Mourne DL) WFD status 2013-2018 – Good • New SW source (Assaroe LWB) WFD status 2013-2018 unassigned
<p>SAA-266 (Part of Grouped Option SAA-566) 0600SC0029 Letterkenny & Inishowen East & Pollan Dam</p>	-3	<p>Develop Pollan Dam, Glen Lough and Gartan Lough for Letterkenny & Inishowen East & Pollan Dam WRZ and surrounding WRZ</p> <ul style="list-style-type: none"> • Letterkenny & Inishowen East & Pollan Dam WRZ in deficit so increase existing SW abstraction and new SW abstractions to meet WRZ future deficit • Letterkenny & Inishowen East & Pollan Dam WRZ current WAFU DYCP 2044 = 19.446MI/d, DYCP 2044 demand = 36.742MI/d so additional 17.296MI/d required to meet WRZ deficit. • Existing SW and GW abstractions maintained • Existing sources: (Pollan Dam) WFD status 2013-2018 – Good and (Fad Meendoran Lake WB) WFD status 2013-2018 – Good • New sources: (Glen LWB - WFD status 2013-2018 – ‘Good’ and ‘Not at Risk’) (Gartan LWB – WFD status 2013-2018 – ‘Good and ‘At Risk’)
<p>SAA-191</p>	-2	<p>New Ballyshannon WTP at Knaddar on River Erne/ESB Dam-Kathleen Falls and supply deficit</p> <ul style="list-style-type: none"> • Ballyshannon & Bundoran WRZ so new abstraction to meet WRZ future deficit

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
<p>(Part of Grouped Option SAA-542) 0600SC0030 Ballyshannon & Bundoran</p>		<ul style="list-style-type: none"> Ballyshannon & Bundoran WRZ current WAFU DYCP 2044 = 5.271MI/d, DYCP 2044 demand = 7.121MI/d so additional 1.850MI/d required to meet WRZ deficit Existing SW and GW abstraction maintained Existing sources: (Gorman LWB) WFD status 2013-2018 – Good (Ballyshannon GWB) WFD status 2013-2018 – Good, (Unshin LWB) WFD status 2013-2018 – Good, (Melvin LWB) WFD status 2013-2018 – Moderate New source (Assaroe LRB) WFD status 2013-2018 – Unassigned
<p>SAA-272 (Part of Grouped Option SAA-567) 0600SC0035 Glenties-Ardara</p>	-2	<p>Split WRZ and supply part of the WRZ from Killybegs and another part from Lettermaccaward and decommission existing source</p> <ul style="list-style-type: none"> Glenties-Ardara WRZ in deficit so split WRZ and supply part of Glenties-Ardara WRZ from Killybegs and Lettermacaward WRZs Glenties-Ardara WRZ current WAFU DYCP 2044 = 1.283MI/d, DYCP 2044 demand = 2.557MI/d so additional 1.273MI/d required to meet WRZ deficit Existing SW abstraction maintained Aderry Reservoir WFD status 2013-2018 – Unassigned Dirkmore Lough WFD status 2013-2018 – Unassigned
<p>SAA-192 (Part of Grouped Option SAA-542) 0600SC0036 Frosses-Inver</p>	-2	<p>Interconnect Frosses-Inver WRZ with new Ballyshannon WTP at Knaddar on River Erne/ESB Dam-Kathleen Falls and supply deficit</p> <ul style="list-style-type: none"> Frosses-Inver WRZ in deficit so interconnect with Ballyshannon & Bundoran WRZ to meet WRZ future deficit Frosses-Inver WRZ current WAFU DYCP 2044 = 2.930MI/d, DYCP 2044 demand = 1.550MI/d so additional 1.380MI/d required to meet WRZ deficit Existing SW abstraction maintained Existing sources: (Glencoagh LWB) WFD status 2013-2018 – Unassigned and (St Peter's LWB) WFD status 2013-2018 – Unassigned New SW source (Assaroe LWB) WFD status 2013-2018 unassigned

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
<p>SAA-271 (Part of Grouped Option SAA-567) 0600SC0038 Lettermacaward</p>	-2	<p>Increase existing SW abstraction from Lough Derkmore impoundment. Involves significant project to raise dam</p> <ul style="list-style-type: none"> • Lettermacaward WRZ in deficit so increase existing SW abstraction to meet WRZ future deficit • Lettermacaward WRZ current WAFU DYCP 2044 = 1.1MI/d, DYCP 2044 demand = 2.612MI/d so additional 1.512MI/d required to meet WRZ deficit • Existing SW abstraction maintained • Aderry Reservoir WFD status 2013-2018 – Unassigned • Dirkmore Lough WFD status 2013-2018 – Unassigned
<p>SAA-268 (Part of Grouped Option SAA-566) 0600SC0039 Creelough Dunfanaghy</p>	-3	<p>Rationalise Creelough Dunfanaghy to new sources developed near Letterkenny</p> <ul style="list-style-type: none"> • Creelough Dunfanaghy WRZ in deficit so rationalise to Letterkenny, Inishown East & Pollan Dam WRZ to meet WRZ future full demand • Creelough Dunfanaghy WRZ current WAFU DYCP 2044 = 0.889MI/d, DYCP 2044 demand = 2.973MI/d so additional 2.084MI/d required to meet WRZ deficit • Existing SW abstraction to be abandoned • New sources: (Glen LWB - WFD status 2013-2018 – ‘Good’ and ‘Not at Risk’) (Gartan LWB – WFD status 2013-2018 – ‘Good and ‘At Risk’)
<p>SAA-267 (Part of Grouped Option SAA-566) 0600SC0043 Carrigart-Downings & Cranford</p>	-3	<p>Rationalise Carrigart-Downings & Cranford to new sources developed near Letterkenny</p> <ul style="list-style-type: none"> • Carrigart-Downings & Cranford WRZ in deficit so rationalise to Letterkenny, Inishown East & Pollan Dam WRZ to meet WRZ future full demand • Carrigart-Downings & Cranford WRZ current WAFU DYCP 2044 = 1.351MI/d, DYCP 2044 demand = 1.818MI/d so additional 0.467MI/d required to meet WRZ deficit • Existing SW abstractions to be abandoned • New sources: (Glen LWB - WFD status 2013-2018 – ‘Good’ and ‘Not at Risk’) (Gartan LWB – WFD status 2013-2018 – ‘Good and ‘At Risk’)
<p>SAA-263 (Part of Grouped Option SAA-566) 0600SC0045</p>	-3	<p>Rationalise Buncrana to new sources developed near Letterkenny</p> <ul style="list-style-type: none"> • Buncrana WRZ in deficit so rationalise to Letterkenny, Inishown East & Pollan Dam WRZ to meet WRZ future full demand • Buncrana WRZ current WAFU DYCP 2044 = 0.259MI/d, DYCP 2044 demand = 1.749MI/d so additional 1.490MI/d required to meet WRZ deficit • Existing SW abstraction to be abandoned

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
Buncrana		<ul style="list-style-type: none"> New sources: (Glen LWB - WFD status 2013-2018 – ‘Good’ and ‘Not at Risk’) (Gartan LWB – WFD status 2013-2018 – ‘Good and ‘At Risk’)
SAA-269 (Part of Grouped Option SAA-566) 0600SC0046 Fanad West	-3	Rationalise Fanad West to new sources developed near Letterkenny <ul style="list-style-type: none"> Fanad West WRZ in deficit so rationalise to Letterkenny, Inishown East & Pollan Dam WRZ to meet WRZ future full demand Fanad West WRZ current WAFU DYCP 2044 = 0.251MI/d, DYCP 2044 demand = 0.857MI/d so additional 0.606MI/d required to meet WRZ deficit Existing SW abstraction to be abandoned New sources: (Glen LWB - WFD status 2013-2018 – ‘Good’ and ‘Not at Risk’) (Gartan LWB – WFD status 2013-2018 – ‘Good and ‘At Risk’)
SAA-270 (Part of Grouped Option SAA-566) 0600SC0047 Fanad East	-3	Rationalise Fanad East to new sources developed near Letterkenny <ul style="list-style-type: none"> Fanad East WRZ in deficit so rationalise to Letterkenny, Inishown East & Pollan Dam WRZ to meet WRZ future full demand Fanad East WRZ current WAFU DYCP 2044 = 0.194MI/d, DYCP 2044 demand = 1.121MI/d so additional 0.926MI/d required to meet WRZ deficit Existing SW abstraction to be abandoned New sources: (Glen LWB - WFD status 2013-2018 – ‘Good’ and ‘Not at Risk’) (Gartan LWB – WFD status 2013-2018 – ‘Good and ‘At Risk’)
SAA-217 0600PRI3077 Alt Raws	-1	Rationalise Alt Raws to Lough Mourne WRZ <ul style="list-style-type: none"> Alt Raws is to be rationalised to Lough Mourne WRZ Alt Raws WRZ current WAFU DYCP 2044 = 0MI/d, DYCP 2044 demand = 0.17MI/d so additional 0.17MI/d required to meet WRZ full demand Existing import from Northern Ireland to be abandoned New SW source (Assaroe LWB) WFD status 2013-2018 unassigned
SAA-218 0600PRI3078 Meeneragh/ Cronalaghey	-1	Rationalise Meeneragh to Lough Mourne WRZ <ul style="list-style-type: none"> Meeneragh is to be rationalised to Lough Mourne WRZ Meeneragh/ Cronalaghey WRZ current WAFU DYCP 2044 = 0MI/d, DYCP 2044 demand = 0.02MI/d so additional 0.02MI/d required to meet WRZ demand Existing import from Northern Ireland to be abandoned

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
		<ul style="list-style-type: none"> <li>New SW source (Assaroe LWB) WFD status 2013-2018 unassigned

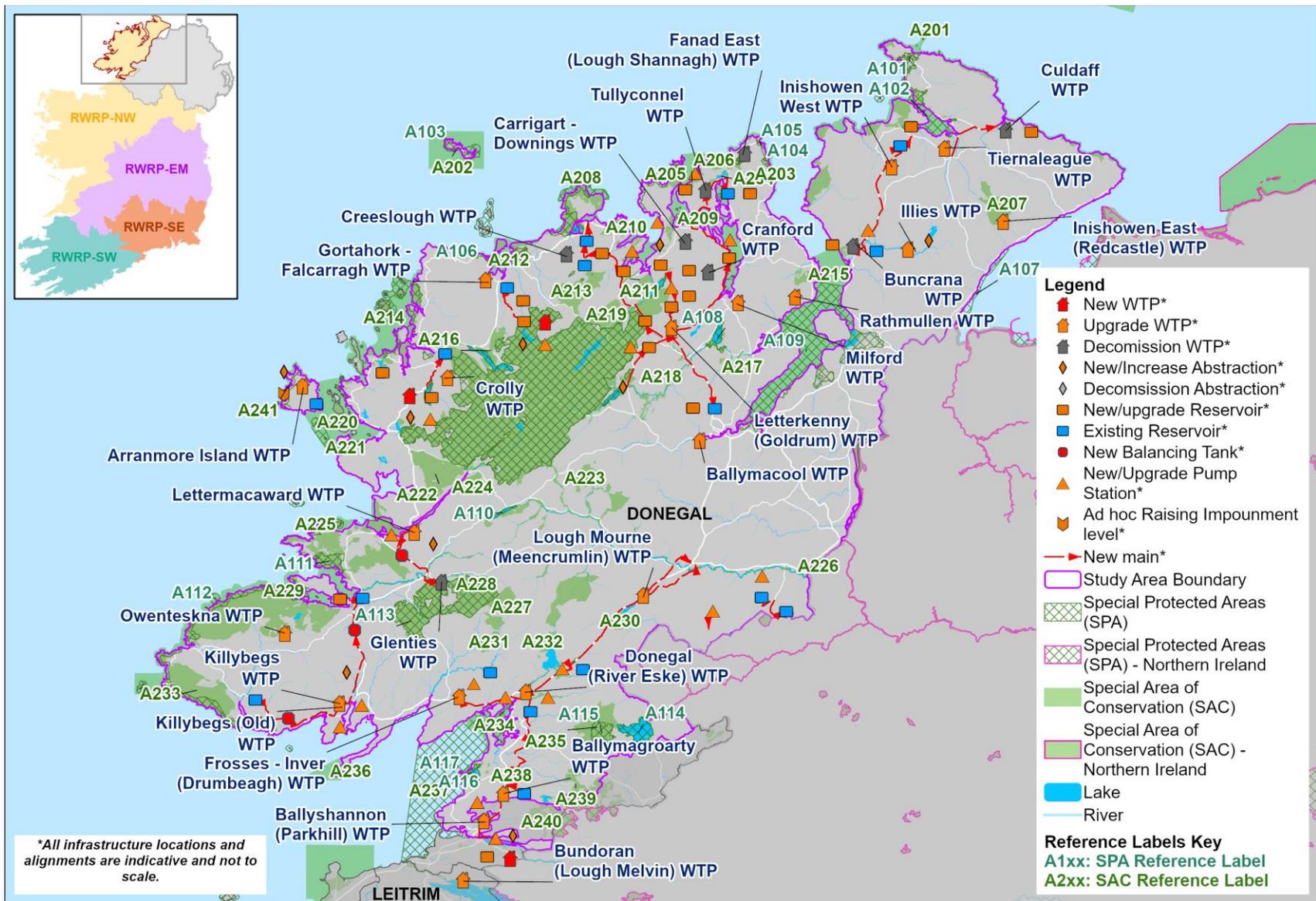


Figure 4.3 - Study Area A – Preferred Approach and European sites within SAA boundary. See Table 4.4 for list of SACs and SPAs referenced on figure

Table 4.4 – SACs and SPAs referenced in SAA Preferred Approach figure (Figure 4.3)

Index Code	SAC/SPA Name
A101	Malin Head SPA
A102	Trawbreaga Bay SPA
A103	Tory Island SPA
A104	Fanad Head SPA
A105	Horn Head to Fanad Head SPA
A106	Falcarragh to Meenlaragh SPA
A107	Lough Foyle SPA
A108	Lough Fern SPA
A109	Lough Swilly SPA
A110	Derryveagh And Glendowan Mountains SPA
A111	Sheskinmore Lough SPA
A112	West Donegal Coast SPA
A113	Lough Nillan Bog SPA
A114	Lough Derg (Donegal) SPA
A115	Pettigo Plateau Nature Reserve SPA
A116	Durnesh Lough SPA
A117	Donegal Bay SPA
A201	North Inishowen Coast SAC
A202	Tory Island Coast SAC
A203	Ballyhoorisky Point To Fanad Head SAC
A204	Kindrum Lough SAC
A205	Tranarossan And Melmore Lough SAC
A206	Lough Nagreany Dunes SAC
A207	Magheradrumman Bog SAC
A208	Horn Head And Rinclevan SAC
A209	Mulroy Bay SAC

A210	Sessiagh Lough SAC
A211	Sheephaven SAC
A212	Ballyness Bay SAC
A213	Muckish Mountain SAC
A214	Gweedore Bay And Islands SAC
A215	Lough Swilly SAC
A216	Fawnboy Bog/Lough Nacung SAC
A217	Ballyarr Wood SAC
A218	Leannan River SAC
A219	Cloghernagore Bog And Glenveagh National Park SAC
A220	Rutland Island And Sound SAC
A221	Termon Strand SAC
A222	Gannivegil Bog SAC
A223	Meentygrannagh Bog SAC
A224	Coolvoy Bog SAC
A225	West Of Ardara/Maas Road SAC
A226	River Finn SAC
A227	Meenaguse Scragh SAC
A228	Lough Nillan Bog (Carrickatlieve) SAC
A229	Slieve Tooley/Tormore Island/Loughros Beg Bay SAC
A230	Croaghonagh Bog SAC
A231	Meenaguse/Ardbane Bog SAC
A232	Lough Eske and Ardamona Wood SAC
A233	Slieve League SAC
A234	Donegal Bay (Murvagh) SAC
A235	Dunragh Loughs/Pettigo Plateau SAC
A236	St. John's Point SAC
A237	Durnesh Lough SAC

A238	Ballintra SAC
A239	Tamur Bog SAC
A240	Lough Golagh And Breesy Hill SAC
A241	Aran Island (Donegal) Cliffs SAC

4.3 Overview of Study Area B – Cavan and Monaghan

The location of Study Area B (SAB) in relation to the NW region is shown in Figure 4.1 above. The Study Area stretches across parts of County Cavan, Donegal, Leitrim, Longford, Monaghan, and Sligo as it extends along an area of the border region with Northern Ireland. The total area of SAB is approximately 2,788 km² and it lies within the counties of Cavan, Monaghan, Leitrim, Longford, Donegal and Sligo. The principal settlement (with a population of over 10,000) within SAB is Cavan (Central Statistics Office, 2016).

There are thirteen SACs and four SPAs within the SAB boundary as shown in Table 4.5. European sites within SAB where there is potential for LSE are discussed further in Section 6.2.2.

Table 4.5 - Number of European Sites within the SAB boundary

Study Area	No. of SACs	No. of SPAs
B (Cavan and Monaghan)	13	4

4.3.1 Existing Water Supplies

SAB consists of 23 WRZs supplying a population of approximately 58,272 people via approximately 1,205km of distribution network. Most of the study area has been delineated to be within the large cross-border River Erne catchment basin. The town of Cavan is the largest demand centre, with other notable towns including Monaghan, Castleblayney, Ballybay and Ballyjamesduff. The sources of water supply consist of twelve surface water abstractions and nine groundwater abstractions. The Study Area is summarised in Figure 4.4 below.

Regarding surface water availability in SAB, most of the study area is within the large cross-border River Erne catchment, with a small area in the northeast around Monaghan being within the other large cross-border catchment of Lough Neagh and Lower Bann. The Erne catchment covers an area of 4,415km², with 2,515km² of which is located in the Republic of Ireland. The Erne rises in the south of County Cavan, flowing through Lough Gowna and Lough Oughter, entering Upper Lough Erne as it crosses into Northern Ireland, before flowing back into the Republic of Ireland and out to sea at Ballyshannon, County Donegal. The Erne catchment is dominated by a glacial drumlin landscape characterised by poorly drained low, steep-sided hills and a pattern of sinuous river tributaries and an abundance of shallow lake sources.

SAB has a group of designated area sites including thirteen SACs with notable areas including the Lough Oughter and Associated SAC and the Cuilcagh - Anierin Uplands SAC. There are no waterbodies

designated for freshwater pearl mussel SAC catchments but there are some sections of the Erne catchment with WFD High Status Objectives.

Over two thirds of the water supplies for Study Area B come from surface water sources with the majority being from relatively small lake sources within the Erne catchment. The largest abstraction in SAB is the Lough Bawn source in the east of the study area which feeds the Kilkitt WTP to supply up to 8.4MI/d to the Ballybay (Lough Egish) WRZ. The second largest abstraction is the Lough Acanon Dam source, which feeds Knockataggart WTP to supply up to 5.4MI/d to the Cavan Regional Water Supply Scheme (RWSS) WRZ. Lough Acanon is an impounding reservoir source in the Laragh River sub-catchment, constructed from the damming and raising of a natural lough to increase the yield available. Other notable surface water abstractions include the Nadrageel Lough source, which feeds Lismean WTP to supply up to 5.2MI/d to the Ballyjamesduff RWSS WRZ, and the Lough Gowna source, which feeds Smear WTP to supply up to 2MI/d to the Gowna WRZ, both in the south of the study area. The single direct river abstraction in SAB is from the main channel of the River Erne to feed Belturbet WTP to supply up to 1MI/d to the Belturbet Public Water Supply (PWS) WRZ in the centre of the study area.

Overall, 15 groundwater sources are managed by Irish Water in the region. The predominant aquifer type of the area is made up of poorly productive bedrock (55%), followed by productive fissured (15%) and karstic (8%) aquifers. There are no sand and gravel aquifers mapped in the area.

The majority of the bedrock in Study Area B is classified as poorly productive and will not offer the same kind of groundwater potential as the productive fissured and karstic rocks seen elsewhere. Groundwater flow in the lesser productive Dinantian Shales and Limestones circulates primarily through fissures as these rocks do not show significant intergranular permeability. These rocks occur primarily in counties Monaghan and Cavan, and are predominantly interbedded shales and limestones, with little or no sandstone content. Development will usually be possible in local zones (i.e., along faults, fractures and zones of clean limestone). Ordovician rocks primarily consisting of greywacke sandstones and slaty mudstones, shales and quartzites and Silurian Metasediments and Volcanics dominate the east of the Study Area. Although fractured the Ordovician and Silurian generally have a low permeability and are mostly regarded as a poor aquifer. Such rocks will often yield enough water to a well to supply a house or small farm (0.2-0.5 l/s) and occasionally in major fracture zones may yield a good deal more. However, since the yield often depends on the permeability developed in the uppermost few metres of broken and weathered rock, yields will often decrease markedly in dry spells as the water table falls, and these supplies may therefore be unreliable.

Groundwater flow in the productive fissured aquifers largely takes place along fractures and faults. The majority of the region's abstractions take place from this setting. Dinantian (early) Sandstones, Shales and Limestones Group comprises a mixture of siltstones, sandstones, mudstones, shales and limestones. Overall, the interbedding will tend to limit vertical permeabilities and groundwater flow systems will be rather localised. Permeability is generally low but may be higher in the sandstone and limestone beds, and substantially higher in certain areas. Where extensive faulting occurs, such as at Clones, the aquifer permeability is likely to be increased. Additional fracturing may also be associated with the faulting. Where clean limestones are present, dissolution may occur along faults, fractures and bedding planes, widening them and enhancing the permeability. The Clones Scheme currently supplies circa 0.6MI/d. The wellfield at Monaghan records some large inflows from dolomitised limestone interbeds, found in the lower portions of the Bundoran Shale. Similarly, faulting between the Dartry Limestone and shales results in the high yields seen at PW5. Previous reports suggest all ten boreholes, if brought online, could provide upwards of 5.7MI/d.

The karst forms a key regionally important aquifer in some areas. The pure bedded limestones make up a relatively minor proportion of the bedrock here and are most prominent in northwest Cavan. A number of relatively high yielding wells (Ballyconnell Lough PWS at circa 0.89MI/d and Bawnboy PWS at circa 0.23MI/d) occur in this setting while others appear as spring overflows (Kinlough Tullaghan), which serve as points of groundwater discharge. Locating high yielding wells in Regionally Important Karstified Bedrock type aquifers can be difficult due to the uneven distribution of permeability; failed and high yielding wells can occur close together. Both point and diffuse recharge occur. Diffuse recharge occurs via rainfall percolating through permeable subsoil and rock outcrops. Despite the presence of peat and till, point recharge to the underlying aquifer occurs by means of swallow holes and collapse features/dolines.

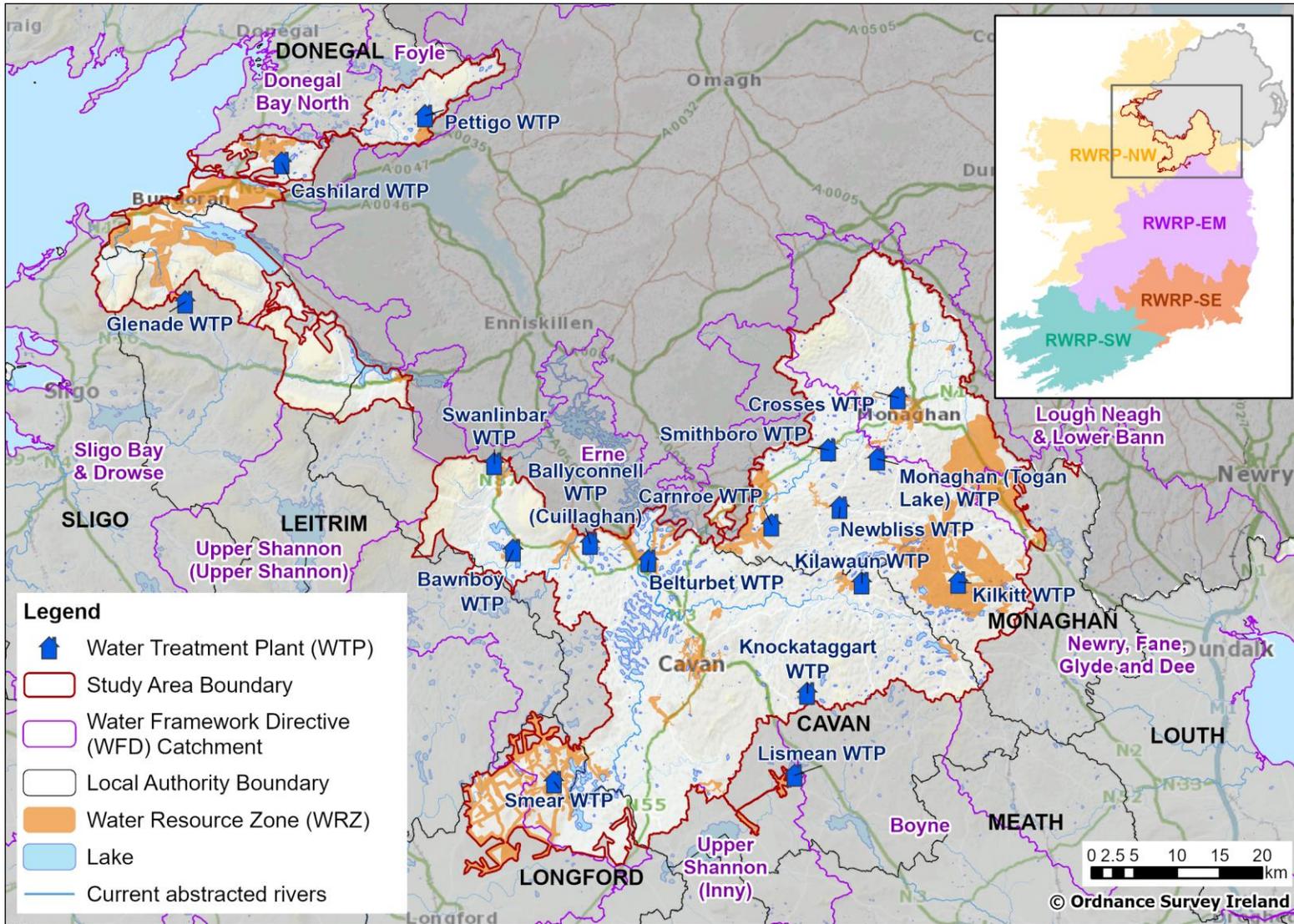


Figure 4.4 - Study Area B Cavan and Monaghan Summary

4.3.2 SAB Options Removed at Coarse Screening

The options detailed in Table 4.6 below were removed at Coarse Screening on environmental grounds.

Table 4.6 - SAB – Options removed at Coarse Screening on environmental grounds

Option Reference	Option Description	Rejection Reasoning
SAB-002	Increase existing SW abstraction from Lough Acanon Dam. Raise the dam and supply deficit to Cavan, upgrade Knockataggart WTP.	SAB-001, to increase abstraction, is a better option. The reservoir has suitable yield, therefore there is no need to raise dam to increase storage/yield available. Proposed abstraction is above allowable abstraction estimate, based on inflows.
SAB-003	Increase existing SW abstraction from Lough Acanon Dam. Raise the dam and supply deficit to Cavan. Interconnect with Belturbit.	Proposed abstraction is above allowable abstraction estimate, based on inflows.
SAB-009	Interconnect Cavan WRZ and Annagh GWS and supply deficit from GWS, upgrade Knockataggart WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAB-033	Interconnect Ballyconnell WRZ and Kildallan GWS and supply deficit from GWS.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAB-058	Increase existing SW abstraction from Lough Coragh and upgrade Kilawaun WTP to supply deficit at Cootehill PWS WRZ.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAB-064	Interconnect Cootehill WRZ and Drumgole GWS and supply deficit from GWS.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAB-065	Interconnect Cootehill WRZ and Barraghy GWS and supply deficit from GWS.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAB-066	Interconnect Cootehill WRZ and Kill GWS and supply deficit from GWS.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAB-067	Keep supplying Ballyhaise WRZ from Annagh GWS.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAB-087	Increase existing SW abstraction from Corconnelly lake, upgrade Carnroe WTP and supply deficit at Clones WRZ.	The desktop assessment undertaken indicates that there is no scope to increase the abstraction from the small lake to meet demand.
SAB-088	Recommission Carnroe Lake (manmade reservoir at the WTP) Skerrick Lake abstractions.	The desktop assessment undertaken indicates that there is no scope to increase the abstraction from the small lake to meet demand.

SAB-103	Interconnect Smithboro WRZ and Aughnashalvey GWS and supply deficit from GWS.	The desktop assessment undertaken indicates that there is no scope to increase the abstraction from the small lake source to meet demand.
SAB-116	Interconnect Emyvale WRZ and Truagh GWS and supply deficit from GWS.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAB-117	Interconnect Emyvale WRZ and Tydavnet GWS and supply deficit from GWS.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAB-139	Interconnect Gowna WRZ and Garty Lough GWS and supply deficit from GWS.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAB-148	Increase existing SW abstraction from Lough Unshin (Ballyshannon (Parkhill) WTP).	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAB-149	Increase existing SW abstraction from Lough Unshin (Ballyshannon (Parkhill) WTP).	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAB-150	Increase existing SW abstraction from Lough Unshin (Ballyshannon (Parkhill) WTP).	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAB-151	Increase existing SW abstraction from Lough Unshin (Ballyshannon (Parkhill) WTP).	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAB-168	Rationalise Cashilard to Ballyshannon WSZ.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAB-171	Split Cashilard and rationalise part to Ballyshannon supply and part to Ballymagroarty WRZs.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAB-181	Rationalise Pettigo Pub to Ballyshannon WRZ (Lough Unshin source).	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAB-184	Rationalise Derrykillew to Ballyshannon WRZ (Lough Unshin source).	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.

4.3.3 Preferred Approach for SAB

Full details of the Preferred Approach (and how it was reached) are included in the SAB Technical Report in Appendix 2 of the draft RWRP-NW. The findings of the Preferred Approach Development for SAB Cavan and Monaghan include the following:

- Eight options score a 0 in relation to potential impact on a designated European Site.
- There are no -3 scores against designated European sites within the Preferred Approach.
- The remaining options within the Preferred Approach have either a -1 or a -2 score against European sites.

In summary, the Preferred Approach for SAB is the Combination 5 approach which consists of local WRZs solutions for Cootehill PWS, Shercock PWS (GWS Import), Blacklion PWS (GWS Import), Clones, Newbliss, Smithboro, Lough Egish, Kinlough Tullaghan and Pettigo Pub WRZs. The Preferred Approach for the remaining Water Resource Zones involve transfers from a number of existing surface water abstractions in the study area. It is proposed to rationalise Gowna (GWS Import) to Gowna WRZ.

Delivery of the Preferred Approach will secure all of the supplies in the area in terms of Quality, Quantity, Sustainability and Resilience. The Preferred Approach for SAB Cavan and Monaghan also includes for demand side (**Lose Less** and **Use Less**) measures, including:

- Ongoing leakage management including active leakage control, pressure management and find and fix activities to offset Natural Rate of Leakage Rise (NRR).
- Continuation of Irish Water household and business water conservation campaigns, initiatives and education programmes.
- The option to implement legally enforceable Water Conservation Orders in drought periods in order to protect the environment and our public water supplies.

All of the options that make up the Preferred Approach and assessed as part of the NIS are shown in Table 4.7 and shown in Figure 4.5 below.

Table 4.7 - Final Preferred Approach for SAB – Options

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
<p>SAB-203 (Part of Grouped Option SAB-553) 0200SC0014 Cavan RWSS</p>	<p>-1</p>	<p>Interconnect Cavan and Ballyjamesduff WRZs. Supply spare capacity from Ballyjamesduff RWSS to Cavan RWSS</p> <ul style="list-style-type: none"> • Cavan RWSS in deficit so interconnect with Ballyjamesduff RWSS • Cavan RWSS – Current WAFU DYCP 2044 = 4.95MI/d, DYCP 2044 demand = 5.804MI/d so additional 0.854MI/d required to meet WRZ deficit • Existing SW abstraction maintained • Existing source (Lough Nadrageel LWB) WFD status 2013-2018 – ‘Moderate’ and ‘At Risk’
<p>SAB-024 (Part of Grouped Option SAB-538) 0200SC0016 Belturbet PWS</p>	<p>-2</p>	<p>Rationalise Belturbet WRZ, Swanlinbar and Bawnboy to Ballyconnell WRZ and create a new regional scheme</p> <ul style="list-style-type: none"> • Belturbet PWS in deficit so rationalise to Ballyconnell • Belturbet PWS – Current WAFU DYCP 2044 = 0.917MI/d, DYCP 2044 demand = 0.815MI/d so additional 0.102MI/d required to meet WRZ deficit • Existing GW abstraction maintained • Existing source (Newtown-Ballyconnell WB) WFD status 2013-2018 – ‘Good’ and ‘Not at Risk’
<p>SAB-029 (Part of Grouped Option SAB-538) 0200SC0011 Ballyconnell PWS</p>	<p>-2</p>	<p>Increase GW abstraction (Newtown-Ballyconnell GWB (karstic)) from existing boreholes to supply deficit at Ballyconnell PWS</p> <ul style="list-style-type: none"> • Ballyconnell PWS not in deficit • Ballyconnell PWS – Current WAFU DYCP 2044 = 0.557MI/d, DYCP 2044 demand = 0.908MI/d so surplus of 0.351MI/d • Existing GW abstraction maintained • Existing source (Newtown-Ballyconnell WB) WFD status 2013-2018 – ‘Good’ and ‘Not at Risk’
<p>SAB-041 (Part of Grouped Option SAB-538) 0200SC0013 Bawnboy PWS</p>	<p>-2</p>	<p>Rationalise Belturbet WRZ, Swanlinbar and Bawnboy to Ballyconnell WRZ and create a new regional scheme</p> <ul style="list-style-type: none"> • Bawnboy PWS in deficit so rationalise to Ballyconnell • Bawnboy PWS – Current WAFU DYCP 2044 = 0.236MI/d, DYCP 2044 demand = 0.174MI/d so additional 0.061MI/d required to meet WRZ deficit • Existing GW abstraction maintained • Existing source (Newtown-Ballyconnell WB) WFD status 2013-2018 – ‘Good’ and ‘Not at Risk’

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
SAB-048 (Part of Grouped Option SAB-538) 0200SC0019 Swanlinbar PWS	-2	Rationalise Belturbet WRZ, Swanlinbar and Bawnboy to Ballyconnell WRZ and create a new regional scheme <ul style="list-style-type: none"> Swanlinbar PWS in deficit so rationalise to Ballyconnell Swanlinbar PWS – Current WAFU DYCP 2044 = 0.149MI/d, DYCP 2044 demand = 0.147MI/d so additional 1MI/d required to meet WRZ deficit Existing GW abstraction maintained Existing source (Newtown-Ballyconnell WB) WFD status 2013-2018 – ‘Good’ and ‘Not at Risk’
SAB-204 (Part of Grouped Option SAB-553) 0200SC0012 Ballyjamesduff RWSS	-1	Upgrade Lismean WTP for water quality improvements. Ballyjamesduff RWSS is not in deficit and supply spare capacity to Cavan RWSS <ul style="list-style-type: none"> Ballyjamesduff RWSS in surplus so supply to neighbouring WRZs Ballyjamesduff RWSS – Current WAFU DYCP 2044 = 4.73MI/d, DYCP 2044 demand = 3.425MI/d so surplus off 1.305MI/d Existing SW abstraction maintained Existing source (Lough Nadrageel LWB) WFD status 2013-2018 – ‘Moderate’ and ‘At Risk’
SAB-060 0200SC0017 Cootehill PWS	-1	New SW abstraction from River Drumore to supply deficit. Treat at the existing Kilawaun WTP <ul style="list-style-type: none"> Cootehill PWS in deficit so new surface water abstraction Cootehill PWS – Current WAFU DYCP 2044 = 0.647MI/d, DYCP 2044 demand = 0.888MI/d so additional 0.241MI/d required to meet WRZ deficit New SW abstraction New source (Dromore RWB) WFD status 2013-2018 – ‘Poor’ and ‘At Risk’
SAB-205 (Part of Grouped Option SAB-553) 0200SC0008 Ballyhaise PWS (GWS Import)	-1	Interconnect Ballyhaise and Ballyjamesduff WRZs. Supply spare capacity from Ballyjamesduff RWSS to Cavan RWSS <ul style="list-style-type: none"> Ballyhaise in deficit so interconnect with Ballyjamesduff RWSS GWS import so no demand data. Small demand requirement only Existing SW abstraction maintained Existing source (Lough Nadrageel LWB) WFD status 2013-2018 – ‘Moderate’ and ‘At Risk’
SAB-072 0200SC0006	0	Keep supplying Shercock WRZ from Dhuish GWS <ul style="list-style-type: none"> Shercock PWS in deficit so continue supplying from Dhuish GWS GWS import so no demand data. Small demand requirement only

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
Shercock PWS (GWS Import)		<ul style="list-style-type: none"> Continue SW Lake abstraction Existing source (Sillan LWB) WFD status 2013-2018 – ‘Poor’ and ‘At Risk’
SAB-081 0200SC0002 Blacklion PWS (GWS Import)	0	New GW abstraction to supply Blacklion WRZ <ul style="list-style-type: none"> Blacklion PWS in deficit so new GW abstraction in karstic region GWS import so no demand data. Small demand requirement only New GW abstraction New source (Marble Arch GWB) WFD status 2013-2018 – ‘Good’ and ‘Not at Risk’
SAB-085 (Part of Grouped Option SAB-524) 0200SC0004 Gowna (GWS Import)	-1	Rationalise Gowna (GWS Import) to Gowna WRZ <ul style="list-style-type: none"> Gowna (GWS) import so no demand data. Small demand requirements only Increase SW lake abstraction Existing source (Lough Gowna LWB) WFD status 2013-2018 – ‘Poor’ and ‘At Risk’
SAB-086 2400SC0003 Clones	-1	Increase GW abstraction from existing boreholes to supply deficit <ul style="list-style-type: none"> Clones WRZ in deficit so increase GW abstraction GWS import so no demand data. Small demand requirement only Clones – Current WAFU DYCP 2044 = 0.647MI/d, DYCP 2044 demand = 0.888MI/d so additional 0.241MI/d required to meet WRZ deficit Increase existing GW abstraction Existing source (Clones GWB) WFD status 2013-2018 – ‘Good’ and ‘Not at Risk’
SAB-189 2400SC0004 Newbliss	0	Upgrade Newbliss WTP for water quality improvements. Newbliss WRZ is not in deficit <ul style="list-style-type: none"> Upgrade works at existing WTP adjacent to Lough Feagh Newbliss – Current WAFU DYCP 2044 = 0.242MI/d, DYCP 2044 demand = 0.197MI/d so surplus of 0.045MI/d Existing source (Feagh LWB) WFD status 2013-2018 – ‘Unassigned’

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
SAB-104 2400SC0010 Smithboro	0	Interconnect Smithboro WRZ and Stranoodan GWS and supply deficit from GWS <ul style="list-style-type: none"> Smithboro in deficit so interconnect with Stranoodan GWS Smithboro – Current WAFU DYCP 2044 = 0.123MI/d, DYCP 2044 demand = 0.176MI/d so additional 0.053MI/d required to meet WRZ deficit Existing SW abstraction maintained Existing source (White Rockcorry LWB) WFD status 2013-2018 – ‘Poor’ and ‘At Risk’
SAB-211 (Part of Grouped Option SAB-555) 2400SC0011 Monaghan	0	Upgrade existing WTPs for water quality improvements. Monaghan WRZ is not in deficit <ul style="list-style-type: none"> Monaghan WRZ not in deficit. Upgrade existing WTP Monaghan current WAFU DYCP 2044 = 5.733MI/d, DYCP 2044 demand = 4.384MI/d so additional 1.349MI/d required to meet WRZ deficit Existing GW abstraction maintained Existing source (Monaghan GWS) WFD status 2013-2018 – ‘Good’ and ‘Not At Risk’
SAB-209 (Part of Grouped Option SAB-555) 2400SC0008 Emyvale (GWS Import)	0	Rationalise Emyvale to Monaghan WRZ <ul style="list-style-type: none"> Emyvale (GWS) import so no demand data. Emyvale in projected deficit circa 0.261MI/d Existing GW abstraction maintained Existing source (Monaghan GWS) WFD status 2013-2018 – ‘Good’ and ‘Not At Risk’
SAB-210 (Part of Grouped Option SAB-555) 2400SC0005 Glaslough (GWS Import)	0	Rationalise Glaslough to Monaghan WRZ <ul style="list-style-type: none"> Glaslough (GWS) import so no demand data. Glaslough in projected deficit circa 0.25MI/d Existing GW abstraction maintained Existing source (Monaghan GWS) WFD status 2013-2018 – ‘Good’ and ‘Not At Risk’
SAB-127 2400SC0002 Lough Egish	0	Upgrade Kilkitt WTP for water quality improvements <ul style="list-style-type: none"> Upgrade works at existing WTP Ballybay – Current WAFU DYCP 2044 = 7.7MI/d, DYCP 2044 demand = 5.814MI/d so surplus of 1.886MI/d required Continue abstraction at existing source (Bawn LWB) WFD status 2013-2018 – ‘Poor’ and ‘At Risk’

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
SAB-202 1700SC0004 Kinlough Tullaghan	-2	New SW abstraction from Glenade Lough and upgrade of existing Glenade WTP <ul style="list-style-type: none"> Kinlough/Tullaghan WRZ in deficit so new abstraction from Glenade Lake and upgrade WTP WRZ – Current WAFU DYCP 2044 = 0.576MI/d, DYCP 2044 demand = 1.547MI/d so additional 0.971MI/d required to meet WRZ deficit New SW abstraction New source (Glenade LWB) WFD status 2013-2018 – ‘Good’ and ‘Under Review’
SAB-135 (Part of Grouped Option SAB-524) 2000SC0004 Gowna	-1	Replace rising main connecting raw water pump station and WTP at Lough Gowna (Cornadrung Pump Station), namely flooding of pump station, lack of control (raw water pumps control flow through plant) and increase SW abstraction to supply deficit <ul style="list-style-type: none"> Gowna (GWS) import so no demand data. Small demand requirements only Increase SW abstraction to supply deficit Existing source (Lough Gowna LWB) WFD status 2013-2018 – ‘Poor’ and ‘At Risk’
SAB-170 (Part of Grouped Option SAB-549) 0600SC0041 Cashilard	0	Rationalise Cashilard to Ballymagoarty (part of Ballyshannon/Bundoran WRZ) <ul style="list-style-type: none"> Dependent on Preferred Approach for Ballyshannon/Bundoran WRZ (SAA-542) Cashilard WRZ – Current WAFU DYCP 2044 = 0.275MI/d, DYCP 2044 demand = 0.252MI/d so additional 0.023MI/d required to meet WRZ deficit New Assaroe SW abstraction to supply deficit New source (Assaroe HMWB) WFD status 2013-2018 – ‘Unassigned’ and ‘Review’
SAB-173 0600SC0011 Pettigo Pub	0	Increase GW abstraction from existing BHs to supply deficit at Pettigo Pub WRZ <ul style="list-style-type: none"> Pettigo Pub WRZ in deficit so increase GW abstraction GWS import so no demand data. Small demand requirement only Pettigo – Current WAFU DYCP 2044 = 0.147MI/d, DYCP 2044 demand = 0.222MI/d so additional 0.075MI/d required to meet WRZ deficit Increase existing GW abstraction Existing source (Ballyshannon East GWB) WFD status 2013-2018 – ‘Good’ and ‘Not at Risk’
SAB-185 (Part of Grouped Option SAB-535) N/A	-1	Rationalise Derrykillew to Ballyshannon WRZ (Assaroe lake source) <ul style="list-style-type: none"> Dependent on Preferred Approach for Ballyshannon/Bundoran WRZ (SAA) Derrykillew SDB N/A New Assaroe SW abstraction to supply deficit

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
Derrykillew		<ul style="list-style-type: none"> <li>New source (Assaroe HMWB) WFD status 2013-2018 – ‘Unassigned’ and ‘Review’

4.4 Overview of Study Area C – Mayo and Sligo

Note: Study Area C is referred to as SA-C in this report to differentiate between the Study Area and Special Areas of Conservation (SAC).

The location of Study Area C (SA-C) in relation to the NW region is shown in Figure 4.1 above. The Study Area extends across the northern half of County Mayo, including Achill Island and the Belmullet Peninsula, the whole of County Sligo and into the northern parts of County Leitrim. The total area of SA-C is approximately 5,147 km² and it lies within the counties of Mayo, Sligo, Leitrim, Cavan and Roscommon. The principal settlement (with a population of over 10,000) within SA-C are Sligo, Castlebar and Ballina (Central Statistics Office, 2016).

There are forty-four SACs and sixteen SPAs within the SA-C boundary as shown in Table 4.8. European sites within SA-C where there is potential for LSE are discussed further in Section 6.2.3.

Table 4.8 - Number of European Sites within the SA-C boundary

Study Area	No. of SACs	No. of SPAs
C (Mayo and Sligo)	44	16

4.4.1 Existing Water Supplies

SA-C consists of 17 WRZs supplying a population of approximately 96,788 people via approximately 3,119km of distribution network. SA-C is the third largest study area in the country. The town of Sligo is the largest demand centre, with other towns elsewhere including Ballina and Tobercurry. The sources of water supply consist of fourteen surface water abstractions and seven groundwater abstractions. The Study Area is summarised in Figure 4.6 below.

Regarding surface water availability in SA-C, the Study Area extends across three catchments: the Blacksod-Broadhaven in the west, the Moy & Killala Bay in the central areas, and the Sligo Bay & Drowse in the east. The Blacksod-Broadhaven catchment contains several small stream and river sub catchments draining some upland areas across the northern part of the Nephin Beg Mountain range and Achill Island, as well as the flat wide expanses of Atlantic bog landscape that makes up much of western County Mayo. The Moy & Killala Bay catchment consists of the larger River Moy system, which includes the large Lough Conn source in the west of the catchment as well as expanses of drumlin topography across the lowland areas of the catchment. The Sligo Bay & Drowse catchment consists of several smaller sub catchments including the Garavogue River system which flows through the Lough Gill source before Sligo Town and entering the sea at Sligo Harbour.

SA-C has a number of designated area sites including several water dependent SACs such as the River Moy SAC, Lough Gill SAC and Carrowmore Lake Complex SAC. There are no waterbodies designated for freshwater pearl mussel SAC catchments but there are several waterbodies across the study area with WFD High Status Objectives.

Around 90% of the water supplies for SA-C come from surface water sources, with the majority being from a few large lake abstractions. Around half of the total water supply to SA-C comes from two lake sources, with each supplying two separate WTPs. The Lough Gill source has an abstraction on the western bank feeding up to 13.2MI/d to Foxes Den WTP to supply Sligo Town & Environs WRZ, and another abstraction on the eastern side providing up to 6.6MI/d to Moneyduff WTP to supply North Leitrim RWS WRZ. The large Lough Conn source supplies Ballina WRZ via a single abstraction point on

the northern side which feeds up to 9.1MI/d to Lisglennon WTP and up to 4.55MI/d to Wherrew WTP. Other notable surface water abstractions within SA-C involve smaller lake sources including Lough Talt, Lough Easkey, Carramore Lough and the Kilsellagh Impounding Reservoir.

Overall, seven groundwater sources are managed by Irish Water in the region. The predominant aquifer type of the area is made up of poorly productive bedrock (59%), followed by karstic (30%), with a relatively minor contribution from productive fissured (5%) and sand and gravel (2%). The majority of the large abstractions occur as springs which emerge mainly from sand and gravel aquifers.

The karst forms a key regionally important aquifer in some areas. The pure bedded limestones in this area are flat lying and extensive and stretch from North Clare to Mayo. The majority of the larger abstractions occur in this setting and mainly appear as spring overflows, which serve as points of groundwater discharge. This can be seen at Swinford PWS, Killaturly GWS and Charlestown WSS, which abstract on average between 0.785 – 1.1MI/d, although the latter two are believed to also be fed from the local sand and gravel aquifer overlying the limestone bedrock. Limestone dissolution during karstification causes groundwater flow to concentrate along certain pathways/conduits, making it difficult to locate successful wells. The karstification present in the Northwestern Plateau (counties Sligo, Leitrim and Cavan) is similar to the Burren, but more dissected. Locating high yielding wells in Regionally Important Karstified Bedrock type aquifers can be difficult due to the uneven distribution of permeability; failed and high yielding wells can occur close together. Both point and diffuse recharge occur. Diffuse recharge occurs via rainfall percolating through permeable subsoil and rock outcrops. Despite the presence of peat and till, point recharge to the underlying aquifer occurs by means of swallow holes and collapse features/dolines.

Groundwater flow in the lesser productive Dinantian Shales and Limestones circulates primarily through fissures as these rocks do not show significant intergranular permeability. These rocks occur primarily in counties Sligo and Leitrim, and are predominantly interbedded shales and limestones, with little or no sandstone content. Development will usually be possible in local zones (i.e. along faults, fractures and zones of clean limestone). There are also large swathes of Dinantian (Lower Carboniferous) Impure Limestones and are interleaved with the Pure Bedded Limestones. The limestones are often characterised by the occurrence of chert and shale bands and are generally less productive than the Pure Bedded Limestones. Ceide Fields WSS abstracts from this type of bedrock which supplies < 0.05MI/d. Precambrian rocks consist mainly of gneisses, schists (pelites and psammites), quartzites, and marbles and can be found in northwest County Mayo and the Ox Mountains in County Sligo. The development potential of the Precambrian rocks is very limited. The marbles may contain some solutionally enhanced permeability zones which could provide a domestic or farm supply or small group scheme. Such rocks will often yield enough water to supply a house or small farm (0.2-0.5 l/s) and occasionally in major fracture zones may yield a good deal more. However, since the yield often depends on the permeability developed in the uppermost few metres of broken and weathered rock, yields will often decrease markedly in dry spells as the water table falls, and these supplies may therefore be unreliable. There are smaller representations of Dinantian Sandstones, where zones of higher permeability may be found nearer faults and in the upper weathered fractured zone of the top 10-30m. Yields are dependent on the nature and concentration of faults and fissures.

There are a number of locally important sand and gravel aquifers in the region, namely at Crossmolina, Foxford and Swinford-Charlestown. The Moy Sand and Gravel GWB acts as a discharge zone for the Killaturly springs and the Charlestown spring. The gravel body, although classified by the GSI as a 'Locally Important Sand and Gravel aquifer', is significant, and provides water to several supply schemes

in the region. The sand/gravel deposits, when overlying areas of bedrock aquifers, can improve the overall flow and storage to the aquifer and also protect against pollution. Crossmolina PWS supply (circa 0.9MI/d) is from a spring which issues local sand and gravel body, with the underlying bedrock not believed to add significant quantities of water to the source. Conversely, groundwater from the bedrock can feed into the gravel under certain conditions. This can be seen at Killaturly GWS, where groundwater in the limestone discharges into the overlying sand and gravel body, under inferred upward hydraulic gradients.

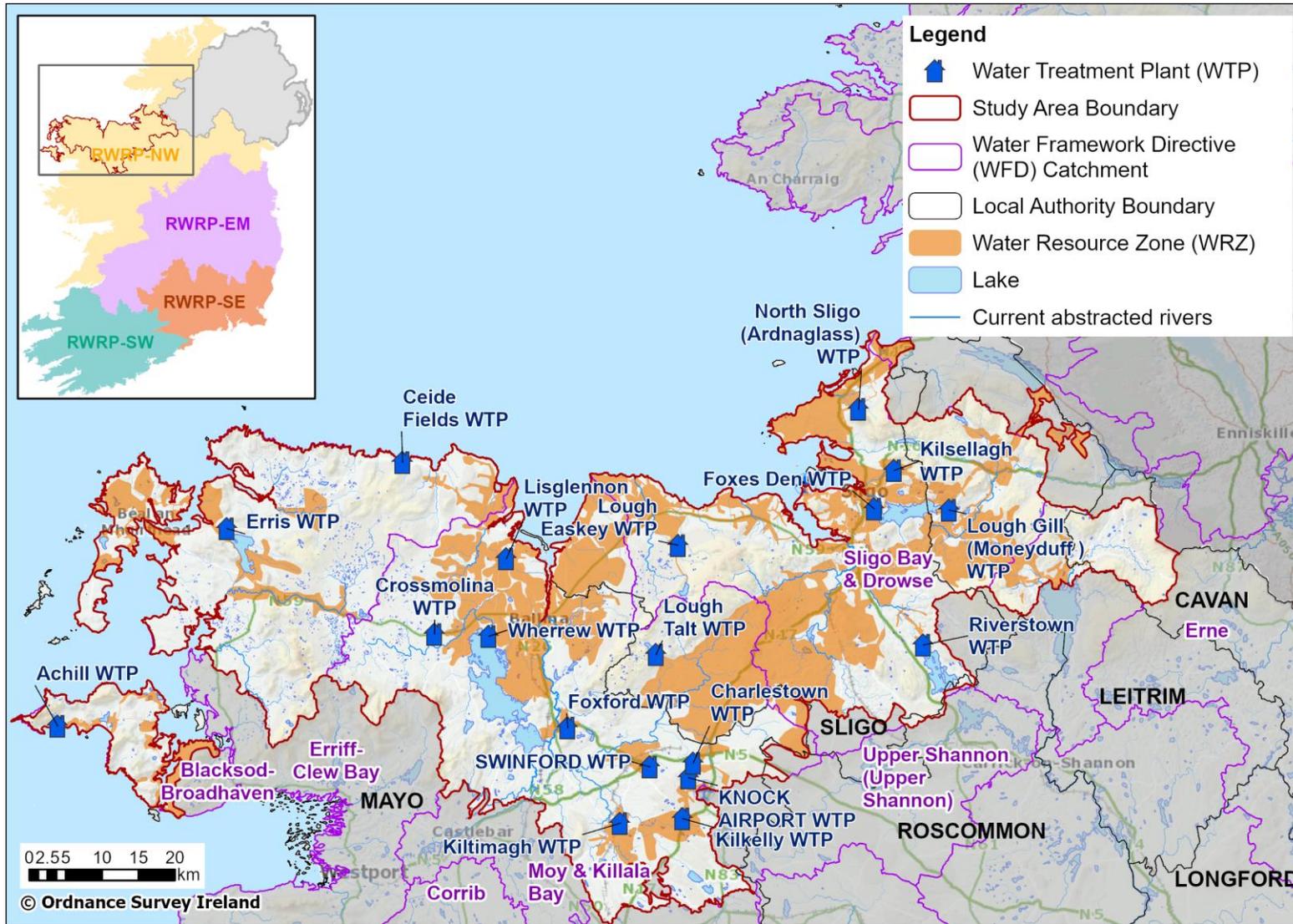


Figure 4.6 - Study Area C Mayo and Sligo Summary

4.4.2 SA-C Options Removed at Coarse Screening

The options detailed in Table 4.9 below were removed at Coarse Screening on environmental grounds.

Table 4.9 – SA-C – Options removed at Coarse Screening on environmental grounds

Option Reference	Option Description	Rejection Reasoning
SA-C-08	New SW abstraction at Lough Arrow and abandon Lough Talt source.	Lough Arrow is a WFD high status waterbody. Abstracting the volume of water required to make this a feasible option is likely to result in the waterbody not achieving high WFD status and also to result in a greater risk of having adverse effects on this European site.
SA-C-12	Part supply deficit from Lough Easkey.	Lough Easkey is a WFD high status waterbody. Abstracting the volume of water required to make this a feasible option is likely to result in the waterbody not achieving high WFD status and also to result in a greater risk of having adverse effects on this European site.
SA-C-13	Interconnect Foxford and Lough Talt WRZs. Supply deficit from Foxford WRZ.	Abstracting the volume of water required to make this a feasible option is likely to result in the waterbody not achieving good WFD status.
SA-C-13a	Increase existing SW abstraction from Lough Muck to supply deficit at Foxford, upgrade WTP.	Abstracting the volume of water required to make this a feasible option is likely to result in the waterbody not achieving good WFD status.
SA-C-16 ¹⁴	Maintain allowable abstraction at Lough Talt.	Lough Talt is a WFD high status waterbody. Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status and also to result in a greater risk of having adverse effects on this European site.
SA-C-114x ¹⁴	Maintain allowable abstraction at Lough Talt.	Lough Talt is a WFD high status waterbody. Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status and also to result in a greater risk of having adverse effects on this European site.
SA-C-17	WSZ near Lough Talt-extend Boyle & Boyle/Ardcarne supply into Lough Talt. New GW source required for Boyle & Boyle/Ardcarne scheme.	Abstracting the volume of water required is considered unfeasible.
SA-C-18	New SW abstraction from the River Moy to supply deficit at	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving good WFD status.

¹⁴ In 2019 a 10-year planning permission was obtained to carry out an upgrade of the existing Lough Talt WTP to provide adequate treatment against cryptosporidium and THM. This was the first planning application in Ireland to be completed on the grounds of "Imperative Reasons of Overriding Public Interest" (IROPI) under the Habitats Directive. Irish Water is committed to implementing the required Compensatory Measures required as part of this consent and to developing an alternative water source for this supply in the medium term. Accordingly, the Preferred Approach for this supply is to decommission the existing Lough Talt WTP and rationalise scheme to Ballina Water Resource Zone and increase abstraction from Lough Conn [option TG1-SA-C-543].

Option Reference	Option Description	Rejection Reasoning
	Lough Talt WRZ, upgrade WTP.	
SA-C-19	Recomission Bellanascarrow Lake source (old Ballymote supply).	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving good WFD status.
SA-C-28	Increase GW abstraction at Riverstown and supply spare capacity to Lough Talt WRZ.	Abstracting the volume of water required is considered unfeasible.
SA-C-28a	Increase GW abstraction at Riverstown and supply spare capacity to Lough Talt WRZ.	Abstracting the volume of water required is considered unfeasible.
SA-C-30	Interconnect Geevagh/Highwood & Castlebaldwin GWSs with Riverstown WRZ and supply deficit from GWSs.	Abstracting the volume of water required is considered unfeasible.
SA-C-30a	Interconnect Geevagh/Highwood & Castlebaldwin GWSs with Lough Talt WRZ and supply deficit from GWSs.	Abstracting the volume of water required is considered unfeasible.
SA-C-31	Rationalise Riverstown to Lough Talt for long term OPEX savings and improved resilience.	Abstracting the volume of water required is considered unfeasible.
SA-C-31b	Rationalise Riverstown to Lough Talt (Lough Arrow source) for long term OPEX savings and improved resilience.	Lough Arrow is a WFD high status waterbody. Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status and to result in a greater risk of having adverse effects on this European site.
SA-C-31c	New SW abstraction from Lough Arrow and abandon Lough Talt WTP.	Lough Arrow is a WFD high status waterbody. Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status and to result in a greater risk of having adverse effects on this European site.
SA-C-31a	New GW abstraction in regionally karstified aquifer in Tobercurry to partly supply deficit in Lough Talt WRZ.	Abstracting the volume of water required is considered unfeasible.
SA-C-43	Supply deficit from neighbouring GWS.	Abstracting the volume of water required is considered unfeasible.
SA-C-115x	New SW abstraction from Glenade lake, upgrade Glenade WTP.	Abstracting the volume of water required to make this a feasible option is likely to result in the waterbody not achieving good WFD status.

Option Reference	Option Description	Rejection Reasoning
SA-C-52	New SW abstraction from Glenade Lake and supply deficit to North Sligo RWSS WRZ.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving good WFD status.
SA-C-54	Increase GW abstraction at Swinford and upgrade WTP.	Abstracting the volume of water required is considered unfeasible.
SA-C-54a	Increase SW abstraction at Swinford and upgrade WTP. Rationalise Foxford, Chalestown, Knock Airport, Kilkelly and Kiltimagh to Swinford - new Regional Water Supply Scheme.	Abstracting the volume of water required is considered unfeasible.
SA-C-54b	Increase SW abstraction at Swinford and upgrade WTP. Rationalise Foxford, Chalestown, Knock Airport, Kilkelly and Kiltimagh to Swinford - new Regional Water Supply Scheme.	Abstracting the volume of water required is considered unfeasible.
SA-C-54c	Increase SW abstraction at Swinford and upgrade WTP. Rationalise Foxford, Chalestown, Knock Airport, Kilkelly and Kiltimagh to Swinford - new Regional Water Supply Scheme.	Abstracting the volume of water required is considered unfeasible.
SA-C-54d	Increase SW abstraction at Swinford and upgrade WTP. Rationalise Foxford, Chalestown, Knock Airport, Kilkelly and Kiltimagh to Swinford - new Regional Water Supply Scheme.	Abstracting the volume of water required is considered unfeasible.
SA-C-54e	Increase SW abstraction at Swinford and upgrade WTP. Rationalise Foxford, Chalestown, Knock Airport, Kilkelly and Kiltimagh to Swinford - new Regional Water Supply Scheme.	Abstracting the volume of water required is considered unfeasible.
SA-C-57a	Increase SW abstraction from Carrowcanada Spring to supply deficit at Swinford WRZ, upgrade WTP.	Abstracting the volume of water required is considered unfeasible.
SA-C-57b	Increase SW abstraction from Carrowcanada Spring to supply deficit at Swinford WRZ, upgrade WTP.	Abstracting the volume of water required is considered unfeasible.

Option Reference	Option Description	Rejection Reasoning
SA-C-114a	Interconnect Swinford WRZ with Lough Talt.	Lough Talt is a WFD high status waterbody. Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status and also to result in a greater risk of having adverse effects on this European site.
SA-C-63	Increase SW abstraction from Lough Muck to supply deficit at Foxford, upgrade WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SA-C-64	Rationalise Foxford to Swinford WRZ.	Abstracting the volume of water required is considered unfeasible.
SA-C-66	New SW abstraction from Callow Lake GWS to supply deficit at Foxford, upgrade WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SA-C-114b	Interconnect Charlestown WRZ with Lough Talt.	Lough Talt is a WFD high status waterbody. Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status and also to result in a greater risk of having adverse effects on this European site.
SA-C-58	New GW wellfield and supply deficit to Swinford WRZ (new regional WSS).	The overall plan required a significant length of the pipeline for relatively small supply. Abstracting the volume of water required is considered unfeasible
SA-C-114c	Interconnect Knock Airport WRZ with Lough Talt.	Abstracting the volume of water required is considered unfeasible. The overall plan required a significant length of the pipeline for relatively small supply.
SA-C-58x	New GW wellfield and supply deficit to Knock Airport WRZ (new regional WSS).	Abstracting the volume of water required is considered unfeasible. The overall plan required a significant length of the pipeline for relatively small supply.
SA-C-114d	Interconnect Kilkelly WRZ with Lough Talt.	Lough Talt is a WFD high status waterbody. Abstracting the volume of water required to make this a feasible option is likely to result in the waterbody not achieving high WFD status and to result in a greater risk of having adverse effects on this European site.
SA-C-58c	New GW wellfield and supply deficit to Kilkelly WRZ (new regional WSS).	The overall plan required a significant length of the pipeline for relatively small supply. Abstracting the volume of water required is considered unfeasible.
SA-C-114e	Interconnect Kiltimagh WRZ with Lough Talt.	Lough Talt is a WFD high status waterbody. Abstracting the volume of water required to make this a feasible option is likely to result in the waterbody not achieving high WFD status and to result in a greater risk of having adverse effects on this European site.

Option Reference	Option Description	Rejection Reasoning
SA-C-58d	New GW wellfield and supply deficit to Kiltimagh WRZ (new regional WSS).	The overall plan required a significant length of the pipeline for relatively small supply. Abstracting the volume of water required is considered unfeasible.
SA-C-114f	Interconnect Foxford WRZ with Lough Talt.	Lough Talt is a WFD high status waterbody. Abstracting the volume of water required to make this a feasible option is likely to result in the waterbody not achieving high WFD status and to result in a greater risk of having adverse effects on this European site.
SA-C-58e	New GW wellfield and supply deficit to Foxford WRZ (new regional WSS).	The overall plan required a significant length of the pipeline for relatively small supply. Abstracting the volume of water required is considered unfeasible.
SA-C-72	Rationalise Charlestown to Lough Talt WRZ.	Abstracting the volume of water required is considered unfeasible.
SA-C-79	Rationalise Kilkelly to Lough Talt WRZ.	Abstracting the volume of water required is considered unfeasible.
SA-C-80	Rationalise Kilkelly to Swinford WRZ.	Abstracting the volume of water required is considered unfeasible.
SA-C-83	Refurbish old spring source.	This option included increasing the abstraction at Kilkelly Charlestown GWB to supply deficit at Kiltimagh WRZ. There is a great uncertainty around available yield, to meet the full demand requirement.
SA-C-88a	Increase SW abstraction from Bunnahowna River to supply deficit at Mulranny WRZ, upgrade WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving good WFD status.
SA-C-88	Rationalise Achill Island to Mulranny WRZ.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving good WFD status.
SA-C-96	Increase SW abstraction from Lough Easkey to supply deficit at Lough Easkey WRZ, upgrade WTP.	Lough Easkey is a WFD high status waterbody. Abstracting the volume of water required to make this a feasible option is likely to result in the waterbody not achieving high WFD status and to result in a greater risk of having adverse effects on this European site.
SA-C-98	New GW abstraction at Lough Easkey to supply deficit at Lough Easkey WRZ, upgrade WTP.	Abstracting the volume of water required is considered unfeasible.
SA-C-103	New SW abstraction from Ballysadare River and raw water pumped to Foxes Den WTP which would need expansion of plant capacity	Does not meet WFD objectives as there is risk of transfer of invasive species across catchment with raw water transfers.

Option Reference	Option Description	Rejection Reasoning
	to treat new additional supply.	
SA-C-104	New SW abstraction from Ballysadare River and expansion of Lough Gill abstraction and Foxes Den WTP capacity to treat from either river or lough. Based on conjunctive use approach of using new river/lough in combination to meet deficit i.e., utilise high river flows when available in winter months.	Does not meet WFD objectives as there is risk of transfer of invasive species across catchment with raw water transfers.
SA-C-105	New SW abstraction from Ballysadare River and expansion of Lough Gill abstraction and Cairns Hill WTP capacity to treat from either river or lough. Based on conjunctive use approach of using new river/lough in combination to meet deficit i.e., utilise high river flows when available in winter months.	Does not meet WFD objectives as there is risk of transfer of invasive species across catchment with raw water transfers.
SA-C-58a	New GW wellfield and supply deficit to Charlestown WRZ (new regional WSS).	The overall plan required a significant length of the pipeline for relatively small supplies. Abstracting the volume of water required is considered unfeasible.

4.4.3 Preferred Approach for SA-C

Full details of the Preferred Approach (and how it was reached) are included in the SA-C Technical Report in Appendix 3 of the draft RWRP-NW. The final Preferred Approach for SA-C is shown in Table 4.10 below. The findings of the Preferred Approach Development for SA-C Mayo and Sligo at WRZ level, include the following:

- There is one option that scores a 0 in relation to potential impact on a designated European Site; option SA-C-86.
- There are two -3 scores against designated European sites within the Preferred Approach; options SA-C-39 and SA-C-142.
- The remaining options within the Preferred Approach have either a -1 or a -2 score against European sites.

In summary, the Preferred Approach for SA-C is the Combination 5 approach which consists of local WRZ solutions for Ceide Fields, North Sligo Regional Water Supply, Swinford, Foxford, Charlestown, Erris RWSS, Achill, Sligo Town & Environs, North Leitrim Regional Water Supply, Riverstown Public Water Supply and Dowra PWS (GWS Import) WRZs. The Preferred Approach for Ballina, Lough Talt Regional Water Supply, Knock Airport, Kilkelly, Kiltimagh PWS and Lough Easkey Regional Water

Supply WRZs involve transfers from a number of existing surface water and groundwater abstractions in the study area.

Delivery of the Preferred Approach will secure all of the supplies in the area in terms of Quality, Quantity, Sustainability and Resilience. The Preferred Approach for SA-C Mayo and Sligo also includes for demand side (**Lose Less** and **Use Less**) measures, including:

- Ongoing leakage management including active leakage control, pressure management and find and fix activities to offset Natural Rate of Leakage Rise (NRR).
- Nett leakage reduction in North Leitrim Regional Water Supply, Ballina, and Sligo Town & Environs Water Resource Zones, amounting to 0.578MI/d (applied to SDB Deficit) to move towards achieving the National SELL Target by 2034.
- Continuation of Irish Water household and business water conservation campaigns, initiatives and education programmes.
- The option to implement legally enforceable Water Conservation Orders in drought periods in order to protect the environment and our public water supplies.

The Preferred Approach provides benefits for the environment and European sites through decommissioning existing abstractions at a number of WTPs (for example Kiltimagh WTP, Lough Talt WTP and Lough Easky WTP) which currently extract from European sites including River Moy SAC and Ox Mountains Bogs SAC.

All of the options that make up the final Preferred Approach and assessed as part of the NIS are shown in Table 4.10 and shown in Figure 4.7 below.

Table 4.10 - Final Preferred Approach for SA-C – Options

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
<p>SA-C-143 (Part of Grouped Option SA-C-543) 2700SC0001 Lough Talt</p>	-2	<p>Rationalise Lough Talt to Lisglennon WTP</p> <ul style="list-style-type: none"> • Increase SW abstraction from Lough Conn. Upgrade Lisglennon for increased capacity and maintain Wherrew WTP. Rationalise Lough Talt and Lough Easky to Lisglennon WTP • Lough Talt WRZ current WAFU DYCP 2044 = 4.276MI/d, DYCP 2044 demand = 9.917MI/d so additional 5.642MI/d to meet SDB • Existing SW source (Lough Conn). WFD status 2013-2018 – “Moderate” and “At Risk”
<p>SA-C-144 (Part of Grouped Option SA-C-543) 2200SC0004 Ballina</p>	-2	<p>Increase SW abstraction from Lough Conn. Upgrade Lisglennon WTP for increased capacity and maintain Wherrew WTP at current capacity</p> <ul style="list-style-type: none"> • Increase SW abstraction from Lough Conn. Upgrade Lisglennon for increased capacity and maintain Wherrew WTP. Rationalise Lough Talt and Lough Easkey to Lisglennon WTP • Ballina WRZ current WAFU DYCP 2044 = 13.182MI/d, DYCP 2044 demand = 16.961MI/d so additional 3.78MI/d to meet SDB • Existing SW source (Lough Conn). WFD status 2013-2018 – “Moderate” and “At Risk”
<p>SA-C-35 (Part of Grouped Option SA-C-515) 2200SC0019 Knock Airport</p>	-2	<p>Rationalise Knock Airport to Kilkelly WRZ</p> <ul style="list-style-type: none"> • Increase GW abstraction at Kilkelly WRZ, upgrade Kilkelly WTP and rationalise Knock Airport to Kilkelly (exploration of region required) • Knock Airport WRZ current WAFU DYCP 2044 = 0.073MI/d, DYCP 2044 demand = 0.822MI/d so additional 0.749MI/d to meet SDB • Existing GW source (Swinford Gravels). WFD status 2013-2018 – Good and Not at Risk
<p>SA-C-39 2200SC0006 Ceide Fields</p>	-3	<p>Increase GW abstraction (Belmullet GWB (poorly productive bedrock)) to supply deficit at Ceide Fields WRZ, upgrade Ceide Fields WTP</p> <ul style="list-style-type: none"> • Ceide Fields WRZ current WAFU DYCP 2044 = 0.046MI/d, DYCP 2044 demand = 0.065MI/d so additional 0.019MI/d to meet SDB • Existing GW source (Belmullet). WFD status 2013-2018 – Good and Not at Risk
<p>SA-C-44 2700SC0003</p>	-2	<p>New GW abstraction to supply deficit at North Sligo, upgrade WTP. To be used in conjunction with current Ardnaglass BH</p> <ul style="list-style-type: none"> • North Sligo Regional Water Supply WRZ current WAFU DYCP 2044 = 0.681MI/d, DYCP 2044 demand = 2.807MI/d so additional 2.126MI/d to meet SDB

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
North Sligo Regional Water Supply		<ul style="list-style-type: none"> Existing GW source (Grange East). WFD status 2013-2018 – Good and Not At Risk
SA-C-137 2200SC0018 Swinford	-2	Rationalise Swinford to Kilaturley GWS <ul style="list-style-type: none"> Swinford WRZ current WAFU DYCP 2044 = 0.185MI/d, DYCP 2044 demand = 1.304MI/d so additional 1.119MI/d to meet SDB Existing GW source (Swinford Gravels). WFD status 2013-2018 – Good and Not At Risk
SA-C-67 2200SC0011 Foxford	-1	New GW abstraction to supply deficit in Foxford, upgrade WTP <ul style="list-style-type: none"> Foxford WRZ current WAFU DYCP 2044 = 0.917MI/d, DYCP 2044 demand = 1.238MI/d so additional 0.321MI/d to meet SDB Existing GW source (Foxford gravels). WFD status 2013-2018 – Good and Not At Risk
SA-C-73 2200SC0008 Charlestown	-2	Interconnect Kilaturley GWS with Charlestown and supply deficit from GWS <ul style="list-style-type: none"> Swinford WRZ current WAFU DYCP 2044 = 0.185MI/d, DYCP 2044 demand = 1.304MI/d so additional 1.119MI/d to meet SDB Existing GW source (Swinford Gravels). WFD status 2013-2018 – Good and Not At Risk
SA-C-35a (Part of Grouped Option SA-C-515) 2200SC0012 Kilkelly	-2	Increase GW abstraction at Kilkelly WRZ, upgrade Kilkelly WTP <ul style="list-style-type: none"> Increase GW abstraction at Kilkelly WRZ, upgrade Kilkelly WTP and rationalise Knock Airport to Kilkelly (exploration of region required) Knock Airport WRZ current WAFU DYCP 2044 = 0.073MI/d, DYCP 2044 demand = 0.822MI/d so additional 0.749MI/d to meet SDB Existing GW source (Swinford Gravels). WFD status 2013-2018 – Good and Not at Risk
SA-C-139 (Part of Grouped Option SA-C-542) 2200SC0014 Kiltimagh PWS	-2	Rationalise Kiltimagh to Lough Mask WRZ <ul style="list-style-type: none"> Increase SW abstraction from Lough Mask and upgrade Lough Mask WTP Kiltimagh WRZ current WAFU DYCP 2044 = 0.733MI/d, DYCP 2044 demand = 1.191MI/d so additional 0.458MI/d to meet SDB Existing SW source (Lough Mask). WFD status 2013-2018 – Good and At Risk

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
SA-C-86 2200SC0007 Erris RWSS	0	Increase SW abstraction from Carrowmore Lake to supply deficit at Erris WRZ, upgrade Erris WTP <ul style="list-style-type: none"> • Increase SW abstraction from Carrowmore Lake and upgrade local WTP • Erris RWSS WRZ current WAFU DYCP 2044 = 4.125MI/d, DYCP 2044 demand = 4.385MI/d so additional 0.26MI/d to meet SDB • Existing SW source (Carrowmore Lake). WFD status 2013-2018 – “Moderate” and “At Risk”
SA-C-142 2200SC0005 Achill	-3	New SW abstraction from Keel Lough and new raw water transfer to existing WTP. Includes WTP upgrade. New source to supplement Accorymore Lake during dry periods only <ul style="list-style-type: none"> • New SW abstraction from Keel Lough • Achill WRZ current WAFU DYCP 2044 = 1.496MI/d, DYCP 2044 demand = 2.813MI/d so additional 1.317MI/d to meet SDB • New SW source (Keel MO). WFD status 2013-2018 – “Moderate” and “At Risk”
SA-C-145 (Part of Grouped Option SA-C-543) 2700SC0002 Lough Easkey RWSS	-2	Rationalise Lough Easkey to Lisglennon WTP <ul style="list-style-type: none"> • Increase SW abstraction from Lough Conn. Upgrade Lisglennon for increased capacity and maintain Wherrew WTP. Rationalise Lough Talt and Lough Easkey to Lisglennon WTP • Lough Easkey RWSS WRZ current WAFU DYCP 2044 = 4.033MI/d, DYCP 2044 demand = 4.504MI/d so additional 0.471MI/d to meet SDB • Existing SW source (Lough Conn). WFD status 2013-2018 – Moderate and At Risk
SA-C-101 2700SC0004 Sligo Town & Environs Foxes Den Public Water Supply	-2	Rationalise Kilsellagh impoundment if deemed unreliable source and increase abstraction from Lough Gill and expand of Foxes Den WTP to cover Kilsellagh supply and supply deficit <ul style="list-style-type: none"> • Increase existing abstraction at Lough Gill • WRZ current WAFU DYCP 2044 = 13.206MI/d, DYCP 2044 demand = 22.138MI/d so additional 8.932MI/d to meet SDB • Existing SW source (L Gill SO). WFD status 2013-2018 – “Moderate” and “At Risk”
SA-C-108 1700SC0003 North Leitrim RWSS	-2	Increase SW abstraction from Lough Gill <ul style="list-style-type: none"> • Increase existing abstraction at Lough Gill • WRZ current WAFU DYCP 2044 = 6.05MI/d, DYCP 2044 demand = 5.567MI/d so additional 0.483MI/d to meet SDB • Existing SW source (L Gill SO). WFD status 2013-2018 – “Moderate” and “At Risk”

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
SA-C-138 2700SC0005 Riverstown	-2	Refurb existing spring and upgrade WTP for water quality improvements <ul style="list-style-type: none"> • Increase existing abstraction at Heapstown Spring • WRZ current WAFU DYCP 2044 = 0.587MI/d, DYCP 2044 demand = 0.417MI/d so additional 0.17MI/d to meet SDB • Existing GW source (Ballymote). WFD status 2013-2018 – “Good” and “Not At Risk”
SA-C-131 0200SC0003 Dowra PWS (GWS Import)	-2	Dowra PWS (GWS Import) - Keep supplying Dowra WRZ from Doobally GWS <ul style="list-style-type: none"> • WRZ current WAFU DYCP 2044 = TBC, DYCP 2044 demand = 0.046MI/d so additional TBC MI/d to meet SDB • Existing SW source (Naweleian Lake). WFD status 2013-2018 – “Unassigned” and “Not At Risk”

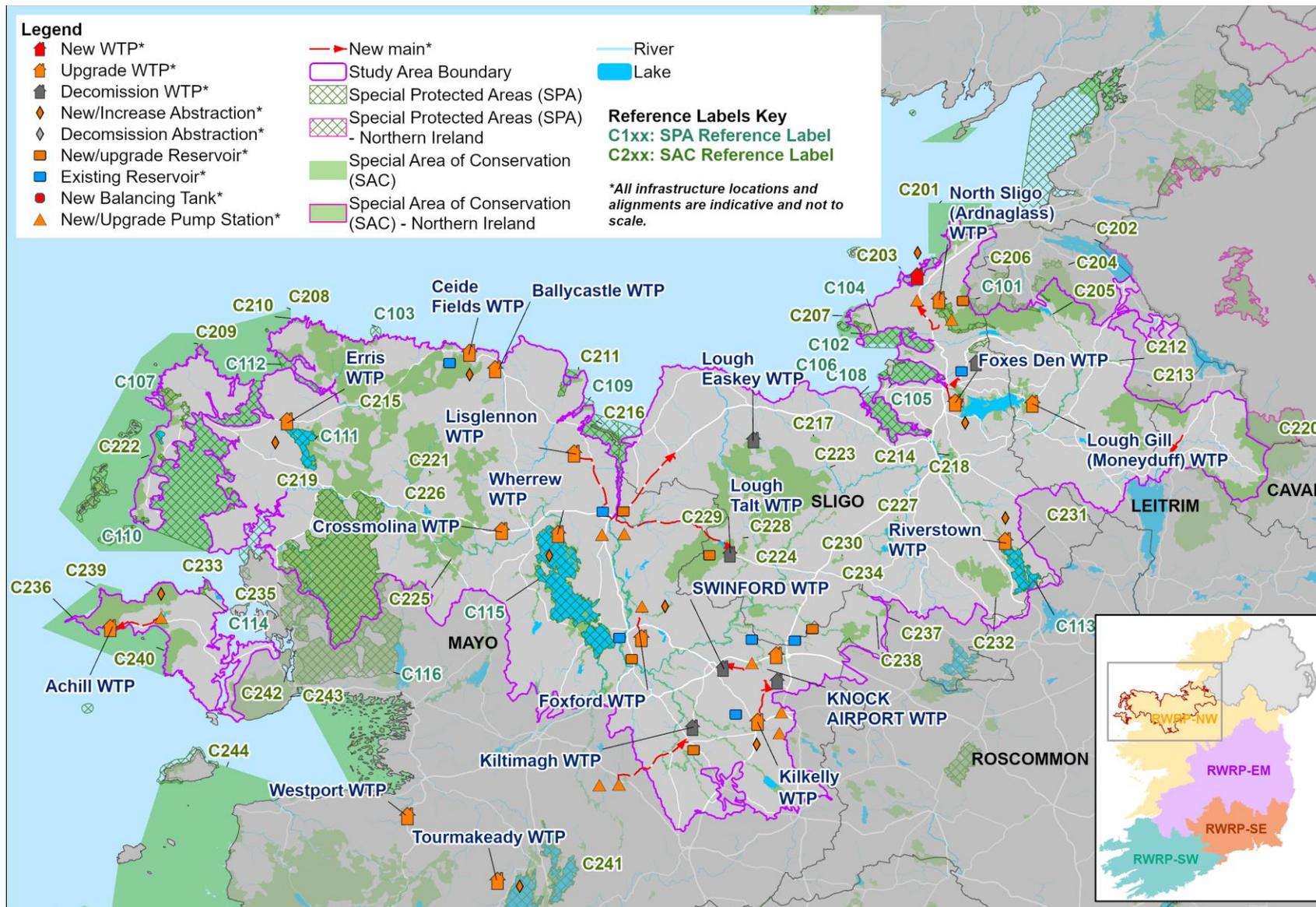


Figure 4.7 - Study Area C – Preferred Approach and European sites within SA-C boundary. See Table 4.11 for list of SACs and SPAs referenced on figure

Table 4.11 – SACs and SPAs referenced in SA-C Preferred Approach figure (Figure 4.7)

Index Code	SAC/SPA Name
C101	Sligo/Leitrim Uplands SPA
C102	Ballintemple and Ballygilgan SPA
C103	Illanmaster SPA
C104	Drumcliff Bay SPA
C105	Cummeen Strand SPA
C106	Aughris Head SPA
C107	Termoncarragh Lake and Annagh Machair SPA
C108	Ballysadare Bay SPA
C109	Killala Bay/Moy Estuary SPA
C110	Mullet Peninsula SPA
C111	Carrowmore Lake SPA
C112	Blacksod Bay/Broad Haven SPA
C113	Lough Arrow SPA
C114	Doogort Machair SPA
C115	Lough Conn and Lough Cullin SPA
C116	Owenduff/Nephin Complex SPA
C201	Bunduff Lough And Machair/Trawalua/Mullaghmore SAC
C202	Lough Melvin SAC
C203	Streedagh Point Dunes SAC
C204	Arroo Mountain SAC
C205	Glenade Lough SAC
C206	Ben Bulben, Gleniff And Glenade Complex SAC
C207	Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC
C208	Broadhaven Bay SAC
C209	Erris Head SAC
C210	Glenamoy Bog Complex SAC
C211	Lackan Saltmarsh and Kilcummin Head SAC
C212	Lough Gill SAC

C213	Boleybrack Mountain SAC
C214	Ballysadare Bay SAC
C215	Slieve Fyagh Bog SAC
C216	Killala Bay/Moy Estuary SAC
C217	Knockalongy and Knockachree Cliffs SAC
C218	Union Wood SAC
C219	Carrowmore Lake Complex SAC
C220	Cuilcagh - Anierin Uplands SAC
C221	Bellacorick Iron Flush SAC
C222	Mullet/Blacksod Bay Complex SAC
C223	Unshin River SAC
C224	Ox Mountains Bogs SAC
C225	Bellacorick Bog Complex SAC
C226	Lough Dahybaun SAC
C227	Templehouse And Cloonacleigha Loughs SAC
C228	Lough Nabrickkeagh Bog SAC
C229	Lough Hoe Bog SAC
C230	Turloughmore (Sligo) SAC
C231	Lough Arrow SAC
C232	Bricklieve Mountains and Keishcorran SAC
C233	Doogort Machair/Lough Doo SAC
C234	Doocastle Turlough SAC
C235	Owenduff/Nephin Complex SAC
C236	Croaghaun/Slievemore SAC
C237	Flughany Bog SAC
C238	Cloonakillina Lough SAC
C239	Achill Head SAC
C240	Keel Machair/Menaun Cliffs SAC
C241	River Moy SAC
C242	Lough Gall Bog SAC

C243	Corraun Plateau SAC
C244	West Connacht Coast SAC

4.5 Overview of Study Area D – Galway and Mayo

The location of Study Area D (SAD) in relation to the NW region is shown in Figure 4.1 above. The Study Area extends across most of County Galway and the southern half of County Mayo, including several islands off the coast of Ireland such as the Aran Islands (Inishmore, Inishmean, Inishere), Inisboffin, Inishturk and Clare Island. The total area of SAD is approximately 6,704 km² and it lies within the counties of Galway, Mayo, Roscommon and Galway City. The principal settlement (with a population of over 10,000) within SAD are Galway city and suburbs, and Castlebar (Central Statistics Office, 2016).

There are seventy-three SACs and sixteen SPAs within the SAD boundary as shown in Table 4.12. European sites within SAD where there is potential for LSE are discussed further in Section 6.2.4.

Table 4.12 - Number of European Sites within the SAD boundary

Study Area	No. of SACs	No. of SPAs
D (Galway and Mayo)	73	16

4.5.1 Existing Water Supplies

SAD consists of 25 WRZs supplying a population of approximately 228,609 people via approximately 3,566km of distribution network. SAD is the largest Study Area in the country. Galway City is by far the largest demand centre, with other notable towns elsewhere including Castlebar, Tuam and Westport. The sources of water supply consist of 26 surface water abstractions and eight groundwater abstraction sites. The Study Area is summarised in Figure 4.8 below.

Regarding surface water availability in SAD, the Study Area extends across three main catchments: the Corrib in the central and eastern parts, the Galway Bay North in the south west, and the Erriff-Clew Bay in the north west. The Corrib catchment is a large complex system that dominates the Study Area as it comprises of two large lake sources, Lough Corrib and Lough Mask, that receive most of their water from the wide, flat limestone plain in the eastern side of the catchment. This area to the east of the lakes is characterised by karstified limestone where groundwater and surface water are highly interconnected. At the southern tip of Lough Corrib, the River Corrib flows through Galway City before becoming tidal at Galway Bay. The Galway Bay North catchment includes the mountainous Connemara region in the north consisting of some larger lake sources within the Inagh Valley, and the complex bog covered coastline areas of West Galway which comprise of networks of smaller river and lake sources. The Erriff-Clew Bay catchment comprises of several small coastline river and lake systems draining large parts of western County Galway and Mayo. This catchment includes both many mountainous areas and the drumlinised lowland area at Clew Bay.

Study Area D has a number of designated area sites including several large water dependent SACs such as the Lough Corrib SAC, Lough Carra/ Mask Complex SAC and Connemara Bog Complex SAC. It has three SAC catchments designated for freshwater pearl mussel - the Owenriff, Dawros, and Bundorragha. The Study Area also has several waterbodies with WFD High Status Objectives, including the large Lough Mask source.

Around 90% of the water supply to Study Area D is from surface water sources, with 80% of total supply coming from three large abstractions from the Corrib system. In the upper part of the Corrib catchment, an abstraction on the north end of Lough Mask delivers up to 38MI/d to Tourmakeady WTP to supply Lough Mask & Westport WRZ. Whilst further downstream at Lough Corrib, there are two abstractions to supply the Lough Corrib (Galway City, Tuam, Loughrea) WRZ. One on the eastern banks of Lough Corrib feeds up to 36MI/d to Tuam (Luimnagh) WTP, and another downstream on the lake outflow, River Corrib, delivers up to 55MI/d to Terryland WTP.

Elsewhere in the Study Area, the other notable surface water abstractions are from smaller lake sources. These include the Loughrea source which supplies up to 4.3MI/d to Lough Corrib (Galway City, Tuam, Loughrea) WRZ, Moher Lake source supplies up to 2.5MI/d to Lough Mask & Westport WRZ, and Loughanwillian supplies up to 2.4MI/d to Carraroe WRZ. In the past, several other natural loughs around the Study Area have been raised and impounded to develop reservoir sources to increase the resilience of supply. These impounding reservoir sources include Lough Bouliska supplying up to 4MI/d to Spiddal WRZ, and Lough Buffy supplying up to 3MI/d to Oughterard WRZ.

Overall, eight groundwater sites are managed by Irish Water in the region. The predominant aquifer type of the area is made up of poorly productive bedrock (53%), followed by karstic (44%), with a relatively minor contribution from productive fissured (2%) and sand and gravel (0.3%). Surface water abstractions dominate the total water supply for the region, highlighting the vast areas underlain by aquifer with lower potential, with the majority of higher volume groundwater abstractions taking place from a number of karstic springs.

The majority of the Study Area west of Galway city and Loughs Corrib and Mask are classified as poorly productive aquifers and will not offer the same kind of groundwater potential as the karstic rocks seen elsewhere (central and eastern areas). This area is characterised by its more mountainous regions of Connemara, which are composed of Precambrian quartzites, with Ordovician igneous and volcanic rocks also present. Silurian Metasediments and Volcanics can be found to the northwest near Louisburgh and Westport, while Granites and other Igneous intrusive rocks make up the bedrock to the south of Connemara, stretching towards the coastline of Galway Bay. The Precambrian rocks and Granites are characterised by the absence of an intergranular permeability and the presence of low fissure permeability. The marbles may contain some solutionally enhanced permeability zones which could provide a domestic or farm supply or small group scheme. Yields are lowest in the fine-grained schists (pelites) where wells may fail to provide even a domestic yield. Well yields are greater in the coarser grained rocks such as the quartzites, but even in these rocks yields greater than 0.1MI/d would be unusual. Although fractured, the Ordovician and Silurian generally have a low permeability and are mostly regarded as a poor aquifer. Such rocks will often yield enough water to a well to supply a house or small farm (0.2-0.5 l/s) and occasionally in major fracture zones may yield a good deal more. However, since the yield often depends on the permeability developed in the uppermost few metres of broken and weathered rock, yields will often decrease markedly in dry spells as the water table falls, and these supplies may therefore be unreliable.

The karst forms a key regionally important aquifer in some areas, underlying much of central and east Galway, which consists of clean limestone that has been extensively karstified. The majority of the larger abstractions occur in this setting and mainly appear as spring overflows, which serve as points of groundwater discharge. Limestone dissolution during karstification causes groundwater flow to concentrate along certain pathways/conduits (Regionally Important Karstified Bedrock type aquifers), making it difficult to locate successful wells. Locating high yielding wells in Regionally Important

Karstified Bedrock type aquifers can be difficult due to the uneven distribution of permeability; failed and high yielding wells can occur close together. Both point and diffuse recharge occur. Diffuse recharge occurs via rainfall percolating through permeable subsoil and rock outcrops. Despite the presence of peat and till, point recharge to the underlying aquifer occurs by means of swallow holes and collapse features/dolines.

In the lowlands of East Galway and southeast Mayo, where the elevation rarely exceeds 70m above sea level, most drainage is underground in solutionally enlarged fissures and conduits, and in several areas groundwater catchments do not match the surface water catchments. Groundwater flow is dominantly westward, to Lough Mask and Lough Corrib or to Galway Bay. The area is characterised by sinking rivers, with losing rivers during periods of lower groundwater levels and gaining rivers in the winter, as seen with the Robe. In the River Clare–Lough Corrib catchment, no gaining streams are known, so all groundwater discharge is via springs. The Mid-Galway and Dunmore/Glenamaddy are the most notable schemes in this part of the Study Area, which supplies on average 4Ml/d and 3Ml/d respectively. It should be noted the springs discharge in the range of 19 – 22Ml/d highlighting the kinds of volumes transported throughout the conduit system. Oftentimes the spring abstraction can be augmented by drilling a borehole, however the nature of the Regionally Important Karstified Bedrock type aquifers flow regime makes well success unpredictable. Both borehole and spring supplies are highly vulnerable to contamination from any pollutants that are allowed to enter the karstic aquifers.

The same karstic bedrock is mirrored in the Aran Islands, with various existing natural groundwater discharge seeps on the islands. Much of the flow takes place in the shallower epikarstic layer with springs often occurring where the shale bands intersect the surface. These spring flows rise and fall quickly in response to rainfall events. Natural discharge is generally less than 0.4Ml/d, with the largest source located on Inis Mór. This receives the bulk of the rainfall owing to its steep cliffs and it is estimated that Inis Oírr, and perhaps Inis Meáin, get 30% less rainfall. The quantity of groundwater available is limited by the surface area of the island, the amount of precipitation, the ability to collect the runoff/recharge and the amount storage available. The groundwater discharge system is fed by rainfall that rapidly discharges at the surface, which can be described as shallow subsurface run off. This is because flow paths are short and the limestone system is shallow, whereby underlying shale beds, above sea level elevation, control groundwater discharge at the surface.

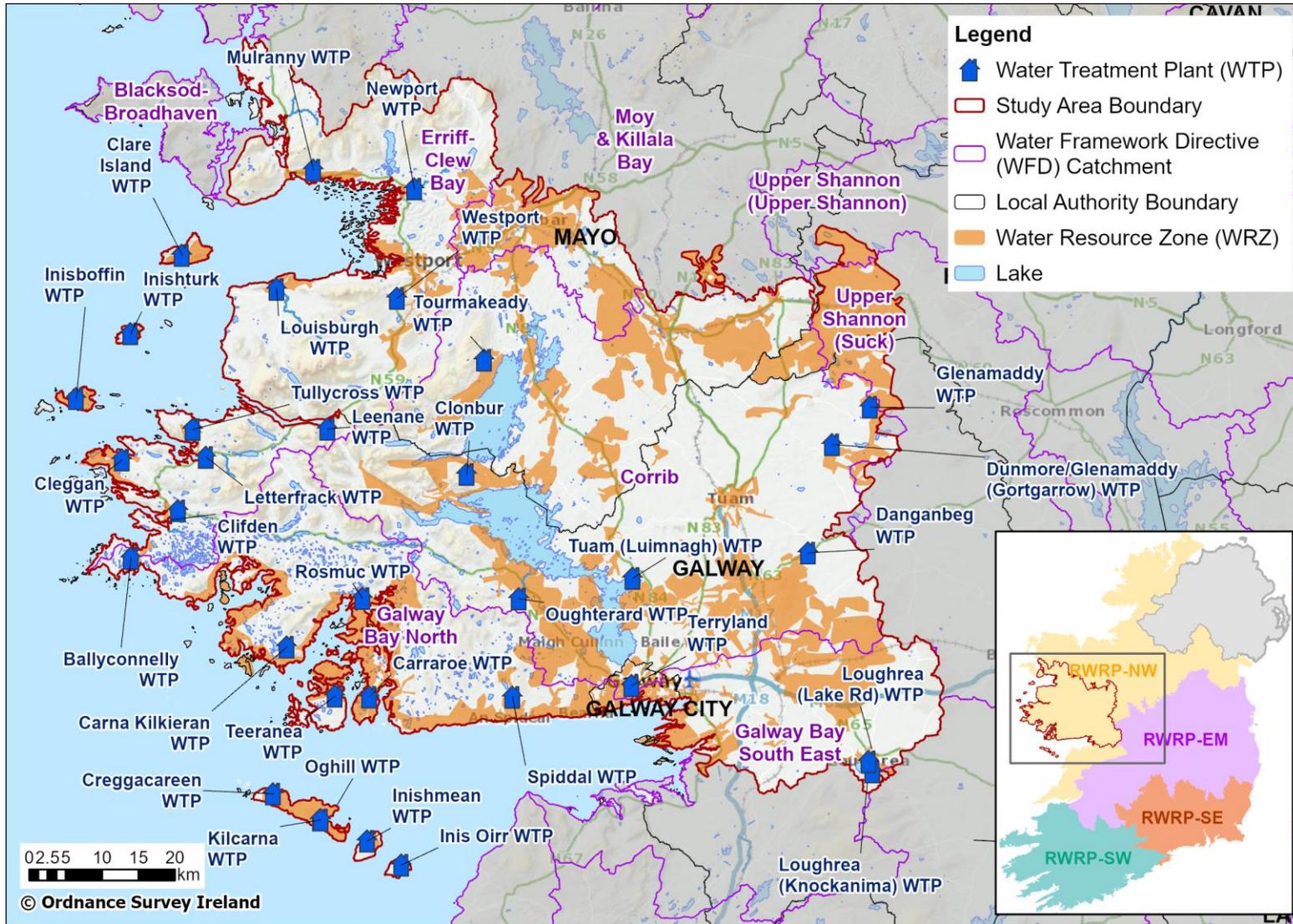


Figure 4.8 - Study Area D Galway and Mayo Summary

4.5.2 SAD Options Removed at Coarse Screening

The options detailed in Table 4.13 below were removed at Coarse Screening on environmental grounds.

Table 4.13 - SAD – Options removed at Coarse Screening on environmental grounds

Option Reference	Option Description	Rejection Reasoning
SAD-001	Increase existing SW abstraction from Lake Anaserd to supply deficit at Ballyconneely WRZ, upgrade WTP.	Sustainability issues associated with this option. Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAD-007	Increase existing SW abstraction from Lough Lerin to supply deficit at Carna Kilkieran, upgrade Carna Kilkieran WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAD-008	Increase existing SW abstraction from Lough Loughaunore to supply deficit at Carna Kilkieran, upgrade Carna Kilkieran WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAD-013	Increase SW abstraction from existing River Knockmore to supply deficit at Clare Island WRZ, upgrade WTP.	Sustainability issues associated with this option. Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAD-017A	Increase existing SW abstraction from Lough Courhoor to supply deficit at Cleggan Claddaghduff WRZ, upgrade Cleggan WTP.	Sustainability issues associated with this option. Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAD-017B	Increase existing SW abstraction from Lough Courhoor to supply deficit at Cleggan Claddaghduff WRZ, upgrade Cleggan WTP.	Sustainability issues associated with this option. Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAD-023	Increase existing SW abstraction from Lough Nambrackeagh to supply deficit at Clifden WRZ, upgrade WTP.	Sustainability issues associated with this option. Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAD-028	New SW abstraction from Derrylea Lough to supply deficit at Clifden WRZ, upgrade WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAD-032	Increase existing SW abstraction from Lough Coolin to supply deficit at Colnbur WRZ, upgrade WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.

Option Reference	Option Description	Rejection Reasoning
SAD-045B	Increase existing SW abstraction from Lough Haunwillan (Carraroe source) to supply deficit at Carraroe ERZ, upgrade WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAD-045C	Increase existing SW abstraction from Lough Haunwillan (Carraroe source) to supply deficit at Carraroe ERZ, upgrade WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAD-045D	Increase existing SW abstraction from Lough Haunwillan (Carraroe source) to supply deficit at Carraroe ERZ, upgrade WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAD-052	Increase existing SW abstraction from Lough Fawna to supply deficit at Inisboffin WRZ, upgrade WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAD-056	Connect Inisboffin to mainland (Cleggan-Claddaduff).	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAD-065	Connect Inish Oirr to mainland (Carraroe - Lough Corrib WRZ).	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAD-072	Connect Inishmean to mainland (Carraroe).	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAD-079	Connect Inishmore to mainland.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAD-086	Increase SW existing abstraction from River to supply deficit at Leenane WRZ, upgrade WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAD-094	Increase SW abstraction from existing Lake Moher (Westport WSS source) to supply deficit at Lough Mask & Westport WRZ, upgrade WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAD-097B	New GW abstraction (Poorly productive Clifden Castlebar GWB) to supply deficit at Louisburgh WRZ, upgrade WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAD-098	Supply deficit from neighbouring GWS - Laughta	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.

Option Reference	Option Description	Rejection Reasoning
	GWS; Killeen GWS (GW Clifden Castlebar).	
SAD-106	Take off section of Farmablake from Mid-Galway and connect to Loughrea.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAD-107	Supply deficit from GWS (DBO (Design-Build-Operate) schemes) Kilkieran GWS.	Abstracting the volume of water required is considered unfeasible.
SAD-109	Increase SW abstraction from existing River Bunnahowna to supply deficit at Mulranny WRZ, upgrade WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAD-120	Supply deficit from neighbouring GWS - Kilmeena GWS.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAD-126	Increase SW abstraction from existing Lough Aroolagh to supply deficit at Rosmuc WRZ, upgrade Rosmuc WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAD-130	Increase SW abstraction from existing Lough Illauntrasna to supply deficit at Teeranea Lettermore WRZ, upgrade Tiernee WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAD-133	New SW abstraction and new WTP from lake - Lough Ballynakill.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAD-135	Supply deficit from neighbouring GWSs - Lettermullen GWS; Lettermullen GWS 2.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAD-138	Increase existing SW abstraction from Diamond Hill River to supply deficit at Tully-Tullycross WRZ, upgrade WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAD-150	Connect to Cuilmore GWS (increase abstraction from Skerdagh River).	Abstracting the volume of water required is considered unfeasible.
SAD-082	Increase SW abstraction from existing Lake Coolacknick impoundment.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.

4.5.3 Preferred Approach for SAD

Full details of the Preferred Approach (and how it was reached) are included in the SAD Technical Report in Appendix 4 of the draft RWRP-NW. The final Preferred Approach for SAD is shown in Table

4.14 below. The findings of the Preferred Approach Development for SAD Galway and Mayo at WRZ level, include the following:

- There are no options that score a 0 in relation to potential impact on a designated European site.
- There are five -3 scores against designated European sites within the Preferred Approach; options SAD-033, SAD-040 and SAD-055, and Group options SAD-543 and SAD-545.
- The remaining options within the Preferred Approach have either a -1 or a -2 score against European sites.

In summary, the Preferred Approach for SAD is the Combination 21 approach which consists of local WRZ supplies for Clare Island, Clifden, Clonbur, Dunmore Glenamaddy P.S., Lough Corrib (Galway City, Tuam, Loughrea), Inisboffin, Inishere, Inishmean, Inishmore, Inishturk, Mid-Galway, Mulranny, Newport and Oughterard in the Study Area. The Preferred Approach for Ballyconneely, CARNA Kilkieran, Cleggan Claddaghduff, Carraroe, Spiddal, Leenane, Lough Mask & Westport, Louisburgh, Rosmuc, Teeranea Lettermore, and Tully-Tullycross WRZs involve transfers from a number of existing and new surface water abstractions in the study area.

Delivery of the Preferred Approach will secure all of the supplies in the area in terms of Quality, Quantity, Sustainability and Resilience. The Preferred Approach for SAD Galway and Mayo also includes for demand side (**Lose Less** and **Use Less**) measures, including:

- Ongoing leakage management including active leakage control, pressure management and find and fix activities to offset Natural Rate of Leakage Rise (NRR).
- Continuation of Irish Water household and business water conservation campaigns, initiatives and education programmes.
- The option to implement legally enforceable Water Conservation Orders in drought periods in order to protect the environment and our public water supplies.

The Preferred Approach provides benefits for the environment and European sites through decommissioning existing abstractions at a number of WTPs (for example Lake Road WTP, Knockanima WTP, Ballyconnelly WTP, Tullycross WTP, Letterfrack WTP and Leenane WTP) which currently extract from European sites including Lough Rea SAC and SPA, Slyne Head Peninsula SAC, Tully Lough SAC, The Twelve Bens/Garraun Complex SAC, and Maumturk Mountains SAC.

All of the options that make up the final Preferred Approach and assessed as part of the NIS are shown in Table 4.14 and shown in Figure 4.9 below.

Table 4.14 - Final Preferred Approach for SAD – Options

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
<p>SAD-196 (Part of Grouped Option SAD-541) 1200SC0007 Ballyconneely</p>	-2	<p>Rationalise to Carna Kilkieran</p> <ul style="list-style-type: none"> Ballyconneely P.S. WRZ – Current WAFU DYCP 2044 = 0.871MI/d, DYCP 2044 demand = 0.742MI/d so additional 0.129MI/d required to meet WRZ deficit New SW abstraction New source (Lough Skannive LWB) WFD status 2013-2018 – ‘Good’ and projection ‘Review’
<p>SAD-195 (Part of Grouped Option SAD-541) 1100SC0001_B Carna Kilkieran RWSS</p>	-2	<p>New SW abstraction from Lough Skannive and upgrade existing WTP and upgrade existing Carna Kilkieran WTP</p> <ul style="list-style-type: none"> Carna Kilkieran RWSS WRZ – Current WAFU DYCP 2044 = 2.475MI/d, DYCP 2044 demand = 2.554MI/d so additional 0.079MI/d required to meet WRZ deficit New SW abstraction New source (Lough Skannive LWB) WFD status 2013-2018 – ‘Good’ and projection ‘Review’
<p>SAD-014 2200SC0002 Clare Island</p>	-2	<p>New GW abstraction (poorly productive bedrock - Clare Island groundwater body)</p> <ul style="list-style-type: none"> Clare Island WRZ – Current WAFU DYCP 2044 = 0.03MI/d, DYCP 2044 demand = 0.159MI/d so additional 0.128MI/d required to meet WRZ deficit New GW abstraction New source (Clare Island GWB) WFD status 2013-2018 – ‘Good’ and ‘Not At Risk’
<p>SAD-209 (Part of Grouped Option SAD-545) 1200SC0010 Cleggan Claddaghduff</p>	-3	<p>New Connemara RWSS (Kylemore Lough)</p> <ul style="list-style-type: none"> Cleggan Claddaghduff WRZ – Current WAFU DYCP 2044 = 0.321MI/d, DYCP 2044 demand = 0.335MI/d so additional 0.014MI/d required to meet WRZ deficit New SW abstraction New source (Kylemore LWB) WFD status 2013-2018 – ‘Good’ and Projection ‘Not At Risk’
<p>SAD-027 1200SC0011 Clifden</p>	-1	<p>New SW abstraction from Lough Auna and new WTP</p> <ul style="list-style-type: none"> Clifden WRZ – Current WAFU DYCP 2044 = 0.481MI/d, DYCP 2044 demand = 1.112MI/d so additional 0.631MI/d required to meet WRZ deficit New SW abstraction New source (Lough Auna LWB) WFD status 2013-2018 – ‘Unassigned’

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
SAD-033 1200SC0012 Clonbur	-3	New SW abstraction from Lough Corrib and new WTP <ul style="list-style-type: none"> Clonbur WRZ – Current WAFU DYCP 2044 = 1.128MI/d, DYCP 2044 demand = 1.365MI/d so additional 0.237MI/d required to meet WRZ deficit New SW abstraction New source (Lough Corrib Upper LWB) WFD status 2013-2018 – ‘Good’ and ‘Not At Risk’
SAD-040 1100SC0001_D Dunmore/Glenamaddy P.S. (Glenamaddy)	-3	New GW abstracton from Gortgarogh GWB (Sean, Robbie spring) spring <ul style="list-style-type: none"> Dunmore/Glenamaddy WRZ – Current WAFU DYCP 2044 = 2.113MI/d, DYCP 2044 demand = 2.481MI/d so additional 0.368MI/d required to meet WRZ deficit New GW abstraction New source (Clare Corrib GWB) WFD status 2013-2018 – ‘Good’ and ‘At Risk’
SAD-046a 1100SC0001 Lough Corrib (Galway City, Tuam, Loughrea)	-2	Increase existing SW abstraction at Terryland from River Corrib <ul style="list-style-type: none"> Galway City WRZ – Current WAFU DYCP 2044 = 83.188MI/d, DYCP 2044 demand = 103.78MI/d so additional 20.593MI/d required to meet WRZ deficit Increase existing SW abstraction Existing source (Lough Corrib Upper LWB) WFD status 2013-2018 – ‘Good’ and ‘Not At Risk’
SAD-200 (Part of Grouped Option SAD-543) 1200SC0037 Carraroe	-3	Rationalise Carraroe to Spiddal (Lough Bouliska) <ul style="list-style-type: none"> Carraroe WRZ – Current WAFU DYCP 2044 = 2.2MI/d, DYCP 2044 demand = 1.96MI/d so additional 0.24MI/d required to meet WRZ deficit Increase existing SW abstraction Existing source (Boliska LWB) WFD status 2013-2018 – ‘Good’ and Projection ‘Review’
SAD-199 (Part of Grouped Option SAD-543) 1200SC0038 Spiddal	-3	Increase existing SW abstraction from Lough Bouliska and connect with neighbouring WRZs <ul style="list-style-type: none"> Carraroe WRZ – Current WAFU DYCP 2044 = 2.2MI/d, DYCP 2044 demand = 1.96MI/d so additional 0.24MI/d required to meet WRZ deficit Increase existing SW abstraction Existing source (Boliska LWB) WFD status 2013-2018 – ‘Good’ and Projection ‘Review’

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
SAD-055 1200SC0017 Inisboffin	-3	Desalination plant to supply full deficit. No blending, chemical remineralization only <ul style="list-style-type: none"> Inisboffin WRZ – Current WAFU DYCP 2044 = 0.099MI/d, DYCP 2044 demand = 0.245MI/d so additional 0.145MI/d required to meet WRZ deficit Desalination Plant Existing source (Lough Boffin LWB) WFD status 2013-2018 – ‘Unassigned’ and ‘Under Review’
SAD-058 1200SC0018 Inishere	-2	Optimise GW abstraction from current springs (includes GW harvesting/raw water storage) <ul style="list-style-type: none"> Inishere WRZ – Current WAFU DYCP 2044 = 0MI/d, DYCP 2044 demand = 0.16MI/d so additional 0.16MI/d required to meet WRZ deficit Optimise GW abstraction Existing source (Inishmore GWB) WFD status 2013-2018 – ‘Good’ and ‘Not At Risk’
SAD-069 1200SC0004 Inishmean	-2	Optimise GW abstraction from current springs (includes GW harvesting/raw water storage) <ul style="list-style-type: none"> Inishmean WRZ – Current WAFU DYCP 2044 = 0.083MI/d, DYCP 2044 demand = 0.106MI/d so additional 0.022MI/d required to meet WRZ deficit Optimise GW abstraction Existing source (Inishmore GWB) WFD status 2013-2018 – ‘Good’ and ‘Not At Risk’
SAD-074 1200SC0019 Inishmore	-2	Increase GW abstraction from existing boreholes and new raw water storage to maximise GW availability in winter months <ul style="list-style-type: none"> Inishmore WRZ – Current WAFU DYCP 2044 = 0.332MI/d, DYCP 2044 demand = 1.086MI/d so additional 0.756MI/d required to meet WRZ deficit Increase GW abstraction Existing source (Inishmore GWB) WFD status 2013-2018 – ‘Good’ and ‘Not At Risk’
SAD-158 2200SC0003 Inishturk	-1	Raise existing dam height and new impoundment on the other side of the lake. Increase SW abstraction from existing Lake Coolacknick impoundment and WTP upgrade <ul style="list-style-type: none"> Inishturk WRZ – Current WAFU DYCP 2044 = 0.028MI/d, DYCP 2044 demand = 0.044MI/d so additional 0.016MI/d required to meet WRZ deficit Increase SW abstraction Existing source (Lough Coolacknick LWB) WFD status 2013-2018 – ‘unassigned’ and projection ‘unknown’

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
SAD-210 (Part of Grouped Option SAD-545) 1200SC0024 Leenane	-3	New Connemara RWSS (Kylemore Lough) <ul style="list-style-type: none"> Cleggan Claddaghduff WRZ – Current WAFU DYCP 2044 = 0.096MI/d, DYCP 2044 demand = 0.123MI/d so additional 0.026MI/d required to meet WRZ deficit New SW abstraction New source (Kylemore LWB) WFD status 2013-2018 – ‘Good’ and Projection ‘Not At Risk’
SAD-218 (Part of Grouped Option SAD-548) 2200SC0001 Lough Mask & Westport	-2	Increase SW abstraction from existing Lough Mask and upgrade Tourmakeady WTP <ul style="list-style-type: none"> Lough Mask and Westport WRZ – Current WAFU DYCP 2044 = 35.383MI/d, DYCP 2044 demand = 52.504MI/d so additional 17.121MI/d required to meet WRZ deficit Increase existing SW abstraction Existing source (Lough Mask LWB) WFD status 2013-2018 – ‘Good’ and projection ‘At Risk’
SAD-217 (Part of Grouped Option SAD-548) 2200SC0015 Louisburgh	-2	Rationalise Louisburgh via new Community/GWS being developed to take water from Westport to Murrisk <ul style="list-style-type: none"> Lough Mask and Westport WRZ – Current WAFU DYCP 2044 = 35.383MI/d, DYCP 2044 demand = 52.504MI/d so additional 17.121MI/d required to meet WRZ deficit Increase existing SW abstraction Existing source (Lough Mask LWB) WFD status 2013-2018 – ‘Good’ and projection ‘At Risk’
SAD-101 1100SC0001_H Mid-Galway	-2	Increase existing GW abstraction from existing spring (karstic bedrock - Clare-Corrib groundwater body) <ul style="list-style-type: none"> Mid Galway WRZ – Current WAFU DYCP 2044 = 0.332MI/d, DYCP 2044 demand = 1.086MI/d so additional 0.756MI/d required to meet WRZ deficit Increase existing GW abstraction Existing source (Clare-Galway GWB) WFD status 2013-2018 – ‘Good’ and ‘At Risk’
SAD-111 2200SC0016 Mulranny	-1	New GW abstraction (Newport GWB) <ul style="list-style-type: none"> Mulranny WRZ – Current WAFU DYCP 2044 = 0.587MI/d, DYCP 2044 demand = 0.6MI/d so additional 0.013MI/d required to meet WRZ deficit New GW abstraction New source (Beltra Lough South GWB) WFD status 2013-2018 – ‘Good’ and ‘Not At Risk’

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
SAD-117a 2200SC0017 Newport	-2	Increase SW abstraction from existing River Newport <ul style="list-style-type: none"> • Mulranny WRZ – Current WAFU DYCP 2044 = 0.374MI/d, DYCP 2044 demand = 0.431MI/d so additional 0.057MI/d required to meet WRZ deficit • Increase SW abstraction • New source (Newport RWB) WFD status 2013-2018 – ‘High’ and ‘Not At Risk’
SAD-122 1100SC0001_J Oughterard	-2	Increase SW abstraction from existing Lough Buffy <ul style="list-style-type: none"> • Oughterard WRZ – Current WAFU DYCP 2044 = 2.75MI/d, DYCP 2044 demand = 3.274MI/d so additional 0.524MI/d required to meet WRZ deficit • Increase SW abstraction • Existing source (Newport RWB) WFD status 2013-2018 – ‘Moderate’ and Projection ‘Review’
SAD-201 (Part of Grouped Option SAD-543) 1100SC0001_K Rosmuc	-3	Rationalise Rosmuc to Spiddal (Lough Bouliska) <ul style="list-style-type: none"> • Carraroe WRZ – Current WAFU DYCP 2044 = 2.2MI/d, DYCP 2044 demand = 1.96MI/d so additional 0.24MI/d required to meet WRZ deficit • Increase existing SW abstraction • Existing source (Boliska LWB) WFD status 2013-2018 – ‘Good’ and Projection ‘Review’
SAD-202 (Part of Grouped Option SAD-543) 1100SC0001_M Teeranea Lettermore	-3	Rationalise to Spiddal (Lough Bouliska) <ul style="list-style-type: none"> • Carraroe WRZ – Current WAFU DYCP 2044 = 2.2MI/d, DYCP 2044 demand = 1.96MI/d so additional 0.24MI/d required to meet WRZ deficit • Increase existing SW abstraction • Existing source (Boliska LWB) WFD status 2013-2018 – ‘Good’ and Projection ‘Review’
SAD-211 (Part of Grouped Option SAD-545) 1200SC0035 Tully-Tullycross	-3	New Connemara RWSS (Kylemore Lough) <ul style="list-style-type: none"> • Tully-Tullycross WRZ – Current WAFU DYCP 2044 = 0.272MI/d, DYCP 2044 demand = 0.426MI/d so additional 0.153MI/d required to meet WRZ deficit • New SW abstraction • New source (Kylemore LWB) WFD status 2013-2018 – ‘Good’ and Projection ‘Not At Risk’

Table 4.15 – SACs and SPAs referenced in SAD Preferred Approach figure (Figure 4.9)

Index Code	SAC/SPA Name
D101	Blacksod Bay/Broad Haven SPA
D102	Owenduff/Nephin Complex SPA
D103	Cross Lough (Killadoon) SPA
D104	Lough Carra SPA
D105	Lough Mask SPA
D106	Inishbofin, Omev Island and Turbot Island SPA
D107	Illaunnaon SPA
D108	Lough Corrib SPA
D109	Connemara Bog Complex SPA
D110	Cregganna Marsh SPA
D111	Rahasane Turlough SPA
D112	Inner Galway Bay SPA
D113	Lough Rea SPA
D114	Inishmore SPA
D115	Slieve Aughty Mountains SPA
D116	Clare Island SPA
D201	Owenduff/Nephin Complex SAC
D202	River Moy SAC
D203	Bellacragher Saltmarsh SAC
D204	Lough Gall Bog SAC
D205	Newport River SAC
D206	Corraun Plateau SAC
D207	Clew Bay Complex SAC
D208	Derrinea Bog SAC
D209	West Connacht Coast SAC
D210	Balla Turlough SAC
D211	Drumalough Bog SAC
D212	Carrowbehy/Caher Bog SAC

D213	Oldhead Wood SAC
D214	Ballinafad SAC
D215	Cloonchambers Bog SAC
D216	Brackloon Woods SAC
D217	Lough Cahasy, Lough Baun And Roonah Lough SAC
D218	Towerhill House SAC
D219	Corliskea/Trien/Cloonfelliv Bog SAC
D220	Cross Lough (Killadoon) SAC
D221	Moore Hall (Lough Carra) SAC
D222	Coolcam Turlough SAC
D223	Lough Corrib SAC
D224	Croaghill Turlough SAC
D225	Mweelrea/Sheeffry/Erriff Complex SAC
D226	Carrowkeel Turlough SAC
D227	Williamstown Turloughs SAC
D228	Lough Carra/Mask Complex SAC
D229	Inishbofin And Inishshark SAC
D230	Kilglassan/Cahevavostia Turlough Complex SAC
D231	Rusheenduff Lough SAC
D232	Lisnageeragh Bog and Ballinastack Turlough SAC
D233	Skealaghan Turlough SAC
D234	Greaghans Turlough SAC
D235	Ardkill Turlough SAC
D236	Tully Lough SAC
D237	Tully Mountain SAC
D238	Lough Lurgeen Bog/Glenamaddy Turlough SAC
D239	Clyard Kettle-Holes SAC
D240	Aughrusbeg Machair And Lake SAC
D241	Kildun Souterrain SAC
D242	Omey Island Machair SAC

D243	Barnahallia Lough SAC
D244	The Twelve Bens/Garraun Complex SAC
D245	Ballymaglancy Cave, Cong SAC
D246	Mocorha Lough SAC
D247	Shrule Turlough SAC
D248	Kingstown Bay SAC
D249	Levally Lough SAC
D250	Maumturk Mountains SAC
D251	Derrinlough (Cloonkeenleananode) Bog SAC
D252	Cloughmoyne SAC
D253	Slyne Head Peninsula SAC
D254	Slyne Head Islands SAC
D255	Rosroe Bog SAC
D256	Gortnandarragh Limestone Pavement SAC
D257	Murvey Machair SAC
D258	Cregduff Lough SAC
D259	Dog's Bay SAC
D260	Connemara Bog Complex SAC
D261	Ross Lake And Woods SAC
D262	Monivea Bog SAC
D263	Lough Nageeron SAC
D264	Kilkieran Bay And Islands SAC
D265	Rahasane Turlough SAC
D266	Galway Bay Complex SAC
D267	Lough Rea SAC
D268	Castletaylor Complex SAC
D269	Lough Fingall Complex SAC
D270	Inishmore Island SAC
D271	Inishmaan Island SAC
D272	Inisheer Island SAC

4.6 Overview of Study Area E – Louth

The location of Study Area E (SAE) in relation to the NW region is shown in Figure 4.1 above. The majority of the Study Area is in County Louth, with the southwestern boundary in County Meath, the western boundary in County Cavan and the northwest boundary in County Monaghan. The total area of SAE is approximately 1,261 km² and it lies within the counties of Louth, Monaghan, Meath and Cavan. The principal settlement (with a population of over 10,000) within SAE are Drogheda and Dundalk (Central Statistics Office, 2016).

There are three SACs and three SPAs within the SAE boundary as shown in Table 4.16. European sites within SAE where there is potential for LSE are discussed further in Section 6.2.5.

Table 4.16 - Number of European Sites within the SAE boundary

Study Area	No. of SACs	No. of SPAs
E (Louth)	3	3

4.6.1 Existing Water Supplies

SAE consists of 9 WRZs supplying a population of approximately 84,053 people via approximately 1,036km of distribution network. The largest town is Dundalk, whilst Ardee and Carrickmacross are other areas of high demand within the Study Area. The sources of water supply consist of eight surface water abstractions and eleven groundwater abstractions. The Study Area is summarised in Figure 4.10 below.

Regarding surface water availability in the Study Area, SAE is entirely within the boundaries of the Newry, Fane, Glyde and Dee catchment. This catchment includes the area drained by the Newry, Fane, Glyde and Dee rivers, and by all streams entering tidal water between Murlough Upper and The Haven, Co. Louth. Regarding surface waters within designated areas, there is only the Carlingford Mountain SAC in the north east of the Study Area. There are no High Ecological Status waterbodies within SAE.

Over two thirds of the total water supply for the Study Area comes from surface water sources, with a third supplied from groundwater sources. Around 60% of the SAE supply comes from a large river abstraction at River Fane to supply Cavanhill & North Louth WRZ. The River Fane source was designed as part of a low flow augmentation scheme for the Dundalk Water Supply Scheme some thirty years ago. The River Fane source has two centres of activity as it comprises a headworks at Lough Muckno in County Monaghan to regulate lake levels and outflows, and the abstraction intake from River Fane over 20km downstream in County Louth. Dundalk U.D.C have an historical water order to abstract up to 36.4MI/d from the River Fane.

Elsewhere in the Study Area, the other surface water abstractions consist of another smaller intake from the River Fane at Inniskeen WTP, an abstraction from the River Glyde at Tallanstown WTP, two intakes from the River Dee at Ardee and Greenmount WTPs, two mountain stream sources feed Carlingford WTP, and the small lake source Lough Brackan partly supplies Drumcondrath WTP.

Overall, 22 groundwater sources are managed by Irish Water in the region. The predominant aquifer type of the area is made up of poorly productive bedrock (70%), with a relatively minor contribution from karstic (5%), productive fissured (5%) and sand and gravel aquifers (3%). Although groundwater

abstractions are more numerous than surface water, they serve a smaller fraction of the region's total supply. This highlights the difficulty in procuring large volumes of water from groundwater abstractions.

Much of the Study Area forms part of the low-lying Longford-Down massif and is underlain by sandy and shaley rocks deposited in the Silurian period. These areas, as seen in North Louth and eastern Monaghan, are classified as poorly productive aquifers and will not offer the same kind of groundwater potential as the karstic and productive fissured rocks seen elsewhere. Although fractured, these rocks generally have a low permeability and are regarded as poor aquifers. Such rocks will often yield enough water to supply a house or small farm (0.2-0.5 l/s) and occasionally in major fracture zones may yield a good deal more. However, since the yield often depends on the permeability developed in the uppermost few metres of broken and weathered rock, yields will often decrease markedly in dry spells as the water table falls, and these supplies may therefore be unreliable.

The karst forms a key regionally important aquifer in some areas, most notably in the west of the Study Area around Carrickmacross, which consists of clean limestone that has been extensively karstified. The flow regime in the area is strongly affected by the aquifer, with recharge occurring rapidly. Streams and lakes in the area are also predominantly supplied by baseflow. The well data indicate that high permeability zones exist within the aquifer. Due to the karstic nature of the aquifer, the permeabilities are likely to be variable. Thus, this aquifer is classified as a regionally important karstic aquifer. Given the number of productive wells and the apparent lack of 'failed' or 'poor' wells, this aquifer is considered to be dominated by diffuse flow within the karstic system. Notable high yielding wells in this area include the Nafarty well field, with potential yields of up to 1.6MI/d reported.

The sandstone aquifers which outcrop nearby the aforementioned Carrickmacross area, are classified by the GSI as Locally Important Aquifers - generally moderately productive and would generally offer less groundwater potential than the karst. The main units of interest here are the Kingscourt/Permian-Triassic Sandstones and the Carrickleck Sandstones. The Permian and Triassic are a very significant aquifer in Northern Ireland due to the high yields, however, make up a much smaller areal extent in the Republic. They generally consist of red shales, siltstones and sandstones. Drilling at Mullantra showed the sandstones were very friable and liable to collapse, with yields in the range of 0.5MI/d. The Carrickleck Sandstones are composed of thick alternating sequences of sandstones with shales, with the Carrickleck Sandstone Member being cleaner and less shaley, and therefore considered to be the more productive portions of the aquifer. Groundwater flow in these sandstones is expected to be largely along faults and fractures, however those within the shaley or mudstone beds are likely to be closed due to the high clay content. The wells at Descart have a proven combined yield of 2.16MI/day, although they are believed to receive much of their supply from the deeper, confined, dolomitised limestone strata.

There are a number of locally important sand and gravel aquifers in the region, namely in the east at Williamstown, Dromiskin and Dundalk. There is potential for saline intrusion, namely along the eastern side of Dromiskin, and some interaction between the River Fane and groundwater. It is thought the variability in the recorded yields is a reflection in the variability in composition of the deposits.

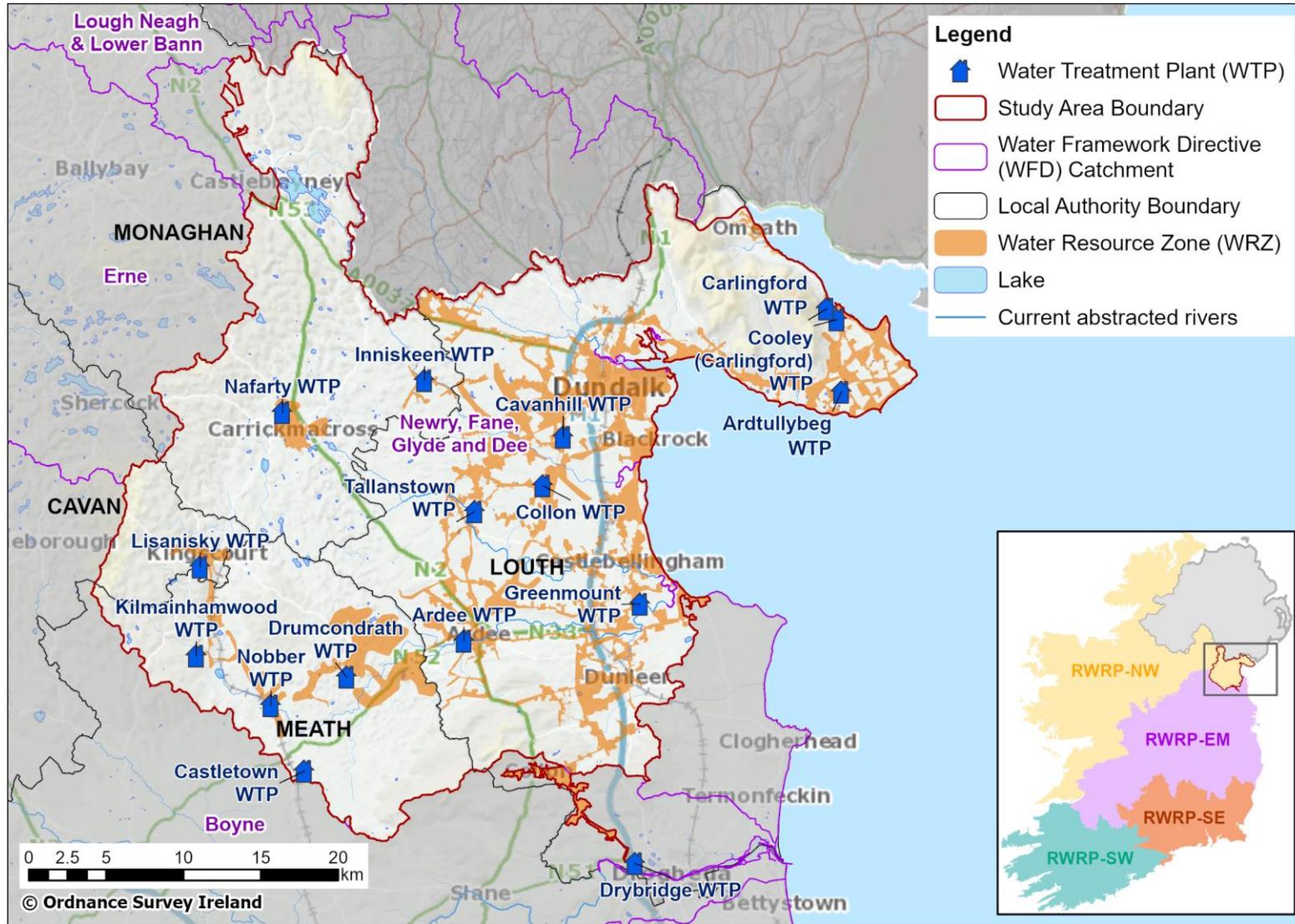


Figure 4.10 - Study Area E Louth Summary

4.6.2 SAE Options Removed at Coarse Screening

The options detailed in Table 4.17 below were removed at Coarse Screening on environmental grounds.

Table 4.17 - SAE – Options removed at Coarse Screening on environmental grounds

Option Reference	Option Description	Rejection Reasoning
SAE-012	New wellfield at Ardtullybeg site - pumps and rising main is the limiting factor here and to be upgraded as part of options assessment.	Abstracting the volume of water required is considered unfeasible.
SAE-015	Potential to look at bringing WTP at Castletown back into operation - Annaskeagh, supply off Cooley Mountains.	Abstracting the volume of water required is considered unfeasible.
SAE-016	Rationalisation Drumcondrath to new GW supply at Ardee.	Abstracting the volume of water required is considered unfeasible.
SAE-016a	GW potential from limestone aquifer at Ardee, east of plant.	Abstracting the volume of water required is considered unfeasible.
SAE-017	Upgrade of Drumcondrath WTP to solve water quality issues (CFC package plant), WRZ not in deficit.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAE-018	New SW source abstraction on the River Dee, new WTP or upgrade of existing WTP, abandon existing Lough Bracken source. Full demand required.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAE-023	New GW abstraction in Kingscourt GWB. Rationalise Nobber WTP to Kilmainhamwood WTP.	Abstracting the volume of water required is considered unfeasible.
SAE-023a	New GW abstraction in Carrickmacross GWB. Rationalise Kilmainhamwood WTP to Nobber WTP.	Abstracting the volume of water required is considered unfeasible.
SAE-035	Possible option of supplying/interconnecting with Tullyallen Group Water Scheme.	Abstracting the volume of water required is considered unfeasible.
SAE-039	Supply Drumcondrath from new GW at Kingscourt and rationalise to Kilmainhamwood.	Abstracting the volume of water required is considered unfeasible.

Option Reference	Option Description	Rejection Reasoning
SAE-039b	New GW from Kingscourt GWB. Includes gravity main from Kilmainhamwood, rationalising Nobber and Drumcondrath.	Abstracting the volume of water required is considered unfeasible.
SAE-040	Connect Drumcondrath to Kilmainhamwood (New GW from Nobber (Karstic GWB)).	Abstracting the volume of water required is considered unfeasible.
SAE-040b	New GW from Nobber (Karstic GWB) and connect to and rationalise Drumcondrath.	Abstracting the volume of water required is considered unfeasible.
SAE-046	New SW abstraction at the confluence of the River Dee and River Glyde to supply deficit at Ardee, Collon and Drybridge WRZ.	There are water quality issues associated with this option.

4.6.3 Preferred Approach for SAE

Full details of the Preferred Approach (and how it was reached) are included in the SAE Technical Report in Appendix 5 of the draft RWRP-NW. The final Preferred Approach for SAE is shown in Table 4.18 below. The findings of the Preferred Approach Development for SAE Louth include the following:

- Six options score a 0 in relation to potential impact on a designated European Site.
- There are no -3 scores against designated European sites within the Preferred Approach.
- One option has no score due to it being an import maintained from Northern Ireland which is not managed by IW (SAE-033), and therefore does not need to be assessed.
- The remaining options within the Preferred Approach have a -1 score against European sites.

In summary, the Preferred Approach for SAE is the Combination 7 approach which consists of local WRZ solutions for Cavanhill & North Louth, Castletown (Meath County Council), Kilmainhamwood/ Nobber, Carrickarnon (Water Supplied from NI-Water Import), Kingscourt PWS, Carrickmacross and Inniskeen WRZs, primarily driven by the small scale of the supplies and difficulties in transporting small volumes of water over long distances.

The Preferred Approach for Collon Drybridge and Ardee involves developing a new groundwater source at Ardee WTP and rationalising Collon and Drybridge to South Louth East Meath. The Preferred Approach for Drumcondrath involves developing two new groundwater sources at Possextown and Rolagh townland to address the deficit within the WRZ.

Delivery of the Preferred Approach will secure all of the supplies in the area in terms of Quality, Quantity, Sustainability and Resilience. The Preferred Approach for SAE Louth also includes for demand side (**Lose Less** and **Use Less**) measures, including:

- Ongoing leakage management including active leakage control, pressure management and find and fix activities to offset Natural Rate of Leakage Rise (NRR).

- Continuation of Irish Water household and business water conservation campaigns, initiatives and education programmes.
- The option to implement legally enforceable Water Conservation Orders in drought periods in order to protect the environment and our public water supplies.

All of the options that make up the final Preferred Approach and assessed as part of the NIS are shown in Table 4.18 and shown in Figure 4.11 below.

Table 4.18 - Final Preferred Approach for SAE – Options

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
<p>SAE-001 2100SC0002 Cavanhill & North Louth</p>	<p>-1</p>	<p>Dependant on operational regime implementation, increase abstraction from the River Fane and upgrade existing WTP to meet critical peak demand. Supervisory Control and Data Acquisition (SCADA) and weir control system upgrade required</p> <ul style="list-style-type: none"> • Cavanhill & North Louth WRZ in deficit so increase existing SW abstraction (River Fane) to meet WRZ future deficit • Cavanhill & North Louth PWS WRZ current WAFU DYCP 2044 = 30.335MI/d, DYCP 2044 demand = 31.183MI/d so additional 0.847MI/d required to meet WRZ deficit • Existing GW and SW abstractions maintained • Existing sources: (Dundalk GWB) WFD status 2013-2018 – Good, (Fane RWB) WFD status 2013-2018 – Good, (Dundalk Gravels GWB) WFD status 2013-2018 – Good, (Dee RWB) WFD status 2013-2018 – Poor and (Glyde RWB) WFD status 2013-2018 – Moderate
<p>SAE-049 and SAE-050 (Part of Grouped Option SAE-508) 2100SC0007 Ardee, Collon and Drybridge</p>	<p>-1</p>	<p>New GW (partial supply) for Ardee within WTP vicinity. Rationalise Collon Drybridge to South Louth East Meath</p> <ul style="list-style-type: none"> • Ardee, Collon and Drybridge WRZ in deficit so new GW abstraction to meet WRZ partial future deficit and rationalise Collon WTP and Drybridge WTP to South Louth East Meath WRZ • Ardee, Collon and Drybridge WRZ current WAFU DYCP 2044 = 4.643MI/d, DYCP 2044 demand = 6.22MI/d so additional 1.576MI/d required to meet WRZ deficit • Existing GW abstractions for Collon WTP and Drybridge WTP to be decommissioned. Existing GW and SW abstractions for Ardee WTP maintained • Existing sources: (Drogheda GWB) WFD status 2013-2018 – Good, (Wilkinstown GWB) WFD status 2013-2018 – Good. Dee RWB - WFD status 2013-2018 – Poor • New source (Ardee GWB) WFD status 2013-2018 – Good and At Risk
<p>SAE-037 and SAE-038 (Part of Grouped Option SAE-513) 2300SC0004 Drumcondrath</p>	<p>0</p>	<p>Groundwater (Ardee GWB poorly productive bedrock) from locally important aquifer at Possextown. Groundwater (Ardee GWB poorly productive bedrock) from Rolagh townland</p> <ul style="list-style-type: none"> • Drumcondrath WRZ in deficit so abandon existing GW and SW abstractions and provide new GW abstractions to meet WRZ future demand • Drumcondrath WRZ current WAFU DYCP 2044 = 1.146MI/d, DYCP 2044 demand = 1.615MI/d so additional 0.469MI/d required to meet WRZ deficit • Existing GW and SW to be decommissioned • Existing sources: (Ardee GWB) WFD status 2013-2018 – Good and (Brackan LWB) WFD status 2013-2018 – Moderate

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
		<ul style="list-style-type: none"> New sources - Carrickmacross GWB; WFD status 2013-2018 – Good and Not at Risk. Kingscourt GWB; WFD status 2013-2018 – Good and Not at Risk
SAE-021 2300SC0024 Castletown	0	GW enhancement at Castletown <ul style="list-style-type: none"> Castletown WRZ in deficit so increase existing GW abstraction to meet WRZ future deficit Castletown WRZ current WAFU DYCP 2044 = 0.037MI/d, DYCP 2044 demand = 0.041MI/d so additional 0.005MI/d required to meet WRZ deficit Existing GW abstraction maintained Existing source (Ardee GWB) WFD status 2013-2018 – Good and At Risk
SAE-024 2300SC0025 Kilmainhamwood/Nobber	0	Maintain both plants and new GW abstractions in Kingscourt GWB <ul style="list-style-type: none"> Kilmainhamwood WRZ in deficit so new GW abstraction to meet WRZ future deficit Kilmainhamwood WRZ current WAFU DYCP 2044 = 0.463MI/d, DYCP 2044 demand = 0.551MI/d so additional 0.088MI/d required to meet WRZ deficit Existing GW abstraction maintained Existing sources: (Kingscourt GWB) WFD status 2013-2018 – Good and Not at Risk
SAE-033 2100SC0013 Carrickarnon	N/A	Maintain import from Northern Ireland (see above in Section 4.6.3 for further details) <ul style="list-style-type: none"> Carrickarnon WRZ current WAFU DYCP 2044 = 0mL/d, DYCP 2044 demand = 0.061MI/d so 0.061MI/d required to meet WRZ full demand Existing import maintained Existing source Northern Ireland Water No information available for Northern Ireland water
SAE-061 0200SC0018 Kingscourt PWS	0	Upgrade Lisanisky WTP for water quality improvements. Kingscourt WRZ is not in deficit <ul style="list-style-type: none"> Kingscourt WRZ in projected surplus so WTP upgrade works only Kingscourt WRZ current WAFU DYCP 2044 = 1.285MI/d, DYCP 2044 demand = 1.081MI/d so surplus of 0.204MI/d Existing GW abstraction maintained Existing source (Kingscourt GWB) WFD status 2013-2018 – Good and Not at Risk
SAE-050b 2400SC0006 Carrickmacross	0	Upgrade WTP for water quality improvements. Carrickmacross WRZ is not in deficit <ul style="list-style-type: none"> Carrickmacross WRZ in projected surplus so WTP upgrade works only Carrickmacross WRZ current WAFU DYCP 2044 = 3.227MI/d, DYCP 2044 demand = 1.757MI/d so surplus of 1.47MI/d

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
		<ul style="list-style-type: none"> Existing GW abstractions maintained Existing source (Carrickmacross GWB) WFD status 2013-2018 – Good and Not at Risk
SAE-052 2400SC0009 Inniskeen	0	Upgrade WTP for water quality improvements. Inniskeen WRZ is not in deficit <ul style="list-style-type: none"> Inniskeen WRZ in projected surplus so WTP upgrade works only Inniskeen WRZ current WAFU DYCP 2044 = 0.422MI/d, DYCP 2044 demand = 0.237MI/d so surplus of 0.185MI/d Existing SW abstraction maintained Existing source (Fane RWB) WFD status 2013-2018 – Moderate and At Risk

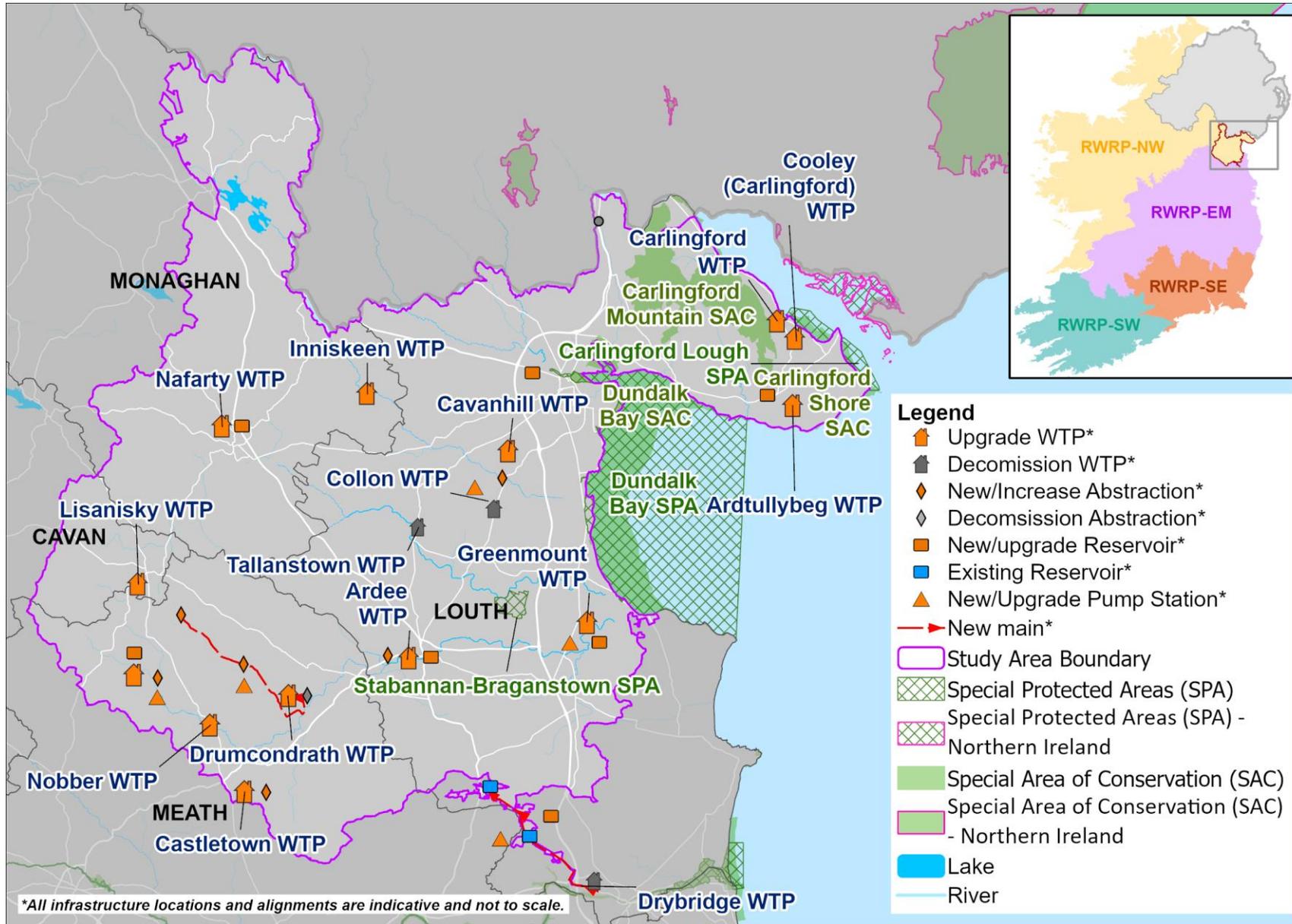


Figure 4.11 - Study Area E – Preferred Approach and European sites within SAE boundary

4.7 Overview of Study Area F – Roscommon and Leitrim

The location of Study Area F (SAF) in relation to the NW region is shown in Figure 4.1 above. The Study Area extends across parts of County Cavan, Galway, Leitrim, Longford, Roscommon and Sligo. The total area of SAF is approximately 3,990 km² and it lies within the counties of Roscommon, Leitrim, Longford, Galway, Sligo, Cavan, Mayo and Westmeath. The principal settlement (with a population of over 10,000) within SAF is Longford (Central Statistics Office, 2016).

There are thirty-five SACs and seven SPAs within the SAF boundary as shown in Table 4.19. European sites within SAF where there is potential for LSE are discussed further in Section 6.2.6.

Table 4.19 - Number of European Sites within the SAF boundary

Study Area	No. of SACs	No. of SPAs
F (Roscommon and Leitrim)	35	7

4.7.1 Existing Water Supplies

SAF consists of 15 WRZs supplying a population of approximately 85,573 people via approximately 3,340km of distribution network. The town of Longford is the largest demand centre, with other notable towns including Roscommon and Carrick-On-Shannon. The sources of water include thirteen groundwater sites and five surface water sources. The Study Area is summarised in Figure 4.12 below.

Regarding surface water availability in SAF, the Study Area mainly extends across parts of the large Upper Shannon catchment, except for a small section in the north east crossing into the Erne catchment. The sections of the Upper Shannon catchment within SAF covers the upper reaches around Lough Allen, the adjoining Boyle River sub catchment which includes Lough Gara, and then further downstream sections where the Shannon flows through Lough Forbes before entering the large Lough Ree.

SAF has a number of designated area sites including a few small water dependent SACs such as the Lough Forbes Complex SAC and Callow Bog SAC. There are some sections of the Upper Shannon catchment with WFD High Status Objectives, but none designated for freshwater pearl mussel.

Around 60% of the water supply to SAF comes from surface water sources, with water being abstracted from four lake sources and one direct river abstraction within the Upper Shannon system. The largest abstraction is from the Lough Gara source, which supplies up to 10MI/d to North Roscommon RWSS WRZ. Closely followed by the direct river abstraction from the River Shannon to supply up to 9.5MI/d to Carrick on Shannon WRZ. Elsewhere, Grange Lough supplies up to 7.2MI/d to North East Regional PWS WRZ, Lough Forbes supplies up to 6.9MI/d to Longford Central WRZ, and Lough Kinale supplies up to 2MI/d to Granard WRZ.

Overall, thirteen groundwater sources are managed by Irish Water in the region. The predominant aquifer type of the area is made up of karstic (57%) bedrock followed by poorly productive (40%), with a relatively minor contribution from productive fissured (3%). There are no sand and gravel bodies mapped in the area. 45 of the 51 public supply sources in County Roscommon are supplied by karstified limestones, highlighting their potential for to supply large quantities of water.

The karst forms a key regionally important aquifer in some areas, underlying much of Roscommon, which consists of clean limestone that has been extensively karstified. This band also extends north into Leitrim and east into Longford. All of the area's groundwater abstractions occur in this setting, with the majority appearing as spring overflows, which serve as points of groundwater discharge. Limestone

dissolution during karstification causes groundwater flow to concentrate along certain pathways/conduits, making it difficult to locate successful wells. Locating high yielding wells in Regionally Important Karstified Bedrock type aquifers can be difficult due to the uneven distribution of permeability; failed and high yielding wells can occur close together. Both point and diffuse recharge occur. Diffuse recharge occurs via rainfall percolating through permeable subsoil and rock outcrops. Despite the presence of peat and till, point recharge to the underlying aquifer occurs by means of swallow holes and collapse features/dolines. The largest abstractions in the region take place from springs, most notably at Roscommon Central WSS (circa 6MI/d), Boyle/Ardcarne WSS (circa 5.5MI/d) and Castlerea WSS (circa 2.5MI/d). The Dinantian (Lower Carboniferous) Impure Limestones are interleaved in places with the Pure Bedded Limestones. The limestones are often characterised by the occurrence of chert and shale bands and are generally less productive than the Pure Bedded Limestones. These rocks occur primarily in the east of the Study Area in Longford.

The Namurian Sandstones and Shales make up the 'shale uplands' in Leitrim, an area of flat-topped hills. The fractured upper and more permeable layer is unlikely to provide sustainable supplies for larger wells and will often contain lesser quality water than the deeper permeable horizons. In general, optimum well yields from the Namurian aquifers will be obtained from boreholes drilled into one of the many fault zones and penetrating at least 50-100m of the aquifer. Groundwater flow in the lesser productive Dinantian Shales and Limestones circulates primarily through fissures as these rocks do not show significant intergranular permeability, and are predominantly interbedded shales and limestones, with little or no sandstone content. Development will usually be possible in local zones (i.e. along faults, fractures and zones of clean limestone).

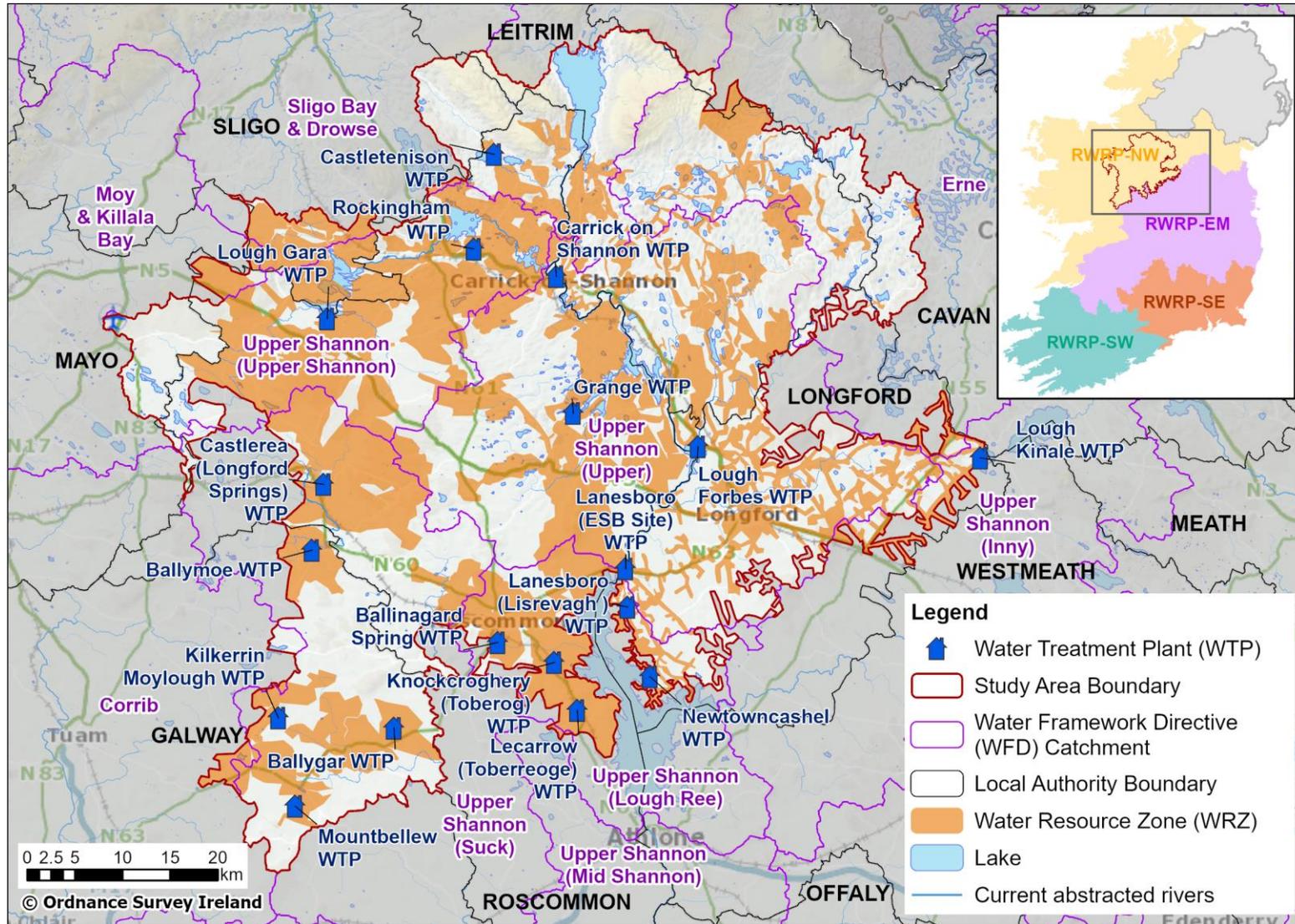


Figure 4.12 - Study Area F Roscommon and Leitrim Summary

4.7.2 SAF Options Removed at Coarse Screening

The options detailed in Table 4.20 below were removed at Coarse Screening on environmental grounds.

Table 4.20 - SAF – Options removed at Coarse Screening on environmental grounds

Option Reference	Option Description	Rejection Reasoning
SAF-003	New riverbank filtration adjacent to River Shannon at Carrick-on-Shannon to supply deficit in South Leitrim RWSS WRZ.	Abstracting the volume of water required is considered unfeasible.
SAF-008	Partly supply deficit from Arigna (Co. Roscommon) to Drumshambo.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAF-099	Partly supply deficit from Arigna (Co. Roscommon) to Drumshambo.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAF-017	Increase GW abstraction from ESB well and extend supply from Lanesboro into Newtowncashel and upgrade WTP.	Abstracting the volume of water required is considered unfeasible.
SAF-019	New riverbank filtration adjacent to River Shannon at Lanesborough to supply deficit in Lanesboro & Newtowncashel WRZ.	Difficult to constrain whether there are gravels beneath the alluvium and no information available on the alluvium itself.
SAF-025	Raw water impoundment in cutaway bog area to capture flood water in Lanesboro & Newtowncashel WRZ.	A bog is located on a regionally important aquifer (Karstified) presenting a water quality issue.
SAF-037	Develop new wellfield in North East Regional PWS and supply deficit to neighbouring WRZs.	Abstracting the volume of water required is considered unfeasible.
SAF-113	Develop new wellfield in North East Regional and supply neighbouring WRZs.	Abstracting the volume of water required is considered unfeasible.
SAF-114	Develop new wellfield in North East Regional and supply neighbouring WRZs.	Abstracting the volume of water required is considered unfeasible.
SAF-115	Develop new wellfield in North East Regional and supply neighbouring WRZs.	Abstracting the volume of water required is considered unfeasible.
SAF-116	Develop new wellfield in North East Regional and supply neighbouring WRZs.	Abstracting the volume of water required is considered unfeasible.

Option Reference	Option Description	Rejection Reasoning
SAF-117	Develop new wellfield in North East Regional and supply neighbouring WRZs.	Abstracting the volume of water required is considered unfeasible.
SAF-078	New SW abstraction for Kilkerrin Moylough WRZ to supply deficit.	This option has a lack of suitable SW river sources in local vicinity that can meet the deficit. This is not a sustainable long-term abstraction to supply deficit.
SAF-147	Maintain supply to Arvagh WRZ from Erne Valley GWS.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAF-150	Keep supplying Killeshandra WRZ from Erne Valley GWS.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAF-151	Recommission Portaliffe WTP (Mill Lough) and supply Killeshandra.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.

4.7.3 Preferred Approach for SAF

Full details of the Preferred Approach (and how it was reached) are included in the SAF Technical Report in Appendix 6 of the draft RWRP-NW. The final Preferred Approach for SAF is shown in Table 4.21 below. The findings of the Preferred Approach Development for SAF Roscommon and Leitrim at WRZ level, include the following:

- Four options score a 0 in relation to potential impact on a designated European Site.
- There are two -3 scores against designated European sites within the Preferred Approach; option SAF-052 and Group option SAF-534.
- The remaining options within the Preferred Approach have either a -1 or a -2 score against European sites.

In summary, the Preferred Approach for SAF is the Combination 1 approach which consists of local WRZ for Arigna Regional PWS, Ballymoe P.S, Castlerea PWS, Granard, Killeshandra PWS (GWS Import), Lanesboro & Newtowncashel, Longford Central, Mountbellew, North East Regional PWS, North Roscommon RWSS, Roscommon Central WSS WRZs in the Study Area. As part of Grouped Preferred Approach, it is proposed to rationalise Arvagh PWS (GWS Import) to Gowna WRZ, rationalise Kilkerrin/Moylough to Dunmore/Glenamaddy and interconnect Boyle with Carrick-on-Shannon WRZ and supply deficit from Carrick-on-Shannon. It is also proposed to increase abstraction from River Shannon and upgrade Carrick-on-Shannon WTP.

Delivery of the Preferred Approach will secure all of the supplies in the area in terms of Quality, Quantity, Sustainability and Resilience. The Preferred Approach for SAF Roscommon and Leitrim also includes for demand side (**Lose Less** and **Use Less**) measures, including:

- Ongoing leakage management including active leakage control, pressure management and find and fix activities to offset Natural Rate of Leakage Rise (NRR).

- Continuation of Irish Water household and business water conservation campaigns, initiatives and education programmes.
- The option to implement legally enforceable Water Conservation Orders in drought periods in order to protect the environment and our public water supplies.

All of the options that make up the final Preferred Approach and assessed as part of the NIS are shown in Table 4.21 and shown in Figure 4.13 below.

Table 4.21 - Final Preferred Approach for SAF – Options

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
SAF-068 2600SC0007 Arigna Regional PWS	0	Not in deficit - WTP Upgrade <ul style="list-style-type: none"> Arigna WRZ not in deficit – Upgrade works only Arigna Regional PWS, WRZ current WAFU DYCP 2044 = 1.254MI/d, DYCP 2044 demand = 0.591MI/d so additional 0.663MI/d to meet SDB Existing GW source (Lough Allen Uplands) WFD status 2013-2018 – “Good” and “Not At Risk”
SAF-148 (Part of Grouped Option SAF-542) 0200SC0001 Arvagh PWS (GWS Import)	1	Rationalise Arvagh to Gowna WRZ <ul style="list-style-type: none"> Arvagh PWS, WRZ current WAFU DYCP 2044 = TBC, DYCP 2044 demand = 0.199MI/d so additional TBC to meet SDB Existing SW source (Lough Gowna North) WFD status 2013 -2018 – “Poor” and “At Risk”
SAF-149 (Part of Grouped Option SAF-542) 0200SC0004 Gowna	1	Increase SW abstraction and supply Arvagh <ul style="list-style-type: none"> Arvagh PWS, WRZ current WAFU DYCP 2044 = TBC, DYCP 2044 demand = 0.199MI/d so additional TBC to meet SDB Existing SW source (Lough Gowna North) WFD status 2013 -2018 – “Poor” and “At Risk”
SAF-072 1200SC0001 Ballymoe P.S.	0	WTP upgrade - no deficit <ul style="list-style-type: none"> WRZ current WAFU DYCP 2044 = 0.733MI/d, DYCP 2044 demand = 0.683MI/d, so surplus of 0.05MI/d Existing GWB source (Suck South) WFD status 2013-2018 – “Good” and “Under Review”
SAF-066 (Part of Grouped Option SAF-529) 2600SC0008 Boyle Regional	0	Interconnect Boyle Ardcarne with South Leitrim WRZ and supply deficit <ul style="list-style-type: none"> WRZ current WAFU DYCP 2044 = 4.583MI/d, DYCP 2044 demand = 4.988MI/d so additional 0.405MI/d to meet SDB Existing Shannon Upper SWB source WFD status 2013-2018 – “Poor” and “At Risk”

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
SAF-039 2600SC0003 Castlerea PWS	-1	Increase GW abstraction at Longford Springs to supply deficit and upgrade WTP <ul style="list-style-type: none"> Castlerea PWS current WAFU DYCP 2044 = 0.99MI/d, DYCP 2044 demand = 3.225MI/d so additional 2.235MI/d to meet SDB Existing GW source (Suck South) WFD status 2013-2018 – “Good” and “under review”
SAF-030 2000SC0002 Granard	-2	Increase SW abstraction from Lough Kinale, relocate existing intake and upgrade WTP <ul style="list-style-type: none"> Granard WRZ current WAFU DYCP 2044 = 1.833MI/d, DYCP 2044 demand = 2.051MI/d so additional 0.217MI/d to meet SDB Existing LWB source (Lough Kinale) WFD status 2013-2018 – “Moderate” and “At Risk”
SAF-081 (Part of Grouped Option SAF-534) 1100SC0001_F Kilkerrin/Moylough	-3	Rationalise to Dunmmore Glenamaddy <ul style="list-style-type: none"> WRZs current WAFU DYCP 2044 = 1.022MI/d, DYCP 2044 demand = 1.659MI/d so additional 0.637MI/d to meet SDB Existing GWB source (Clare-Corrib) WFD status 2013-2018 – “Good” and “At Risk”
SAF-133 (Part of Grouped Option SAF-534) 1100SC0001_D Dunmore/Glenamaddy P.S.	-3	Increase GW abstraction at Gortgarrow Spring, upgrade WTP <ul style="list-style-type: none"> WRZs current WAFU DYCP 2044 = 1.022MI/d, DYCP 2044 demand = 1.659MI/d so additional 0.637MI/d to meet SDB Existing GWB source (Clare-Corrib) WFD status 2013-2018 – “Good” and “At Risk”
SAF-156 0200SC0005 Killeshandra PWS (GWS Import)	-2	New SW abstraction from Lake Town and new WTP <ul style="list-style-type: none"> Killeshandra current WAFU DYCP 2044 = TBC, DYCP 2044 demand = TBC so additional TBC to meet SDB Existing LWB source (Town Lough) WFD status 2013-2018 – “Poor” and “Under Review”
SAF-021 200SC0001 Lanesboro & Newtowncashel	-2	New GW abstraction to supply deficit at Lanesboro & Newtowncashel, upgrade Lisreevagh WTP <ul style="list-style-type: none"> Lanesboro & Newtowncashel WRZ current WAFU DYCP 2044 = 3.634MI/d, DYCP 2044 demand = 4.116MI/d so additional 0.481MI/d to meet SDB Existing GW source (Funshinagh GWB) WFD status 2013-2018 – “Good” and “At Risk”.

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
SAF-009 2000SC0005 Longford Central	-2	Increase SW abstraction from Lough Forbes and upgrade WTP <ul style="list-style-type: none"> Longford Central WRZ current WAFU DYCP 2044 = 6.325MI/d, DYCP 2044 demand = 10.971MI/d so additional 4.646MI/d to meet SDB Existing SW source (Lough Forbes) WFD status 2013-2018 – “Moderate” and “At Risk”
SAF-084 1100SC0001_I Mountbellew	-2	Increase GW abstraction for Mountbellew WRZ to supply deficit <ul style="list-style-type: none"> Mountbellew WRZ current WAFU DYCP 2044 = 2.146MI/d, DYCP 2044 demand = 2.482MI/d so additional 0.336MI/d to meet SDB Existing GWB source (South Suck) WFD status 2013-2018 – “Good” and “Under Review”
SAF-161 2600SC0002 North East Regional PWS	0	Not in deficit - WTP Upgrade <ul style="list-style-type: none"> North East Regional PWS WRZ current WAFU DYCP 2044 = 6.6MI/d, DYCP 2044 demand = 4.719MI/d so additional 1.881MI/d to meet SDB Existing LWB source (Grange lough) WFD status 2013-2018 – “Good” and “Not At Risk” WRZ not in deficit so no additional abstraction Existing WTP footprint, upgrade works only
SAF-052 2600SC0009 North Roscommon RWSS	-3	Abandon existing intake. New intake from middle lake to meet full demand. New 1.6km raw water mains to existing WTP. Upgrade of WTP to meet full demand <ul style="list-style-type: none"> North Roscommon RWSS WRZ current WAFU DYCP 2044 = 8.708MI/d, DYCP 2044 demand = 10.247MI/d so additional 1.538MI/d to meet SDB Existing LWB source (Lough Gara) WFD status 2013-2018 – “Moderate” and “At Risk”
SAF-038 2600SC0004 Roscommon Central WSS	-1	WTP Upgrade - Not in deficit, pump tests to prove high yield spring and BHs <ul style="list-style-type: none"> Roscommon Central WSS WRZ current WAFU DYCP 2044 = 7.517MI/d, DYCP 2044 demand = 5.458MI/d so additional 2.058MI/d to meet SDB Existing GW source (Los) WFD status 2013-2018 – “Good” and “Not At Risk”
SAF-128 (Part of Grouped Option SAF-529) 1700SC0001	0	Interconnect Boyle Ardcarne with South Leitrim WRZ and supply deficit (increase abstraction from Shannon and upgrade WTP) <ul style="list-style-type: none"> Carrick-on-Shannon WRZ current WAFU DYCP 2044 = 8.708MI/d, DYCP 2044 demand = 13.982MI/d so additional 5.274MI/d to meet SDB

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
Carrick-on-Shannon		<ul style="list-style-type: none"> <li>Existing Shannon Upper SWB source WFD status 2013-2018 – “Poor” and “At Risk”

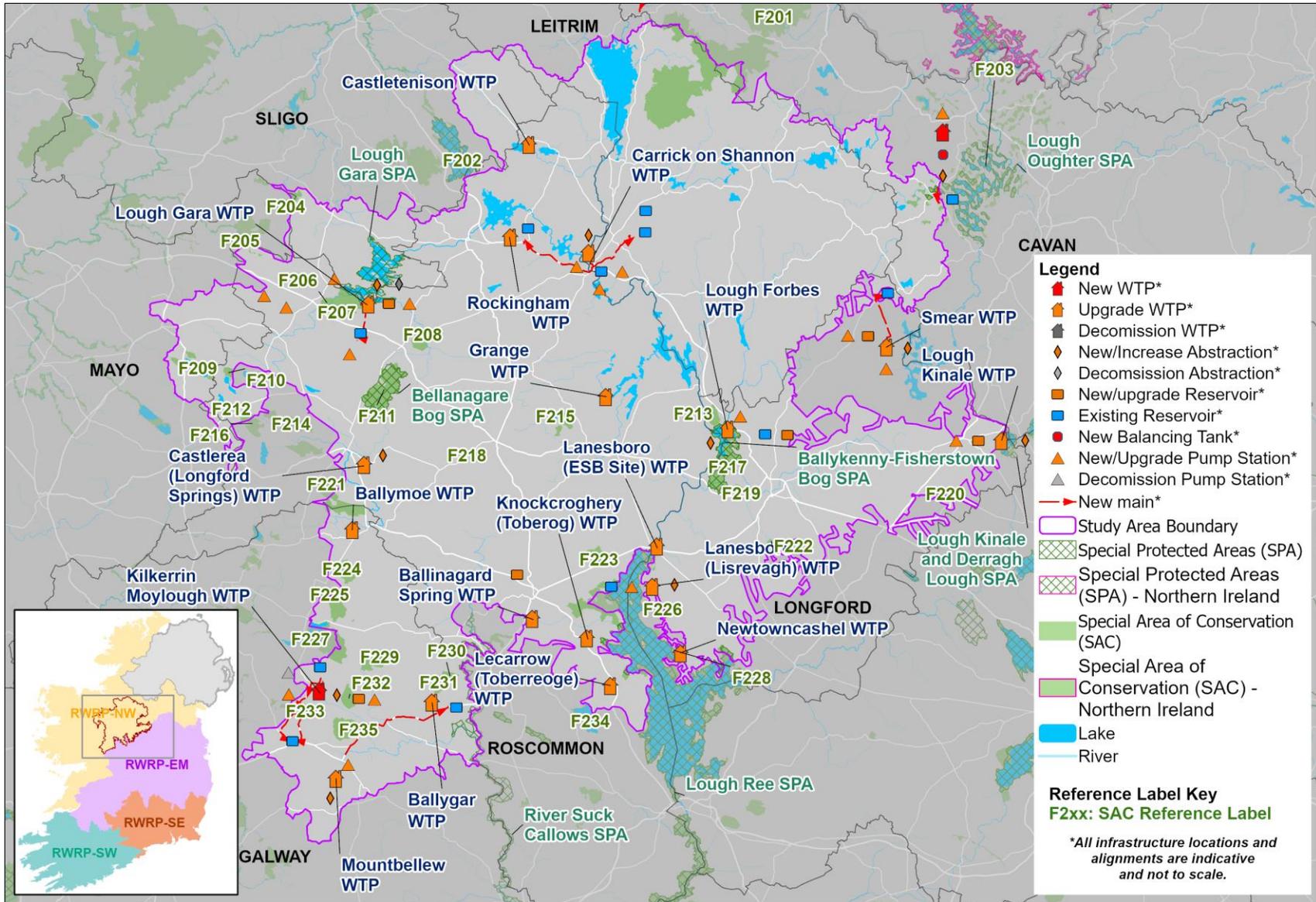


Figure 4.13 - Study Area F – Preferred Approach and European sites within SAF boundary. See Table 4.22 for list of SACs referenced on figure

Table 4.22 – SACs referenced in SAF Preferred Approach figure (Figure 4.13)

Index Code	SAC/SPA Name
F201	Cuilcagh - Anierin Uplands SAC
F202	Lough Arrow SAC
F203	Lough Oughter And Associated Loughs SAC
F204	Flughany Bog SAC
F205	River Moy SAC
F206	Tullaghanrock Bog SAC
F207	Callow Bog SAC
F208	Cloonshanville Bog SAC
F209	Urlaur Lakes SAC
F210	Derrinea Bog SAC
F211	Bellanagare Bog SAC
F212	Errit Lough SAC
F213	Clooneen Bog SAC
F214	Drumalough Bog SAC
F215	Annaghmore Lough (Roscommon) SAC
F216	Carrowbehy/Caher Bog SAC
F217	Lough Forbes Complex SAC
F218	Mullygollan Turlough SAC
F219	Brown Bog SAC
F220	Ardagullion Bog SAC
F221	Corliskea/Trien/Cloonfelliv Bog SAC
F222	Mount Jessop Bog SAC
F223	Corbo Bog SAC
F224	Kilsallagh Bog SAC
F225	Lisnageeragh Bog and Ballinastack Turlough SAC
F226	Fortwilliam Turlough SAC
F227	Lough Lurgreen Bog/Glenamaddy Turlough SAC
F228	Lough Ree SAC

F229	Camderry Bog SAC
F230	Aughrim (Aghrane) Bog SAC
F231	Ballygar (Aghrane) Bog SAC
F232	Curraghlehane Bog SAC
F233	Shankill West Bog SAC
F234	Lough Funshinagh SAC
F235	Carrownagappul Bog SAC

4.8 Overview of Study Area G – Clare

The location of Study Area G (SAG) in relation to the NW region is shown in Figure 4.1 above. The majority of the Study Area is in County Clare, with the northeast boundary in County Galway. The total area of SAG is approximately 2,389 km² and it lies within the counties of Clare and Galway. There are no principal settlements with a population of over 10,000 within SAG. The largest settlements (with population of over 2,000) within SAG are Gort and Kilrush (Central Statistics Office, 2016).

There are thirty-three SACs and nine SPAs within the SAG boundary as shown in Table 4.23. European sites within SAG where there is potential for LSE are discussed further in Section 6.2.7.

Table 4.23 - Number of European Sites within the SAG boundary

Study Area	No. of SACs	No. of SPAs
G (Clare)	33	9

4.8.1 Existing Water Supplies

SAG consists of 9 WRZs supplying a population of approximately 29,804 people via approximately 1,454km of distribution network. West Clare with the towns Kilrush and Kilkee is the high demand area, whilst the town of Ennistymon is another significant demand area within the Study Area. The sources of water supply consist of six surface water abstractions and five groundwater abstraction sites. The Study Area is summarised in Figure 4.14 below.

Regarding surface water availability in the Study Area, SAG is split between the Mal Bay catchment in the west, the Shannon Estuary North catchment in the south and central parts, and the Galway Bay South East catchment in the north.

The Mal Bay catchment consists of several small river sub catchments flowing west into the Atlantic Ocean. The parts of the Shannon Estuary North catchment in the Study Area includes small coastal sub catchments in the south flowing into the Shannon Estuary, whilst in the north the River Fergus drains an area underlain with highly karstified limestone geology where the surface water drainage network is either virtually absent (i.e. The Burren) or highly connected to the groundwater system. The areas of the Galway Bay South East catchment within the north of the Study Area includes the Kilchreest River which flows west before crossing onto the limestones near Gort where it follows a pattern of sinking underground and re-emerging before flowing underground through caverns and resurfacing via springs flowing into Galway Bay around Kinvara.

The Study Area has several designated SACs, especially in the north, with the largest designation being the East Burren Complex SAC which covers an area across both the Shannon Estuary North and Galway Bay South East catchments.

Around 90% of the total water supplies for the Study Area come from surface water sources, and more specifically a few large lake abstractions. The Doo Lough source is the most significant abstraction source in SAG and has the most strategic importance for the future water supply of the region. Doo Lough is an impounding reservoir on the Annageeragh River within the Mal Bay catchment and feeds both the Old and New Doolough WTPs to supply West Clare WRZ, the largest water resource zone in Study Area. The reservoir has a fish pass and compensation flow constructed as part of the dam, and an existing historical abstraction licence allowing up to 40MI/d.

Elsewhere in SAG, other surface water abstractions include Lickeen Lake, a natural lake source in the River Inagh sub catchment within the Mal Bay catchment, which supplies Ennistymon WRZ. In the south of the Study Area, the small Gortglass Lough source, within the Shannon Estuary North catchment, supplies Killadysert PWS WRZ. In the centre of the Study Area, the Lough Inchiquin source, a lake on the River Fergus located within the karstified limestone region of the Shannon Estuary North catchment, supplies Corofin PWS WRZ. In the north of the Study Area, the Cannahawna River source, within the Galway Bay South East catchment, partly supplies Gort WRZ in combination with some borehole abstractions.

The predominant aquifer type of the area is made up of poorly productive bedrock (73%), with the remainder (27%) consisting of karstic productive aquifers. There are no major productive fissured or sand and gravel aquifers mapped in SAG. The majority of the large abstractions occur as springs which emerge mainly in the Burren region. This is a large karstified area whereby any rainfall rapidly enters the groundwater conduit system and discharges at any number of internal and external springs in the area.

The landscape of the area reflects the varied underlying geology. The more resistant Old Red Sandstones primarily make up the Slieve Aughty mountains to the northeast of the area, with older, less competent Silurian and Ordovician aged sandstones and siltstones in their cores. The upland area of the west of the county is underlain by the sandstones, siltstones, and shales of Namurian (Upper Carboniferous) age. These areas are classified as poorly productive aquifers and will not offer the same kind of groundwater potential as the limestones.

The karst forms a key regionally important aquifer in some areas, most notably around the Burren, an area covering the limestone uplands of north-western Clare and adjacent lowlands. These younger, softer, and more soluble Carboniferous limestones and shales form part of a larger area which extends from the Ennis area northwards to Gort and the Burren plateau. The Burren can be defined as a temperate glaciokarst landscape, which has been subject to repeated glaciation during the Pleistocene, creating distinctive features such as turloughs, swallow holes, sinking streams, limestone pavement, dry valleys, caves, and large springs. Limestone dissolution during karstification causes groundwater flow to concentrate along certain pathways/conduits, making it difficult to locate successful wells. Bare rock and thin subsoils are common across much of the area meaning groundwater is vulnerable to pollution, thus creating difficulties when it comes to water supply and pollution prevention.

Although recharge is high due to high rainfall coupled with low evapotranspiration and shallow/bare rock there is relatively low storage capacity among the limestones. As mentioned, the nature of the Regionally Important Karstified Bedrock type aquifers flow coupled with low aquifer storage, makes drilling successful boreholes challenging, despite the large volumes of groundwater flowing through the limestones. This is evidenced by the Ballyvaughan scheme which had eleven boreholes drilled to obtain

an adequate yield, with three being contaminated and most giving poor yields. The Burren uplands often result in yield failures for domestic well drilling, while the larger supplies in the lowlands are often serviced by large springs. Springs are the best option for groundwater development, whether by using the overflow, deepening or drilling in the vicinity. However, they usually have a flashy flow regime, with high turbidity and occasionally high iron from surface water flowing off the Namurian rocks.

Overall, five groundwater sites are managed by Irish Water in the region, with the majority of the smaller abstractions (< 0.2Ml/d) taking place from boreholes sited in the limestones but most likely not intercepting any major water-bearing conduit. The coastal springs at Ballyvaughan and Kinvara serve as discharge points, and with flows reported to be upwards of 12Ml/d, give an idea of the types of volumes being transported throughout the paleokarstic system.

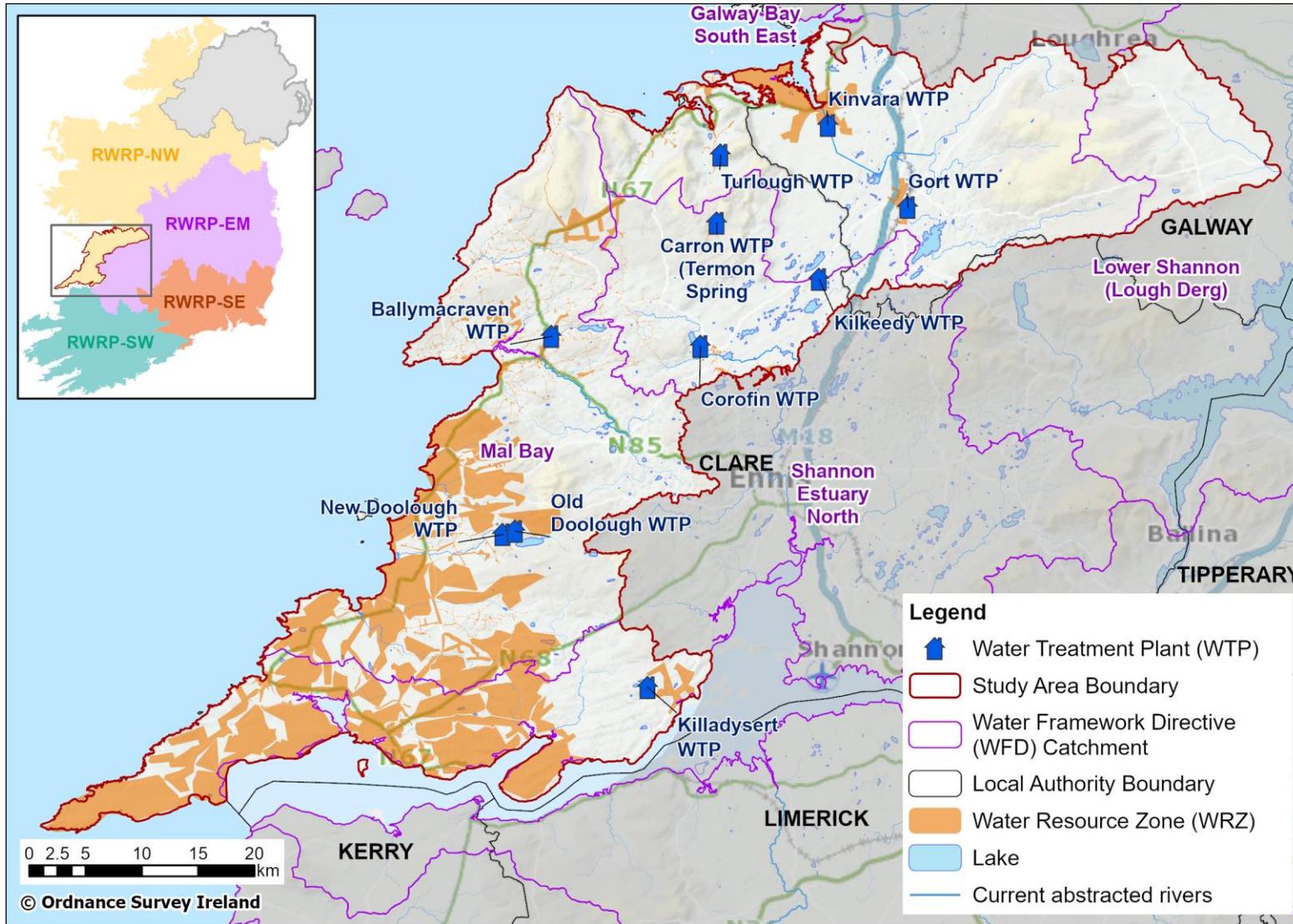


Figure 4.14 - Study Area G Clare Summary

4.8.2 SAG Options Removed at Coarse Screening

The options detailed in Table 4.24 below were removed at Coarse Screening on environmental grounds.

Table 4.24 - SAG – Options removed at Coarse Screening on environmental grounds

Option Reference	Option Description	Rejection Reasoning
SAG-06	Increase SW abstraction from Gortglass Lough and upgrade Killadysert WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAG-08	Interconnect Killadysart PWS and Lissycasey GWS and supply partial deficit from Liscasey GWS (network upgrades required).	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAG-09	Interconnect Killadysart and West Clare (New Doolough WTP) for increased resilience and supply deficit.	Abstracting the volume of water required is considered unfeasible.
SAG-10	Rationalise Killadysart WRZ to West Clare New Doolough WTP, abandon existing WTP.	Abstracting the volume of water required is considered unfeasible.
SAG-11	Increase SW abstraction from Lickeen Lake and upgrade existing Ballymacraven WTP to partly supply deficit.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAG-14	Bring back to production abandoned GW sources.	Abstracting the volume of water required is considered unfeasible.
SAG-15	Interconnect Ennistymon and Kilmaley/Inagh GWS and supply part of the deficit from Kilmaley/Inagh GWS (approx. distance 1km, new watermains and network upgrades required).	Abstracting the volume of water required is considered unfeasible.
SAG-25	New GW abstraction and new WTP to supply deficit.	Abstracting the volume of water required is considered unfeasible.
SAG-28	Recommission abandoned SW source - Kilkee Impoundment.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAG-41	Interconnect Gort and Coole GWS and supply deficit from Coole GWS.	This is not a sustainable long-term source to supply Gort.
SAG-44	Rationalise Gort WRZ to Kinvara WRZ (new source required).	The desktop assessments undertaken indicate that there will be issues regarding salinity and siting new wells will be difficult.

Option Reference	Option Description	Rejection Reasoning
SAG-47	New GW abstraction/wellfield to supply deficit (karstic bedrock - Kinvara-Gort groundwater body).	The desktop assessments undertaken indicate that sitting new wells in this area will pose a challenge. There is no guarantee of yield associated with this option.
SAG-53	Rationalise Kinvara to Ennistymon.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAG-64	Increase SW abstraction from Lickeen Lake and upgrade existing Ballymacraven WTP to partly supply deficit.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAG-65	New GW abstraction and new WTP to supply deficit- location TBC.	Abstracting the volume of water required is considered unfeasible.
SAG-66	New GW abstraction and new WTP to supply deficit- location TBC.	Abstracting the volume of water required is considered unfeasible.
SAG-67	Interconnect Gort and Seehan GWS and supply deficit from Seehan GWS.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAG-68	Interconnect Gort and Roo GWS and supply deficit from Roo GWS	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives.
SAG-73	Increase existing GW abstraction from Kinvara Well (karstic bedrock - Kinvara-Gort groundwater body) - saline intrusion	The desktop assessments undertaken indicate that there will be issues regarding salinity and sitting new wells will be difficult.

4.8.3 Preferred Approach for SAG

Full details of the Preferred Approach (and how it was reached) are included in the SAG Technical Report in Appendix 7 of the draft RWRP-NW. The final Preferred Approach for SAG is shown in Table 4.25 below. The findings of the Preferred Approach Development for SAG Clare include the following:

- No options score a 0 in relation to potential impact on a designated European Site.
- There are no -3 scores against designated European sites within the Preferred Approach.
- All options within the Preferred Approach have either a -1 or a -2 score against European sites.

In summary, the Preferred Approach for SAG is the Combination 8 approach which consists of local WRZs solutions for Kilkeedy PWS, Corrofin PWS, Gort and Kinvara WRZs in the Study Area, primarily driven by the small scale of the supplies and difficulties in transporting small volumes of water over long distances.

Proposed solutions for Killadysart PWS, Ennistymon, Turlough, West Clare and Carran PWS WRZs involve constructing connections across one or more supplies. The Preferred Approach for Killadysart

PWS involves rationalising the scheme to West Clare and increasing abstraction from the existing Doo Lough abstraction. The Preferred Approach for West Clare and Ennistymon looks at increasing abstraction from the existing Doo Lough abstraction, interconnecting the two schemes and interconnecting Old Doo Lough WTP and New Doo Lough WTP. Finally, the preferred approach for Turlough and Carran PWS involves increasing GW abstraction from Turlough BH and rationalising Carran PWS to Turlough.

Delivery of the Preferred Approach will secure all of the supplies in the area in terms of Quality, Quantity, Sustainability and Resilience. The Preferred Approach for SAG Clare also includes for demand side (**Lose Less** and **Use Less**) measures, including:

- Ongoing leakage management including active leakage control, pressure management and find and fix activities to offset Natural Rate of Leakage Rise (NRR).
- Nett leakage reduction in Ennistymon Water Resource Zone, amounting to 0.231MI/d (applied to SDB Deficit) to move towards achieving the National SELL Target by 2034.
- Continuation of Irish Water household and business water conservation campaigns, initiatives and education programmes.
- The option to implement legally enforceable Water Conservation Orders in drought periods in order to protect the environment and our public water supplies.

The Preferred Approach provides benefits for the environment and European sites through decommissioning the existing abstraction at Carran (Termon Spring) WTP which currently extracts from East Burren Complex SAC.

All of the options that make up the final Preferred Approach and assessed as part of the NIS are shown in Table 4.25 and shown in Figure 4.15 below.

Table 4.25 - Final Preferred Approach for SAG – Options

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
<p>SAG-001 0300SC0005 Kilkeedy PWS</p>	<p>-2</p>	<p>Increase abstraction at Kilkeedy BH (Lough Mannagh Turlough groundwater body - karstic bedrock) and upgrade Kilkeedy WTP to supply deficit</p> <ul style="list-style-type: none"> • Kilkeedy PWS WRZ in deficit so increase existing GW abstraction to meet WRZ future deficit • Kilkeedy PWS WRZ current WAFU DYCP 2044 = 0.092MI/d, DYCP 2044 demand = 0.093MI/d so additional 0.001MI/d required to meet WRZ deficit • Existing GW abstraction maintained • Existing source (Lough Mannagh Turlough GWB) WFD status 2013-2018 – Good and ‘Not at Risk’
<p>SAG-070 (Part of Grouped Option SAG-513) 0300SC0013 Killadysart PWS</p>	<p>-2</p>	<p>Rationalise Killadysart PWS WRZ to West Clare Old Doolough WTP</p> <ul style="list-style-type: none"> • Part of Group 513 and in-combination to Group 501 • Killadysart PWS WRZ in deficit so to be rationalised to West Clare WRZ • Killadysart PWS WRZ current WAFU DYCP 2044 = 0.462MI/d, DYCP 2044 demand =1.907MI/d so an additional 1.444MI/d required to meet WRZ deficit • Existing SW abstraction to be decommissioned • Proposed source (Doo CE LWB) WFD status 2013-2018 – Good
<p>SAG-016 (Part of Grouped Option SAG-501) 0300SC0021 Ennistymon</p>	<p>-2</p>	<p>Interconnect Ennistymon and West Clare (distance TBC, new watermain and network upgrades required) for increased resilience and supply part of the deficit from West Clare (New Doolough WTP) to Ennistymon WRZ</p> <ul style="list-style-type: none"> • Part of Group 501 and in-combination to Group 513 • Ennistymon WRZ in deficit and is to be interconnected with West Clare WRZ • Ennistymon WRZ current WAFU DYCP 2044 = 4.354MI/d, DYCP 2044 demand = 8.430MI/d so additional 4.075MI/d required to meet WRZ deficit • Existing SW abstraction maintained • Proposed source (Doo CE LWB) WFD status 2013-2018 – Good
<p>SAG-062 (Part of Grouped Option SAG-506) 0300SC0022 Turlough</p>	<p>-2</p>	<p>Increase GW abstraction from Turlough BH (Ballyvaughan Uplands groundwater body - karstic bedrock) and upgrade Turlough WTP</p> <ul style="list-style-type: none"> • Turlough WRZ in deficit • Increase existing GW abstraction to meet WRZ future deficit • Turlough WRZ current WAFU DYCP 2044 = 0.458MI/d, DYCP 2044 demand = 0.577MI/d so an additional 0.118MI/d required to meet WRZ deficit • Existing GW abstraction maintained

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
		<ul style="list-style-type: none"> Existing source (Ballyvaughan Uplands GWB) WFD status 2013-2018 – Good
SAG-057 (Part of Grouped Option SAG-501) 0300SC0001 West Clare	-2	Increase SW abstraction from Doo Lough and upgrade existing New Doolough WTP. Rationalise Old Doolough WTP <ul style="list-style-type: none"> Part of Group 501 and in-combination to Group 513 Ennistymon WRZ in deficit and is to be interconnected with West Clare WRZ Ennistymon WRZ current WAFU DYCP 2044 = 4.354MI/d, DYCP 2044 demand = 8.43MI/d so additional 4.075MI/d required to meet WRZ deficit Existing SW abstraction maintained Proposed source (Doo CE LWB) WFD status 2013-2018 – Good
SAG-079 0300SC0003 Corrofin PWS	-2	No deficit - upgrade WTP <ul style="list-style-type: none"> Corofin PWS WRZ in projected surplus so WTP upgrade works only Corofin PWS WRZ current WAFU DYCP 2044 = 0.66MI/d, DYCP 2044 demand = 0.46MI/d so surplus of 0.2MI/d Existing SW abstraction maintained Existing sources (Inchiquin LWB) WFD status 2013-2018 – Moderate
SAG-036 (Part of Grouped Option SAG-506) 0300SC0004 Carran PWS	-2	Rationalise Carran WRZ to Turlough WRZ to supply deficit <ul style="list-style-type: none"> Turlough WRZ in deficit Increase existing GW abstraction to meet WRZ future deficit Turlough WRZ current WAFU DYCP 2044 = 0.458MI/d, DYCP 2044 demand = 0.577MI/d so an additional 0.118MI/d required to meet WRZ deficit Existing GW abstraction maintained Existing source (Ballyvaughan Uplands GWB) WFD status 2013-2018 – Good
SAG-039 1200SC0016 Gort	-1	Increase existing GW abstraction from boreholes (poorly productive bedrock - Caherglassaun Turlough groundwater body) <ul style="list-style-type: none"> Gort WRZ in deficit so increase existing GW abstraction to meet WRZ future deficit Gort WRZ current WAFU DYCP 2044 = 1.32MI/d, DYCP 2044 demand = 1.503MI/d so additional 0.183MI/d required to meet WRZ deficit Existing GW and SW abstraction maintained Existing sources (GWDTE-Caherglassaun Turlough GWB) WFD status 2013-2018 – Poor and (Cannahowna RWB) WFD status 2013-2018 – ‘Poor’ and ‘At Risk’

WRZ Name and Option Reference	Fine Screening score (European sites question only)	Option Description
SAG-046 1200SC0023 Kinvara	-1	Increase existing GW abstraction from Kinvara Well (karstic bedrock - Kinvara-Gort groundwater body) <ul style="list-style-type: none"> • Kinvara WRZ in projected surplus so WTP upgrade works only • Kinvara WRZ current WAFU DYCP 2044 = 1.65MI/d, DYCP 2044 demand = 1.64MI/d so surplus of 0.01MI/d • Existing GW abstraction maintained • Existing sources (Kinvara-Gort GWB) WFD status 2013-2018 – Good

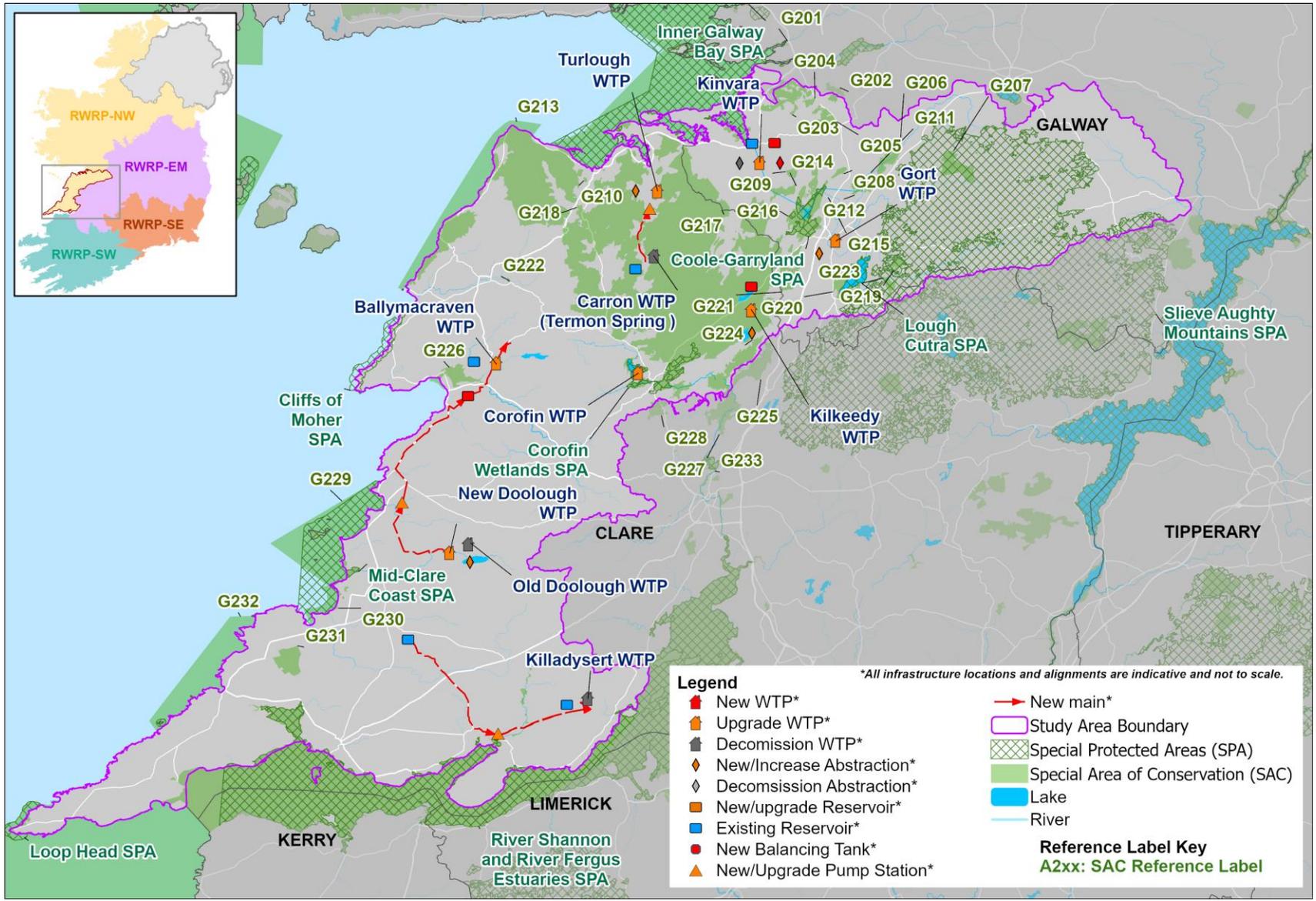


Figure 4.15 - Study Area G – Preferred Approach and European sites within SAG boundary. See Table 4.26 for list of SACs referenced on figure

Table 4.26 – SACs referenced in SAG Preferred Approach figure (Figure 4.15)

Index Code	SAC/SPA Name
G201	Galway Bay Complex SAC
G202	Castletaylor Complex SAC
G203	Lough Fingall Complex SAC
G204	Kiltiernan Turlough SAC
G205	Ardrahan Grassland SAC
G206	Peterswell Turlough SAC
G207	Sonnagh Bog SAC
G208	Ballinduff Turlough SAC
G209	Cahermore Turlough SAC
G210	Ballyvaughan Turlough SAC
G211	Lough Coy SAC
G212	Carrowbaun, Newhall and Ballylee Turloughs SAC
G213	Black Head-Poulsallagh Complex SAC
G214	Caherglassaun Turlough SAC
G215	Kiltartan Cave (Coole) SAC
G216	Coole-Garryland Complex SAC
G217	East Burren Complex SAC
G218	Moneen Mountain SAC
G219	Drummin Wood SAC
G220	Lough Cutra SAC
G221	Termon Lough SAC
G222	Ballyteige (Clare) SAC
G223	Gortacarnaun Wood SAC
G224	Ballyogan Lough SAC
G225	Moyree River System SAC
G226	Inagh River Estuary SAC
G227	Dromore Woods And Loughs SAC
G228	Ballycullinan Lake SAC

G229	Carrowmore Point To Spanish Point And Islands SAC
G230	Carrowmore Dunes SAC
G231	Tullaheer Lough And Bog SAC
G232	Kilkee Reefs SAC
G233	Lower River Shannon SAC

5

**Summary of
Screening for
Appropriate
Assessment**

5.1 Identification of potential impacts and pathways for effect

Table 5.1 outlines broad categories of potential impacts that could occur as a result of construction and or operation of the Preferred Approach for each Study Area, and the likely significant effects on European sites and their qualifying interest.

Table 5.1 - Potential effect pathways of Preferred Approaches arising from the draft RWRP-NW

Broad categories of potential impacts on European sites	Potential effect pathways (<i>distance assumptions shown in italics</i>)
<p>Physical loss of habitats/supporting habitat</p> <p><i>(Construction-related)</i></p>	<p>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).</p> <p><i>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).</i></p>
<p>Mortality</p> <p><i>(Construction-related)</i></p>	<ul style="list-style-type: none"> • Mortality of some species could occur through an increase in wildlife casualty incidents, for example through smothering of spawning gravels from a pollution event during construction. • 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.
<p>Habitat degradation – changes in water quality (pollution)</p> <p><i>(Construction-related)</i></p>	<ul style="list-style-type: none"> • Water quality can be affected by oil, chemicals, heavy metals and other material, or through chronic runoff of such materials. • Water quality can also be affected by sedimentation through runoff from construction 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. • <i>Pollution effects can occur outside of a European site and at a distance from works (for example, via a hydrological link).</i>
<p>Disturbance (including biological disturbance)</p> <p><i>(Construction-related)</i></p>	<ul style="list-style-type: none"> • 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 site¹⁵ • Creation of new pathways for non-native invasive species.
<p>Habitat degradation – hydrological/hydrogeological changes</p> <p><i>(Operation-related)</i></p>	<ul style="list-style-type: none"> • Operational effects from the construction phase related to tunnelling and deep excavations affecting groundwater quality and/or quantity and thereby the existing hydrological regime. • Operational effects due to ground and/or surface water abstraction. • Changes in hydrology can alter geomorphological processes which can affect the deposition of shingle or other material potentially impacting on QI fish species

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.

Broad categories of potential impacts on European sites	Potential effect pathways (<i>distance assumptions shown in italics</i>)
	<p>amongst others.</p> <ul style="list-style-type: none"> • Changes in these processes can impact aquatic/riparian/terrestrial habitats and species either directly or indirectly. • Brine discharged during operation of a desalination plant may lead to increased salinity and thermal changes in the surrounding marine habitat. This has the potential to alter the diversity, activity and abundance of species within and surrounding the habitat it disperses into.
<p>Water table/availability <i>(Operation-related)</i></p>	<ul style="list-style-type: none"> • Changes to water levels and flows due to water abstraction from ground or surface waters. <p><i>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.</i></p>

5.2 Assessment of Likely Significant Effects

The AA screening report for the draft RWRP-NW is provided in Appendix A. The draft RWRP-NW has applied the methodology developed in the Framework Plan to identify suitable water resource management options for the various WRZs throughout the region. The focus of the draft RWRP-NW is on the North West region (core baseline area – see Section 3.5 of the SEA Scoping Report).

All of the Preferred Approaches as outlined in Chapters 4.2 to 4.8 identified in the draft RWRP-NW have been considered for their potential for LSE as part of this NIS for the draft RWRP-NW (as presented in Appendix C). The Preferred Approaches with identified potential LSEs that could lead to adverse effects on site integrity (AESI) are assessed for the purposes of AA in Chapter 6 of this report. Where Preferred Approaches were determined not to give rise to potential LSEs, no further assessment for the purposes of AA was carried out.

6

Assessment of Adverse Effects on Site Integrity

6.1 Preferred Approach taken forward to Appropriate Assessment

This section assesses the LSEs that may occur from the identified impact pathways as a result of progressing activities associated with the various Preferred Approaches for North West region (Study Areas A-G), the implications they may have for European site(s) and their conservation objectives, and mitigation measures required to ensure there are no AESI.

As outlined above, all of the Preferred Approaches identified in the draft RWRP-NW were considered for their potential to give rise to LSEs as part of this NIS. The Preferred Approaches outlined in Chapter 6 below were assessed as having potential for LSEs (see Appendix C) and therefore taken forward to full AA. As noted in Section 5.2, a number of other Preferred Approaches were assessed as not having the potential for LSEs (see Appendix C), and therefore no further assessment was carried out of those options for the purposes of AA.

6.1.1 Study Area A

The Preferred Approaches for SAA with potential for LSEs on European sites are shown in Table 6.1.1.

Table 6.1.1 – SAA Preferred Approaches subject to AA

WRZ Name and Option Reference	Option Description
SAA-262 (Part of Grouped Option SAA-566) 0600SC0001 Inishowen West & Carndonaghdaff	Interconnect Inishowen West/Carndonagh/ Culdaff to new sources developed near Letterkenny
SAA-118a 0600SC0006 Rosses	New SW abstraction from Loch an Luir and New WTP
SAA-141 0600SC0007 Arranmore Island	Increase existing SW abstraction from Lough Shore. Involves rebuilding dam structure to increase operational lake storage volume
SAA-273 (Part of Grouped Option SAA-567) 0600SC0009 Killybegs	Increase existing SW abstraction from Lough Aderry
SAA-193 (Part of Grouped Option SAA-542) 0600SC0010 Donegal (River Eske)	Interconnect Donegal (River Eske) WRZ with new Ballyshannon WTP at Knaddar on River Erne/ESB Dam-Kathleen Falls and supply deficit
SAA-261 (Part of Grouped Option SAA-566) 0600SC0012 Culdaff	Rationalise Culdaff to new sources developed near Letterkenny
SAA-274 (Part of Grouped Option SAA-567)	Interconnect Owenteskiny and Killybegs to meet deficit from Lough Aderry

WRZ Name and Option Reference	Option Description
0600SC0013 Owenteskiny	
SAA-111a 0600SC0026 Gortahork-Falcarragh	New SW abstraction from Lough Altan and new WTP
SAA-026a (Part of Grouped Option SAA-542) 0600SC0028 Lough Mourne	Interconnect Lough Mourne with new WTP at Knaddar, Ballyshannon on River Erne/Kathleen Falls (ESB) and supply deficit
SAA-266 (Part of Grouped Option SAA-566) 0600SC0029 Letterkenny & Inishowen East & Pollan Dam	Develop Pollan Dam, Glen Lough and Gartan Lough for Letterkenny & Inishowen East & Pollan Dam WRZ and surrounding WRZ
SAA-191 (Part of Grouped Option SAA-542) 0600SC0030 Ballyshannon & Bundoran	New Ballyshannon WTP at Knaddar on River Erne/ESB Dam-Kathleen Falls and supply deficit
SAA-272 (Part of Grouped Option SAA-567) 0600SC0035 Glenties-Ardara	Split WRZ and supply part of the WRZ from Killybegs and another part from Lettermaccaward and decommission existing source
SAA-192 (Part of Grouped Option SAA-542) 0600SC0036 Frosses-Inver	Interconnect Frosses-Inver WRZ with new Ballyshannon WTP at Knaddar on River Erne/ESB Dam-Kathleen Falls and supply deficit
SAA-271 (Part of Grouped Option SAA-567) 0600SC0038 Lettermacaward	Increase existing SW abstraction from Lough Derkmore impoundment. Involves significant project to raise dam
SAA-268 (Part of Grouped Option SAA-566) 0600SC0039 Creeslough Dunfanaghy	Rationalise Creeslough Dunfanaghy to new sources developed near Letterkenny
SAA-267 (Part of Grouped Option SAA-566) 0600SC0043 Carrigart-Downings & Cranford	Rationalise Carrigart-Downings & Cranford to new sources developed near Letterkenny

WRZ Name and Option Reference	Option Description
SAA-263 (Part of Grouped Option SAA-566) 0600SC0045 Buncrana	Rationalise Buncrana to new sources developed near Letterkenny
SAA-269 (Part of Grouped Option SAA-566) 0600SC0046: Fanad West	Rationalise Fanad West to new sources developed near Letterkenny
SAA-270 (Part of Grouped Option SAA-566) 0600SC0047 Fanad East	Rationalise Fanad East to new sources developed near Letterkenny
SAA-217 0600PRI3077 Alt Raws	Rationalise Alt Raws to Lough Mourne WRZ
SAA-218 0600PRI3078 Meeneragh/ Cronalaghey	Rationalise Meeneragh to Lough Mourne WRZ

6.1.2 Study Area B

The Preferred Approaches for SAB with potential for LSEs on European sites are shown in Table 6.1.2.

Table 6.1.2- SAB Preferred Approaches subject to AA

WRZ Name and Option Reference	Option Description
SAB-203 (Part of Grouped Option SAB-553) 0200SC0014 Cavan RWSS	Interconnect Cavan and Ballyjamesduff WRZs. Supply spare capacity from Ballyjamesduff RWSS to Cavan RWSS
SAB-024 (Part of Grouped Option SAB-538) 0200SC0016 Belturbet PWS	Rationalise Belturbet WRZ, Swanlinbar and Bawnboy to Ballyconnell WRZ and create a new regional scheme
SAB-029 (Part of Grouped Option SAB-538) 0200SC0011 Ballyconnell PWS	Increase GW abstraction (Newtown-Ballyconnell GWB (karstic)) from existing boreholes to supply deficit at Ballyconnell PWS
SAB-041 (Part of Grouped Option SAB-538)	Rationalise Belturbet WRZ, Swanlinbar and Bawnboy to Ballyconnell WRZ and create a new regional scheme

WRZ Name and Option Reference	Option Description
0200SC0013 Bawnboy PWS	
SAB-048 (Part of Grouped Option SAB-538) 0200SC0019 Swanlinbar PWS	Rationalise Belturbet WRZ, Swanlinbar and Bawnboy to Ballyconnell WRZ and create a new regional scheme
SAB-204 (Part of Grouped Option SAB-553) 0200SC0012 Ballyjamesduff RWSS	Upgrade Lismean WTP for water quality improvements. Ballyjamesduff RWSS is not in deficit and supply spare capacity to Cavan RWSS
SAB-060 0200SC0017 Cootehill PWS	New SW abstraction from River Drumore to supply deficit. Treat at the existing Kilawaun WTP
SAB-205 (Part of Grouped Option SAB-553) 0200SC0008 Ballyhaise PWS (GWS Import)	Interconnect Ballyhaise and Ballyjamesduff WRZs. Supply spare capacity from Ballyjamesduff RWSS to Cavan RWSS
SAB-085 (Part of Grouped Option SAB-524) 0200SC0004 Gowna (GWS Import)	Rationalise Gowna (GWS Import) to Gowna WRZ
SAB-086 2400SC0003 Clones	Increase GW abstraction from existing boreholes to supply deficit
SAB-202 1700SC0004 Kinlough Tullaghan	New SW abstraction from Glenade Lough and upgrade of existing Glenade WTP
SAB-135 (Part of Grouped Option SAB-524) 2000SC0004 Gowna	Replace rising main connecting raw water pump station and WTP at Lough Gowna (Cornadrunng Pump Station), namely flooding of pump station, lack of control (raw water pumps control flow through plant) and increase SW abstraction to supply deficit
SAB-185 (Part of Grouped Option SAB-535) N/A Derrykillew	Rationalise Derrykillew to Ballyshannon WRZ (Assaroe lake source)

6.1.3 Study Area C

The Preferred Approaches for SA-C with potential for LSEs on European sites are shown in Table 6.1.3.

Table 6.1.3 – SA-C Preferred Approaches subject to AA

WRZ Name and Option Reference	Option Description
SA-C-143 (Part of Grouped Option SA-C-543) 2700SC0001 Lough Talt	Rationalise Lough Talt to Lisglennon WTP
SA-C-144 (Part of Grouped Option SA-C-543) 2200SC0004 Ballina	Increase SW abstraction from Lough Conn. Upgrade Lisglennon WTP for increased capacity and and maintain Wherrew WTP at current capacity
SA-C-35 (Part of Grouped Option SA-C-515) 2200SC0019 Knock Airport	Rationalise Knock Airport to Kilkelly WRZ
SA-C-39 2200SC0006 Ceide Fields	Increase GW abstraction (Belmullet GWB (poorly productive bedrock)) to supply deficit at Ceide Fields WRZ, upgrade Ceide Fields WTP
SA-C-44 2700SC0003 North Sligo Regional Water Supply	New GW abstraction to supply deficit at North Sligo, upgrade WTP. To be used in conjunction with current Ardnaglass BH
SA-C-137 2200SC0018 Swinford	Rationalise Swinford to Kilaturley GWS
SA-C-67 2200SC0011 Foxford	New GW abstraction to supply deficit in Foxford, upgrade WTP
SA-C-73 2200SC0008 Charlestown	Interconnect Kilaturley GWS with Charlestown and supply deficit from GWS
SA-C-35a (Part of Grouped Option SA-C-515) 2200SC0012 Kilkelly	Increase GW abstraction at Kilkelly WRZ, upgrade Kilkelly WTP
SA-C-139 (Part of Grouped Option SA-C-542) 2200SC0014	Rationalise Kiltimagh to Lough Mask WRZ

WRZ Name and Option Reference	Option Description
Kiltimagh PWS	
SA-C-142 2200SC0005 Achill	New SW abstraction from Keel Lough and new raw water transfer to existing WTP. Includes WTP upgrade. New source to supplement Accormore Lake during dry periods only
SA-C-145 (Part of Grouped Option SA-C-543) 2700SC0002 Lough Easkey RWSS	Rationalise Lough Easkey to Lisglennon WTP
SA-C-101 2700SC0004 Sligo Town & Environs Foxes Den Public Water Supply	Rationalise Kilsellagh impoundment if deemed unreliable source and increase abstraction from Lough Gill and expand of Foxes Den WTP to cover Kilsellagh supply and supply deficit
SA-C-108 1700SC0003 North Leitrim RWSS	Increase SW abstraction from Lough Gill
SA-C-138 2700SC0005 Riverstown	Refurb existing spring and upgrade WTP for water quality improvements
SA-C-131 0200SC0003 Dowra PWS (GWS Import)	Dowra PWS (GWS Import) - Keep supplying Dowra WRZ from Doobally GWS

6.1.4 Study Area D

The Preferred Approaches for SAD with potential for LSEs on European sites are shown in Table 6.1.4.

Table 6.1.4 - SAD Preferred Approaches subject to AA

WRZ Name and Option Reference	Option Description
SAD-196 (Part of Grouped Option SAD-541) 1200SC0007 Ballyconneely	Rationalise to Carna Kilkieran
SAD-195 (Part of Grouped Option SAD-541) 1100SC0001_B Carna Kilkieran RWSS	New SW abstraction from Lough Skannive and upgrade existing WTP and upgrade existing Carna Kilkieran WTP
SAD-014 2200SC0002	New GW abstraction (poorly productive bedrock - Clare Island groundwater body)

WRZ Name and Option Reference	Option Description
Clare Island	
SAD-209 (Part of Grouped Option SAD-545) 1200SC0010 Cleggan Claddaghduff	New Connemara RWSS (Kylemore Lough)
SAD-027 1200SC0011 Clifden	New SW abstraction from Lough Auna and new WTP
SAD-033 1200SC0012 Clonbur	New SW abstraction from Lough Corrib and new WTP
SAD-040 1100SC0001_D Dunmore/Glenamaddy P.S (Glenamaddy)	New GW abstracton from Gortgarogh GWB (Sean, Robbie spring) spring
SAD-46a 1100SC0001 Lough Corrib (Galway City, Tuam, Loughrea)	Increase existing SW abstraction at Terryland from River Corrib
SAD-200 (Part of Grouped Option SAD-543) 1200SC0037 Carraroe	Rationalise Carraroe to Spiddal (Lough Bouliska)
SAD-199 (Part of Grouped Option SAD-543) 1200SC0038 Spiddal	Increase existing SW abstraction from Lough Bouliska and connect with neighbouring WRZs
SAD-055 1200SC0017 Inisboffin	Desalination plant to supply full deficit. No blending, chemical remineralization only
SAD-058 1200SC0018 Inishere	Optimise GW abstraction from current springs (includes GW harvesting/raw water storage)
SAD-069 1200SC0004 Inishmean	Optimise GW abstraction from current springs (includes GW harvesting/raw water storage)
SAD-074 1200SC0019 Inishmore	Increase GW abstraction from existing boreholes and new raw water storage to maximise GW availability in winter months

WRZ Name and Option Reference	Option Description
SAD-158 2200SC0003 Inishturk	Raise existing dam height and new impoundment on the other side of the lake. Increase SW abstraction from existing Lake Coolacknick impoundment and WTP upgrade
SAD-210 (Part of Grouped Option SAD-545) 1200SC0024 Leenane	New Connemara RWSS (Kylemore Lough)
SAD-218 (Part of Grouped Option SAD-548) 2200SC0001 Lough Mask & Westport	Increase SW abstraction from existing Lough Mask and upgrade Tourmakeady WTP
SAD-217 (Part of Grouped Option SAD-548) 2200SC0015 Louisburgh	Rationalise Louisburgh via new Community/GWS being developed to take water from Westport to Murrisk
SAD-101 1100SC0001_H Mid-Galway	Increase existing GW abstraction from existing spring (karstic bedrock - Clare-Corrib groundwater body)
SAD-111 2200SC0016 Mulranny	New GW abstraction (Newport GWB)
SAD-117a 2200SC0017 Newport	Increase SW abstraction from existing River Newport
SAD-122 1100SC0001_J Oughterard	Increase SW abstraction from existing Lough Buffy
SAD-201 (Part of Grouped Option SAD-543) 1100SC0001_K Rosmuc	Rationalise Rosmuc to Spiddal (Lough Bouliska)
SAD-202 (Part of Grouped Option SAD-543) 1100SC0001_M Teeranea Lettermore	Rationalise to Spiddal (Lough Bouliska)

WRZ Name and Option Reference	Option Description
SAD-211 (Part of Grouped Option SAD-545) 1200SC0035 Tully-Tullycross	New Connemara RWSS (Kylemore Lough)

6.1.5 Study Area E

The Preferred Approaches for SAE with potential for LSEs on European sites are shown in Table 6.1.5.

Table 6.1.5 – SAE Preferred Approaches subject to AA

WRZ Name and Option Reference	Option Description
SAE-001 2100SC0002 Cavanhill & North Louth	Dependant on operational regime implementation, increase abstraction from the river Fane and upgrade existing WTP to meet critical peak demand. SCADA and weir control system upgrade required
SAE-049 and SAE-050 (Part of Grouped Option SAE-508) 2100SC0007 Ardee, Collon and Drybridge	New GW (partial supply) for Ardee within WTP vicinity. Rationalise Collon Drybridge to South Louth East Meath

6.1.6 Study Area F

The Preferred Approaches for SAF with potential for LSEs on European sites are shown in Table 6.1.6.

Table 6.1.6 – SAF Preferred Approaches subject to AA

WRZ Name and Option Reference	Option Description
SAF-148 (Part of Grouped Option SAF-542) 0200SC0001 Arvagh PWS (GWS Import)	Rationalise Arvagh to Gowna WRZ
SAF-149 (Part of Grouped Option SAF-542) 0200SC0004 Gowna	Increase SW abstraction and supply Arvagh
SAF-039 2600SC0003 Castlerea PWS	Increase GW abstraction at Longford Springs to supply deficit and upgrade WTP
SAF-030 2000SC0002 Granard	Increase SW abstraction from Lough Kinale, re-locate existing intake and upgrade WTP

WRZ Name and Option Reference	Option Description
SAF-081 (Part of Grouped Option SAF-534) 1100SC0001_F Kilkerrin/Moylough	Rationalise to Dunmmore Glenamaddy
SAF-133 (Part of Grouped Option SAF-534) 1100SC0001_D Dunmore/Glenamaddy P.S.	Increase GW abstraction at Gortgarrow Spring, upgrade WTP
SAF-156 0200SC0005 Killeshandra PWS (GWS Import)	New SW abstraction from Lake Town and new WTP
SAF-021 200SC0001 Lanesboro & Newtowncashel	New GW abstraction to supply deficit at Lanesboro & Newtowncashel, upgrade Lisreevagh WTP
SAF-009 2000SC0005 Longford Central	Increase SW abstraction from Lough Forbes and upgrade WTP
SAF-084 1100SC0001_I Mountbellew	Increase GW abstraction for Mountbellew WRZ to supply deficit
SAF-052 2600SC0009 North Roscommon RWSS	Abandon existing intake. New intake from middle lake to meet full demand. New 1.6km raw water mains to existing WTP. Upgrade of WTP to meet full demand
SAF-038 2600SC0004 Roscommon Central WSS	WTP Upgrade - Not in deficit, pump tests to prove high yield spring and BHs

6.1.7 Study Area G

The Preferred Approaches for SAG with potential for LSEs on European sites are shown in Table 6.1.7.

Table 6.1.7 – SAG Preferred Approaches subject to AA

WRZ Name and Option Reference	Option Description
SAG-001 0300SC0005 Kilkeedy PWS	Increase abstraction at Kilkeedy BH (Lough Mannagh Turlough groundwater body - karstic bedrock) and upgrade Kilkeedy WTP to supply deficit

WRZ Name and Option Reference	Option Description
SAG-070 (Part of Grouped Option SAG-513) 0300SC0013 Killadysart PWS	Rationalise Killadysart PWS WRZ to West Clare Old Doolough WTP
SAG-016 (Part of Grouped Option SAG-501) 0300SC0021 Ennistymon	Interconnect Ennistymon and West Clare (distance TBC, new watermains and network upgrades required) for increased resilience and supply part of the deficit from West Clare (New Doolough WTP) to Ennistymon WRZ
SAG-062 (Part of Grouped Option SAG-506) 0300SC0022 Turlough	Increase GW abstraction from Turlough BH (Ballyvaughan Uplands groundwater body - karstic bedrock) and upgrade Turlough WTP
SAG-057 (Part of Grouped Option SAG-501) 0300SC0001 West Clare	Increase SW abstraction from Doo Lough and upgrade existing New Doolough WTP. Rationalise Old Doolough WTP
SAG-079 0300SC0003 Corrofin PWS	No deficit - upgrade WTP
SAG-036 (Part of Grouped Option SAG-506) 0300SC0004 Carran PWS	Rationalise Carran WRZ to Turlough WRZ to supply deficit
SAG-039 1200SC0016 Gort	Increase existing GW abstraction from boreholes (poorly productive bedrock - Caherglassaun Turlough groundwater body)
SAG-046 1200SC0023 Kinvara	Increase existing GW abstraction from Kinvara Well (karstic bedrock - Kinvara-Gort groundwater body)

6.2 Appraisal of LSE leading to potential AESI

An overview of the potential impact types/pathways leading to LSEs identified as part of this NIS, and that could arise as a result of progressing the various Preferred Approaches for the NW region, and which could potentially lead to AESI in the absence of mitigation are outlined below. The European sites and their qualifying interest (QI) species or habitats potentially affected are detailed further in Appendix D (Tables D1 [SAA] – D7 [SAG]) and summarised below.

Note:

- To decipher whether “Habitat Degradation” has been considered a construction-related and/or an operation-related impact, a “C” (construction-related), “O” (operation-related) or “C&O” (both construction and operation-related) has been included in the tables in Sections 6.2.1 – 6.2.7.
- To decipher between these impacts being related to a ground or surface water abstraction, a “GW” (groundwater abstraction) or “SW” (surface water abstraction) has been included in the tables in Sections 6.2.1 – 6.2.7 if the option includes an abstraction. If the option does not include an abstraction, for example, a WTP upgrade only, then neither “GW” or “SW” has been included.

6.2.1 Study Area A

European sites identified as at risk of LSEs as a result of progressing the Preferred Approaches for SAA are shown in Table 6.2.1 while potential impact types identified for SAA are discussed below and outlined in Tables 6.2.2 – 6.2.14.

Table 6.2.1 - European sites within the Zol of Study Area A (Donegal) with LSE identified and the potential for AESI (in the absence of more detail/mitigation)

SACs	SPAs
Aran Island Cliffs SAC (000111)	Derryveagh and Glendowan Mountains SPA (004039)
Ballintra SAC (000115)	Donegal Bay SPA (004151)
Ballyness Bay SAC (001090)	Durnesh Lough SPA (004145)
Cloghernagore Bog and Glenveagh National Park SAC (002047)	Horn Head to Fanad Head SPA (004194)
Croaghonagh Bog SAC (000129)	Lough Fern SPA (004060)
Donegal Bay (Murvagh) SAC (000133)	Lough Nillan Bog SPA (00410)
Gweedore Bay and Islands SAC (001141)	Lough Swilly SPA (004075)
Horn Head and Rinclevan SAC (000147)	Sheskinmore Lough SPA (004090)
Kindrum Lough SAC (001151)	Trawbreaga Bay SPA (004034)
Leannan River SAC (002176)	West Donegal Coast SPA (004150)
Lough Eske and Ardnamona Wood SAC (000163)	
Lough Nillan Bog (Carrickatlieve) SAC (000165)	
Lough Swilly SAC (002287)	
Magheradrumman Bog SAC (000168)	
Mulroy Bay SAC (002159)	
North Inishowen Coast SAC (002012)	
River Finn SAC (002301)	
River Foyle and Tributaries SAC (UK0030320)	
Sheephaven SAC (001190)	
Slieve Tooley/ Tormore Island/ Loughros Beg Bay SAC (000190)	

SACs	SPAs
West of Ardara/Maas Road SAC (000197)	

The Preferred Approach for SAA does not include any groundwater abstractions, but it does include a number of new or increased surface water abstractions. Potential operational LSEs were identified as a result of progressing four Preferred Approaches associated with SAA. These four options including surface water abstractions are SAA-111a, SAA-141, Group SAA-566 and Group SAA-567. These abstractions could potentially impact on wetland bird species utilising wetland habitats within Derryveagh and Glendowan Mountains SPA, as well as aquatic QI species including freshwater pearl mussel (*Margaritifera margaritifera*), otter (*Lutra lutra*) and salmon (*Salmo salar*), associated with Cloghernagore Bog and Glenveagh National Park SAC, Leannan River SAC and West of Ardara/Maas Road SAC through a reduction or changes in water levels/flows (water table/availability) and or changes in water quality (habitat degradation/hydrological changes). These impacts could also affect water dependent habitats designated within SACs, such as oligotrophic and/or mesotrophic waters (Cloghernagore Bog and Glenveagh National Park SAC and West of Ardara/Maas Road SAC).

The main construction related LSEs identified were in relation to disturbance, pollution, habitat degradation with the potential for the spread of invasive species, mortality and/or physical loss of habitat associated with works adjacent to or crossing a SAC. For example, works associated with Group SAA-566 are within and/or crossing Cloghernagore Bog and Glenveagh National Park SAC, North Inishowen Coast SAC, Leannan River SAC, Mulroy Bay SAC, Horn Head and Rinclevan SAC and Kindrum Lough SAC. These works could potentially impact freshwater pearl mussel through habitat loss, mortality, disturbance and pollution within both Cloghernagore Bog and Glenveagh National Park SAC and Leannan River SAC. Other pipeline crossings include that of River Finn SAC, Lough Eske and Ardnamona Wood SAC (both from Group SAA-542), West of Ardara/Maas Road SAC and Ballintra SAC (both from Group SAA-567).

Potential LSEs were also identified in relation to habitat degradation, disturbance and the potential for the spread of invasive species and changes in water quality during construction where European sites are hydrologically linked to or adjacent to potential works areas (e.g. Ballyness Bay SAC, Gweedore Bay and Islands SAC, Aran Island (Donegal) Cliffs SAC, Magheradrumman Bog SAC, Sheephaven SAC, Lough Swilly SAC, Lough Nillan Bog (Carrickatlieve) SAC, River Foyle and Tributaries SAC and Slieve Tooley/ Tormore Island/ Loughros Beg Bay SAC). Changes in water quality from a pollution event could impact on a number of aquatic QI species including but not limited to otter and slender naiad (*Najas flexilis*), as well as aquatic habitats including oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea*, and oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*).

In addition, works adjacent to or in close proximity to Derryveagh and Glendowan Mountains SPA (associated with SAA-111a, SAA-118a and Group SAA-566), and Donegal Bay SPA (Group SAA-542) could result in disturbance, habitat degradation, mortality and/or physical loss of habitat related impacts to a number of QI bird species utilising habitats situated within the immediate hinterland of these SPAs or in areas outside of a SPA but ecologically connected to it (e.g. grassland, arable farmland). Species that may be impacted include light-bellied brent goose (*Branta bernicla hrota*), merlin (*Falco columbarius*), and peregrine (*Falco peregrinus*). Other potential LSEs were identified in relation to disturbance of QI birds and changes in water quality during construction where European sites are

hydrologically linked to or adjacent to potential works area (e.g. West Donegal Coast SPA, Trawbreaga Bay SPA, Horn Head to Fanad Head SPA, Lough Fern SPA, Lough Swilly SPA, Lough Nillan Bog SPA, Durnesh Lough SPA and Sheskinmore Lough SPA).

Potential transboundary effects were identified in the SAA Preferred Approach. There is potential for pollution and disturbance impacts to the River Foyle and Tributaries SAC in Northern Ireland from options SAA-217, SAA-218 and Group SAA-542. This SAC is hydrologically linked to the River Finn SAC in the Republic of Ireland, and is within the Zone of Influence of these options.

Table 6.2.2 - Summary of potential LSEs from option SAA-111a on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Cloghernagore Bog and Glenveagh National Park SAC (002047)	✓	✓ (C&O) (SW)	✓	✓	✓
Ballyness Bay SAC (001090)		✓ (C) (SW)			

Table 6.2.3 - Summary of potential LSEs from option SAA-118a on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Gweedore Bay and Islands SAC (001141)		✓ (C) (SW)			✓

Table 6.2.4 - Summary of potential LSEs from option SAA-141 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Aran Island Cliffs SAC (000111)		✓ (C&O) (SW)	✓		

Table 6.2.5 - Summary of potential LSEs from options SAA-217 and SAA-218 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
River Finn SAC (002301)		✓ (C)			✓
River Foyle and Tributaries SAC (UK0030320)		✓ (C)			✓

Table 6.2.6 - Summary of potential LSEs from option SAA-Group 542 (026a, 191, 192, 193) on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
River Finn SAC (002301)	✓	✓ (C) (SW)		✓	✓
Lough Eske and Ardnamona Wood	✓	✓ (C)		✓	✓

SAC (000163)		(SW)			
Donegal Bay (Murvagh) SAC (000133)	✓	✓ (C) (SW)			✓
Croaghonagh Bog SAC (000129)	✓	✓ (C) (SW)			✓
Ballintra SAC (000115)	✓	✓ (C) (SW)			✓
River Foyle and Tributaries SAC (UK0030320)		✓ (C) (SW)			✓

Table 6.2.7 - Summary of potential LSEs from option SAA-Group 566 (261, 262, 263, 264, 265, 266, 267, 268, 269, 270) on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrogeological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
North Inishowen Coast SAC (002012)		✓ (C) (SW)		✓	✓
Cloghernagore Bog and Glenveagh National Park SAC (002047)	✓	✓ (C&O) (SW)	✓	✓	✓
Leannan River SAC (002176)	✓	✓ (C&O) (SW)	✓	✓	✓
Horn Head and Rinclevan SAC (000147)		✓ (C) (SW)			✓
Mulroy Bay SAC (002159)		✓		✓	✓

		(C) (SW)			
Kindrum Lough SAC (001151)		✓ (C) (SW)			
Magheradrumman Bog SAC (000168)					✓
Sheephaven SAC (001190)		✓ (C) (SW)			✓
Lough Swilly SAC (002287)		✓ (C) (SW)			✓

Table 6.2.8 - Summary of potential LSEs from option SAA-Group 567 (271, 272, 273, 274) on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
West of Ardara/Maas Road SAC (000197)	✓	✓ (C&O) (SW)	✓	✓	✓
Lough Nillan Bog (Carrickatlieve) SAC (000165)					✓
River Finn SAC (002301)					✓
Slieve Tooley/ Tormore Island/ Loughros Beg Bay SAC (000190)		✓ (C) (SW)			✓

Table 6.2.9 - Summary of potential LSEs from option SAA-111a on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Derryveagh and Glendowan Mountains SPA (004039)	✓	✓ (C&O) (SW)	✓	✓	✓

Table 6.2.10 - Summary of potential LSEs from option SAA-118a on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Derryveagh and Glendowan Mountains SPA (004039)	✓	✓ (C) (SW)		✓	✓

Table 6.2.11 - Summary of potential LSEs from option SAA-141 on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
West Donegal Coast SPA (004150)					✓

Table 6.2.12 - Summary of potential LSEs from option SAA-Group 542 (026a, 191, 192, 193) on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Donegal Bay SPA (004151)	✓	✓ (C) (SW)		✓	✓
Durnesh Lough SPA (004145)					✓

Table 6.2.13 - Summary of potential LSEs from option SAA-Group 566 (261, 262, 263, 264, 265, 266, 267, 268, 269, 270) on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Trawbreaga Bay SPA (004034)		✓ (C) (SW)			✓
Derryveagh and Glendowan Mountains SPA (004039)	✓	✓ (C&O) (SW)	✓	✓	✓
Horn Head to Fanad Head SPA (004194)					✓
Lough Swilly SPA (004075)		✓ (C) (SW)			✓
Lough Fern SPA (004060)		✓ (C) (SW)			

Table 6.2.14 - Summary of potential LSEs from option SAA-Group 567 (271, 272, 273, 274) on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrogeological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Nillan Bog SPA (00410)					✓
Derryveagh and Glendowan Mountains SPA (004039)					✓
Sheskinmore Lough SPA (004090)					✓

6.2.2 Study Area B

European sites identified as at risk of LSE as a result of progressing the Preferred Approaches for SAB are shown in Table 6.2.15 while potential impact types identified for SAB are discussed below and outlined in Tables 6.2.16 – 6.2.26.

Table 6.2.15 - European sites within the Zol of Study Area B (Cavan and Monaghan) with LSEs identified and the potential for AESI (in the absence of more detail/mitigation)

SACs	SPAs
Cladagh (Swanlinbar) River SAC (UK0030116)	Donegal Bay SPA (004151)
Glenade Lough SAC (001919)	Lough Oughter Complex SPA (004049)
Lough Gill SAC (001976)	Lough Sheelin SPA (004065)
Lough Oughter and Associated Loughs SAC (000007)	Pettigoe Plateau SPA (UK9020051)
Upper Lough Erne SAC (UK0016614)	Sligo/Leitrim Uplands SPA (004187)
	Upper Lough Erne SPA (UK9020071)

The Preferred Approach for SAB includes a number of new or increased surface and groundwater abstractions. Potential operational LSEs were identified as a result of progressing two options associated with the Preferred Approach for SAB. One of these options is associated with a groundwater abstraction, Group SAB-538, and the other option is linked to a surface water abstraction, SAB-202. These abstractions could potentially impact on aquatic QI species (including white-clawed crayfish (*Austropotamobius pallipes*), otter, salmon, lamprey species, and slender naiad) associated with Lough Oughter and Associated Loughs SAC, Glenade Lough SAC, and Lough Gill SAC through a reduction or changes in water levels/flows (water table/availability) and or changes in water quality (habitat

degradation/hydrological changes). The groundwater abstraction in option Group SAB-538 could also potentially affect the groundwater dependent habitats designated within Lough Oughter and Associated Loughs SAC, including bog woodlands and natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* – type vegetation.

The main construction related LSEs identified were in relation to disturbance, pollution, habitat degradation with the potential for the spread of invasive species, mortality and/or physical loss of habitat associated with works adjacent to or crossing SACs. For example, works associated with Group SAB-538 require pipeline crossings of Lough Oughter and Associated Loughs SAC. The works associated with SAB-202 could also lead to Annex I habitat loss, including that of natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* – type vegetation within Glenade Lough SAC due to works within the SAC.

There were also potential LSEs identified in relation to habitat degradation, disturbance, the potential for the spread of invasive species and changes in water quality during construction where European sites are hydrologically linked to or adjacent to potential works areas. The SACs that could potentially be impacted include Lough Gill SAC, Lough Oughter and Associated Loughs SAC, Cladagh (Swanlinbar) River SAC, and Upper Lough Erne SAC. Changes in water quality from a pollution event could impact on a number of aquatic QI species including but not limited to, salmon, otter, and white-clawed crayfish.

Potential construction related LSEs were identified for six SPAs. There may be disturbance and/or habitat degradation related impacts to a number of QI bird species utilising habitats situated within the immediate hinterland of these SPAs or in areas outside of a SPA but ecologically connected to it (e.g. grassland, arable farmland). There may also be disturbance of QI birds and changes in water quality during construction where European sites are hydrologically linked to or adjacent to potential works area. The SPAs potentially affected by works within the SAB Preferred Approach include Lough Oughter Complex SPA (from options SAB-060, Group SAB-524, Group SAB-538 and Group SAB-553), Sligo/Leitrim Uplands SPA (from SAB-202), Donegal Bay SPA, Pettigoe Plateau SPA (both from Group SAB-535), Lough Sheelin SPA (from Group SAB-553), and Upper Lough Erne SPA (from SAB-086, Group SAB-538 and Group SAB-553). Species that may be impacted include peregrine, chough (*Pyrrhocorax pyrrhocorax*), whooper swan (*Cygnus cygnus*) and various waterbird species.

Potential transboundary effects were identified in the SAB Preferred Approach. There is potential for pollution and disturbance impacts to the Upper Lough Erne SAC in Northern Ireland from options SAB-086, Group SAB-538 and Group SAB-553. This SAC is hydrologically linked to the Lough Oughter and Associated Loughs SAC in the Republic of Ireland, and is within the Zone of Influence of these options. There is also potential for pollution impacts to the Cladagh (Swanlinbar) River SAC in NI from Group SAB-538 as the SAC is hydrologically linked to this option. Two SPAs in Northern Ireland may also be impacted by pollution and/or disturbance impacts. These are the Upper Lough Erne SPA (from options SAB-086, Group SAB-538, Group SAB-553), and the Pettigoe Plateau SPA (from Group SAB-535). Upper Lough Erne SPA is hydrologically linked to the Lough Oughter Complex SPA in the Republic of Ireland and is within the Zone of Influence of the options listed. The Pettigoe Plateau SPA is within the Zone of Influence of Group SAB-535.

Table 6.2.16 - Summary of potential LSEs from option SAB-060 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Oughter and Associated Loughs SAC (000007)		✓ (C) (SW)			

Table 6.2.17 - Summary of potential LSEs from option SAB-086 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Oughter and Associated Loughs SAC (000007)		✓ (C) (GW)			✓
Upper Lough Erne SAC (UK0016614)		✓ (C) (GW)			✓

Table 6.2.18 - Summary of potential LSEs from option SAB-202 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Glenade Lough SAC (001919)	✓	✓ (C&O) (SW)	✓	✓	✓
Lough Gill SAC		✓	✓		✓

(001976)		(C&O) (SW)			
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Table 6.2.19 - Summary of potential LSEs from option SAB-Group 538 (024, 029, 041, 048) on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Oughter and Associated Loughs SAC (000007)	✓	✓ (C&O) (GW)	✓	✓	✓
Cladagh (Swanlinbar) River SAC (UK0030116)		✓ (C) (GW)			
Upper Lough Erne SAC (UK0016614)		✓ (C) (GW)			✓

Table 6.2.20 - Summary of potential LSEs from option SAB-Group 553 (203, 204, 205) on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Oughter and Associated Loughs SAC (000007)		✓ (C) (SW)			✓
Upper Lough Erne SAC (UK0016614)		✓ (C) (SW)			✓

Table 6.2.21 - Summary of potential LSEs from options SAB-060 and SAB-Group 524 (085, 135) on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Oughter Complex SPA (004049)					✓

Table 6.2.22 - Summary of potential LSEs from option SAB-086 on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Upper Lough Erne SPA (UK9020071)		✓ (C) (GW)			✓

Table 6.2.23 - Summary of potential LSEs from option SAB-202 on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Sligo/Leitrim Uplands SPA (004187)					✓

Table 6.2.24 - Summary of potential LSEs from option SAB Group-535 (157, 185) on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Pettigoe Plateau SPA (UK9020051)					✓
Donegal Bay SPA (004151)		✓ (C) (SW)			✓

Table 6.2.25 - Summary of potential LSEs from option SAB Group-538 (024, 029, 041, 048) on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Upper Lough Erne SPA (UK9020071)		✓ (C) (GW)			✓
Lough Oughter Complex SPA (004049)					✓

Table 6.2.26- Summary of potential LSEs from option SAB Group-553 (203, 204, 205) on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Oughter Complex SPA (004049)		✓ (C) (SW)			✓
Upper Lough Erne SPA (UK9020071)		✓ (C) (SW)			✓
Lough Sheelin SPA (004065)		✓ (C) (SW)			

6.2.3 Study Area C

European sites identified with potential for LSEs as a result of progressing the Preferred Approaches for SA-C are shown in Table 6.2.27 while potential impact pathways identified for SA-C and discussed below and outlined in Tables 6.2.28 – 6.2.45.

Table 6.2.27 - European sites within the ZoI of Study Area C (Mayo and Sligo) with LSE identified and the potential for AESI (in the absence of more detail/mitigation)

SACs	SPAs
Balla Turlough SAC (000463)	Ballysadare Bay SPA (004129)
Boleybrack Mountain SAC (002032)	Cummeen Strand SPA (004035)
Bunduff Lough And Machair/ Trawalua/ Mullaghmore SAC (000625)	Killala Bay/Moy Estuary SPA (004036)
Croaghoun/ Slievemore SAC (001955)	Lough Arrow SPA (004050)
Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC (000627)	Lough Conn and Lough Cullin SPA (004228)
Glenamoy Bog Complex SAC (000500)	Lough Mask SPA (004062)
Keel Machair/Menaun Cliffs SAC (001513)	
Killala Bay/Moy Estuary SAC (000458)	
Lough Arrow SAC (001673)	
Lough Carra/Mask Complex SAC (001774)	

Lough Gill SAC (001976)
Lough Hoe Bog SAC (000633)
River Moy SAC (002298)
Streedagh Point Dunes SAC (001680)
Unshin River SAC (001898)

The Preferred Approach for SA-C includes both new and increased surface and groundwater abstractions. Potential operational LSEs were identified as a result of progressing eight options associated with the Preferred Approach for SA-C. Four of these options are associated with groundwater abstractions (SA-C-039, SA-C-044, SA-C-073 and SA-C-138), and the other four options are associated with surface water abstractions (SA-C-101, SA-C-108, SA-C-131 and Group SA-C-542). These abstractions could potentially impact on bird species utilising wetland habitats within Lough Mask SPA through a reduction or changes in water levels/flows (water table/availability) and or changes in water quality (habitat degradation/hydrological changes). These impacts may also affect aquatic QI species such as salmon, otter, white-clawed crayfish and lamprey species associated with Glenamoy Bog Complex SAC, River Moy SAC, Lough Gill SAC, Lough Carra/Mask Complex SAC and Unshin River SAC. Some of the groundwater abstractions associated with the PA could also potentially affect groundwater dependent habitats designated within SACs, such as blanket bogs, transition mires and quaking bogs and depressions on peat substrates of the *Rhynchosporion* in Glenamoy Bog Complex SAC, alkaline fens in Bunduff Lough And Machair/ Trawalua/ Mullaghmore SAC, and both active and degraded raised bogs in the River Moy SAC. The surface water abstractions within the PA may also impact water dependent habitats such as natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* – type vegetation in Lough Gill SAC, natural dystrophic lakes in Boleybrack Mountain SAC, and various oligotrophic water habitats in Lough Carra/Mask Complex SAC.

The main construction related LSEs identified were in relation to disturbance, pollution, habitat degradation with the potential for the spread of invasive species, mortality and/or physical loss of habitat associated with works adjacent to or crossing a SAC. These impacts were associated with a number of options and SACs, for example, works associated with options SA-C-073, Group SA-C-542 and Group SA-C-543 require pipeline crossings of River Moy SAC, and works associated with SA-C-101 and SA-C-108 include pipeline crossings of Lough Gill SAC.

Potential LSEs were also identified in relation to habitat degradation, disturbance and the potential for the spread of invasive species and changes in water quality during construction where European sites are hydrologically linked to or adjacent to potential works areas (e.g. Streedagh Point Dunes SAC, Bunduff Lough And Machair/ Trawalua/ Mullaghmore SAC, Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC, Croaghaun/Slievemore SAC, Boleybrack Mountain SAC, Lough Arrow SAC, Unshin River SAC, Balla Turlough SAC, Killala Bay/Moy Estuary SAC, and Lough Hoe Bog SAC). Changes in water quality from a pollution event could impact on a number of aquatic habitats including natural dystrophic lakes and ponds, hard oligo-mesotrophic waters, and oligotrophic waters containing very few minerals of sandy plains, as well as aquatic QI such as white-clawed crayfish, otter and salmon.

There may be disturbance and/or habitat degradation related impacts to a number of QI bird species utilising habitats situated within the immediate hinterland of SPAs or in areas outside of a SPA but ecologically connected to it (e.g. grassland, arable farmland) due to the works associated with the SA-C

PA. Other potential LSEs were identified in relation to disturbance of QI birds and changes in water quality during construction where the SPAs were hydrologically linked to or adjacent to potential works areas. The SPAs potentially affected by works within the SA-C Preferred Approach include Lough Mask SPA, Lough Conn and Lough Cullin SPA, Killala Bay/Moy Estuary SPA, Cummeen Strand SPA, Lough Arrow SPA, and Ballysadare Bay SPA. The species that may be impacted were all waterbirds and included Greenland white-fronted goose (*Anser albifrons flavirostris*), dunlin, and curlew (*Numenius arquata*).

There were no potential transboundary effects identified within the SA-C Preferred Approach.

Table 6.2.28 - Summary of potential LSEs from option SA-C-039 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Glenamoy Bog Complex SAC (000500)	✓	✓ (C&O) (GW)	✓		✓

Table 6.2.29 - Summary of potential LSEs from options SA-C-044 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Streedagh Point Dunes SAC (001680)		✓ (C&O) (GW)	✓		
Bunduff Lough And Machair/ Trawalua/ Mullaghmore SAC (000625)		(C) (GW)	✓		

Table 6.2.30 - Summary of potential LSEs from options SA-C-067 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
River Moy SAC (002298)		✓ (C) (GW)			

Table 6.2.31 - Summary of potential LSEs from option SA-C-073 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
River Moy SAC (002298)		✓ (C&O) (GW)	✓	✓	✓

Table 6.2.32 - Summary of potential LSEs from option SA-C-101 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Gill SAC (001976)	✓	✓ (C&O) (SW)	✓	✓	✓
Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC (000627)		✓ (C) (SW)			

Table 6.2.33 - Summary of potential LSEs from option SA-C-108 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Gill SAC (001976)	✓	✓ (C&O) (SW)	✓	✓	✓

Table 6.2.34 - Summary of potential LSEs from option SA-C-131 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Boleybrack Mountain SAC (002032)		✓ (C&O) (GW)	✓		

Table 6.2.35 - Summary of potential LSEs from option SA-C-137 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
River Moy SAC (002298)		✓ (C) (GW)		✓	

Table 6.2.36 - Summary of potential LSEs from option SA-C-138 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Arrow SAC (001673)		✓ (C) (GW)			✓
Unshin River SAC (001898)		✓ (C&O) (GW)	✓		✓

Table 6.2.37 - Summary of potential LSEs from option SA-C-142 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Keel Machair/Menaun Cliffs SAC (001513)	✓	✓ (C) (SW)			✓
Croaghau/Slievemore SAC (001955)					✓

Table 6.2.38 - Summary of potential LSEs from option SA-C-Group 515 (035, 035a) on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
River Moy SAC (002298)		✓ (C) (GW)			

Table 6.2.39 - Summary of potential LSEs from option SA-C-Group 542 (139, 140) on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
River Moy SAC (002298)		✓ (C) (SW)		✓	✓
Balla Turlough SAC (000463)		✓ (C) (SW)			✓
Lough Carra/Mask Complex SAC (001774)		✓ (O) (SW)	✓		

Table 6.2.40 - Summary of potential LSEs from option SA-C-Group 543 (143, 144, 145) on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
River Moy SAC (002298)	✓	✓ (C) (SW)		✓	✓
Killala Bay/Moy Estuary SAC (000458)		✓ (C) (SW)			✓
Lough Hoe Bog SAC (000633)		✓ (C) (SW)			✓

Table 6.2.41 - Summary of potential LSEs from option SA-C-067 on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Conn and Lough Cullin SPA (004228)					✓

Table 6.2.42 - Summary of potential LSEs from option SA-C-101 on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Cummeen Strand SPA		✓			✓

(004035)		(C) (SW)			
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Table 6.2.43 - Summary of potential LSEs from option SA-C-138 on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Arrow SPA (004050)		✓ (C) (GW)			✓
Ballysadare Bay SPA (004129)					✓

Table 6.2.44 - Summary of potential LSEs from option SA-C-Group 542 (139, 140) on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Mask SPA (004062)		✓ (C&O) (SW)	✓		✓

Table 6.2.45 - Summary of potential LSEs from options SA-C-Group 543 (143, 144, 145), on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Conn and Lough Cullin SPA		✓			✓

(004228)		(C) (SW)			
Killala Bay/Moy Estuary SPA (004036)		✓ (C) (SW)			

6.2.4 Study Area D

European sites identified with potential for LSEs as a result of progressing the Preferred Approaches for SAD are shown in Table 6.2.46 while potential impact pathways identified for SAD and discussed below and outlined in Tables 6.2.47 – 6.2.76.

Table 6.2.46 - European sites within the Zol of Study Area D (Galway and Mayo) with LSE identified and the potential for AESI (in the absence of more detail/mitigation)

SACs	SPAs
Ballymaglancy Cave, Cong SAC (000474)	Blacksod Bay/Broad Haven SPA (004037)
Clew Bay Complex SAC (001482)	Clare Island SPA (004136)
Connemara Bog Complex SAC (002034)	Connemara Bog Complex SPA (004181)
Cregduff Lough SAC (001251)	Cregganna Marsh SPA (004142)
Duvillaun Islands SAC (000495)	Cruagh Island SPA (004170)
Galway Bay Complex SAC (000268)	High Island, Inishshark and Davillaun SPA (004144)
Inishbofin and Inishshark SAC (000278)	Illaunnaon SPA (004221)
Inisheer Island SAC (001275)	Inishbofin, Omey Island and Turbot Island SPA (004231)
Inishkea Islands SAC (000507)	Inishmore SPA (004152)
Inishmaan Island SAC (000212)	Inner Galway Bay SPA (004031)
Inishmore Island SAC (000213)	Lough Corrib SPA (004042)
Kilkieran Bay and Islands SAC (002111)	Lough Mask SPA (004062)
Kingstown Bay SAC (002265)	Owenduff/Nephin Complex SPA (004098)
Lough Carra/Mask Complex SAC (001774)	Rahasane Turlough SPA (004089)
Lough Corrib SAC (000297)	Slyne Head to Ardmore Point Islands SPA (004159)
Lough Lurgeen Bog/Glenamaddy Turlough SAC (000301)	
Maumturk Mountains SAC (002008)	
Newport River SAC (002144)	
Owenduff/Nephin Complex SAC (000534)	
Slyne Head Islands SAC (000328)	
Slyne Head Peninsula SAC (002074)	

The Twelve Bens/Garraun Complex SAC (002031)

West Connacht Coast SAC (002998)

Potential operational LSEs were identified as a result of progressing fourteen options associated with the Preferred Approach for SAD. Nine of these options are associated with a surface water abstraction (SAD-033, SAD-046a, SAD-055, SAD-117a, SAD-122, Group SAD-541, Group SAD-543, Group SAD-545 and Group SAD-548), and the other five options are linked to groundwater abstractions (SAD-040, SAD-058, SAD-069, SAD-074 and SAD-101). These abstractions could potentially impact on bird species utilising wetland habitats within Lough Corrib SPA and Lough Mask SPA, as well as aquatic QI species (including freshwater pearl mussel, white-clawed crayfish, lamprey species, otter and salmon) associated with a number of SACs such as Lough Corrib SAC, Newport River SAC, Kilkieran Bay and Islands SAC, Connemara Bog Complex SAC, The Twelve Bens/Garraun Complex SAC and Lough Carra/Mask Complex SAC through a reduction or changes in water levels/flows (water table/availability) and or changes in water quality (habitat degradation/hydrological changes). The groundwater abstractions associated with five of the options in the SAD PA could potentially affect the groundwater dependent habitats designated within various SACs, including both active and degraded raised bogs, calcareous and alkaline fens, petrifying springs with tufa formation, depressions on peat substrates of the *Rhynchosporion*, bog woodlands, coastal lagoons, machair and turloughs.

The works associated with option SAD-055 include a desalination plant, which will involve a seawater abstraction off the coast of Inishbofin (within Inishbofin and Inishshark SAC). The process of desalinating seawater produces brine, which has a higher salinity than that of seawater. Discharging this brine into the sea may have impacts on QI marine mammals, in particular harbour seals (*Phoca vitulina*) (designated within Kilkieran Bay and Islands SAC and Clew Bay Complex SAC), grey seals (*Halichoerus grypus*) (designated within Inishbofin and Inishshark SAC, Slyne Head Islands SAC, Duvillaun Islands SAC and Inishkea Islands SAC) and common bottlenose dolphins (*Tursiops truncatus*) (designated within West Connacht Coast SAC, Slyne Head Islands SAC and Duvillaun Islands SAC). The brine discharged during operation of the desalination plant could lead to increased salinity and thermal changes. This has the potential to alter the diversity, activity and abundance of species within and surrounding the habitat it disperses into. This may impact the foraging ground of the species noted above through changes to the assemblage of species present in the habitat, including their prey. The brine discharge may also impact on bird species designated for within the High Island, Inishshark and Davillaun SPA through similar impacts. Further assessments including hydrological modelling will be required at project level to determine the impacts of this desalination on marine species and to determine the mitigation required to prevent any significant effects on these QI species and their marine habitat.

The main construction related LSEs identified for options within the SAD PA were in relation to disturbance, pollution, habitat degradation with the potential for the spread of invasive species, mortality and/or physical loss of habitat associated with works adjacent to or crossing a SAC. For example, works associated with Group SAD-545 are within and/or crossing Maumturk Mountains SAC and The Twelve Bens/Garraun Complex SAC, which could potentially impact freshwater pearl mussel and/or salmon through habitat loss, mortality, disturbance and pollution. Other pipeline crossings within the SAD PA include that of Inishbofin and Inishshark SAC (from SAD-055), Slyne Head Peninsula SAC (from Group SAD-541), Connemara Bog Complex SAC (from both Group SAD-541 and Group SAD-543) and Kilkieran Bay and Islands SAC (from Group SAD-543).

The works associated with option SAD-033 may impact on lesser horseshoe (LHS) bats (*Rhinolophus hipposideros*) within Lough Corrib SAC, Lough Carra/Mask Complex SAC and Ballymaglancy Cave, Cong SAC. Some of the works within this option are within the 2.5km core foraging ranges of the LHS bats within these three SACs. As such, vegetation, hedgerow or tree clearance associated with the works or lighting impacts from the works could sever important commuting routes for LHS bats commuting between their roost site in the SACs and foraging areas outside the confines of the SACs. This would require further assessment to ensure impacts are avoided.

Potential LSEs were also identified in relation to habitat degradation, disturbance, the potential for the spread of invasive species and changes in water quality during construction where European sites are hydrologically linked to or adjacent to potential works areas (e.g. West Connacht Coast SAC, Kingstown Bay SAC, Galway Bay Complex SAC, Slyne Head Islands SAC, Inisheer Island SAC, Lough Corrib SAC, Owenduff/Nephin Complex SAC, Clew Bay Complex SAC, Kilkieran Bay and Islands SAC and Lough Carra/Mask Complex SAC). Changes in water quality from a pollution event could impact on a number of aquatic QI species including freshwater pearl mussel, white-clawed crayfish, salmon, lamprey species, otter and slender naiad, as well as aquatic habitats including coastal lagoons, natural dystrophic lakes and ponds, water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, and various oligotrophic and/or mesotrophic water habitat types.

In addition, works adjacent to or in close proximity to Clare Island SPA (associated with SAD-014), Lough Corrib SPA (SAD-033 and SAD-046a), Lough Mask SPA (SAD-033 and Group SAD-548), and Connemara Bog Complex SPA (Group SAD-541, Group SAD-543 and Group SAD-545) could result in disturbance, habitat degradation, mortality and/or physical loss of habitat related impacts to a number of QI bird species utilising habitats situated within the immediate hinterland of these SPAs or in areas outside of a SPA but ecologically connected to it (e.g. grassland, arable farmland). Species that may be impacted include tern species (*Sterna spp.*), fulmar (*Fulmarus glacialis*), chough, merlin and Greenland white-fronted goose. Other potential LSEs were identified in relation to disturbance of QI birds and changes in water quality during construction where European sites or supporting habitat for QI birds are hydrologically linked to or adjacent to potential works area (e.g. Slyne Head to Ardmore Point Islands SPA, Cruagh Island SPA, High Island, Inishshark and Davillaun SPA, Inner Galway Bay SPA, Cregganna Marsh SPA, Rahasane Turlough SPA, Inishbofin, Omev Island and Turbot Island SPA, Inishmore SPA, Owenduff/Nephin Complex SPA, Blacksod Bay/Broad Haven SPA, Lough Corrib SPA, Illaunnaon SPA and Lough Mask SPA).

There were no potential transboundary effects identified within the SAD Preferred Approach.

Table 6.2.47 - Summary of potential LSEs from option SAD-014 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
West Connacht Coast SAC (002998)					✓

Table 6.2.48 - Summary of potential LSEs from option SAD-027 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrogeological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
The Twelve Bens/Garraun Complex SAC (002031)		✓ (C) (SW)		✓	✓
Kingstown Bay SAC (002265)		✓ (C) (SW)			

Table 6.2.49 - Summary of potential LSEs from option SAD-033 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrogeological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Corrib SAC (000297)	✓	✓ (C&O) (SW)	✓	✓	✓
Lough Carra/Mask Complex SAC (001774)	✓	✓ (C) (SW)		✓	✓
Ballymaglancy Cave, Cong SAC (000474)	✓				✓

Table 6.2.50 - Summary of potential LSEs from option SAD-040 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Corrib SAC (000297)		✓ (C&O) (GW)	✓	✓	✓
Lough Lurleen Bog/Glenamaddy Turlough SAC (000301)		✓ (O) (GW)	✓		

Table 6.2.51 - Summary of potential LSEs from option SAD-046a on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Corrib SAC (000297)		✓ (C&O) (SW)	✓	✓	✓
Galway Bay Complex SAC (000268)		✓ (C) (SW)			✓

Table 6.2.52 - Summary of potential LSEs from option SAD-055 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Inishbofin and Inishshark SAC	✓	✓ (C&O)		✓	✓

(000278)		(SW)			
West Connacht Coast SAC (002998)		✓ (C&O) (SW)		✓	✓
Slyne Head Islands SAC (000328)		✓ (C&O) (SW)			✓
Kilkieran Bay and Islands SAC (002111)		✓ (O) (SW)			
Clew Bay Complex SAC (001482)		✓ (O) (SW)			
Duvillaun Islands SAC (000495)		✓ (O) (SW)			
Inishkea Islands SAC (000507)		✓ (O) (SW)			

Table 6.2.53 - Summary of potential LSEs from option SAD-058 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Inisheer Island SAC (001275)		✓ (C&O) (GW)	✓		

Table 6.2.54 - Summary of potential LSEs from option SAD-069 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Inishmaan Island SAC (000212)	✓	✓ (C&O) (GW)	✓		

Table 6.2.55 - Summary of potential LSEs from option SAD-074 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Inishmore Island SAC (000213)	✓	✓ (C&O) (GW)	✓	✓	

Table 6.2.56 - Summary of potential LSEs from option SAD-101 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Corrib SAC (000297)		✓ (C&O) (GW)	✓		✓

Table 6.2.57 - Summary of potential LSEs from option SAD-111 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Owenduff/Nepin Complex SAC (000534)		✓ (C) (GW)			✓
Clew Bay Complex SAC (001482)		✓ (C) (GW)			✓

Table 6.2.58 - Summary of potential LSEs from option SAD-117a on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Newport River SAC (002144)		✓ (C&O) (SW)	✓	✓	✓
Clew Bay Complex SAC (001482)		✓ (C) (SW)			✓

Table 6.2.59 - Summary of potential LSEs from option SAD-122 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Corrib SAC (000297)		✓ (C&O) (SW)	✓		

Table 6.2.60 - Summary of potential LSEs from option SAD-Group 541 (195, 196) on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Cregduff Lough SAC (001251)	✓	✓ (C) (SW)			
Slyne Head Peninsula SAC (002074)	✓	✓ (C) (SW)			✓
Connemara Bog Complex SAC (002034)	✓	✓ (C) (SW)		✓	✓
Kilkieran Bay and Islands SAC (002111)		✓ (C&O) (SW)	✓		✓

Table 6.2.61 - Summary of potential LSEs from option SAD-Group 543 (199, 200, 201, 202) on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Connemara Bog Complex SAC (002034)	✓	✓ (C&O) (SW)	✓	✓	✓
Kilkieran Bay and Islands SAC (002111)	✓	✓ (C) (SW)		✓	✓

Table 6.2.62 - Summary of potential LSEs from option SAD-Group 545 (209, 210, 211) on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Maumturk Mountains SAC (002008)	✓	✓ (C) (SW)		✓	✓
The Twelve Bens/Garraun Complex SAC (002031)	✓	✓ (C&O) (SW)	✓	✓	✓
West Connacht Coast SAC (002998)					✓

Table 6.2.63 - Summary of potential LSEs from option SAD-Group 548 (217, 218) on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Carra/Mask Complex SAC (001774)		✓ (C&O) (SW)	✓		✓
Clew Bay Complex SAC (001482)		✓ (C) (SW)			✓

Table 6.2.64 - Summary of potential LSEs from option SAD-014 on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Clare Island SPA (004136)	✓				✓

Table 6.2.65 - Summary of potential LSEs from option SAD-027 on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Slyne Head to Ardmore Point Islands SPA (004159)					✓
Cruagh Island SPA (004170)					✓

High Island, Inishshark and Davillaun SPA (004144)					✓
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Table 6.2.66 - Summary of potential LSEs from option SAD-033 on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Corrib SPA (004042)	✓	✓ (C&O) (SW)	✓		✓
Lough Mask SPA (004062)	✓	✓ (C) (SW)			✓

Table 6.2.67 - Summary of potential LSEs from option SAD-046a on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Corrib SPA (004042)		✓ (C&O) (SW)	✓		✓
Inner Galway Bay SPA (004031)		✓ (C) (SW)			✓
Cregganna Marsh SPA (004142)					✓
Rahasane Turlough SPA (004089)					✓

Table 6.2.68 - Summary of potential LSEs from option SAD-055 on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Inishbofin, Omev Island and Turbot Island SPA (004231)					✓
High Island, Inishshark and Davillaun SPA (004144)		✓ (O) (SW)			✓
Cruagh Island SPA (004170)					✓

Table 6.2.69 - Summary of potential LSEs from option SAD-074 on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Inishmore SPA (004152)					✓
Slyne Head to Ardmore Point Islands SPA (004159)					✓

Table 6.2.70 - Summary of potential LSEs from option SAD-111 on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrogeological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Owenduff/Nephin Complex SPA (004098)					✓
Blacksod Bay/Broad Haven SPA (004037)					✓

Table 6.2.71 - Summary of potential LSEs from option SAD-122 on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrogeological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Corrib SPA (004042)					✓
Inner Galway Bay SPA (004031)					✓

Table 6.2.72 - Summary of potential LSEs from option SAD-158 on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrogeological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
High Island, Inishshark and Davillaun SPA (004144)					✓

Table 6.2.73 - Summary of potential LSEs from option SAD-Group 541 (195, 196) on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrogeological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Connemara Bog Complex SPA (004181)	✓	✓ (C) (SW)			✓
Slyne Head to Ardmore Point Islands SPA (004159)					✓
Cruagh Island SPA (004170)					✓
High Island, Inishshark and Davillaun SPA (004144)					✓

Table 6.2.74 - Summary of potential LSEs from option SAD-Group 543 (199, 200, 201, 202) on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrogeological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Connemara Bog Complex SPA (004181)	✓	✓ (C) (SW)			✓
Slyne Head to Ardmore Point Islands SPA (004159)					✓
Inner Galway Bay SPA (004031)					✓
Lough Corrib SPA (004042)					✓

Table 6.2.75 - Summary of potential LSEs from option SAD-Group 545 (209, 210, 211) on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Illaunnaon SPA (004221)					✓
Cruagh Island SPA (004170)					✓
High Island, Inishshark and Davillaun SPA (004144)					✓
Lough Mask SPA (004062)					✓
Slyne Head to Ardmore Point Islands SPA (004159)					✓
Lough Corrib SPA (004042)					✓

Table 6.2.76 - Summary of potential LSEs from option SAD-Group 548 (217, 218) on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Mask SPA (004062)		✓ (C&O) (SW)	✓		✓
Lough Corrib SPA (004042)					✓

6.2.5 Study Area E

European sites identified with potential for LSEs as a result of progressing the Preferred Approaches for SAE are shown in Table 6.2.77 while potential impact pathways identified for SAE and discussed below and outlined in Tables 6.2.78 – 6.2.81.

Table 6.2.77 - European sites within the Zol of Study Area E (Louth) with LSE identified and the potential for AESI (in the absence of more detail/mitigation)

SACs	SPAs
Dundalk Bay SAC (000455)	Carlingford Lough SPA (004078)
River Boyne and River Blackwater SAC (002299)	Carlingford Lough SPA (NI) (UK9020160)
	Dundalk Bay SPA (004026)
	River Boyne and River Blackwater SPA (004232)
	Stabannan-Braganstown SPA (004091)

While there are both surface and groundwater abstractions included in the SAE Preferred Approach, there were no potential operational LSEs identified for any SACs or SPAs as a result of progressing any of these options.

The potential construction related LSEs identified were in relation to habitat degradation, disturbance, the potential for the spread of invasive species and changes in water quality during construction where European sites are hydrologically linked to or adjacent to potential works areas. The European sites that could potentially be impacted are Dundalk Bay SAC (from option SAE-001) and River Boyne and River Blackwater SAC (from Group SAE-508). Changes in water quality from a pollution event could impact aquatic QI species including river lamprey (*Lampetra fluviatilis*), salmon and otter, and QI habitats such as estuaries.

Potential construction related LSEs were identified for five SPAs. There may be disturbance of QI birds and/or changes in water quality during construction where European sites are hydrologically linked to or adjacent to potential works area. The SPAs potentially affected by the works are Dundalk Bay SPA (from options SAE-001 and Group SAE-508), Carlingford Lough SPA, Carlingford Lough SPA (in Northern Ireland), Stabannan-Braganstown SPA (all three from SAE-001), and River Boyne and River Blackwater SPA (from Group SAE-508). Species that may be impacted include lapwing (*Vanellus vanellus*), greylag goose (*Anser anser*), light-bellied brent goose, kingfisher (*Alcedo atthis*) and various waterbird species.

Potential transboundary effects were identified in the SAE Preferred Approach. There is potential for disturbance impacts to the Carlingford Lough SPA in Northern Ireland from option SAE-001 due to the SPA being within the Zone of Influence of this option.

Table 6.2.78 - Summary of potential LSEs from option SAE-001 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Dundalk Bay SAC (000455)		✓ (C) (SW)			

Table 6.2.79 - Summary of potential LSEs from option SAE-Group 508 (049, 050) on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
River Boyne and River Blackwater SAC (002299)		✓ (C) (GW)			✓

Table 6.2.80 - Summary of potential LSEs from option SAE-001 on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Dundalk Bay SPA (004026)					✓
Carlingford Lough SPA (004078)					✓
Carlingford Lough SPA (NI) (UK9020160)					✓

Stabannan-Braganstown SPA (004091)					✓
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Table 6.2.81 - Summary of potential LSEs from option SAE-Group 508 (049, 050) on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
River Boyne and River Blackwater SPA (004232)		✓ (C) (GW)			✓
Dundalk Bay SPA (004026)					✓

6.2.6 Study Area F

European sites identified with potential for LSEs as a result of progressing the Preferred Approaches for SAF are shown in Table 6.2.82 while potential impact pathways identified for SAF and discussed below and outlined in Tables 6.2.83 – 6.2.99.

Table 6.2.82 - European sites within the Zol of Study Area F (Roscommon and Leitrim) with LSE identified and the potential for AESI (in the absence of more detail/mitigation)

SACs	SPAs
Callow Bog SAC (000595)	Ballykenny-Fisherstown Bog SPA (004101)
Carrownagappul Bog SAC (001242)	Bellanagare Bog SPA (004105)
Corliskea/ Trien/ Cloonfelliv Bog SAC (002110)	Four Roads Turlough SPA (004140)
Fortwilliam Turlough SAC (000448)	Garriskil Bog SPA (004102)
Lough Corrib SAC (000297)	Lough Croan Turlough SPA (004139)
Lough Forbes Complex SAC (001818)	Lough Derravarragh SPA (004043)
Lough Oughter and Associated Loughs SAC (000007)	Lough Gara SPA (004048)
Lough Ree SAC (000440)	Lough Kinale and Derragh Lough SPA (004061)
Shankill West Bog SAC (000326)	Lough Oughter Complex SPA (004049)
Upper Lough Erne SAC (UK0016614)	Lough Ree SPA (004064)
	Lough Sheelin SPA (004065)
	River Suck Callows SPA (004097)

The Preferred Approach for SAF includes a number of new or increased surface and groundwater abstractions. Potential operational LSEs were identified as a result of progressing seven options within the SAF Preferred Approach. Three of these options include surface water abstractions (SAF-009, SAF-030 and SAF-156). The other four options involve groundwater abstractions (SAF-021, SAF-039, SAF-084 and Group SAF-534). These abstractions could potentially impact on wetland bird species utilising wetland habitats within Lough Kinale and Derragh Lough SPA and Lough Oughter Complex SPA, as well as aquatic QI species including freshwater pearl mussel, otter, white-clawed crayfish, lamprey species and salmon associated with Lough Ree SAC, Lough Corrib SAC, and Lough Oughter and Associated Loughs SAC through a reduction or changes in water levels/flows (water table/availability) and or changes in water quality (habitat degradation/hydrological changes). These impacts could also affect surface water dependent habitats designated within SACs, such as natural eutrophic lakes (Lough Forbes Complex SAC, Lough Ree SAC and Lough Oughter and Associated Loughs SAC), and groundwater dependent habitats such as active and degraded raised bogs, bog woodland, turloughs, depressions on peat substrates of the *Rhynchosporion*, both calcareous and alkaline fens, and petrifying springs with tufa formation (within Lough Ree SAC, Corliskea/ Trien/ Cloonfelliv Bog SAC, Carrownagappul Bog SAC, Fortwilliam Turlough SAC and Lough Corrib SAC).

The main construction related LSEs identified were in relation to disturbance, pollution, habitat degradation with the potential for the spread of invasive species, mortality and/or physical loss of habitat associated with works adjacent to or crossing a SAC. For example, works associated with SAF-052 are within and/or crossing Callow Bog SAC and could potentially lead to loss of QI habitats such as active and degraded raised bogs and depressions on peat substrates of the *Rhynchosporion*. Some of the works involved in option SAF-156 are within Lough Oughter and Associated Loughs SAC and could therefore potentially impact otter and the natural eutrophic lake habitat in the area.

Potential LSEs were also identified in relation to habitat degradation, disturbance, the potential for the spread of invasive species and changes in water quality during construction where European sites are hydrologically linked to or adjacent to potential works areas (e.g. Lough Ree SAC, Corliskea/ Trien/ Cloonfelliv Bog SAC, Lough Corrib SAC, Shankill West Bog SAC and Upper Lough Erne SAC). Changes in water quality from a pollution event could impact on aquatic QI species including otter, as well as aquatic habitats such as natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation.

Works adjacent to or in close proximity to Lough Kinale and Derragh Lough SPA (associated with SAF-030), Lough Gara SPA (SAF-052) and Lough Oughter Complex SPA (SAF-156) could result in disturbance, habitat degradation and/or physical loss of habitat related impacts to a number of QI bird species utilising habitats situated within the immediate hinterland of these SPAs or in areas outside of a SPA but ecologically connected to it (e.g. grassland, arable farmland). Species that may be impacted include whooper swan and Greenland white-fronted goose. Other potential LSEs were identified in relation to disturbance of QI birds and changes in water quality during construction where European sites are hydrologically linked to or adjacent to potential works area (e.g. Ballykenny-Fisherstown Bog SPA, Lough Ree SPA, Lough Sheelin SPA, Lough Derravarragh SPA, Garriskil Bog SPA, River Suck Callows SPA, Bellanagare Bog SPA, Four Roads Turlough SPA, Lough Croan Turlough SPA and Upper Lough Erne SPA).

Potential transboundary effects were identified in the SAF Preferred Approach. There is potential for pollution impacts to the Upper Lough Erne SAC in Northern Ireland from option SAF-156. This SAC is hydrologically linked to the Lough Oughter and Associated Loughs SAC in the Republic of Ireland and is hydrologically linked to this option. The Upper Lough Erne SPA may be impacted by pollution and disturbance impacts from option SAF-156 as it is also hydrologically linked to the Lough Oughter Complex SPA in the Republic of Ireland, as well as hydrologically linked to the option, and is within the Zone of Influence of option SAF-156.

Table 6.2.83 - Summary of potential LSEs from option SAF-009 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Forbes Complex SAC (001818)		✓ (O) (SW)	✓		

Table 6.2.84 - Summary of potential LSEs from option SAF-021 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Ree SAC (000440)		✓ (O) (GW)	✓		
Fortwilliam Turlough SAC (000448)		✓ (O) (GW)	✓		

Table 6.2.85 - Summary of potential LSEs from option SAF-038 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrogeological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Ree SAC (000440)		✓ (C)			✓

Table 6.2.86 - Summary of potential LSEs from option SAF-039 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrogeological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Corliskea/ Trien/ Cloonfelliv Bog SAC (002110)		✓ (C&O) (GW)	✓		

Table 6.2.87 - Summary of potential LSEs from option SAF-052 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrogeological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Callow Bog SAC (000595)	✓				✓

Table 6.2.88 - Summary of potential LSEs from option SAF-084 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Carrownagappul Bog SAC (001242)		✓ (O) (GW)	✓		

Table 6.2.89 - Summary of potential LSEs from option SAF-156 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Oughter and Associated Loughs SAC (000007)	✓	✓ (C&O) (SW)	✓	✓	✓
Upper Lough Erne SAC (UK0016614)		✓ (C) (SW)			

Table 6.2.90 - Summary of potential LSEs from option SAF-Group 534 (081, 133) on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Corrib SAC (000297)		✓ (C&O) (GW)	✓		✓

Shankill West Bog SAC (000326)		✓ (C) (GW)			
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Table 6.2.91 - Summary of potential LSEs from option SAF-009 on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Ballykenny-Fisherstown Bog SPA (004101)					✓
Lough Ree SPA (004064)					✓

Table 6.2.92 - Summary of potential LSEs from option SAF-021 on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Ree SPA (004064)					✓

Table 6.2.93 - Summary of potential LSEs from option SAF-030 on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Kinale and Derragh Lough SPA (004061)	✓	✓ (C&O) (SW)	✓		✓

Lough Sheelin SPA (004065)					✓
Lough Derravarragh SPA (004043)					✓
Garriskil Bog SPA (004102)					✓

Table 6.2.94 - Summary of potential LSEs from option SAF-038 on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Ree SPA (004064)		✓ (C)			✓
River Suck Callows SPA (004097)					✓

Table 6.2.95 - Summary of potential LSEs from option SAF-052 on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Gara SPA (004048)	✓				✓
Bellanagare Bog SPA (004105)					✓

Table 6.2.96 - Summary of potential LSEs from option SAF-084 on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
River Suck Callows SPA (004097)		✓ (C) (GW)			✓
Four Roads Turlough SPA (004140)					✓
Lough Croan Turlough SPA (004139)					✓

Table 6.2.97 - Summary of potential LSEs from option SAF-156 on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Oughter Complex SPA (004049)	✓	✓ (C&O) (SW)	✓		✓
Upper Lough Erne SPA (UK9020071)		✓ (C) (SW)			✓

Table 6.2.98 - Summary of potential LSEs from option SAF-Group 534 (081, 133) on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
River Suck Callows SPA (004097)					✓

Table 6.2.99 - Summary of potential LSEs from option SAF-Group 542 (148, 149) on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lough Oughter Complex SPA (004049)					✓

6.2.7 Study Area G

European sites identified with potential for LSEs as a result of progressing the Preferred Approaches for SAG are shown in Table 6.2.100 while potential impact pathways identified for SAG and discussed below and outlined in Tables 6.2.101 – 6.2.113.

Table 6.2.100 - European sites within the Zol of Study Area G (Clare) with LSE identified and the potential for AESI (in the absence of more detail/mitigation)

SACs	SPAs
Caherglassaun Turlough SAC (000238)	Coole-Garryland SPA (004107)
Cahermore Turlough SAC (002294)	Corofin Wetlands SPA (004220)
Carrowmore Point to Spanish Point and Islands SAC (001021)	Inner Galway Bay SPA (004031)
Coole-Garryland Complex SAC (000252)	Mid-Clare Coast SPA (004182)
East Burren Complex SAC (001926)	River Shannon and River Fergus Estuaries SPA (004077)

Galway Bay Complex SAC (000268)
Inagh River Estuary SAC (000036)
Lower River Shannon SAC (002165)
Moneen Mountain SAC (000054)

Potential operational LSEs were identified as a result of progressing three of the options in the SAG Preferred Approach. All three of these options, SAG-001, SAG-046 and Group SAG-506, are associated with groundwater abstractions. These abstractions are not predicted to impact any SPAs. These abstractions could potentially impact on groundwater dependent habitats designated within East Burren Complex SAC, Galway Bay Complex SAC, Caherglassaun Turlough SAC, Cahermore Turlough SAC, Coole-Garryland Complex SAC and Moneen Mountain SAC including turloughs, both calcareous and alkaline fens, and petrifying springs with tufa formation through a reduction or changes in water levels/flows (water table/availability) and or changes in water quality (habitat degradation/hydrological changes).

The main construction related LSEs identified for options within the PA were in relation to disturbance, pollution, habitat degradation with the potential for the spread of invasive species, mortality and/or physical loss of habitat associated with works adjacent to or crossing a SAC. The works associated with option SAG-001 may impact on lesser horseshoe (LHS) bats within East Burren Complex SAC. Some of the works within this option are within or adjacent to the 2.5km core foraging ranges of the LHS bats within the SAC. As such, vegetation, hedgerow or tree clearance associated with the works or lighting impacts from the works could sever important commuting routes for LHS bats commuting between their roost site in the SACs and foraging areas outside the confines of the SACs. This would require further assessment to ensure impacts are avoided. Works associated with Group SAG-513 are within and/or crossing the Lower River Shannon SAC, which could potentially impact aquatic QI species such as freshwater pearl mussel and/or salmon through habitat loss, mortality, disturbance and pollution.

Potential LSEs were also identified in relation to habitat degradation, disturbance and the potential for the spread of invasive species and changes in water quality during construction where European sites are hydrologically linked to or adjacent to potential works areas (e.g. Coole-Garryland Complex SAC, Galway Bay Complex SAC, East Burren Complex SAC, Inagh River Estuary SAC, Moneen Mountain SAC and Carrowmore Point to Spanish Point and Islands SAC). For example, changes in water quality from a pollution event could impact on aquatic QI species, such as otter, and aquatic habitats including natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation and coastal lagoons.

In addition, potential construction related LSEs were identified for seven SPAs. There may be disturbance of QI birds and/or changes in water quality during construction where European sites are hydrologically linked to or adjacent to potential works area. The SPAs potentially affected by the works are Coole-Garryland SPA (from options SAG-001, SAG-046, Group SAG-501 and Group SAG-506), Inner Galway Bay SPA (from options SAG-046 and Group SAG-506), Corofin Wetlands SPA (from options SAG-001, SAG-046, SAG-079 and Group SAG-506), Mid-Clare Coast SPA (from options Group SAG-501 and Group SAG-513) and River Shannon and River Fergus Estuaries SPA (from Group SAG-513). Species that may be impacted include cormorant (*Phalacrocorax carbo*), whooper swan, tern species, light-bellied brent goose and various waterbird species.

There were no potential transboundary effects identified within the SAG Preferred Approach.

Table 6.2.101 - Summary of potential LSEs from option SAG-001 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
East Burren Complex SAC (001926)	✓	✓ (O) (GW)	✓	✓	✓

Table 6.2.102 - Summary of potential LSEs from option SAG-039 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Coole-Garryland Complex SAC (000252)		✓ (C) (GW)			

Table 6.2.103 - Summary of potential LSEs from option SAG-046 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Galway Bay Complex SAC (000268)		✓ (C&O) (GW)	✓		
Caherglassaun Turlough SAC (000238)		✓ (O) (GW)	✓		
Cahermore Turlough SAC		✓	✓		

(002294)		(O) (GW)			
East Burren Complex SAC (001926)		✓ (O) (GW)	✓		
Coole-Garryland Complex SAC (000252)		✓ (O) (GW)	✓		

Table 6.2.104 - Summary of potential LSEs from option SAG-079 on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
East Burren Complex SAC (001926)		✓ (C)			✓

Table 6.2.105 - Summary of potential LSEs from option SAG-Group 501 (016, 057) on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Inagh River Estuary SAC (000036)		✓ (C) (SW)			✓
Carrowmore Point to Spanish Point and Islands SAC (001021)		✓ (C) (SW)			

Table 6.2.106 - Summary of potential LSEs from option SAG-Group 506 (036, 062) on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
East Burren Complex SAC (001926)	✓	✓ (O) (GW)	✓		✓
Moneen Mountain SAC (000054)		✓ (O) (GW)	✓		✓

Table 6.2.107 - Summary of potential LSEs from option SAG-Group 513 (023, 070) on SACs with the potential to give rise to AESI

SAC	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Lower River Shannon SAC (002165)	✓	✓ (C) (SW)		✓	✓
Carrowmore Point to Spanish Point and Islands SAC (001021)		✓ (C) (SW)			

Table 6.2.108 - Summary of potential LSEs from option SAG-001 on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Corofin Wetlands SPA (004220)					✓
Coole-Garryland SPA (004107)					✓

Table 6.2.109 - Summary of potential LSEs from option SAG-046 on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Inner Galway Bay SPA (004031)		✓ (C) (GW)			✓
Coole-Garryland SPA (004107)					✓
Corofin Wetlands SPA (004220)					✓

Table 6.2.110 - Summary of potential LSEs from option SAG-079 on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Corofin Wetlands SPA (004220)		✓ (C)			✓

Table 6.2.111 - Summary of potential LSEs from option SAG-Group 501 (016, 057) on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Mid-Clare Coast SPA (004182)					✓
Coole-Garryland SPA (004107)					✓

Table 6.2.112 - Summary of potential LSEs from option SAG-Group 506 (036, 062) on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
Inner Galway Bay SPA (004031)					✓
Corofin Wetlands SPA (004220)					✓
Coole-Garryland SPA (004107)					✓

Table 6.2.113 - Summary of potential LSEs from option SAG-Group 513 (023, 070) on SPAs with the potential to give rise to AESI

SPA	Habitat Loss (including supporting habitat outside designated sites)	Habitat degradation (impacts to water quality and hydrological/hydrogeological changes etc.)	Water table/availability	Mortality	Disturbance (incl. spread of non-native invasive species)
River Shannon and River Fergus Estuaries SPA		✓ (C) (SW)			✓

(004077)					
Mid-Clare Coast SPA (004182)					✓

6.3 Mitigation

6.3.1 Protection of European Sites in Plan Development

Set out in Chapter 2.5 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 Preferred Approach for the NW region are detailed below.

6.3.2 Avoidance

The setting of sustainable abstraction limits (as outlined in Chapter 2.5.1) for any new or increased abstractions arising as a result of the draft RWRP-NW is intended 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 2.5.3). 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 of the assessment 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 Plan and scores neutral or zero against the European Sites (Biodiversity) question is automatically selected 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 Section 2.5.4. no option arising from the Plan with the potential for AESI identified at project level will be progressed as the 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 RWRP-NW.

6.3.3 General Mitigation Measures and Principles

6.3.3.1 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); and
- **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 project stage, taking into consideration any changes in best-practice as well as project-specific survey information or studies.

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

Irish Water will implement the objectives of their Biodiversity Action Plan (Irish Water, 2021). Where appropriate this would include measures to ensure “no net loss” of biodiversity across Irish Water sites when carrying out activities, delivering plans for example, or promote the use of nature-based solutions for water protection and wastewater treatment or manage invasive alien species on Irish Water sites to increase biodiversity on their sites.

Pollution Prevention

Best practice construction methods will 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 Schemes¹⁶

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 C649: 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 RWRP-NW as a minimum standard, unless project-specific

¹⁶<https://www.tii.ie/tii-library/environment/construction-guidelines/Guidelines-for-the-Crossing-of-Watercourses-during-the-Construction-of-National-Road-Schemes.pdf> (Accessed, January 2022)

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 RWRP-NW 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 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), Environmental Protection Agency (EPA) and Inland Fisheries Ireland (IFI).

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

Use less: Will aim to minimise environmental effects through water efficiency measures, for example, reducing water wastage.

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 sited outside of European sites. Where preferred approach options are within or hydrologically/hydrogeologically linked to European sites, 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 RWRP-NW. 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 RWRP-NW. 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 (Irish Water, n.d. a-e) 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 with appropriate qualifications to manage the risks associated with the specific conservation interests of the affected European Site.

6.3.4 Option Specific Measures

The plan-level assessment has identified option specific mitigation measures for a small number of options with highly sensitive QI species (e.g. freshwater pearl mussel) as outlined in Table 6.3.1 below.

Table 6.3.1 - Option specific mitigation measures

Study Area/Option	European Site	QI Features	Mitigation Measure (in addition to General Mitigation Measures.
<p>SAA (Options SAA-542, SAA-566, SAA-567)</p>	<p>Lough Eske and Ardnamona Wood SAC</p> <p>Cloghernagore Bog and Glenveagh National Park SAC</p> <p>Leannan River SAC</p> <p>West of Ardara/Maas Road SAC</p>	<p>Salmon/ Freshwater pearl mussel (FWPM)</p>	<p>The pipelines associated with these options will cross these European sites. For SAC river crossings it is assumed that the least impactful solution will always be employed, for example, directional drilling beneath the river rather than open cut.</p> <p>Note it is not anticipated that there would be any direct impacts on FWPM, as such impacts could be designed out through, for example, strategic positioning of crossing points. Only indirect effects are anticipated for FWPM through potential impacts on their host species. The potential for direct impacts can only be determined at the project stage which will influence the location for any crossing points.</p> <p>Construction works (pipeline crossing of SAC) will avoid the main migration and spawning periods for salmon (this period is also critical to the lifecycle of the freshwater pearl mussel) to minimise the risk of displacement or barrier effects due to noise, vibration or site-derived pollutants, unless project-specific environmental assessments identify that any effects associated with construction works will be 'not significant' or will have no adverse effect on the integrity of the SAC. To note there are significant variations in the timing and duration of salmonid spawning activity</p>

Study Area/Option	European Site	QI Features	Mitigation Measure (in addition to General Mitigation Measures.
			throughout the Republic of Ireland (IFI, 2016). Instream works should be carried out during the period July-September (except in exceptional circumstances and with agreement with IFI).
SAB	-	-	No option specific mitigation measures required for SAB.
SA-C	-	-	No option specific mitigation measures required for SA-C.
SAD (Option SAD-545)	The Twelve Bens/Garraun Complex SAC	Salmon/ Freshwater pearl mussel (FWPM)	<p>The pipelines associated with this option will cross this European site. For SAC river crossings it is assumed that the least impactful solution will always be employed, for example, directional drilling beneath the river rather than open cut.</p> <p><i>Note it is not anticipated that there would be any direct impacts on FWPM, as such impacts could be designed out through, for example, strategic positioning of crossing points. Only indirect effects are anticipated for FWPM through potential impacts on their host species. The potential for direct impacts can only be determined at the project stage which will influence the location for any crossing points.</i></p> <p>Construction works (pipeline crossing of SAC) will avoid the main migration and spawning periods for salmon (this period is also critical to the lifecycle of the freshwater pearl mussel) to minimise the risk of displacement or barrier effects due to noise, vibration or site-derived pollutants, unless project-specific environmental assessments identify that any effects associated with construction works will be 'not significant' or will have no adverse effect on the integrity of the SAC. To note there are significant variations in the timing and duration of salmonid spawning activity throughout the Republic of Ireland (IFI, 2016). Instream works should be carried out during the period July-September (except in exceptional circumstances and with agreement with IFI).</p>
SAE	-	-	No option specific mitigation measures required for SAE.
SAF	-	-	No option specific mitigation measures required for SAF.
SAG (Option SAG-513)	Lower River Shannon SAC	Salmon/ Freshwater pearl mussel (FWPM)	The pipelines associated with this option will cross this European site. For SAC river crossings it is assumed that the least impactful solution will always be employed, for example,

Study Area/Option	European Site	QI Features	Mitigation Measure (in addition to General Mitigation Measures.
			<p>directional drilling beneath the river rather than open cut.</p> <p><i>Note it is not anticipated that there would be any direct impacts on FWPM, as such impacts could be designed out through, for example, strategic positioning of crossing points. Only indirect effects are anticipated for FWPM through potential impacts on their host species. The potential for direct impacts can only be determined at the project stage which will influence the location for any crossing points.</i></p> <p>Construction works (pipeline crossing of SAC) will avoid the main migration and spawning periods for salmon (this period is also critical to the lifecycle of the freshwater pearl mussel) to minimise the risk of displacement or barrier effects due to noise, vibration or site-derived pollutants, unless project-specific environmental assessments identify that any effects associated with construction works will be 'not significant' or will have no adverse effect on the integrity of the SAC. To note there are significant variations in the timing and duration of salmonid spawning activity throughout the Republic of Ireland (IFI, 2016). Instream works should be carried out during the period July-September (except in exceptional circumstances and with agreement with IFI).</p>

6.3.5 Further assessments and data to inform potential impacts

As discussed in Chapter 2.5 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 or Q50 as appropriate 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. These further assessments are particularly important for new groundwater abstractions where there is very limited information or knowledge on sustainable 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.

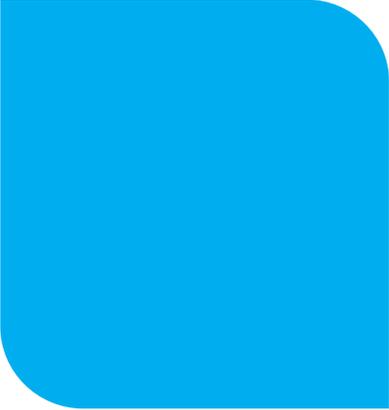
Potential effects include, but are not limited to, changes in water quality and/or water levels, habitat loss and disturbance. Prior to progressing any new management option, the following assessments will be required:

- **Measure 6.3.5a: Yield assessment:** This assessment will identify the amount of water that can be sustainably abstracted from a given waterbody, 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 6.3.5b: 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 6.3.5c: 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 6.3.5d: 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.

6.4 Conclusion to AESI

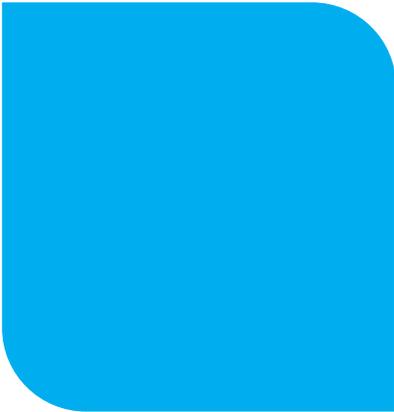
Appendix D (see Tables D1 [SAA] – D7 [SAG]) summarises the potential impacts to European sites and the corresponding mitigation measures to ensure any potential adverse effects on site integrity are avoided as a result of progressing the Preferred Approach for the NW region. Mitigation measures are referenced in Appendix D but detailed in Section 6.3 above.



7



**In-combination
Effects**



7.1 Assessment of In-combination Effects

Under Article 6(3) of the Habitats Directive, an assessment of 'in-combination' effects with other plans and projects is required. The assessment used the best available information at the time of writing.

The assessment of in-combination effects focused on potential effects between options and effects between options and other major projects or plans. Table 7.1 presents the in-combination assessment for RWRP-NW with other plans. The assessment is undertaken at the regional level. The in-combination assessment for projects and between SAs is detailed in Appendix E (see Tables E1 [SAA] – E7 [SAG] and E8 [NW region]), the in-combination assessment between regional groups is detailed in Appendix E (see Table E9 [NW, SW and EM region]), and all are summarised in Table 7.2 below.

In summary potential in-combination effects with other plans, projects, between options and between regional groups were identified. However, with the implementation of mitigation there will be no adverse effects on the integrity of any European site, either alone or in-combination with other plans or projects as a result of implementing the draft RWRP-NW.

As noted previously, at the project level further detailed assessment of potential in-combination effects in relation to surface or groundwater abstractions will be required and appropriate measures to avoid in-combination effects will be identified at that stage.

Table 7.1 - Summary of in-combination assessment with other plans

Plan/Project	Potential impact types common to RWRP-NW and other plans	In-combination Likely Significant Effects? (Y/N)	Potential for in-combination effects and mitigation	In-combination adverse effects on site integrity? (Y/N)
Irish Water Plans [RWRP-EM and RWRP-SW not included in Table 7.1 as they are assessed in more detail in Table 7.2 below]				
<p>Water Services Strategic Plan (WSSP)¹⁷</p> <p>The WSSP is the highest tier Irish Water asset management plan. It sets the overarching framework for detailed Implementation Plans including the Framework Plan and specific water services projects over the next 25 years.</p>	<ul style="list-style-type: none"> Habitat loss and disturbance from new/upgraded infrastructure Species disturbance/mortality Changes to water quality or quantity 	Y	<p>A screening for AA¹⁸ 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 RWRP-NW identify potential LSEs from impacts of a similar nature, and therefore a potential for in-combination effects was identified.</p> <p>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:</p> <p><i>“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</i></p>	N

¹⁷ https://www.water.ie/docs/WSSP_Final.pdf (Accessed, January 2022)

¹⁸ [https://www.water.ie/docs/WSSP-AA-Natura-Impact-Statement-\(Web\).pdf](https://www.water.ie/docs/WSSP-AA-Natura-Impact-Statement-(Web).pdf) (Accessed, January 2022)

			<p><i>to/construction of new infrastructure, including potential transboundary effects“.</i></p> <p>The NIS for the draft RWRP-NW has highlighted the need for additional project level environmental assessments, while high-level mitigation measures have been outlined in Chapter 6 of this NIS. Mitigation required will be developed and delivered as options are advanced which will protect European sites within the NW region 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.</p>	
<p>National Wastewater Sludge Management Plan (NWSMP) 2016-2021¹⁹</p> <p>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. This is currently the most recent NWSMP.</p>	<ul style="list-style-type: none"> • 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 siting of new infrastructure. 	Y	<p>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 RWRP-NW 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 RWRP-SW.</p> <p>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.</p> <p>Given the mitigation measures set out in the NIS for the NWSMP and the mitigation measures in Chapter 6 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.</p>	N
<p>Lead in Drinking Water Mitigation Plan (LDWMP)²⁰</p> <p>In 2015, the Government published the National Strategy with the aim to</p>	<ul style="list-style-type: none"> • Changes to water quality • Increased phosphorous in receiving waters leading to nutrient enrichment and 	Y	<p>The AA screening 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 RWRP-NW identify potential LSEs from impacts of a similar nature, and therefore a potential for in-combination effects has been identified. An AA Determination is available for this Plan²¹.</p>	N

¹⁹ <https://www.water.ie/iw-documents/our-projects/Final-NWSMP.pdf> (Accessed, January 2022)

²⁰ <https://www.water.ie/docs/Lead-in-Drinking-Water-Mitigation-Plan.pdf> (Accessed, January 2022)

²¹ https://www.water.ie/docs/Lead_AA-Determination.pdf (Accessed, March 2022)

<p>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.</p>	<p>proliferation of plant growth (eutrophication)</p>		<p>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,</p> <p><i>“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”.</i></p> <p>Given the mitigation measures set out in Chapter 7 of the NIS for the LDWMP and the mitigation measures in Chapter 6 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.</p>	
<p>Other relevant Plans</p>				
<p>National Planning Framework (NPF)²²</p> <p>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</p>	<ul style="list-style-type: none"> • Loss of habitat • Changes to hydrology/ water quality • Disturbance/ disruption resulting in a reduction of key specie/species density during construction and operation 	<p>Y</p>	<p>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 <i>“Ensuring that water supply and waste-water needs are met by new national projects”</i>. 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 undertaken²³. Therefore, there is potential for in-combination effects from the</p>	<p>N</p>

²² <http://npf.ie/wp-content/uploads/Project-Ireland-2040-NPF.pdf> (Accessed, January 2022)

²³ <http://npf.ie/wp-content/uploads/2017/09/Natura-Impact-Statement-%E2%80%93-Ireland-2040.pdf> (Accessed, January 2022)

<p>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.</p>	<ul style="list-style-type: none"> • Invasive species introduction 		<p>NPF and the draft RWRP-NW.</p> <p>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 6 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.</p>	
<p>Regional Spatial and Economic Strategies</p> <p>The Regional Spatial and Economic Strategies is a policy document which seeks to focus future 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:</p> <ul style="list-style-type: none"> • Northern and Western Region²⁴; • Eastern and Midland Region²⁵; and 	<ul style="list-style-type: none"> • Loss of habitat • Provision of new/upgraded infrastructure • Changes to hydrology • Changes in water quality • Disturbance to species • Species mortality 	<p>Y</p>	<p>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 RWRP-NW.</p> <p>As with all projects arising from the draft RWRP-NW, all projects arising from Regional Spatial and Economic Strategies will be subject to project level assessments. Given the mitigation measures set out in Chapter 6 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.</p>	<p>N</p>

²⁴ <https://www.nwra.ie/rses/> (Accessed, January 2022)

²⁵ <https://emra.ie/rses/> (Accessed, January 2022)

<ul style="list-style-type: none"> Southern Region²⁶. <p>Regions are connected through hydrological links, for example the River Shannon.</p>				
<p>River Basin Management Plan 2018-2021/Draft River Basin Management Plan (RBMP) (2022 - 2027)²⁷</p> <p>This Plan/Draft Plan by the Department of Housing, Local Government and Heritage sets out the objectives and recommendations to help protect, improve and sustainably manage the water environment in Ireland to 2027. The Draft Plan was issued for six-month public consultation in September 2021 which is now closed and submissions are being reviewed. Finalised Plan due this year.</p>	<ul style="list-style-type: none"> Habitat loss and destruction Habitat degradation Habitat/species fragmentation Disturbance to key species Changes to favourable conservation status of key species Changes in key indicators of conservation value, such as water quality 	Y	<p>The AA screening for the RBMP/Draft RBMP concluded that the Plan could lead to significant effects on European sites. The RBMP/Draft RBMP is a strategic and high-level plan, which will inform the preparation of lower tier catchment and sub-catchment plans which will in turn inform specific water body interventions. Therefore, there is potential for in-combination effects with the draft RWRP-NW.</p> <p>The RBMP/Draft 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 with the Framework Plan, any projects arising as a result of the RBMP/Draft RBMP will be subject to project level AA assessments. Given the mitigation measures set out in Chapter 8 of the RBMP NIS/Chapter 7 of the Draft RBMP NIS and Chapter 6 of this NIS, including the requirement for project level assessments, the RBMP/Draft RBMP will not adversely affect the integrity of any European Site either alone or in-combination with other plans or projects.</p>	N

²⁶ <http://www.southernassembly.ie/regional-planning/rse> (Accessed, January 2022)

²⁷ <https://www.gov.ie/en/consultation/2bda0-public-consultation-on-the-draft-river-basin-management-plan-for-ireland-2022-2027/> (Accessed, January 2022)

<p>Forestry Programme 2014 – 2020: IRELAND²⁸</p> <p>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.</p>	<ul style="list-style-type: none"> • Changes to water quality • Loss/ fragmentation of habitats and species • Increase in pollution from sediment and nutrients entering watercourses • Acidification 	<p>Y</p>	<p>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’²⁹ 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 AA³⁰ 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 RWRP-NW identify potential LSEs from impacts of a similar nature, and therefore a potential for in-combination effects was identified.</p> <p>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 6 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.</p>	<p>N</p>
<p>Water Resource and Supply Resilience Plan – Habitats Regulation Assessment³¹</p> <p>The Plan by Northern Ireland Water (NI Water) aims to have a secure, resilient water supply network that will provide protection against drought and</p>	<ul style="list-style-type: none"> • Physical loss – destruction (including offsite effects, e.g. foraging habitat) and smothering • Physical damage – sedimentation/ silting etc. • Non-physical disturbance – noise, visual presence, human 	<p>Y</p>	<p>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 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.</p> <p>Both the Water Resource and Supply Resilience Plan and the draft RWRP-NW identify potential LSEs from impacts of a similar nature, and therefore potential</p>	<p>N</p>

²⁸ <https://www.gov.ie/en/publication/forestry-policy-and-strategy/#forestry-programme-2014-2020> (Accessed, March 2022)

²⁹ <https://wayback.archive-it.org/11501/20201127124443/https://www.agriculture.gov.ie/media/migration/forestry/publications/codeofbestforestpractice/Code%20of%20Best%20Forest%20Prac%20Part%201.pdf> (Accessed, March 2022)

³⁰ <https://wayback.archive-it.org/11501/20201127093539/https://www.agriculture.gov.ie/media/migration/forestry/publicconsultation/newforestryprogramme2014-2020/nis/ForestryProgrammeNaturalImpactStatement290914.pdf> (Accessed, March 2022)

³¹ <https://www.niwater.com/sitefiles/resources/pdf/2020/wrm/wrsrplanhabitatregulationsassessment.pdf> (Accessed, April 2022)

<p>emergency situations.</p>	<p>presence, light pollution</p> <ul style="list-style-type: none"> • 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, air pollution • Non-toxic contamination – nutrient enrichment etc. 		<p>for in-combination effects was identified.</p> <p>Given the mitigation measures set out in Chapter 6 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 nature conservation sites of international or European importance would be avoided/eliminated. No AESI in light of a European site’s conservation objectives are predicted as a result of in-combination effects.</p>	
<p>National Marine Planning Framework (NMPF)³²</p> <p>The Plan by the Department of Housing, Planning and Local Government aims to provide a common framework for the marine area where environmental, social and economic factors will be considered in the decision-making</p>	<ul style="list-style-type: none"> • Habitat loss or destruction • Loss of key supporting habitats and ecosystem complexes • Habitat fragmentation or degradation • Disturbance to habitats/species • Species mortality • Alterations to water quality 	<p>Y</p>	<p>The NMPF is a strategic plan subject to a high-level AA and SEA. The AA concluded that there was potential for significant effects on European sites from the implementation of the programme given the nature of the policy objectives that it presents. The NMPF is at a national strategic level, therefore it focuses on the potential for indirect impacts arising from the developments arising from the various national policy objectives.</p> <p>Both the NMPF and draft RWRP-NW identify potential LSEs from impacts of a similar nature, and therefore the potential for in-combination effects was identified.</p> <p>A number of mitigation measures are proposed as part of the NMPF in Chapter 8 of the accompanying NIS for the NMPF. The mitigation chapter was revised post consultation to reflect the final and adopted NMPF. As the NMPF is a strategic plan it relies on other policy, strategy and plan initiatives to achieve its objectives to ensure that the objectives are met and that there are no adverse effects on</p>	<p>N</p>

³² <https://www.gov.ie/en/publication/60e57-national-marine-planning-framework/> (Accessed, January 2022)

process for a range of projects, plans and policy.	<ul style="list-style-type: none"> and/or water movement Alterations to air quality Alterations due to climate change Introduction or spread of invasive species 		any European sites. Given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.	
<p>Clare County Development Plan 2017-2023³³</p> <p>The Plan sets out an overall strategy for the proper planning and sustainable development of the functional area of Clare County Council over a six-year period.</p>	<ul style="list-style-type: none"> Changes in water quality Disturbance to lesser horseshoe bats Changes to the hydrology of groundwater-dependent QI habitats Invasive non-native species Disturbance to QI birds 	Y	<p>Clare County Development Plan 2017-2023 was subject to a SEA, Stage 1 and Stage 2 AA and LSEs were identified for the Plan.</p> <p>There is the potential for in-combination effects with the Plan and the draft RWRP-NW. However, the NIS for Clare County Development Plan determined that with the application of the mitigation measures provided in Table C2 of the NIS, there would be no adverse effects on the integrity of European Sites in isolation or in-combination with other Plans and Projects acting in the same area.</p> <p>Therefore, given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	N
<p>County Donegal Development Plan 2018-2024³⁴</p> <p>The Plan is the principal statutory land use plan for the County, and it sets out a strategic vision for the future growth and development of the County over the six-year life of the Plan and beyond to a twenty-</p>	<ul style="list-style-type: none"> Loss of habitat area Fragmentation of habitats Disturbance of species Changes to population structure or density Changes in quantity or quality of the water resource 	Y	<p>County Donegal Development Plan 2018-2024 was subject to a SEA, Stage 1 and Stage 2 AA, and LSEs were identified for the Plan.</p> <p>There is the potential for in-combination effects with the Plan and the draft RWRP-NW. Having incorporated the mitigation measures outlined in Section 6.4 of the NIR, it was found that no direct, indirect or cumulative significant effects on Natura 2000 sites were likely from the Plan.</p> <p>Therefore, given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	N

³³ <https://www.clarecoco.ie/services/planning/ccdp2017-2023/> (Accessed, January 2022)

³⁴ <https://www.donegalcoco.ie/services/planning/developmentplansbuilttheheritageincludinggrants/county%20donegal%20development%20plan%202018-2024/> (Accessed, August 2022)

year timeframe.				
<p>Leitrim County Development Plan 2015-2021 (as varied)/Draft Leitrim County Development Plan 2023-2029³⁵</p> <p>The Plan/Draft Plan sets out an overall strategy for the proper planning and sustainable development of the County for the next six years whilst also aligning with longer term national and regional objectives up to 2040. The Draft Plan is at Stage 3 (Publication of Draft). It is expected to be adopted in 2023.</p>	<ul style="list-style-type: none"> • Loss/reduction of habitat area • Habitat or species fragmentation • Disturbance to key species • Reduction in species density • Changes in key indicators of conservation value (e.g. water quality) • Climate change 	Y	<p>Leitrim County Development Plan 2015-2021 (as varied)/Draft Leitrim County Development Plan 2023-2029 was subject to a SEA, Stage 1 and Stage 2 AA, and LSEs were identified for the Plan/Draft Plan.</p> <p>There is the potential for in-combination effects with the Plan/Draft Plan and the draft RWRP-NW. Having incorporated the mitigation measures outlined in Section 11 of the Plan NIR/Section 5 of the Draft Plan NIR, it was found that the Plan/Draft Plan was not foreseen to give rise to any adverse effects on the integrity of European Sites, alone or in combination with other plans or projects.</p> <p>Therefore, given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	N
<p>Sligo County Development Plan 2017-2023³⁶</p> <p>The County Development Plan is the over-arching strategic framework document for sustainable</p>	<ul style="list-style-type: none"> • Reduction of habitat area • Disturbance to key species • Habitat or species fragmentation • Reduction in species density • Changes in key indicators of 	N	<p>Sligo County Development Plan 2017-2023 was subject to a SEA and Stage 1 AA, and no LSEs were identified for the Plan.</p> <p>Therefore, there is no potential for in-combination effects with the Plan and the draft RWRP-NW. Having incorporated elements of the Plan as outlined in Section 5.4 of the AA Screening, it was found that the implementation of the proposed draft Plan will not have a significant effect on the Natura 2000 network and Stage 2 Appropriate Assessment is not required at this stage of the plan making process.</p>	N

³⁵ http://www.countyleitrim.ie/eng/Services_A-Z/Planning-and-Development/Development-Plans/Leitrim-County-Development-Plan-2023-%E2%80%93-2029/Stage-3-%E2%80%93-Publication-of-Draft-Leitrim-County-Development-Plan-2023-2029.html (Accessed, April 2022)

³⁶ <https://www.sligococo.ie/cdp/> (Accessed, March 2022)

development in spatial, economic, social and environmental terms for Sligo over a six-year period.	conservation value (water quality etc.)		Therefore, given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.	
<p>Mayo County Development Plan 2022-2028³⁷</p> <p>The Mayo County Development Plan 2022-2028 sets out the roadmap for the overall proper planning and sustainable development of County Mayo over the six-year plan period.</p>	<ul style="list-style-type: none"> • Loss/ reduction of habitat area • Disturbance to key species • Habitat or species fragmentation • Reduction in species density • Changes in key indicators of conservation value, such as changes in water quality and quantity, and air quality 	Y	<p>Mayo County Development Plan 2022-2028 was subject to a SEA, Stage 1 and Stage 2 AA, and LSEs were identified for the Plan.</p> <p>There is the potential for in-combination effects with the Plan and the draft RWRP-NW. Having incorporated the mitigation measures outlined in Section 9 of the NIR, it was found that the Plan will not adversely impact on the Natura 2000 sites, either alone or in-combination with other plans, projects or policies.</p> <p>Therefore, given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	N
<p>Roscommon County Development Plan 2022-2028³⁸</p> <p>The County Development Plan is a document that sets out the overall strategy and vision for the proper planning and sustainable development of the county over the six-year plan period.</p>	<ul style="list-style-type: none"> • Loss/reduction of habitat area • Habitat or species fragmentation, including barrier effects • Disturbance to key species • Reduction in species density • Changes in key indicators of conservation value (e.g. water quality) • Climate change 	Y	<p>Roscommon County Development Plan 2022-2028 was subject to a SEA, Stage 1 and Stage 2 AA, and LSEs were identified for the Plan.</p> <p>There is the potential for in-combination effects with the Plan and the draft RWRP-NW. Having incorporated the mitigation measures outlined in Section 5 of the NIR, it was found that the Plan will not give rise to any adverse effects on the integrity of European Sites, alone or in combination with other plans or projects.</p> <p>Therefore, given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	N

³⁷ <https://www.mayo.ie/planning/county-development-plans/2022-2028> (Accessed, August 2022)

³⁸ <https://www.rosdevplan.ie/roscommon-county-development-plan-2022-2028/> (Accessed, August 2022)

<p>Cavan County Development Plan 2014 – 2020/Draft Cavan County Development Plan 2022-2028³⁹</p> <p>The Plan/Draft Plan sets out the Council’s proposed policies and objectives for the development of the County over the Plan period. The Plan/Draft Plan seeks to develop and improve, in a sustainable manner, the social, economic, environmental and cultural assets of County Cavan. The Draft Plan is at Stage 3 (Consideration of Chief Executive’s Report by Elected Members). It is expected to be adopted by the end of 2022.</p>	<ul style="list-style-type: none"> • Loss/reduction of habitat area • Habitat or species fragmentation • Disturbance to key species • Reduction in species density • Changes in key indicators of conservation value (e.g. water quality) • Climate change 	<p>Y</p>	<p>Cavan County Development Plan 2014 – 2020 was subject to Stage 1 Screening for AA. The AA Screening report concluded that there are likely to be no significant effects on the Natura 2000 sites and that appropriate protection and mitigation, where necessary, in respect of Natura 2000 Network has been formulated within the Amended Draft Cavan County Development Plan. The Draft Cavan County Development Plan 2022-2028 was subject to a SEA, Stage 1 and Stage 2 AA, and LSEs were identified for the Plan.</p> <p>There is the potential for in-combination effects with the Plan/Draft Plan and the draft RWRP-NW. Having incorporated the mitigation measures outlined in Section 5 of the NIR of the Draft Plan, it was found that the Draft Plan was not foreseen to give rise to any adverse effects on the integrity of European Sites, alone or in combination with other plans or projects.</p> <p>Therefore, given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site’s conservation objectives are predicted as a result of in-combination effects.</p>	<p>N</p>
<p>Monaghan County Development Plan 2019-2025⁴⁰</p> <p>The County Development Plan provides an overall strategy for the proper planning and sustainable</p>	<ul style="list-style-type: none"> • Loss/reduction of habitat area • Disturbance to key species • Habitat or species fragmentation • Reduction in species density • Changes in key indicators of 	<p>Y</p>	<p>Monaghan County Development Plan 2019-2025 was subject to a SEA, Stage 1 and Stage 2 AA, and LSEs were identified for the Plan.</p> <p>There is the potential for in-combination effects with the Plan and the draft RWRP-NW. Having incorporated the mitigation measures outlined in Section 5 of the NIR, it was found that the Plan will not have a significant adverse effect on the ecological integrity of any European Sites, either individually or in combination with any other plan or project.</p> <p>Therefore, given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a</p>	<p>N</p>

³⁹ <https://www.cavancoco.ie/services/planning-building/forward-planning/development-plan/> (Accessed, April 2022)

⁴⁰ <https://monaghan.ie/planning/new-county-development-plan/?msckid=f4e77849b42311eca9a5808e40655eec> (Accessed, April 2022)

development of County Monaghan over the timescale of the Plan.	conservation value such as decrease in water quality / quantity		European site's conservation objectives are predicted as a result of in-combination effects.	
<p>Louth County Development Plan 2021-2027⁴¹</p> <p>The Louth County Development Plan 2021-2027 sets out the Council's overall strategy for the proper planning and sustainable development of County Louth.</p>	<ul style="list-style-type: none"> • Loss/reduction of habitat area • Habitat fragmentation • Disturbance to key species • Reduction in species density • Changes in key indicators of conservation value (e.g. water quality) • Climate change 	Y	<p>The Louth County Development Plan 2021 – 2027 was subject to AA and SEA. The AA concluded that, with the implementation of mitigation measures, the Plan is not foreseen to give rise to any significant effects on designated European sites, alone or in combination with other plans or projects.</p> <p>There is potential for in-combination effects with the Plan and the draft RWRP-NW. However, with the mitigation measures proposed as part of the Louth County Development Plan in Section 5 of the accompanying NIR for the Plan, there is no potential for adverse effects on European sites. In addition, all lower-level plans and projects arising through the implementation of the Plan will themselves be subject to AA/screening for AA when further details of design and location are known.</p> <p>Given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	N
<p>Meath County Development Plan 2021-2027⁴²</p> <p>The Meath County Development Plan 2021-2027 sets out the policies and objectives and the overall strategy for the development of the County over the plan period.</p>	<ul style="list-style-type: none"> • Impacts on water quality • Impact on hydrogeology • Habitat loss/degradation • Disturbance impacts on sensitive species • Reduction in ecological connectivity 	Y	<p>The Meath County Development Plan 2021 – 2027 was subject to AA and SEA. The AA concluded that, with the implementation of mitigation measures, the Plan is not foreseen to give rise to any significant effects on designated European sites, alone or in combination with other plans or projects.</p> <p>There is potential for in-combination effects with the Plan and the draft RWRP-NW. However, assuming the successful implementation of the policies/objectives in the Written Statement of the Meath County Development Plan, compliance with the Settlement Written Statement and Maps and application of the mitigation measures provided in Table C1 and C2 (Appendix C) of the NIR, there will be no adverse effects on integrity of European Sites in isolation, or in combination, with other Plans and Projects acting in the same area.</p> <p>Given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	N

⁴¹ <https://www.louthcoco.ie/en/publications/development-plans/louth-county-development-plan-2021-2027/volume-1-lcdp-2021-2027-.html> (Accessed, April 2022)

⁴² <https://consult.meath.ie/en/consultation/meath-adopted-county-development-plan> (Accessed, April 2022)

<p>Westmeath County Development Plan 2021-2027⁴³</p> <p>The County Development Plan sets out the Council's proposed policies and objectives for the development of the County over the Plan period. The Plan seeks to develop and improve, in a sustainable manner, the social, economic, environmental and cultural assets of the County.</p>	<ul style="list-style-type: none"> • Loss/reduction of habitat area • Habitat or species fragmentation • Disturbance to key species • Reduction in species density • Changes in key indicators of conservation value (e.g. water quality) • Climate change 	<p>Y</p>	<p>The Westmeath County Development Plan 2021 – 2027 was subject to AA and SEA. The AA concluded that, with the implementation of mitigation measures, the Plan is not foreseen to give rise to any significant effects on designated European sites, alone or in combination with other plans or projects.</p> <p>There is potential for in-combination effects with the Plan and the draft RWRP-NW. However, with the mitigation measures proposed as part of the Westmeath County Development Plan in Section 5 of the accompanying NIR for the Plan, there is no potential for adverse effects on European sites. In addition, all lower-level plans and projects arising through the implementation of the Plan will themselves be subject to AA/screening for AA when further details of design and location are known.</p> <p>Given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	<p>N</p>
<p>Galway County Development Plan 2022-2028⁴⁴</p> <p>The County Development Plan is a land use plan and overall strategy for the proper planning and sustainable development of the functional area of County Galway over the six-year period 2022-2028. The Plan sets out the Councils proposed policies and objectives for the</p>	<ul style="list-style-type: none"> • Loss/reduction of habitat area • Habitat or species fragmentation • Disturbance to key species • Reduction in species density • Changes of indicators of conservation value (e.g. water quality) 	<p>Y</p>	<p>Galway County Development Plan 2022-2028 was subject to a SEA, Stage 1 and Stage 2 AA, and LSEs were identified for the Plan.</p> <p>There is the potential for in-combination effects with the Plan and the draft RWRP-NW. Having incorporated the mitigation measures outlined in Section 5 of the NIR, it was found that the Plan is not foreseen to give rise to any adverse effects on the integrity of any European Site, alone or in combination with other plans or projects.</p> <p>Therefore, given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	<p>N</p>

⁴³ <https://www.westmeathcoco.ie/en/ourservices/planning/developmentplans/countydevelopmentplan2021-2027/?msclkid=ccf278fab43111eca6edd3db2899af65> (Accessed, April 2022)

⁴⁴ <https://consult.galway.ie/en/consultation/adopted-galway-county-development-plan-2022-2028> (Accessed, August 2022)

development of the County over the Plan period.				
<p>Galway City Development Plan 2017-2023⁴⁵</p> <p>The City Development Plan is centred on a vision for Galway City to be a successful, sustainable, socially inclusive regional capital. It aspires to create prosperity while also being environmentally responsible, and encouraging development, growth and innovation through the best use of land and resources.</p>	<ul style="list-style-type: none"> • Habitat loss • Disturbance • Fragmentation • Effects of displaced species • Habitat degradation • Reduced water quality • Invasive species 	Y	<p>Galway City Development Plan 2017-2023 was subject to a SEA, Stage 1 and Stage 2 AA, and LSEs were identified for the Plan.</p> <p>There is the potential for in-combination effects with the Plan and the draft RWRP-NW. Having incorporated the mitigation measures outlined in Section 4 of the NIR and the strategies set out in Chapter 4 of the Plan, it was found that the Plan would not have a significant adverse effect on the integrity of European sites.</p> <p>Therefore, given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	N
<p>Longford County Development Plan 2021-2027⁴⁶</p> <p>The Development Plan sets out an overall strategy for the proper planning and sustainable development of Longford County.</p>	<ul style="list-style-type: none"> • Loss/reduction of habitat area • Habitat or species fragmentation • Disturbance to key species • Reduction in species density • Changes in key indicators of conservation value (e.g. water quality) 	Y	<p>The Longford County Development Plan 2021 - 2027 was subject to AA and SEA. The AA concluded that, with the implementation of mitigation measures, the Plan will not have a significant adverse effect on the integrity of the Natura 2000 network alone or in combination with other plans or projects.</p> <p>There is potential for in-combination effects with the Plan and the draft RWRP-NW. However, with the mitigation measures proposed as part of the Longford County Development Plan in Section 5 of the accompanying NIR for the Plan, there is no potential for adverse effects on European sites. In addition, all lower-level plans and projects arising through the implementation of the Plan will themselves be subject to AA/screening for AA when further details of design and location are known.</p> <p>Given the mitigation measures set out in Chapter 6 of this NIS and with the</p>	N

⁴⁵ <https://www.galwaycity.ie/development-plan-2017-2023> (Accessed, April 2022)

⁴⁶ <https://www.longfordcoco.ie/services/planning/longford-county-development-plan-2021-2027/?msclid=d4b4eed5b43311ec878a3294b22e3be9> (Accessed, April 2022)

	<ul style="list-style-type: none"> Climate change 		standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.	
<p>Armagh City, Banbridge and Craigavon Borough Council Local Development Plan⁴⁷</p> <p>The Local Development Plan (LDP) is to inform the general public, statutory authorities, developers, investors and other interested bodies of the policy framework and land use proposals that will guide development decisions within the Borough up to 2030.</p>	<ul style="list-style-type: none"> Loss, fragmentation, damage of habitats and/or species Disturbance (physical, noise, lighting) Biological disturbance (invasive species, human) Contamination of land Emissions by air Emissions by water and changes to hydrology 	Y	<p>The Armagh City, Banbridge and Craigavon Borough Council Local Development Plan was subject to AA and SEA. With the implementation of mitigation measures, the Plan will not have a significant adverse effect on the integrity of the Natura 2000 network alone or in combination with other plans or projects.</p> <p>There is potential for in-combination effects with the Plan and the draft RWRP-NW. However, given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	N
<p>Northern Area Plan 2016 (Causeway Coast and Glens Borough Council Local Development Plan)⁴⁸</p> <p>The purpose of this Plan for the Causeway Coast and Glens Borough Council is to inform the general public, statutory authorities, developers</p>	<ul style="list-style-type: none"> Loss, fragmentation, damage of habitats and/or species Disturbance (physical, noise, lighting) Biological disturbance (invasive species, human) Emissions 	Y	<p>The Northern Area Plan 2016 was subject to Stage 1 and Stage 2 AA, and LSEs were identified for the Plan.</p> <p>There is the potential for in-combination effects with the Plan and the draft RWRP-NW. Having incorporated the mitigation measures outlined in Section 4 of the Habitats Regulation Assessment (HRA) Report, it was found that the Plan would not adversely affect the key species and key habitats or the integrity (structure and function and conservation objectives) of any European site.</p> <p>Therefore, given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	N

⁴⁷ <https://www.armaghibanbridgecraigavon.gov.uk/resident/local-development-plan-residents/#1522162519976-f43e6047-05a2> (Accessed, October 2022)

⁴⁸ https://wayback.archive-it.org/11112/20190702150405/https://www.planningni.gov.uk/index/policy/dev_plans/devplans_az/northern_2016.htm (Accessed, October 2022)

<p>and other interested parties of the policy framework and land use proposals that will be used to guide development decisions within the Plan area over the period of the Plan.</p>	<p>through hydro connectivity and changes to hydrology</p> <ul style="list-style-type: none"> • Aerial emissions • Contamination of land 			
<p>Derry City & Strabane District Council Local Development Plan 2032⁴⁹</p> <p>The purpose of the Derry City and Strabane District LDP, is to inform the general public, statutory authorities, developers and other interested bodies of the policy framework and land use proposals that will implement the strategic objectives of the Regional Development Strategy and guide development decisions within Derry City and Strabane District up to 2032.</p>	<ul style="list-style-type: none"> • Direct effects (habitat loss/degradation, effects on species) • Direct effects on aquatic/marine environment (contamination, changes in flow regime) • Coastal processes • Mobile species • Recreational pressure (erosion, habitat damage, disturbance) • Growth – from water supply, wastewater, aerial emissions • Aerial emissions (other) • Disturbance (other) 	<p>Y</p>	<p>The Derry City & Strabane District Council Local Development Plan 2032 was subject to Stage 1 and Stage 2 AA, and LSEs were identified for the Plan.</p> <p>There is the potential for in-combination effects with the Plan and the draft RWRP-NW. Having incorporated the mitigation measures outlined in Section 5 and Table 4 of the HRA Report, it was found that the Plan will have no adverse effect on the integrity of any international sites.</p> <p>Therefore, given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	<p>N</p>

⁴⁹ <https://www.derrystrabane.com/Subsites/LDP/Local-Development-Plan> (Accessed, October 2022)

<p>Fermanagh and Omagh District Council Local Development Plan 2030⁵⁰</p> <p>The Fermanagh and Omagh Local Development Plan (LDP) sets out how the area will change and grow over the period up to 2030. It provides a vision for Fermanagh and Omagh towards the end of the plan period, a set of objectives to deliver the vision, a strategy for the growth of the area including how much development should be provided, where it should go and where it shouldn't go, a suite of strategic planning policies and detailed policies to guide development, and details of how the plan will be monitored.</p>	<ul style="list-style-type: none"> • Habitat loss • Direct disturbance • Indirect disturbance • Introduced species • Aerial emissions • Water pollution • Hydrological change 	<p>Y</p>	<p>The Fermanagh and Omagh District Council Local Development Plan 2030 was subject to SEA and Stage 1 and Stage 2 AA, and LSEs were identified for the Plan.</p> <p>There is the potential for in-combination effects with the Plan and the draft RWRP-NW. Having incorporated the mitigation measures and recommendations outlined in Sections 5 and 7 of the HRA Report, it was found that the Plan will not have any adverse effect on the integrity of the International sites connected to the plan area, either alone or in combination with other plans and projects.</p> <p>Therefore, given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	<p>N</p>
<p>Mid Ulster District Council Local Development Plan 2030⁵¹</p> <p>The purpose of the Mid</p>	<ul style="list-style-type: none"> • Habitat loss • Direct disturbance • Indirect disturbance • Introduced species 	<p>Y</p>	<p>The Mid Ulster District Council Local Development Plan 2030 was subject to SEA and Stage 1 and Stage 2 AA, and LSEs were identified for the Plan.</p> <p>There is the potential for in-combination effects with the Plan and the draft RWRP-NW. Having incorporated the mitigation measures and recommendations outlined in Sections 5 and 7 of the HRA Report, it was found that subject to</p>	<p>N</p>

⁵⁰ <https://www.fermanaghomagh.com/services/planning/local-development-plan/local-development-plan-draft-plan-strategy/> (Accessed, October 2022)

⁵¹ <https://www.midulstercouncil.org/planning/mid-ulster-development-plan> (Accessed, October 2022)

<p>Ulster District Council Local Development Plan is to inform the general public, statutory authorities, developers and other interested bodies of the policy framework and land use proposals that will implement the strategic objectives of the Regional Development Strategy and guide development decisions within Mid Ulster District Council up to 2030.</p>	<ul style="list-style-type: none"> • Aerial emissions • Water pollution • Hydrological change 		<p>included and proposed mitigation, the implementation of the Plan will not adversely affect the integrity of any International sites, either alone or in combination with other plans and projects.</p> <p>Therefore, given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	
<p>Newry, Mourne and Down District Council Local Development Plan 2030⁵²</p> <p>The Newry, Mourne and Down District Council Local Development Plan sets out the vision, strategy and objectives for the district up to 2030 and identifies key planning issues of strategic significance that are likely to influence the shape of future development within the district.</p>	<ul style="list-style-type: none"> • Loss, fragmentation, damage of habitats and/or species • Disturbance (physical, noise, lighting) • Biological disturbance (invasive species, human) • Contamination of land • Emissions by air • Emissions by water and changes to hydrology 	<p>Y</p>	<p>The Newry, Mourne and Down District Council Local Development Plan 2030 was subject to SEA and AA, and LSEs were identified for the Plan. With the implementation of mitigation measures, the Plan will not have a significant adverse effect on the integrity of the Natura 2000 network alone or in combination with other plans or projects.</p> <p>There is potential for in-combination effects with the Plan and the draft RWRP-NW. However, given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	<p>N</p>
<p>Strategic Integrated</p>	<ul style="list-style-type: none"> • Loss of habitat • Fragmentation 	<p>Y</p>	<p>The SIFP for the Shannon Estuary was subject to a SEA, Stage 1 and Stage 2</p>	<p>N</p>

⁵² <https://www.newrymournedown.org/local-development-plan> (Accessed, October 2022)

<p>Framework Plan (SIFP) for the Shannon Estuary⁵³</p> <p>The SIFP for the Shannon Estuary is an inter-jurisdictional land and marine based spatial planning strategy for the future development and management of the Shannon Estuary. The aim of the SIFP is to identify the potential nature and location of future development, economic growth and employment that can be sustainably accommodated within the Shannon Estuary.</p>	<ul style="list-style-type: none"> • Disturbance • Species population density • Water resource • Water Quality 		<p>AA and LSEs were identified for the Plan. The AA⁵⁴ concluded that there was potential for significant effects on European sites from the implementation of the Plan.</p> <p>Both the SIFP and draft RWRP-NW identify potential LSEs from impacts of a similar nature, and therefore the potential for in-combination effects was identified.</p> <p>A number of mitigation measures are proposed as part of the SIFP in Chapter 6 of the accompanying NIS for the SIFP. The SIFP acknowledged that following the application and adherence of the SIFP mitigation measures a risk of adverse effect on site integrity may still remain and will be determined by the project level detail of the future development opportunity, and its specific use, nature, scale, extent, type and exact content and layout - depending on this, there may or may not be an impact on the qualifying interests of the Natura 2000 sites.</p> <p>Given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	
<p>Shannon Foynes Port Company - Vision 2041⁵⁵</p> <p>Shannon Foynes Port Company has developed a thirty-year strategic vision for the provision of port infrastructure and services for their operations on the Shannon Estuary.</p>	<ul style="list-style-type: none"> • Habitat loss • Mortality • Habitat degradation including pollution • Disturbance • Invasive species • Changes to hydrology/ water quality 	Y	<p>Shannon Foynes Port Company - Vision 2041 was subject to AA and SEA and LSEs were identified for the strategy.</p> <p>There is the potential for in-combination effects with the strategy and the draft RWRP-NW. However, with the recommendations set out in the NIR for the strategy, the potential impacts associated with the strategy will not adversely affect the integrity of the European sites either alone or in-combination with other plans or projects.</p> <p>Therefore, given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects</p>	N

⁵³ <https://shannonestuariesifp.wordpress.com/sifp-documents/> (Accessed, March 2022)

⁵⁴ https://shannonestuariesifp.files.wordpress.com/2015/08/nir_2211_2013.pdf (Accessed, March 2022)

⁵⁵ <https://sfpc.ie/wp-content/uploads/2020/07/SFPC-MASTERPLAN-Final.pdf> (Accessed, March 2022)

<p>Food Vision 2030⁵⁶</p> <p>This is a ten-year agri-food strategy that aims to establish how the agri-food sector is to develop up to 2030 for the benefit of the Irish economy, society and environment.</p>	<ul style="list-style-type: none"> • Agricultural intensification • Atmospheric factors • Diffuse pollution of surface water and groundwater • Drainage • Reduced breeding success or increased predation, possibly resulting in reduced population viability • Impacts to inshore and offshore fisheries 	<p>Y</p>	<p>The Food Vision 2030 strategy was subject to AA and SEA. The AA concluded that after the consideration of the positive sustainable measures in place and with safeguards and best practice measures there would be no adverse impacts on the integrity of European sites.</p> <p>There is potential for in-combination effects with the strategy and the draft RWRP-NW. However, with the mitigation measures proposed as part of Food Vision 2030 in Chapter 5 of the accompanying NIS for the Strategy, there is no potential for adverse effects on European sites.</p> <p>Given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	<p>N</p>
<p>EU Biodiversity Strategy for 2030⁵⁷</p> <p>This is a long-term plan to protect nature and reverse the degradation of ecosystems. The strategy aims to put Europe's biodiversity on a path to recovery by 2030 and contains specific actions and commitments.</p>	<ul style="list-style-type: none"> • Establishing a larger network of protected areas • Launching a nature restoration plan • Improved implementation of biodiversity strategies 	<p>N</p>	<p>The 2030 Biodiversity Strategy builds upon and goes beyond the existing EU Birds and Habitats Directives and the EU Natura 2000 Network of protected areas. The strategy aims to build our societies' resilience to future threats such as the impacts of climate change, forest fires, food insecurity and disease outbreaks - including by protecting wildlife and fighting illegal wildlife trade. Given the nature of this plan there is potential for beneficial impacts to biodiversity and the conservation objectives of European sites.</p> <p>Given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	<p>N</p>
<p>National Biodiversity Action Plan 2017-2021⁵⁸ /Draft Irelands's 4th National</p>	<ul style="list-style-type: none"> • Strengthened legislation to tackle biodiversity loss • Increased 	<p>N</p>	<p>This Plan provides a framework to track and assess progress towards Ireland's Vision for Biodiversity over a five-year timeframe from 2017 to 2021, and the Draft Plan covers the period 2023 to 2027. Ireland's Vision for Biodiversity is: "That biodiversity and ecosystems in Ireland are conserved and restored,</p>	<p>N</p>

⁵⁶ <https://www.gov.ie/en/publication/c73a3-food-vision-2030-a-world-leader-in-sustainable-food-systems/> (Accessed, January 2022)

⁵⁷ https://ec.europa.eu/environment/strategy/biodiversity-strategy-2030_en (Accessed, January 2022)

⁵⁸ <https://www.npws.ie/legislation/national-biodiversity-plan> (Accessed, January 2022)

<p>Biodiversity Action Plan 2023-2027⁵⁹</p> <p>The Plan/Draft Plan sets out actions through which a range of government, civil and private sectors will undertake to achieve Ireland’s ‘Vision for Biodiversity’ and follows on from the work of the first and second National Biodiversity Action Plans. The Draft Plan was issued for two-month public consultation in September 2022 which is currently open. It is due to close November 2022 and then submissions will be reviewed. Finalised Plan due in 2023.</p>	<p>awareness of biodiversity and ecosystem services</p> <ul style="list-style-type: none"> • Conservation of biodiversity and ecosystem services • Improved management of protected areas and species 		<p>delivering benefits essential for all sectors of society and that Ireland contributes to efforts to halt the loss of biodiversity and the degradation of ecosystems in the EU and globally.” Given the nature of this Plan/Draft Plan there is potential for beneficial impacts to biodiversity and the conservation objectives of European sites.</p> <p>Given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods, no AESI in light of a European site’s conservation objectives are predicted as a result of in-combination effects.</p>	
<p>All Ireland Pollinator Plan 2021 – 2025⁶⁰</p> <p>This plan aims to help restore pollinator populations to healthy levels. Over the next five years, this plan will work to bring about landscape where pollinators can flourish.</p>	<ul style="list-style-type: none"> • Making land more pollinator friendly • Conserving rare pollinator species • Support for beekeepers 	<p>N</p>	<p>At its core, the Pollinator Plan is about providing food and shelter across all types of land so that pollinators can survive and thrive. It creates a framework to bring together pollinator initiatives across the island. Given the nature of this plan there is potential for beneficial impacts to biodiversity and the conservation objectives of European sites.</p> <p>Given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site’s conservation objectives are predicted as a result of in-combination effects.</p>	<p>N</p>

⁵⁹ <https://www.gov.ie/en/consultation/1566c-public-consultation-on-irelands-4th-national-biodiversity-action-plan/> (Accessed, October 2022)

⁶⁰ <https://pollinators.ie/aijp-2021-2025/> (Accessed, January 2022)

<p>National Waste Action Plan for a Circular Economy 2020 – 2025⁶¹</p> <p>This plan is Ireland's new roadmap for waste planning and management. It shifts focus away from waste disposal and looks instead to how we can preserve resources by creating a circular economy.</p>	<ul style="list-style-type: none"> • Transition to a circular economy • Supporting reuse and recycling of materials 	<p>N</p>	<p>The plan identifies opportunities for the application of circular economy principles across a range of areas such as food. The plan also recognises the importance of eco- and smart design in waste prevention through the delivery of products that are more amenable to recycling or reuse of constituent components.</p> <p>Given the nature of this plan there is limited potential for negative impacts to biodiversity and some potential for beneficial impacts to biodiversity through a reduction in waste and pollution.</p> <p>Given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	<p>N</p>
<p>Climate Action Plan 2021⁶²</p> <p>This plan provides a detailed plan for taking decisive action to achieve a 51% reduction in overall greenhouse gas emissions by 2030 and to reach net-zero emissions by no later than 2050.</p>	<ul style="list-style-type: none"> • Loss/reduction of habitat area • Habitat fragmentation • Disturbance to key species • Reduction in species density • Alterations to water quality/water movement 	<p>Y</p>	<p>The plan sets out proposals to reduce Ireland's greenhouse gas emissions in line with other important policy objectives, such as promoting sustainable economic development pathways, improving energy security, addressing air pollution impacts on human health, and implementing essential adaptations for climate change.</p> <p>However, there is also potential for in-combination effects with the Plan and the draft RWRP-NW. Given the nature of this plan there is potential for beneficial impacts to biodiversity and the conservation objectives of European sites. There is also potential for negative impacts to European sites, however, all lower-level plans and projects arising through the implementation of the Plan will themselves be subject to AA/screening for AA when further details of design and location are known.</p> <p>Given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	<p>N</p>
<p>Offshore Renewable Energy Development</p>	<ul style="list-style-type: none"> • Loss or damage to habitats • Damage to non-mobile species • Impacts to water 	<p>Y</p>	<p>The Offshore Renewable Energy Development Plan (OREDPA) was subject to AA and SEA. The AA concluded that, with the implementation of mitigation measures, the OREDPA will not have a likely significant effect on a Natura site or cetacean species listed under Annex IV of the Habitats Directive.</p>	<p>N</p>

⁶¹ <https://www.gov.ie/en/publication/4221c-waste-action-plan-for-a-circular-economy/> (Accessed, January 2022)

⁶² <https://www.gov.ie/en/publication/6223e-climate-action-plan-2021/> (Accessed, January 2022)

<p>Plan⁶³</p> <p>This plan provides a framework for the sustainable development of Ireland's offshore renewable energy resource.</p>	<p>quality and water movement</p> <ul style="list-style-type: none"> • Species disturbance • Collision risk • Changes to food availability 		<p>There is potential for in-combination effects with the Plan and the draft RWRP-NW. However, with the mitigation measures proposed as part of the OREDP in Chapter 11 of the accompanying NIS, there is no potential for adverse effects on European sites.</p> <p>Given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	
<p>National Adaptation Framework (NAF)⁶⁴</p> <p>This plan specifies the national strategy for the application of adaptation measures in different sectors and by local authorities to reduce the vulnerability of the State to the negative effects of climate change and to avail of any positive effects that may occur.</p>	<ul style="list-style-type: none"> • Loss/reduction of habitat area • Habitat fragmentation • Disturbance to key species • Reduction in species density • Alterations to water quality/water movement 	Y	<p>The National Adaptation Framework was subject to screening for AA. This screening concluded that an AA of the framework was not required, given that the administrative provisions of Articles 9(1) and 9(3) of the European Communities (Environmental Assessment of Certain Plans and Programmes) Regulations, as amended have not been fulfilled. Adaptation approaches and identification of locations or sites will be detailed via lower-level adaptation plans and strategies which may undergo appropriate assessment, as appropriate.</p> <p>Given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	N
<p>Tourism Development and Innovation 2016 – 2022⁶⁵</p> <p>This strategy sets out the framework and mechanisms for delivery of investment to cities, towns, villages, communities and businesses across the country</p>	<ul style="list-style-type: none"> • Loss/reduction of habitat area • Habitat fragmentation • Disturbance to key species • Reduction in species density • Alterations to water quality/water movement 	Y	<p>The strategy will be outcome based and will identify the types of projects to invest in that will support innovation in the tourism sector, rather than specific projects or locations for investment.</p> <p>There is potential for in-combination effects with the Plan and the draft RWRP-NW. However, all lower-level plans and projects arising through the implementation of the Plan will themselves be subject to AA/Screening for AA when further details of design and location are known.</p> <p>Given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	N

⁶³ <https://www.gov.ie/en/publication/e13f49-offshore-renewable-energy-development-plan/> (Accessed, January 2022)

⁶⁴ <https://www.gov.ie/en/publication/fbe331-national-adaptation-framework/> (Accessed, January 2022)

⁶⁵ https://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/2_Develop_Your_Business/6_Funding/1-FI-Tourism-Investment-Strategy-Final-07-06-16.pdf (Accessed, January 2022)

<p>Biodiversity Strategy for Northern Ireland to 2020⁶⁶</p> <p>The Strategy sets out how Northern Ireland plans to meet its international obligations and local targets to protect biodiversity and ensure that the environment can continue to support people and the economy.</p>	<ul style="list-style-type: none"> • Improved implementation of biodiversity strategies • Designating more protected areas • Expanding and restoring various habitat types • Reducing the impact of climate change • Encouraging ecosystem scale protection measures • Tackling invasive species 	<p>N</p>	<p>The Biodiversity Strategy builds upon and goes beyond the existing EU Birds and Habitats Directives and the EU Natura 2000 Network of protected areas. The Strategy aims to complement the work of Northern Ireland's neighbouring countries to work together to achieve the overarching aim of halting biodiversity loss. The Strategy sets out how Northern Ireland plans to meet its international obligations and local targets to protect biodiversity and ensure that the environment can continue to support people and the economy. It adopts the modern and internationally agreed approach that emphasises the management of biological systems to deliver the materials and services upon which people depend – the ecosystem services approach. Given the nature of this strategy there is potential for beneficial impacts to biodiversity and the conservation objectives of European sites.</p> <p>Given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	<p>N</p>
<p>Draft Environment Strategy for Northern Ireland⁶⁷</p> <p>Northern Ireland's first Environment Strategy will form the basis for a coherent and effective set of interventions that can deliver real improvements in the quality of the environment and thereby improve the health and well-being of all who live and work there; create opportunities to develop the economy; elevate Northern</p>	<ul style="list-style-type: none"> • Improvement in quality and quantity of both marine and freshwater resources • Management, planning, enhancement & protection of landscapes & seascapes • More natural spaces • Habitat restoration and protection • Sustainable production and consumption 	<p>N</p>	<p>The Draft Strategy sets out six Strategic Environmental Outcomes (SEOs) which encompass the main environmental challenges Northern Ireland will face in the coming decades. The Draft Strategy is a guide to how Northern Ireland can preserve, protect and improve the environment for future generations, with proposals to reduce greenhouse gas emissions, promoting sustainable production practices, implementing adaptations for climate change, and improving and protecting water quality and habitats.</p> <p>Given the nature of this Draft Strategy there is limited potential for negative impacts to biodiversity and some potential for beneficial impacts to biodiversity through a reduction in waste, water pollution, and greenhouse gas emissions.</p> <p>Given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	<p>N</p>

⁶⁶ <https://www.daera-ni.gov.uk/publications/biodiversity-strategy-northern-ireland-2020-0> (Accessed, August 2022)

⁶⁷ <https://www.daera-ni.gov.uk/sites/default/files/consultations/daera/Draft%20Environment%20Strategy.PDF> (Accessed, September 2022)

<p>Ireland to an environmental leader; and enable Northern Ireland to play a part in protecting the global environment for many decades to come.</p>	<ul style="list-style-type: none"> • Zero waste/circular economy • Reducing the impact of climate change • Net zero greenhouse gas emissions 			
<p>Northern Ireland Peatland Strategy 2021-2040⁶⁸</p> <p>The overarching aim of this Strategy will be to ensure that, where possible, all semi-natural peatlands in Northern Ireland are conserved or restored to healthy, functioning ecosystems by 2040 and that the ecosystem services that they provide are acknowledged and appreciated.</p>	<ul style="list-style-type: none"> • Conserve peatlands & prevent degradation • Restoration of degraded areas to functioning peatland ecosystems (designated & non-designated sites) • Supporting Sustainable Peatland Management • Governance, Implementation & Funding 	<p>N</p>	<p>The Northern Ireland Peatland Strategy includes six Strategic Objectives with associated targets and actions to conserve or restore all semi-natural peatlands in Northern Ireland to healthy, functioning ecosystems by 2040. The vision is: “to ensure that all semi-natural peatlands are protected, managed and where possible, prioritised for restoration, so that they can maintain their natural functions, biodiversity and ecosystem services”.</p> <p>The Strategy was subject to AA Screening where it was found it will have a positive effect on SACs and SPAs in Northern Ireland which have semi-natural peatland habitat as a feature. Site specific Habitat Regulation Assessment will be required on any management plans which will involve works taking place directly on designated sites.</p> <p>Given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site’s conservation objectives are predicted as a result of in-combination effects.</p>	<p>N</p>
<p>Draft Green Growth Strategy for Northern Ireland⁶⁹</p> <p>The Draft Green Growth Strategy aims to help Northern Ireland move from being a high greenhouse gas emissions society to a</p>	<ul style="list-style-type: none"> • Restoring and protecting natural capital • Replacing fossil fuels with renewable energy • Reducing wasteful use of resources • Introducing new 	<p>Y</p>	<p>The Draft Strategy sets out proposals to reduce Northern Ireland’s greenhouse gas emissions. The vision for 2050 is to have moved to a low emission society in a fair way for society, and to have a more resilient environment with a healthy ecosystem and a strong sustainable economy, with more people employed in green jobs and all generations benefitting from improved wellbeing.</p> <p>However, there is also potential for in-combination effects with the Draft Strategy and the draft RWRP-NW. Given the nature of this strategy there is potential for beneficial impacts to biodiversity and the conservation objectives of European sites. There is also potential for negative impacts to European sites, such as the</p>	<p>N</p>

⁶⁸ <https://www.daera-ni.gov.uk/consultations/ni-peatland-strategy-consultation> (Accessed, September 2022)

⁶⁹ https://www.daera-ni.gov.uk/sites/default/files/consultations/daera/Green%20Growth_Brochure%20V8.pdf (Accessed, September 2022)

<p>low emissions society while improving the environment and creating green jobs. The Draft Strategy runs up to 2050.</p>	<p>legislation</p>		<p>construction of new renewable energy sites.</p> <p>Given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	
<p>Path to Net Zero Energy - Northern Ireland Energy Strategy 2050⁷⁰</p> <p>The Energy Strategy sets out a pathway for energy to 2030 that will mobilise the skills, technologies and behaviours needed to take Northern Ireland towards the vision of net zero carbon and affordable energy by 2050.</p>	<ul style="list-style-type: none"> Invest in green innovation and low carbon technologies Increase funding and support for retrofitting buildings Investment in renewable electricity generation Phase out fossil fuel heating oil, coal and certain solid fuels for home heating Develop and invest in new heat solutions New policies and legislation 	<p>Y</p>	<p>The Strategy sets out proposals to reduce Northern Ireland's carbon emissions while providing affordable energy solutions to people, addressing climate change, and growing the green economy. The long-term vision of the Strategy is to achieve net zero carbon and affordable energy for Northern Ireland, leading to the highest levels of energy efficiency, thus reducing the amount of energy needed, whilst making sure the energy used comes from clean renewable sources.</p> <p>However, there is also potential for in-combination effects with the Strategy and the draft RWRP-NW. Given the nature of this strategy there is potential for beneficial impacts to biodiversity and the conservation objectives of European sites. There is also potential for negative impacts to European sites, such as the construction of new renewable energy sites.</p> <p>Given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	<p>N</p>
<p>Draft Marine Plan for Northern Ireland 2018⁷¹</p> <p>The Draft Marine Plan will inform and guide the regulation, management, use and protection of the</p>	<ul style="list-style-type: none"> Promote the sustainable development of productive activities Use of energy resources and energy storage, within the marine 	<p>N</p>	<p>The Draft Marine Plan includes eight objectives to help achieve the sustainable development of the marine. It was subject to a high-level Habitats Regulations Assessment (HRA) Screening which found that none of the Draft Marine Plan policies will result in any LSEs on European sites and features.</p> <p>Therefore, there is no potential for in-combination effects with the Draft Plan and the draft RWRP-NW. Having incorporated the policies of the Draft Plan as outlined in Section 4, Table 2 of the HRA Screening, it was found that the implementation of the proposed Draft Plan will not have a significant effect on the</p>	<p>N</p>

⁷⁰ <https://www.economy-ni.gov.uk/publications/energy-strategy-path-net-zero-energy> (Accessed, September 2022)

⁷¹ <https://www.daera-ni.gov.uk/articles/marine-plan-northern-ireland> (Accessed, September 2022)

<p>Northern Ireland marine area including both the inshore and offshore regions. It will support and complement other existing legislation, policies, plans and strategies.</p>	<p>area</p> <ul style="list-style-type: none"> • Development of coastal communities • Promote the marine resource • Promote the preservation and enjoyment of marine related heritage assets • Promote a healthy, resilient and adaptable marine ecosystem and an ecologically coherent network of Marine Protected Areas • Contribute towards climate change mitigation and adaptation 		<p>European sites and features, and there was therefore no need to undertake the subsequent stages of the HRA.</p> <p>Therefore, given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	
<p>Convention for the Conservation of Salmon in the North Atlantic Implementation Plan for the period 2019 – 2024 (Northern Ireland)⁷²</p> <p>This is an international agreement that a number of countries are signatories to. The Plan involves the</p>	<ul style="list-style-type: none"> • Management of salmonid rivers • Update conservation limits and management targets • Protection of wild salmon stocks • Water quality management • Update data on salmon habitat • Enhancement/ 	<p>N</p>	<p>This Plan provides information on how Northern Ireland will implement the actions required by the Convention for the conservation of wild salmon. The Plan includes 17 actions in relation to managing salmon fisheries, protecting, restoring and enhancing salmon habitat, and managing aquaculture for the benefit of wild salmon. Given the nature of this plan there is potential for beneficial impacts to biodiversity and the conservation objectives of European sites.</p> <p>Given the mitigation measures set out in Chapter 6 of this NIS and with the standard good practice construction methods no AESI in light of a European site's conservation objectives are predicted as a result of in-combination effects.</p>	<p>N</p>

⁷² https://nasco.int/wp-content/uploads/2021/11/IP1908rev3_Revised-Implementation-Plan_UK-NI.pdf (Accessed, September 2022)

management of salmon fisheries, protection and restoration of Atlantic salmon habitat, and the management of aquaculture, introductions and transfers and transgenics within Northern Ireland.	improvement of salmon habitat			
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Table 7.2 - Summary of In-combination Assessment between SAs and Projects, between SAs within the NW region, and between the NW, SW and EM regions

Study Area	Appendix E	Potential for in-combination effect	Conclusion
SAA	See Table E1	<p><u>In-combination with other projects</u></p> <p>Potential in-combination effects with other projects and options were identified for Derryveagh and Glendowan Mountains SPA from habitat loss, mortality, pollution and disturbance impacts during construction if the construction phase for options SAA-111a (all impacts), SAA-118a (all impacts), SAA-566 (all impacts) and SAA-567 (disturbance only) is concurrent with Ailt an Chorráin (Burtonport)/ Oileán Árinn Mhór (Arranmore Island) - Harbour to Island Regeneration, Dungloe Community Hospital, N56 Dungloe to Glenties, Falcarragh Community Hospital and Milford, Ramelton and Rathmullan Wastewater Treatment Plant works. There is also the potential for impacts during operation of some of these projects from habitat degradation and water table/availability from options SAA-111a and SAA-566 (see Appendix E, Table E1 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Cloghernagore Bog and Glenveagh National Park SAC from habitat loss, mortality, pollution, spread of invasive non-native species and disturbance impacts during construction if the construction phase for options SAA-111a (all impacts) and SAA-566 (all impacts) is concurrent with Dungloe Community Hospital and N56 Dungloe to Glenties works. There is also the potential for impacts during operation of some of these projects from habitat degradation and water table/availability from options SAA-111a and SAA-566 (see Appendix E, Table E1 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for West Donegal Coast SPA from disturbance impacts during construction if the construction phase for option SAA-141 (all impacts) is concurrent with Ailt an Chorráin (Burtonport)/ Oileán Árinn Mhór (Arranmore Island) - Harbour to Island Regeneration works (see Appendix E, Table E1 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for River Finn SAC from pollution and disturbance impacts during construction if the construction phase for options SAA-217 (all impacts), SAA-218 (all impacts) and SAA-542 (all impacts) is concurrent with Admiran, Stranorlar social housing and Raphoe Flood Relief scheme works (see Appendix E, Table E1 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for River Foyle and Tributaries SAC from pollution impacts during construction if the construction phase for options SAA-217 (all impacts), SAA-218 (all impacts) and SAA-542 (all impacts) is concurrent with Admiran, Stranorlar social housing and Raphoe Flood Relief scheme works (see Appendix E, Table E1 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Donegal Bay SPA from habitat loss, mortality, pollution and disturbance impacts during construction if the construction phase for option</p>	<p>With the implementation of mitigation as detailed in Chapter 6.3 and Appendix E (Table E1) there will be no adverse effects on the integrity of these European sites, either alone or in-combination with other plans or projects.</p>

Study Area	Appendix E	Potential for in-combination effect	Conclusion
		<p>SAA-542 (all impacts) is concurrent with Ballyshannon 2040, regeneration project, Shiel Hospital, N56 Mountcharles to Inver Road and Donegal Library works (see Appendix E, Table E1 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Lough Eske and Ardnamona Wood SAC from pollution, spread of invasive non-native species and disturbance impacts during construction if the construction phase for option SAA-542 (all impacts) is concurrent with Donegal Library works (see Appendix E, Table E1 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified Donegal Bay (Murvagh) SAC from pollution, spread of invasive non-native species and disturbance impacts during construction if the construction phase for option SAA-542 (all impacts) is concurrent with Donegal Library works (see Appendix E, Table E1 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Lough Swilly SAC from pollution and disturbance impacts during construction if the construction phase for option SAA-566 (all impacts) is concurrent with Buncrana Community Nursing Unit, Swan Park restoration, Letterkenny Institute of Technology Library, IT and Education Building works, Willowbrook, Letterkenny social housing, and Letterkenny Community Nursing Unit and Milford, Ramelton and Rathmullan Wastewater Treatment Plant works (see Appendix E, Table E1 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Lough Swilly SPA from pollution and disturbance impacts during construction if the construction phase for option SAA-566 (all impacts) is concurrent with Buncrana Community Nursing Unit, Swan Park restoration, Letterkenny Institute of Technology Library, IT and Education Building works, Willowbrook, Letterkenny social housing, Letterkenny Community Nursing Unit and Milford, Ramelton and Rathmullan Wastewater Treatment Plant works (see Appendix E, Table E1 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for North Inishowen Coast SAC from pollution and disturbance impacts during construction if the construction phase for option SAA-566 (all impacts) is concurrent with Convent Road, Carndonagh social housing and Milford, Ramelton and Rathmullan Wastewater Treatment Plant works (see Appendix E, Table E1 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Trawbreaga Bay SPA from pollution and disturbance impacts during construction if the construction phase for option SAA-566 (all impacts) is concurrent with Convent Road, Carndonagh social housing works (see Appendix E, Table E1 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Horn Head to Fanad Head SPA from disturbance impacts during construction if the construction phase for option SAA-566 (all impacts) is</p>	

Study Area	Appendix E	Potential for in-combination effect	Conclusion
		<p>concurrent with Falcarragh Community Hospital and Milford, Ramelton and Rathmullan Wastewater Treatment Plant works (see Appendix E, Table E1 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Leannan River SAC from pollution impacts during construction if the construction phase for option SAA-566 (all impacts) is concurrent with Milford, Ramelton and Rathmullan Wastewater Treatment Plant works (see Appendix E, Table E1 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Lough Fern SPA from disturbance and pollution impacts during construction if the construction phase for option SAA-566 (all impacts) is concurrent with Milford, Ramelton and Rathmullan Wastewater Treatment Plant works (see Appendix E, Table E1 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for West of Ardara/Maas Road SAC from habitat loss, mortality, pollution, spread of invasive non-native species and disturbance impacts during construction if the construction phase for option SAA-567 (all impacts) is concurrent with Ailt an Chorráin (Burtonport)/ Oileán Árainn Mhór (Arranmore Island) - Harbour to Island Regeneration, and N56 Dungloe to Glenties works. There is also the potential for impacts during operation of some of these projects from habitat degradation and water table/availability from option SAA-567 (see Appendix E, Table E1 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Lough Nillan Bog SPA from disturbance impacts during construction if the construction phase for option SAA-567 (all impacts) is concurrent with N56 Dungloe to Glenties and N56 Mountcharles to Inver Road works (see Appendix E, Table E1 for details on specific options and projects).</p> <p><u>In-combination between Preferred Approach options</u></p> <p>There is potential for construction and operational related in-combination effects from the projects within SAA to Cloghernagore Bog and Glenveagh National Park SAC from habitat loss, mortality, spread of invasive non-native species, disturbance, pollution, habitat degradation and water table/availability impacts if Preferred Approach options SAA-111a (all impacts) and SAA-566 (all impacts) were constructed at the same time and/or during operation (see Appendix E, Table E1 for details on specific options and projects).</p> <p>There is potential for construction and operational related in-combination effects from the projects within SAA to Derryveagh and Glendowan Mountains SPA from habitat loss, mortality, disturbance, pollution, habitat degradation and water table/availability impacts if Preferred Approach options SAA-111a (all impacts), SAA-118a (habitat loss, mortality, disturbance and pollution only), SAA-566 (all impacts) and SAA-567 (disturbance only) were constructed at the same time and/or during operation (see Appendix E, Table E1 for details on specific options and projects).</p>	

Study Area	Appendix E	Potential for in-combination effect	Conclusion
		<p>There is potential for construction related in-combination effects from the projects within SAA to River Finn SAC from spread of invasive non-native species, disturbance and pollution if Preferred Approach options SAA-217 (disturbance and pollution only), SAA-218 (disturbance and pollution only), SAA-542 (all impacts) and SAA-567 (spread of invasive non-native species only) were constructed at the same time (see Appendix E, Table E1 for details on specific options and projects).</p> <p>There is potential for construction related in-combination effects from the projects within SAA to River Foyle and Tributaries SAC from disturbance and pollution if Preferred Approach options SAA-217 (all impacts), SAA-218 (all impacts) and SAA-542 (all impacts) were constructed at the same time (see Appendix E, Table E1 for details on specific options and projects).</p>	
SAB	See Table E2	<p><u>In-combination with other projects</u></p> <p>Potential in-combination effects with other projects and options were identified for Lough Oughter and Associated Loughs SAC from pollution and disturbance impacts during construction if the construction phase for options SAB-060 (pollution only), SAB-086 (all impacts), SAB-538 (all impacts) and SAB-553 (all impacts) is concurrent with Ballyconnell Community Services, Ballyconnell Market House Hub, Cavan General Hospital, Emergency Department and Ward Block, Drumalee Manor housing, Cavan Town Centre Regeneration, Clones Regeneration and Ulster Canal Restoration works. There is also the potential for impacts during operation of some of these projects from habitat degradation and water table/availability from option SAB-538 (see Appendix E, Table E2 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Lough Oughter Complex SPA from pollution and disturbance impacts during construction if the construction phase for options SAB-060 (disturbance only), SAB-524 (disturbance only), SAB-538 (disturbance only) and SAB-553 (all impacts) is concurrent with Cavan General Hospital, Emergency Department and Ward Block, Drumalee Manor housing and Cavan Town Centre Regeneration works (see Appendix E, Table E2 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Upper Lough Erne SAC from pollution and disturbance impacts during construction if the construction phase for options SAB-086 (all impacts), SAB-538 (all impacts) and SAB-553 (all impacts) is concurrent with Ballyconnell Community Services, Ballyconnell Market House Hub, Cavan General Hospital, Emergency Department and Ward Block, Drumalee Manor housing, Cavan Town Centre Regeneration, Clones Regeneration and Ulster Canal Restoration works (see Appendix E, Table E2 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Upper Lough Erne SPA from pollution and disturbance impacts during construction if the construction phase for options SAB-086 (all impacts), SAB-538 (all impacts) and SAB-553 (all impacts) is concurrent with Ballyconnell Community Services, Ballyconnell Market House Hub, Cavan General Hospital, Emergency Department and Ward Block,</p>	With the implementation of mitigation as detailed in Chapter 6.3 and Appendix E (Table E2) there will be no adverse effects on the integrity of these European sites, either alone or in-combination with other plans or projects.

Study Area	Appendix E	Potential for in-combination effect	Conclusion
		<p>Drumalee Manor housing, Cavan Town Centre Regeneration, Clones Regeneration and Ulster Canal Restoration works (see Appendix E, Table E2 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Lough Gill SAC from pollution and disturbance impacts during construction if the construction phase for option SAB-202 (all impacts) is concurrent with Eastern Garavogue Bridge and Approach Road, City Campus Sligo Hub works, Sligo Hospital Redevelopment works and Sligo University Hospital Ward Development works. There is also the potential for impacts during operation of these projects from habitat degradation and water table/availability from option SAB-202 (see Appendix E, Table E2 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Donegal Bay SPA from pollution and disturbance impacts during construction if the construction phase for option SAB-535 (all impacts) is concurrent with Ballyshannon 2040, Shiel Hospital and Donegal Library works (see Appendix E, Table E2 for details on specific options and projects).</p> <p><u>In-combination between Preferred Approach options</u></p> <p>There is potential for construction related in-combination effects from the projects within SAB to Lough Oughter and Associated Loughs SAC from disturbance and pollution impacts if Preferred Approach options SAB-060 (pollution only), SAB-086 (all impacts), SAB-538 (all impacts) and SAB-553 (all impacts) were constructed at the same time (see Appendix E, Table E2 for details on specific options and projects).</p> <p>There is potential for construction related in-combination effects from the projects within SAB to Upper Lough Erne SAC from disturbance and pollution impacts if Preferred Approach options SAB-086 (all impacts), SAB-538 (all impacts) and SAB-553 (all impacts) were constructed at the same time (see Appendix E, Table E2 for details on specific options and projects).</p> <p>There is potential for construction related in-combination effects from the projects within SAB to Lough Oughter Complex SPA from disturbance impacts if Preferred Approach options SAB-060 (all impacts), SAB-524 (all impacts), SAB-538 (all impacts) and SAB-553 (all impacts) were constructed at the same time (see Appendix E, Table E2 for details on specific options and projects).</p> <p>There is potential for construction related in-combination effects from the projects within SAB to Upper Lough Erne SPA from disturbance and pollution impacts if Preferred Approach options SAB-086 (all impacts), SAB-538 (all impacts) and SAB-553 (all impacts) were constructed at the same time (see Appendix E, Table E2 for details on specific options and projects).</p>	
SA-C	See Table E3	<p><u>In-combination with other projects</u></p> <p>Potential in-combination effects with other projects and options were identified for River Moy SAC from habitat loss, mortality, pollution, spread of invasive non-native species and disturbance impacts during construction if the construction phase for options SA-C-067 (pollution only), SA-C-073 (mortality, pollution, spread of invasive non-native species and disturbance only), SA-C-137 (mortality, pollution, spread of invasive non-native species</p>	With the implementation of mitigation as detailed in Chapter 6.3 and Appendix E (Table E3) there will be no adverse effects on the

Study Area	Appendix E	Potential for in-combination effect	Conclusion
		<p>and disturbance only), SA-C-515 (pollution only), SA-C-542 (mortality, pollution, spread of invasive non-native species and disturbance only) and SA-C-543 (all impacts) is concurrent with Rehins Fort housing scheme, Castlebar Urban Greenway Link, Castlebar Historic Core, Mayo University Hospital Emergency Department and Medical Assessment Unit, Crossmolina Flood Relief Scheme, N5 Westport to Turlough, and Tubbercurry Regeneration Project works. There is also the potential for impacts during operation of some of these projects from habitat degradation and water table/availability from option SA-C-073 (see Appendix E, Table E3 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Lough Conn and Lough Cullin SPA from pollution and disturbance impacts during construction if the construction phase for options SA-C-067 (disturbance only) and SA-C-543 (all impacts) is concurrent with Rehins Fort housing scheme, Crossmolina Flood Relief Scheme and N5 Westport to Turlough works (see Appendix E, Table E3 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Lough Gill SAC from habitat loss, mortality, pollution, spread of invasive non-native species and disturbance impacts during construction if the construction phase for options SA-C-101 (all impacts) and SA-C-108 (all impacts) is concurrent with Sligo University Hospital Ward Development, IT Sligo Extension to Central Campus, Sligo Hospital Redevelopment Phase 1 and City Campus Sligo Hub works. There is also the potential for impacts during operation of these projects from habitat degradation and water table/availability from options SA-C-101 and SA-C-108 (see Appendix E, Table E3 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC from pollution impacts during construction if the construction phase for option SA-C-101 (all impacts) is concurrent with Sligo University Hospital Ward Development, IT Sligo Extension to Central Campus, Sligo Hospital Redevelopment Phase 1, City Campus Sligo Hub, Robbers' Lane social housing, Public Realm Enhancement of the villages of Strandhill and Rosses Point, and National Centre of Excellence for Surfing works (see Appendix E, Table E3 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Cummeen Strand SPA from pollution and disturbance impacts during construction if the construction phase for option SA-C-101 (all impacts) is concurrent with Sligo University Hospital Ward Development, IT Sligo Extension to Central Campus, Sligo Hospital Redevelopment Phase 1, City Campus Sligo Hub, Robbers' Lane social housing, Public Realm Enhancement of the villages of Strandhill and Rosses Point, and National Centre of Excellence for Surfing works (see Appendix E, Table E3 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Unshin River SAC from pollution and disturbance impacts during construction if the construction phase for option SA-C-138 (all impacts) is concurrent with International Mountain Biking Project, Coolany works. There is also the potential for</p>	<p>integrity of these European sites, either alone or in-combination with other plans or projects.</p>

Study Area	Appendix E	Potential for in-combination effect	Conclusion
		<p>impacts during operation of this project from habitat degradation and water table/availability from option SA-C-138 (see Appendix E, Table E3 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Ballysadare Bay SPA from disturbance impacts during construction if the construction phase for option SA-C-138 (all impacts) is concurrent with International Mountain Biking Project, Coolany, Public Realm Enhancement of the villages of Strandhill and Rosses Point and National Centre of Excellence for Surfing works (see Appendix E, Table E3 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Lough Carra/Mask Complex SAC from habitat degradation and water table/availability impacts during operation if the operational phase for option SA-C-542 (all impacts) is concurrent with Ballinrobe Regeneration and Ballintober Abbey Culture and Heritage Visitor Centre operation (see Appendix E, Table E3 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Lough Mask SPA from pollution and disturbance impacts during construction if the construction phase for option SA-C-542 (all impacts) is concurrent with Ballinrobe Regeneration, Ballintober Abbey Culture and Heritage Visitor Centre and N5 Westport to Turlough works. There is also the potential for impacts during operation of some of these projects from habitat degradation and water table/availability from option SA-C-542 (see Appendix E, Table E3 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Killala Bay/Moy Estuary SAC from pollution and spread of invasive non-native species impacts during construction if the construction phase for option SA-C-543 (all impacts) is concurrent with Rehins Fort housing scheme, Enniscrone Cliff Bath House and N5 Westport to Turlough works (see Appendix E, Table E3 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Killala Bay/Moy Estuary SPA from pollution impacts during construction if the construction phase for option SA-C-543 (all impacts) is concurrent with Rehins Fort housing scheme, Enniscrone Cliff Bath House and N5 Westport to Turlough works (see Appendix E, Table E3 for details on specific options and projects).</p> <p><u>In-combination between Preferred Approach options</u></p> <p>There is potential for construction related in-combination effects from the projects within SA-C to Lough Conn and Lough Cullin SPA from disturbance impacts if Preferred Approach options SA-C-101 (all impacts) and SA-C-108 (all impacts) were constructed at the same time (see Appendix E, Table E3 for details on specific options and projects).</p> <p>There is potential for construction and operational related in-combination effects from the projects within SA-C to Lough Gill SAC from habitat loss, mortality, spread of invasive non-native species, disturbance, pollution,</p>	

Study Area	Appendix E	Potential for in-combination effect	Conclusion
		<p>habitat degradation and water table/availability impacts if Preferred Approach options SA-C-101 (all impacts) and SA-C-108 (all impacts) were constructed at the same time and/or during operation (see Appendix E, Table E3 for details on specific options and projects).</p> <p>There is potential for construction and operational related in-combination effects from the projects within SA-C to River Moy SAC from mortality, spread of invasive non-native species, disturbance and pollution impacts if Preferred Approach options SA-C-067 (pollution only), SA-C-073 (all impacts), SA-C-137 (mortality and pollution only), SA-C-515 (pollution only), SA-C-542 (all impacts) and SA-C-543 (all impacts) were constructed at the same time (see Appendix E, Table E3 for details on specific options and projects).</p>	
SAD	See Table E4	<p>In-combination with other projects</p> <p>Potential in-combination effects with other projects and options were identified for West Connacht Coast SAC from pollution and disturbance impacts during construction if the construction phase for options SAD-014 (disturbance only), SAD-055 (all impacts) and SAD-545 (disturbance only), is concurrent with Clew Bay Greenway Project: Belcare to Murrisk, Clifden Town Centre, St Annes Community Nursing Unit, Newport Regeneration Project, Westport Library, Regeneration of Sisters of Mercy Convent Site and Adjacent Lands, and the N5 Westport to Turlough works. There is also the potential for impacts during operation of some of these projects from habitat degradation from option SAD-055 (see Appendix E, Table E4 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for The Twelve Bens/Garraun Complex SAC from mortality, pollution, spread of invasive non-native species and disturbance impacts during construction if the construction phase for options SAD-027 (all impacts) and SAD-545 (all impacts), is concurrent with Clifden Town Centre and St Annes Community Nursing Unit works. There is also the potential for impacts during operation of some of these projects from habitat degradation and water table/availability from option SAD-545 (see Appendix E, Table E4 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Lough Carra/Mask Complex SAC from mortality, pollution, spread of invasive non-native species and disturbance impacts during construction if the construction phase for options SAD-033 (all impacts) and SAD-548 (pollution, spread of invasive non-native species and disturbance only), is concurrent with Ballinrobe Regeneration and Ballintubber Abbey Culture and Heritage Visitor Centre works. There is also the potential for impacts during operation of some of these projects from habitat degradation and water table/availability from option SAD-548 (see Appendix E, Table E4 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Lough Mask SPA from pollution and disturbance impacts during construction if the construction phase for options SAD-033 (all impacts), SAD-545 (disturbance only) and SAD-548 (all impacts) is concurrent with Ballinrobe Regeneration, Ballintubber Abbey Culture and Heritage Visitor Centre and N5 Westport to Turlough works. There is also the</p>	With the implementation of mitigation as detailed in Chapter 6.3 and Appendix E (Table E4) there will be no adverse effects on the integrity of these European sites, either alone or in-combination with other plans or projects.

Study Area	Appendix E	Potential for in-combination effect	Conclusion
		<p>potential for impacts during operation of some of these projects from habitat degradation and water table/availability from option SAD-548 (see Appendix E, Table E4 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Lough Corrib SAC from habitat loss, mortality, pollution, spread of invasive non-native species and disturbance impacts during construction if the construction phase for options SAD-033 (all impacts), SAD-040 (mortality, pollution, spread of invasive non-native species and disturbance only), SAD-046a (mortality, pollution, spread of invasive non-native species and disturbance only), SAD-101 (pollution and disturbance only) and SAD-122 (pollution only) is concurrent with Ballyhaunis Community Vision, Dunmore Regeneration, Cycling and Walking Scheme, GMIT STEM building, Merlin Park University Hospital Theatre Block, Merlin Park Hospital Units 5 and 6, NUIG Learning Commons, Nun's Island master plan, Regeneration of Galway City Inner Harbour, Transport Connectivity Project, University College Hospital Galway Emergency Department and Ward Block, University College Hospital Galway New Radiation Oncology Unit, Galway City Ring Road, Galway Public Spaces and Streets Project, N59 Moycullen Bypass, Tuam Community Nursing Unit, and Tuam Regeneration Strategy works. There is also the potential for impacts during operation of some of these projects from habitat degradation and water table/availability from options SAD-033, SAD-040, SAD-046a, SAD-101 and SAD-122 (see Appendix E, Table E4 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Lough Corrib SPA from habitat loss, pollution and disturbance impacts during construction if the construction phase for options SAD-033 (all impacts), SAD-046a (pollution and disturbance only), SAD-122 (disturbance only), SAD-543 (disturbance only), SAD-545 (disturbance only) and SAD-548 (disturbance only) is concurrent with Cycling and Walking Scheme, GMIT STEM building, Merlin Park University Hospital Theatre Block, Merlin Park Hospital Units 5 and 6, NUIG Learning Commons, Nun's Island master plan, Regeneration of Galway City Inner Harbour, Transport Connectivity Project, University College Hospital Galway Emergency Department and Ward Block, University College Hospital Galway New Radiation Oncology Unit, Galway City Ring Road, Galway Public Spaces and Streets Project, N59 Moycullen Bypass, Tuam Community Nursing Unit, and Tuam Regeneration Strategy works. There is also the potential for impacts during operation of some of these projects from habitat degradation and water table/availability from options SAD-033 and SAD-046a (see Appendix E, Table E4 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Lough Lurleen Bog/Glenamaddy Turlough SAC from habitat degradation and water table/availability impacts during operation if the operational phase for option SAD-040 (all impacts) is concurrent with the Dunmore Regeneration operational phase (see Appendix E, Table E4 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Galway Bay Complex SAC from pollution and disturbance impacts during construction if the construction phase for option SAD-046a (all impacts) is concurrent with Athenry regeneration/Bia Innovator, Cycling and Walking Scheme, GMIT STEM building, Merlin Park University Hospital Theatre Block, Merlin Park Hospital Units 5 and 6, NUIG Learning</p>	

Study Area	Appendix E	Potential for in-combination effect	Conclusion
		<p>Commons, Nun's Island master plan, Regeneration of Galway City Inner Harbour, Transport Connectivity Project, University College Hospital Galway Emergency Department and Ward Block, University College Hospital Galway New Radiation Oncology Unit, Galway City Ring Road, Galway Public Spaces and Streets Project, Kinvara Boardwalk and Walkway and Oranmore Railway Station works (see Appendix E, Table E4 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Inner Galway Bay SPA from pollution and disturbance impacts during construction if the construction phase for options SAD-046a (all impacts), SAD-122 (disturbance only) and SAD-543 (disturbance only) is concurrent with Athenry regeneration/Bia Innovator, Cycling and Walking Scheme, GMIT STEM building, Merlin Park University Hospital Theatre Block, Merlin Park Hospital Units 5 and 6, NUIG Learning Commons, Nun's Island master plan, Regeneration of Galway City Inner Harbour, Transport Connectivity Project, University College Hospital Galway Emergency Department and Ward Block, University College Hospital Galway New Radiation Oncology Unit, Galway City Ring Road, Galway Public Spaces and Streets Project, Kinvara Boardwalk and Walkway, N59 Moycullen Bypass and Oranmore Railway Station works (see Appendix E, Table E4 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Cregganna Marsh SPA from disturbance impacts during construction if the construction phase for option SAD-046a (all impacts) is concurrent with Kinvara Boardwalk and Walkway works (see Appendix E, Table E4 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Rahasane Turlough SPA from disturbance impacts during construction if the construction phase for option SAD-046a (all impacts) is concurrent with Kinvara Boardwalk and Walkway works (see Appendix E, Table E4 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Clew Bay Complex SAC from pollution, spread of invasive non-native species and disturbance impacts during construction if the construction phase for options SAD-111 (all impacts), SAD-117a (pollution and disturbance only) and SAD-548 (all impacts) is concurrent with Clew Bay Greenway Project, Newport Regeneration Project, Westport Library, Regeneration of Sisters of Mercy Convent Site and Adjacent Lands and N5 Westport to Turlough works. There is also the potential for impacts during operation of some of these projects from habitat degradation from option SAD-055 (see Appendix E, Table E4 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Inishmore Island SAC from habitat loss, mortality and pollution impacts during construction if the construction phase for option SAD-074 (all impacts) is concurrent with Áras Ronáin Community Nursing Unit works. There is also the potential for impacts during operation of this project from habitat degradation and water table/availability from option SAD-074 (see Appendix E, Table E4 for details on specific options and projects).</p>	

Study Area	Appendix E	Potential for in-combination effect	Conclusion
		<p>Potential in-combination effects with other projects and options were identified for Inishmore SPA from disturbance impacts during construction if the construction phase for option SAD-074 (all impacts) is concurrent with Áras Ronáin Community Nursing Unit works (see Appendix E, Table E4 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Newport River SAC from mortality, pollution, spread of invasive non-native species and disturbance impacts during construction if the construction phase for option SAD-117a (all impacts) is concurrent with Newport Regeneration Project works. There is also the potential for impacts during operation of this project from habitat degradation and water table/availability from option SAD-117a (see Appendix E, Table E4 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Slyne Head Peninsula SAC from pollution impacts during construction if the construction phase for option SAD-541 (all impacts) is concurrent with Clifden Town Centre and St Annes Community Nursing Unit works (see Appendix E, Table E4 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Connemara Bog Complex SPA from disturbance impacts during construction if the construction phase for options SAD-541 (all impacts) and SAD-543 (all impacts) is concurrent with Clifden Town Centre, St Annes Community Nursing Unit and N59 Moycullen Bypass works (see Appendix E, Table E4 for details on specific options and projects).</p> <p><u>In-combination between Preferred Approach options</u></p> <p>There is potential for construction related in-combination effects from the projects within SAD to Clew Bay Complex SAC from spread of invasive non-native species, disturbance and pollution impacts if Preferred Approach options SAD-111 (all impacts), SAD-117a (pollution and disturbance only) and SAD-548 (all impacts) were constructed at the same time and/or during operation (see Appendix E, Table E4 for details on specific options and projects).</p> <p>There is potential for construction related in-combination effects from the projects within SAD to Connemara Bog Complex SAC from habitat loss, mortality, disturbance and pollution impacts if Preferred Approach options SAD-541 (all impacts) and SAD-543 (all impacts) were constructed at the same time (see Appendix E, Table E4 for details on specific options and projects).</p> <p>There is potential for construction and operational related in-combination effects from the projects within SAD to Kilkieran Bay and Islands SAC from pollution, disturbance, spread of invasive non-native species and habitat degradation impacts if Preferred Approach options SAD-055 (habitat degradation only), SAD-541 (all impacts) and SAD-543 (pollution, disturbance and spread of invasive non-native species only) were constructed at the same time and/or during operation (see Appendix E, Table E4 for details on specific options and projects).</p>	

Study Area	Appendix E	Potential for in-combination effect	Conclusion
		<p>There is potential for construction and operational related in-combination effects from the projects within SAD to Lough Corrib SAC from mortality, spread of invasive non-native species, disturbance, pollution, habitat degradation and water table/availability impacts if Preferred Approach options SAD-033 (all impacts), SAD-040 (all impacts), SAD-046a (all impacts), SAD-101 (disturbance, pollution, habitat degradation and water table/availability only) and SAD-122 (pollution, habitat degradation and water table/availability only) were constructed at the same time and/or during operation (see Appendix E, Table E4 for details on specific options and projects).</p> <p>There is potential for construction related in-combination effects from the projects within SAD to Lough Carra/Mask Complex SAC from spread of invasive non-native species, disturbance and pollution impacts if Preferred Approach options SAD-033 (all impacts) and SAD-548 (all impacts) were constructed at the same time (see Appendix E, Table E4 for details on specific options and projects).</p> <p>There is potential for construction related in-combination effects from the projects within SAD to The Twelve Bens/Garraun Complex SAC from mortality, spread of invasive non-native species, disturbance and pollution impacts if Preferred Approach options SAD-027 (all impacts) and SAD-545 (all impacts) were constructed at the same time (see Appendix E, Table E4 for details on specific options and projects).</p> <p>There is potential for construction related in-combination effects from the projects within SAD to West Connacht Coast SAC from disturbance if Preferred Approach options SAD-014 (all impacts), SAD-055 (all impacts) and SAD-545 (all impacts) were constructed at the same time (see Appendix E, Table E4 for details on specific options and projects).</p> <p>There is potential for construction related in-combination effects from the projects within SAD to Connemara Bog Complex SPA from habitat loss, disturbance and pollution impacts if Preferred Approach options SAD-541 (all impacts) and SAD-543 (all impacts) were constructed at the same time (see Appendix E, Table E4 for details on specific options and projects).</p> <p>There is potential for construction related in-combination effects from the projects within SAD to Cruagh Island SPA from disturbance impacts if Preferred Approach options SAD-027 (all impacts), SAD-055 (all impacts), SAD-541 (all impacts) and SAD-545 (all impacts) were constructed at the same time (see Appendix E, Table E4 for details on specific options and projects).</p> <p>There is potential for construction related in-combination effects from the projects within SAD to High Island, Inishshark and Davillaun SPA from disturbance impacts if Preferred Approach options SAD-027 (all impacts), SAD-055 (all impacts), SAD-158 (all impacts), SAD-541 (all impacts) and SAD-545 (all impacts) were constructed at the same time (see Appendix E, Table E4 for details on specific options and projects).</p> <p>There is potential for construction related in-combination effects from the projects within SAD to Inner Galway Bay SPA from disturbance impacts if Preferred Approach options SAD-046a (all impacts), SAD-122 (all impacts) and SAD-543 (all impacts) were constructed at the same time (see Appendix E, Table E4 for details on specific options and projects).</p>	

Study Area	Appendix E	Potential for in-combination effect	Conclusion
		<p>There is potential for construction and operational related in-combination effects from the projects within SAD to Lough Corrib SPA from disturbance, pollution, habitat degradation and water table/availability impacts if Preferred Approach options SAD-033 (all impacts), SAD-046a (all impacts), SAD-122 (disturbance only), SAD-543 (disturbance only), SAD-545 (disturbance only) and SAD-548 (disturbance only) were constructed at the same time and/or during operation (see Appendix E, Table E4 for details on specific options and projects).</p> <p>There is potential for construction related in-combination effects from the projects within SAD to Lough Mask SPA from disturbance and pollution impacts if Preferred Approach options SAD-033 (all impacts), SAD-545 (disturbance only) and SAD-548 (all impacts) were constructed at the same time (see Appendix E, Table E4 for details on specific options and projects).</p> <p>There is potential for construction related in-combination effects from the projects within SAD to Slyne Head to Ardmore Point Islands SPA from disturbance impacts if Preferred Approach options SAD-027 (all impacts), SAD-074 (all impacts), SAD-541 (all impacts), SAD-543 (all impacts) and SAD-545 (all impacts) were constructed at the same time (see Appendix E, Table E4 for details on specific options and projects).</p>	
SAE	See Table E5	<p><u>In-combination with other projects</u></p> <p>Potential in-combination effects with other projects and options were identified for Stabannan-Braganstown SPA from disturbance impacts during construction if the construction phase for option SAE-001 (all impacts) is concurrent with Ardee Regeneration works and the St Joseph's Hospital works (see Appendix E, Table E5 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Dundalk Bay SPA from disturbance impacts during construction if the construction phase for options SAE-001 (all impacts) and SAE-508 (all impacts) is concurrent with Carlingford Flood Relief Scheme, Carlingford Sustainable Tourism Strategy, Dublin Road social housing, Mount Avenue social housing, Racecourse Meadows social housing, Kitchen Garden social housing, Dundalk Flood Relief Scheme, Long Walk Quarter Regeneration, and the St. Nicholas Quarter Backlands and Regeneration works (see Appendix E, Table E5 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Carlingford Lough SPA from disturbance impacts during construction if the construction phase for option SAE-001 (all impacts) is concurrent with Carlingford Flood Relief Scheme works and the Carlingford Sustainable Tourism Strategy works (see Appendix E, Table E5 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Carlingford Lough SPA (NI) from disturbance impacts during construction if the construction phase for option SAE-001 (all impacts) is concurrent with Carlingford Flood Relief Scheme works and the Carlingford Sustainable Tourism Strategy works (see Appendix E, Table E5 for details on specific options and projects).</p>	With the implementation of mitigation as detailed in Chapter 6.3 and Appendix E (Table E5) there will be no adverse effects on the integrity of these European sites, either alone or in-combination with other plans or projects.

Study Area	Appendix E	Potential for in-combination effect	Conclusion
		<p>Potential in-combination effects with other projects and options were identified for Dundalk Bay SAC from pollution impacts during construction if the construction phase for option SAE-001 (all impacts) is concurrent with Dublin Road social housing, Mount Avenue social housing, Racecourse Meadows social housing, Kitchen Garden social housing, Dundalk Flood Relief Scheme, Long Walk Quarter Regeneration, and the St. Nicholas Quarter Backlands and Regeneration works (see Appendix E, Table E5 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for River Boyne and River Blackwater SAC from pollution, spread of invasive non-native species and disturbance impacts during construction if the construction phase for option SAE-508 (all impacts) is concurrent with Donore Road social housing, Newfoundwell Road social housing, Newtown, Marsh Road social housing, Tullybrook social housing, Drogheda Flood Relief Scheme, St Mary's Hospital, Westgate Regeneration Vision, Boyne Navigation and Greenway, Athboy Road social housing, Farganstown social housing, Flowerhill Regeneration, Railway Street Regeneration and County Archive, and the the N2 Slane Bypass works (see Appendix E, Table E5 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for River Boyne and River Blackwater SPA from pollution and disturbance impacts during construction if the construction phase for option SAE-508 (all impacts) is concurrent with Donore Road social housing, Newfoundwell Road social housing, Newtown, Marsh Road social housing, Tullybrook social housing, Drogheda Flood Relief Scheme, St Mary's Hospital, Westgate Regeneration Vision, Boyne Navigation and Greenway, Athboy Road social housing, Farganstown social housing, Flowerhill Regeneration, Railway Street Regeneration and County Archive, and the the N2 Slane Bypass works (see Appendix E, Table E5 for details on specific options and projects).</p> <p><u>In-combination between Preferred Approach options</u></p> <p>There is potential for construction related in-combination effects from the projects within SAE to Dundalk Bay SPA from disturbance impacts if Preferred Approach options SAE-001 (all impacts) and SAE-508 (all impacts) were constructed at the same time (see Appendix E, Table E5 for details on specific options and projects).</p>	
SAF	See Table E6	<p><u>In-combination with other projects</u></p> <p>Potential in-combination effects with other projects and options were identified for Lough Forbes Complex SAC from habitat degradation and water table/availability impacts during operation if the operational phase for option SAF-009 (all impacts) is concurrent with the N5 Ballaghaderreen to Scramoge, Longford Connected Regeneration, St Joseph's Care Centre and Camlin Quarter Regeneration operational phase (see Appendix E, Table E6 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Lough Ree SPA from pollution and disturbance impacts during construction if the construction phase for options SAF-009</p>	With the implementation of mitigation as detailed in Chapter 6.3 and Appendix E (Table E6) there will be no adverse effects on the integrity of these European sites, either alone or in-

Study Area	Appendix E	Potential for in-combination effect	Conclusion
		<p>(disturbance only), SAF-021 (disturbance only) and SAF-038 (all impacts) is concurrent with Ballymahon 'Pobal le Cheile', Enhancement of Attractiveness of Lanesborough as a Tourism Destination, Longford Connected Regeneration, St Joseph's Care Centre, Camlin Quarter Regeneration, Roscommon Rehabilitation Unit, Roscommon Sewerage Scheme, Sacred Heart Hospital and Roscommon Town Regeneration works (see Appendix E, Table E6 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Ballykenny-Fisherstown Bog SPA from disturbance impacts during construction if the construction phase for option SAF-009 (all impacts) is concurrent with Enhancement of Attractiveness of Lanesborough as a Tourism Destination, Longford Connected Regeneration, St Joseph's Care Centre, and Camlin Quarter Regeneration works (see Appendix E, Table E6 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Lough Ree SAC from pollution impacts during construction if the construction phase for option SAF-038 (all impacts) is concurrent with Ballymahon 'Pobal le Cheile', Enhancement of Attractiveness of Lanesborough as a Tourism Destination, Roscommon Rehabilitation Unit, Roscommon Sewerage Scheme, Sacred Heart Hospital and Roscommon Town Regeneration works. There is also the potential for impacts during operation of some of these projects from habitat degradation and water table/availability from option SAF-021 (see Appendix E, Table E6 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Lough Kinale and Derragh Lough SPA from disturbance impacts during construction if the construction phase for option SAF-030 (all impacts) is concurrent with Historic Granard Motte Project works (see Appendix E, Table E6 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Lough Sheelin SPA from disturbance impacts during construction if the construction phase for option SAF-030 (all impacts) is concurrent with Historic Granard Motte Project works (see Appendix E, Table E6 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Lough Derravarragh SPA from disturbance impacts during construction if the construction phase for option SAF-030 (all impacts) is concurrent with Historic Granard Motte Project works (see Appendix E, Table E6 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Garriskil Bog SPA from disturbance impacts during construction if the construction phase for option SAF-030 (all impacts) is concurrent with Historic Granard Motte Project works (see Appendix E, Table E6 for details on specific options and projects).</p>	<p>combination with other plans or projects.</p>

Study Area	Appendix E	Potential for in-combination effect	Conclusion
		<p>Potential in-combination effects with other projects and options were identified for River Suck Callows SPA from disturbance impacts during construction if the construction phase for options SAF-038 (all impacts), SAF-084 (all impacts) and SAF-534 (all impacts) is concurrent with Banagher Regeneration Projects, Roscommon Rehabilitation Unit, Roscommon Sewerage Scheme, Sacred Heart Hospital and Roscommon Town Regeneration works (see Appendix E, Table E6 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Lough Gara SPA from disturbance impacts during construction if the construction phase for option SAF-052 (all impacts) is concurrent with N5 Ballaghaderreen to Scramoge works (see Appendix E, Table E6 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Bellanagare Bog SPA from disturbance impacts during construction if the construction phase for option SAF-052 (all impacts) is concurrent with N5 Ballaghaderreen to Scramoge works (see Appendix E, Table E6 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Four Roads Turlough SPA from disturbance impacts during construction if the construction phase for option SAF-084 (all impacts) is concurrent with Roscommon Rehabilitation Unit, Roscommon Sewerage Scheme, Sacred Heart Hospital and Roscommon Town Regeneration works (see Appendix E, Table E6 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Lough Croan Turlough SPA from disturbance impacts during construction if the construction phase for option SAF-084 (all impacts) is concurrent with Roscommon Rehabilitation Unit, Roscommon Sewerage Scheme, Sacred Heart Hospital and Roscommon Town Regeneration works (see Appendix E, Table E6 for details on specific options and projects).</p> <p><u>In-combination between Preferred Approach options</u></p> <p>There is potential for construction related in-combination effects from the projects within SAF to Lough Oughter Complex SPA from disturbance impacts if Preferred Approach options SAF-156 (all impacts) and SAF-542 (all impacts) were constructed at the same time (see Appendix E, Table E6 for details on specific options and projects).</p> <p>There is potential for construction related in-combination effects from the projects within SAF to Lough Ree SPA from disturbance impacts if Preferred Approach options SAF-009 (all impacts), SAF-021 (all impacts) and SAF-038 (all impacts) were constructed at the same time (see Appendix E, Table E6 for details on specific options and projects).</p> <p>There is potential for construction related in-combination effects from the projects within SAF to River Suck Callows SPA from disturbance impacts if Preferred Approach options SAF-038 (all impacts), SAF-084 (all</p>	

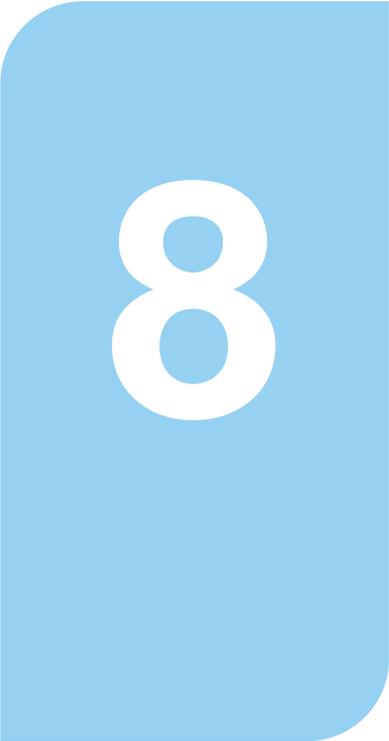
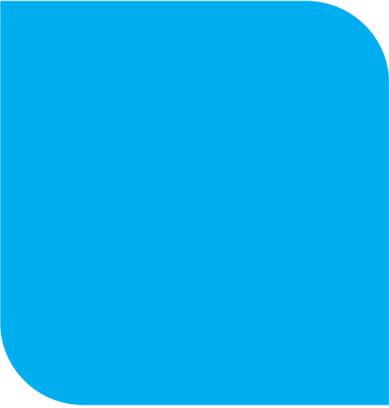
Study Area	Appendix E	Potential for in-combination effect	Conclusion
		impacts) and SAF-534 (all impacts) were constructed at the same time (see Appendix E, Table E6 for details on specific options and projects).	
SAG	See Table E7	<p><u>In-combination with other projects</u></p> <p>Potential in-combination effects with other projects and options were identified for Corofin Wetlands SPA from disturbance impacts during construction if the construction phase for options SAG-001 (all impacts), SAG-046 (all impacts), SAG-079 (all impacts) and SAG-506 (all impacts) is concurrent with Gort Lowlands Flood Relief Scheme and Kinvara Boardwalk and Walkway works (see Appendix E, Table E7 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Coole-Garryland SPA from disturbance impacts during construction if the construction phase for options SAG-001 (all impacts), SAG-046 (all impacts), SAG-501 (all impacts) and SAG-506 (all impacts) is concurrent with Gort Lowlands Flood Relief Scheme and Kinvara Boardwalk and Walkway works (see Appendix E, Table E7 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Coole-Garryland Complex SAC from pollution impacts during construction if the construction phase for option SAG-039 (all impacts) is concurrent with Gort Lowlands Flood Relief Scheme works. There is also the potential for impacts during operation of this project from habitat degradation and water table/availability from option SAG-046 (see Appendix E, Table E7 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Galway Bay Complex SAC from pollution impacts during construction if the construction phase for option SAG-046 (all impacts) is concurrent with Athenry/Bia Innovator, Galway City Ring Road, Galway Public Spaces and Streets Project, Cycling and Walking, Galway Emergency Department and Ward Block, GMIT STEM building, Merlin Park University Hospital, Theatre Block, NUI Galway Learning Commons, Nun's Island Masterplanning, Regeneration of Galway City Inner Harbour, Terryland Water Treatment Plant, Transport Connectivity Project, Oranmore Railway Station, University College Hospital Galway, Radiation Oncology Unit, Gort Lowlands Flood Relief Scheme and Kinvara Boardwalk and Walkway works. There is also the potential for impacts during operation of some of these projects from habitat degradation and water table/availability from option SAG-046 (see Appendix E, Table E7 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Inner Galway Bay SPA from pollution and disturbance impacts during construction if the construction phase for options SAG-046 (all impacts) and SAG-506 (disturbance only) is concurrent with Athenry/Bia Innovator, Galway City Ring Road, Galway Public Spaces and Streets Project, Cycling and Walking, Galway Emergency Department and Ward Block, GMIT STEM building, Merlin Park University Hospital, Theatre Block, NUI Galway Learning Commons, Nun's Island Masterplanning, Regeneration of Galway City Inner Harbour, Terryland Water Treatment Plant,</p>	With the implementation of mitigation as detailed in Chapter 6.3 and Appendix E (Table E7) there will be no adverse effects on the integrity of these European sites, either alone or in-combination with other plans or projects.

Study Area	Appendix E	Potential for in-combination effect	Conclusion
		<p>Transport Connectivity Project, Oranmore Railway Station, University College Hospital Galway, Radiation Oncology Unit, Gort Lowlands Flood Relief Scheme, Kinvara Boardwalk and Walkway and N59 Moycullen Bypass works (see Appendix E, Table E7 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Inagh River Estuary SAC from spread of invasive non-native species and pollution impacts during construction if the construction phase for option SAG-501 (all impacts) is concurrent with Lahinch Wastewater Treatment Plant works (see Appendix E, Table E7 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for Lower River Shannon SAC from habitat loss, mortality, spread of invasive non-native species, disturbance and pollution impacts during construction if the construction phase for option SAG-513 (all impacts) is concurrent with N21/N69 Limerick to Adare to Foynes, Barrack Square and Old Barrack Street and O'Connell Square and High Street, Clonroadmore Wastewater Treatment Plant, Ennis Town Centre Regeneration, Ennis Library, St Joseph's Community Nursing Unit, Ennis, Foynes Port Capacity Extension, Foynes Flying Boat & Maritime Museum, Shannon Crossing/Killaloe Bypass/R494 Upgrade, King's Island Flood Relief Scheme, Opera Site, Limerick, Digital Collaboration and Virtual Reality Centre, Condell Road social housing, Clonmacken social housing, Limerick Library, Limerick Flood Relief Scheme, Limerick Wastewater Treatment Plant, LIT Applied Science & IT Building, National Laboratory, Coonagh to Knockalisheen, Churchfield, Southhill social housing, St. Camillus Community Hospital, Listowel Bypass and Shannon Flood Relief Scheme works (see Appendix E, Table E7 for details on specific options and projects).</p> <p>Potential in-combination effects with other projects and options were identified for River Shannon and River Fergus Estuaries SPA from disturbance and pollution impacts during construction if the construction phase for option SAG-513 (all impacts) is concurrent with N21/N69 Limerick to Adare to Foynes, Barrack Square and Old Barrack Street and O'Connell Square and High Street, Clonroadmore Wastewater Treatment Plant, Ennis Town Centre Regeneration, Ennis Library, St Joseph's Community Nursing Unit, Ennis, Foynes Port Capacity Extension, Foynes Flying Boat & Maritime Museum, King's Island Flood Relief Scheme, Opera Site, Limerick, Digital Collaboration and Virtual Reality Centre, Condell Road social housing, Clonmacken social housing, Limerick Library, Limerick Flood Relief Scheme, Limerick Wastewater Treatment Plant, LIT Applied Science & IT Building, National Laboratory, Coonagh to Knockalisheen, Churchfield, Southhill social housing, St. Camillus Community Hospital, Listowel Bypass, Murroe Community Hub and Shannon Flood Relief Scheme works (see Appendix E, Table E7 for details on specific options and projects).</p> <p><u>In-combination between Preferred Approach options</u></p> <p>There is potential for construction related in-combination effects from the projects within SAG to Carrowmore Point to Spanish Point and Islands SAC from pollution impacts if Preferred Approach options SAG-501 (all impacts) and SAG-513 (all impacts) were constructed at the same time (see Appendix E, Table E7 for details on specific options and projects).</p>	

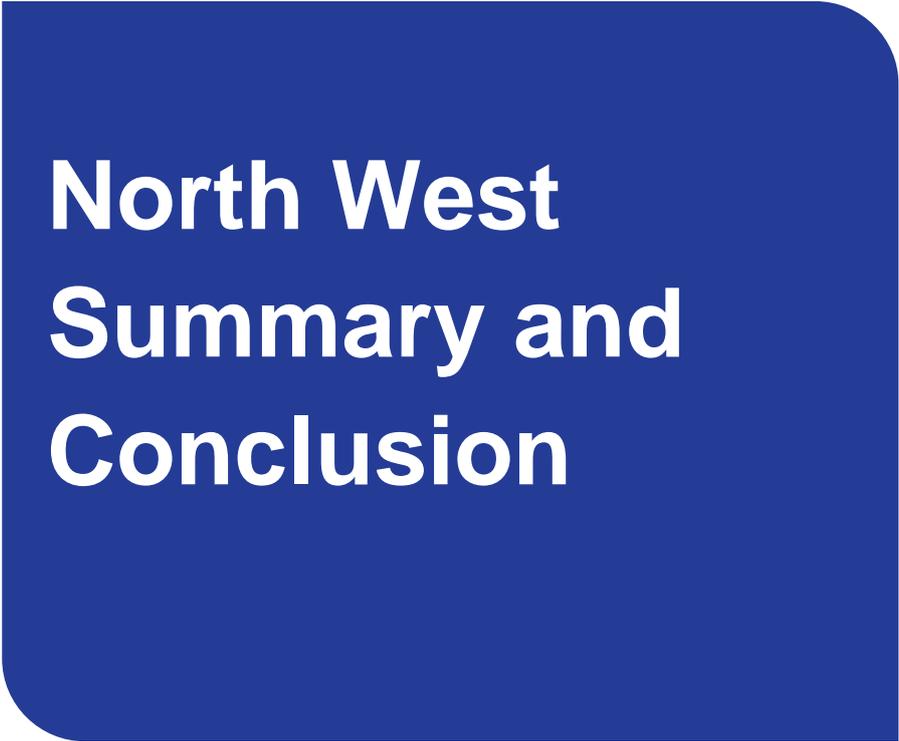
Study Area	Appendix E	Potential for in-combination effect	Conclusion
		<p>There is potential for construction and operational related in-combination effects from the projects within SAG to East Burren Complex SAC from habitat loss, spread of invasive non-native species, disturbance, habitat degradation and water table/availability impacts if Preferred Approach options SAG-001 (all impacts), SAG-046 (habitat degradation and water table/availability only), SAG-079 (spread of invasive non-native species and disturbance) and SAG-506 (habitat loss, spread of invasive non-native species, habitat degradation and water table/availability only) were constructed at the same time and/or during operation (see Appendix E, Table E7 for details on specific options and projects).</p> <p>There is potential for construction related in-combination effects from the projects within SAG to Coole-Garryland SPA from disturbance impacts if Preferred Approach options SAG-001 (all impacts), SAG-046 (all impacts), SAG-501 (all impacts) and SAG-506 (all impacts) were constructed at the same time (see Appendix E, Table E7 for details on specific options and projects).</p> <p>There is potential for construction related in-combination effects from the projects within SAG to Corofin Wetlands SPA from disturbance impacts if Preferred Approach options SAG-001 (all impacts), SAG-046 (all impacts), SAG-079 (all impacts) and SAG-506 (all impacts) were constructed at the same time (see Appendix E, Table E7 for details on specific options and projects).</p> <p>There is potential for construction related in-combination effects from the projects within SAG to Inner Galway Bay SPA from disturbance impacts if Preferred Approach options SAG-046 (all impacts) and SAG-506 (all impacts) were constructed at the same time (see Appendix E, Table E7 for details on specific options and projects).</p> <p>There is potential for construction related in-combination effects from the projects within SAG to Mid-Clare Coast SPA from disturbance impacts if Preferred Approach options SAG-501 (all impacts) and SAG-513 (all impacts) were constructed at the same time (see Appendix E, Table E7 for details on specific options and projects).</p>	
NW Region	See Table E8	<p>In-combination between Study Areas within the NW region</p> <p>There are potential in-combination effects between options across Study Areas but only if construction/operation of options progressed concurrently as follows:</p> <ul style="list-style-type: none"> • On Donegal Bay SPA from options within SAA and SAB. There is potential for in-combination impacts from habitat degradation and disturbance if construction of options within these SAs is concurrent. • On Lough Gill SAC from options within SAB and SA-C. There is potential for in-combination impacts from habitat degradation and disturbance if construction of options within these SAs is concurrent, and during operation from water table/availability and habitat degradation impacts. • On Lough Oughter and Associated Loughs SAC from options within SAB and SAF. There is potential for in-combination impacts from habitat loss, mortality risk, habitat degradation, disturbance and spread of 	With the implementation of mitigation as detailed in Chapter 6.3 and Appendix E (Table E8) there will be no adverse effects on the integrity of these European sites, either alone or in-combination with other plans or projects.

Study Area	Appendix E	Potential for in-combination effect	Conclusion
		<p>invasive non-native species if construction of options within these SAs is concurrent, and during operation from water table/availability and habitat degradation impacts.</p> <ul style="list-style-type: none"> • On Upper Lough Erne SAC from options within SAB and SAF. There is potential for in-combination impacts from habitat degradation if construction of options within these SAs is concurrent. • On Lough Oughter Complex SPA from options within SAB and SAF. There is potential for in-combination impacts from habitat degradation and disturbance if construction of options within these SAs is concurrent. • On Upper Lough Erne SPA from options within SAB and SAF. There is potential for in-combination impacts from habitat degradation and disturbance if construction of options within these SAs is concurrent. • On Lough Carra/Mask Complex SAC from options within SA-C and SAD. There is potential for in-combination impacts during operation from water table/availability and habitat degradation impacts. • On Lough Mask SPA from options within SA-C and SAD. There is potential for in-combination impacts from habitat degradation and disturbance if construction of options within these SAs is concurrent, and during operation from water table/availability and habitat degradation impacts. • On Lough Corrib SAC from options within SAD and SAF. There is potential for in-combination impacts from habitat degradation, disturbance and spread of invasive non-native species if construction of options within these SAs is concurrent, and during operation from water table/availability and habitat degradation impacts. • On Galway Bay Complex SAC from options within SAD and SAG. There is potential for in-combination impacts from habitat degradation if construction of options within these SAs is concurrent. • On Inner Galway Bay SPA from options within SAD and SAG. There is potential for in-combination impacts from habitat degradation and disturbance if construction of options within these SAs is concurrent. 	
NW, SW and EM Regions	See Table E9	<p>In-combination between the NW region, SW region and the EM region</p> <p>There are potential in-combination effects between options across regional groups but only if construction/operation of options progressed concurrently as follows:</p> <ul style="list-style-type: none"> • On Lower River Suir SAC from options within SW and EM. There is potential for in-combination impacts from habitat degradation if construction of options within these regions is concurrent. • On Blackwater River (Cork/Waterford) SAC from options within SW and EM. There is potential for in-combination impacts from habitat degradation if construction of options within these regions is concurrent. • On Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA from options within SW and EM. There is potential for in-combination impacts from disturbance if construction of options within these regions is concurrent. 	<p>With the implementation of mitigation as detailed in Chapter 6.3 and Appendix E (Table E9) there will be no adverse effects on the integrity of these European sites, either alone or in-combination with other plans or projects.</p>

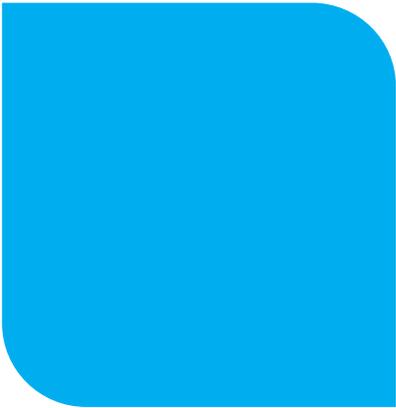
Study Area	Appendix E	Potential for in-combination effect	Conclusion
		<ul style="list-style-type: none"> • On River Boyne and River Blackwater SAC from options within NW and EM. There is potential for in-combination impacts from habitat degradation, disturbance and spread of invasive non-native species if construction of options within these regions is concurrent. • On River Boyne and River Blackwater SPA from options within NW and EM. There is potential for in-combination impacts from habitat degradation and disturbance if construction of options within these regions is concurrent. • On Lough Ree SAC from options within NW and EM. There is potential for in-combination impacts from habitat degradation and disturbance if construction of options within these regions is concurrent, and during operation from water table/availability and habitat degradation impacts. • On Lough Ree SPA from options within NW and EM. There is potential for in-combination impacts from habitat degradation and disturbance if construction of options within these regions is concurrent. • On Lough Derravarragh SPA from options within NW and EM. There is potential for in-combination impacts from disturbance if construction of options within these regions is concurrent. • On River Suck Callows SPA from options within NW and EM. There is potential for in-combination impacts from habitat degradation and disturbance if construction of options within these regions is concurrent. • On Four Roads Turlough SPA from options within NW and EM. There is potential for in-combination impacts from disturbance if construction of options within these regions is concurrent. • On Lower River Shannon SAC from options within NW, SW and EM. There is potential for in-combination impacts from habitat loss (all regions), mortality risk (all regions), habitat degradation (all regions), disturbance (all regions) and spread of invasive non-native species (all regions) if construction of options within these regions is concurrent, and during operation from water table/availability (SW and EM only) and habitat degradation (SW and EM only) impacts. • On River Shannon and River Fergus Estuaries SPA from options within NW, SW and EM. There is potential for in-combination impacts from habitat degradation (all regions) and disturbance (NW and EM only) if construction of options within these regions is concurrent. 	



8



**North West
Summary and
Conclusion**



8.1 North West Region Summary

8.1.1 In-combination Assessment (NW region Summary)

The in-combination assessment is detailed in Chapter 7 and Appendix E of this report including the assessment of potential in-combination effects at the NW regional level. In summary, potential in-combination effects were identified within the NW region between Preferred Approaches, between Preferred Approaches and other (non-Irish Water) projects, and between Study Areas (Preferred Approaches only) as shown in Table 8.1 below. Potential in-combination effects were also identified between Preferred Approaches in the NW region, the SW region and the EM region as shown in Table 8.2. However, potential in-combination effects (construction and/or operational) would only occur where options within each Study Area are progressed concurrently with one another or with other external projects, and in the absence of mitigation. With the implementation of mitigation as outlined in Chapter 6.3 and Appendix E there will be no adverse effects on the integrity of any European site(s), either alone or in-combination with other plans or projects as a result of progressing the Preferred Approach options associated with the draft RWRP-NW.

Table 8.1 – European sites with potential in-combination effects within the NW region

In-combination effects between Preferred Approaches and other projects within a Study Area	In-combination effects between Preferred Approaches only within a Study Area	In-combination effects between Study Areas (Preferred Approaches only)
Ballykenny-Fisherstown Bog SPA	Carrowmore Point to Spanish Point and Islands SAC	Donegal Bay SPA
Ballysadare Bay SPA	Clew Bay Complex SAC	Galway Bay Complex SAC
Bellanagare Bog SPA	Cloghernagore Bog and Glenveagh National Park SAC	Inner Galway Bay SPA
Carlingford Lough SPA	Connemara Bog Complex SAC	Lough Carra/Mask Complex SAC
Carlingford Lough SPA (NI)	Connemara Bog Complex SPA	Lough Corrib SAC
Clew Bay Complex SAC	Coole-Garryland SPA	Lough Gill SAC
Cloghernagore Bog and Glenveagh National Park SAC	Corofin Wetlands SPA	Lough Mask SPA
Coole-Garryland Complex SAC	Cruagh Island SPA	Lough Oughter and Associated Loughs SAC
Connemara Bog Complex SPA	Derryveagh and Glendowan Mountains SPA	Lough Oughter Complex SPA
Coole-Garryland SPA	Dundalk Bay SPA	Upper Lough Erne SAC
Corofin Wetlands SPA	East Burren Complex SAC	Upper Lough Erne SPA
Cregganna Marsh SPA	High Island, Inishshark and Davillaun SPA	
Cummeen Strand SPA	Inner Galway Bay SPA	
Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC	Kilkieran Bay and Islands SAC	
Derryveagh and Glendowan Mountains SPA	Lough Carra/Mask Complex SAC	
Donegal Bay (Murvagh) SAC	Lough Conn and Lough Cullin SPA	
Donegal Bay SPA	Lough Corrib SAC	
Dundalk Bay SAC	Lough Corrib SPA	
Dundalk Bay SPA	Lough Gill SAC	
Four Roads Turlough SPA	Lough Mask SPA	
Galway Bay Complex SAC	Lough Oughter and Associated	

In-combination effects <u>between Preferred Approaches and other projects</u> within a Study Area	In-combination effects <u>between Preferred Approaches only</u> within a Study Area	In-combination effects <u>between Study Areas (Preferred Approaches only)</u>
Garriskil Bog SPA	Loughs SAC	
Horn Head to Fanad Head SPA	Lough Oughter Complex SPA	
Inagh River Estuary SAC	Lough Ree SPA	
Inishmore Island SAC	Mid-Clare Coast SPA	
Inishmore SPA	River Finn SAC	
Inner Galway Bay SPA	River Foyle and Tributaries SAC	
Killala Bay/Moy Estuary SAC	River Moy SAC	
Killala Bay/Moy Estuary SPA	River Suck Callows SPA	
Leannan River SAC	Slyne Head to Ardmore Point Islands SPA	
Lough Carra/Mask Complex SAC	The Twelve Bens/Garraun Complex SAC	
Lough Conn and Lough Cullin SPA	Upper Lough Erne SAC	
Lough Corrib SAC	Upper Lough Erne SPA	
Lough Corrib SPA	West Connacht Coast SAC	
Lough Croan Turlough SPA		
Lough Derravarragh SPA		
Lough Eske and Ardnamona Wood SAC		
Lough Fern SPA		
Lough Forbes Complex SAC		
Lough Gara SPA		
Lough Gill SAC		
Lough Kinale and Derragh Lough SPA		
Lough Lurgreen Bog/Glenamaddy Turlough SAC		
Lough Mask SPA		
Lough Nillan Bog SPA		
Lough Oughter and Associated Loughs SAC		
Lough Oughter Complex SPA		
Lough Ree SAC		
Lough Ree SPA		
Lough Sheelin SPA		
Lough Swilly SAC		
Lough Swilly SPA		
Lower River Shannon SAC		
Newport River SAC		
North Inishowen Coast SAC		
Rahasane Turlough SPA		
River Boyne and River Blackwater		

In-combination effects <u>between Preferred Approaches and other projects</u> within a Study Area	In-combination effects <u>between Preferred Approaches only</u> within a Study Area	In-combination effects <u>between Study Areas (Preferred Approaches only)</u>
SAC River Boyne and River Blackwater SPA River Finn SAC River Foyle and Tributaries SAC River Moy SAC River Shannon and River Fergus Estuaries SPA River Suck Callows SPA Slyne Head Peninsula SAC Stabannan-Braganstown SPA The Twelve Bens/Garraun Complex SAC Trawbreaga Bay SPA Unshin River SAC Upper Lough Erne SAC Upper Lough Erne SPA West Connacht Coast SAC West Donegal Coast SPA West of Ardara/Maas Road SAC		

Table 8.2 – European sites with potential in-combination effects between the NW region, the SW region and the EM region

In-combination effects <u>between Regional Groups (Preferred Approaches only)</u>
Blackwater River (Cork/Waterford) SAC Four Roads Turlough SPA Lough Derravarragh SPA Lough Ree SAC Lough Ree SPA Lower River Shannon SAC Lower River Suir SAC River Boyne and River Blackwater SAC River Boyne and River Blackwater SPA River Shannon and River Fergus Estuaries SPA River Suck Callows SPA Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA

Groundwater Abstraction

The potential for in-combination effects on groundwater bodies have been considered in the hydrogeological assessment of the groundwater abstractions. The methodology for setting out the process for groundwater assessment and cumulative assessment is set out in Appendix C of the Framework Plan. The assessment considered the likely cumulative effects of groundwater abstractions on meeting WFD objectives.

In-combination effects from groundwater and surface water abstractions on European sites is considered in the in-combination assessment undertaken in this NIS.

8.2 Conclusion

The conclusion of the NIS for the draft RWRP-NW is that, based on a plan-level assessment, and with implementation of appropriate mitigation for protecting European sites, there will be no adverse effects on the integrity of any European site(s), either alone or in-combination with other plans or projects as a result of progressing Preferred Approach options within the draft RWRP-NW.

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