Autumn 2022

Regional Water Resources Plan–Eastern and Midlands

Strategic Environmental Assessment

Appendix H: Study Area 5 – Environmental Review

Tionscadal Éireann
Project Ireland
2040

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

Baseline data included in the RWRP-EM has been incorporated from numerous sources including but not limited to; National Planning Framework, Central Statistics Office, Regional Spatial and Economic Strategies, Local Authority data sets, Regional Assembly data sets and Irish Water data sets. Data sources will be detailed in the relevant sections of the RWRP-EM. 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 Eastern and Midlands Region (referred to as the Regional Plan). The Regional Plan includes nine individual Study Area reviews (SA1-9) as appendices.

This Study Area 5 Environmental Review includes:

- Context for the Study Area Environmental Review;
- 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; and
- Recommendations for implementation, including mitigation and monitoring.

This Environmental Review summarises the environmental assessment undertaken for Study Area 5 within the Eastern and Midlands Region for the options and approaches considered and as outlined in the Study Area 5 Technical Report (RWRP-EM Appendix 5). 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 will form Appendices to the SEA Environmental Reports for the Regional Plans which form 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. The Framework Plan 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 implemented as part of the RWRP-EM provides a framework to identify potential solutions to address identified need. The key stages of the process are illustrated in Figure 1.1 and summarised below:

1) Identifying need – based on SDB and/or Drinking Water Safety Plan Barrier Assessment;
2) Scoping of the study area (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.

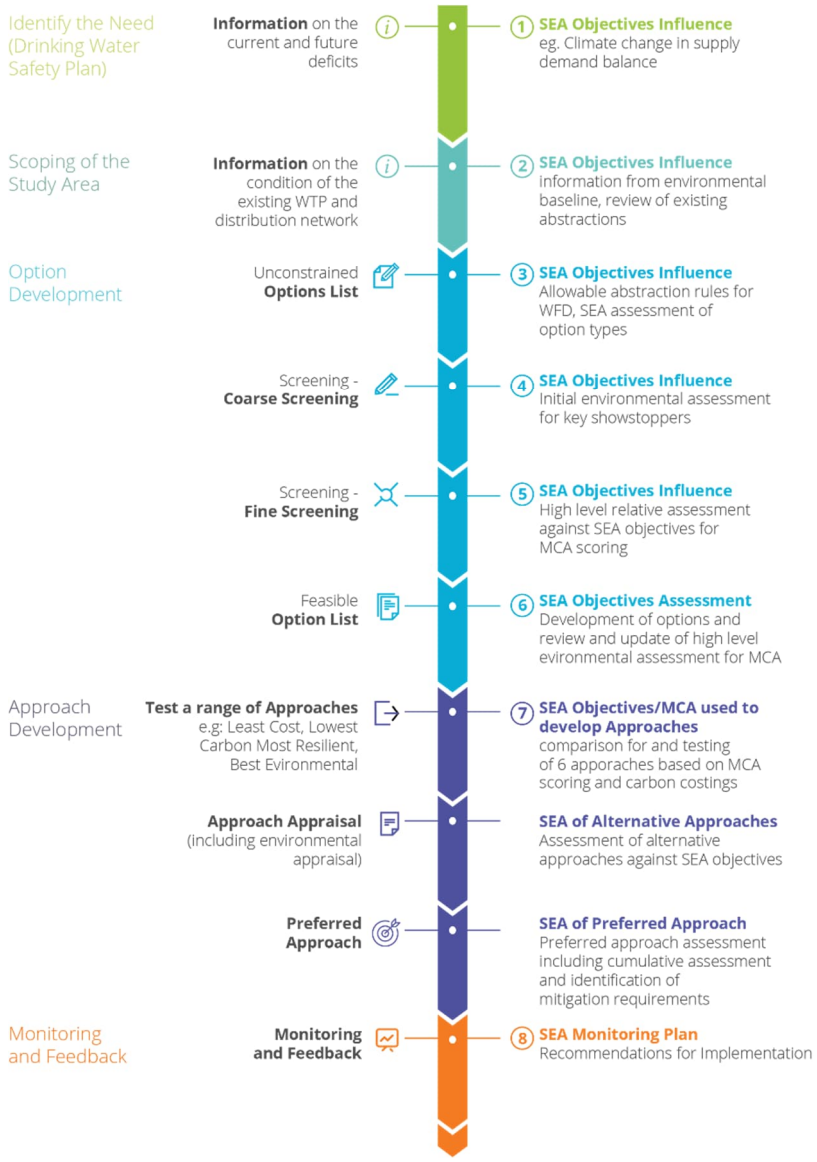

Figure 1.1 Option and Approach Development Process

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 Report was published for consultation alongside the draft Regional Plans for each of the four regions.

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

- Introduction for SEA, Water Framework 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 other 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 in 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	Water quality and resources Prevent deterioration of the WFD status of waterbodies with regard to both water quality and quantity due to Irish Water'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.
	Flood risk Protect and, where possible, reduce risk from ground water and surface water flooding as a result of Irish Water's activities.
Biodiversity	Protect and, where possible, enhance terrestrial, aquatic and soil biodiversity; particularly regarding European sites and protected species in providing water services.
Material assets	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. Minimise impacts on other material assets and existing water abstractions.
Landscape and visual amenity	Protect and, where possible, enhance designated landscapes in providing water services.
Climate change	Climate change mitigation Minimise contributions to climate change emissions to air (including greenhouse gas emissions) as a result of Irish Water's activities.
	Climate change adaptation

SEA Topic	SEA Objective
	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 developments 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 Eastern-Midlands region were available. At that point, Irish Water 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 Eastern Midlands region. The conclusions of that cumulative assessment are presented in the SEA Environmental Report for the Eastern-Midlands region.

If appropriate, the Preferred Approach identified for SA5 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 SA5 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 Irish Water is required to carry out. Habitats Directive requirements have been integrated into the options development process and conclusions from the NIS for SA5 are provided in chapter 9 of this review.

1.6 Study Area 5

The Eastern and Midlands Region is subdivided into nine 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 SA5, the location of SA5 in relation to the Eastern and Midlands Region is shown in Figure 1.2.

Study Area 5 lies within the counties of Galway, Roscommon, Longford, Westmeath, Tipperary, Offaly and Laois and its total area is approximately 2,589 km^2. The principal settlement (with a population of over 10,000) within SA5 is Athlone (CSO, 2016a), as shown in Figure 1.3.

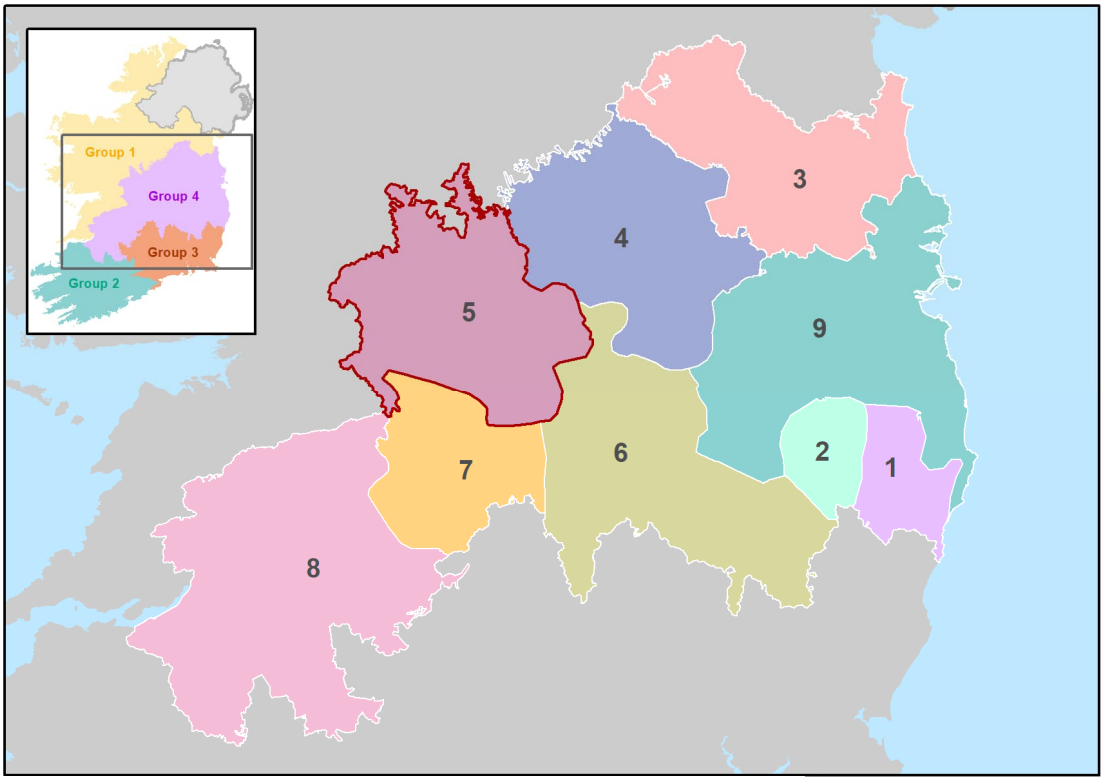

Figure 1.2 Eastern and Midlands Region Study Areas

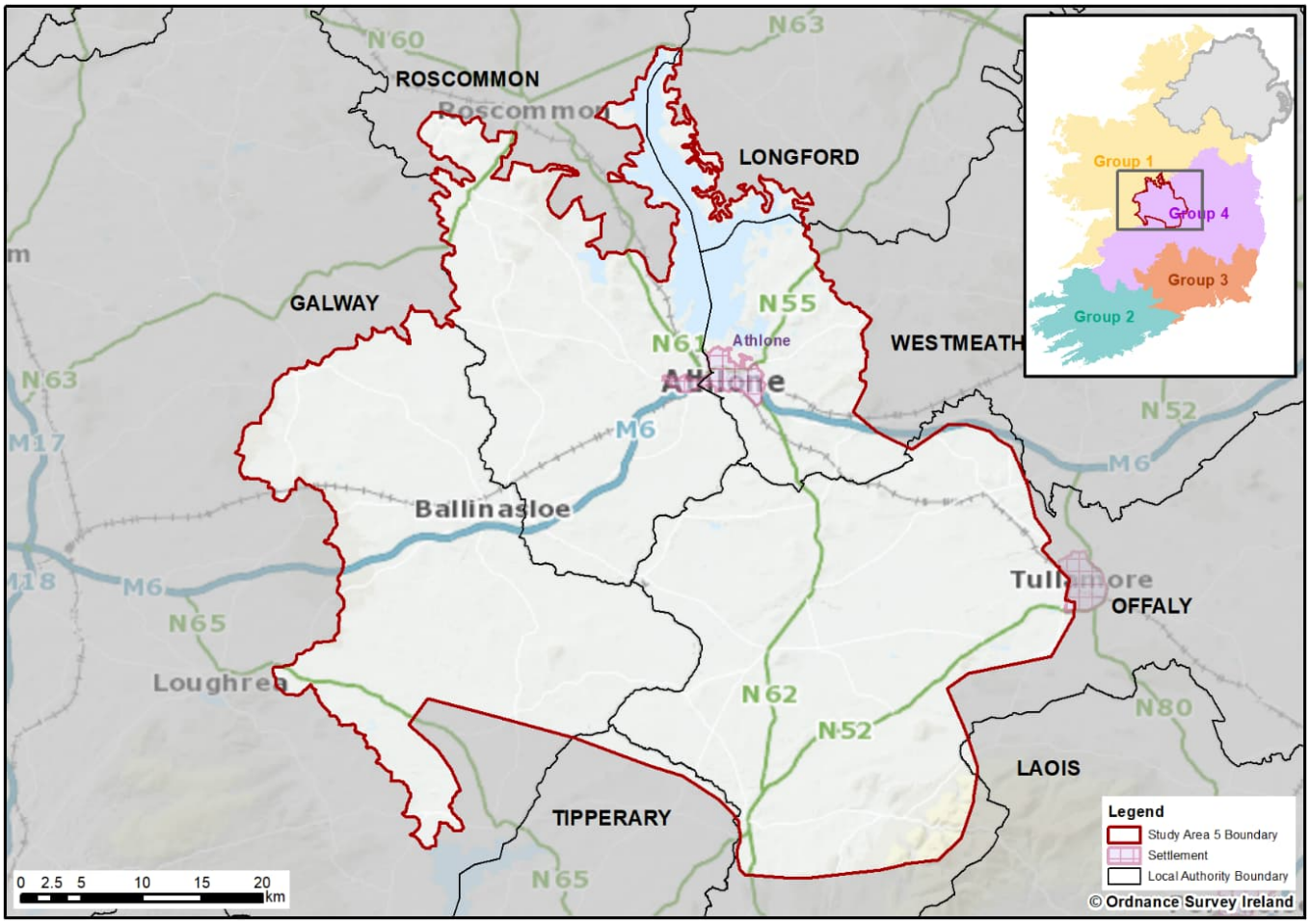

Figure 1.3 Study Area 5

2

Study Area 5 Environmental Baseline Context

2 Study Area 5 Environmental Baseline Context

This chapter provides environmental baseline information for SA5 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 planning 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 Plans 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 largest projected increases in population are expected in the WRZs: Athlone (3200SC0002), South Roscommon (Lisbrock & Killeglan) (2600SC0006) and Ballinasloe (1200SC0006). 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. Irish Water 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).

Table 2.1 Overview of the Population within the WRZs of SA5

WRZ Reference Number and Name	Total Population Served (2019)*	% Population Change (2019-2044)*
1200SC0005 - Ahascragh	770	+15.3%
3200SC0002 - Athlone	22,477	+36.9%
1200SC0006 - Ballinasloe	8,291	+27.5%
2500SC0001 - Banagher	3,492	+15.3%
2500SC0015 - Birr/Kinnity	5,742	+15.3%
2500SC00016 - Clara/Ferbane	8,665	+15.3%
2500SC0003 - Kilcormac	1,186	+15.3%
2600SC0001 - Mount Talbot/Four Roads	3,711	+16.0%
2500SC0017 - Rahan	3,684	+19.8%
2600SC0006 - South Roscommon (Lisbrock & Killeglan)	13,920	+29.2%

*The estimated population has been based on the 2016 Census data. Irish Water 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

Half of SA5 lies within the Midlands region and half lies within the West region of Ireland. SA5 had a below average household disposable income per person in 2016 (CSO, 2016b), and an unemployment rate of 10.1% in the Midlands and 7.4% in the West region of the country (CSO, 2017a).

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 Q3 2020 was 214 for the Midlands region and 432 for the West region (CSO, 2020a).

2.1.3 Tourism and Recreation

Tourism in SA5 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 Roscommon has been described as the "*Land of Memories*", with emphasis placed on the county's cultural and historical attractions (Visit Roscommon, 2020); the county of Galway also emphasises these aspects (Visit Galway, 2020).

Additionally, the study area is located within Ireland's Hidden Heartlands and Ireland's Ancient East, two of Fáilte Ireland's tourism programmes in the country. Ireland's Hidden Heartlands is located in the Mid-West, focussing on rural communities (Fáilte Ireland, 2020). Ireland's Ancient East, which is part of a tourism development strategy that covers the South, East and part of the Midlands, places emphasis on the importance of historic sites in the area (National Tourism Development Authority, 2016).

Ireland's natural heritage is also recognised as an important tourism asset by the Department of Transport, Tourism and Sport (2019) and is a key aspect of county Offaly's tourism strategy (Visit Offaly, 2020). For SA5, the nature reserves of note are Mongan Bog, Clara Bog and Redwood Bog. 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 Midlands and West region 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 Midlands and West Region within Ireland

Life Expectancy (CSO, 2017b)	Participation in Sports, Fitness or Recreational Physical Activities (% of Persons Aged 15+) (CSO, 2020b)	Air Quality (EPA, 2020a)
Midlands: Male: 77.2 Female: 81.5	**Midlands:** 47%	Good
West: Male: 77.1 Female: 82.7	**West:** 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 Irish Water'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 SA5.

Table 2.3 Areas Supplied by the WTPs in SA5

WTP	WRZ	Local Authority Supplied
Agall WTP, Rahan - Holmshill WTP and Rahan - Tully WTP	2500SC0017 - Rahan	Offaly
Ahascragh WTP	1200SC0005 - Ahascragh	Galway
Athlone WTP	3200SC0002 - Athlone	Westmeath
Ballinasloe Town WTP	1200SC0006 - Ballinasloe	Galway
Banagher WTP	2500SC0001 - Banagher	Offaly
Birr WTP and Kinnitty WTP	2500SC0015 - Birr/Kinnity	Offaly
Clara WTP and Moyclare WTP	2500SC00016 - Clara/Ferbane	Offaly
Clontotin WTP	2500SC0001 - Banagher	Offaly
Cloonlaughnan WTP	2600SC0001 - Mount Talbot/Four Roads	Roscommon

WTP	WRZ	Local Authority Supplied
Kilcormac WTP	2500SC0003 - Kilcormac	Offaly
Killeglan Springs WTP and Lisbrock WTP	2600SC0006 - South Roscommon (Lisbrock & Killeglan)	Roscommon

Currently for day-to-day operations, seven out of ten of the WRZs in the area have a current SDB deficit and eight have a projected SDB deficit (based on a 'Do Minimum' approach – see section 4.5 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 fourteen of the sixteen WTPs within the study area as being at high risk of failing to achieve Irish Water's conservative Barrier Assessment standards in relation to bacteria and viruses (Barrier 1) and maintaining chlorine residuals in the network (Barrier 2.1) (see Table 2.1 in the SA5 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 Irish Water assessment of the need to invest in areas of the Irish Water asset base through resource planning, to ensure that potential risks or emerging risks to supplies are addressed. Currently, there is one WRZ on the EPA Remedial Action List within SA5, namely Clara/Ferbane Regional Water Supply Scheme. Irish Water is currently progressing immediate corrective action in advance of the NWRP for a number of supplies within SA5.

Irish Water is currently progressing immediate corrective action in relation to a number of supplies within SA5 in advance of the NWRP. Details of these are included in the SA5 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 SA5.

Table 2.4 provides a summary of the WFD catchments within SA5.

Table 2.4 Catchments within SA5 (EPA, 2020b)

WFD Catchments	Total Catchment Area (km^2)	Catchment Area within SA5 (km^2)
Lower Shannon (Brosna)	1,248	513
Lower Shannon (Little Brosna)	982	484
Lower Shannon (Lough Derg)	1,820	203
Upper Shannon (Suck)	1,598	686
Upper Shannon (Lough Ree)	581	324
Upper Shannon (Mid Shannon)	383	377
Galway Bay South East	1,270	<1

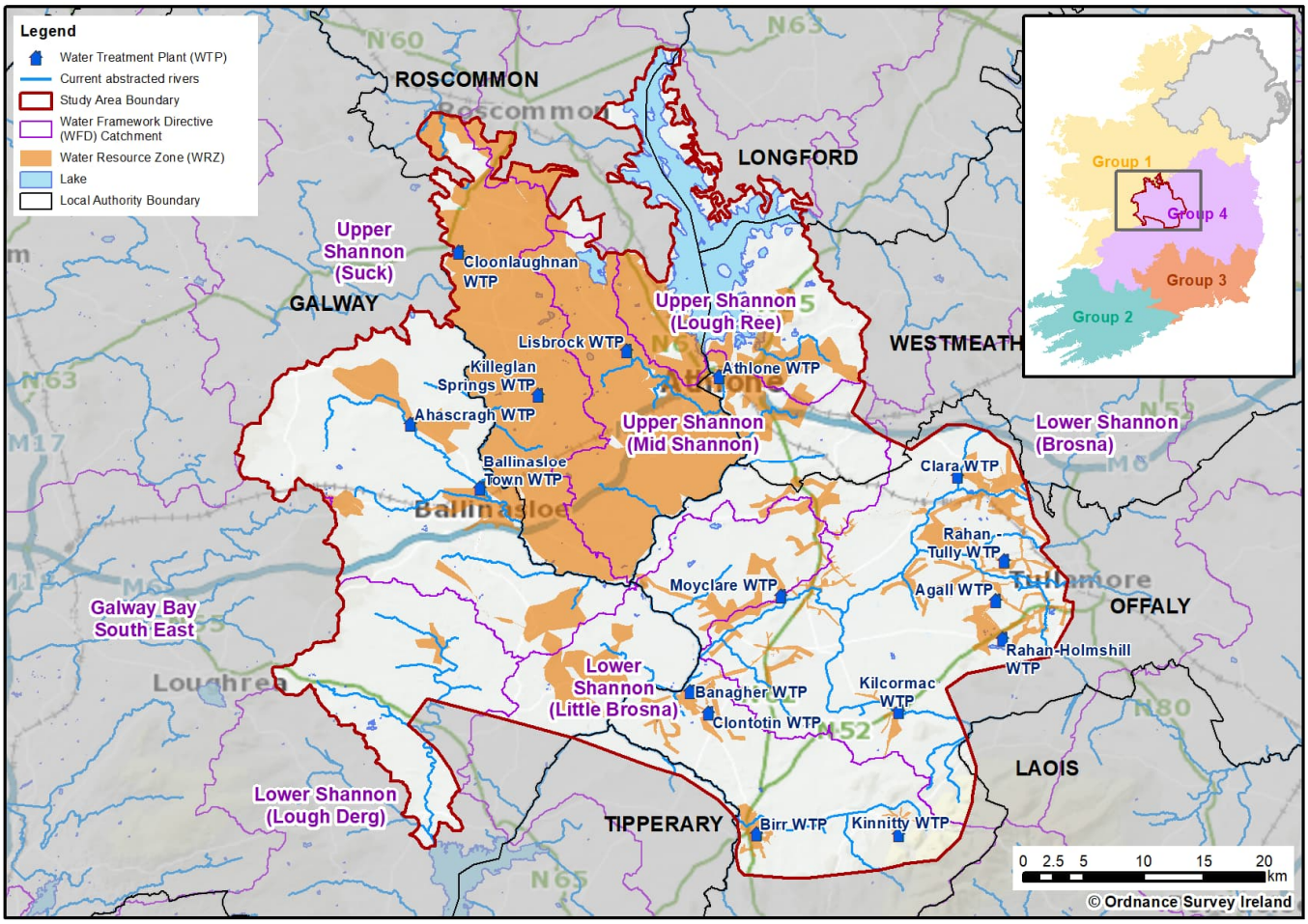

Figure 2.1 Water Environment of SA5

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.

The General Scheme of the Water Environment (Abstractions) Bill 2018 (The Bill), to introduce abstraction licensing aligned to the WFD, was published in summer 2018. This legislation will set the amount Irish Water can take from the water supplies that it abstracts water from.

As there are very few long duration flow records for Irish Water's abstractions and for waterbodies within Ireland, Irish Water 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. Irish Water 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, Irish Water has developed an initial desktop assessment based on available information (see SA5 Technical Report). Over the coming years, Irish Water 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 SA5 supplies, Irish Water has assessed its surface water abstractions and summarised the potential impact on the River Shannon (Athlone and Banagher), Glenfelly Stream and River Camcor (Birr), River Suck and Bunowen River (Ballinasloe), and the Gageborough River (Clara). Based on this initial assessment, the volumes of water

abstracted from the River Gageborough (Clara) may not meet sustainability guidelines during dry weather flows.

Irish Water 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 Irish Water. Therefore, the pressures, and the relevant priority 'Areas for Action' are provided below and in Table 2.7.

There are seven WFD catchments in SA5 and the total number of surface and groundwater waterbodies within SA5 are provided in Table 2.5 below.

Table 2.5 WFD Waterbodies within SA5 (EPA, 2019b, 2019c, 2019d, 2019e and 2019f)

Waterbody Type	Water Catchments	Number of Waterbodies	Number of Waterbodies Rated Below Moderate
Rivers	Lower Shannon (Brosna, Little Brosna and Lough Derg)	68	9
	Upper Shannon (Suck, Lough Ree and Mid Shannon)	55	10
	Galway Bay South East	0	0
Lakes	Lower Shannon (Brosna, Little Brosna and Lough Derg)	0	0
	Upper Shannon (Suck, Lough Ree and Mid Shannon)	9	0
	Galway Bay South East	0	0
Transitional and Coastal	N/A	0	0
Groundwater	N/A	38	2

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

- Lower Shannon (Brosna): Agriculture (56%) and Hydromorphology (38%);
- Lower Shannon (Little Brosna): Agriculture (80%);
- Lower Shannon (Lough Derg): Agriculture (66%), Hydromorphology (34%) and Forestry (28%);
- Upper Shannon (Suck): Agriculture (73%) and Hydromorphology (42%);
- Upper Shannon (Lough Ree): Hydromorphology (70%), Agriculture (60%) and Urban Runoff (40%);
- Upper Shannon (Mid Shannon): Hydromorphology (75%), Peat Drainage and Extraction (50%) and Agriculture (38%); and
- Galway Bay South East: Agriculture (33%), Domestic Wastewater (30%) and Other (including aquaculture and unknown anthropogenic) (30%).

The Lower Shannon (Brosna) catchment summary (catchments.ie, 2021a) also notes that the Clodiagh (Tullamore_050) river waterbody (Kilcormac Public Water Supply) is under significant pressure from a

reduction in water levels due to abstraction. Table 2.6 includes a summary of the 'at risk' waterbodies within SA5.

Table 2.6 Summary of 'At Risk' Waterbodies in SA5 (EPA, 2019b, 2019c, 2019d, 2019e and 2019f)

Waterbody Type	Water Catchments	Number of Waterbodies Identified as 'At Risk'	Surface Waterbodies Status 'At Risk' Due to Abstraction Pressure*
Rivers	Lower Shannon (Brosna, Little Brosna and Lough Derg)	22	1
	Upper Shannon (Suck, Lough Ree and Mid Shannon)	18	
	Galway Bay South East	0	
Lakes	Lower Shannon (Brosna, Little Brosna and Lough Derg)	0	0
	Upper Shannon (Suck, Lough Ree and Mid Shannon)	2	
	Galway Bay South East	0	
Transitional and Coastal	N/A	0	0
Groundwater	N/A	3	0
Total		**45**	**1**

* Based on Irish Water 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 SA5 are listed in Table 2.7. Note that the 'Areas for Action' included in Table 2.7 are from the WFD cycle 2 River Basin Management Plan (RBMP), as the WFD cycle 3 RBMP was undergoing consultation at the time of writing.

Table 2.7 'Areas for Action' within SA5 (catchments.ie, 2021h)

Areas for Action	Key Reasons for Selection
Gageborough	• Joint County project • Potential 'quick wins' • Headwaters to river Gageborough • Group water scheme in area • One deteriorated waterbody
Boora	• Bog project to examine potential for improvement by rewetting, in collaboration with Bord na Mona

Areas for Action	Key Reasons for Selection
	• Long term challenge • Area important for tourism
Silver (Kilcormac)	• Building on existing work completed by Offaly County Council • Build on works completed by Inland Fisheries Ireland, in conjunction with Bord na Mona • Headwaters to a High Ecological Status objective waterbody • Three potential 'quick wins' • Group water scheme in the area • One deteriorated waterbody
Clareen	• Building on existing knowledge from works completed by Offaly County Council • Manageable area • Large group water scheme in the area
Little Brosna	• Little Brosna_040 returned to 'good' status in 2010-2012 • Sharavoge Bog is in the area (important raised bog) • Riverstown drinking water abstraction in the area
Castlegar - Upper Shannon (Suck)	• Building on proposed improvements at Mountbellew WwTP • One deteriorated waterbody
Suck	• There is an MCPA issue at the drinking water abstraction on Suck_140. Need to rule out tributaries before entering the Suck to identify the sources of MCPA • Two deteriorated waterbodies
Ballinure	• Recent deterioration • Potential 'quick win' • Manageable area
Radford	• Kilcolgan river ultimately flows into the Clarinbridge/Kinvarra shellfish area which failed to meet its protected area objectives • Active community groups • Two deteriorated waterbodies in the headwaters to the shellfish area • Linked with sub catchment 29_9

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 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 SA5.

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 IW, to take account of, 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) published November 2021, replacing CAP 2019, 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 2021 to 2030. CAP 2021 updates existing targets with renewable energy to provide 80% of electricity by 2030 and sets targets for sectors including for agriculture and forestry such as woodland planting and improving land management to support carbon sequestration (Department of the Environment, Climate and Communications, 2021).

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	• 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 • 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	• 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	• 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 proactive 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 SA5

County	Key Risk Areas
Cavan (Cavan County Council, 2019)	• Strong wind • Extreme rainfall • Heavy snowfall/low temperatures • Low rainfall/drought • High temperatures
Kildare (Kildare Country Council, 2019)	• Extreme rainfall events • Windstorms • Extreme heat/drought events • Freezing/snow events
Longford (Longford County Council, 2019)	• Strong wind • Extreme rainfall • Heavy snowfall/low temperatures • Low rainfall/drought • High temperatures
Meath (Meath County Council, 2019)	• Strong wind • Extreme rainfall • Heavy snowfall/low temperatures • Low rainfall/drought • High temperatures
Offaly (Offaly County Council, 2019)	• Strong wind • Extreme rainfall • Heavy snowfall/low temperatures • Low rainfall/drought • High temperatures
Westmeath (Westmeath County Council, 2019)	• Strong wind • Extreme rainfall • Heavy snowfall/low temperatures • Low rainfall/drought

County	Key Risk Areas
	• High temperatures

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 SA5, not all supplies within the study area meet the required levels of reserve capacity. As evidenced in the 2018 drought, there is the potential for this deficit to affect access to water in the future. This situation will further deteriorate over time due to climate change driven reductions in water resources.

A key aspect of Irish Water'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 SA5 there are a number of European, national and locally designated sites, including Special Protected Areas (SPAs), Special Areas of Conservation (SACs), nature reserves, Natural Heritage Areas, and proposed Natural Heritage Areas (see Table 2.10 and Figure 2.2). The European sites (SPAs and SACs), and the potential impacts on them, are discussed in more detail in the NIS.

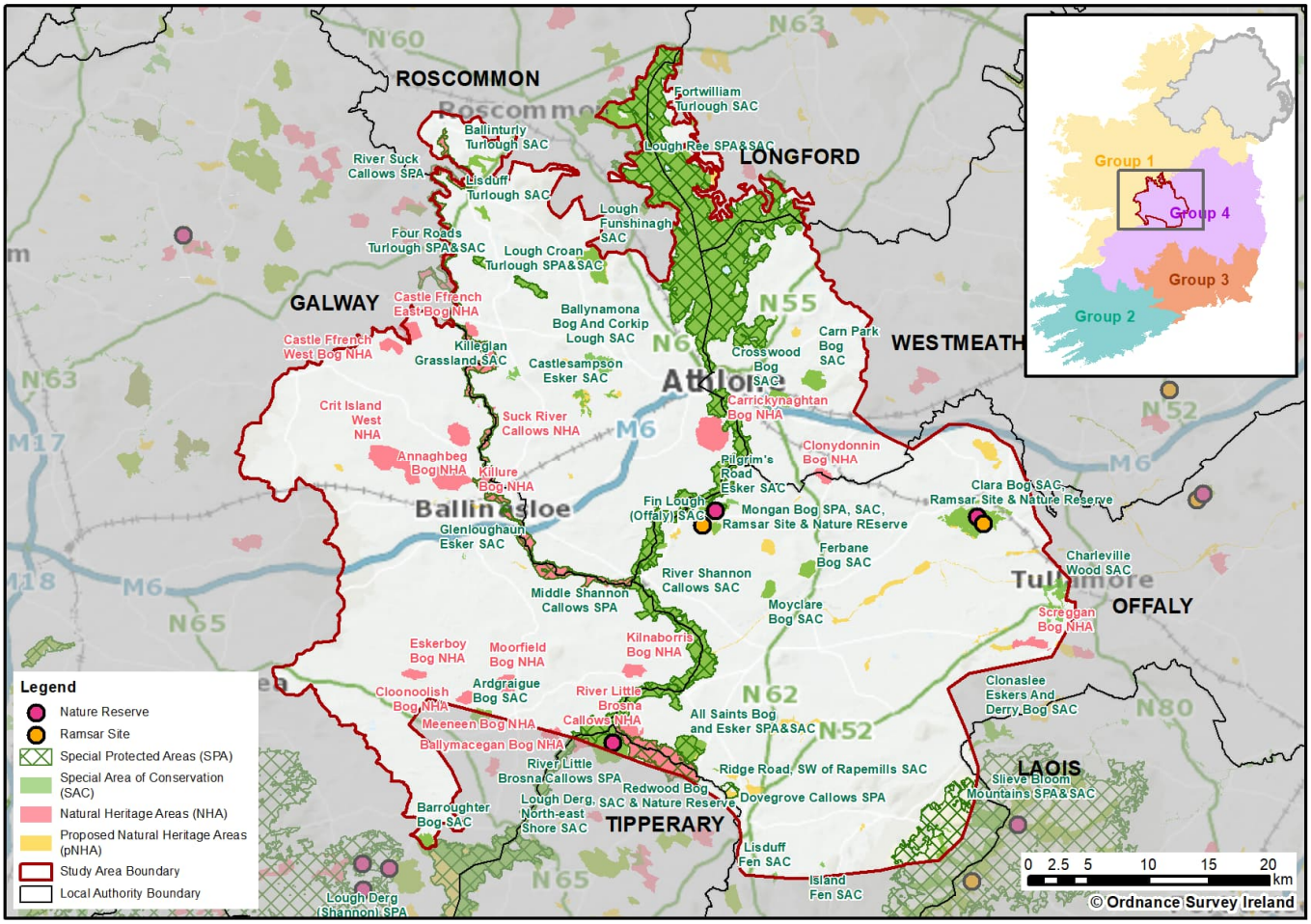

Figure 2.2 Designated Sites in SA5

Table 2.10 Designated Sites within SA5 (NPWS, 2019a)

Receptor	Name	Total Number
Special Protected Area (SPA)	All Saints Bog SPA	11
	Dovegrove Callows SPA	
	Four Roads Turlough SPA	
	Lough Croan Turlough SPA	
	Lough Derg (Shannon) SPA	
	Lough Ree SPA	
	Middle Shannon Callows SPA	
	Mongan Bog SPA	
	River Little Brosna Callows SPA	
	River Suck Callows SPA	
	Slieve Bloom Mountains SPA	
Special Area of Conservation (SAC)	All Saints Bog and Esker SAC	31
	Ardgraigue Bog SAC	
	Ballinturly Turlough SAC	

Receptor	Name	Total Number
	Ballynamona Bog and Corkip Lough SAC	
	Barroughter Bog SAC	
	Carn Park Bog SAC	
	Castlesampson Esker SAC	
	Charleville Wood SAC	
	Clara Bog SAC	
	Clonaslee Eskers and Derry Bog SAC	
	Crosswood Bog SAC	
	Ferbane Bog SAC	
	Fin Lough (Offaly) SAC	
	Fortwilliam Turlough SAC	
	Four Roads Turlough SAC	
	Glenloughaun Esker SAC	
	Island Fen SAC	
	Killeglan Grassland SAC	
	Lisduff Fen SAC	
	Lisduff Turlough SAC	
	Lough Croan Turlough SAC	
	Lough Derg, North-east Shore SAC	
	Lough Funshinagh SAC	
	Lough Ree SAC	
	Mongan Bog SAC	
	Moyclare Bog SAC	
	Pilgrim's Road Esker SAC	
	Redwood Bog SAC	
	Ridge Road, SW of Rapemills SAC	
	River Shannon Callows SAC	
	Slieve Bloom Mountains SAC	
Ramsar sites	Clara Bog	3
	Mongan Bog	
	Slieve Bloom Mountains	
Nature reserves	Clara Bog SAC	3

Receptor	Name	Total Number
	Mongan Bog SAC	
	Redwood Bog SAC	
National Parks	N/A	0
Natural Heritage Areas (NHAs)	Annaghbeg Bog NHA	16
	Ballymacegan Bog NHA	
	Carrickynaghtan Bog NHA	
	Castle Ffrench East Bog NHA	
	Castle Ffrench West Bog NHA	
	Clonydonnin Bog NHA	
	Cloonoolish Bog NHA	
	Crit Island West NHA	
	Eskerboy Bog NHA	
	Killure Bog NHA	
	Kilnaborris Bog NHA	
	Meeneen Bog NHA	
	Moorfield Bog NHA	
	River Little Brosna Callows NHA	
	Screggan Bog NHA	
	Suck River Callows NHA	
Proposed Natural Heritage Areas (pNHAs)	Shown in Figure 2.2	58

2.4.2 Habitats

Table 2.11 lists the percentage of the study area, and the number of hectares, covered by each habitat within SA5; as reported in the Corine land use dataset[1].

Table 2.11 Habitat Areas for SA5 (EPA, 2018)

Habitat	Ha	% of Study Area
Agricultural Land		
Pastures	176,592	68.01%
Land principally occupied by agriculture, with significant areas of natural vegetation	6,597	2.54%
Complex cultivation patterns	2,711	1.04%

[1] The EPA land use dataset will be used once this is available

Habitat	Ha	% of Study Area
Non-irrigated arable land	2,140	0.82%
Natural Habitats		
Peat bogs	37,720	14.53%
Water bodies	10,871	4.19%
Inland marshes	4,438	1.71%
Water courses	696	0.27%
Natural grasslands	270	0.10%
Forest		
Transitional woodland-shrub	5,243	2.02%
Coniferous forest	3,710	1.43%
Mixed forest	3,265	1.26%
Broad-leaved forest	1,737	0.67%

Particularly relevant habitats that depend on the water quality and/or quantity in SA5 are:

- Turlough ecosystems;
- Hard oligo-mesotrophic and natural eutrophic lakes;
- Bog habitats – Active raised bogs, degraded raised bogs still capable of natural regeneration, *Rhynchosporion* depressions, transition mires and quaking bogs;
- Alkaline fens; and
- Groundwater dependant terrestrial habitats, such as petrifying springs with tufa formation, calcareous fens and blanket bogs.

2.4.3 Species

The key species and habitats (Nelson et al, 2019) of concern within SA5 include:

- Otter;
- Bat species - Daubenton's bat along the waterways. The most common species in the study area are Common and Soprano pipistrelles and Leisler's bat;
- Fish species (Lamprey and European eel);
- Waterbirds of 'qualifying interest' e.g. Greenland white-fronted goose (*Anser albifrons flavirostris*) and winter migratory waders;
- Other 'qualifying interest' bird species e.g. hen harrier (*Circus cyaneus*);
- Protected whorl snails (*Vertigo geyeri* (particularly high sensitivity to changes), *Vertigo moulinsiana*); and
- Freshwater white-clawed crayfish.

The key invasive species to consider (European Communities (Birds and Natural Habitats) Regulations, 2011) for developing options within SA5 include:

- Japanese knotweed;
- Himalayan balsam;
- *Elodea spp.*;

- Parrot's feather (*Myriophyllum aquaticum*); and
- Zebra mussel (*Dreissena polymorpha*).

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 SA5 are listed in Table 2.12, such as agricultural land 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.

Irish Water has sixteen WTPs in SA5, meeting the demand of 36.0 Ml/d in 2019 (Normal Year Annual Average).

Ireland’s canals once played a significant role as a transport network; however, their primary use is now for recreational and heritage purposes. The key canal within SA5 is the Grand Canal.

There are no ports of national or regional significance within SA5. There are two airports of local significance, namely Birr Airfield and Ballyboy Airfield.

Other significant transport infrastructure includes the main road (particularly the M6, N6 and N55) and rail network (Dublin Heuston - Galway, Dublin Heuston - Westport and Ballina, and Galway - Limerick).

Any new infrastructure considered for SA5 will need to take, existing as well as planned land zoning and local development into consideration.

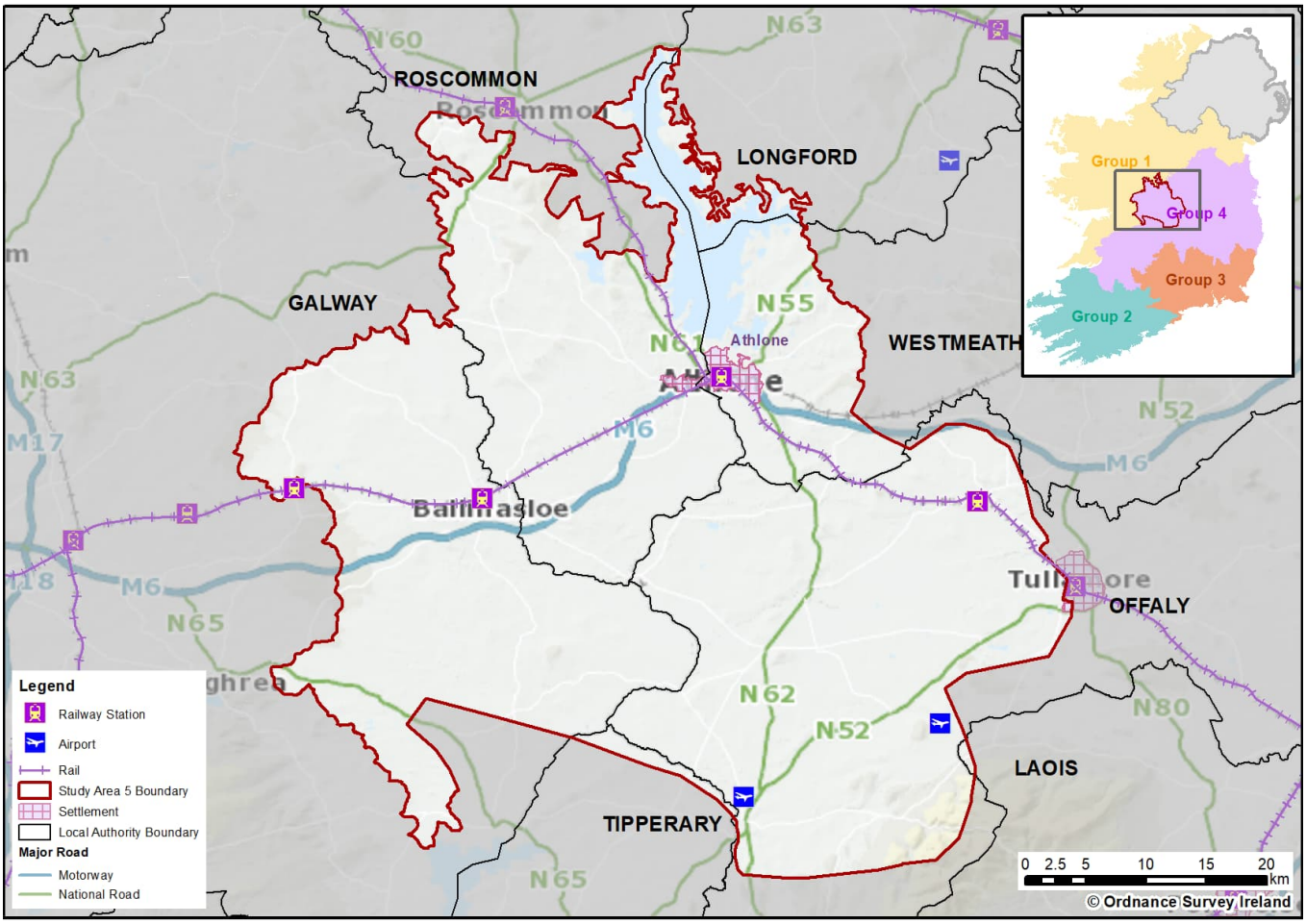

Figure 2.3 Transport Infrastructure in SA5

Table 2.12 Land Use within SA5 (EPA, 2018)[2]

Land use	Ha	% of Study Area	Comparison to Overall Eastern and Midlands Region %
Agriculture	188,040	72.42%	75.52%
Urban	3,071	1.18%	3.69%
Forest	53,994	20.79%	9.42%
Natural habitats	13,954	5.37%	10.61%
Industry	606	0.23%	0.70%
Other	>1	>0.01%	0.06%

Proposals for other strategic developments within SA5 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.

[2] The EPA land use dataset will be used once it has been made available

Table 2.13 gives an overview of the project developments which are available from myProjectIreland (2021) for SA5[3]. 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		
Athlone Flood Relief Scheme	Athlone Institute of Technology STEM building	Athlone Sewerage Scheme
Athlone Tourism Cultural Quarter	Athlone Town Centre Regeneration and Enhancement	Banagher Regeneration Projects
Life Sciences Innovation Hub and Soft Landing Space	Lissywollen, Athlone	Loughanaskin
Portiuncula ward block	Raheen, Clara	South Westmeath Regional Water Supply Scheme (Athlone and Mullingar)
St Vincent's Care Centre, Athlone		

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 value and sensitivity of the Landscape Character Areas (LCAs) within each of the counties listed within the study area. No data is available for the values of the LCAs within the county of Longford, Offaly or Tipperary. No data is available for the values and sensitivities of the LCAs within the counties of Laois and Westmeath[4].

The value of the landscape in SA5 is reflected in baseline data sections 2.1.3 (Tourism and Recreation), 0 (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 SA5 being the 15//01/21.
[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 SA5 (Ordnance Survey Ireland. n.d.)

Landscape Character Area	Value	Sensitivity
County: Galway (Galway County Council, 2015)		
Northeast Galway (Balinasloe to Ballymoe)	Low	Low with pockets of Moderate
Shannon and Suck River Valley between Portumna and Ballinasloe	Medium	Special
East central Galway (Athenry, Ballinasloe to Portumna)	Low	Low with pockets of Moderate
Southeast Galway (Clarinbridge to Gort)	Medium	Moderate with pockets of High
Northeast Galway (Tuam environs)	Low	Low with pockets of Moderate
Slieve Aughty Mountains	Medium	High
Northwest Lough Derg	Medium	Special
Lower Burren (Co. Galway portion)	Outstanding	Special with pockets of Moderate
Inveran to Galway City coastline	High	High with a parallel strip of Special
East Connemara Mountains (Moycullen, Oughterard to Loughanillaun)	High	High with pockets of Special
Lough Corrib and environs	Outstanding	Unique with pockets of High and Special
South foothills of east Connemara Mountains (Ouranavilla Tully to Tonabrocky)	Medium (pockets of varying landscape value rating)	Approximately half Special and half High
East Galway Bay (Oranmore to Kinvarra Bay and inland to N18 road)	High	High with a coastal edge of Special
West Connemara	Outstanding	Special
Lettermore and Gorumna Islands	High	High with a coastal edge of Special
West foothills of east Connemara Mountains	High	High
Carraroe (Cashla Bay to Glencoh)	High	High with a coastal edge of Special
Bertraghboy bay and eastern banks	High	Special
West Coast (Gorteen bay to Clifden).	Outstanding	Special
West Coast (Clifden to mouth of Killary Harbour)	Outstanding	High with a coastal edge of Special

Landscape Character Area	Value	Sensitivity
Killary Harbour and southern banks	Outstanding	Unique with pockets of Special
Connemara National Park (including Lough Fee, Lough Inagh and Derryclare Lough)	Outstanding	Unique
Joyces Country (including Lehanagh Loughs and south Lough Mask)	Outstanding	Unique with pockets of Special
Aran Islands	Outstanding	Unique with pockets of Special
Lough Rea	High	Special
County: Roscommon (Roscommon County Council, 2014)		
Slieve Bawn and Feirish Bogland Basin	Very High	High
Athleague and Lower Suck Valley	High	High
Suck Callows	High	High
Cloonown and Shannon Callows	Very High	High
Ballydangan Pastures	Moderate	Medium
Brideswell Esker Belt	Moderate	Medium
Lower Lough Ree and Athlone Environs	Very High	High
Lough Funshinagh, Stone Wall Grasslands and Esker Ridges	Moderate	Medium
Skrine Hill and Limestone Pavement	High	High
Mid Lough Ree Pastureland	Very High	High
Upper Lough Ree Bogland	Very High	High
Cloonfad Bog and Upland	Moderate	Medium
Cloonfad Hills and Esker Ridges	Moderate	Medium
Ballinlough Bogland and Esker Ridges	Moderate	Medium
Suck River Source and Lough OFlynn Boglands and Esker Ridges	High	High
Mullaghnashee Wet Farmland Plateau	Moderate	Medium
Castlerea and Upper Suck Valley	High	High
Castlerea Raised Bogland	High	High
Tulsk and Rathcroghan Plateau	Exceptional	High
Oran Undulating Open Farmland	Moderate	Medium
Roscommon Town and Hinterland	High	High

Landscape Character Area	Value	Sensitivity
Scramoge River Basin	Moderate	Medium
Lough Allen and Arigna foothills	Very High	High
Arigna Mountains	Very High	High
Lough Meelagh Drumlins	Very High	High
Lough Key and Boyle River Network	Exceptional	High
Boyle and Curlew Mountains	Very High	High
Elphin Drumlins	Moderate	Medium
Strokestown Drumlin and Turlough Belt	Moderate	Medium
Kilglass Drumlin Lakelands	Very High	High
Upper Shannon and Derreenannagh Drumlin Belt	Very High	High
Lough Corry Drumlin Basin	Very High	High
Ballaghaderreen and Bockagh Hill Uplands	Moderate	Medium
Cloona Lough and Lung River Bogland basin	Moderate	Medium
Plains of Boyle	Moderate	Medium
Breedoge Bogland Basin	Moderate	Medium
County: Longford (Longford County Council, 2015)		
Northern Drumlin Lakeland	-	Low to Medium with some High areas
Northern Upland	-	Medium to High
Shannon Basin/Lough Ree	-	Medium to High
Central Corridor	-	Low with potential areas of Medium to High
Inny Basin	-	Low with potential areas of Medium to High
Peatlands	-	Low with the vicinity of the Royal Canal High.
Open Agricultural	-	Low
County: Westmeath (Westmeath County Council, 2021)		
No values and sensitivities information available		
County: Tipperary (Tipperary County Council, 2016)		
Urban and Fringe Areas	-	Low
Thurles Hinterland	-	Low
Nenagh Corridor	-	Low

Landscape Character Area	Value	Sensitivity
River Suir Central Plain / Nenagh Corridor	-	Low
Templemore Plains	-	Low
West Tipperary Farmland Mosaic	-	Low
Borrisokane Lowlands	-	Dominant Moderate with some Low and High
Littleton Raised Bog	-	Dominant High with some Low and Moderate
Littleton Farmland Mosaic and Marginal Peatland	-	Dominant Low with some Moderate and High
Upper Lough Derg	-	Dominant High with some Low, Moderate, Special and Unique
The Shannon Callows	-	Dominant High with some Low, Moderate, Special and Unique
River Shannon - Newport	-	Dominant Special with some Low, Moderate, High and Unique
Arra Mountains – Lower Lough Derg	-	Dominant Special with some Low, Moderate, High and Unique
Slieveardagh Hills Farmland Mosaic	-	Dominant Moderate with some Low
Linguan Valley Marginal and Farmland Mosaic	-	Dominant Moderate with some Low
Slievenamuck Marginal Mosaic	-	Dominant High with some Moderate and Special
Upperchurch - Kilcommon / Hollyford Hills Mountain Mosaic	-	Dominant High with some Moderate and Special
Silvermines – Rearcross	-	Dominant High with some Low, moderate, Special and Unique
Slievenamon Mountain Mosaic	-	Dominant Unique with some Low, Moderate, High and Special
Glen of Aherlow Uplands	-	Dominant Unique with some Moderate, High and Special

Landscape Character Area	Value	Sensitivity
Galtee Mountains Mosaic	-	Dominant Unique with some Moderate, High and Special
Devilsbit Uplands	-	Dominant Unique with some Moderate, High and Special
Knockmealdown Mountain Mosaic	-	Dominant Unique with some Moderate, High and Special
County: Offaly (Offaly County Council, 2014)		
Rural and Agricultural Areas	-	Low
Cutaway Bog	-	Moderate
The River Shannon and Callows	-	High
The Grand Canal Corridor	-	High
Wetlands	-	High
Slieve Bloom Upland Area	-	High
Croghan Hill and its Environs	-	High
Bogland Areas	-	High
The Esker Landscape	-	High
Archaeological and Historical Landscapes	-	High
County: Laois (Laois County Council, 2017)		
No values and sensitivities information available		

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 SA5 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 Irish Water vehicles, generator plants and drinking water residuals treatment facilities. There is a requirement to comply with air pollution regulations and also 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 M6, N6 and N55.

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 SA5, 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.

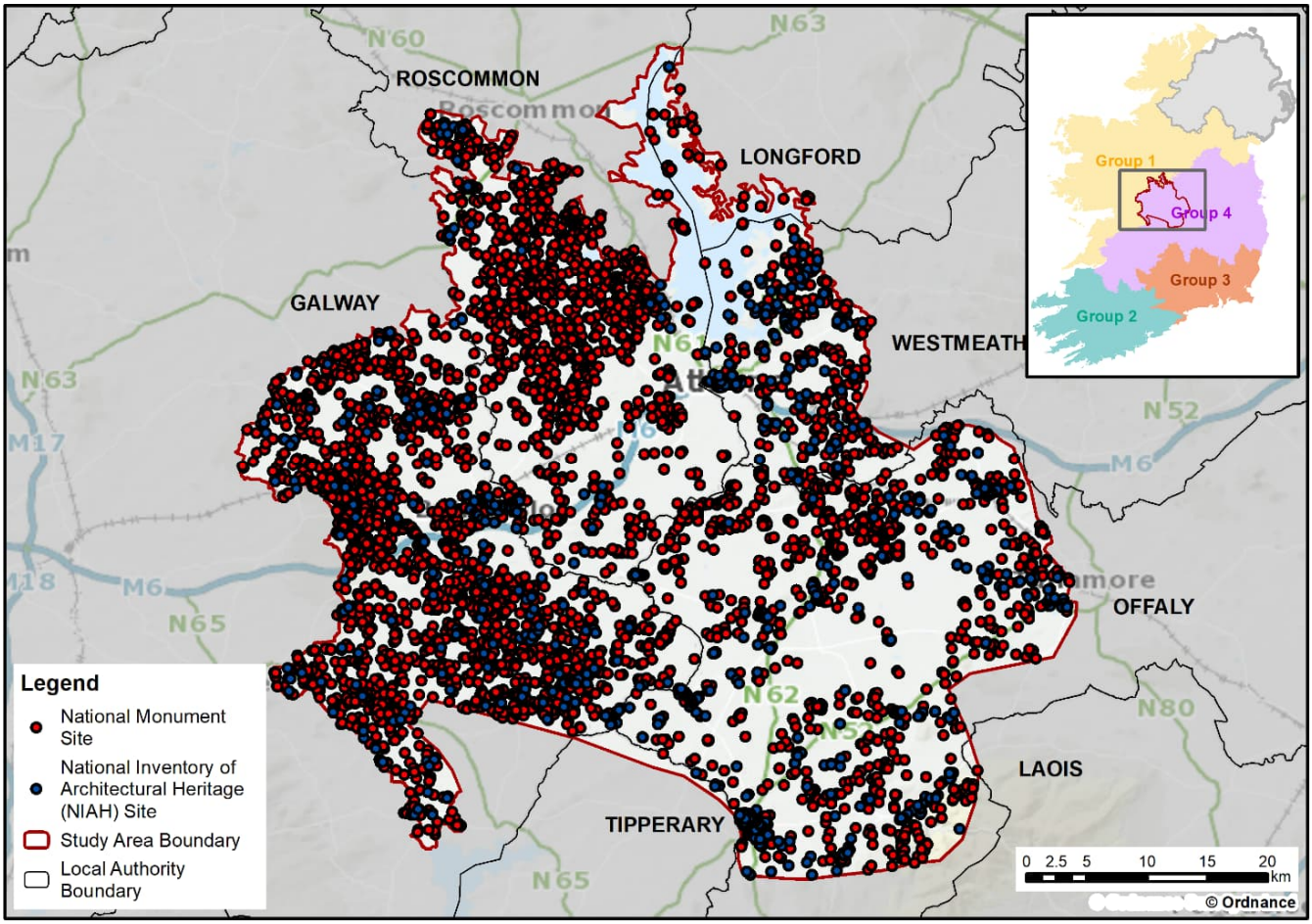

Figure 2.4 SA5 Cultural Heritage Assets

Table 2.15 Cultural Heritage Assets within SA5

Assets	Total Number
National Monuments Service sites	7,133
National Inventory of Architectural Heritage sites	1,377
Sites and Monuments Record Zones	2,713

2.9 Geology and Soils

Table 2.12 lists the land uses within SA5. SA5 has a wide variation of soil types, although there is a predominance of fine loamy soils and peat (EPA, 2019a).

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 SA5 are shown in Figure 2.5.

County Offaly forms part of the Central Lowland of Ireland, an area of low-lying rolling topography with higher ground at the Slieve Bloom Mountains. The higher topographic features have bedrock at or close to the surface. Most of the bedrock in County Offaly is masked by quaternary sediments and subsoils which form the irregular topographic features in the lowlands, such as esker sand, gravel ridges and raised bogs. The landscape of County Roscommon reflects the dominant underlying karstic, carboniferous limestone and shales, much of it exposed as outcrop. This karst forms a key regionally important aquifer around the towns of Ballinasloe, Athlone and Tullamore.

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, 43 of which have the potential to constrain water resource options in SA5.

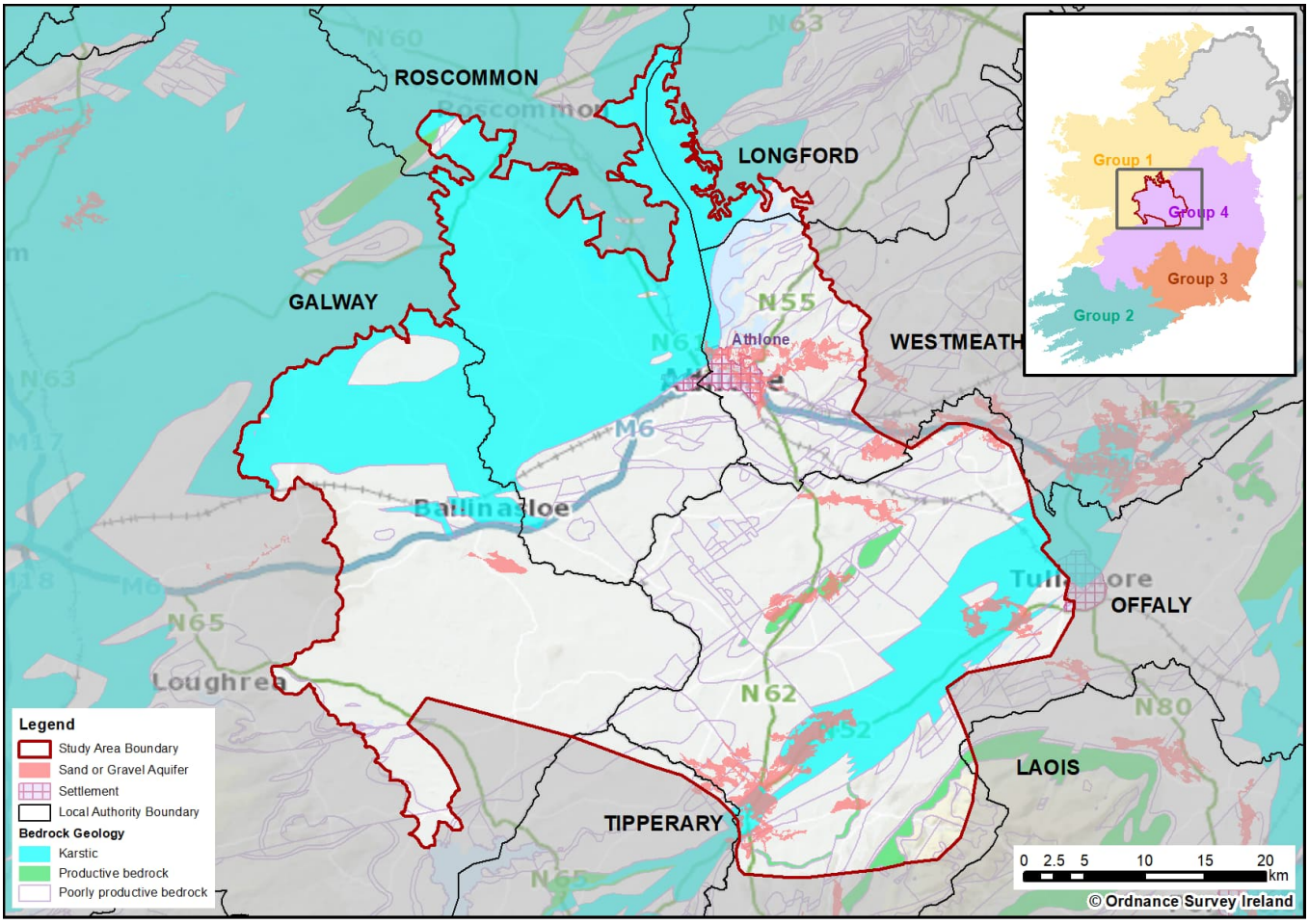

Figure 2.5 SA5 Hydrogeology

2.10 Summary of Key Issues and Trends over the Plan Period

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 SA5 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	**Issues:** Increasing population and the increased stress of climate change on water quality and water resources could affect health and well-being. **Opportunities**: Irish Water will put in place plans to assess water quality and measures to address risks as part of the Framework Plan. Irish Water has ongoing activities to improve the SDB in SA5, including, leakage management and water conservation measures. Raising awareness of the importance of water conservation and efficiency measures, and the value of the environment for health and wellbeing, can play an	Climate Change, biodiversity, water environment, material assets and landscape and visual amenity

SEA Topic	Issues and Opportunities	Interrelated Topics
	important part in water planning. Valuing access to environment for recreation.	
Water Environment	**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 SA5, some of the existing abstractions may not meet sustainability guidelines in the medium term; specifically, during drought periods. On an interim basis, Irish Water has developed an initial conservative assessment based on available information (see SA5 Technical Report). This has been used to inform options identification and appraisal. Irish Water will update its sustainability analysis and impact on their baseline SDB calculations when regulatory assessments for the new legislation is undertaken. **Opportunities:** To take account of identified pressure on the water environment in the selection of solutions for SA5.	Biodiversity and climate change
Biodiversity, Flora and Fauna	**Issues:** For SA5, the majority of surface water sources are within designated areas, including the River Shannon Callows SAC, Lough Ree SAC/SPA, River Suck Callows SPA, Middle Shannon Callows SPA, and River Little Brosna Callows SPA. It is considered especially important to avoid the loss of irreplaceable or rare habitats and avoid increasing pressure on vulnerable species; potentially through direct or indirect land take, such as through increased abstraction pressure.	Water resources, water quality and climate change
Material Assets	**Issues:** WTP assets and network infrastructure requiring improvement or replacement. **Opportunities**: Improvements to support reliability of access to good quality water.	Health and Wellbeing
Landscape and Visual Amenity	**Issues:** Potential for climate change to affect land use and habitats and influencing landscape quality and amenity.	Biodiversity and geology and soils, climate change, health and well being
Air Quality and Noise	No specific issues identified for the baseline for SA5.	Health and well being
Climate Change	**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	Biodiversity and water environment

SEA Topic	Issues and Opportunities	Interrelated Topics
	freeze/thaw events; and in detailed scheme design and network operation. **Opportunities:** Additional management to minimise impact on supply and the environment, vulnerability to climate change, and drought is required.	
Cultural Heritage	**Issues:** Known cultural heritage and archaeological assets and potential unknown archaeological assets.	Health and wellbeing
Geology and Soils	No specific issues, although general need for good soil conservation and retention of nutrients and carbon in soil resources.	Biodiversity and Landscape and climate change
Additional interrelated aspects	**Issues**: Poor water quality requiring additional water treatment and affecting biodiversity. **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.	

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

Irish Water applied its Options Assessment Methodology from the Framework Plan to identify potential solutions to meet the needs identified in the SA5 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 Framework Plan 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 SA5 are Stage 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 new legislative regime might require. The EPA will be the authority adjudicating the sustainability or otherwise of abstractions, once the legislation is enacted and will have the benefit of 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

The Government is currently developing new legislation dealing with water abstractions. As this legislation is still being developed, Irish Water 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 Irish Water as part of this plan will be based on conservative assessments of sustainable abstraction. This will ensure that water supplies continually improve in terms of environmental sustainability.

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

3.3 Stage 4: Coarse Screening

A total of 103 unconstrained options were identified for SA5 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 9 of the SEA Environmental Report for the Framework Plan. 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 103 unconstrained options, 40 were rejected after being analysed against the coarse screening criteria of resilience, deliverability and environment.

Sustainability reasons for rejecting options were identified for four options. Table 3.2 provides the options that were rejected on an environmental basis and not considered suitable to address the deficit for the WRZs located in SA5. The full rejection register for both the coarse and fine screening (where applicable) is provided in Appendix C of the SA5 Technical Report.

Table 3.2 Coarse Screening Rejection Register

Option Reference	Option Description	Rejection Reasoning
SA5-10a	New WTP at Killinure Lake for Athlone	A planning application for a new abstraction from Killinue Lake was withdrawn in 2020 for environmental reasons and, as a result, it was not taken forward to fine screening stage.
SA5-10b	New WTP at Killinure Lake to supply deficit in Athlone and South Roscommon	
SA5-052		
SA5-078	Rationalise Rahan WRZ to Tullamore (neighbouring scheme) and supply deficit	Great uncertainty around groundwater availability for the full demand requirement. Option unlikely to address the full deficit. Therefore, this option did not meet the

Option Reference	Option Description	Rejection Reasoning
	from Tullamore WRZ (network upgrades required)	requirements of the Environmental, Resilience or Deliverability criteria.

3.4 Stage 5: Fine Screening

A total of 63 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.

At fine screening a further 5 options were rejected. Table 3.3 provides the options that were rejected from the fine screening and not considered suitable to meet the needs identified for the WRZ located in SA5.

Table 3.3 Fine Screening Rejection Register

Option Reference	Option Description	Rejection Reasoning
SA5-06a	Leakage reduction targets for Athlone to partly remove deficit for Athlone WRZ and connect to South Roscommon (Lisbrock & Killeglan) via 1.6km of new watermain for resilience, connecting into existing 4mm	This option refers to a "Tactical Option" as planned works are underway across all Irish Water's WRZs as part of the National Leakage Reduction Programme. However, it is unlikely to meet the full deficit on its own. Irish Water is committed to Leakage reduction and targets are included in the SDB. As leakage reduction targets will progress in conjunction with other supply
SA5-06b	Advanced leakage reduction targets for Athlone to partly remove deficit for Athlone WRZ	

Option Reference	Option Description	Rejection Reasoning
SA5-048	Leakage reduction targets for Athlone to partly remove deficit for Athlone WRZ and connect to South Roscommon (Lisbrock & Killeglan) via 1.6km of new watermain for resilience, connecting into existing 4mm	options, this option was screened out of the Preferred Approach development phase at coarse screening.
SA5-021	New connection point from Tuam Regional Water Supply Scheme connecting Ballinasloe with total length of 46 km	This option requires a transfer of water via a pipeline over 69km for a relatively small supply. Transferring small amount of water over long distances can affect the quality of water. It is also a high cost option. It is therefore considered not feasible due to age of water and sedimentation and would not be considered at the fine screening stage.
SA5-022	New connection point from Galway City P.W.S connecting Ballinasloe with total length of 67 km	This option requires a transfer of water via a pipeline over 76km for a relatively small supply. Transferring small amount of water over long distances can affect the quality of water. It is also a high cost option. It is therefore considered not feasible due to age of water and sedimentation and would not be considered at the fine screening stage.

3.5 Stage 6: Feasible Options List

A total of 58 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 SA5 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.

A 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, Irish Water 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-EM:

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 options[5] 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

[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).

project specific mitigation applied as these can be addressed with general/standard mitigation measures. Scores of -3 equates to LSEs that may be difficult to mitigate or where uncertainty remains.

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.

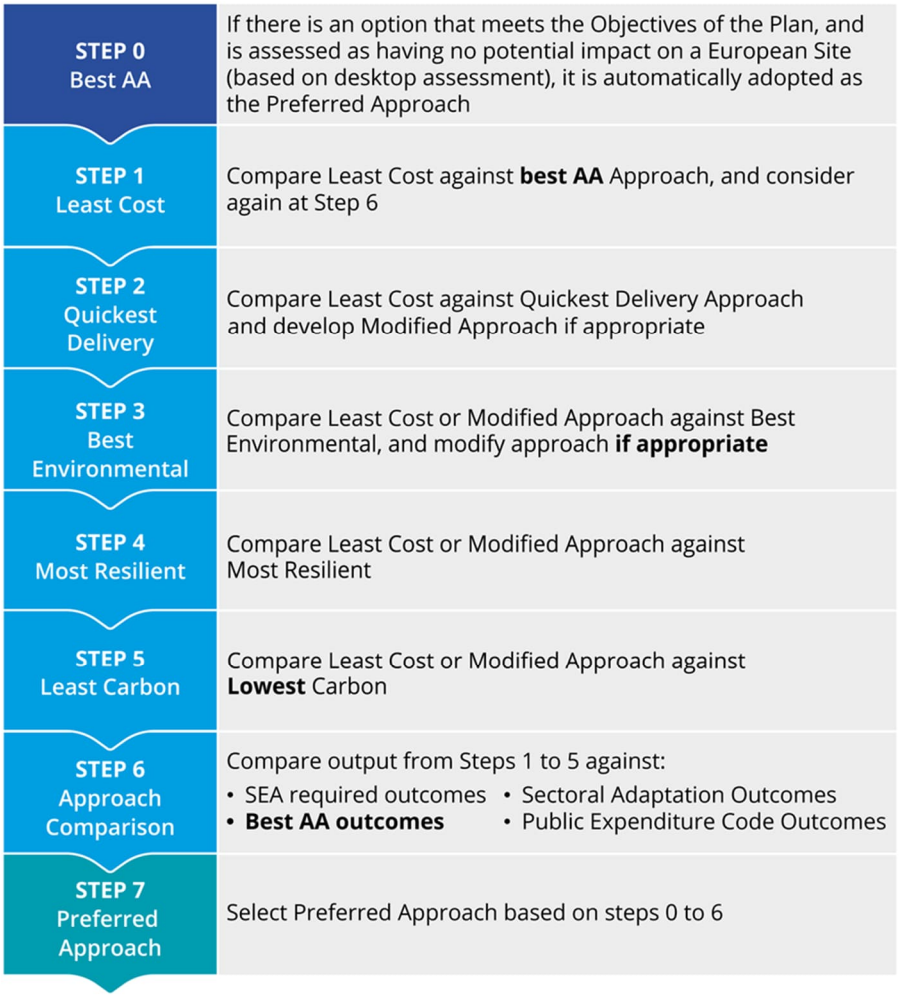

Figure 4.1 The 7 Step Process

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 Irish Water 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 (tCO_2e) and carbon costs as are calculated alongside option 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 (tCO_2e) 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.

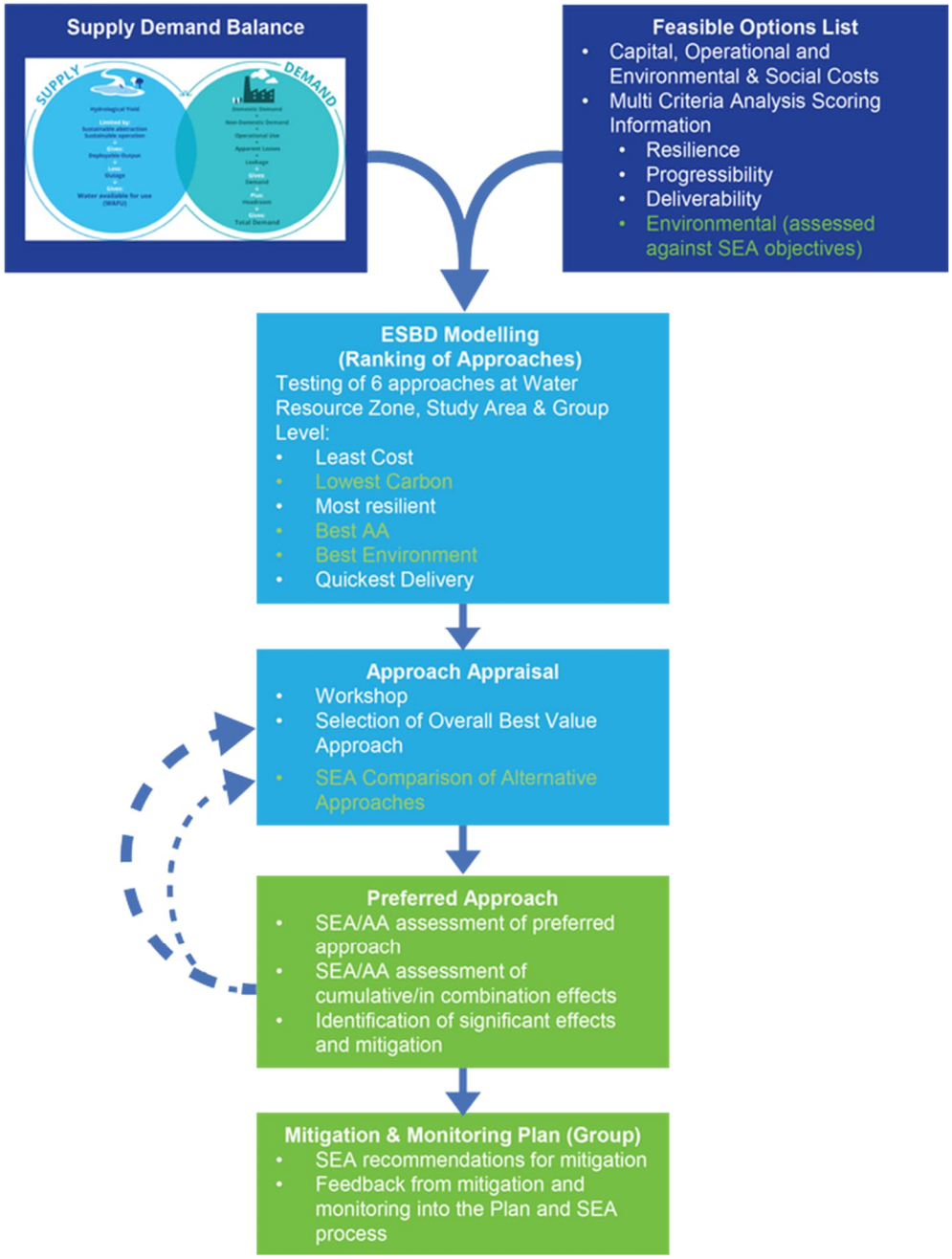

Figure 4.2 Approach Development Process

4.3 SA5 Approach Development Process

The approach appraisal 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 SA5 there are 27 WRZ options and these are listed in Table 5.2 in the SA5 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 4.2)

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 SA5, a total of 14 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 SA5 Summary of SA Combination of Performance against Approach Type

Category	WRZ level approach	SA combination 1 (SA option 2)	SA combination 2 (SA option 3)	SA combination 3 (SA option 5)	SA combination 4 (SA option 8)	SA combination 5 (SA option 9)	SA combination 6 (SA option 10)	SA combination 7 (SA option 12)	SA combination 8 (SA option 14)	SA combination 9 (SA option 15)	SA combination 10 (SA option 16)	SA combination 11 (SA option 18)	SA combination 12 (SA option 12 & 14)	SA combination 13 (SA option 15 & 16)
Least Cost												Best		Worst
Quickest Delivery												Worst		Best
Number of -3 Biodiversity Scores	No -3 scores	No -3 scores	No -3 scores	One -3 score	No -3 scores	No -3 scores	No -3 scores	One -3 score	No -3 scores	One -3 score	One -3 score	No -3 scores	One -3 score	Two -3 scores
Lowest Carbon							Best							Worst
Most Resilient			Worst	Best										
Best Environmental		Best*										Worst		

Key														
Ranked order (best to worst)	Best													Worst

*Combination 1 has the best environmental score with no -3 biodiversity scores

Through comparing all the potential SA combinations, the best SA approach for each of the six approach categories was identified (also see section 5 of the Study Area Technical Report); these aligned as five approaches (see Table 4.3). For SA5, combination 1, combination 10 and combination 13 have a very similar ranking under the Best Environmental category. As set out in section 7.2.1 of the RWRP-EM, when the combination with the lowest environmental score also scores any -3 biodiversity scores under the Best AA criteria the other combinations are reviewed to determine if there are any combinations with no -3 biodiversity scores. Therefore, as set out in further detail in section 5 of the SA5 Technical Report, combination 1 was identified as the Best Environmental Approach.

Table 4.3 Study Area Approach Categories

Category	SA Approach 1 (SA Combination 11) (LCo)	SA Approach 2 (SA Combination 13) (QD)	SA Approach 3 (SA Combination 1) (BE, BA)	SA Approach 4 (SA Combination 3) (MR)	SA Approach 5 (SA Combination 6) (LC)
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 Appendix B of this report.

Table 4.4 Study Area Approaches

Options included	Do Minimum	Least Cost Approach (SA Combination 11)	Best Appropriate Assessment Approach (SA Combination 11)	Quickest Delivery Approach (SA Combination 13)	Best Environmental Approach (SA Combination 1)	Most Resilient Approach (SA Combination 3)	Lowest Carbon Approach (SA Combination 6)
SA options	No options	**SA option 18:**	**SA option 2:**	**SA option 15:**	**SA option 2:**	**SA option 5:**	**SA option 10:**

Options included	Do Minimum	Least Cost Approach (SA Combination 11)	Best Appropriate Assessment Approach (SA Combination 11)	Quickest Delivery Approach (SA Combination 13)	Best Environmental Approach (SA Combination 1)	Most Resilient Approach (SA Combination 3)	Lowest Carbon Approach (SA Combination 6)
(Group options)		082, 083	17c, 039, 45a	004, 42d **SA option 16:** 12b, 019, 027, 030, 036, 041	17c, 039, 45a	38b, 42c	016, 50a
WRZ options	No options	002 09a 017a 025 033 037b 080 & 081 084 086	002 09a 033 080 & 081 084 086	037b 080 & 081	002 09a 025 033 080 & 081 084 086	002 09a 017a 025 033 080 & 081 084 086	002 017a 033 025 37b 080 & 081 084 086

* For the option references - all options are part of SA5 e.g. SA5-002 is shown as 002 above

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, Irish Water 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 SA5 Technical Report.

Within SA5, this resulted in five approaches being selected from the 14 SA combinations identified in Table 4.2, 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 five 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 shows that the best environmental score is SA approach 2. However, SA approach 2 has two -3 biodiversity scores, therefore, it has not been chosen as the best environmental approach. Instead, the next best environmental score (SA approach 3) with no -3 biodiversity scores is considered as the best environmental approach (see section 7.2.1 of the RWRP-EM for further details).

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

Category Criteria	SA Approach 1 (SA Combination 11) (LCo)	SA Approach 2 (SA Combination 13) (QD)	SA Approach 3 (SA Combination 1) (BE, BA)	SA Approach 4 (SA Combination 3) (MR)	SA Approach 5 (SA Combination 6) (LC)
Least Cost Score	Best	Worst			
Quickest Delivery Score	Worst	Best			
Best AA Score	No -3 Biodiversity Scores	Two -3 Biodiversity Scores	No -3 Biodiversity Scores	One -3 Biodiversity Score	No -3 Biodiversity Scores
Lowest Carbon Score		Worst			Best
Most Resilient Score				Best	Worst
Best Environmental Score	Worst		Best*		

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

* As mentioned above, the Best Environmental approach selected has the lowest environmental score with no -3 biodiversity scores

4.4 Comparison of SA5 Approaches

An overall summary of the infrastructure components and abstractions for each of the SA approaches identified for SA5 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 11) (LCo)	SA Approach 2 (SA Combination 13) (QD)	SA Approach 3 (SA Combination 1) (BE, BA)	SA Approach 4 (SA Combination 3) (MR)	SA Approach 5 (SA Combination 6) (LC)
New pipeline network (km)	0	25	150	29	39	18
New WTPs	0	1	0	1	1	1
Upgrade WTPs	0	15	5	14	16	16
New/upgraded abstractions	0	9	2	5	6	6
WTPs decommissioned	0	0	11	0	0	0
Abstractions abandoned	0	0	0	0	0	0
Raw water storage	0	0	0	0	0	0
Treated water storage	0	6	6	6	6	6

A comparative assessment of the five 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 11) (LCo)	SA Approach 2 (SA Combination 13) (QD)	SA Approach 3 (SA Combination 1) (BE, BA)	SA Approach 4 (SA Combination 3) (MR)	SA Approach 5 (SA Combination 6) (LC)	Range (Difference between Lowest and Highest Score)
Population, health, economy and recreation	-3 scores	No Difference					0
	MCA score	Worst	Best		Worst		8

Topic	Total No. of	SA Approach 1 (SA Combination 11) (LCo)	SA Approach 2 (SA Combination 13) (QD)	SA Approach 3 (SA Combination 1) (BE, BA)	SA Approach 4 (SA Combination 3) (MR)	SA Approach 5 (SA Combination 6) (LC)	Range (Difference between Lowest and Highest Score)
Water Environment: quality and resources	-3 scores	No Difference					0
	MCA score	Worst	Worst	Best	Worst	Worst	1
Biodiversity, Flora and Fauna	-3 scores	Best	Worst	Best		Best	2
	MCA score	Worst	Best				25
Material Assets	-3 scores	Best	Worst	Best	Best	Best	1
	MCA score	Worst	Best				4
Landscape and Visual	-3 scores	No difference					0
	MCA score	Worst	Best				2
Climate Change	-3 scores	No Difference					0
	MCA Score	Worst	Best				6
Culture, Heritage and Archaeology	-3 scores	No Difference					0
	MCA Score	No Difference					0
Geology and Soils	-3 scores	No Difference					0
	MCA Score	Best	Worst	Best	Best	Best	2

Key				
MCA/No. of -3 scores against each criterion				
Worst				Best

Key

* 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 constructions 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 11) (LCo)

SA approach 1, key comparison points:

- Identified as the best in the Least Cost category;
- Option types included:
    - SA option (group option): 1 groundwater abstraction option;
    - WRZ options: 4 groundwater abstraction options, 3 surface water abstraction options and 3 WTP upgrade options;
- No -3 biodiversity scores (higher risk options that could impact on European sites); and
- SA approach 1 is similar in terms of infrastructure to SA approach 3, 4 and 5. However, some key differences are that SA approach 1 includes approximately 25km of pipeline, and the highest number of new/upgraded abstractions. These account for worse scores against the biodiversity, landscape and carbon criteria compared to the other approaches.

4.4.2 SA Approach 2 (SA Combination 13) (QD)

SA approach 2, key comparison points:

- Identified as the best in the Quickest Delivery category;
- Option types included:
    - SA option (group option): 1 groundwater abstraction and rationalisation option and 1 New Shannon Source option;
    - WRZ options: 1 groundwater abstraction option and 2 WTP upgrade options;
- Two -3 biodiversity scores (higher risk options that could impact on European sites); and
- SA approach 2 is different to any of the other SA approaches in terms of infrastructure due to it being a rationalisation scheme. This requires:
    - Approximately four times the length of pipeline required compared with the other SA approaches;
    - Extensive rationalisation resulting in the decommissioning of eleven WTPs;
    - Approximately a third of the number of WTP upgrades and new/upgraded abstractions required compared with the other SA approaches; and
    - No new WTP.

4.4.3 SA Approach 3 (SA Combination 1) (BE, BA)

SA approach 3, key comparison points:

- Identified as the best in the Best Environmental and the Best AA categories;
- Option types included:
    - SA option (group option): 1 surface water abstraction option;

- WRZ options: 3 groundwater abstraction options, 2 surface water abstraction options and 3 WTP upgrade options;

- No -3 biodiversity scores (higher risk options that could impact on European sites); and
- SA approach 3 is similar to SA approach 1, 4 and 5 in terms of infrastructure development. The main difference being a result of the different SA options within each of the four approaches requiring different lengths of pipeline. Of these four SA approaches, SA approach 3 requires approximately 4km more than SA approach 1, 10km less than SA approach 4 and 11km more than SA approach 5. SA approach 3 also requires fewer WTP upgrades and new/upgraded abstractions compared with SA approaches, 1, 4 and 5.

4.4.4 SA Approach 4 (SA Combination 3) (MR)

SA approach 4, key comparison points:

- Identified as the best in the Most Resilient category;
- Option types included:
  - SA option (group option): 1 groundwater abstraction option;
  - WRZ options: 3 groundwater abstraction options, 3 surface water abstraction options and 3 WTP upgrade options;
- One -3 biodiversity score (higher risk options that could impact on European sites); and
- SA approach 4 is similar to SA approaches 1, 3 and 5 in terms of infrastructure development. The main difference being that SA approach 4 requires the most new pipeline compared with the other four approaches.

4.4.5 SA Approach 5 (SA Combination 6) (LC)

SA approach 5, key comparison points:

- Identified as the best in the Lowest Carbon category;
- Option types included:
  - SA option (group option): 1 groundwater abstraction option;
  - WRZ options: 4 groundwater abstraction options, 2 surface water abstraction options and 3 WTP upgrade options;
- No -3 biodiversity scores (higher risk options that could impact on European sites); and
- SA approach 5 is similar to SA approaches 1, 3 and 4 in terms of infrastructure development, the difference being the length of pipeline associated with the different SA options within them as explained above.

4.5 SA5 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 -7,654 m^3/d in 2019, to a projected maximum of -10,692 m^3/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 SA5.

Table 4.8 Supply Demand Balance for SA5

WRZ Name	WRZ Code	Population	Maximum Deficit m^3/day*	
			2019	2044
Athlone	3200SC0002	22,477	-3,068	-4,605
South Roscommon (Lisbrock & Killeglan)	2600SC0006	13,920	-884	-1,594
Clara / Ferbane / Moyclare	2500SC0016	8,665	No Deficit	No Deficit
Ballinasloe Public Supply	1200SC0006	8,291	-1,080	-1,583
Birr / Kinnitty	2500SC0015	5,742	-220	-252
Mount Talbot / Four Roads	2600SC0001	3,711	No Deficit	-73
Rahan	2500SC0017	3,684	-1,499	-1,578
Banagher P.W.S	2500SC0001	3,492	No Deficit	No Deficit
Kilcormac P.W.S	2500SC0003	1,186	-175	-226
Ahascragh P.S.	1200SC0005	770	-728	-781

*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 11) (LCo)	SA Approach 2 (SA Combination 13) (QD)	SA Approach 3 (SA Combination 1) (BE, BA)	SA Approach 4 (SA Combination 3) (MR)	SA Approach 5 (SA Combination 6) (LC)
1. Protect public health and promote wellbeing	C	0	-	-	-	-	-
	O	---	++	++	++	++	++
2. Protect and enhance biodiversity and contribute to resilient ecosystems	C	0	-	-	-	-	-
	O	--	-	---	-	---	-
	C	0	-	-	-	-	-

SEA Objectives	Phase (Construction (C) / Operation (O))	Do Minimum	SA Approach 1 (SA Combination 11) (LCo)	SA Approach 2 (SA Combination 13) (QD)	SA Approach 3 (SA Combination 1) (BE, BA)	SA Approach 4 (SA Combination 3) (MR)	SA Approach 5 (SA Combination 6) (LC)
3. To protect landscapes, townscapes and visual amenity	O	0	-	+	-	-	-
4. Protect and where appropriate enhance, built and natural assets and reduce waste	C	0	-	--	-	-	-
	O	-	-	0	-	-	-
5. Reduce greenhouse gas emissions	C	0	-	-	-	-	-
	O	-	-	-	-	-	-
6. Contribute to environmental climate change resilience	C	0	-	-	-	-	-
	O	--	-	+	-	+	--
7. Protect and improve surface water and groundwater status	C	0	0	0	0	0	0
	O	--	-	--	-	-	-
8. Avoid flood risk	C	0	0	0	0	0	0
	O	0	0	0	0	0	0
9. Protect and where appropriate, enhance cultural heritage assets	C	0	-	-	-	-	-
	O	0	0	0	0	0	0

SEA Objectives	Phase (Construction (C) / Operation (O))	Do Minimum	SA Approach 1 (SA Combination 11) (LCo)	SA Approach 2 (SA Combination 13) (QD)	SA Approach 3 (SA Combination 1) (BE, BA)	SA Approach 4 (SA Combination 3) (MR)	SA Approach 5 (SA Combination 6) (LC)
10. Protect quality and function of soils	C	0	-	--	-	-	-
	O	0	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 approaches 1, 3, 4 and 5 are likely to have lower water and soil impacts than SA approach 2. SA approach 1, 3 and 5 also have lower biodiversity impacts than SA approach 2 and SA approach 4. However, SA approach 2 and SA approach 4 are indicated to be more resilient than the other approaches. Mitigation for the Preferred Approach is identified in chapter 5 through the individual options assessment and the chapter 6 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

SA approach 1 has been selected through the 7 step process as the best performing approach overall based on a significant lower cost compared to the other approaches and not being significant worse in terms of environmental issues taking into account temporary nature of some of the construction impacts.

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

SA5 Preferred Approach: Strategic Environmental Assessment

5 SA5 Preferred Approach Strategic Environmental Assessment

5.1 SA5 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 all of the WRZs in the study area. This reflects the small scale of the supplies and difficulties in transporting small volumes of water over long distances. For one of the larger demand areas, South Roscommon (Lisbrock & Killeglan), the SA Preferred Approach involves increasing the existing groundwater abstraction at Killeglan and Lisbrock, upgrading the associated WTPs and providing new/upgraded network to allow for the additional supply. The SA Preferred Approach for the remaining WRZs involves a new WTP, new and increased groundwater abstractions, along with increased surface water abstractions and WTP upgrades.

Table 5.1 gives a breakdown of the options in SA5 and the associated abstractions/demand.

Table 5.1 Preferred Approach Breakdown

WRZ Name and Option Reference*	Option Description	Abstraction / Demand
SA5-002 1200SC0005 Ahascragh	New GW abstraction for Ahascragh WRZ to supply deficit • New GW abstraction for Ahascragh WRZ to supply deficit DYCP (2044) • Suck South groundwater body WFD status 2013-2018 – Good	1,320 m^3/d
SA5-09a 3200SC0002 Athlone	Increase SW abstraction at River Shannon and upgrade Athlone WTP • Upgrade Athlone WTP DYCP (2044) • Current River waterbody (Shannon Upper) WFD status 2013 - 2018 – Poor	16,362 m^3/d
SA5-17a 1200SC0006 Ballinasloe	Increase abstraction from River Suck and upgrade Ballinasloe WTP • Increase abstraction from River Suck (New Intake required) DYCP (2044) • Current River waterbody (Suck) WFD status 2013 - 2018 – Moderate	5,937 m^3/d
SA5-025 2500SC0015 Birr/Kinnitty	Increase abstraction from the River Camcor and upgrade WTP to supply Birr and Kinnity • Increase SW abstraction to meet WRZ deficit (DYCP 2044) • Camcor River waterbody (CAMCOR_050) WFD status 2013-2018 – Good	2,819 m^3/d

WRZ Name and Option Reference*	Option Description	Abstraction / Demand
SA5-033 2500SC0003 Kilcormac	Increase GW abstraction to supply deficit in Kilcormac and upgrade WTP • Increase GW abstraction to meet WRZ deficit (DYCP 2044) • Tullamore groundwater body WFD status 2013-2018 – Good	558 m^3/d
SA5-37b 2600SC0001 Mount Talbot/ Four Roads	Increase GW abstraction at Mount Talbot Spring to supply deficit and upgrade WTP • Increase GW abstraction to meet WRZ deficit (DYCP 2044) • Suck South GWB WFD status 2013-2018 – Good	3,007 m^3/d
SA5-082 & SA5-083 (SA option 18) 2600SC0006 South Roscommon (Lisbrock and Killeglan)	Increase GW abstraction at Killeglan and Lisbrock and Upgrade WTPs • SA option 18 involves increased GW abstraction at Killeglan and Lisbrock and upgrade of two WTPs • Suck south groundwater body: WFD status 2013 - 2018 – Good • Funshinagh groundwater body: WFD status 2013 - 2018 – Good	7,772 m^3/d
SA5-084 2500SC0016 Clara/Ferbane	No Deficit. WTPs Upgrade Only • No Deficit. WTPs Upgrade Only • Gageborogh-Brosna gravels groundwater body: WFD status 2013 - 2018 – Good	N/A
SA5-086 2500SC0017 Rahan	New GW abstraction to meet partial deficit for Rahan and upgrade WTP • Increase GW at existing borehole • Holimshill-Killeigh Gravels Groundwater Body: WFD status 2013-2018 – Good	2,412 m^3/d
SA5-080 2500SC0001 Banagher	No deficit. Upgrade Banagher WTP to address water quality issue • WRZ not in deficit, option to upgrade Banagher WTP for WQ issues • River Shannon abstraction waterbody (SHANNON (LOWER)_010) WFD status – Unassigned but Poor immediately downstream	N/A
SA5-081 2500SC0001 Banagher	No deficit. Upgrade Clontotin WTP to address water quality • WRZ not in deficit, option to upgrade Clontotin WTP for water quality issues • GW abstraction (Banagher groundwater body) WFD status – Good	N/A

WRZ Name and Option Reference*	Option Description	Abstraction / Demand

* Note: 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 18 is labelled as SA5-518.

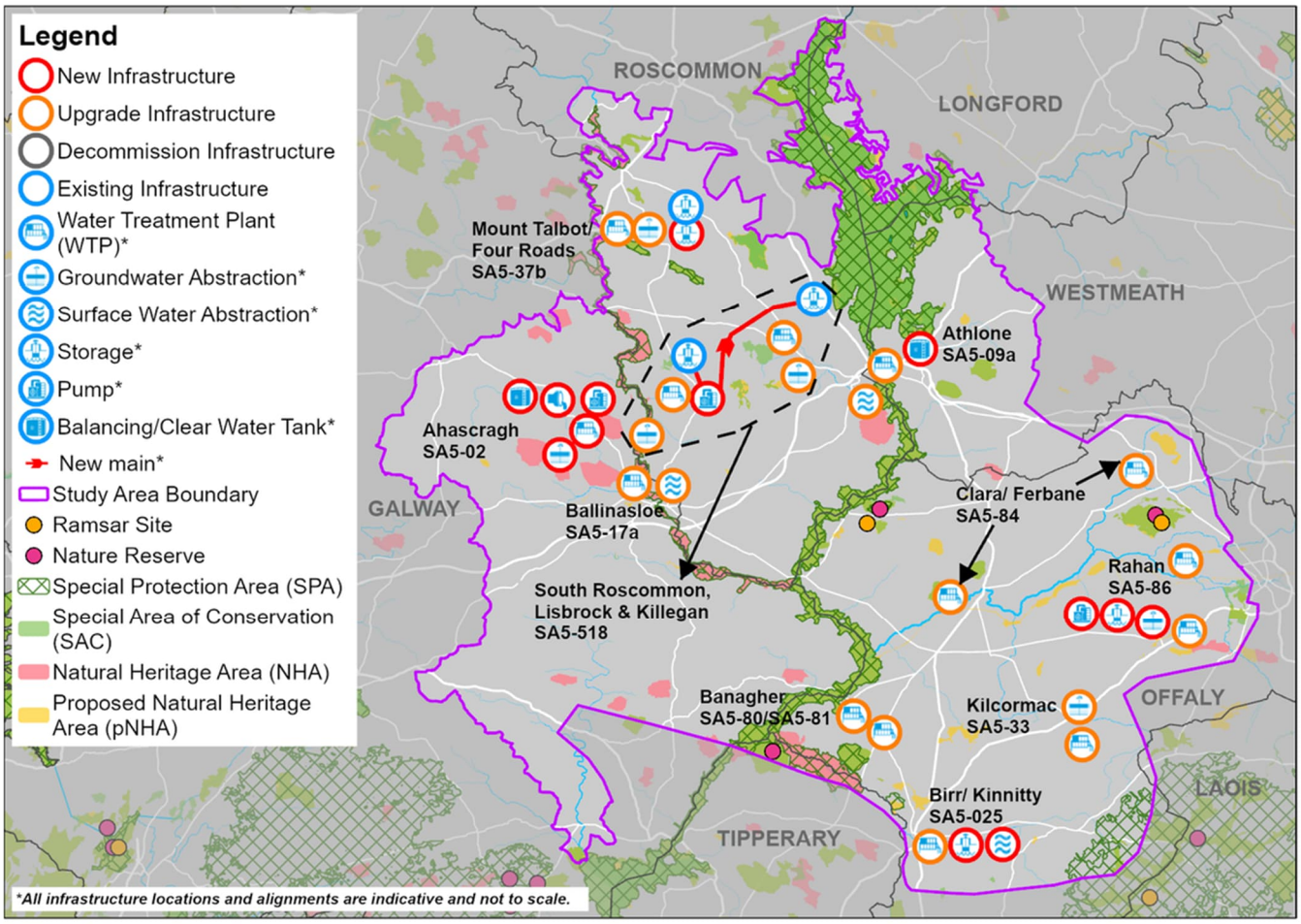

Figure 5.1 SA Preferred Approach and Key Environmental Designations

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 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
SA Option 18 (SA5-082 and SA5-083)	✓	-	✓	✓	-	-	-	✓
SA5-002	✓	✓	✓	✓	-	-	-	✓
SA5-09a	-	-	✓	✓	-	-	-	✓
SA5-17a	-	-	✓	✓	-	-	-	-
SA5-025	-	-	✓	✓	-	-	-	✓
SA5-033	-	-	✓	✓	-	-	-	-
SA5-37b	-	-	✓	✓	-	-	-	✓
SA5-080 & SA5-081	-	-	✓	-	-	-	-	-
SA5-084	-	-	✓	-	-	-	-	-
SA5-086	✓	-	✓	✓	-	-	-	✓

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)
SA5-09a	Upgrade Athlone WTP	Construction	--	-	-	0	---	-	0	0	0	0
		Operation	++	--	0	0	---	-	-	0	0	0
SA5-002	New GW abstraction for Ahascragh WRZ to supply deficit	Construction	-	-	-	-	--	--	0	0	-	-
		Operation	+	-	-	0	--	--	-	0	0	0
SA5-17a	Increase abstraction from River Suck (New intake required)	Construction	-	-	0	0	-	-	0	0	0	0
		Operation	0	--	0	0	-	-	-	0	0	0
SA5-080	No deficit. Upgrade Banagher WTP to address water quality issue	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 (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)
SA5-081	No deficit. Upgrade Clontotin borehole to address water quality issue	Construction	-	-	0	0	0	0	0	0	0	0
		Operation	+	0	0	0	0	0	0	0	0	0
SA5-025	Increase abstraction from the River Camcor and upgrade WTP to supply Birr and Kinnity	Construction	-	-	-	0	-	-	0	0	0	0
		Operation	++	-	0	0	-	-	-	0	0	0
SA5-084	No deficit. WTP upgrade only	Construction	-	-	0	0	-	0	0	0	0	0
		Operation	++	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 (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)
SA5-033	Increase GW abstraction to supply deficit in Kilcormac and upgrade WTP (Tullamore groundwater body - karstic bedrock)	Construction	-	-	0	0	-	-	0	0	0	0
		Operation	0	-	0	0	-	-	-	0	0	0
SA5-37b	Increase GW abstraction at Mount Talbot Spring to supply deficit	Construction	-	-	-	0	--	-	0	0	0	0
		Operation	++	--	0	0	--	-	-	0	0	0
SA5-086	New GW abstraction to meet partial deficit	Construction	-	-	-	-	-	-	0	0	-	-
		Operation	+	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 (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)
	for Rahan and upgrade WTP											
SA Option 18 (SA5-082 and SA5-083)	New GW at Killeglan and upgrade of WTP	Construction	-	-	-	-	-	-	0	0	-	-
		Operation	0	--	0	0	-	-	-	0	0	0

* Note SA Option is the same as Group Option

** 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, Irish Water 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 SA5 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 Irish Water 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;
- Net leakage reductions targets have been applied to the SDB deficit to move towards achieving the national Sustainable Economic Level of Leakage (SELL) target prioritised based on:
  - Supply demand deficit;
  - Existing abstractions with sustainability issues; and
  - Drought impacts.
- Additional leakage targets to achieve SELL and reduce leakage levels to 21% of demand in the WRZs: Birr/Kinnitty, Ahascragh P.S., Ballinasloe Public Supply, Rahan, South Roscommon (Lisbrock & Killeglan), Athlone, Clara/Ferbane/Moyclare, and Mount Talbot/Four Roads.

5.2.2 Water Conservation

At present, Irish Water is conducting pilot studies in relation to water conservation stewardship in businesses and is actively progressing water conservation messaging campaigns. During drought conditions in 2018, a Water Conservation Order was implemented, in order to protect their water supplies and reduce pressure on the natural environment during this period. Irish Water 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, Irish Water 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 SA5 Technical Report identifies potential interim solutions that allow shorter terms 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 Irish Water have undertaken for the SA5 Preferred Approach is provided in the SA5 Technical report. A high-level assessment of what this could mean for the SEA is shown in Table 5.4.

Table 5.4 SA5 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 our current abstractions are large compared to the water bodies from which they abstract)	+700 m^3/d	The impact of sustainability reductions would reduce the volumes that can be abstracted from Irish Water's existing sources; therefore, increasing the SDB deficit. Irish Water's outline sustainability assessments would mean a potential increase in deficit for SA5 based on reductions in the sustainable abstraction amounts from the Gageborough River, affecting the Clara Ferbane WRZ. As this WRZ currently shows no deficit, feasible options would have to be considered if a sustainability issue is confirmed for the Gageborough River.
			The SA Preferred Approach addresses sustainability reduction, although additional sustainability reductions could add pressure for additional supply from outside the study area. Another option would need to be considered for the Clara/Ferbane WRZ if sustainability issues are confirmed for the River Gageborough.
Climate Change	High (international climate change targets have not been met)	+200 m^3/d	Higher climate change scenarios would impact Irish Water'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 by optimising Irish Water's operations on a more environmentally sustainable basis across the range of supplies.
			Potential for additional abstraction pressure unless optimisation can address.
Demand Growth	Low/Moderate (growth has been based on policy)	-200 m^3/d	The impact of lower than expected growth would reduce the SDB deficit and the overall need requirement. The SDB deficit is currently spread across six of the WRZs in SA5 and is projected to spread across seven of the ten WRZs in SA5. This is driven by quality and quantity issues. In this rural area, growth is relatively low. However, there are large growth centres such as Athlone, Tullamore, Ballinasloe and Roscommon.
			This could allow lower than expected energy and carbon and reduce expected abstraction requirements

Uncertainty	Likelihood	Increase/ Decrease in Deficit	Environmental Impacts Relative to Assessment of Preferred Approach Key: Green - Positive Amber – Negative
Leakage Targets	Low (Irish Water is focused on sustainability and aggressive leakage reduction)	+570 m^3/d	The impact of lower than expected leakage savings would increase the SDB deficit and the overall need requirement. Due to the length and condition of Irish Water's networks, Irish Water could potentially fail to achieve target leakage reductions within the timeframes set out. As Irish Water is committed to achieving leakage reductions, the likely scenario would be an extension in the period of time taken to achieve leakage targets as opposed to accepting lower targets.
			This could increase carbon emissions and the effects of abstraction pressure on the environment
	Moderate/High (Irish Water is focused on sustainability and aggressive leakage reduction)	-7,352 m^3/d	Increased leakage savings beyond SELL would reduce the SDB deficit and the overall need requirement. The need drivers in SA5 are across all WRZs and are driven by quality as well as availability issues.
			This could allow lower than expected energy and carbon emissions and reduce expected abstraction requirements

6

SEA Cumulative Effects for SA5 Preferred Approach

6 SEA Cumulative Effects for SA5 Preferred Approach

Secondary, cumulative and the synergistic nature of the effects of the SA5 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 nine study areas within the Eastern and Midlands 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 SA5

The potential 'within plan' cumulative effects for SA5 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 Irish Water 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 Eastern and Midlands Region level: Considering combined effects from proposals in the nine 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 effects 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 SA5

Preferred Approach option references	SA5-09a	SA5-002	SA5-17a	SA5-080	SA5-081	SA5-025	SA5-084	SA5-033	SA5-37b	SA5-086
SA Option 18 (Group option 18)	Shan / LL / M6	Suck	Suck / M6	Shan	Shan		Shan		Suck	
SA5-086								N52		
SA5-37b		Suck	Suck							
SA5-033										
SA5-084	Shan			Shan	Shan					
SA5-025										
SA5-081	Shan			Shan	ASBE					
SA5-080	Shan									
SA5-17a	M6	Suck								
SA5-002										

Key	
Construction Phase	
Operation Phase	
Construction and Operation	
River Suck Callows SPA	Suck
River Shannon Callows SAC	Shan
Lough Lee	LL
All Saints Bog SPA	ASB

Key	
Route N52	N52
Motorway 6	M6

There could be cumulative effects associated with construction, in terms of traffic, noise and dust, for the options located along the N52 route (indicated by N52 in Table 6.1) and along the M6 (indicated by M6 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 could be cumulative effects during construction associated with options located along the River Suck Callows SPA and the River Shannon Callows SAC. Both of the sites are designated for their wetland habitats and bird species. Options SA5-002, SA5-17a, SA5-37b and SA option 18 (see Table 6.1) have the potential to cause cumulative effects to the River Suck Callows SPA from habitat degradation, pollution and disturbance if construction of the options are concurrent. Similarly, options SA5-09a, SA5-080, SA5-081, SA5-084 and SA option 18 could cause potential cumulative effects to the River Shannon Callow SAC from habitat degradation, spread of invasive species and pollution if construction of the options occurred at the same time. Construction works within the river valley could affect water quality through increasing surface water run off or increasing the risk of pollution during works.

There is also potential for cumulative effects during construction between options SA5-081 and SA5-080 to All Saints Bog SPA from disturbance, although effects would be very limited due to the nature of the options. Both options only require an upgrade to the existing WTP to improve water quality within their respectively WRZ. In addition, Table 6.1 demonstrated that there is potential for cumulative effects during construction between option SA5-09a and SA option 18 from disturbance to Lough Ree SPA and SAC. With standard good practice mitigations in place (e.g. having buffers along the edge of the river and having an emergency plan) during construction, cumulative effects to all European designated sites mentioned above are unlikely to be significant. The impacts on the European designations are provided in the NIS and also summarised in chapter 9 of this review.

6.1.2 Cumulative Effects during Operation

The SEA has identified, at a plan level, that there is potential for cumulative effects during the operation phase of the SA5 Preferred Approach to the River Suck Callows SPA and the River Shannon Callows SAC (see Table 6.1). Options SA5-002, SA5-17a, SA5-37b and SA option 18 all include new or increase groundwater abstraction that could have potential cumulative effects to the River Suck Callows SPA from habitat degradation impacts. New and increase groundwater abstractions could cause hydrological changes and water table/availability impacts to the site. Option SA5-09a and SA option 18 also involve new or increase abstraction that could cause the same cumulative effects to the River Shannon Callows SAC and the Lough Ree SAC. See Figure 6.1 for the Preferred Approach abstractions in SA5. Note that SA option 18 is labelled as SA5-518. However, with the implementation of mitigation as outlined in section 6.3.3 of the NIS, there will be no adverse cumulative effects on the integrity of the SPA or the SAC.

The potential for cumulative effects on groundwater bodies have been considered in a hydrogeological assessment of the groundwater abstractions commissioned by Irish Water (Irish Water, 2022). This hydrogeological assessment considers the abstraction quantities and proximities and concludes that all four of the WFD groundwater bodies (Funshinagh, Suck South and Tullamore) affected by abstractions

have a good quantitative status, therefore, the likelihood of affecting their WFD objectives is low and no interaction was identified with existing Irish Water abstractions.

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 SA5 this averages as 3.25 tCO_2e/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.

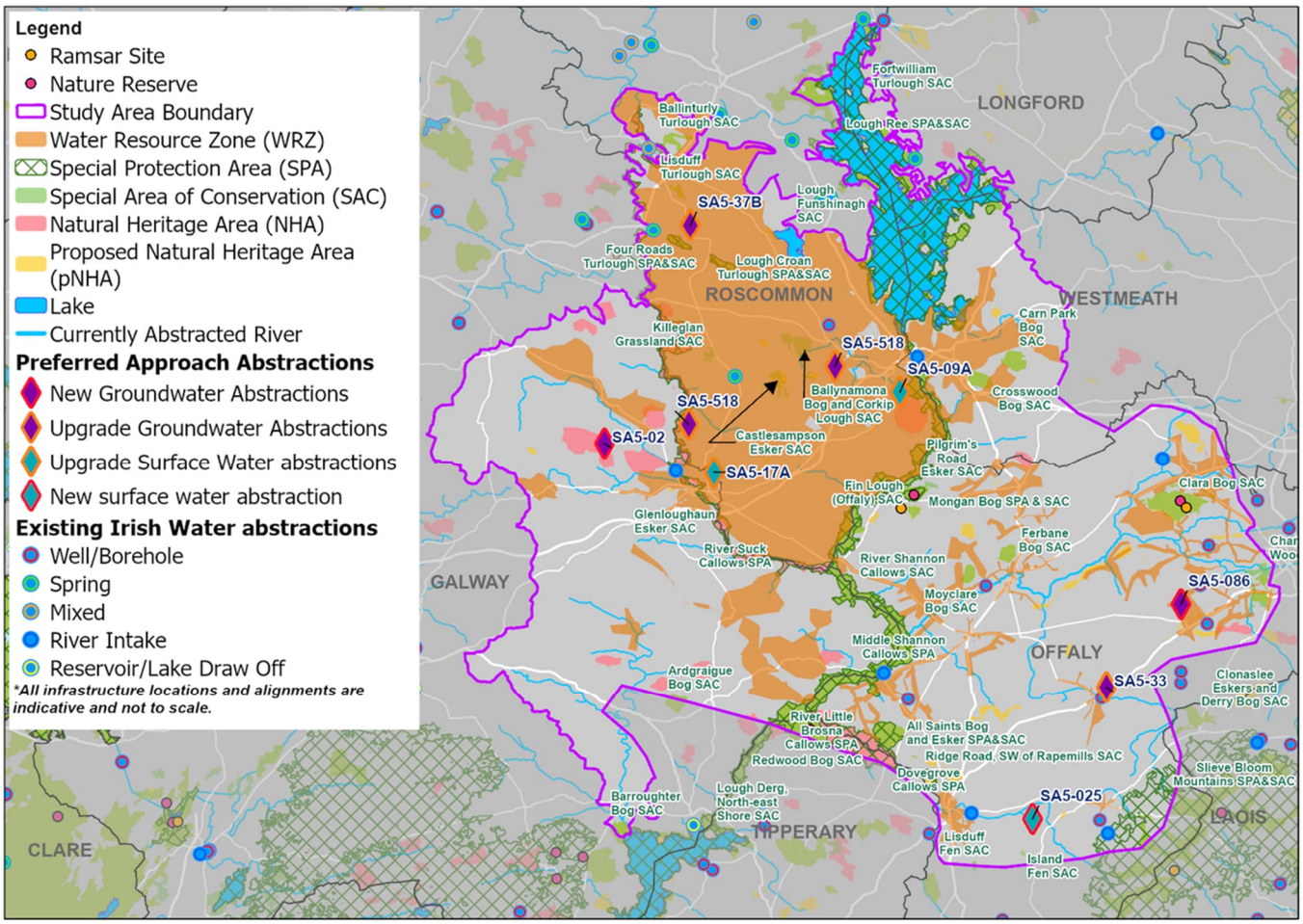

Figure 6.1 SA Preferred Approach Abstractions in SA5

6.2 Cumulative Effects with Other Developments

The SA5 Preferred Approach has been assessed alongside other developments that could occur within the plan area. Potential 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 SA5 there are a number of regeneration and construction projects clustered around Athlone. There is also a project located at Clara, Banagher and at Ballinasloe. Table 6.2 shows that within SA5 there are twelve other developments that could cause cumulated effects with the SA Preferred Approach. No potential for cumulative effects has been identified with the other remaining developments mentioned in Table 2.13 and the SA Preferred Approach. Other developments that were not considered further due to the size and the distance of the developments from the SA Preferred Approach are the Turraun to Shannon Harbour Link Greenway and Viewing Tower at Mote Forest Park.

6.2.1 Cumulative Effects during Construction

The regeneration projects in Athlone, and to a lesser degree in Banagher, could result in cumulative effects with the SA Preferred Approach (SA5-09a and SA5-080) if they were to be constructed at the same time (Table 6.2). Potential effects could include increased traffic, noise and dust on the local roads in Athlone and Banagher town centres. These cumulative effects 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. Social housing scheme for 38 units and option SA5-084, and Portiuncula University Hospital 50 beds ward block and SA5-17a are both located in Clara and Ballinasloe; however, they are not within close proximity to each other for potential 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.

The plan level assessment indicates that there is potential for cumulative effects from disturbance, spread of invasive species and habitat degradation impacts on the River Shannon Callows SAC if construction phase of the regeneration projects in Athlone and Banagher are concurrent with the SA Preferred Approach (SA5-09a, 080, 081, 084 and SA option 18). The River Shannon Callows SAC is less than 1km away from central Athlone and Banagher where these regeneration projects are located. Lough Ree SAC and SPA are also less than 1km away from central Athlone where regeneration projects of Athlone are located. There is potential for cumulative from disturbance, spread of invasive species and habitat degradation impacts on the Lough Ree SAC and SPA sites if construction of the regeneration projects in Athlone occurred at the same time as the SA Preferred Approach (SA5-09a and SA option 18). Furthermore, there is potential for cumulative effects from disturbance and habitat degradation impacts on the River Suck Callows SPA if construction phase of the Portiuncula University Hospital 50 beds ward block is concurrent with the SA Preferred Approach. These are identified in Table 6.2 as ‘Suck’. Portiuncula University Hospital 50 bed ward block is less than 1km away from the SPA. With the implementation of mitigations as outlined in section 6.3.3 of the NIS, there will be no adverse cumulative effects on the integrity of the SACs and SPAs mentioned above.

Table 6.2 Potential Cumulative Effects between Preferred Options and Other Developments in SA5

	Preferred Approach Options										
Project Developments	**SA5-09a**	**SA5-002**	**SA5-17a**	**SA5-080**	**SA5-081**	**SA5-025**	**SA5-084**	**SA5-033**	**SA5-37b**	**SA5-086**	**SA Option 18 (Group option 18)**
Athlone Flood Relief Scheme	LL Shan ATC			Shan	Shan		Shan				LL Shan
Athlone Tourism Cultural Quarter	LL Shan ATC			Shan	Shan		Shan				LL Shan
Athlone, Life Sciences Innovation Hub and Soft Landing Space	LL Shan			Shan	Shan		Shan				LL Shan
Athlone Institute of Technology STEM building	LL Shan			Shan	Shan		Shan				LL Shan
Athlone Town Centre Regeneration and Enhancement	LL Shan ATC			Shan	Shan		Shan				LL Shan
Athlone, Lissywollen	LL Shan ATC			Shan	Shan		Shan				LL Shan
Athlone, Loughanaskin	LL Shan ATC			Shan	Shan		Shan				LL Shan

	Preferred Approach Options										
Project Developments	**SA5-09a**	**SA5-002**	**SA5-17a**	**SA5-080**	**SA5-081**	**SA5-025**	**SA5-084**	**SA5-033**	**SA5-37b**	**SA5-086**	**SA Option 18 (Group option 18)**
South Westmeath Regional Water Supply Scheme (Athlone and Mullingar)	LL Shan ATC			Shan	Shan		Shan				LL Shan
Athlone Sewerage Scheme	LL Shan ATC			Shan	Shan		Shan				LL Shan
Athlone, St Vincent's Care Centre,	LL Shan ATC			Shan	Shan		Shan				LL Shan
Portiuncula University Hospital 50 beds ward block		Suck	Suck						Suck		Suck
Raheen, Clara social housing scheme for 38 units.											
Banagher Regeneration Projects	Shan			Shan BTC	Shan		Shan				Shan

Key	
Construction Phase	
Operation Phase	
Construction and Operation	
River Suck Callows SPA	Suck
River Shannon Callows SAC	Shan

Key	
Lough Lee	LL
Athlone Town Centre	ATC
Banagher Town Centre	BTC

6.2.2 Cumulative Effects during Operation

The plan level assessment indicates that there could be cumulative effects to the Lough Ree SAC and River Shannon Callows SAC during the operation phase of the SA Preferred Approach (SA5-09a and SA option 18), the Athlone Flood Relief Scheme, Sewerage Scheme and the South Westmeath Regional Water Supply Scheme. However, in combination effects are assessed in the NIS and mitigation measures are identified to avoid significant effects. These other developments could have potential benefits to water quality and quantity to the Lough Ree and Shannon River, which could combine with the SA Preferred Approach to bring cumulative benefits to water quality and quantity.

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 SA5 Preferred Approach, 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 SA5 and a range of options and SA Approaches have been considered and assessed, including a 'Do Minimum' approach.

Key beneficial impacts assessed include, up to, moderate beneficial impacts for all options associated with increasing resilience and the quality of water supply for local communities; and the subsequent benefits of this for public health.

Key potential adverse impacts identified at plan level include:

- Moderate adverse impacts on the River Shannon Callows SAC and Middle Shannon Callows SPA given the direct increase abstraction of water (SA5-09a) from the River Shannon. There is a risk that this abstraction will reduce water flow in the River Shannon, which could impact protected species such as otters. There is also potential for impacts on otters utilising watercourse hydrologically linked to this European site through a reduction in flows/water levels. The NIS identifies mitigation measures to avoid AESI for these sites;
- Moderate adverse impacts on River Suck Callows SPA associated with direct increase of abstraction from the River Shannon (SA5-17a) and new and increase groundwater abstractions that are hydrologically linked to the River Suck Callows SPA (SA5-002, 37b and SA option 18). During operation phase, abstraction could lead to hydrological changes (reduced flows – impacting on water quality) that could impact QI species. There is potential for impacts on aquatic QI species utilising watercourse hydrologically linked to this European site through a reduction in flows/water levels. Groundwater abstraction points of option SA5-018 and SA option 18 are also within a karstic aquifer which connects to other designated sites such as Four Roads Turlough SAC and SPA, and Ballynamona Bog and Corkin Lough SAC and Castlesampson Esker SAC, respectively. The NIS identifies mitigation measures to avoid AESI for these sites; and
- Moderate adverse effects on Athlone's health and wellbeing from increase in traffic, noise and dust during construction as the upgrade of WTP and increase abstraction from River Shannon are within the town centre.

Cumulative effects assessment identifies potential significant effects in relation to carbon emissions, the individual options are assessed as neutral to major 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 SA5 but does not provide a complete picture as it does not fully take account of efficiencies from replacement of failing infrastructure or 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 development of construction environmental management plans, public consultation with local residents on disruptions during construction and consideration of waste hierarchy in design. Measures to address the cumulative impact for carbon emissions include increasing the sourcing of 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 1) 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	C Minor Adverse to Moderate Adverse O Neutral to Moderate Beneficial 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.	Standard good construction practice and consultation 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.	• 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	• 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 of the River Camcor, Silver, Suck or Shannon are impeded
2. Protect and enhance biodiversity and contribute to	C Minor Adverse O Neutral to Moderate Adverse Impacts from construction works for pipelines and service reservoirs on biodiversity. These can be	Routing/siting to avoid impacts. Standard good construction practice and specific measures as identified in the NIS	• Temporary and permanent habitats lost vs habitats created/enhanced • Site condition and population data for QI of European and	• Monitor construction activities to ensure compliance

SEA Objectives	SA Preferred Approach (PA) (SA Approach 1) Residual Effects Including Mitigation C – Construction (Short Term) O – Operational (Long Term)	Mitigation	Monitoring	
			Study Area Level	Scheme Level
resilient ecosystems	minimised through careful routing and siting. Operational impacts on habitats of the River Shannon and River Suck. Potential for construction and operational impacts on European and National designated sites, most notably the Lough Ree SAC, River Suck Callows SPA and NHA, Castlesampson Esker SAC, Ballynamona Bog SAC and River Shannon Callows SAC.	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. Further hydrological/hydrogeological assessments to determine impacts on designated sites. Operating rules to limit impacts on European and National sites.	National designated sites, including the Lough Ree SAC, River Suck Callows SPA and NHA, Castlesampson Esker SAC, Ballynamona Bog SAC and River Shannon Callows SAC.	
3. To protect landscapes, townscapes and visual amenity	C Neutral to Minor Adverse O Neutral to Minor Adverse Construction landscape impacts and long term impacts from above ground structures, such as new WTPs.	Routing and siting to reduce tree loss and appropriate location and design of above ground structures with landscape planting. Reinstatement of land use and vegetation.	• 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	• Duration of construction works • Number of complaints received regarding visual impact of construction works
4. Protect and where appropriate enhance, built	C Neutral to Minor Adverse O Neutral to Minor Adverse	Materials management to be integrated into design to optimise use of existing resources and	• Loss of greenfield land, including agricultural, forestry or other land uses	• Construction wastes sent to landfill

SEA Objectives	SA Preferred Approach (PA) (SA Approach 1) 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	New resources required for construction works, including extensive lengths of pipeline, service reservoirs and new/upgraded WTPs. Ongoing maintenance requirements.	minimise waste from construction and operation.	• Disruptions to strategic infrastructure/services • Use of waste management plans • Volume of drinking water treatment residuals sent to landfill	
5. Reduce greenhouse gas emissions	C Neutral to Major Adverse O Neutral to Major Adverse Embodied and operational carbon contribute to national level carbon emission targets. Leakage and water efficiency can contribute to reducing carbon.	Design to minimise embodied carbon emissions and optimise operational efficiency. Seek renewable energy supply sources and optimise use of leakage and water efficiency measures to reduce carbon. Consider offsetting approaches with multiple benefits for water quality, carbon sequestration and linking with other objectives.	• 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)	• Carbon footprint (total tonnes) during construction • Operational Carbon Intensity kgsCO2equic/ML
6. Contribute to environmental climate	C Neutral to Moderate Adverse O Neutral to Moderate Adverse Abstractions generally reduce environmental resilience but	Consider how operation can further reduce climate change pressure on at risk sources and	• WFD waterbody status objectives at risk and designated site condition status	• None identified

SEA Objectives	SA Preferred Approach (PA) (SA Approach 1) 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. All options, excluding SA5-080, SA5-081, and SA5-084 require further assessment to understand their sustainability in the longer term.	associated designations, particularly for SA5-002. Sustainability review of sources taking account of groundwater and surface water interconnections for all options, excluding SA5-080, SA5-081, and SA5-084 .	• 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 Minor 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.	• WFD waterbody status objectives at risk	• Pollution incidents during construction
8. Avoid flood risk	C Neutral O Neutral	Siting and design of schemes to take account of flood risk and design for flood risk resilience.	• Number of options at risk of flooding at each AEP level	• Lost time to flooding • Lost time to power supply interruptions
9. Protect and where appropriate,	C Neutral to Minor Adverse O Neutral	Standard good practice approaches to minimise potential impacts.	• Number of archaeological assets adversely affected by water resource options	• Number of archaeological finds recorded during construction

SEA Objectives	SA Preferred Approach (PA) (SA Approach 1) Residual Effects Including Mitigation C – Construction (Short Term) O – Operational (Long Term)	Mitigation	Monitoring	
			Study Area Level	Scheme Level
enhance cultural heritage assets	Potential construction impacts on unknown archaeological interest. Impacts on known interests are expected to be avoided.		• 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	
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.	• Soil Management Plans implemented • Volume of contaminated land restored, or soils removed	• 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 SA5 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 SA5 abstractions have good quantitative status (Irish Water, 2022). The abstractions are not located in close proximity, although three boreholes associated with SA5-002 and SA option 18 are within existing groundwater source protection areas. The risk of combined effects on groundwater body WFD objectives, or on existing abstractions, are considered low. However, impacts, including cumulative effects with non Irish Water 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 SA5, 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 on European sites were identified for the River Suck Callows SPA, Lough Ree SPA, Lough Ree SAC, Middle Shannon Callows SPA and the River Shannon Callows SAC. The potential effects included disturbance, habitat degradation and spread of invasive non-native species. However, 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 River Suck Callows SPA, River Shannon Callow SAC, Middle Shannon Callows SPA, All Saints Bog SPA and Lough Ree SAC & SPA if construction of options is concurrent. The potential impacts include habitat loss, habitat degradation, spread of invasive non-native species, disturbance and water table/availability impacts. With the implementation of mitigation as detailed in Appendix E of the NIS, there will be no adverse effects on the integrity of these European sites, either alone or in-combination between preferred options.

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 Eastern and Midlands 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 Groundwater Options in SA5

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
SA5-001	Increase GW abstraction for Ahascragh WRZ to supply deficit									1	0	-10
SA5-002	New GW abstraction for Ahascragh WRZ to supply deficit									0	0	-9
SA5-004	Rationalise Ahascragh WRZ to South Roscommon (Lisbrock &									1	0	-16

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
	Killeglan) (new source required)											
SA5-011	New riverbank filtration adjacent to River Shannon at Athlone to supply deficit in Athlone WRZ									0	0	-15
SA5-014	Gravels at Ballycumber to supply deficit									0	0	-16
SA5-016	New GW at South Roscommon (Lisbrock & Killeglan) WRZ to supply deficit in Athlone & South Roscommon (Lisbrock & Killeglan)									0	0	-12
SA5-020	New wellfield in Ballinasloe to supply the scheme (better quality water anticipated - lower OPEX costs)									0	0	-16

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
SA5-026	New GW abstraction to supply Birr and Kinnity									0	0	-15
SA5-033	Increase GW Abstraction at Kilcormac - 0.4Ml/d									0	0	-6
SA5-38b	Interconnect Mount Talbot/Four Roads with South Roscommon (Lisbrock & Killeglan) and supply deficit from new GW at South Roscommon (Lisbrock & Killeglan)									1	0	-12
SA5-42a	New GW at Killeglan and upgrade of WTP									1	0	-12
SA5-42c	New GW at Killeglan and upgrade of WTP									1	0	-13
SA5-42d	New GW at Killeglan and upgrade of WTP									1	0	-16
SA5-043	New GW at Lisbrock and upgrade of 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
SA5-047	Supply deficit from Mount talbot spring (Mount Talbot/Four Roads WRZ)									2	0	-15
SA5-049	Develop Moate groundwater (3 No. borehole) and transfer water from new WTP at Moate through new pumped watermain (17.5km) to SR in Athlone.									0	0	-18
SA5-50a	New GW at South Roscommon (Lisbrock & Killeglan) WRZ to supply deficit in Athlone & South Roscommon (Lisbrock & Killeglan)									0	0	-12
SA5-059	Increase GW abstraction at Ballyshane Bridge Borehole, Kinnity (Bredagh groundwater									1	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
	body - productive fissured bedrock) to partly supply deficit											
SA5-082	New GW at Killeglan and upgrade of WTP									0	0	-13
SA5-083	New GW at Lisbrock and upgrade of WTP									0	0	-13
SA5-086	New GW abstraction to meet partial deficit for Rahan and Upgrade WTP									0	0	-13

Table A.2 Fine Screening Summary of Surface Water Options in SA5

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
SA5-003	Increase SW abstraction on River Suck for Ahascragh WRZ to supply deficit									0	0	-10
SA5-05a	Interconnect South Roscommon (Lisbrock & Killeglan), Athlone and Ballinasloe to supply deficits and increase resilience of WRZs									0	0	-12
SA5-09b	Upgrade Athlone WTP									0	0	-13
SA5-015	Upgrade Ballymahon (Abbeyshrule WTP) and interconnect									0	0	-12
SA5-17a	Increase abstraction from River Suck (New intake required)									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
SA5-17b	Supply deficit from Ballinasloe (River Suck) and interconnect South Roscommon (Lisbrock & Killeglan) (existing links)									0	0	-10
SA5-17c	Supply deficit from Ballinasloe (River Suck) and interconnect South Roscommon (Lisbrock & Killeglan) (existing links)									0	0	-10
SA5-17d	Supply deficit from Ballinasloe (River Suck) and interconnect South Roscommon (Lisbrock & Killeglan) (existing links)									0	0	-10
SA5-018	Interconnect South Roscommon (Lisbrock & Killeglan), Athlone and Ballinasloe to supply deficits and increase									1	0	-13

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
	resilience of WRZs (offset from South Roscommon (Lisbrock & Killeglan))											
SA5-025	Increase abstraction from the River Camcor and upgrade WTP to supply Birr and Kinnity									0	0	-11
SA5-039	Increase SW abstraction from River Suck at Ballinasloe and supply deficit at Mount Talbot									0	0	-10
SA5-45a	Increased SW abstraction from River Suck and WTP Upgrade at Ballinasloe									0	0	-11
SA5-45b	New SW abstraction from River Suck									0	0	-14
SA5-45c	Supply deficit from Ballinasloe and									0	0	-10

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
	interconnect WRZs (existing links)											
SA5-46b	Interconnect South Roscommon (Lisbrock & Killeglan), Athlone and Ballinasloe to supply deficits and increase resilience of WRZs									1	0	-13
SA5-051	Upgrade Athlone WTP to 18Ml/d and supply deficit to the east of South Roscommon via new watermain (1.6km), connecting into existing 400mm									0	0	-13
SA5-057	New SW abstraction from River Little Brosna to supply deficit									0	0	-16

Table A.3 Fine Screening Summary of Surface Water/Groundwater Options in SA5

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
SA5-055	New GW from River Camcor to Supply Deficit									0	0	-12

Table A.4 Fine Screening Summary of Group Water Scheme Options in SA5

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
SA5-013	New GW Abstraction at Mount Temple - 5.0Ml/d									0	0	-11

Table A.5 Fine Screening Summary of New Shannon Source Options in SA5

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
SA5-12a	Rationalise and Supply from New Shannon Source - 17Ml/d									3	0	-19
SA5-12b	Rationalisation and Supply from New Shannon Source									2	0	-17
SA5-019	Rationalisation and Supply from New Shannon Source									2	0	-17
SA5-027	Rationalisation and Supply from New Shannon Source									2	0	-17
SA5-030	Rationalisation and Supply from New Shannon Source									2	0	-17
SA5-036	Rationalisation and Supply from New Shannon Source									2	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
SA5-041	Rationalisation and Supply from New Shannon Source									2	0	-17

Table A.6 Fine Screening Summary of WTP Options in SA5

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
SA5-080	Upgrade WTP to address water quality issue									0	0	-6
SA5-081	Upgrade WTP to address water quality issue									0	0	-6

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
SA5-084	No deficit. WTP upgrade only									0	0	-6
SA5-085	No deficit. WTP upgrade only									0	0	-6

Table A.7 Fine Screening Summary of Rationalisation Options in SA5

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
SA5-021	New connection point from Tuam Regional Water Supply Scheme									2	0	-19

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
	connecting Ballinasloe with total length of 46 km											
SA5-022	New connection point from Galway City PWS connecting Ballinasloe with total length of 67 km									2	0	-17

Appendix B SA Approaches for SA5

Note: SA Options are also referred to as 'Group' options

WRZ	Preferred Approach - SA Approach 1		Least Cost - SA Approach 1		Quickest Delivery - SA Approach 2	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
1200SC0005: Ahascragh	SA5-002 Increase GW Abstraction at Ahascragh by 0.5Ml/d	-	SA5-002 Increase GW Abstraction at Ahascragh by 0.5Ml/d	-	SA5-004 Expand GW at Killeglan - 5.0Ml/d Rationalise Ahascragh	15
3200SC0002: Athlone	SA5-09a Increase River Shannon SW Abstraction and Upgrade Athlone WTP - 5.0Ml/d	-	SA5-09a Increase River Shannon SW Abstraction and Upgrade Athlone WTP - 5.0Ml/d	-	SA5-12b Rationalisation and Supply from New Shannon Source	16
1200SC0006: Ballinasloe	SA5-17a Increase Abstraction from River Suck - 2.3Ml/d	-	SA5-17a Increase Abstraction from River Suck - 2.3Ml/d	-	SA5-019 Rationalisation and Supply from New Shannon Source	16
2500SC0001: Banagher	SA5-080 & SA5-081 Replace WTP to Address Water Quality Issue	-	SA5-080 & SA5-081 Replace WTP to Address Water Quality Issue	-	SA5-080 & SA5-081 Replace WTP to Address Water Quality Issue	-
2500SC0015: Birr/Kinnitty	SA5-025 Increase abstraction from the River Camcor and upgrade WTP to supply Birr and Kinnity	-	SA5-025 Increase abstraction from the River Camcor and upgrade WTP to supply Birr and Kinnity	-	SA5-027 Rationalisation and Supply from New Shannon Source	16
2500SC0016: Clara/Ferbane	SA5-084 No deficit. WTP upgrade only	-	SA5-084 No deficit. WTP upgrade only	-	SA5-030	16

WRZ	Preferred Approach - SA Approach 1		Least Cost - SA Approach 1		Quickest Delivery - SA Approach 2	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
					Rationalisation and Supply from New Shannon Source	
2500SC0003: Kilcormac	SA5-033 Increase GW Abstraction at Kilcormac - 0.4Ml/d	-	SA5-033 Increase GW Abstraction at Kilcormac - 0.4Ml/d	-	SA5-036 Rationalisation and Supply from New Shannon Source	16
2600SC0001: Mount Talbot/Four Roads	SA5-37b Increase GW Abstraction at Mount Talbot Spring - 0.5Ml/d	-	SA5-37b Increase GW Abstraction at Mount Talbot Spring - 0.5Ml/d	-	SA5-37b Increase GW Abstraction at Mount Talbot Spring - 0.5Ml/d	-
2500SC0017: Rahan	SA5-086 New GW abstraction to meet partial deficit for Rahan and Upgrade WTP	-	SA5-086 New GW abstraction to meet partial deficit for Rahan and Upgrade WTP	-	SA5-041 Rationalisation and Supply from New Shannon Source	16
2600SC0006: South Roscommon (Lisbrock and Killeglan)	SA5-082 & SA5-083 New GW at Killeglan and Lisbrock and upgrade of WTP	18	SA5-082 & SA5-083 New GW at Killeglan and Lisbrock and upgrade of WTP	18	SA5-42d Expand GW at Killeglan - 5.0Ml/d Rationalise Ahascragh	15

WRZ	Best Environmental - SA Approach 3		Most Resilient - SA Approach 4		Lowest Carbon - SA Approach 5	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
1200SC0005: Ahascragh	SA5-002 Increase GW Abstraction at Ahascragh by 0.5Ml/d	-	SA5-002 Increase GW Abstraction at Ahascragh by 0.5Ml/d	-	SA5-002 Increase GW Abstraction at Ahascragh by 0.5Ml/d	-
3200SC0002: Athlone	SA5-09a Increase River Shannon SW Abstraction and Upgrade Athlone WTP - 5.0Ml/d	-	SA5-09a Increase River Shannon SW Abstraction and Upgrade Athlone WTP - 5.0Ml/d	-	SA5-016 Expand GW at Lisbrock - 5.8Ml/d Interconnect Athlone	10
1200SC0006: Ballinasloe	SA5-17c Expand SW at Ballinasloe 7.0Ml/d, Interconnect Mount Talbot & South Roscommon WRZs	2	SA5-17a Increase Abstraction from River Suck - 2.3Ml/d	-	SA5-17a Increase Abstraction from River Suck - 2.3Ml/d	-
2500SC0001: Banagher	SA5-080 & SA5-081 Replace WTP to Address Water Quality Issue	-	SA5-080 & SA5-081 Replace WTP to Address Water Quality Issue	-	SA5-080 & SA5-081 Replace WTP to Address Water Quality Issue	-
2500SC0015: Birr/Kinnitty	SA5-025 Increase abstraction from the River Camcor and upgrade WTP to supply Birr and Kinnity	-	SA5-025 Increase abstraction from the River Camcor and upgrade WTP to supply Birr and Kinnity	-	SA5-025 Increase abstraction from the River Camcor and upgrade WTP to supply Birr and Kinnity	-
2500SC0016: Clara/Ferbane	SA5-084 No deficit. WTP upgrade only	-	SA5-084 No deficit. WTP upgrade only	-	SA5-084 No deficit. WTP upgrade only	-
2500SC0003: Kilcormac	SA5-033	-	SA5-033	-	SA5-033	-

WRZ	Best Environmental - SA Approach 3		Most Resilient - SA Approach 4		Lowest Carbon - SA Approach 5	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
	Increase GW Abstraction at Kilcormac - 0.4Ml/d		Increase GW Abstraction at Kilcormac - 0.4Ml/d		Increase GW Abstraction at Kilcormac - 0.4Ml/d	
2600SC0001: Mount Talbot/Four Roads	SA5-039 Expand SW at Ballinasloe 7.0Ml/d, Interconnect Mount Talbot & South Roscommon (Lisbrock and Killeglan) WRZs	2	SA5-38b Expand GW at Killeglan - 1.4Ml/d Interconnect Mount Talbot	5	SA5-37b Increase GW Abstraction at Mount Talbot Spring - 0.5Ml/d	-
2500SC0017: Rahan	SA5-086 New GW abstraction to meet partial deficit for Rahan and Upgrade WTP	-	SA5-086 New GW abstraction to meet partial deficit for Rahan and Upgrade WTP	-	SA5-086 New GW abstraction to meet partial deficit for Rahan and Upgrade WTP	-
2600SC0006: South Roscommon (Lisbrock and Killeglan)	SA5-45a Expand SW at Ballinasloe 7.0Ml/d, Interconnect Mount Talbot & South Roscommon (Lisbrock and Killeglan) WRZs	2	SA5-42c Expand GW at Killeglan - 1.4Ml/d Interconnect Mount Talbot	5	SA5-50a Expand GW at Lisbrock - 5.8Ml/d Interconnect Athlone	10

WRZ	Best Appropriate Assessment - SA Approach 3	
	Option Description	SA Option
1200SC0005: Ahascragh	SA5-002	-

WRZ	Best Appropriate Assessment - SA Approach 3	
	Option Description	SA Option
	Increase GW Abstraction at Ahascragh by 0.5Ml/d	
3200SC0002: Athlone	SA5-09a Increase River Shannon SW Abstraction and Upgrade Athlone WTP - 5.0Ml/d	-
1200SC0006: Ballinasloe	SA5-17c Expand SW at Ballinasloe 7.0Ml/d, Interconnect Mount Talbot & South Roscommon (Lisbrock and Killeglan) WRZs	2
2500SC0001: Banagher	SA5-080 & SA5-081 Replace WTP to Address Water Quality Issue	-
2500SC0015: Birr/Kinnitty	SA5-025 Increase abstraction from the River Camcor and upgrade WTP to supply Birr and Kinnity	-
2500SC0016: Clara/Ferbane	SA5-084 No deficit. WTP upgrade only	-
2500SC0003: Kilcormac	SA5-033 Increase GW Abstraction at Kilcormac - 0.4Ml/d	-
2600SC0001: Mount Talbot/Four Roads	SA5-039 Expand SW at Ballinasloe 7.0Ml/d, Interconnect Mount Talbot & South Roscommon (Lisbrock and Killeglan) WRZs	2
2500SC0017: Rahan	SA5-086	-

WRZ	Best Appropriate Assessment - SA Approach 3	
	Option Description	SA Option
	New GW abstraction to meet partial deficit for Rahan and Upgrade WTP	
2600SC0006: South Roscommon (Lisbrock and Killeglan)	SA5-45a Expand SW at Ballinasloe 7.0Ml/d, Interconnect Mount Talbot & South Roscommon (Lisbrock and Killeglan) WRZs	2