

Regional Water Resources Plan – North West

Strategic Environmental
Assessment

Appendix H: Study Area G –
Environmental Review



Tionscadal Éireann
Project Ireland
2040



Data disclaimer: This document uses best available data at time of writing. 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. In December 2022, the Water Services (Amendment) (No. 2) Act, 2022 was signed into law. This act provides that, from the 31 December 2022, Irish Water will only be known as Uisce Éireann. It also provides that, from that date, all references in any enactment, legal proceedings or other document to Irish Water shall be construed as references to Uisce Éireann only. The SEA Environmental Report and Appendices, including this Environmental Review reflect this transition from Irish Water to Uisce Éireann.

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 Uisce Éireann data sets. Data sources are detailed in the relevant sections of the draft RWRP-NW. The year 2019 was selected as the base year to align with the planning period (2019-2025) of the NWRP.

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1

Introduction and Background

1 Introduction and Background

This Study Area Environmental Review forms part of the SEA Environmental Report for the Regional Water Resources Plan (RWRP) for the North West Region (referred to as the Regional Plan). The Regional Plan includes seven individual study area reviews (SAA-G) as appendices.

This Study Area G Environmental Review includes:

- Context for the Study Area Environmental Review;
- Environmental baseline;
- Environmental assessment for the options screening process and feasible options;
- Assessment of the alternatives considered and the Preferred Approach;
- Cumulative effects assessment; and
- Recommendations for implementation, including mitigation and monitoring.

This Environmental Review summarises the environmental assessment undertaken for Study Area G within the North West Region for the options and approaches considered and as outlined in the Study Area G Technical Report (draft RWRP-NW Appendix 7). This Environmental Review applies the Strategic Environmental Assessment (SEA) objectives and environmental assessment methodology set out in the NWRP Framework Plan (Framework Plan).

Environmental Reviews have been undertaken for each study area and form appendices to the SEA Environmental Report for the Regional Plan as part of Phase 2 of the National Water Resources Plan (NWRP). Phase 1 in the development of the NWRP was the preparation of the Framework Plan, which was adopted in Spring 2021 following SEA, Appropriate Assessment (AA) and extensive public consultation. Two regional plans, the RWRP for the Eastern and Midlands region and the RWRP for the South West region have been taken through a consultation process and have been finalised and adopted. The RWRP for the North West region, which this Environmental Review supports as part of the SEA documentation, is expected to be adopted in Summer 2023. The RWRP for the South East is currently underway, is out for public consultation, and will be the final region for the Phase 2 NWRP. The Framework Plan, Regional Plans and supporting documentation are available at <https://www.water.ie/projects/strategic-plans/national-water-resources/>.

1.1 Options Assessment Methodology

The Options Assessment Methodology as adopted in the Framework Plan and implemented as part of the RWRP-NW provides a framework to identify potential solutions to address identified need. The key stages of the process are illustrated in **Error! Reference source not found.** and summarised below:

- 1) Identifying 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) Identifying potential options for consideration relevant to the study area;
- 4) Coarse screening – assessing 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 and scoring assessment update;
- 7) Approach appraisal – comparison and assessment of combinations of options identified to meet the predicted supply demand deficit to determine the Preferred Approach; and
- 8) Monitoring and Feedback – a process for monitoring the implementation of the plan and responding to changes to policy and guidelines and to information changes which will feed into the 5 year plan cycle and includes an annual review to identify actions required within the plan cycle.

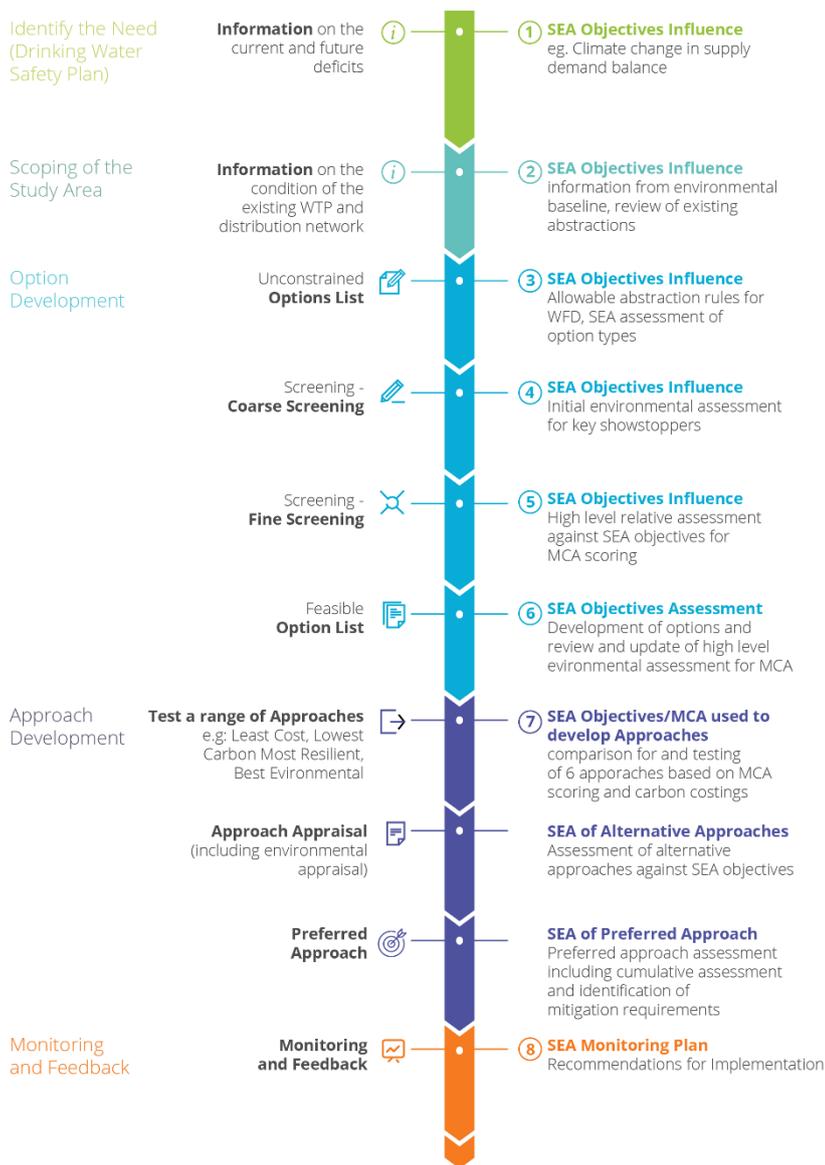


Figure 1.1 Option and Approach Development Process

1.2 Regional Plan Strategic Environmental Assessment

The four RWRPs, implementing Phase 2 of the NWRP, are each subject to a separate SEA process. The study area assessments will follow the outline methodology established by the Framework Plan. The SEA Environmental Reports are being published for consultation alongside the draft Regional Plans for each of the four regions. As indicated above, this consultation process has been completed for three of

the regions and the South East Region, which is currently in consultation, is the final region in the Phase 2 NWRP.

Each of the Study Area Environmental Reviews, are presented as appendices to the SEA Environmental Reports, and include:

- Introduction for SEA, Water Framework Directive (Council Directive 2000/60/EC) (WFD) and AA applied at the study area level;
- Environmental baseline context;
- Environmental assessment for the options screening process and feasible options;
- Assessment of the alternatives considered and the Preferred Approach;
- Cumulative effects assessment between options within each study area and with proposed developments in the study area; and
- Recommendations for implementation, including mitigation and monitoring.

1.3 Study Area: Strategic Environmental Assessment

The set of SEA objectives developed at the Phase 1 scoping stage have been refined and finalised following consultation (see Table 1.1). These objectives have been influenced by the plans, policies and programmes review, the baseline trends and pressures identified, and the scope of the assessment as defined and consulted on in the Regional Plan SEA scoping report.

Table 1.1 SEA Objectives

SEA Topic	SEA Objective
Population, economy, tourism and recreation, and human health	Protect and, where possible, contribute to enhancement of human health and wellbeing and to prevent restrictions to recreation and amenity facilities in providing water services.
Water environment	<p><u>Water quality and resources</u></p> <p>Prevent deterioration of the WFD status of waterbodies with regard to both water quality and quantity due to Uisce Éireann’s activities. Contribute towards the “no deterioration” WFD condition and, where possible, to the improvement of waterbody status for rivers, lakes, transitional and coastal waters, and groundwater to at least ‘Good’ status.</p>
	<p><u>Flood risk</u></p> <p>Protect and, where possible, reduce risk from ground water and surface water flooding as a result of Uisce Éireann’s activities.</p>
Biodiversity	Protect and, where possible, enhance terrestrial, aquatic and soil biodiversity; particularly regarding European sites and protected species in providing water services.
Material assets	<p>Minimise resource use and waste generation from, new or upgraded, existing water services infrastructure and management of residuals from drinking water treatment - to protect human health and the ecological status of waterbodies.</p>
	<p>Minimise impacts on other material assets and existing water abstractions.</p>

SEA Topic	SEA Objective
Landscape and visual amenity	Protect and, where possible, enhance designated landscapes in providing water services.
Climate change	<u>Climate change mitigation</u> Minimise contributions to climate change emissions to air (including greenhouse gas emissions) as a result of Uisce Éireann's activities.
	<u>Climate change adaptation</u> Promote the resilience of the environment, water supply and treatment infrastructure to the effects of climate change.
Cultural heritage	Protect and, where possible, enhance cultural heritage resources in providing water services.
Geology and soils	Protect soils and geological heritage sites and, where possible, contribute towards the appropriate management of soil quality and quantity.

The SEA informs the development of the approaches and is undertaken on the various alternative approaches considered and the Preferred Approaches identified, along with cumulative impact assessment and identification of 'in-combination' effects.

The Regional Plan SEA Environmental Report was completed only after all study area reports for the North West region were available. At that point, Uisce Éireann conducted an exercise as part of the development of the overall relevant Regional Plan to assess the cumulative and in-combination impacts of the Preferred Approaches identified for each study area within the North West region. The conclusions of that cumulative assessment are presented in the SEA Environmental Report for the North West region.

If appropriate, the Preferred Approach identified for SAG will have been modified prior to finalisation of the Regional Plan Technical Report and Environmental Review to take into account the conclusions of that cumulative assessment and identification of in-combination effects. The SEA for each of the Regional Plans in turn includes a cumulative assessment of the Preferred Approaches identified in the Regional Plan, in combination with the effects of the Preferred Approaches for each other region (to the extent that data was available and recognising that each Regional Plan is at a different stage of development).

1.4 Study Area: Water Framework Directive

Requirements under the WFD to avoid deterioration in waterbody status or objectives has been incorporated into the allowable abstraction constraints for new option abstractions. WFD requirements are also included in the SEA objectives for the assessment (see Table 1.1). Baseline data in relation to the WFD is presented in section 2.2.1 and a summary of the assessment for SAG is provided in chapter 8 of this review.

1.5 Study Area: Appropriate Assessment

An AA was required for the Framework Plan to comply with the EU Habitats Directive (92/43/EEC) and is relevant to development of the Regional Plans, including the component study areas.

AA issues will be addressed in a separate Natura Impact Statement (NIS) for the Regional Plan, which will support the overall AA process that Uisce Éireann is required to carry out. Habitats Directive requirements have been integrated into the options development process and conclusions from the NIS for SAG are provided in chapter 9 of this review.

1.6 Study Area G

The North West Region is subdivided into seven study areas 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.

This appendix reports on SAG, the location of SAG in relation to the North West Region is shown in Figure 1.2.

Study Area G lies within the counties of Clare and Galway, and its total area is approximately 2,390 km². There are no principal settlements (with a population of over 10,000) within SAG. The largest settlement is Gort, with a population of 2,994 (CSO, 2016a), as shown in Figure 1.3.

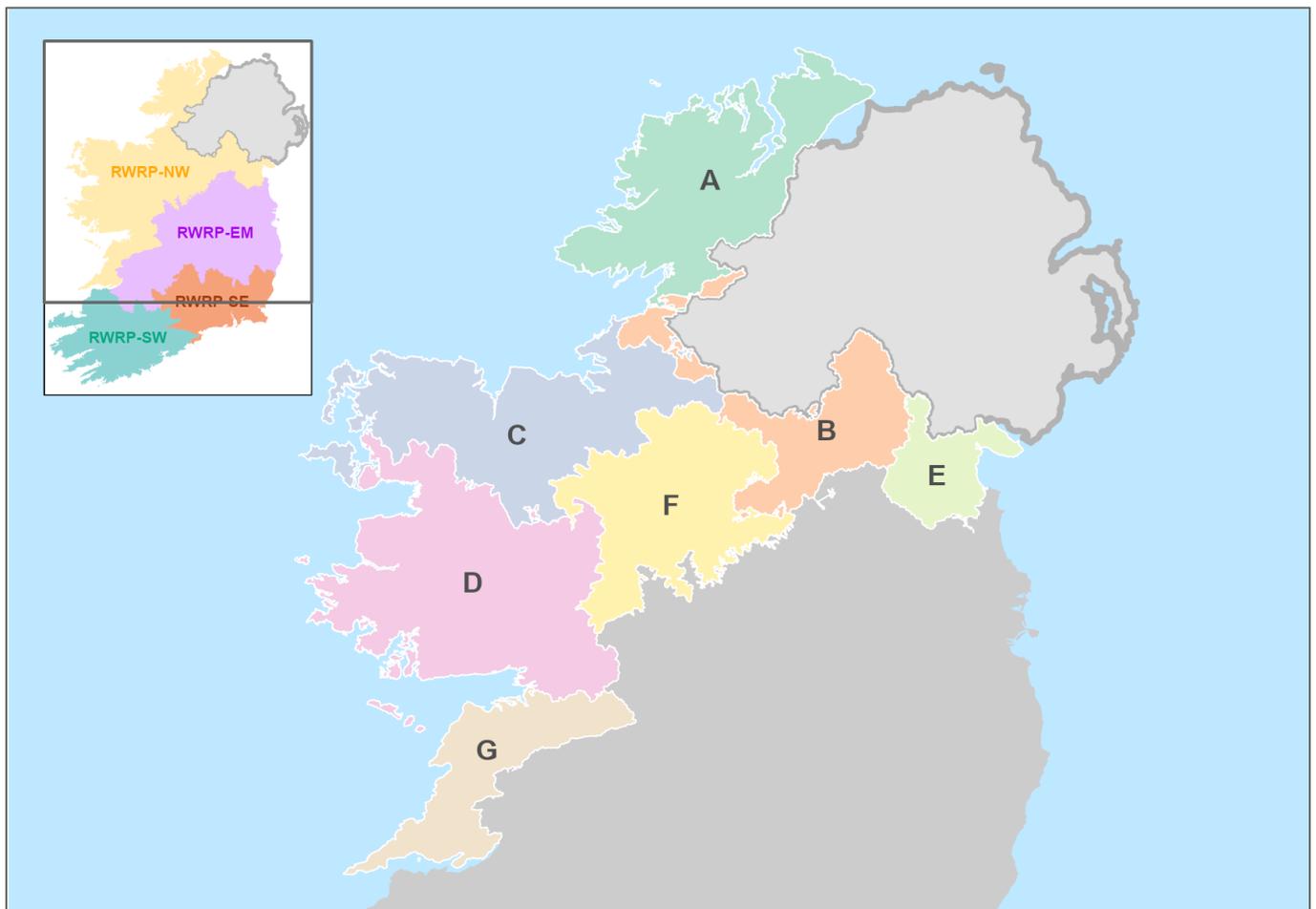


Figure 1.2 North West Region Study Areas

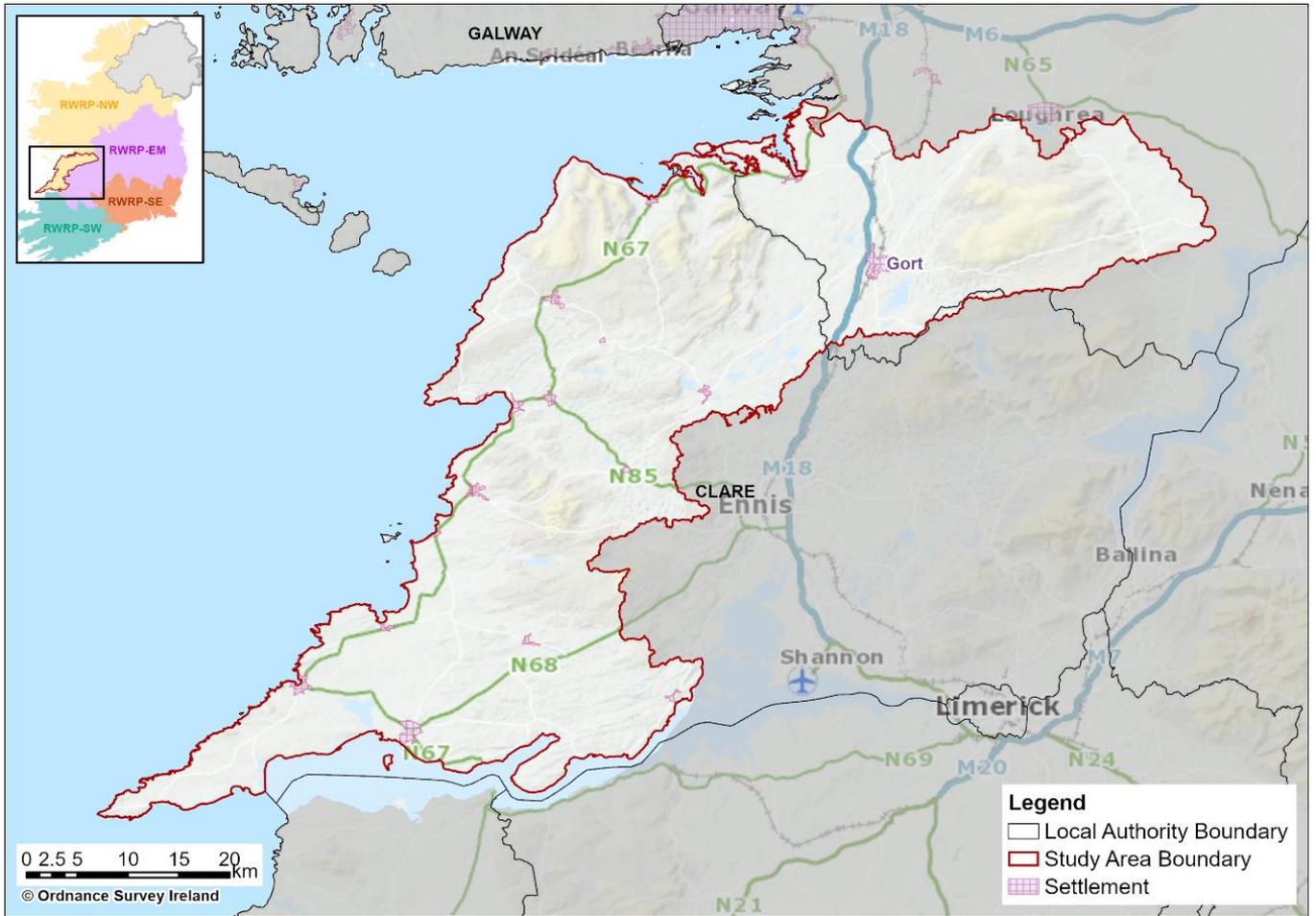


Figure 1.3 Study Area G

2

Study Area G Environmental Baseline Context

2 Study Area G Environmental Baseline Context

This chapter provides environmental baseline information for SAG regarding the following key environmental topics in the SEA:

- Population, Economy, Tourism and Recreation, and Human Health;
- Water Environment;
- Biodiversity, Flora and Fauna;
- Material Assets;
- Landscape and Visual Amenity;
- Air Quality and Noise;
- Climate Change;
- Cultural Heritage;
- Geology and Soils; and
- Summary of key issues and trends over the plan period within the study area.

The baseline environment considers key indicators characterising the current situation in the study area and how these aspects are likely to develop over the Framework Plan's implementation period. This includes issues relating to pressures on the environment or the sensitivity of the environment to change. This chapter is intended to support and add to the baseline environmental information for the Regional Plan SEA Environmental Report, as context for the option appraisal and programme selection.

The baseline assessment also addresses the environmental aspects of Stages 1 and 2 of the options assessment methodology:

- Stage 1 Identifying need – based on SDB and/or Drinking Water Safety Plan Barrier Assessment; and
- Stage 2 Scoping of the study area (WRZs) – understanding WRZ's within the study area and the existing conditions of assets, supply and demand issues as well as environmental constraints and opportunities.

2.1 Population, Economy, Tourism and Recreation, and Human Health

2.1.1 Population

Table 2.1 provides a general overview of the WRZ's population and the projected percentage change in population between 2019 and 2044. The estimated population currently living in each WRZ has been based on the 2016 Census data. The 2016 population was assigned to District Metering Areas (DMAs) by mapping the Central Statistics Office (CSO) data to DMA boundaries. Uisce Éireann have projected the 2016 population forward to 2019 using the growth projections in the National Planning Framework, updated information from the Regional Spatial and Economic Strategies, and Local Authority Planning sections (where available). The full 2022 Census data was not available at the time of the SDB analysis, however, Uisce Éireann will update the SDB with the 2022 census data when published. Updated data and information will be incorporated via the monitoring and feedback process as set out in section 8.3.8 of the Framework Plan.

Table 2.1 Overview of the Population within the WRZs of SAG

WRZ Reference Number and Name	Total Population Served (2019)*	% Population Change (2019-2044)*
0300SC0004 - Carron PWS	54	15.3
0300SC0003 - Corofin PWS	1,199	25.1
0300SC0021 - Ennistymon	6,841	19.6
1200SC0016 - Gort	2,840	15.3
0300SC0005 - Kilkeedy PWS	76	15.3
0300SC0013 - Killadysert PWS	1,508	20.7
1200SC0023 - Kinvara P.S.	2,240	15.3
0300SC0022 - Turlough	415	15.3
0300SC0001 - West Clare	14,630	21.4

*The estimated population has been based on the 2016 Census data. Uisce Éireann have projected the 2016 population forward to 2019 using the growth projections in the National Planning Framework, Regional Spatial and Economic Strategies, and Local Authority Planning sections

2.1.2 Economy and Employment

SAG had a below average household disposable income per person in 2019 (CSO, 2022a), and an unemployment rate of 4.0% in the Mid-West, and 4.8% in the West region of the country (CSO, 2023a).

Population increase and expected economic growth has meant that housing and sustainable urban development have been made a priority for the National Development Programme; therefore, to supply the demand there is an aim to increase housing stock. The number of new dwellings completed in Q1 2023 was 431 for the Mid-West region, and 434 for the West region (CSO, 2023b).

2.1.3 Tourism and Recreation

Tourism in SAG has an important role, particularly in rural areas, with the National Planning Framework (NPF) stating that tourism is a key aspect of rural job creation now and in the future (Government of Ireland, 2018). The county of Clare has been described as “*the home of great activities and adventure*”, containing great walking and cycling routes, while also combining the stunning natural beauty of its long, meandering coastline with unique windswept landscapes and Irish culture. (Visit Clare, 2022).

Additionally, the study area is located along Ireland’s Wild Atlantic Way, which is a tourism development strategy that aims to achieve greater visibility for the west coast of Ireland and is Ireland’s first long-distance touring route (Fáilte Ireland, 2020).

Ireland’s natural heritage is also recognised as an important tourism asset by the Department of Transport, Tourism and Sport (2019). For SAG, the national park of note in SAG is Burren National Park. Rivers, loughs and coastal areas all make an important contribution to tourism and recreational opportunities and support important fisheries.

2.1.4 Human Health

Table 2.2 provides well-being indicators for the Mid-West and West regions within Ireland. Improvements in air quality, access to good quality drinking water and participation in recreational activities can all have a positive influence on human health and well-being.

Table 2.2 Well-Being Indicators for the Mid-West and West Regions within Ireland

Region	Life Expectancy (CSO, 2020a)	Participation in Sports, Fitness or Recreational Physical Activities (% of Persons Aged 15+) (CSO, 2020b)	Air Quality (EPA, 2021a)
Mid-West	Male: 79.0 Female: 82.5	35%	Good
West	Male: 78.7 Female: 84.5	56%	Good

A key issue for public health is reliable access to good quality drinking water. Regulated water service providers have to ensure appropriate standards of supply and be able to cope with drought conditions, peak events, and maintenance of assets. This requires adequate reserve capacity in Uisce Éireann's Uisce Éireann's supplies to provide a 1 in 50 Level of Service. At present, not all supplies within this study area provide the required levels of reserve capacity. Due to the limited historical monitoring of these supplies, particularly in relation to groundwater, this will need to be studied further. Table 2.3 lists the areas supplied by the Water Treatment Plants (WTPs) in SAG.

Table 2.3 Areas Supplied by the WTPs in SAG

Water Treatment Plants	Water Resource Zone	Local Authority Supplied
Ballymacraven WTP	0300SC0021 - Ennistymon	Clare
Carron WTP (Termon Spring)	0300SC0004 - Carron PWS	Clare
Corofin WTP	0300SC0003 - Corofin PWS	Clare
Gort WTP	1200SC0016 - Gort	Galway
Kilkeedy WTP	0300SC0005 - Kilkeedy PWS	Clare
Killadysert WTP	0300SC0013 - Killadysert PWS	Clare
Kinvara WTP	1200SC0023 - Kinvara P.S.	Galway
New Doolough WTP and Old Doolough WTP	0300SC0001 - West Clare	Clare
Turlough WTP	0300SC0022 - Turlough	Clare

Currently for day-to-day operations, 5 out of 9 of the WRZs in the area have a current SDB deficit and 6 have a projected SDB deficit (based on a 'Do Minimum' approach – see section 4 for further clarification). However, under normal weather and demand conditions, the current deficit does not manifest as an interruption to supply for all WRZs.

Poor water quality can be linked to risks to health. The Barrier Assessment identified 23 of the 29 WTPs within the study area are at high risk of failing to achieve Uisce Éireann’s conservative Barrier Assessment standards. Particularly in relation to chlorine residuals in the networks (Barrier 2.1) (see Table 2.1 in the SAG Technical Report).

The “quality need” identified through the Barrier Assessment is not an indicator of compliance with the Drinking Water Regulations. It is an internal Uisce Éireann assessment of the need to invest in areas of the Uisce Éireann asset base through resource planning, to ensure that potential risks or emerging risks to supplies are addressed. Currently, there are three WRZs with WTPs on the EPA Remedial Action List within SAG, Corofin (Corofin WTP), Ennistymon (Ballymacraven WTP), and West Clare (New Doolough WTP and Old Doolough WTP). Uisce Éireann is currently progressing immediate corrective action in relation to a number of supplies within SAG in advance of the NWRP. Details of these are included in the SAG Technical Report.

2.2 Water Environment

This topic covers geomorphology, WFD, flood risk, surface water quality and groundwater receptors. Figure 2.1 shows the water environment, including the WRZs, the WFD water catchment boundaries, the WTPs and the waterbodies in SAG.

Table 2.4 provides a summary of the WFD catchments within SAG.

Table 2.4 Catchments within SAG (EPA, 2020)

WFD Catchments	Total Catchment Area (km ²)	Catchment Area within SAG (km ²)
Galway Bay South East	1,268	658
Lower Shannon	1,820	166
Mal Bay	847	846
Shannon Estuary North	1,651	708

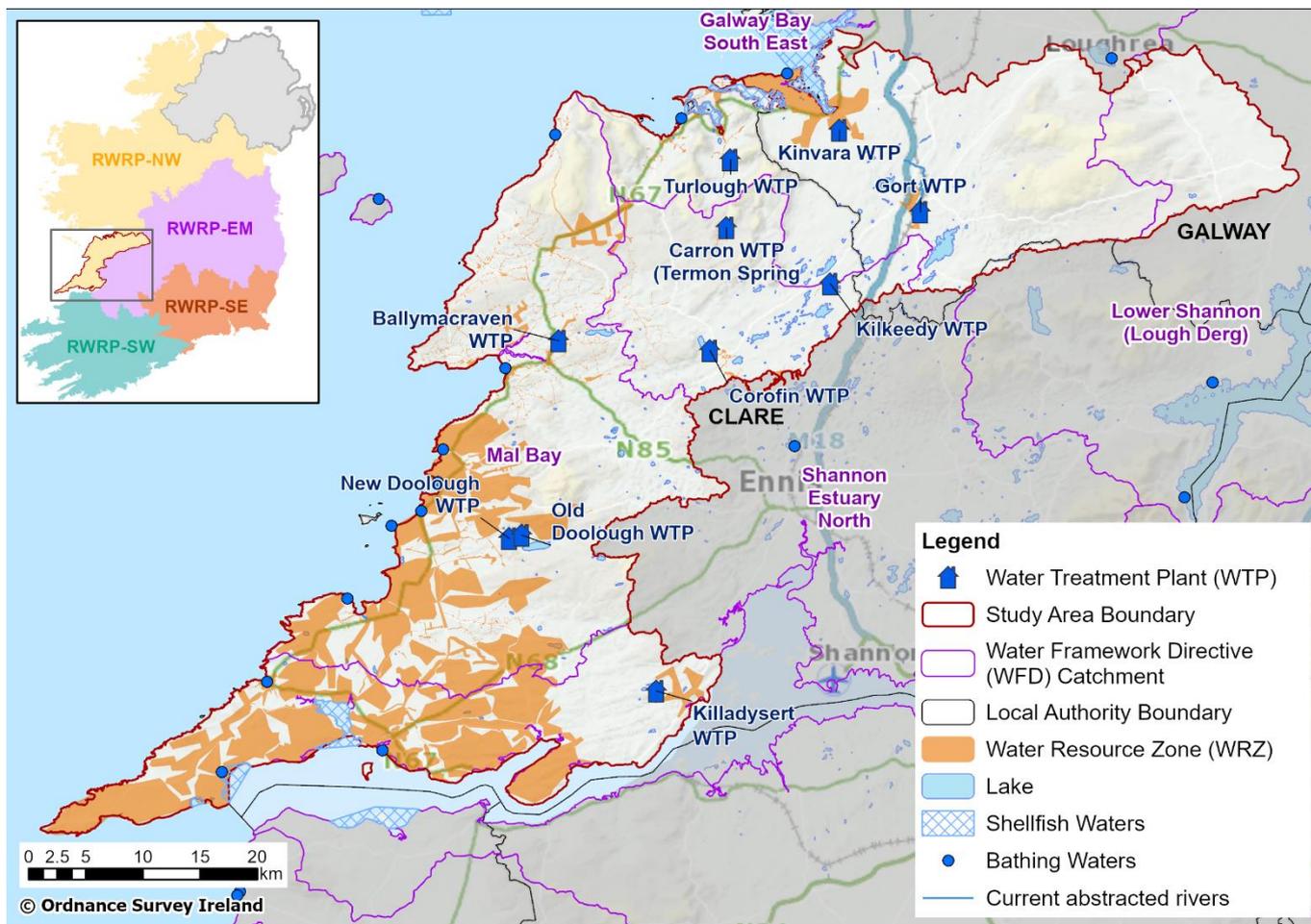


Figure 2.1 Water Environment of SAG

2.2.1 Water Framework Directive

Under the WFD, Ireland must ensure that all waterbodies achieve ‘Good’ status by 2027. In addition, under the legislation, any modification to a WFD waterbody should not lead to deterioration in either the overall status or any of the WFD water quality parameters.

At the end of 2022, the government passed the Water Environment (Abstractions and Associated Impoundments) Act, 2022 (the Abstractions Act) which will ensure that national abstractions align with the requirements of the Water Framework Directive. The Abstractions Act has not yet commenced and the associated regulations and guidelines which will further detail the types of assessment and national methodology to be used have not yet been published and are not yet in place.

Whilst the regulations and guidelines for the new abstraction regime are being developed, Uisce Éireann are assessing existing abstractions to identify surface water sites that may exceed future abstraction thresholds (see Appendix C of the Framework Plan for assessment methodology). Uisce Éireann have taken a precautionary approach based on their current understanding of how proposed abstraction legislation might be applied. This assessment suggests that certain schemes may be subject to reductions in abstraction under the new legislation; however, this will ultimately be determined by the EPA based on the project level information before them.

As there are very few long duration flow records for Uisce Éireann’s abstractions and for waterbodies within Ireland, Uisce Éireann lacks comprehensive data to fully understand the impact of the new legislation on these sources. Information is not currently stored centrally as it was historically collected and collated by Local Authorities. Uisce Éireann is building a telemetry system which will aid bringing all

this data together, but this will take time. Therefore, improved monitoring and gathering better data is a priority.

On an interim basis, Uisce Éireann has developed an initial desktop assessment based on available information (see SAG Technical Report). Over the coming years, Uisce Éireann will work with the environmental regulator, the EPA and the Geological Survey of Ireland, to develop desktop and site investigation systems to better understand the sustainability of its groundwater sources.

To understand the potential impact of the Abstraction Legislation on the SAG supplies, Uisce Éireann have assessed the potential impacts on their six surface water abstractions, namely: Cannahawna River (Gort), Lickeen Lake (Ennistymon), Gortglass Lough (Killadysert PWS), Lough Inchiquin (Corofin PWS), and Doo Lough (West Clare, two abstractions). Based on this initial assessment, the volumes of water abstracted at Lickeen Lake (Ennistymon), Gortglass Lough (Killadysert PWS), and Doo Lough (West Clare, two abstractions) may not meet sustainability guidelines during dry weather flows. However, under the proposed regulatory regime, this will be adjudicated by the EPA. Uisce Éireann have assumed, given the need to maintain supplies, that a transition to new abstraction quantities would likely take place in the medium term.

Uisce Éireann has taken a conservative approach in identifying sustainable abstractions for new options (described in section 3.2) and has applied a sensitivity assessment that considers proposals against potential for future sustainability related reductions in volume (section 5.4).

The Department of Housing, Planning and Local Government's (2019a) public consultation document, regarding the significant water management issues, has been considered by Uisce Éireann. Therefore, the pressures, and the relevant priority 'Areas for Action' are provided below and in Table 2.7.

There are four WFD catchments in SAG and the total number of surface and groundwater waterbodies within SAG are provided in Table 2.5 below.

Table 2.5 WFD Waterbodies within SAG (EPA, 2023a)

Waterbody Type	Water Catchments	Number of Waterbodies	Number of Waterbodies Rated Below Moderate
Rivers	Galway Bay South East	12	0
	Lower Shannon	9	0
	Mal Bay	40	9
	Shannon Estuary North	24	6
Lakes	Galway Bay South East	4	0
	Lower Shannon	0	0
	Mal Bay	4	1
	Shannon Estuary North	14	1
Transitional and Coastal	N/A	27	3
Groundwater	N/A	25	2

The predominant pressures, and the percentage of 'at risk' waterbodies impacted by them, in the latest catchment summaries (catchments.ie, 2021a, 2021b, 2021c and 2021d) are:

- Galway Bay South East: Agriculture (33%), Domestic Wastewater (30%) and Other (abstractions, aquaculture, atmospheric, anthropogenic pressures, historically polluted sites, waste, water treatment and invasive species) (30%);
- Lower Shannon (25C): Agriculture (66%) and Hydromorphology (34%);
- Mal Bay: Forestry (56%) and Other (abstractions, aquaculture, atmospheric, anthropogenic pressures, historically polluted sites, waste, water treatment and invasive species) (44%); and
- Shannon Estuary North: Agriculture (73%) and Hydromorphology (34%).

The Castle CE lake and Gortglass lake waterbodies are at particular risk of abstraction in SAG. Table 2.6 includes a summary of the ‘at risk’ waterbodies within SAG.

Table 2.6 Summary of ‘At Risk’ Waterbodies in SAG (EPA, 2023b)

Waterbody Type	Water Catchments	Number of Waterbodies Identified as ‘At Risk’	Surface Waterbodies Status ‘At Risk’ Due to Abstraction Pressure*
Rivers	Galway Bay South East	5	0
	Lower Shannon	5	
	Mal Bay	26	
	Shannon Estuary North	10	
Lakes	Galway Bay South East	0	4
	Lower Shannon	0	
	Mal Bay	2	
	Shannon Estuary North	6	
Transitional and Coastal	N/A	4	0
Groundwater	N/A	3	N/A
Total		61	4

* Based on Uisce Éireann assessment of their current abstractions

To meet WFD objectives, it has been recognised that there is a need to prioritise and focus efforts to address issues through identifying ‘Areas for Action’. The reasons for selection of the ‘Areas for Action’ within the sub-catchments of SAG are listed in Table 2.7. Note that the ‘Areas for Action’ included in Table 2.7 are from the WFD cycle 3 River Basin Management Plan (RBMP).

Table 2.7 ‘Areas for Action’ within SAG (catchments.ie, 2022)

Areas for Action	Key Reasons for Selection
Aille (Clare)	<ul style="list-style-type: none"> • Opportunity to work with Integrated catchment management project (Grainne - Uis ce Aille) • Community interest due to the amenity value of the river • Unique habitat for fish surviving in the karst conduits • Important for tourism • Historic heritage value

Areas for Action	Key Reasons for Selection
	<ul style="list-style-type: none"> • Headwaters of the river Aille • One deteriorated waterbody
Bleach and Lough Graney	<ul style="list-style-type: none"> • Lough Graney is a prime angling lake especially for brown trout • There are numerous nature designations within the Area for Action including SPAs, SACs and NHAs • Decline in the water quality of the waterbodies within the catchment thus no longer meeting their good or high status objectives • Nutrient issues within the waterbodies
Carrigaholt	<ul style="list-style-type: none"> • There are nature designations within the Area for Action including SPAs and SACs • Carrigaholt Bay is a designated Shellfish Water • The waterbody is currently at Poor biological status and has been since 1997
Doo Lough and Annageeragh	<ul style="list-style-type: none"> • In an acid sensitive area due to the nature of the extensive peat and bedrock type which provides little buffering capacity in water. • An abstraction source for a public drinking water supply serving a population of up to 30,000 people • The Natural Heritage Areas of Cragnashingaun Bog and Lough Namina Bog partially overlap with the catchment • Two of the three waterbodies are achieving poor or moderate quality status • One waterbody is achieving good quality status but it may be at risk of deteriorating in the future from current pressures.
Doonbeg System	<ul style="list-style-type: none"> • Both waterbodies within the catchment are at Poor status due to high nutrient levels and high sedimentation, thus are not meeting their Good status objectives
Inchiquin and Atedaun Lakes	<ul style="list-style-type: none"> • Potential pilot project to examine nutrient impact in groundwater fed lakes in karst areas • Building on existing work completed by Inland Fisheries Ireland • Building on existing knowledge from research completed by Trinity College Dublin (David Drew) • Opportunity to work with farmers including in the expanded BurrenLIFE scheme • Inchiquin is an important drinking water abstraction • Important fishery (trout) - top 8 in the country • Amenity value • Inchiquin is one of the 5 arctic char lakes in Clare, deep lake so good candidate for reintroduction due to depth

Areas for Action	Key Reasons for Selection
Lickeen System	<ul style="list-style-type: none"> • The lake provides the drinking water supply for approximately 14,000 people in Ennistymon and so is a WFD Registered Protected Area for Drinking Water, as is the Ballymacravan River • Ballymacraven_010 flows into and out of Lickeen Lake, in a westerly direction to the Inagh River Estuary Special Area of Conservation (SAC) • Decline in water quality of the two waterbodies within the area, both achieving either Poor or Bad status thus not meeting the Good status objectives
Shallee	<ul style="list-style-type: none"> • Within the area is the protected Natural 2000 Site Special Area of Conservation There is also a proposed Natural Heritage Area (pNHA) • Immediately downstream of the Shallee Area for Action is Ballyallia Lake Special Area of Conservation (SAC) and Special Protection Area (SPA) • The upper and mid sections of the river are good quality however the lower section has been fluctuating between moderate and poor due to sedimentation, increased nutrients, and organic pollution
St Clerans Stream	<ul style="list-style-type: none"> • There are several protected areas within or downstream of the catchment • A number of waterbodies within the catchment have declined and are not meeting their water quality and ecological standards
Woodford	<ul style="list-style-type: none"> • Deteriorated water quality • Importance as a brown trout tributary of Lough Derg • Strong community and angling groups in the area.

2.2.2 Flood Risk

Flood risk is considered as part of the options appraisal; however, many options are at a conceptual stage and there is insufficient information to differentiate between options on the basis of flood risk when design details, siting and routing are still to be determined. Both surface water and ground water flood risk will need to be considered further as part of the development of option design and for assessment at project level.

The Office of Public Works (OPW) has been implementing the European Communities (Assessment and Management of Flood Risks) Regulations 2010 mainly through the Catchment Flood Risk Assessment and Management (CFRAM) Programme, through which draft Flood Risk Management Plans have been developed. Approximately 300 'Areas for Further Assessment' have been established along with a range of measures to reduce or manage the flood risk within each catchment. CRFAMS mapping for all Areas for Further Assessment is available to view on the CFRAMS website (OPW, 2018). Figure 5.4 in the SEA Environmental Report (Appendix A) provides a summary of surface water and groundwater flood risk from the OPW CFRAMS data for the region including SAG.

For existing water infrastructure assets such as WTPs, flood risk vulnerability is considered in decisions on need to rationalise and decommission assets.

Any options which are progressed and require planning permission will require a Flood Risk Assessment to be completed in accordance with The Planning System and Flood Risk Management Guidelines for Planning Authorities (2009).

2.3 Climate Change

Ireland’s climate is heavily influenced by the Atlantic Ocean. Consequently, Ireland has a milder climate that has less extreme temperature variation compared with other countries at a similar latitude. The hills and mountains, many of which are near the coasts, provide shelter from strong winds and from the direct oceanic influence. Winters tend to be cool and windy, while summers are generally mild and less windy (Met Éireann, 2019).

In June 2019, the government agreed to support the adoption of a net zero target by 2050 at EU level, and to pursue a trajectory of emissions reduction nationally which is in line with reaching net zero in Ireland by 2050.

Section 15 of the Climate Action and Low Carbon Development Act 2015 (as amended in 2021) sets a new "national climate objective" for Ireland, which provides that:

"The State shall, so as to reduce the extent of further global warming, pursue and achieve, by no later than the end of the year 2050, the transition to a climate resilient, biodiversity rich, environmentally sustainable and climate neutral economy."

The amended Act requires public authorities, including Uisce Éireann, to, so far as practicable, perform their functions in a manner consistent with the furtherance of the national climate objective and the relevant national and sectoral plans and strategies to mitigate greenhouse gas emissions and adapt to the effects of climate change.

The Department of the Environment, Climate and Communications' Climate Action Plan (CAP) 2023 published December 2022, replacing CAP 2021, commits to achieving a 51% reduction in overall greenhouse gas emissions by 2030 and reaching net zero carbon emissions by 2050. The aim is for more sustainable growth and to create a resilient, vibrant and sustainable country. The CAP defines a roadmap to this goal and initiates a set of policy actions to achieve this. A detailed sectoral roadmap has also been set out, which is designed to deliver a cumulative reduction in emissions, over the period 2023 to 2030. CAP 2023 updates existing targets with renewable energy to provide 80% of electricity by 2030 and sets targets for sectors, including a target of 9 Gigawatts from onshore wind, 8 from solar, and at least 5 of offshore wind energy by 2030 (Department of the Environment, Climate and Communications, 2023).

In addition, Ireland has a sectoral climate adaptation plan for the 'Water Quality and Water Services Infrastructure' sector. A summary of the report’s findings is included in Table 2.8.

Table 2.8 Summary of Key Points from the 'Water Quality and Water Services Infrastructure' Sectoral Climate Change Plan (Department of Housing, Planning and Local Government, 2019b)

Summary	
Key Points	<ul style="list-style-type: none"> Protecting and improving water quality and improving water services infrastructure are major challenges in Ireland Climate change-induced threats will increase the scale of these challenges

Summary

	<ul style="list-style-type: none"> • Risks to water quality and water infrastructure arise from changing rainfall patterns and different annual temperature profiles. The frequency and intensity of storms and sea level rise are also considered
The challenges: Water services infrastructure	<ul style="list-style-type: none"> • Increased surface and sewer flooding leading to pollution, water and wastewater service interruptions • Reduced availability of water resources • Hot weather increasing the demand for water • Increased drawdown from reservoirs in the autumn/winter for flood capacity, leading to resource issues • Business continuity impacts or interruptions for water services providers
Primary adaptive measures	<ul style="list-style-type: none"> • Fully adopt the 'integrated catchment management' approach • Improve treatment capacity and network functions for water services infrastructure • Water resource planning and conservation – on both supply and demand sides • Include climate measures in monitoring programmes and research • Many of these proposed adaptation actions are already underway through existing and scheduled water sector plans and programmes

There are four aims that local authorities are required to include in their climate adaptation strategies (Department of Communications, Climate Action and Environment, 2018):

- **Mainstream Adaptation:** That climate change adaptation is a core consideration and is mainstreamed in all functions and activities across the local authority. In addition, ensure that local authority is well placed to benefit from economic development opportunities that may emerge due to a commitment to climate change adaptation and community resilience;
- **Informed decision making:** That effective and informed decision making is based on a reliable and robust evidence base of the key impacts, risks and vulnerabilities of the area. This will support long term financial planning, effective management of risks and help to prioritise actions;
- **Building Resilience:** That the needs of vulnerable communities are prioritised and addressed, encourage awareness to reduce and adapt to anticipated impacts of climate change, and promote a sustainable and robust action response; and
- **Capitalising on Opportunities:** Projected changes in climate may result in additional benefits and opportunities for the local area and these should be explored and capitalised upon to maximise the use of resources and influence positive behavioural changes.

In addition to these high-level aims, each local authority is required to identify the key risks to their area; these are provided in Table 2.9.

Table 2.9 Climate Change Risks Identified by Local Authorities in SAG

County	Key Risk Areas
Clare (Clare County Council, 2019)	<ul style="list-style-type: none"> • Fluvial (rivers)/ Pluvial (rainfall) Flooding • Coastal Flooding / Sea Level rise • Increased sea temperature • Storms • Protracted hot and cold weather events
Galway (Galway County Council, 2019)	<ul style="list-style-type: none"> • Extreme rainfall • Flooding • Strong winds • Higher temperatures and droughts • Lower temperatures and snowfall

Climate change is expected to influence weather conditions, such as frequency of droughts and extreme events such as storms, and is likely to affect habitats and species, water availability for supply and water demand and water quality. For SAG, not all supplies within the study area meet the required levels of reserve capacity. As evidenced in the 2018 and 2020 drought, there is the potential for this deficit to affect access to water in the future. This situation could further deteriorate over time due to climate change driven reductions in water resources.

A key aspect of Uisce Éireann’s strategy is to ‘Supply Smarter’, by improving the quality, resilience and security of their supply through infrastructural improvements. One of the high-level goals taken from the national level is building resilience, with water services being a key factor.

Supporting environmental resilience to climate change will also be an important consideration for the future with additional benefits for supply resilience.

2.4 Biodiversity, Flora and Fauna

2.4.1 Designated Sites

Within SAG there are a number of European, national and locally designated sites, including Special Protected Areas (SPAs), Special Areas of Conservation (SACs), National Parks, Nature Reserves, and proposed Natural Heritage Areas (see Table 2.10 and Figure 2.2 – note that an index key for Figure 2.2 is provided in Appendix C). The European sites (SPAs and SACs), and the potential impacts on them, are discussed in more detail in the NIS.

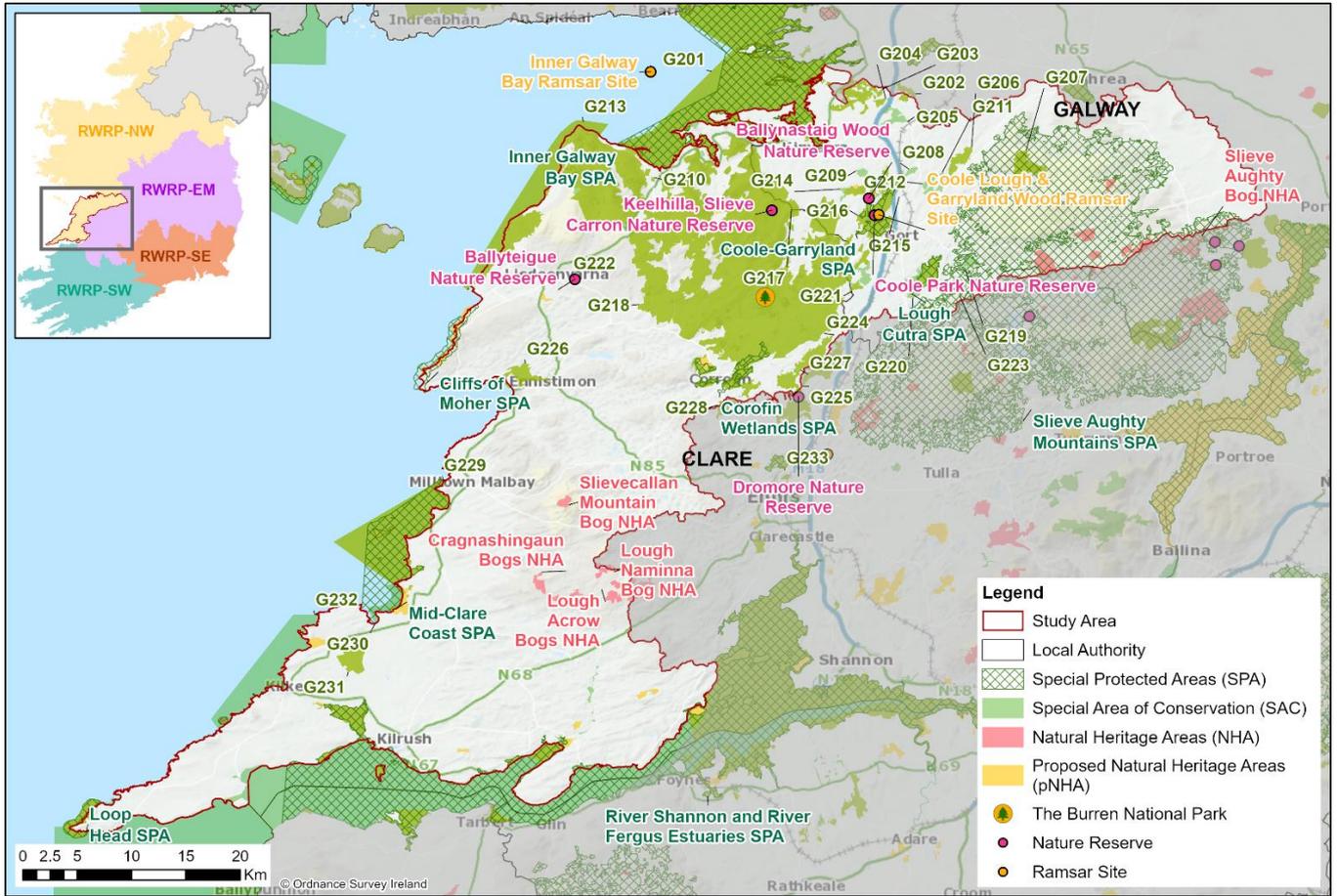


Figure 2.2 Designated Sites in SAG

Table 2.10 Designated Sites within SAG (NPWS, 2023)

Receptor	Name	Total Number
Special Protected Area (SPA)	Cliffs of Moher SPA	9
	Lough Cutra SPA	
	Coole-Garryland SPA	
	Loop Head SPA	
	Slieve Aughty Mountains SPA	
	Mid-Clare Coast SPA	
	Corofin Wetlands SPA	
	Inner Galway Bay SPA	
	River Shannon and River Fergus Estuaries SPA	
Special Area of Conservation (SAC)	Ballyoghan Lough SAC	33
	Black Head-Poulsallagh Complex SAC	
	Dromore Woods And Loughs SAC	
	Moneen Mountain SAC	
	Moyree River System SAC	

Receptor	Name	Total Number
	Caherglassaun Turlough SAC	
	Coole-Garryland Complex SAC	
	Galway Bay Complex SAC	
	Peterswell Turlough SAC	
	Lough Fingall Complex SAC	
	Carrowmore Point to Spanish Point and Islands SAC	
	Kiltiernan Turlough SAC	
	Termon Lough SAC	
	Sonnagh Bog SAC	
	East Burren Complex SAC	
	Lough Coy SAC	
	Lower River Shannon SAC	
	Tullaheer Lough And Bog SAC	
	Ballyteige (Clare) SAC	
	Kiltartan Cave (Coole) SAC	
	Gortacarnaun Wood SAC	
	Drummin Wood SAC	
	Carrowbaun, Newhall and Ballylee Turloughs SAC	
	Cahermore Turlough SAC	
	Ballycullinan Lake SAC	
	Ballinduff Turlough SAC	
	Lough Cutra SAC	
	Castletaylor Complex SAC	
	Kilkee Reefs SAC	
	Inagh River Estuary SAC	
	Ballyvaughan Turlough SAC	
	Ardrahan Grassland SAC	
	Carrowmore Dunes SAC	
Ramsar Sites	Coole Lough & Garryland Wood	2
	Inner Galway Bay	
Nature Reserves	Ballyteigue Nature Reserve	5
	Ballynastaig Wood Nature Reserve	

Receptor	Name	Total Number
	Keelhillia (Slieve Carron) Nature Reserve	
	Coole Park Nature Reserve	
	Dromore Nature Reserve	
National Parks	Burren National Park	1
Natural Heritage Areas (NHAs)	Slieve Aughty Bog NHA	5
	Lough Naminna Bog NHA	
	Slievecallan Mountain Bog NHA	
	Cragnashingaun Bogs NHA	
	Lough Acrow Bogs NHA	
Proposed Natural Heritage Areas (pNHAs)	See Figure 2.2	41

2.4.2 Habitats

Table 2.11 lists the percentage of the study area, and the number of hectares, covered by each habitat within SAG; as reported in the Corine land use dataset¹.

Table 2.11 Habitat Areas for SAG (EPA, 2018)

Habitat	Ha	% of Study Area
Agricultural Land		
Pastures	118,925	49.79%
Land principally occupied by agriculture, with significant areas of natural vegetation	34,159	14.30%
Non-irrigated arable land	54	0.02%
Complex cultivation patterns	45	0.02%
Natural Habitats		
Peat bogs	17,901	7.49%
Bare rocks	11,503	4.82%
Sparsely vegetated areas	7,718	3.23%
Natural grasslands	6,529	2.73%
Water bodies	1,615	0.68%
Inland marshes	1,402	0.59%

¹ Since the land cover analysis was undertaken for the NWRP, OSI has published the National Land Cover Map. The analysis will be updated as part of the data review process as outlined in section 9 of the draft RWRP-SE. The National Land Cover data is identified as a source of baseline information in the SEA monitoring plan to be used for project development and assessments going forward

Habitat	Ha	% of Study Area
Salt marshes	653	0.27%
Intertidal flats	518	0.22%
Sea and ocean	369	0.15%
Estuaries	236	0.10%
Beaches, dunes, sands	140	0.06%
Moors and heathland	110	0.05%
Coastal lagoons	2	0.001%
Forest		
Coniferous forest	16,972	7.11%
Transitional woodland-shrub	12,860	5.38%
Broad-leaved forest	3,068	1.28%
Mixed forest	2,494	1.04%

Particularly relevant habitats that depend on the water quality and/or quantity in SAG are:

- Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.;
- Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation;
- Bog habitats – Active raised bogs, degraded raised bogs still capable of natural regeneration, *Rhynchosporion* depressions, transition mires and quaking bog habitats;
- Alkaline fens;
- Groundwater dependant terrestrial habitats, such as petrifying springs with tufa formation and blanket bogs;
- Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*;
- Turlough ecosystems;
- Coastal lagoons;
- *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*); and
- Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho–Batrachion* vegetation.

2.4.3 Species

The key species (Nelson et al, 2019) of concern within SAG include:

- Otter (*Lutra lutra*);
- Bat species – Lesser Horseshoe Bat (*Rhinolophus hipposideros*);
- Fish species - Atlantic Salmon (*Salmo salar*), Lamprey species;
- Fresh-water pearl mussel (*Margaritifera margaritifera*);
- Marsh Fritillary (*Euphydryas aurinia*);
- Narrow-mouthed Whorl Snail (*Vertigo angustior*);
- Petalwort (*Petalophyllum ralfsii*);
- ‘Qualifying interest’ bird species e.g. merlin (*Falco columbarius*), chough (*Pyrrhocorax pyrrhocorax*) and hen harrier (*Circus cyaneus*); and

- Waterbirds of 'qualifying interest' e.g. Brent goose (*Branta bernicla*), whooper swan (*Cygnus cygnus*) and winter migratory waders.

The key invasive species to consider (National Biodiversity Data Centre, 2021) for developing options within SAG include:

Animals:

- A colonial sea squirt (*Didemnum* spp.);
- Brown rat (*Rattus norvegicus*);
- Canada goose (*Branta canadensis*);
- Common carp (*Cyprinus carpio*);
- Greylag goose (*Anser anser*);
- Roach (*Rutilus rutilus*);
- Ruddy duck (*Oxyura jamaicensis*);
- Stalked/leathery sea squirt (*Styela clava*); and
- Zebra mussel (*Dreissena polymorpha*).

Plants:

- Brazilian giant-rhubarb (*Gunnera manicata*);
- Cord-grasses (*Spartina* spp.);
- Giant hogweed (*Heracleum mantegazzianum*);
- Giant knotweed (*Fallopia sachalinensis*);
- Giant-rhubarb (*Gunnera tinctoria*);
- Himalayan/Indian balsam (*Impatiens glandulifera*);
- Himalayan knotweed (*Persicaria wallichii*);
- Japanese knotweed (*Fallopia japonica*);
- Rhododendron (*Rhododendron ponticum*);
- Sea-buckthorn (*Hippophae rhamnoides*);
- Spanish bluebell (*Hyacinthoides hispanica*);
- Three-cornered leek (*Allium triquetrum*);
- Waterweeds (*Elodea* spp.); and
- Wireweed (*Sargassum muticum*).

2.5 Material Assets

Material assets are considered to be the natural and built assets (non-cultural assets) required to enable a society to function as a place to live and work, in giving them material value.

Some of the natural assets within SAG are listed in Table 2.12, such as agricultural land, forest and bog areas.

Built assets include transport and communications infrastructure, and other developed areas, including existing water supply infrastructure (see Figure 2.1 and Figure 2.3). These assets all need to be taken into account in new water resource developments.

In addition, water resources and water quality are influenced by urban, agricultural and forestry activity within river and groundwater catchments. This can affect the availability and quality of water for supply.

Uisce Éireann has 10 WTPs in SAG, meeting the average demand of 23.7 MI/d in 2019.

There are no canals, however, there is one port of regional significance, namely Moneypoint port in SAG. There is one airport of local significance, namely Kilrush Airport. Other significant transport infrastructure includes the main road network (particularly the M18, N66, N67, N68, and N85).

Any new infrastructure considered for SAG will need to take existing as well as planned land zoning and local development into consideration.

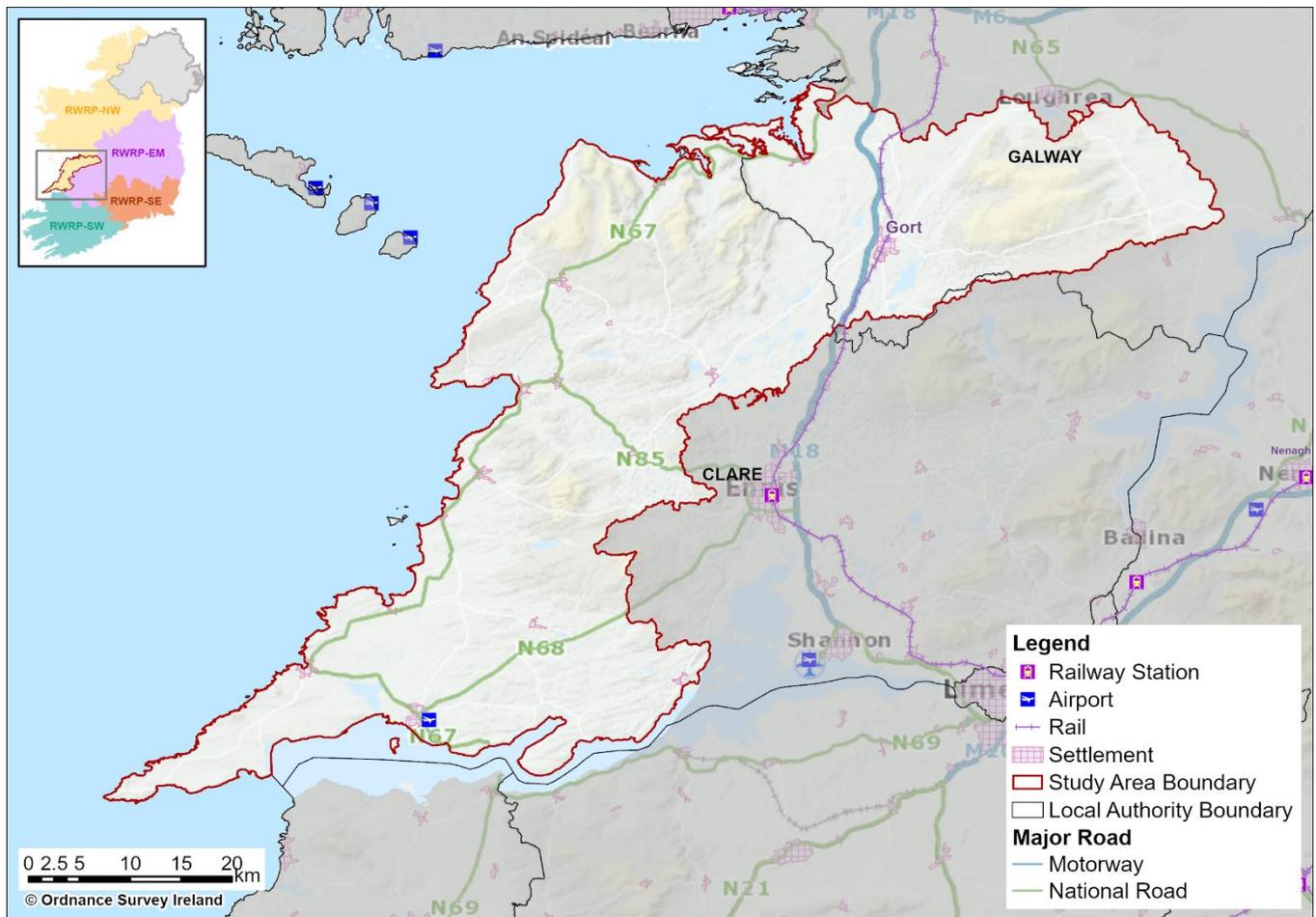


Figure 2.3 Transport Infrastructure in SAG

Table 2.12 Land Use within SAG (EPA, 2018)²

Land use	Ha	% of Study Area	Comparison to Overall North West Region %
Agriculture	153,184	64.14%	57.28%
Urban	1,471	0.62%	1.18%
Natural Habitats	48,696	20.39%	31.76%
Forest	35,393	14.82%	9.47%
Industry	28	0.01%	0.07%
Other	71	0.03%	0.24%

² Since the land cover analysis was undertaken for the NWRP, OSI has published the National Land Cover Map. The analysis will be updated as part of the data review process as outlined in section 9 of the draft RWRP-SE. The National Land Cover data is identified as a source of baseline information in the SEA monitoring plan to be used for project development and assessments going forward.

Proposals for other strategic developments within SAG are considered for the assessment. These are primarily identified from the National Planning Framework and from myProjectIreland, where any relevant projects for the study area are included (other local developments may also be included that are not listed in myProjectIreland if they are considered to be of an appropriate scale). Small scale housing and business development are not considered for this plan level assessment.

Table 2.13 gives an overview of the project developments which are available from myProjectIreland (2022) for SAG³. The myProjectIreland map focuses mainly on major projects with costs over €20 million. The map also includes all projects supported to date under the Government’s Urban and Rural Regeneration Funds and reflects the full portfolio of projects in the pipeline at present.

Table 2.13 Proposed New Developments

Development		
Ennis to Ennistymon Greenway	Inis Cealtra Island	National Parks - Location #7 of 8 - Keelhillia
Ennistymon Innovation Centre	Ireland’s National Parks - Location #5 of 6 - Corofin	Vandeleur Estate
Ennistymon School Campus - 20245S & 91518F	Kinvara Boardwalk and Walkway	West Clare Railway Greenway - Section 1 Kilkee to Kilrush
Ennistymon to Milltown Malbay Greenway	Lahinch Wastewater Treatment Plant	Wild Atlantic Way - Clare
Gort Inse Guaire	Milltown Malbay to Moyasta Greenway	National Parks - Location #7 of 8 - Keelhillia
Gort Lowlands Flood Relief Scheme	National Cycle Network - Galway to Athlone Cycleway	Vandeleur Estate

2.6 Landscape and Visual Amenity

The National Landscape Strategy 2015-2025 is in the process of being implemented and will be Ireland’s vehicle for complying with the EU Landscape Convention. Landscape assessment guidance is also available from the local authorities. This will be taken into account when identifying landscape character areas and protected areas at the project level in the future. Table 2.14 shows the sensitivity and value of the Landscape Character Areas (LCAs) within each of the counties listed within the study area⁴.

The value of the landscape in SAG is reflected in baseline data sections 2.1.3 (Tourism and Recreation), 2.4 (Biodiversity, Flora and Fauna) and 2.8 (Cultural Heritage).

Water supply infrastructure development will need to take account of sensitive landscapes and views. This will need to include culturally important areas, townscapes, natural areas and areas and views of importance for tourism and recreation.

³ Note that the myProjectIreland dataset was taken at a fixed point in time to allow for assessment of cumulative effects. The date for SAG being the 15/04/22.

⁴ As with all the baseline information, the LCA information will be updated as part of regular reviews

Table 2.14 Value and Sensitivity of Landscape Character Areas in the Counties of SAG (Ordnance Survey Ireland. n.d.)

Landscape Character Area	Sensitivity	Value
County: Clare (Clare County Council, 2004)		
Burren Uplands	High	-
Low Burren	High	-
Cliffs of Moher and Lahinch	High	-
Fergus Loughlands	-	-
Slieve Aughty Uplands	Medium	-
Lough Graney	High	-
Lough Derg Basin	High	-
Slieve Bernagh Uplands	Low	-
River Shannon Farmlands	Low	-
Sixmilebridge Farmlands	Low	-
East Clare Loughlands	Medium	-
Tulla Drumlin Farmland	High	-
Ennis Drumlin Farmland	Low	-
Fergus Estuary	High	-
Kilnamona High Drumlin Farmland	Low	-
Cullenagh River Farmlands	-	-
Slieve Callan Uplands	Medium	-
Shannon Estuary Farmlands	-	-
Kilmihil Farmlands	Low	-
Malbay Coastal Farmland	High	-
Loop Head Peninsula	Medium	-
County: Galway (Galway County Council, 2015)		
Northeast Galway (Balinasloe to Ballymoe)	Low with pockets of Moderate	Low
Shannon and Suck River Valley between Portumna and Ballinasloe	Special	Medium
East central Galway (Athenry, Ballinasloe to Portumna)	Low with pockets of Moderate	Low
Southeast Galway (Clarinbridge to Gort)	Moderate with pockets of High	Medium

Landscape Character Area	Sensitivity	Value
Northeast Galway (Tuam environs)	Low with pockets of Moderate	Low
Slieve Aughty Mountains	High	Medium
Northwest Lough Derg	Special	Medium
Lower Burren (Co. Galway portion)	Special with pockets of Moderate	Outstanding
Inveran to Galway City coastline	High with a parallel strip of Special	High
East Connemara Mountains (Moycullen, Oughterard to Loughanillaun)	High with pockets of Special	High
Lough Corrib and environs	Unique with pockets of High and Special	Outstanding
South foothills of east Connemara Mountains (Ouranavilla Tully to Tonabrocky)	Approximately half Special and half High	Medium (pockets of varying landscape value rating)
East Galway Bay (Oranmore to Kinvarra Bay and inland to N18 road)	High with a coastal edge of Special	High
West Connemara	Special	Outstanding
Lettermore and Gorumna Islands	High with a coastal edge of Special	High
West foothills of east Connemara Mountains	High	High
Carraroe (Cashla Bay to Glencoh)	High with a coastal edge of Special	High
Bertraghboy bay and eastern banks	Special	High
West Coast (Gorteen bay to Clifden)	Special	Outstanding
West Coast (Clifden to mouth of Killary Harbour)	High with a coastal edge of Special	Outstanding
Killary Harbour and southern banks	Unique with pockets of Special	Outstanding
Connemara National Park (including Lough Fee, Lough Inagh and Derryclare Lough)	Unique	Outstanding
Joyces Country (including Lehanagh Loughs and south Lough Mask)	Unique with pockets of Special	Outstanding
Aran Islands	Unique with pockets of Special	Outstanding
Lough Rea	Special	High

2.6.1 Seascape

The Regional Seascape Character Assessment for Ireland (2020) presents the Regional Seascape Character Areas (SCAs) for the entire Republic of Ireland. An SCA is defined as “*an area of sea, coastline and land, as perceived by people, whose character results from the actions and interactions of land with sea, by natural and/or human factors*”. The assessment identifies three SCAs in SAG; Atlantic Galway Bay and Islands, Atlantic Clare Cliffs, and Shannon Estuary and Tralee Bay.

2.7 Air Quality and Noise

2.7.1 Air Quality

Air quality is monitored and managed using Air Quality Zones and air monitoring sites, the air quality index rating of the area within SAG is rated as ‘good’.

In general, the water industry is not a major contributor to air quality issues, although there is potential for local pollution through Uisce Éireann vehicles, generator plants and drinking water residuals treatment facilities. There is a requirement to comply with air pollution regulations and also to identify potential opportunities for reducing emissions. Air quality will be a consideration at the project level, for example, through scheme construction management and scheme design and operation.

2.7.2 Noise

The main areas that experience noise pollution are likely to be areas along the main roads, particularly around the M18, N66, N67, N68, and N85.

Water infrastructure development is not expected to add significantly to noise pollution. Construction noise will be considered through scheme construction management and design for local receptors and for sensitive receptors in close proximity. Noise pollution will also be managed through the planning process with conditions included in planning permissions.

2.8 Cultural Heritage

Within SAG, there are numerous designated and non-designated cultural heritage assets inventoried in the Record of Monuments and Places, the Sites and Monuments Record, the Record of Protected Structures, and the National Inventory of Architectural Heritage (NIAH) (see Table 2.15).

Figure 2.4 shows the location of the individual cultural heritage records from the National Monuments Service and the NIAH. Given the number of small sites, these can be better viewed on the Department of Culture, Heritage and the Gaeltacht’s (2020) ‘Historic Environment Viewer’ website.

There are also potentially unknown, undesignated archaeological and architectural remains throughout Ireland. Water supply can affect cultural heritage through, direct loss or construction of infrastructure involving disturbance of soils, above ground structures close to existing heritage sites affecting setting or changes due abstraction changing drainage and affecting interests within wetland sites.

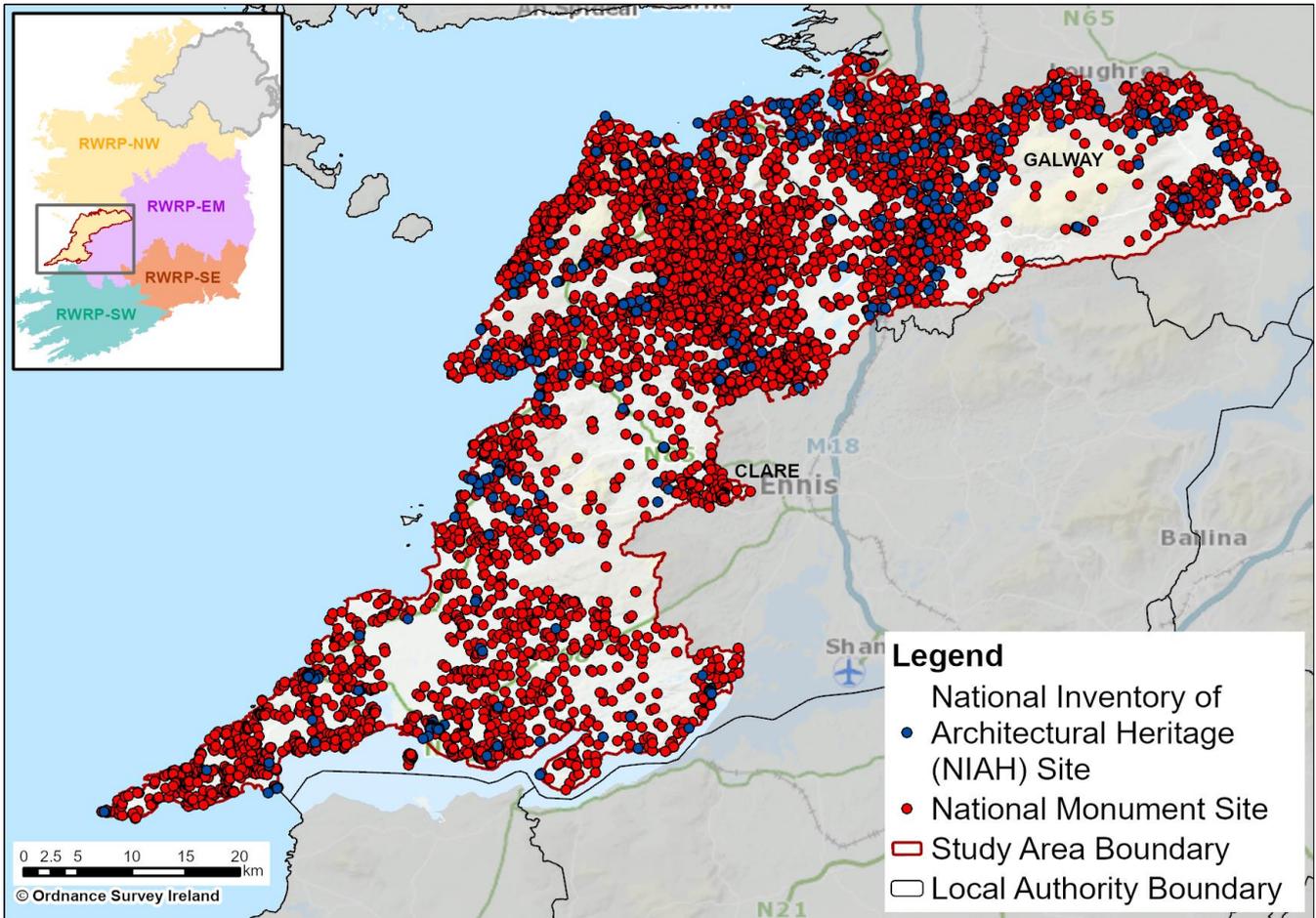


Figure 2.4 SAG Cultural Heritage Assets

Table 2.15 Cultural Heritage Assets within SAG

Assets	Total Number
National Monuments Service Sites	6,452
National Inventory of Architectural Heritage Sites	445
Sites and Monuments Record Zones	3,263

2.9 Geology and Soils

Table 2.12 lists the land uses within SAG. SAG predominantly has a peat soil type with areas of fine loamy soil (EPA, 2019).

The geology and soils in the environment are fundamental for the quality and quantity of water in the area through differences in drainage, chemical composition, filtration and soil type, topography and resultant land use. Land use has significant impact on water quantity and quality. Groundwater supply depends on the type of aquifers in the area, as they determine the system’s ability to store and transmit groundwater. The regionally and locally important aquifers with resource potential for SAG are shown in Figure 2.5.

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 groundwater potential as the limestones.

The predominant aquifer type of the area is made up of poorly productive bedrock (73%), with the remainder consisting of karstic productive aquifers. There are no major productive fissured or sand and gravel aquifers mapped in SAG. The karst forms a key regionally important aquifer in some areas, most notably around the Burren, an area covering the limestone uplands of northwesternnorth-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.

Important geological and geomorphological sites could be identified for protection as NHAs, however, until designation is confirmed, these sites are classified as Irish Geological Heritage Sites (IGHS). There are over 900 IGHS identified around Ireland, 50 of which have the potential to constrain water resource options in SAG.

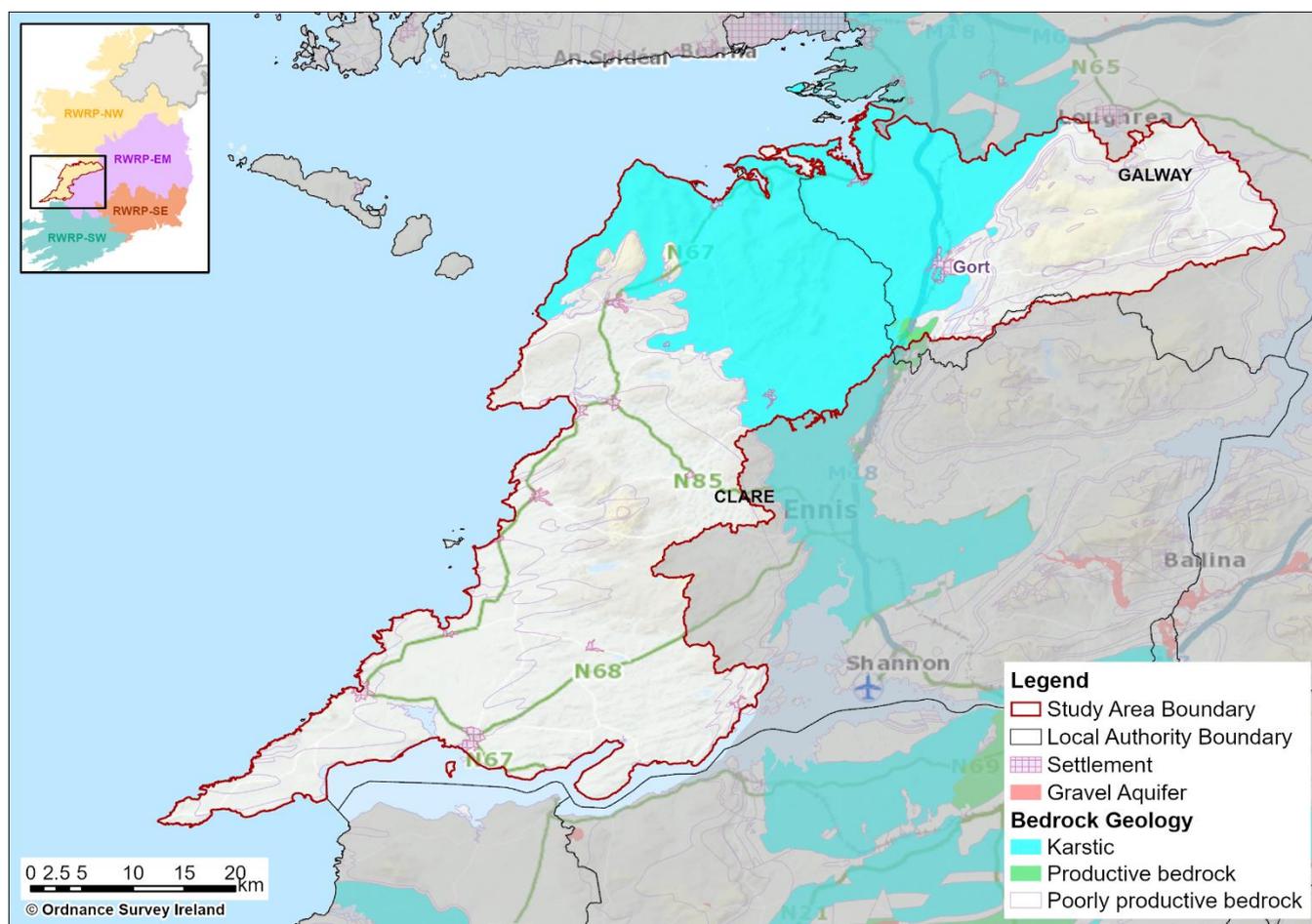


Figure 2.5 SAG Hydrogeology

2.10 Period

Summary of Key Issues and Trends over the Plan

All aspects of the environment will need to be considered as individual schemes are taken forward for further design and implementation. However, the key issues relevant for strategic water planning identified within SAG are listed in Table 2.16.

Table 2.16 Summary of Key Issues and Trends Over the Plan Period

SEA Topic	Issues and Opportunities	Interrelated Topics
Population, Economy, Tourism and Recreation, and Human Health	<p>Issues: Increasing population and the increased stress of climate change on water quality and water resources could affect health and well-being.</p> <p>Opportunities: Uisce Éireann will put in place plans to assess water quality and measures to address risks as part of the Regional Plan</p> <p>Uisce Éireann has ongoing activities to improve the Supply Demand Balance in SAG, including, leakage management and water conservation measures.</p> <p>Raising awareness of the importance of water conservation and efficiency measures, and the value of the environment for health and wellbeing, can play an important part in water planning. Valuing access to environment for recreation.</p>	Climate change, biodiversity, water environment, material assets and landscape and visual amenity
Water Environment	<p>Issues: The proposed abstraction licensing, aligned to WFD requirements, will require many current abstractions to be licensed and may limit future abstraction or involve significant conditions being imposed at associated sites. For SAG, some of the existing abstractions may not meet sustainability guidelines in the medium term; specifically, during drought periods. On an interim basis, Uisce Éireann has developed an initial conservative assessment based on available information (see SAG Technical Report). This has been used to inform options identification and appraisal.</p> <p>Uisce Éireann will update its sustainability analysis and impact on their baseline Supply Demand Balance (SDB) calculations when regulatory assessment for the new legislation is undertaken.</p> <p>Opportunities: To take account of identified pressure on the water environment in the selection of solutions for SAG.</p>	Biodiversity and climate change
Biodiversity, Flora and Fauna	<p>Issues: SAG has several designated Special Areas of Conservation (SACs), especially in the north, with the largest designation being the East Burren Complex SAC</p>	Water resources, water quality and climate change

SEA Topic	Issues and Opportunities	Interrelated Topics
	<p>which covers an area across both the Shannon Estuary North and Galway Bay South East catchments.</p> <p>It is considered especially important to avoid the loss of irreplaceable or rare habitats and increasing pressure on vulnerable species; potentially through direct land take or indirect such as through increased abstraction pressure</p>	
Material Assets	<p>Issues: WTP assets and network infrastructure requiring improvement or replacement</p> <p>Opportunities: Improvements to support reliability of access to good quality water.</p>	Health and wellbeing
Landscape and Visual Amenity	<p>Issues: Potential for climate change to affect land use and habitats and influencing landscape quality and amenity.</p>	Biodiversity and geology and soils, climate change, health and wellbeing
Air Quality and Noise	<p>No specific issues identified for the baseline for SAG.</p>	Health and wellbeing
Climate Change	<p>Issues: Climate change issues regarding sea level rise, flooding, extreme weather events and changes in seasonal weather patterns. Climate change has been taken into account in supply forecasts and additional risks to infrastructure and operations will need to be taken into account in planning for drought and freeze/thaw events; and in detailed scheme design and network operation.</p> <p>Opportunities: Additional management to minimise impact on supply and the environment, vulnerability to climate change and drought is required.</p>	Biodiversity and water environment
Cultural Heritage	<p>Issues: Known cultural heritage and archaeological assets and potential unknown archaeological assets.</p>	Health and wellbeing
Geology and Soils	<p>Issues: General need for good soil conservation and retention of nutrients and carbon in soil resources</p> <p>Opportunities: Potential benefits from soil conservation for biodiversity, water quality and water retention also.</p>	Biodiversity, water quality, landscape and climate change
Additional interrelated aspects	<p>Issues: Poor water quality requiring additional water treatment and affecting aquatic biodiversity.</p> <p>Opportunities: Potential for catchment management initiatives leading to habitat, water retention, water quality enhancement and soil quality have the potential to provide wider benefits for environmental resilience and water supply; although this has not been specifically studied in this study area.</p>	

3

Environmental Assessment – Options Appraisal

3 Environmental Assessment – Options Appraisal

This chapter provides a summary of the environmental assessment of options considered in the study area, including the option identification and screening process, and assessment of options used in approach development.

3.1 Overview

Uisce Éireann applied its Options Assessment Methodology from the Framework Plan to identify potential solutions to meet the needs identified in the SAG WRZs.

The general methodology, and how environmental assessment is included, is outlined in the SEA Environmental Report prepared in relation to the Framework Plan. That report identifies SEA objectives and assessment criteria and provides a framework for integrating the environmental assessment of options and combinations of options into a phased appraisal process which also takes account of other criteria such as feasibility, deliverability, resilience and cost.

The Options Assessment Methodology covers eight stages. Stages 1 and 2 are covered through the needs and baseline assessments addressed in chapter 2 of this review. The key stages considered in this chapter for SAG are Stages 3-6:

- Stage 3 Unconstrained options – to identify all the potential options to be considered to resolve water quality or quantity requirements;
- Stage 4 Coarse screening – to assess the unconstrained options and eliminate any that will not be viable and collect information to inform the next stage;
- Stage 5 Fine screening – options assessment and scoring against the key criteria to verify option feasibility and understand key risks and constraints; and
- Stage 6 Feasible option list – further option development encompassing costing and SEA assessment of options.

3.2 Stage 3: Unconstrained Options

Environmental and social assessment criteria are included at the earliest stages of the screening process. At the outset of the process, some fundamental rules are applied as part of option identification. For example, inter-catchment raw water transfers are excluded due to the high risk of transferring invasive non-native species (INNS) between catchments and potential conflict with WFD objectives.

WFD objectives have also been a key consideration at this stage through an internal sustainable abstraction risk review. This was a specialist review of groundwater bodies and surface water catchments that was undertaken as part of the option identification stage. UK Technical Advisory Group on the Water Framework Directive (UKTAG) guidance (UKTAG, 2013) on baseflows have been used for the purposes of this plan until Ireland specific standards come into place.

The application of these conservative abstraction standards to new options ensures that any new or increased abstractions from rivers are likely to support conservation objectives for the most sensitive environmental sites. For surface waterbodies, the allowable abstraction standard of 10% of Q95 has been applied, with the exception of waterbodies requiring 'High' status where a higher threshold of 5% of Q95 has been applied. Allowable abstraction standards for lakes are set at 5 or 10% of Q50 in line with this guidance (the NIS prepared in relation to the Framework Plan, sets out the approach in relation to Appropriate Assessment).

As mentioned previously, these are estimates applied for the purpose of strategic planning and are based on a conservative approach to what the new regulatory regime might require. The EPA will be the authority adjudicating the sustainability or otherwise of abstractions, once the regulations and guidelines for the new abstraction regime have been developed there will be more detailed site specific information.

For groundwater sources, the assessment includes a high level assessment taking account of a range of information available for existing site and in many cases limited information for new abstraction options. This desktop assessment undertaken aimed to identify potential yield and the impact of the yield, including the steps described below.

3.2.1 Existing Groundwater Abstractions

Site specific data is taken into account where possible in assessing potential sustainable yield for increasing abstraction at existing sources. 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.

3.2.2 New Groundwater Abstractions

The Zone of Contribution (ZOC), the land area that contributes water to the well or spring, is defined and used to calculate a preliminary water balance for the source using the average abstraction rate and the annual average recharge rate as estimated from the Geological Survey Ireland (GSI) recharge maps. The water balance estimates the area needed to supply the yield and is then compared to the delineated ZOC. A WFD >30% recharge is applied as a guide for assessment in the fine screening assessment but is recognised to apply more to catchment scale abstraction impact assessments so at a very local abstraction scale it can overestimate the impacts for some sources.

Additional assessment is undertaken on potential preferred groundwater options to inform the SEA, taking into account site specific information and consideration of likely impacts on WFD and cumulative effects with existing groundwater abstractions.

Further work will need to be undertaken for groundwater options taken forward as part of abstraction licensing and the development of Drinking Water Safety Plans. This will include establishing detailed geoscientifically robust zones of contribution in line with GSI's Groundwater Protection Schemes (Department of Environment, Community and Local Government, GSI and EPA, 1999) and the EPA Advice Note Number 7, Source Protection and Catchment Management (EPA, 2013). This work will provide in-depth hydrogeological information on the source that will establish reliable and sustainable yields.

3.2.3 Sustainable Abstraction in Options Assessment

At the end of 2022, the government passed the Water Environment (Abstractions and Associated Impoundments) Act, 2022 (the Abstractions Act) which will ensure that national abstractions align with the requirements of the Water Framework Directive. The Abstractions Act has not yet commenced and the associated regulations and guidelines which will further detail the types of assessment and national methodology to be used have not yet been published and are not yet in place. Therefore, Uisce Éireann does not have full visibility of the future regulatory regime. As the objective of the plan is to achieve safe,

secure, reliable and sustainable supplies, any new abstractions proposed to be developed by Uisce Éireann 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 outlined above, Uisce Éireann developed an initial list of unconstrained options for new supplies, increases and upgrades to existing supplies. An unconstrained options review workshop was held with Uisce Éireann’s Local Authority Water Services Partners to identify any additional unconstrained options that might be available based on local knowledge.

3.3 Stage 4: Coarse Screening

A total of 80 unconstrained options were identified for SAG and subjected to coarse screening. The coarse screening process assessed the options against the criteria outlined in Table 3.1. This process is summarised in chapter 6 of the SEA Environmental Report for the RWRP-NW. The process allows the assessment of the unconstrained options to eliminate any that will not be viable. The focus at this stage is on options that would be difficult to mitigate, those with likely significant effects on European or nationally important sites, or options likely to lead to deterioration of waterbody WFD status.

Table 3.1 Coarse Screening Assessment Criteria

Criteria	Unconstrained Option Assessment Questions	
Resilience	Q1	Does the option address the supply-demand problem?
Deliverability and Flexibility	Q2	Is the option technically feasible?
	Q3	Can the risks and uncertainties associated with the option be mitigated to avoid failure of the option?
Sustainability (Environmental and Social Impacts)	Q4	Can significant impacts on known high level environmental constraints for example European/ international or nationally designated biodiversity, landscape, cultural heritage sites, WFD objectives or community assets, be avoided or minimised? If not, is mitigation likely to be possible?

Of the 80 unconstrained options, 44 were rejected after being analysed against the coarse screening criteria of resilience, deliverability and environment.

Sustainability reasons for rejecting options were identified for 19 options. Table 3.2 provides the options that were rejected on a sustainability basis and not considered suitable to address the deficit for the WRZs located in SAG. The full rejection register, including those options rejected for other reasons, in both the coarse and fine screening (where applicable) is provided in Annex B of the SAG Technical Report.

Table 3.2 Coarse Screening Rejection Register

Option Reference	Option Description	Rejection Reasoning
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. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.
SAG-10	Rationalise Killadysart WRZ to West Clare New Doolough WTP, abandon existing WTP	

Option Reference	Option Description	Rejection Reasoning	
SAG-14	Bring back to production abandoned GW sources		
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)		
SAG-25	New GW abstraction and new WTP to supply deficit		
SAG-65	New GW abstraction and new WTP to supply deficit- location TBC		
SAG-66			
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. Therefore this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	
SAG-08	Interconnect Killadysart PWS and Lissycasey GWS and supply partial deficit from Liscasey GWS (network upgrades required)		
SAG-11	Increase SW abstraction from Lickeen Lake and upgrade existing Ballymacraven WTP to partly supply deficit		
SAG-28	Recommission abandoned SW source - Kilkee Impoundment		
SAG-53	Rationalise Kinvara to Ennistymon		
SAG-64	Increase SW abstraction from Lickeen Lake and upgrade existing Ballymacraven WTP to partly supply deficit		
SAG-67	Interconnect Gort and Seehan GWS and supply deficit from Seehan GWS		
SAG-68	Interconnect Gort and Roo GWS and supply deficit from Roo GWS		
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. As a result, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.
SAG-44	Rationalise Gort WRZ to Kinvara WRZ (new source required)		The desktop assessments undertaken indicate that there will be issues regarding

Option Reference	Option Description	Rejection Reasoning
SAG-73	Increase existing GW abstraction from Kinvara Well (karstic bedrock - Kinvara-Gort groundwater body) - saline intrusion	salinity and siting new wells will be difficult. As a result, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.
SAG-41	Interconnect Gort and Coole GWS and supply deficit from Coole GWS	This is not a sustainable long-term source to supply Gort. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.

3.4 Stage 5: Fine Screening

A total of 36 options passed the coarse screening stage; these options were subjected to further consideration as part of a multi-criteria assessment (MCA) at the fine screening stage.

The objective of the MCA and the fine screening process is to determine the potential benefits and impacts of the options across a range of key criteria. The MCA process allows a combination of issues to be considered together. This process can help indicate if one option will be overall more cost effective, environmentally sustainable, progressible, resilient or feasible when compared with other options. This process requires a desk-based analysis of the options and their potential benefits and impacts against the key criteria.

The environmental criteria are based on the SEA objectives in the form of screening questions. These questions have been developed to allow the performance of each option to be assessed against the SEA objectives. The list of questions developed to assess the environmental and social effects of the options and guidance on the MCA scoring for the fine screening is provided in the SEA Environmental Report Appendix B.

Summaries of the environmental assessment for options that passed the fine screening stage are grouped by option type and are included in Appendix A. These summaries combine the assessments against individual criteria to give an overall environmental topic score; this overall score is based on the worst score across each of the topic's criteria.

This is a high-level risk based assessment intended to support a comparison of options. Likely beneficial effects are represented by positive scores and likely adverse effects are represented by negative scores based on a seven-point scale.

No further options were rejected at fine screening in SAG.

3.5 Stage 6: Feasible Options List

A total of 36 options were included as feasible options and were taken forward for Approach Development. The next step was to use the information collected for the fine screening assessment to inform the development of approaches to resolve the SDB deficit within each WRZ and across the study area.

Details of the feasible options identified for this study area, and the Preferred Approach selected, are provided in the SAG Technical Report.

4

Environmental Assessment – Approach Development

4 Environmental Assessment – Approach Development

This chapter describes how the SEA was integrated into the development of potential approaches/combinations for meeting the SDB deficit at the WRZ level, then at the study area level, and how alternative approaches were considered and assessed.

4.1 Introduction to Approach Development

After the feasible options for the study area were identified the next step was to assess a range of possible SA combinations to resolve the supply deficit within each WRZ and across the study area as a whole. This chapter addresses Stage 7 in the assessment methodology.

An SA combination is a way of configuring an option, or options, to meet either an SDB deficit or water quality requirements. As set out in the Framework Plan, Uisce Éireann considers six SA approaches, which are the combinations rated as the best within the six categories summarised in Table 4.1. This process contributes to assessment of alternatives to meet plan objectives. Consideration of reasonable alternatives is an important part of meeting SEA regulatory requirements.

Table 4.1 The Six SA Approaches

SA Approaches Tested	Description	Policy Driver
Least Cost (LCo)	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) (BA)	Lowest score against the European Sites (Biodiversity) sub criteria question based on assessing the option as having either no LSEs, LSEs that can be addressed with general/standard mitigation measures or LSEs that may be more difficult to mitigate. For options scoring -3, potential alternative higher scoring options are sought where possible.	Habitats Directive
Quickest Delivery (QD)	Based on an estimate of the time taken to bring an option into operation (including typical feasibility, consent, construction and commissioning durations) as identified at Fine Screening. This is particularly relevant where an option might be required to address an urgent Public Health issue (potential benefit for SEA Objective on population and public health).	Statutory Obligations under the Water Supply Act and Drinking Water Regulations
Best Environmental (BE)	This is the option or combination of options with the highest total score across the SEA objective criteria MCA questions. In addition, high risk -3 issues are considered against individual criteria focusing on long term operational effects.	SEA Directive and WFD
Most Resilient (MR)	This is the option or combination of options with the highest total score against the resilience criteria. (Link	National Adaptation Plan

SA Approaches Tested	Description	Policy Driver
	to SEA Objective for climate change adaptation for environment)	
Lowest Carbon (LC)	This is the option or combination of options with the lowest embodied and operational carbon cost	Climate Change Strategy

These six SA approaches focus on different plan or environmental objectives. Three of the six SA approaches address environmental objectives;

- Best AA;
- Best Environmental; and
- Lowest Carbon approaches.

These are all focused on environmental criteria and are based on the environmental information and scoring undertaken for the MCA.

4.2 Stage 7: Approach Development Process

There are three stages in the Approach Development Process, these are summarised below and provided in more detail in section 7 of the RWRP-NW:

The **First Stage** is the Approach Appraisal at WRZ level. This stage assesses the feasible options for each WRZ and identifies the best performing option within each of the six Approach Types for the relevant WRZ. For example, the option or combination of options that would be classified as the Lowest Carbon Approach, would be that with the lowest carbon cost, based on comparative outline design. The best performing options within each Approach Category are then compared against one another using the 7-step process outlined in Figure 4.1. This process develops an initial Preferred Approach at WRZ level for all of the individual WRZs in the study area (the "WRZ Level Preferred Approach").

For the Best AA Approach, the scoring on the European Sites (Biodiversity) sub-criteria question refers to the possibility for Likely Significant Effects (LSEs). A Score of 0 equates to no LSEs. If an option is identified that meets the "Objectives of the Plan" and is assessed as having no potential impact on a European Site (zero or neutral score based on desktop assessment), it is automatically adopted as the Preferred Approach at WRZ level. Furthermore, because it is possible that all of the potential impacts identified at Plan level can be entirely ruled out through project level investigation and analysis or avoided through project level mitigation, options with potential for LSEs (score of -1 to -3 for biodiversity) may be progressed as the Preferred Approach. If potential impacts cannot be ruled out or avoided, then mitigation in the form of avoidance is provided for within the NWRP to protect European site(s). Should potential adverse effects on European sites be identified at the project level from a given option/Preferred Approach the NWRP will have identified other options⁵ that could be progressed at the project level if required. Therefore, no project arising from the NWRP, with Adverse Effects on Site Integrity (AESI) identified at the project stage would be implemented. Scores of -1 to -3 equates to LSEs being identified. Scores of -1 to -2 are LSEs that will not result in AESI with standard best practice project specific mitigation applied as these can be addressed with general/standard mitigation measures.

⁵ These options may not have progressed as the Preferred Approach initially as they may have scored significantly worse against other environmental, resilience or feasibility criteria (e.g. the best AA approach may identify an option that results in four times more carbon being produced or is twice as expensive).

Scores of -3 equates to LSEs that may be difficult to mitigate, but it is understood at plan level that mitigation would be achievable, noting that further project level assessments are required to confirm this.

The NIS provides more detail in the LSE and the AESI Tables: Appendices C-D. Any option with a score of -1 to -3 is taken forward to AA (Stage 2 of the AA process) and assessed within the NIS for the Regional Plan.

The **Second Stage** assesses whether there are any larger options (SA options also referred to as ‘group’ options) that might resolve deficits across multiple WRZs within a study area. Combinations are then developed using these SA options and WRZ Preferred options to create “SA Combinations”.

The **Third Stage** compiles the SA Combinations that rank highest for each of the Six Approach Types to generate SA Approaches. The WRZ Level Approach and SA Approaches are then compared against each other using the 7-Step process in Figure 4.1 to generate the SA Preferred Approach.

STEP 0 Best AA	If there is an option that meets the Objectives of the Plan, and is assessed as having no potential impact on a European Site (based on desktop assessment), it is automatically adopted as the Preferred Approach
STEP 1 Least Cost	Compare Least Cost against best AA Approach, and consider again at Step 6
STEP 2 Quickest Delivery	Compare Least Cost against Quickest Delivery Approach and develop Modified Approach if appropriate
STEP 3 Best Environmental	Compare Least Cost or Modified Approach against Best Environmental, and modify approach if appropriate
STEP 4 Most Resilient	Compare Least Cost or Modified Approach against Most Resilient
STEP 5 Least Carbon	Compare Least Cost or Modified Approach against Lowest Carbon
STEP 6 Approach Comparison	Compare output from Steps 1 to 5 against: <ul style="list-style-type: none"> • SEA required outcomes • Sectoral Adaptation Outcomes • Best AA outcomes • Public Expenditure Code Outcomes
STEP 7 Preferred Approach	Select Preferred Approach based on steps 0 to 6

Figure 4.1 The 7 Step Process

4.2.1 Environmental Assessment in the Approach Development process

Combinations of feasible options are identified to balance the water demand and predicted baseline supply and address the remaining deficit over the plan period. The Approach Development process allows Uisce Éireann to compare and optimise the options against different elements to create a range of approaches capable of meeting the deficit.

There are two strands of environmental information and assessment used in the Approach Development process. These are:

Environmental and social costs: these were based on a natural capital/ecosystems services framework and scoped to be relevant and achievable with the information available and to add to, rather than duplicate, the qualitative environmental assessment of the options. This included:

- i. Climate regulation – woodland;
- ii. Traffic impacts – opportunity cost of time due to road congestion from roadworks;
- iii. Food – crops and livestock; and
- iv. Carbon equivalent emissions tonnes (note total greenhouse gas emissions are expressed in terms of carbon equivalent emissions) including embodied and operational carbon were also calculated and costed.

The approach for calculating the elements i, ii, iii and iv are explained in the SEA Environmental Report Appendix E.

Carbon emissions (tCO₂e) and carbon costs are calculated alongside construction and operational costs. As part of the environmental assessment carbon efficiency has also been calculated to identify carbon emissions per ML of water supply.

Environmental assessment: this is qualitative assessment against the SEA objective for each option as part of the MCA scoring for the fine screening. These scores are based on assessing options in terms of potential adverse or beneficial effects and a seven-point scale is used from Major, Moderate or Minor Adverse, Neutral, to Minor, Moderate or Major Beneficial. These are reflected in numeric scores -3 to 0 to +3 and are used to assess option performance against the MCA scores. The scoring applied at fine screening is reviewed and updated based on the developed option descriptions and additional environmental analysis.

Carbon emissions (tCO₂e) were initially assessed through qualitative assessment for fine screening as this preceded option costing, however in the approach development process the carbon emissions as total Net Present Value (NPV) costs have been used to inform the Approach Development Process. Total life- time carbon emissions and carbon efficiency per ML have been used to inform the SEA assessment.

The general process is illustrated in Figure 4.2 below.

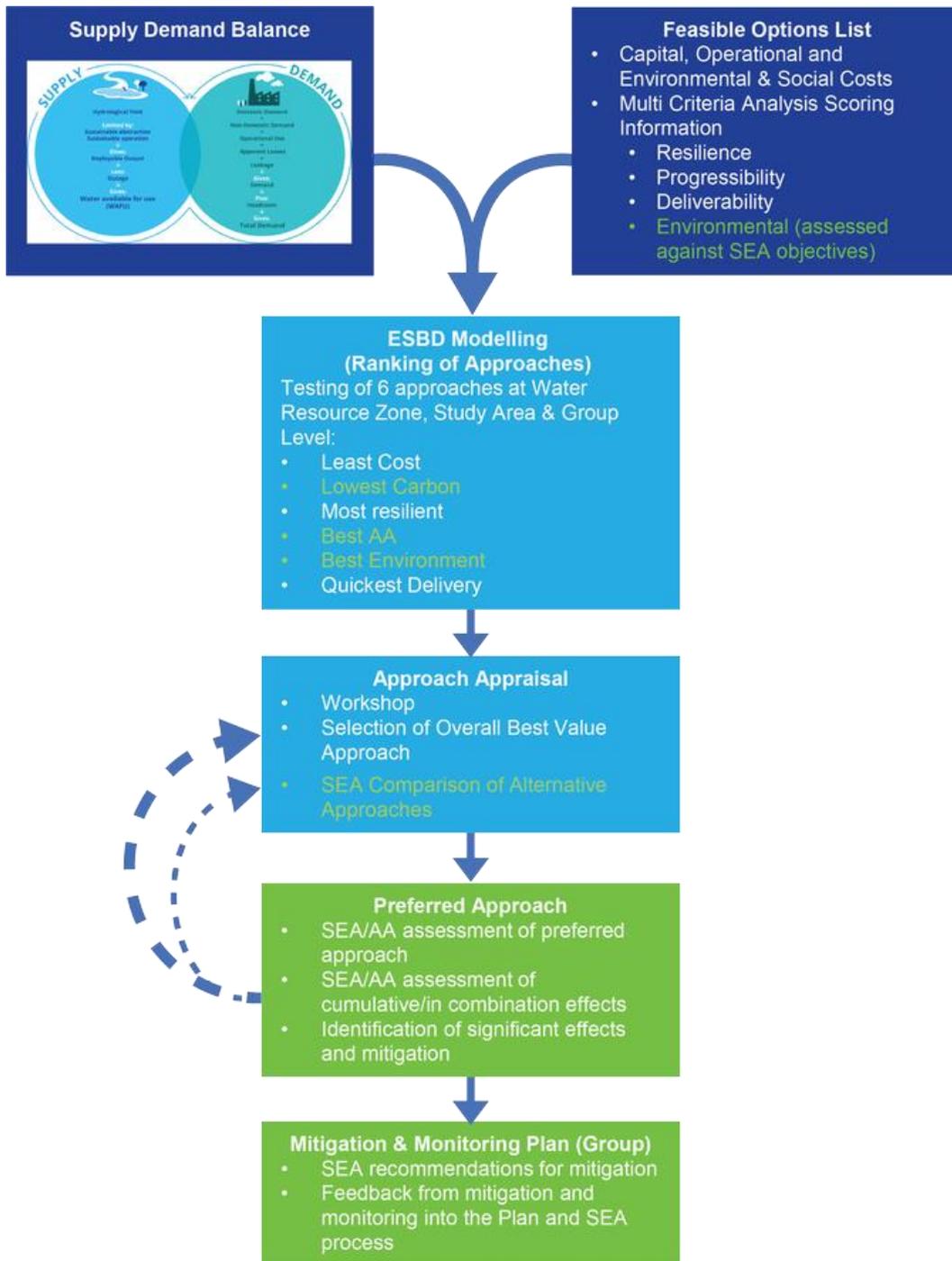


Figure 4.2 Approach Development Process

4.3 SAG Approach Development Process

The approach assessment process was undertaken through structured workshops and reviews involving relevant environmental expertise (including ecologists, hydrogeologists, hydrologists and environmental scientists) and included Local Authority involvement and feedback. This process was supported by information on the feasible options; including the environmental assessment against SEA criteria in the MCA and the option costings. The options were then taken through the sequential testing (the 7 step process detailed in section 4.2, Figure 4.1 above) against the six SA categories (lowest carbon, best environmental, best AA, least cost, quickest delivery and most resilient) to identify the best overall options and combinations at WRZ and study area levels applying the three stages:

Stage 1 - comparing WRZ options and identify the preferred WRZ level approach. For SAG there are 18 WRZ options and these are listed in Table 5.2 in the SAG Technical Report, providing option reference numbers and the relevant WRZ. These options were taken through the 7 step process to identify the preferred WRZ approach.

Stage 2 - creating combinations of WRZ options and SA options (group options) for comparison. These are the possible SA combinations and are presented and ranked against the approach categories (see Table 4.4).

Stage 3 - selecting the Preferred Approach at study area level – this stage compares the WRZ level preferred approach and the SA combinations to determine the Preferred Approach that provides the best outcome for the study area. The best performing SA combinations under each of the six approach categories are identified and then compared using the 7 step process applied in the workshop to establish the Preferred Approach at study area level.

Performance ranking against the assessment criteria was based on the MCA scoring, including the fine screening environmental assessments, and costings. Further environmental assessment has also been undertaken to compare the alternative approaches in line with SEA requirements and this assessment is presented in Table 4.7 and Table 4.9 below.

For SAG, a total of 9 combinations were compared, including the WRZ Level Approach; these are presented in Table 4.2. Note that the Preferred Approach selected at the end of the process has been outlined in red throughout this section.

Table 4.2 SAG Summary of SA Combination of Performance against Approach Category

Category	WRZ Level Approach	SA Combination 1 (SA option 1 and 6)	SA Combination 2 (SA option 2 and 6)	SA Combination 3 (SA option 6 and 13)	SA Combination 4 (SA option 6 and 14)	SA Combination 5 (SA option 6 and 15)	SA Combination 6 (SA option 6, 13 and 14)	SA Combination 7 (SA option 6, 13 and 15)	SA Combination 8 (SA option 1, 6 and 13)
Least Cost			Worst						Best
Quickest Delivery						Worst			Best
Number of -3 Biodiversity Scores	No -3 Scores	No -3 Scores	No -3 Scores	No -3 Scores	No -3 Scores	No -3 Scores	No -3 Scores	No -3 Scores	No -3 Scores
Lowest Carbon	Worst							Best	
Most Resilient	Worst						Best		
Best Environmental	Worst						Best		

Key														
Ranked order (best to worst)	Best													Worst

Through comparing the potential SA combinations, the best SA approach for each of the five approach categories was identified (also see section 5 of the Study Area Technical Report); these aligned as four approaches (see Table 4.3).

Table 4.3 Study Area Approach Categories

Category	SA Approach 1 (SA Combination 4) (BA)	SA Approach 2 (SA Combination 6) (BE, MR)	SA Approach 3 (SA Combination 7) (LC)	SA Approach 4 (SA Combination 8) (LCo, QD)
Least cost (LCo)	-	-	-	✓
Quickest Delivery (QD)	-	-	-	✓
Best Environmental (BE)	-	✓	-	-
Most Resilient (MR)	-	✓	-	-
Lowest Carbon (LC)	-	-	✓	-
Best AA (BA)	✓	-	-	-

The WRZ options and SA options (group options) that make up each SA approach are listed in Table 4.4. More detailed descriptions of the options are provided in Appendix A and a full list of options for each approach is given in B of this report.

Table 4.4 Study Area Approaches

Options included	Do Minimum	Least Cost (SA Approach 4) (SA combination 8)	Quickest Delivery (SA Approach 4) (SA combination 8)	Best Environmental (SA Approach 2) (SA combination 6)	Most Resilient (SA Approach 2) (SA combination 6)	Lowest Carbon (SA Approach 3) (SA combination 7)	Best AA (SA Approach 1) (SA combination 4)
SA options (Group options)	No options	SA option 1: 016, 057 SA option 6: 036, 062 SA option 13: 023, 070	SA option 1: 016, 057 SA option 6: 036, 062 SA option 13: 023, 070	SA option 6: 036, 062 SA option 13: 023, 070 SA option 14: 074, 075	SA option 6: 036, 062 SA option 13: 023, 070 SA option 14: 074, 075	SA option 6: 036, 062 SA option 13: 023, 070 SA option 15: 076, 077	SA option 6: 036, 062 SA option 14: 074, 075
WRZ options	No options	001 039 046 079	001 039 046 079	001 039 046	001 039 046	001 039 046	001 007 024 039 046

For the purposes of the Approach Development Process as set out in the SA Technical Report and for the purpose of the SEA comparison as set out in this Environmental Review, Uisce Éireann has only considered the options that were identified as the "best" performing options for each approach category. The identification of the approaches and 7 step process are outlined in detail in section 5 of the SAG Technical Report.

Within SAG, this resulted in four approaches being selected from the nine SA combinations identified in Table 4.3, as they were identified as the best performing against the six approach categories - Least Cost, Best Environmental, Quickest Delivery, Most Resilient, Best AA and Lowest Carbon. This means that when comparing the four identified approaches against each other (representing the Stage 3 analysis for the selection of the Preferred Approach used in the workshop - see Table 4.5), their relative performance against categories they were not identified as "best" in in Table 4.2 may be different. This because Table 4.2 compares all of the combinations to give a wider ranking, whereas Table 4.5 only compares the best performing combinations that have been selected as approaches. For example, an option identified as the "worst" performer against a particular approach category in Table 4.5 may not be the overall worst performing option when considered alongside all of the combinations in Table 4.2.

Table 4.5 includes a summary of the MCA scoring and cost comparison used in the approach development for the each of the SA approaches identified as performing best against at least one of the approach categories.

The three stages identified above were applied through a final workshop with all of the background MCA and option costing information available for each option and the ranking from the Economic Balance of Supply and Demand (EBSD) tool. Table 4.5 suggests that all four SA approaches are the best AA because they have the same number of -3 biodiversity scores (i.e. neither of these approaches had -3 scores). After comparing the number of -2 and -1 biodiversity scores and wider environmental score SA Approach 1 was selected as the best AA approach in Table 4.3.

Table 4.5 Summary of the MCA Scoring Costing for the SA Approaches

Category Criteria	SA Approach 1 (SA Combination 4) (BA)	SA Approach 2 (SA Combination 6) (BE, MR)	SA Approach 3 (SA Combination 7) (LC)	SA Approach 4 (SA Combination 8) (LCo, QD)
Least Cost Score	Worst			Best
Quickest Delivery Score	Worst			Best
Best AA Score	No -3 Biodiversity Scores	No -3 Biodiversity Scores	No -3 Biodiversity Scores	No -3 Biodiversity Scores
Lowest Carbon Score			Best	Worst
Most Resilient Score	Worst	Best		
Best Environmental Score		Best		Worst

Key			
Ranked order (best to worst) within the four selected approaches			
Worst			Best

4.4

Comparison of SAG Approaches

An overall summary of the infrastructure components and abstractions for each of the SA approaches identified for SAG is provided below in Table 4.6 and has been used to inform the environmental assessment.

Table 4.6 Study Area Approach Components Summary

Infrastructure Summary	Do Minimum	SA Approach 1 (SA Combination 4) (BA)	SA Approach 2 (SA Combination 6) (BE, MR)	SA Approach 3 (SA Combination 7) (LC)	SA Approach 4 (SA Combination 8) (LCo, QD)
New pipeline network (km)	0	31	48	55	59
New WTPs	0	1	0	0	0
Upgrade WTPs	0	8	7	6	7
New / upgraded abstractions	0	6	5	5	4
WTPs decommissioned	0	2	3	4	3
Abstractions abandoned	0	2	3	4	3
Raw Water Storage	0	0	0	0	0
Treated Water Storage	0	3	2	2	3

A comparative assessment of the four SA approaches based on the environmental option scores is summarised in Table 4.7 below. This covers:

- Scores across the options summed for all the sub-criteria against each SEA objective topic heading;
- Total numbers of -3 scores representing higher risk of effect, or likely greater requirement for mitigation, against each SEA objective topic heading; and
- Indication of the extent of difference in performance across the options to help identify if the differences between the SA approaches are small or large.

Table 4.7 Study Area Approach Comparison Summary

Topic	Total No. of	SA Approach 1 (SA Combination 4) (BA)	SA Approach 2 (SA Combination 6) (BE, MR)	SA Approach 3 (SA Combination 7) (LC)	SA Approach 4 (SA Combination 8) (LCo, QD)	Range (Difference between Lowest and Highest Score)
Population, health, economy and recreation	-3 scores	No difference				0
	MCA score	Worst	Best	Best	Worst	2
Water Environment: quality and resources	-3 scores	Worst	Worst	Worst	Best	1
	MCA score	Best	Best		Worst	2
Biodiversity, Flora and Fauna	-3 scores	No difference				0
	MCA score		Best	Best	Worst	5
Material Assets	-3 scores	No difference				0
	MCA score	Worst	Best	Best	Worst	2
Landscape and Visual	-3 scores	No difference				0
	MCA score	Worst	Best	Best		2
Climate Change	-3 scores	No difference				0
	MCA Score	Worst	Best	Best	Worst	1
Culture, Heritage and Archaeology	-3 scores	No difference				0
	MCA Score	Best	Best	Best	Worst	2
Geology and Soils	-3 scores	No difference				0

Topic	Total No. of	SA Approach 1 (SA Combination 4) (BA)	SA Approach 2 (SA Combination 6) (BE, MR)	SA Approach 3 (SA Combination 7) (LC)	SA Approach 4 (SA Combination 8) (LCo, QD)	Range (Difference between Lowest and Highest Score)
	MCA Score	No difference				0

Key

MCA/No. of -3 scores against each criterion

Worst

Best

*approaches are showing similar level of risk on climate change adaptation and therefore represented as no difference. However, carbon mitigation is covered separately based on estimated emissions and carbon cost (NPV). See lowest carbon approach.

** approaches are showing similar level of risk on culture, heritage and archaeology. Routing and siting is only indicative at this stage. Most options involving new construction include a level of risk to buried unknown archaeology, this would need to be investigated further at the project level.

4.4.1 SA Approach 1 (SA Combination 4) (BA)

SA approach 1, key comparison points:

- Identified as the best in the Best AA category;
- Option types included:
 - SA options (group options): 1 rationalisation option and 1 surface water abstraction option;
 - WRZ options: 4 groundwater abstraction options and 1 surface water abstraction option;
- No -3 biodiversity scores (so no higher risk options that could impact on European sites); and
- The key differences in infrastructure development required for SA approach 1 includes:
 - The shortest length of pipeline;
 - One new WTP;
 - The highest number of WTP upgrades;
 - The highest number of new/upgraded abstractions;
 - The lowest number of WTPs decommissioned and abstractions abandoned; and
 - One additional treated water storage facility (the same number as SA approach 4).

4.4.2 SA Approach 2 (SA Combination 6) (BE, MR)

SA approach 2, key comparison points:

- Identified as the best in the following categories: Best Environmental and Most Resilient;
- Option types included:
 - SA options (group options): 2 surface water abstraction options and 1 rationalisation option;
 - WRZ options: 3 groundwater abstraction options;
- No -3 biodiversity scores (so no higher risk options that could impact on European sites); and

- The key difference in infrastructure development required for SA approach 2 is that it has the lowest number of treated water storages (same number as SA approach 3).

4.4.3 SA Approach 3 (SA Combination 7) (LC)

SA approach 3, key comparison points:

- Identified as the best in the Lowest Carbon category;
- Option types included:
 - SA options (group options): 2 surface water abstraction options and 1 rationalisation option;
 - WRZ options: 3 groundwater abstraction options;
- No -3 biodiversity scores (so no higher risk options that could impact on European sites); and
- The key differences in infrastructure development required for SA approach 3 includes:
 - The lowest number of WTP upgrades;
 - The highest number of WTPs decommissioned and abstractions abandoned; and
 - The lowest number of treated water storages (same number as SA approach 2 and 4).

4.4.4 SA Approach 4 (SA Combination 8) (LCo, QD)

SA approach 4, key comparison points:

- Identified as the best in the following categories: Least Cost and Quickest Delivery;
- Option types included:
 - SA options (group options): 1 rationalisation option, 1 interconnection option and 1 surface water abstraction option;
 - WRZ options: 3 groundwater abstraction options and 1 WTP upgrade option;
- No -3 biodiversity scores (so no higher risk options that could impact on European sites); and
- The key differences in infrastructure development required for SA approach 4 includes:
 - The longest length of pipeline;
 - The highest number of WTP upgrades (same number as SA approach 1);
 - The lowest number of new/upgraded abstractions; and
 - One additional treated water storage facility (the same number as SA approach 1).

4.5 SAG Approach Assessment Comparison

The 'Do Minimum' approach is the 'without plan' approach, meaning that this is the approach that would occur without the NWRP. As a result, the 'Do Minimum' approach would only include reactive, unplanned interim measures to address failures in infrastructure.

The SDB shows a current deficit, applying the level of service in the area with the corresponding requirements for reserves, indicating operation of supplies with an SDB ranging from -5,641 m³/d in 2019, to a projected maximum of -5,946 m³/d in 2044 during dry conditions under a 'Do Minimum' scenario. As a result, public water supplies in this area are vulnerable, particularly under drought conditions. In addition, there may be ongoing reliability issues with the supplies and the situation is expected to further deteriorate due to climate change driven reductions in water resources and increased demand growth within the area. Table 4.8 shows the SDB for the WRZs in SAG.

Table 4.8 Supply Demand Balance for SAG

WRZ Name	WRZ Code	Population	Maximum Deficit m ³ /day*	
			2019	2044
Kinvara P.S.	1200SC0023	2,240	No Deficit	No Deficit
Gort	1200SC0016	2,840	-87	-183
Turlough	0300SC0022	415	-93	-118
Ennistymon	0300SC0021	6,841	-4,060	-4,157
Killadysert PWS	0300SC0013	1,508	-1,375	-1,458
Kilkeedy PWS	0300SC0005	76	No Deficit	-1
Carron PWS	0300SC0004	54	-26	-29
Corofin PWS	0300SC0003	1,199	No Deficit	No Deficit
West Clare	0300SC0001	14,630	No Deficit	No Deficit

*Based on the Dry Year Critical Period (DYCP) weather event planning scenario

An overall assessment and comparison of the SA approaches considered along with the ‘Do Minimum’ approach (a continuation of the current situation) is provided in Table 4.9 below.

Table 4.9 Assessment of the SA Approaches and the ‘Do Minimum’ Approach

SEA Objectives	Phase (Construction (C) / Operation (O))	Do Minimum	SA Approach 1 (SA combination 4) (BA)	SA Approach 2 (SA combination 6) (BE, MR)	SA Approach 3 (SA combination 7) (LC)	SA Approach 4 (SA combination 8) (LCo, QD)
1. Protect public health and promote wellbeing	C	0	-	-	-	-
	O	---	++	++	+	++
2. Protect and enhance biodiversity and contribute to resilient ecosystems	C	0	-	-	-	-
	O	--	-	-	-	--
3. To protect landscapes, townscapes and visual amenity	C	0	-	--	--	--
	O	0	--	-	-	-
4. Protect and where appropriate enhance, built and natural assets and reduce waste	C	0	--	-	-	--
	O	-	--	--	--	--
5. Reduce greenhouse gas emissions	C	0	--	--	-	--
	O	-	--	--	-	--
	C	0	-	-	-	-

SEA Objectives	Phase (Construction (C) / Operation (O))	Do Minimum	SA Approach 1 (SA combination 4) (BA)	SA Approach 2 (SA combination 6) (BE, MR)	SA Approach 3 (SA combination 7) (LC)	SA Approach 4 (SA combination 8) (LCo, QD)
6. Contribute to environmental climate change resilience	O	--	-	-	-	-
7. Protect and improve surface water and groundwater status	C	0	0	0	0	0
	O	--	-	-	--	--
8. Avoid flood risk	C	0	-	-	-	-
	O	0	0	0	0	0
9. Protect and where appropriate, enhance cultural heritage assets	C	0	-	-	-	--
	O	0	0	0	0	0
10. Protect quality and function of soils	C	0	-	-	-	-
	O	0	0	0	0	0

Key			
Major beneficial	+++	Minor adverse	-
Moderate beneficial	++	Moderate adverse	--
Minor beneficial	+	Major adverse	---
Neutral	0		

The overall assessment of the approaches against the SEA objectives indicates that SA approach 3 is likely to have less beneficial public health impacts during operation due to having fewer WTP water quality upgrades. SA approach 4 (identified as the Preferred Approach) is likely to have a more adverse biodiversity impact during operation due to more development in designated sites. SA approach 1 is likely to have a less adverse impact on landscape during construction due to the utilisation of significantly less pipeline compared to the other approaches. However, this same approach is also likely to have a more adverse impact on landscape during operation due to a fewer number of WTP decommissions and a greater number of above ground assets. SA approaches 1 and 4 are likely to have greater adverse materials and waste impacts during construction due to a greater number of new WTPs on greenfield sites. SA Approaches 3 and 4 are likely to have greater adverse impacts on water during operation due to the rate of abstraction required. SA Approach 4 is likely to have greater adverse cultural heritage impacts during construction due to the construction of new above ground assets on heritage sites.

Mitigation for the Preferred Approach is identified in chapter 5 based on individual options assessments and in chapter 6 in terms of cumulative assessment. All the approaches address the identified water supply quantity and quality requirements to secure a level of service important for public health and wellbeing compared with the 'Do Minimum'.

4.5.1 Selection of the SA Preferred Approach

It was expressed during workshops that there would be extreme difficulty in boring rock for new watermain from Corofin to Ennistymon in SA approaches 2 and 3. Therefore, SA approach 4 has been selected through the 7 step process as the best performing approach overall across the different categories. Further details are provided in section 5.2.3 of the SAG Technical report.

The SA Preferred Approach does not include any -3 Biodiversity score options. Therefore, no higher risk options for effects on European Sites are included in the Preferred Approach. For options identified as having some level of risk for LSEs, mitigation measures to address these are set out in the NIS and no AESI are identified.

5

**SAG Preferred
Approach:
Strategic
Environmental
Assessment**

5 SAG Preferred Approach Strategic Environmental Assessment

5.1 SAG Preferred Approach Options

This chapter provides an environmental assessment of the proposed SA Preferred Approach as required by the SEA Directive and implementing Irish regulations. The environmental effects are considered for each option individually. Additional measures proposed to be taken forward along with these options are also considered. Cumulative effects for both the 'within plan' SA Preferred Approach and the cumulative effects with other proposed developments outside the Framework Plan are addressed in chapter 6.

The SA Preferred Approach consists of WRZ options for four of the WRZs in the study area. Three SA options are selected for the other five WRZs. The five SA options involve:

- SA option 1: Proposes to increase SW abstraction from Doo Lough, upgrade New Doolough WTP and Ballymacraven WTP, interconnect Ennistymon and West Clare, and decommission Old Doolough WTP;
- SA option 13: Proposes to rationalise Killadysart PWS WRZ to West Clare and decommission Killadysart WTP; and
- SA option 6: Proposes to increase GW abstraction from Turlough borehole, rationalise Carran WRZ to Turlough WRZ, upgrade Turlough WTP, and decommission Carran WTP.

The SA Preferred Approach for the remaining WRZs involves increased groundwater abstractions and upgrades to existing WTPs.

Table 5.1 gives a breakdown of the options in SAG and the associated abstractions.

Table 5.1 Preferred Approach Breakdown

WRZ Name and Option Reference*	Option Description	Abstraction / Demand
SAG-001 0300SC0005 Kilkeedy PWS	Increase abstraction at Kilkeedy BH (Lough Mannagh Turlough groundwater body - karstic bedrock) and upgrade Kilkeedy WTP to supply deficit. <ul style="list-style-type: none"> • Kilkeedy PWS WRZ in deficit so increase existing GW abstraction to meet WRZ future deficit. • Existing source (Lough Mannagh Turlough groundwater body (GWB)) WFD status 2016-2021 – Good 	93 m ³ /d
SAG-039 1200SC0016 Gort	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. • Existing sources: (Groundwater Dependent Terrestrial Ecosystem (GWDTE) - Caherglassaun Turlough GWB) WFD status 2016-2021 – Poor and (Cannahowna river waterbody (RWB)) WFD status 2016-2021 – Poor 	1,503 m ³ /d
SAG-046 1200SC0023	Increase existing GW abstraction from Kinvara Well (karstic bedrock - Kinvara-Gort groundwater body).	1,640 m ³ /d

WRZ Name and Option Reference*	Option Description	Abstraction / Demand
Kinvara	<ul style="list-style-type: none"> Existing sources (Kinvara-Gort GWB) WFD status 2016-2021 – Good 	
SAG-079 0300SC0003 Corofin PWS	<p>No deficit - upgrade WTP</p> <ul style="list-style-type: none"> Kinvara WRZ in projected surplus so WTP upgrade works only. Existing SW abstraction maintained. Existing sources (Inchiquin lake waterbody (LWB)) WFD status 2016-2021 – Moderate 	460 m ³ /d
SAG-016 (SA option 1) 0300SC0021 Ennistymon	Interconnect Ennistymon and West Clare for increased resilience and supply part of the deficit from West Clare (New Doolough WTP) to Ennistymon WRZ. Increase abstraction from Doo Lough and upgrade existing New Doolough WTP. Rationalise Old Doolough WTP. Interconnect West Clare Old Doolough WTP and West Clare New Doolough.	8,430 m ³ /d
SAG-057 (SA option 1) & SAG-023 (SA option 13) 0300SC0001 West Clare	<ul style="list-style-type: none"> Part of SA option 1 and 13. Ennistymon WRZ in deficit and is to be interconnected with West Clare WRZ. Existing SW abstraction maintained. Rationalise Killadysart PWS WRZ to West Clare Old Doolough WTP and decommission Killadysert WTP. Proposed source (Doo CE LWB) WFD status 2016-2021 – Moderate 	8,430 m ³ /d
SAG-062 (SA Option 6) 0300SC0022 Turlough	Rationalise Carran WRZ to Turlough WRZ to supply deficit. Increase GW abstraction from Turlough BH (Ballyvaughan Uplands groundwater body - karstic bedrock) and upgrade Turlough WTP.	577 m ³ /d
SAG-036 (SA Option 6) 0300SC0004 Carran PWS	<ul style="list-style-type: none"> Turlough WRZ in deficit. Increase existing GW abstraction to meet WRZ future deficit. Existing GW abstraction maintained. Existing source (Ballyvaughan Uplands GWB) WFD status 2016-2021 – Good 	577 m ³ /d
SAG-070 (SA option 13) 0300SC0013 Killadysart PWS	<p>Rationalise Killadysart PWS WRZ to West Clare Old Doolough WTP and decommission Killadysert WTP.</p> <ul style="list-style-type: none"> Part of SA option 13. Killadysart PWS WRZ in deficit so to be rationalised to West Clare WRZ. Proposed source (Doo CE LWB) WFD status 2016-2021 – Moderate 	1,907 m ³ /d

*SA Options are the same as Group Options

The SA Preferred Approach options are shown in Figure 5.1, in relation to key environmental designations. Note that SA option 1, 6 and 13 are labelled as SAG-501, 506 and 513.

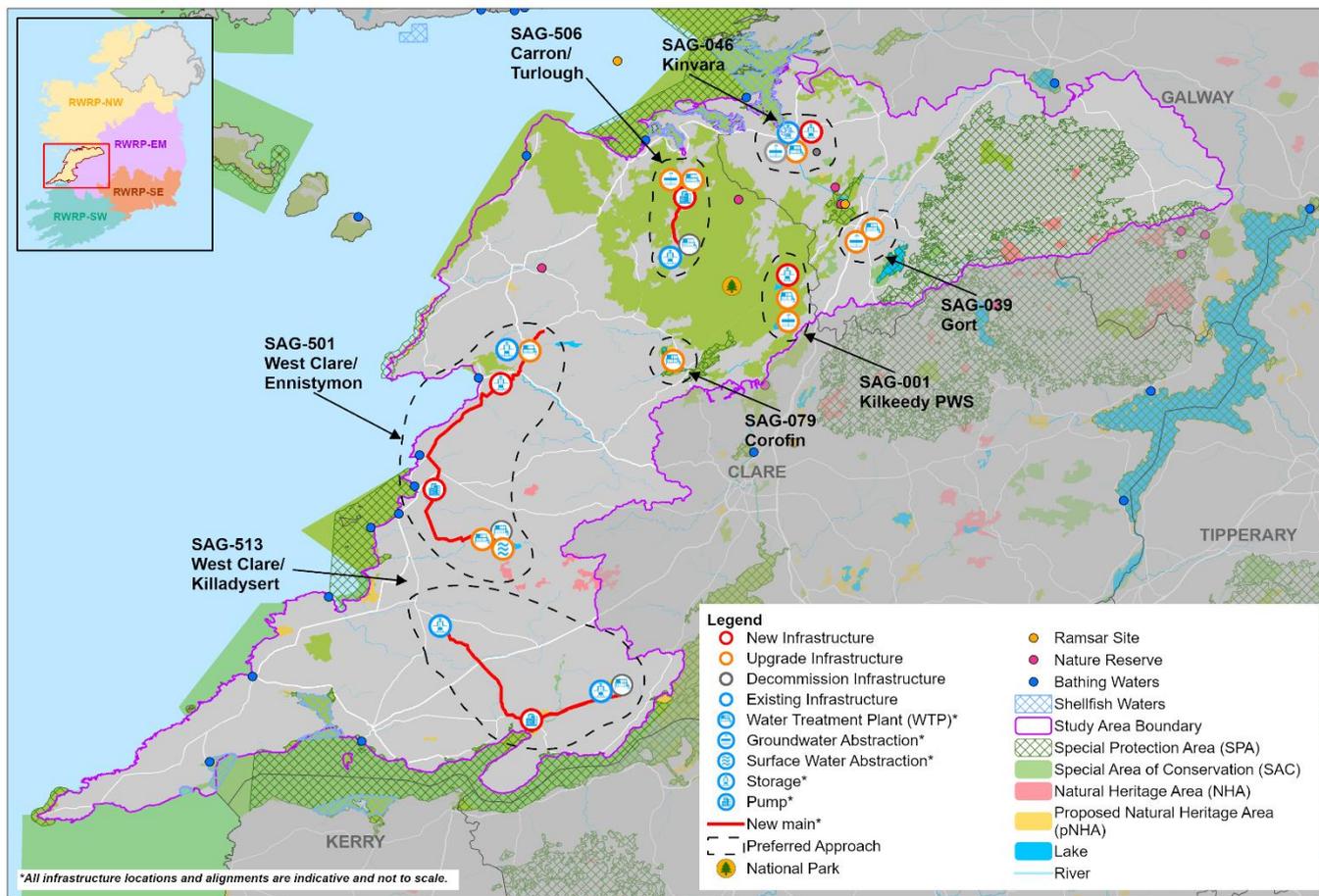


Figure 5.1 SA Preferred Approach and Key Environmental Designations

The SA Preferred Approach options have each been assessed against the SEA objectives, taking account of construction and operational phases, long term and short term, permanent and temporary, and indirect and direct impacts. Mitigation requirements to avoid or reduce effects have also been taken into consideration. Table 5.2 provides a breakdown of the infrastructural components and Table 5.3 provides an assessment summary of the options included in the SA Preferred Approach. Individual options assessments are available on request. The overall Preferred Approach assessment, including all the options combined, is summarised in Table 7.1.

Table 5.2 Component Table

Option Reference*	New / Refurbished Pipeline	New WTP	Upgrade WTPs	New / Upgraded Abstractions	WTPs Decommissioned	Abstractions Abandoned	Raw Water Storage	Treated Water Storage
SAG-001	-	-	✓	✓	-	-	-	✓
SAG-039	✓	-	✓	✓	-	-	-	-
SAG-046	-	-	✓	-	-	-	-	✓

Option Reference*	New / Refurbished Pipeline	New WTP	Upgrade WTPs	New / Upgraded Abstractions	WTPs Decommissioned	Abstractions Abandoned	Raw Water Storage	Treated Water Storage
SAG-079	-	-	✓	-	-	-	-	-
SA Option 1 (SAG-016 and SAG-057)	✓	-	✓	✓	✓	✓	-	✓
SA Option 6 (SAG-036 and SAG-062)	✓	-	✓	✓	✓	✓	-	-
SA Option 13 (SAG-023 and SAG-070)	✓	-	-	-	✓	✓	-	-

*SA Options are the same as Group Options

Table 5.3 Options Assessment Summary

Option Reference*	Option Description	Phase	Protect Public Health and Promote Wellbeing (P1, P2, P3)	Protect and Enhance Biodiversity and Contribute to Resilient Ecosystems (B1, B2, B3, B4, B5)	To Protect Landscapes, Townscapes and Visual Amenity (L1)	Protect and Where Appropriate Enhance, Built and Natural Assets and Reduce Waste (M1, M2)	Reduce Greenhouse Gas Emissions (C1)	Contribute to Environmental Climate Change Resilience (R1, R2, R5)	Protect and Improve Surface Water and Groundwater Status (W1, W2, W3)	Avoid Flood Risk (W5)	Protect and Where Appropriate, Enhance Cultural Heritage Assets (CH1)	Protect Quality and Function of Soils (G1)
SA Option 13 (SAG-023 and SAG-070)	Increase SW abstraction from Doo Lough and upgrade existing New Doolough WTP. Rationalise Old Doolough WTP. Rationalise Killadysart PWS WRZ to West Clare Old Doolough WTP	Construction	-	--	-	--	-	--	0	0	-	-
		Operation	+	-	+	0	-	--	---	0	0	0
SAG-001	Increase GW abstraction at Kilkeedy BH (Lough Mannagh	Construction	-	-	-	-	0	-	0	0	0	0

Option Reference*	Option Description	Phase	Protect Public Health and Promote Wellbeing (P1, P2, P3)	Protect and Enhance Biodiversity and Contribute to Resilient Ecosystems (B1, B2, B3, B4, B5)	To Protect Landscapes, Townscapes and Visual Amenity (L-1)	Protect and Where Appropriate Enhance, Built and Natural Assets and Reduce Waste (M1, M2)	Reduce Greenhouse Gas Emissions (C1)	Contribute to Environmental Climate Change Resilience (R1, R2, R5)	Protect and Improve Surface Water and Groundwater Status (W1, W2, W3)	Avoid Flood Risk (W5)	Protect and Where Appropriate, Enhance Cultural Heritage Assets (CH1)	Protect Quality and Function of Soils (G1)
	Turlough groundwater body - karstic bedrock) and upgrade Kilkeedy WTP to supply deficit	Operation	0	-	0	0	0	-	-	0	0	0
SA Option 1 (SAG-016 and SAG-057)	Increase SW abstraction from Doo Lough and upgrade existing New Doolough WTP. Rationalise Old Doolough WTP.	Construction	-	--	-	--	--	--	0	0	--	-

Option Reference*	Option Description	Phase	Protect Public Health and Promote Wellbeing (P1, P2, P3)	Protect and Enhance Biodiversity and Contribute to Resilient Ecosystems (B1, B2, B3, B4, B5)	To Protect Landscapes, Townscapes and Visual Amenity (L-1)	Protect and Where Appropriate Enhance, Built and Natural Assets and Reduce Waste (M1, M2)	Reduce Greenhouse Gas Emissions (C1)	Contribute to Environmental Climate Change Resilience (R1, R2, R5)	Protect and Improve Surface Water and Groundwater Status (W1, W2, W3)	Avoid Flood Risk (W5)	Protect and Where Appropriate, Enhance Cultural Heritage Assets (CH1)	Protect Quality and Function of Soils (G1)
	Interconnect Ennistymon and West Clare (distance TBC, new water mains and network upgrades required) for increased resilience and supply part of the deficit from West Clare (New Doolough WTP) to Ennistymon WRZ	Operation	+	-	+	0	-	-	-	0	0	0
SAG-079	No deficit - upgrade Corofin WTP	Construction	-	-	0	0	0	0	0	0	0	0
		Operation	+	0	0	0	0	0	0	0	0	0

Option Reference*	Option Description	Phase	Protect Public Health and Promote Wellbeing (P1, P2, P3)	Protect and Enhance Biodiversity and Contribute to Resilient Ecosystems (B1, B2, B3, B4, B5)	To Protect Landscapes, Townscapes and Visual Amenity (L-1)	Protect and Where Appropriate Enhance, Built and Natural Assets and Reduce Waste (M1, M2)	Reduce Greenhouse Gas Emissions (C1)	Contribute to Environmental Climate Change Resilience (R1, R2, R5)	Protect and Improve Surface Water and Groundwater Status (W1, W2, W3)	Avoid Flood Risk (W5)	Protect and Where Appropriate, Enhance Cultural Heritage Assets (CH1)	Protect Quality and Function of Soils (G1)
SAG-039	Increase existing GW abstraction from boreholes (poorly productive bedrock - Caherglassaun Turlough groundwater body)	Construction	-	-	0	0	0	--	0	0	-	-
		Operation	+	0	0	0	0	--	---	0	0	0
SAG-046	Increase existing GW abstraction from Kinvara Well (karstic bedrock - Kinvara-Gort groundwater body) - saline intrusion	Construction	-	-	-	-	0	-	0	-	0	0
		Operation	+	-	+	0	0	-	-	0	0	0

Option Reference*	Option Description	Phase	Protect Public Health and Promote Wellbeing (P1, P2, P3)	Protect and Enhance Biodiversity and Contribute to Resilient Ecosystems (B1, B2, B3, B4, B5)	To Protect Landscapes, Townscapes and Visual Amenity (L-1)	Protect and Where Appropriate Enhance, Built and Natural Assets and Reduce Waste (M1, M2)	Reduce Greenhouse Gas Emissions (C1)	Contribute to Environmental Climate Change Resilience (R1, R2, R5)	Protect and Improve Surface Water and Groundwater Status (W1, W2, W3)	Avoid Flood Risk (W5)	Protect and Where Appropriate, Enhance Cultural Heritage Assets (CH1)	Protect Quality and Function of Soils (G1)
SA Option 6 (SAG-036 and SAG-062)	Increase GW abstraction from Turlough BH (Ballyvaughan Uplands groundwater body - karstic bedrock) and upgrade Turlough WTP	Construction	-	--	-	-	0	-	0	0	-	-
	Rationalise Carran WRZ to Turlough WRZ to supply deficit	Operation	+	-	+	0	0	-	-	0	0	0

*SA Options are the same as Group Options

**Total lifetime tCO₂e categories: minor beneficial = -ve negligible/neutral = <1000 minor = 1000 to <10,000, Moderate = 10,000 to <50,000, Major = 50,000+

5.2

Additional Measures

In addition to the SA Preferred Approach supply options, Uisce Éireann is already implementing measures across the three pillars of Lose Less, Use Less and Supply Smarter to improve the level of service to their customers in this study area. These are described in the SAG Technical Report and include leakage reduction and water conservation.

5.2.1 Leakage Reduction



The leakage reduction measures across the public water supply are based on what Uisce Éireann assess to be both achievable and sustainable and include:

- Ongoing leakage management including active leakage control, pressure management, and find and fix activities to offset Natural Rate of Leakage Rise;
- Further net leakage reductions, to move towards achieving the national SELL target by 2034, in the WRZs: West Clare, Carron PWS, Kilkeedy PWS, Killadysert PWS, Ennistymon, Turlough and Kinvara P.S.

5.2.2 Water Conservation



At present, Uisce Éireann 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 their water supplies and reduce pressure on the natural environment during this period. Uisce Éireann will continue to promote 'Water Conservation Activities', collecting and monitoring data over a number of years to assess the benefits. As part of the Framework Plan, Uisce Éireann have not applied reductions to the SDB for unquantifiable water conservation gains. However, they do assume that any gain will offset consumer usage growth factors.

5.3

Interim Solutions

The SAG Technical Report identifies potential interim solutions that allow shorter term interventions to be identified and prioritised, when needed. These are expected to be small scale, within site works and are not likely to give rise to significant environmental effects. However, they would need to be subject to relevant assessments, including AA screening as and when they are required.

5.4

Approach Uncertainty and Adaptability

A summary of the adaptability criteria and sensitivity analysis Uisce Éireann have undertaken for the SAG Preferred Approach is provided in the SAG Technical Report. A high-level assessment of what this could mean for the SEA is shown in Table 5.4.

Table 5.4 SAG Sensitivity Analysis and Environmental Impacts

Uncertainty	Likelihood	Increase (+)/ Decrease (-) in Deficit	Environmental Impacts Relative to Assessment of Preferred Approach Key: Green - Positive Amber - Negative
Sustainability	Moderate/High (as Uisce Éireann's		The impact of sustainability reductions would reduce the volumes that can be abstracted from Uisce Éireann's

Uncertainty	Likelihood	Increase (+)/ Decrease (-) in Deficit	Environmental Impacts Relative to Assessment of Preferred Approach Key: Green - Positive Amber - Negative
	current abstractions are large compared to the waterbodies from which they abstract)	+21,000 m ³ /d	<p>existing sources, therefore, increasing the SDB deficit. There are some surface water sources in SAG that would be impacted by sustainability reductions. However, the Preferred Approach is designed to relieve pressure on these sources by supplementing from more resilient sources.</p> <p>Abstraction points from Lickeen Lake and Gortglass Lough, and two of the potentially unsustainable current abstractions from Doo Lough are to be decommissioned as part of the Preferred Approach.</p> <p>However, it is assumed that the existing abstraction licence conditions can be maintained regarding the Doo Lough source supplying the West Clare WRZ. This would allow the source to be developed and relieve pressure on the Lickeen Lake and Gortglass Lough sources.</p> <p>Groundwater sustainability is more difficult to assess at desktop level, however, as the abstractions in SAG are small in scale any impacts are likely to be minimal.</p> <p>The SA Preferred Approach addresses reduction and decommissions several unsustainable abstractions. However, additional sustainability reductions could increase pressure for additional supply from outside the study area.</p>
Climate Change	High (international climate change targets have not been met)	+600 m ³ /d	<p>Higher climate change scenarios would impact Uisce Éireann's existing supplies and result in decreased water availability at certain times of year. Although the likelihood of this scenario is high based on climate change adaptation to date, potential impacts may be mitigated against by optimising Uisce Éireann's operations on a more environmentally sustainable basis across the range of supplies.</p> <p>Within SAG, the abstraction points from Lickeen Lake and Gortglass Lough, and two of the potentially unsustainable current abstractions from Doo Lough are to be decommissioned as part of the Preferred Approach.</p> <p>Regarding the groundwater abstractions, there is more difficulty and uncertainty in assessing increased climate change impacts. However, it is generally understood that</p>

Uncertainty	Likelihood	Increase (+)/ Decrease (-) in Deficit	Environmental Impacts Relative to Assessment of Preferred Approach Key: Green - Positive Amber - Negative
			<p>groundwater will be more resilient than surface water sources.</p> <p>Although the Preferred Approach provides more operational flexibility to use less sensitive water sources, this could still result in more pressure on sources.</p>
Demand Growth	Low/Moderate (growth has been based on policy)	-5,946 m ³ /d	<p>The impact of lower than expected growth would reduce the SDB deficit and the overall need requirement. The SDB deficit is currently spread across five of the nine WRZs in the area and is projected to spread across six. This is driven by quality as well as quantity issues. In this rural area, growth is relatively low.</p> <p>This could allow lower than expected energy and carbon costs and lower increased abstraction requirements</p>
Leakage Targets	Low (Uisce Éireann is focused on sustainability and aggressive leakage reduction)	+231 m ³ /d	<p>Increased leakage savings beyond SELL would reduce the SDB deficit and the overall need requirement. The need drivers span across the WRZs in SAG and are driven by quality as well as availability issues.</p> <p>This could increase carbon and the effects of abstraction pressure on the environment</p>
	Moderate/High (Uisce Éireann is focused on sustainability and aggressive leakage reduction)	-9,156 m ³ /d	<p>Increased leakage savings beyond SELL would reduce the SDB deficit and the overall need requirement. The need drivers span across the WRZs in SAG and are driven by quality as well as availability issues.</p> <p>This could allow lower than expected energy and carbon emissions and lower increased abstraction requirements.</p>

6

SEA Cumulative Effects for SAG Preferred Approach

6 SEA Cumulative Effects for SAG Preferred Approach

Secondary, cumulative and the synergistic nature of the effects of the SAG Preferred Approach proposals are required to be considered as part of SEA. These include:

- 'Within plan' or 'in-combination' effects; and
- Interaction with other plans and programmes.

Cumulative effects are also considered for the proposals across the seven study areas within the North West Region and reported in the SEA Environmental Report of the Regional Plan. Further consideration of any inter regional cumulative effects will be addressed in each Regional Plan SEA sequentially.

6.1 Cumulative Effects 'Within Plan' for SAG

The potential 'within plan' cumulative effects for SAG are considered at the following different levels:

- Option level: Identification of mutually exclusive or dependent options – this was considered through the options screening and approach development process;
- SA approaches: Cumulative effects are taken into account in the selection of approaches for key aspects such as abstraction from the same waterbody through the sustainability rules applied for Uisce Éireann abstractions (see section 3.2);
- SA Preferred Approach: The combined effect of options within the SA Preferred Approach – these are addressed in this chapter; and
- The North West Region level: Considering combined effects from proposals in the seven study areas (see the SEA Environmental Report of the Regional Plan).

For cumulative effects to occur, there needs to be an overlap of temporal periods in some way for the impact and/or the effect. For example, two schemes being constructed at the same time could result in cumulative traffic movements, while two schemes being operated together could result in additional drawdown of groundwater levels. A precautionary approach has been taken for the cumulative effect's assessment, which assumes that all options could be constructed at the same time and then all options would be operated at the same time (Table 6.1). However, this is very unlikely to be the case for construction impacts due to budget resources and regulatory constraints.

The assessment has considered the cumulative effects across all environmental topics to identify those interactions that are likely to generate significant effects. These are likely to be around:

- Biodiversity – for example, a cumulative loss of habitats or changes to a habitat's quality through changes in water quality or groundwater levels;
- Water environment (surface water and groundwater WFD status) – for example, changes to water flow due to combined abstraction pressure;
- People and health – for example, disruption due to multiple construction works taking place at the same time;
- Landscape and visual – for example, if there are a number of options located close together that could alter the landscape character or views;
- Cultural heritage – for example if the same cultural heritage features are affected by above ground infrastructure in close proximity or the combined effect of loss to undesignated archaeological assets or from combined impacts resulting in additional changes to water levels affecting archaeological resources; and
- Climate change – combined carbon emissions for the approach as a whole have been considered through the approach selection process and are also reported here to identify

potential requirements for mitigation. Combined effects on climate change adaptation are also considered.

6.1.1 Cumulative Effects during Construction

In general, the SA Preferred Approach options are geographically spaced out and most are small scale construction works. Therefore, there are unlikely to be many cumulative effect interactions during construction.

Table 6.1 Potential In-Combination Effects between Preferred Options in SAG

SAG-039						
SAG-046	EB					
	CW/CG					
SAG-079	CW/EB		CW			
SA Option 1 (SAG-016 and SAG-057)	CG		N67/CG			
SA Option 6 (SAG-036 and SAG-062)	EB		EB			
	CW/CG		CW/IG/ CG/N67	EB/CW	CG/N67	
SA Option 13 (SAG-023 and SAG-070)					MC/CP	
Preferred Approach Option References	SAG-001	SAG-039	SAG-046	SAG-079	SA Option 1 (SAG-016 and SAG-057)	SA Option 6 (SAG-036 and SAG-062)

Key	
Construction Phase	
Operation Phase	
Construction and Operation	
Carrowmore Point to Spanish Point and Islands SAC	CP
East Burren Complex SAC	EB
Coole-Garryland SPA	CG
Corofin Wetlands SPA	CW
Inner Galway Bay SPA	IG
Mid-Clare Coast SPA	MC
N67 Road	N67

There could be cumulative effects associated with construction in terms of traffic, noise and dust for the options located along the N67 road (indicated by N67 in Table 6.1). These could be mitigated by standard mitigation measures such as planning of construction traffic routes and movements and engaging with local residents about the disruption. With these standard good practice measures in place, there are unlikely to be significant cumulative effects.

There is potential for cumulative effects from pollution impacts on Carrowmore Point to Spanish Point and Islands SAC (shown as 'CP' in Table 6.1) if construction of SA options 1 and 13 are concurrent. There could be cumulative effects from habitat loss (SAG-001 and SA option 6), spread of invasive non-native species (SAG-001, 079 and SA option 6) and disturbance (SAG-001 and 079) during construction and habitat degradation (SAG-001, 046 and SA option 6) and water table/availability (SAG-001, 046 and SA option 6) during operation of the SAF Preferred Approach on the East Burren Complex SAC. This is represented in Table 6.1 as 'EB'. There is potential for cumulative effects from disturbance impacts on Coole-Garryland SPA from SAG-001, 046, and SA options 1 and 6; Corofin Wetlands SPA from SAG-001, 046, 079 and SA option 6; Inner Galway Bay SPA from SAG-046 and SA option 6; and Mid-Clare Coast SPA from SA option 1 and 13 ('CG', 'CW', 'IG' and 'MC' in Table 6.1 respectively) if construction is concurrent.

However, these can be managed by standard good practice mitigation, such as having buffers along the edge of the river and having an emergency plan in place during construction. With these standard good practice measures in place, there are unlikely to be significant cumulative effects to the Slaney River Valley SAC. The impacts on the European designations are provided in the NIS and also summarised in chapter 9 of this review. Any option specific mitigation measures are included in section 6.3.4 of the NIS.

6.1.2 Cumulative Effects during Operation

The SEA has identified that, at a plan level, there is potential for cumulative effects during the operational phase of the SA Preferred Approach on East Burren Complex SAC given that SAF-046 and SA option 6 have the potential for hydrological changes and water table impacts to the sites. The options include an increase or new groundwater abstraction (see Figure 6.1). Note that Figure 6.1 also includes an index in Appendix C. These abstractions could potentially lead to changes in water table/availability and hydrological changes during operation that could impact QI habitats. The impacts on the European designations are provided in the NIS and also summarised in chapter 9 of this review. The NIS concluded that with general mitigation measures and hydrogeological modelling, there will be no adverse cumulative effects on the integrity of East Burren Complex SAC.

The potential for cumulative effects on groundwater bodies have been considered in a hydrogeological assessment of the groundwater abstractions commissioned by Uisce Éireann (Irish Water, 2022). This hydrogeological assessment considers the abstraction quantities and proximities and concludes that all groundwater bodies used for the SAG abstractions have good quantitative status and the risk of combined effects on groundwater body WFD objectives, or on existing abstractions, is considered low.

The potential for cumulative effects on European designated sites has been considered in the NIS. The NIS concluded that there will be no operational cumulative effects to the sites.

There could also be cumulative effects in terms of carbon across the SA Preferred Approach. The whole life carbon estimate (including construction and operation) for the SA Preferred Approach indicates increased contribution to carbon emissions related to carbon embodied in materials used for construction and through operational energy use and water treatment. Generally, in terms of carbon emissions, increase in carbon emissions can be considered a significant effect, as these add cumulatively across all developments and contribute to the national target for carbon. However, consideration also needs to be

given to the additional water supply provided from the options and therefore the overall carbon efficiency in terms of carbon emissions per ML of supply is an appropriate metric and for SAG this averages as 0.17 tCO₂e/ML (lifetime sum). Mitigation for carbon emissions could include increased sourcing of energy from renewable sources and improving energy efficiency. This could be undertaken alongside leakage reduction and campaigns to raise awareness of measures to reduce water consumption (which in turn would reduce energy consumption). This could include the promotion of water efficient devices and working with planning authorities and developers to encourage new development to be water efficient.

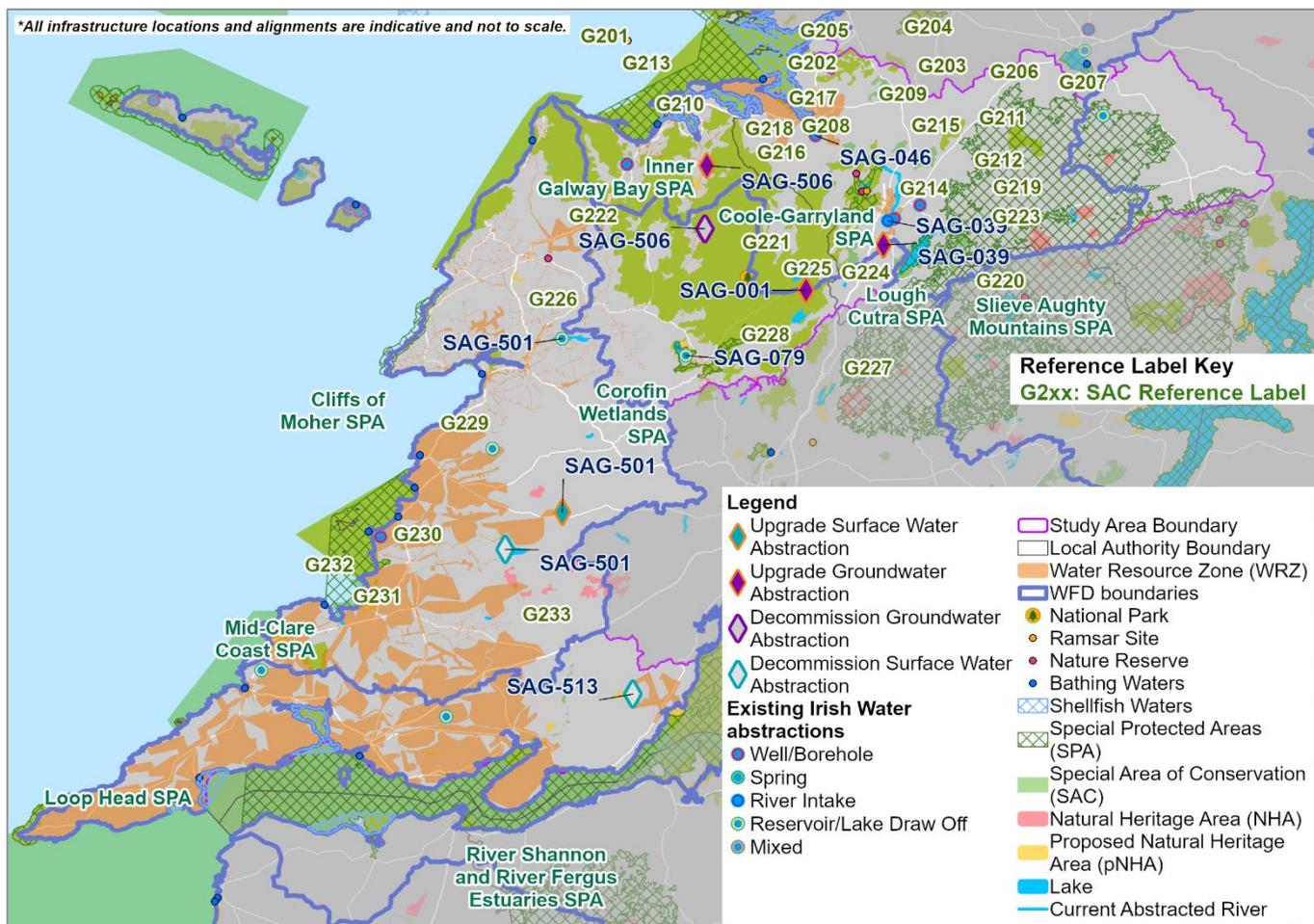


Figure 6.1 SA Preferred Approach Abstractions in SAG

6.2 Cumulative Effects with Other Developments

The SAG Preferred Approach has been assessed alongside other developments that could occur within the plan area. Potential cumulative effects could include increased traffic and noise. These could be mitigated by standard mitigation measures, such as planning of construction traffic routes and informing local residents about the works. With these standard good practice measures in place, there are unlikely to be significant cumulative effects.

Table 6.2 shows that within SAG there are several developments that could cause cumulative effects with the SA Preferred Approach. There are a number of projects near or in Ennistimon, Ennis, Galway, Gort, Limerick, and along the M18, N67, N68, and N85 routes. Other developments that were not considered further due to the size and the distance of the developments from the SA Preferred Approach are the Opera Site, Limerick works; National SAG Cycle Network - Galway to Athlone Cycleway; National

Parks - Location #7 of 8 - Keelhillia; Vandeleur Estate; West Clare Railway Greenway - Section 1 Kilkee to Kiltrush; and Ennistymon Innovation Centre.

6.2.1 Cumulative Effects during Construction

The projects near or in Lehinch (Lahinch Wastewater Treatment Plant), Kinvarra (Kinvara Boardwalk and Walkway), Ennistimon (Ennistymon School Campus, Ennistymon to Milltown Malbay Greenway and Ennis to Ennistymon Greenway), Gort (Gort Inse Guaire and Gort Lowlands Flood Relief Scheme) and Corofin (Ireland's National Parks - Location #5 of 6 - Corofin), and along the M18, N67, N68, and N85 routes could result in cumulative effects with the SAG Preferred Approach if they were to be constructed at the same time (represented in Table 6.2 as 'L', 'K', 'E', 'G' and 'C', and 'M18', 'N67', 'N68' and 'N85' respectively). Potential effects could include increased traffic and noise to the residential and commercial properties near or in these locations. These could be mitigated by standard mitigation measures, such as planning construction traffic routes and informing local residents about the works. With these standard good practice measures in place, there are unlikely to be significant cumulative effects.

The plan level assessment indicates that there is potential for cumulative effects on cultural heritage assets including archaeological resources related to the total extent of the ground works required, this will need to be considered further as detailed route alignments and site locations are determined along with approaches for more detailed desk studies, investigation and mitigation.

There is potential for cumulative effects from pollution and disturbance impacts on the Inner Galway Bay SPA ('IG' in Table 6.2) if the construction phase of N59 Moycullen Bypass works (pollution only); Athenry/Bia Innovator works; Galway City Ring Road works; Galway Public Spaces and Streets Project works; 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 works; and Kinvara Boardwalk and Walkway is concurrent with the SAG Preferred Approach.

There is potential for cumulative effects from pollution and disturbance impacts on the River Shannon and River Fergus Estuaries SPA ('RSRF' in Table 6.2) if the construction phase of N21/N69 Limerick to Adare to Foynes; Barrack Square and Old Barrack Street and O'Connell Square and High Street works, the Clonroadmore Wastewater Treatment Plant works, the Ennis Town Centre Regeneration works, the Ennis Library works, and the St Joseph's Community Nursing Unit, Ennis works; Foynes Port Capacity Extension Works, and the Foynes Flying Boat & Maritime Museum works; King's Island Flood Relief Scheme works (disturbance only); Digital Collaboration and Virtual Reality Centre works, the Condell Road social housing works, the Clonmacken social housing works, the Limerick Library works, the Limerick Flood Relief Scheme works, the Limerick Wastewater Treatment Plant works, the LIT Applied Science & IT Building works, The National Laboratory works, the Coonagh to Knockalisheen works, the Churchfield, Southhill social housing works and the St. Camillus Community Hospital works; Listowel Bypass works; Murroe Community Hub works (disturbance only); and Shannon Flood Relief Scheme is concurrent with the SAG Preferred Approach.

There is potential for cumulative effects from habitat loss, mortality, pollution, spread of invasive non-native species and disturbance on the Lower River Shannon SAC ('LRS' in Table 6.2) if the construction phase of N21/N69 Limerick to Adare to Foynes (pollution and spread of invasive non-native species only); Barrack Square and Old Barrack Street and O'Connell Square and High Street works, the Clonroadmore Wastewater Treatment Plant works, the Ennis Town Centre Regeneration works, the

Ennis Library works, and the St Joseph's Community Nursing Unit, Ennis works; Foynes Port Capacity Extension Works, and the Foynes Flying Boat & Maritime Museum works; Shannon Crossing/Killaloe Bypass/R494 Upgrade works; King's Island Flood Relief Scheme works (only); Digital Collaboration and Virtual Reality Centre works, the Condell Road social housing works, the Clonmacken social housing works, the Limerick Library works, the Limerick Flood Relief Scheme works, the Limerick Wastewater Treatment Plant works, the LIT Applied Science & IT Building works, The National Laboratory works, the Coonagh to Knockalisheen works, the Churchfield, Southhill social housing works and the St. Camillus Community Hospital works; Listowel Bypass; and Shannon Flood Relief Scheme is concurrent with the SAG Preferred Approach.

There is potential for cumulative effects from pollution on the Galway Bay Complex SAC ('GB' in Table 6.2) if the construction phase of Athenry/Bia Innovator works; Galway City Ring Road works; Galway Public Spaces and Streets Project works; 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; and University College Hospital Galway, Radiation Oncology Unit works; Gort Lowlands Flood Relief Scheme works; and Kinvara Boardwalk and Walkway works is concurrent with the SAG Preferred Approach.

There is potential for cumulative effects from disturbance impacts on the Coole-Garryland SPA and Corofin Wetland SPA ('CG' and 'CW' in Table 6.2) if the construction phase of the Gort Lowlands Flood Relief Scheme, and Kinvara Boardwalk and Walkway is concurrent with the SAG Preferred Approach. There is also potential for cumulative effects from pollution and spread of invasive non-native species impacts on the Coole-Garryland Complex SAC (pollution only) and Inagh River Estuary SAC ('CGC' and 'IR' in Table 6.2) if the construction phase of the Gort Lowlands Flood Relief Scheme and Lahinch Wastewater Treatment Plant (respectively) is concurrent with the SAG Preferred Approach.

Table 6.2 Potential Cumulative Effects between Preferred Options and Other Developments in SAG

Preferred Approach Options							
Project Developments	SAG-001	SAG-039	SAG-046	SAG-079	SA Option 1 (SAG-016 and SAG-057)	SA Option 6 (SAG-036 and SAG-062)	SA Option 13 (SAG-023 and SAG-070)
Athenry/Bia Innovator works			GB/IGB GB			IG	

Preferred Approach Options							
Project Developments	SAG-001	SAG-039	SAG-046	SAG-079	SA Option 1 (SAG-016 and SAG-057)	SA Option 6 (SAG-036 and SAG-062)	SA Option 13 (SAG-023 and SAG-070)
Barrack Square and Old Barrack Street and O’Connell Square and High Street works, the Clonroadmore Wastewater Treatment Plant works, the Ennis Town Centre Regeneration works, the Ennis Library works, and the St Joseph’s Community Nursing Unit, Ennis works.							LRS/ RSRF/ N68
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; and University College Hospital Galway, Radiation Oncology Unit works			GB/IG/ N67				
			GB		N67	IG/N67	
Digital Collaboration and Virtual Reality Centre works, the Condell Road social housing works, the Clonmacken social housing works, the Limerick Library works, the Limerick Flood Relief Scheme works, the Limerick Wastewater Treatment Plant works, the LIT Applied Science & IT Building works, The National Laboratory works, the Coonagh to Knockalisheen works, the Churchfield, Southhill							LRS/ RSRF

Preferred Approach Options							
Project Developments	SAG-001	SAG-039	SAG-046	SAG-079	SA Option 1 (SAG-016 and SAG-057)	SA Option 6 (SAG-036 and SAG-062)	SA Option 13 (SAG-023 and SAG-070)
social housing works and the St. Camillus Community Hospital works							
Ennis to Ennistymon Greenway					E/N85		
Ennistymon School Campus - 20245S & 91518F					E/N67		
Ennistymon to Milltown Malbay Greenway			N67		E/N67	N67	
Foynes Port Capacity Extension Works, and the Foynes Flying Boat & Maritime Museum works							LRS/RSRF
Galway City Ring Road works			GB/IG/N67		N67	IG/N67	
Galway Public Spaces and Streets Project works			GB/IG/N67 GB		N67	N67	
Gort Inse Guaire		G/M18					
Gort Lowlands Flood Relief Scheme	CW/CG	G/CGC/M18	GB/IG/CG/CW GB/CT/CGC	CW	CG	IG/CG/CW	
Inis Cealtra Island							
Ireland's National Parks - Location #5 of 6 - Corofin				C			
King's Island Flood Relief Scheme works							LRS/RSRF
Kinvara Boardwalk and Walkway	CW/CG		GB/IG/CG/CW/N67/K	CW	CG/N67	IG/CW/CG/N67	
Lahinch Wastewater Treatment Plant			N67		IR/N67/L	N67	

Preferred Approach Options							
Project Developments	SAG-001	SAG-039	SAG-046	SAG-079	SA Option 1 (SAG-016 and SAG-057)	SA Option 6 (SAG-036 and SAG-062)	SA Option 13 (SAG-023 and SAG-070)
Listowel Bypass works							LRS/ RSRF
Milltown Malbay to Moyasta Greenway			N67		N67	N67	
Murroe Community Hub works							RSRF
N21/N69 Limerick to Adare to Foynes							LRS/ RSRF
N59 Moycullen Bypass works			IG			IG	
Shannon Crossing/Killaloe Bypass/R494 Upgrade works							LRS
Shannon Flood Relief Scheme works							LRS/ RSRF
Wild Atlantic Way - Clare			N67		N67	N67	

Key	
Construction Phase	
Operation Phase	
Construction and Operation	
Galway Bay Complex SAC	GB
Inner Galway Bay SPA	IG
Lower River Shannon SAC	LRS
River Shannon and River Fergus Estuaries SPA	RSRF
Corofin Wetlands SPA	CW
Coole-Garryland SPA	CG
Coole-Garryland Complex SAC	CGC
Caherglassaun Turlough SAC	CT
Inagh River Estuary SAC	IR
M18 Road	M18
N67 Road	N67

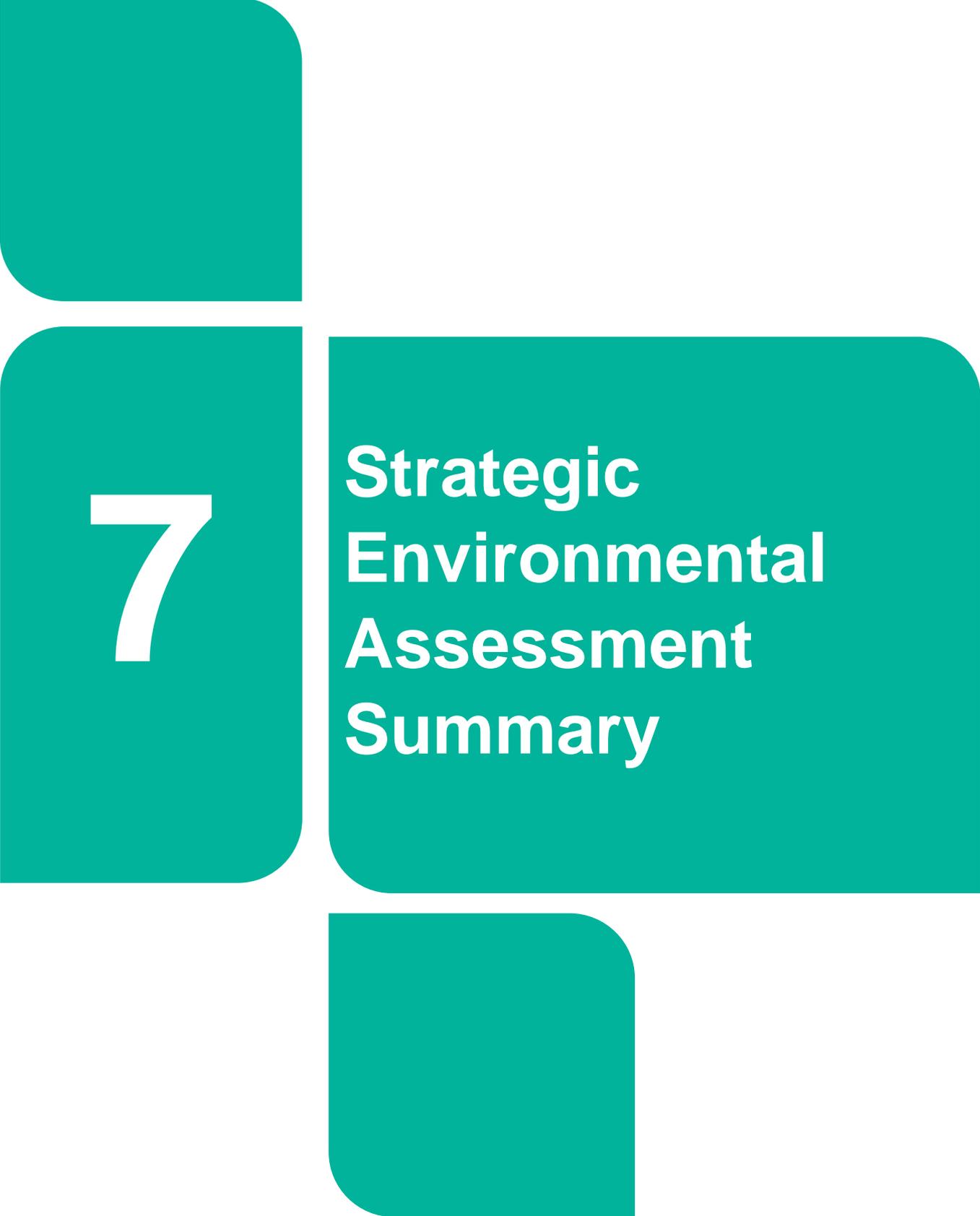
Key	
N68 Road	N68
N85 Road	N85
Lehinch	L
Kinvarra	K
Ennistimon	E
Gort	G
Corofin	C

6.2.2 Cumulative Effects during Operation

There could be cumulative effects on Galway Bay Complex SAC ('GB' in Table 6.2) from habitat degradation and water table/availability if operation of the SAG Preferred Approach and Athenry/Bia Innovator works; Galway Public Spaces and Streets Project works (habitat degradation only); 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; and University College Hospital Galway, Radiation Oncology Unit works; and Gort Lowlands Flood Relief Scheme works are concurrent. The Gort Lowlands Flood Redlief Scheme also has the potential for cumulative effects on the Caherglassaun Turlough SAC and Coole-Garryland Complex SAC ('CT' and 'CGC' in Table 6.2) through habitat degradation and water table/availability.

The Athenry/Bia Innovator works is hydrologically linked to the Galway Bay Complex SAC via Clarinbridge River. The 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; and University College Hospital Galway, Radiation Oncology Unit works; and the Galway Public Spaces and Streets Project works are hydrologically linked to the Galway Bay Complex SAC via the River Corrib. The Gort Lowlands Flood Relief Scheme is connected to the Galway Bay Complex SAC, Caherglassaun Turlough SAC, and Coole-Garryland Complex SAC via the Kilchreest waterbody. However, with the implementation of standard good practice measures there will be no adverse effects on the integrity of these European sites.

The plan level assessment indicates that there could be cumulative effects in terms of carbon emissions, as all developments will generate carbon emissions from operation whether this is from routine maintenance activities to water treatment and the energy required for moving water. As outlined in section 6.1.2, any increase in carbon can be considered a significant effect, as these add cumulatively across all developments and contribute to the national target for carbon. The same mitigation measures suggested for the SAG Preferred Approach apply, including increased sourcing of energy from renewable sources and raising awareness of measures to reduce water consumption (which in turn would reduce energy consumption). Working with third parties, including planning authorities and other developers, to identify water efficient measures and joint promotion of water issues would also further mitigate this effect.



7

**Strategic
Environmental
Assessment
Summary**

7 Strategic Environmental Assessment Summary

SEA objectives have been taken into account at each stage of the approach development process for SAG and a range of options and SA approaches have been considered and assessed, including a 'Do Minimum' approach.

Key beneficial impacts assessed include minor beneficial impacts for SA option 1, and SAG-039 and 079 associated with improving quality of water supply for local communities; and the subsequent benefits of this for public health. Minor beneficial impacts for SA options 6 and 13, and SAG-046 associated with decommissioning of WTPs/abstractions and the reduced noise and traffic disruption in the local area. Minor beneficial impacts against landscape for SA options 1, 6 and 13, and SAG-046 associated with the decommissioning of WTPs/abstractions.

Key potential adverse impacts identified at plan level include:

- Moderate adverse effects during construction against biodiversity for SA options 1, 6 and 13 which are within (SA options 6 and 13), hydrologically linked to (SA options 1 and 13), or within the zone of influence of (SA options 1 and 6), European designated sites. There is the potential for disturbance of QI species, and the loss (SA option 13 only) and pollution of QI habitats and supporting habitats;
- Moderate adverse effects during construction of SA option 1 and 13 associated with the materials required for new assets. Both of these options require over 20km of pipeline, however, these are necessary to make use of the existing assets;
- Moderate adverse effects against greenhouse gas emissions for SA option 1 due to the increase in abstraction and requirement to pump water through over 20km of pipeline;
- Moderate adverse effects to environmental climate change resilience and major adverse effects to water quality and status (during operation) for SA options 1 and 13, and SAG-039 due to the increase of existing surface water (SA option 1 and 13) and groundwater (SAG-039) abstractions at an unsustainable rate. Further studies are required to understand impacts and develop mitigation; and
- Moderate adverse effects associated with SA option 1 against cultural heritage as the option is located in a known archaeological site and there is potential for visual impacts during construction.

Cumulative effects assessment identified potential significant adverse effects in relation to carbon emissions, although the individual options are assessed as only neutral to moderate in relation to this SEA objective. This is because potential increases in carbon emissions contribute to national emissions. The average carbon intensity from the individual options provides an indicator for the new options in SAG but does not provide a complete picture as it does not fully take account of efficiencies from replacement of failing infrastructure, treatment technology or potential for mitigation, such as use of renewable energy sources in relation to the whole network. Insufficient information is available for the cumulative effects assessment to consider how total study area carbon emissions will change overall and per ML of water.

SEA mitigation identified to address the key adverse impacts identified above includes further hydrological or hydrogeological modelling (as appropriate) to further inform understanding of potential impacts on the European and national designated sites identified as potentially affected by increased abstractions from existing surface and groundwater sources (see the NIS of the Framework Plan for further information).

Other mitigation identified includes development of construction environmental management plans, public consultation with local residents on disruption during construction and consideration of the waste hierarchy in design. Measures to address the cumulative impact for carbon emissions include sourcing the energy supply from renewable sources. All developments will aim to achieve as far as possible requirements for no net loss in biodiversity or enhancement, as set out in the Biodiversity Action Plan (Irish Water, 2021). There may be potential to also provide opportunities for carbon sequestration with biodiversity enhancement. In addition, there are opportunities to reduce water demand (which in turn would reduce energy and carbon) by raising awareness of water issues, promoting water efficient devices and through leakage reduction.

In general, these are standard mitigation measures with some specific measures and additional requirements for further assessment or monitoring (see the SEA Appendix and the NIS Appendix for AA and SEA standard mitigation measures respectively).

An overall summary assessment, including potential for cumulative and in-combination effects and other measures, identified to be progressed alongside the supply side options is provided in Table 7.1. Key mitigation and proposed monitoring measures are also shown.

Table 7.1 SEA Summary

SEA Objectives	SA Preferred Approach (PA) (SA Approach 4) Residual Effects Including Mitigation C – Construction (Short Term) O – Operational (Long Term)	Mitigation	Monitoring	
			Study Area Level	Scheme Level
SA Preferred Approach with interim measures as required and a programme of leakage reduction and water conservation measures, taking an adaptive approach to address uncertainty				
1. Protect public health and promote wellbeing	<p>C Minor Adverse</p> <p>O Neutral to Minor Beneficial</p> <p>The PA is expected to improve overall drinking water quality reliability and sustainability through the decommissioning of failing WTPs and the replacement of abstractions vulnerable to drought conditions. The PA is expected to reduce risks to access of good quality water supply across different conditions and over the plan period.</p>	<p>Standard good construction practice and consultation</p> <p>Further assessment of risks to water quality and consideration of catchment management initiatives to improve water quality and reduce treatment cost. For example, working with landowners and managers on practices to reduce levels of sediment and pollution from entering water courses through run off.</p>	<ul style="list-style-type: none"> • Level of service, and the frequency and duration of drought orders • Number of days/hours when water supply to people is disrupted due to drought, freeze-thaw or other service/infrastructure issues • Number of public rights of way closures/diversions and length of paths created compared to loss 	<ul style="list-style-type: none"> • Duration of construction works, and number of complaints received regarding construction works • Duration of temporary closures of footpaths and other recreational assets • Number of days where recreational uses are impeded
2. Protect and enhance biodiversity and contribute to	<p>C Minor Adverse to Moderate Adverse</p> <p>O Neutral to Minor Adverse</p> <p>Impacts from construction works for pipelines and service reservoirs on biodiversity. These can be</p>	<p>Routing/siting to avoid impacts. Standard good construction practice and specific measures as identified in the NIS of the Framework Plan.</p>	<ul style="list-style-type: none"> • Temporary and permanent habitats lost vs habitats created/enhanced • Site condition and population data for QI of European and National designated sites. 	<ul style="list-style-type: none"> • Monitor construction activities to ensure compliance

SEA Objectives	SA Preferred Approach (PA) (SA Approach 4) Residual Effects Including Mitigation C – Construction (Short Term) O – Operational (Long Term)	Mitigation	Monitoring	
			Study Area Level	Scheme Level
resilient ecosystems	<p>minimised through careful routing and siting.</p> <p>Potential for construction and operational impacts on European and National designated sites.</p>	<p>Design to meet no net loss biodiversity or achieve enhancement, where possible, on or off site and in line with the Biodiversity Action Plan objectives.</p> <p>Further hydrological/hydrogeological assessments to determine impacts on designated sites.</p> <p>Operating rules to limit impacts on European and National sites.</p>		
3. To protect landscapes, townscapes and visual amenity	<p>C Neutral to Minor Adverse</p> <p>O Neutral to Minor Beneficial</p> <p>Construction landscape impacts and long term impacts from above ground structures, such as new WTPs.</p>	<p>Routing and siting to reduce tree loss and appropriate location and design of above ground structures with landscape planting.</p> <p>Reinstatement of land use and vegetation.</p>	<ul style="list-style-type: none"> • Total working area of pipelines non-designated landscapes • Land use/landscape features re-established for schemes over appropriate period – areas/km successfully restored to meet requirements 	<ul style="list-style-type: none"> • Duration of construction works • Number of complaints received regarding visual impact of construction works
4. Protect and where appropriate enhance, built	<p>C Neutral to Moderate Adverse</p> <p>O Neutral</p> <p>New resources required for construction works, including</p>	<p>Materials management to be integrated into design to optimise use of existing resources and</p>	<ul style="list-style-type: none"> • Loss of greenfield land, including agricultural, forestry or other land uses 	<ul style="list-style-type: none"> • Construction wastes sent to landfill

SEA Objectives	SA Preferred Approach (PA) (SA Approach 4) Residual Effects Including Mitigation C – Construction (Short Term) O – Operational (Long Term)	Mitigation	Monitoring	
			Study Area Level	Scheme Level
and natural assets and reduce waste	extensive lengths of pipeline, service reservoirs and upgraded WTPs. Ongoing maintenance requirements.	minimise waste from construction and operation.	<ul style="list-style-type: none"> Disruptions to strategic infrastructure/services Use of waste management plans Volume of drinking water treatment residuals sent to landfill 	
5. Reduce greenhouse gas emissions	<p>C Neutral to Moderate Adverse</p> <p>O Neutral to Moderate Adverse</p> <p>Embodied and operational carbon contribute to national level carbon emission targets.</p> <p>Leakage and water efficiency can contribute to reducing carbon.</p>	<p>Design to minimise embodied carbon emissions and optimise operational efficiency.</p> <p>Seek renewable energy supply sources and optimise use of leakage and water efficiency measures to reduce carbon.</p> <p>Consider offsetting approaches with multiple benefits for water quality, carbon sequestration and linking with other objectives.</p>	<ul style="list-style-type: none"> Percentage of energy supply from renewable sources or reduced energy use Carbon footprint (total tonnes) per year, predicted over plan period, lifetime of schemes and carbon intensity of water resource options (tonnes/ML/d) 	<ul style="list-style-type: none"> Carbon footprint (total tonnes) during construction Operational Carbon Intensity kgsCO₂equic/ML
6. Contribute to environmental climate	<p>C Neutral to Moderate Adverse</p> <p>O Neutral to Moderate Adverse</p> <p>Abstractions generally reduce environmental resilience but</p>	Consider how operation can further reduce climate change pressure on at risk sources and associated designations,	<ul style="list-style-type: none"> WFD waterbody status objectives at risk and designated site condition status 	<ul style="list-style-type: none"> None identified

SEA Objectives	SA Preferred Approach (PA) (SA Approach 4) Residual Effects Including Mitigation C – Construction (Short Term) O – Operational (Long Term)	Mitigation	Monitoring	
			Study Area Level	Scheme Level
change resilience	overall improved flexibility for operation using regional schemes has the potential to reduce pressure on at risk local resources. SA options 1 and 13, and SAG-039 require further assessment to understand their sustainability in the longer term.	particularly for SA options 1 and 13, and SAG-039. Sustainability review of sources taking account of groundwater and surface water interconnections for SA options 1 and 13, and SAG-039.	<ul style="list-style-type: none"> Frequency of drought orders requiring change to normal abstractions/ compensation releases 	
7. Protect and improve surface water and groundwater status	C Neutral O Neutral to Major Adverse Generally, new/increased abstractions are limited to allowable limits and have a low risk of adverse effect on WFD waterbody status objectives.	Further investigation to consider effects on groundwater abstraction on the surface water environment.	<ul style="list-style-type: none"> WFD waterbody status objectives at risk 	<ul style="list-style-type: none"> Pollution incidents during construction
8. Avoid flood risk	C Neutral to Minor Adverse O Neutral Potential loss of flood plain increasing flood risk from construction and location of above ground structures for SAG-046.	Siting and design of schemes to take account of flood risk and design for flood risk resilience.	<ul style="list-style-type: none"> Number of options at risk of flooding at each AEP level 	<ul style="list-style-type: none"> Lost time to flooding Lost time to power supply interruptions

SEA Objectives	SA Preferred Approach (PA) (SA Approach 4) Residual Effects Including Mitigation C – Construction (Short Term) O – Operational (Long Term)	Mitigation	Monitoring	
			Study Area Level	Scheme Level
9. Protect and where appropriate, enhance cultural heritage assets	C Neutral to Moderate Adverse O Neutral Potential construction impacts on unknown archaeological interest. Impacts on known interests are expected to be avoided.	Standard good practice approaches to minimise potential impacts.	<ul style="list-style-type: none"> Number of archaeological assets adversely affected by water resource options Number of options that are rerouted to avoid cultural heritage impacts Number of schemes including improvements to access recording of archaeological assets or communication/ interpretation of interest features 	<ul style="list-style-type: none"> Number of archaeological finds recorded during construction
10. Protect quality and function of soils	C Neutral to Minor Adverse O Neutral Potential for loss and damage to valuable soils during construction but impacts to geological assets are expected to be avoided.	Standard good practice to conserve and reinstate soils.	<ul style="list-style-type: none"> Soil Management Plans implemented Volume of contaminated land restored, or soils removed 	<ul style="list-style-type: none"> Total volume of soil removed or reused on site

8

Water Framework Directive Summary

8 Water Framework Directive Summary

Through the options identification and assessment process new options considered have been restricted to those expected to meet estimated sustainability requirements and all options have been assessed based on conservative allowable abstraction constraints. The options identified in SAG are also expected to be sustainable, based on additional plan-level desk-based assessment, in terms of avoiding deterioration of WFD status or avoiding conflict with meeting WFD objectives.

All groundwater bodies used for the SAG abstractions have good quantitative status (Irish Water, 2022), although the GWDTE-Caherglassaun Turlough GWB is considered 'At Risk' of failing it's WFD objectives. However, the risk of combined effects on groundwater body WFD objectives, or on existing abstractions, is considered low. Impacts, including cumulative effects with non Uisce Éireann abstractions, will need to be considered in further detail as part of project level consenting to demonstrate both sustainability for any connected surface waterbodies and groundwater dependent habitats and protected areas.

9

Appropriate Assessment Summary

9 Appropriate Assessment Summary

The NIS of the Regional Plan's conclusions for SAG, regarding 'In-combination effects with other plans and projects' and 'In-combination effects between Preferred Options', as set out below, and are included in more detail in Appendix E of the NIS for the Regional Plan.

Potential in-combination effects with other projects and plans were identified for the preferred options on the Corofin Wetlands SPA, Coole-Garryland Complex SAC and the Coole-Garryland SPA, Galway Bay Complex SAC, Inner Galway Bay SPA, Caherglassaun Turlough SAC, Inagh River Estuary SAC, Lower River Shannon SAC, and River Shannon and River Fergus Estuaries SPA. The potential effects include habitat loss, mortality, pollution, spread of invasive non-native species and disturbance impacts, habitat degradation, and water table/availability. The assessment concluded that with the mitigation identified there will be no adverse effects on the integrity of the European site in-combination with other plans or projects.

Potential in-combination effects between preferred options were identified for Carrowmore Point to Spanish Point and Islands SAC, East Burren Complex SAC, Coole-Garryland SPA, Corofin Wetlands SPA, Inner Galway Bay SPA, and Mid-Clare Coast SPA. The potential impacts include habitat degradation, water table /availability, pollution, habitat loss, spread of invasive non-native species and disturbance impacts. With the implementation of mitigation as detailed in Appendix E of the NIS, there will be no adverse effects on the integrity of European sites.



10

Recommendations for Implementation



10 Recommendations for Implementation

Environmental actions for the implementation plan and the draft monitoring plan are identified in:

- SEA Environmental Report of the Framework Plan – this includes general proposals and standard mitigation requirements (also see SEA Environmental Report Appendix); and
- SEA Environmental Report of the Regional Plan - this includes specific mitigation and monitoring requirements for the North West Region options and cumulative effects.

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Appendix A

Fine Screening Summaries

Key			
0 Neutral	-1 Minor adverse	-2 Moderate Adverse	-3 Major adverse
	1 Minor beneficial	2 Moderate Beneficial	3 Major Beneficial

Table A.1 Fine Screening Summary of Ground Water Options in SAG

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
SAG-01	Increase GW abstraction at Kilkeedy BH (Lough Mannagh Turlough groundwater body - karstic bedrock) and upgrade Kilkeedy WTP to supply deficit									0	0	-10
SAG-07	New GW abstraction to partly meet supply and new WTP									0	0	-12

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
SAG-13	New GW from St Brendan's Well and/or Oughtdarra Spring and new WTP to partly supply deficit. Possibly combine with increasing abstraction from Killeany Spring and/or Ballyvaughan.									0	0	-20
SAG-18	Increase GW abstraction from Turlough BH (Ballyvaughan Uplands groundwater body - karstic bedrock) and upgrade Turlough WTP									0	0	-8
SAG-19	New GW abstraction from Ballyvaughan PWS									0	0	-13
SAG-20	New GW abstraction from Akers spring in									1	0	-17

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
	Ballyvaughan to supply deficit											
SAG-34	Increase GW abstraction at Carran spring (Burren groundwater body - karstic bedrock) and upgrade Carran WTP									1	0	-12
SAG-39	Increase existing GW abstraction from boreholes (poorly productive bedrock - Caherglassaun Turlough groundwater body)									2	0	-15
SAG-46	Increase existing GW abstraction from Kinvara Well (karstic bedrock - Kinvara-Gort groundwater body) - saline intrusion									0	0	-8

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
SAG-59	New GW from St Brendan's Well and/or Oughtdarra Spring and new WTP to partly supply deficit. Possibly combine with increasing abstraction from Killeany Spring and/or Ballyvaughan PWS.									0	0	-17
SAG-60	New GW from St Brendan's Well and/or Oughtdarra Spring and new WTP to partly supply deficit. Possibly combine with increasing abstraction from Killeany Spring and/or Ballyvaughan PWS.									0	0	-18
SAG-62	Increase GW abstraction from Turlough BH (Ballyvaughan Uplands									0	0	-11

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
	groundwater body - karstic bedrock) and upgrade Turlough WTP											
SAG-78	Increase existing GW abstraction from Killeany Spring to meet partial deficit									0	0	-17

Table A.2 Fine Screening Summary of Interconnection Options in SAG

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
SAG-16	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									1	0	-19
SAG-21	Interconnect Turlough and Ennistymon WRZs for increased resilience and to supply deficit									0	0	-17
SAG-75	Interconnect Ennistymon to Corofin and supply deficit from increased abstraction from Lough									0	0	-11

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
	Inchiquin (Corofin WTP upgrade)											

Table A.3 Fine Screening Summary of Rationalisation Options in SAG

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
SAG-17	Rationalise Ennistymon to New Doolough WTP (West Clare WRZ) and abandon existing WTP									1	0	-18
SAG-22	Rationalise Turlough to Ennistymon WRZ to									0	0	-18

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
	supply deficit and abandon existng WTP											
SAG-36	Rationalise Carran WRZ to Turlough WRZ to supply deficit									0	0	-12
SAG-43	Rationalise Gort WRZ to Galway WRZ via Loughrea WRZ (new source required)									0	0	-15
SAG-50	Rationalise Kinvara WRZ to Lough Corrib WRZ (Galway City, Tuam, Loughrea) in SA-D to supply full demand									0	0	-14
SAG-70	Rationalise Killadysart PWS WRZ to West Clare Old Doolough WTP									1	0	-12
SAG-77	Rationalise Ennistymon to Corofin and supply deficit from increased									0	0	-12

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
	abstraction from Lough Inchiquin (Corofin WTP upgrade)											
SAG-81	Rationalise Kinvara to Gort WRZ new Lough Cutra WTP									1	0	-24

Table A.4 Fine Screening Summary of Surface Water Options in SAG

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
SAG-12	New SW abstraction from River Inagh to partly									0	0	-18

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
	supply deficit, upgrade existing WTP/new WTP											
SAG-23	Increase SW abstraction from Doo Lough and upgrade existing New Doolough WTP. Rationalise Old Doolough WTP.									1	0	-12
SAG-24	Increase SW abstraction from Doo Lough and upgrade existing New Doolough WTP. Rationalise Old Doolough WTP.									1	0	-10
SAG-38	Increase SW abstraction from existing River Cannahowna source - river engineering (weir?)									1	0	-14
SAG-40	New SW abstraction from Lough Cutra and new									1	0	-20

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
	WTP. Abandon existing river abstraction d/s of lake.											
SAG-54	New SW abstraction from Lough Cutra and new WTP to supply Gort, Kinvara and nearby GWSs. Abandoning Gort and Kinvara existing sources.									1	0	-24
SAG-57	Increase SW abstraction from Doo Lough and upgrade existing New Doolough WTP. Rationalise Old Doolough WTP.									1	0	-19
SAG-58	Increase SW abstraction from Doo Lough and upgrade existing New Doolough WTP.									1	0	-18

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
	Rationalise Old Doolough WTP.											
SAG-74	Increase existing SW abstraction and upgrade existing WTP									0	0	-11
SAG-76	Increase existing SW abstraction and upgrade existing WTP									0	0	-12

Table A.5 Fine Screening Summary of WTP Upgrade Options in SAG

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
SAG-79	No deficit - upgrade Corofin WTP									0	0	-7

Appendix B

SA Approaches for SAG

Note: SA Options are also referred to as Group Options

WRZ	Preferred Approach - SA Approach 4		Least Cost - SA Approach 4		Best Environmental - SA Approach 2	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
0300SC0005: Kilkeedy PWS	SAG-01 Increase GW abstraction at Kilkeedy BH (Lough Mannagh Turlough groundwater body - karstic bedrock) and upgrade Kilkeedy WTP to supply deficit	-	SAG-01 Increase GW abstraction at Kilkeedy BH (Lough Mannagh Turlough groundwater body - karstic bedrock) and upgrade Kilkeedy WTP to supply deficit	-	SAG-01 Increase GW abstraction at Kilkeedy BH (Lough Mannagh Turlough groundwater body - karstic bedrock) and upgrade Kilkeedy WTP to supply deficit	-
0300SC0013: Killadysart PWS	SAG-70 Increase SW abstraction from Doo Lough and upgrade existing New Doolough WTP. Rationalise Old Doolough WTP.	13	SAG-70 Increase SW abstraction from Doo Lough and upgrade existing New Doolough WTP. Rationalise Old Doolough WTP.	13	SAG-70 Increase SW abstraction from Doo Lough and upgrade existing New Doolough WTP. Rationalise Old Doolough WTP.	13
0300SC0021: Ennistymon	SAG-16 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	1	SAG-16 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	1	SAG-75 Interconnect Ennistymon to Corofin and supply deficit from increased abstraction from Lough Inchiquin (Corofin WTP upgrade)	14
0300SC0022: Turlough	SAG-62	6	SAG-62	6	SAG-62	6

WRZ	Preferred Approach - SA Approach 4		Least Cost - SA Approach 4		Best Environmental - SA Approach 2	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
	Increase GW abstraction from Turlough BH (Ballyvaughan Uplands groundwater body - karstic bedrock) and upgrade Turlough WTP		Increase GW abstraction from Turlough BH (Ballyvaughan Uplands groundwater body - karstic bedrock) and upgrade Turlough WTP		Increase GW abstraction from Turlough BH (Ballyvaughan Uplands groundwater body - karstic bedrock) and upgrade Turlough WTP	
0300SC0001: West Clare	SAG-57 Increase abstraction from Doolough and upgrade existing New Doolough WTP. Rationalise Old Doolough WTP. SAG-23 Rationalise Killadysart PWS WRZ to West Clare Old Doolough WTP	1/13	SAG-57 Increase abstraction from Doolough and upgrade existing New Doolough WTP. Rationalise Old Doolough WTP. SAG-23 Rationalise Killadysart PWS WRZ to West Clare Old Doolough WTP	1/13	SAG-23 Increase SW abstraction from Doolough and upgrade existing New Doolough WTP. Rationalise Old Doolough WTP.	13
0300SC0003: Corofin PWS	SAG-79 No deficit - upgrade Corofin WTP	-	SAG-79 No deficit - upgrade Corofin WTP	-	SAG-74 Increase existing SW abstraction and upgrade existing WTP	14
0300SC0004: Carran PWS	SAG-36 Rationalise Carran WRZ to Turlough WRZ to supply deficit	6	SAG-36 Rationalise Carran WRZ to Turlough WRZ to supply deficit	6	SAG-36 Rationalise Carran WRZ to Turlough WRZ to supply deficit	6
1200SC0016: Gort	SAG-39 Increase existing GW abstraction from boreholes (poorly productive	-	SAG-39 Increase existing GW abstraction from boreholes (poorly productive	-	SAG-39 Increase existing GW abstraction from boreholes (poorly productive	-

WRZ	Preferred Approach - SA Approach 4		Least Cost - SA Approach 4		Best Environmental - SA Approach 2	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
	bedrock - Caherglassaun Turlough groundwater body)		bedrock - Caherglassaun Turlough groundwater body)		bedrock - Caherglassaun Turlough groundwater body)	
1200SC0023: Kinvara	SAG-46 Increase existing GW abstraction from Kinvara Well (karstic bedrock - Kinvara-Gort groundwater body) - saline intrusion	-	SAG-46 Increase existing GW abstraction from Kinvara Well (karstic bedrock - Kinvara-Gort groundwater body) - saline intrusion	-	SAG-46 Increase existing GW abstraction from Kinvara Well (karstic bedrock - Kinvara-Gort groundwater body) - saline intrusion	-

WRZ	Quickest Delivery - SA Approach 4		Most Resilient - SA Approach 2		Lowest Carbon - SA Approach 3	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
0300SC0005: Kilkeedy PWS	SAG-01 Increase GW abstraction at Kilkeedy BH (Lough Mannagh Turlough groundwater body - karstic bedrock) and upgrade Kilkeedy WTP to supply deficit	-	SAG-01 Increase GW abstraction at Kilkeedy BH (Lough Mannagh Turlough groundwater body - karstic bedrock) and upgrade Kilkeedy WTP to supply deficit	-	SAG-01 Increase GW abstraction at Kilkeedy BH (Lough Mannagh Turlough groundwater body - karstic bedrock) and upgrade Kilkeedy WTP to supply deficit	-
0300SC0013: Killadysart PWS	SAG-70 Rationalise Killadysart PWS WRZ to West Clare Old Doolough WTP and decommission Killadysert WTP.	13	SAG-70 Rationalise Killadysart PWS WRZ to West Clare Old Doolough WTP and decommission Killadysert	13	SAG-70 Rationalise Killadysart PWS WRZ to West Clare Old Doolough WTP and decommission Killadysert	13

WRZ	Quickest Delivery - SA Approach 4		Most Resilient - SA Approach 2		Lowest Carbon - SA Approach 3	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
			WTP.		WTP.	
0300SC0021: Ennistymon	SAG-16 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	1	SAG-75 Interconnect Ennistymon to Corofin and supply deficit from increased abstraction from Lough Inchiquin (Corofin WTP upgrade)	14	SAG-77 Rationalise Ennistymon to Corofin and supply deficit from increased abstraction from Lough Inchiquin (Corofin WTP upgrade)	15
0300SC0022: Turlough	SAG-62 Increase GW abstraction from Turlough BH (Ballyvaughan Uplands groundwater body - karstic bedrock) and upgrade Turlough WTP	6	SAG-62 Increase GW abstraction from Turlough BH (Ballyvaughan Uplands groundwater body - karstic bedrock) and upgrade Turlough WTP	6	SAG-62 Increase GW abstraction from Turlough BH (Ballyvaughan Uplands groundwater body - karstic bedrock) and upgrade Turlough WTP	6
0300SC0001: West Clare	SAG-57 Increase abstraction from Doo Lough and upgrade existing New Doolough WTP. Rationalise Old Doolough WTP. SAG-23	1/13	SAG-23 Rationalise Killadysart PWS WRZ to West Clare Old Doolough WTP and decommission Killadysert WTP.	13	SAG-23 Rationalise Killadysart PWS WRZ to West Clare Old Doolough WTP and decommission Killadysert WTP.	13

WRZ	Quickest Delivery - SA Approach 4		Most Resilient - SA Approach 2		Lowest Carbon - SA Approach 3	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
	Rationalise Killadysart PWS WRZ to West Clare Old Doolough WTP and decommission Killadysert WTP.					
0300SC0003: Corofin PWS	SAG-79 No deficit - upgrade Corofin WTP	-	SAG-74 Increase existing SW abstraction and upgrade existing WTP	14	SAG-76 Increase existing SW abstraction and upgrade existing WTP	15
0300SC0004: Carran PWS	SAG-36 Rationalise Carran WRZ to Turlough WRZ to supply deficit	6	SAG-36 Rationalise Carran WRZ to Turlough WRZ to supply deficit	6	SAG-36 Rationalise Carran WRZ to Turlough WRZ to supply deficit	6
1200SC0016: Gort	SAG-39 Increase existing GW abstraction from boreholes (poorly productive bedrock - Caherglassaun Turlough groundwater body)	-	SAG-39 Increase existing GW abstraction from boreholes (poorly productive bedrock - Caherglassaun Turlough groundwater body)	-	SAG-39 Increase existing GW abstraction from boreholes (poorly productive bedrock - Caherglassaun Turlough groundwater body)	-
1200SC0023: Kinvara	SAG-46 Increase existing GW abstraction from Kinvara Well (karstic bedrock - Kinvara-Gort groundwater body) - saline intrusion	-	SAG-46 Increase existing GW abstraction from Kinvara Well (karstic bedrock - Kinvara-Gort groundwater body) - saline intrusion	-	SAG-46 Increase existing GW abstraction from Kinvara Well (karstic bedrock - Kinvara-Gort groundwater body) - saline intrusion	-

WRZ	Best Appropriate Assessment - SA Approach 1	
	Option Description	SA Option
0300SC0005: Kilkeedy PWS	SAG-01 Increase GW abstraction at Kilkeedy BH (Lough Mannagh Turlough groundwater body - karstic bedrock) and upgrade Kilkeedy WTP to supply deficit	-
0300SC0013: Killadysart PWS	SAG-07 New GW abstraction to partly meet supply and new WTP	-
0300SC0021: Ennistymon	SAG-75 Interconnect Ennistymon to Corofin and supply deficit from increased abstraction from Lough Inchiquin (Corofin WTP upgrade)	14
0300SC0022: Turlough	SAG-62 Increase GW abstraction from Turlough BH (Ballyvaughan Uplands groundwater body - karstic bedrock) and upgrade Turlough WTP	6
0300SC0001: West Clare	SAG-24 Increase SW abstraction from Doo Lough and upgrade existing New Doolough WTP. Rationalise Old Doolough WTP.	-
0300SC0003: Corofin PWS	SAG-74 Increase existing SW abstraction and upgrade existing WTP	14
0300SC0004: Carran PWS	SAG-36 Rationalise Carran WRZ to Turlough WRZ to supply deficit	6
1200SC0016: Gort	SAG-39	-

WRZ	Best Appropriate Assessment - SA Approach 1	
	Option Description	SA Option
	Increase existing GW abstraction from boreholes (poorly productive bedrock - Caherglassaun Turlough groundwater body)	
1200SC0023: Kinvara	SAG-46 Increase existing GW abstraction from Kinvara Well (karstic bedrock - Kinvara-Gort groundwater body) - saline intrusion	-

Appendix C

Figure Index Tables

Designated Site	Label	Designated Site	Label	Designated Site	Label
SACs (Figure 2.2)					
Galway Bay Complex SAC	G201	Carrowbaun, Newhall and Ballylee Turloughs SAC	G212	Gortacarnaun Wood SAC	G223
Castletaylor Complex SAC	G202	Black Head-Poulsallagh Complex SAC	G213	Ballyogan Lough SAC	G224
Lough Fingall Complex SAC	G203	Caherglassaun Turlough SAC	G214	Moyree River System SAC	G225
Kiltiernan Turlough SAC	G204	Kiltartan Cave (Coole) SAC	G215	Inagh River Estuary SAC	G226
Ardrahan Grassland SAC	G205	Coole-Garryland Complex SAC	G216	Dromore Woods And Loughs SAC	G227
Peterswell Turlough SAC	G206	East Burren Complex SAC	G217	Ballycullinan Lake SAC	G228
Sonnagh Bog SAC	G207	Moneen Mountain SAC	G218	Carrowmore Point To Spanish Point And Islands SAC	G229
Ballinduff Turlough SAC	G208	Drummin Wood SAC	G219	Carrowmore Dunes SAC	G230
Cahermore Turlough SAC	G209	Lough Cutra SAC	G220	Tullaheer Lough And Bog SAC	G231
Ballyvaughan Turlough SAC	G210	Termon Lough SAC	G221	Kilkee Reefs SAC	G232
Lough Coy SAC	G211	Ballyteige (Clare) SAC	G222	Lower River Shannon SAC	G233