

Autumn 2022



# Regional Water Resources Plan—Eastern and Midlands

Strategic Environmental Assessment

Appendix H: Study Area 7 – 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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# Table of Contents

<b>1</b>	<b>Introduction and Background</b>	<b>2</b>
1.1	Options Assessment Methodology	2
1.2	Regional Plan Strategic Environmental Assessment	3
1.3	Study Area: Strategic Environmental Assessment	4
1.4	Study Area: Water Framework Directive	5
1.5	Study Area: Appropriate Assessment	5
1.6	Study Area 7	6
<b>2</b>	<b>Study Area 7 Environmental Baseline Context</b>	<b>9</b>
2.1	Population, Economy, Tourism and Recreation, and Human Health	9
2.1.1	Population	9
2.1.2	Economy and Employment	10
2.1.3	Tourism and Recreation	10
2.1.4	Human Health	11
2.2	Water Environment	12
2.2.1	Water Framework Directive	13
2.2.2	Flood Risk	15
2.3	Climate Change	16
2.4	Biodiversity, Flora and Fauna	19
2.4.1	Designated Sites	19
2.4.2	Habitats	21
2.4.3	Species	22
2.5	Material Assets	22
2.6	Landscape and Visual Amenity	24
2.7	Air Quality and Noise	28
2.7.1	Air Quality	28
2.7.2	Noise	28
2.8	Cultural Heritage	29
2.9	Geology and Soils	30
2.10	Summary of Key Issues and Trends over the Plan Period	31
<b>3</b>	<b>Environmental Assessment – Options Appraisal</b>	<b>35</b>
3.1	Overview	35
3.2	Stage 3: Unconstrained Options	35
3.2.1	Existing Groundwater Abstractions	36

3.2.2	New Groundwater Abstractions.....	36
3.2.3	Sustainable Abstraction in Options Assessment.....	36
<b>3.3</b>	<b>Stage 4: Coarse Screening.....</b>	<b>37</b>
<b>3.4</b>	<b>Stage 5: Fine Screening .....</b>	<b>37</b>
<b>3.5</b>	<b>Stage 6: Feasible Options List.....</b>	<b>38</b>
<b>4</b>	<b>Environmental Assessment – Approach Development.....</b>	<b>40</b>
<b>4.1</b>	<b>Introduction to Approach Development.....</b>	<b>40</b>
<b>4.2</b>	<b>Stage 7: Approach Development Process.....</b>	<b>41</b>
4.2.1	Environmental Assessment in the Approach Development process.....	42
<b>4.3</b>	<b>SA7 Approach Development Process .....</b>	<b>44</b>
<b>4.4</b>	<b>Comparison of SA7 Approaches .....</b>	<b>47</b>
4.4.1	SA Approach 1 (SA Combination 2) (BE, MR, BA) .....	50
4.4.2	SA Approach 2 (SA Combination 3) (QD).....	50
4.4.3	SA Approach 3 (SA Combination 4) (LCo, LC) .....	50
<b>4.5</b>	<b>SA7 Approach Assessment Comparison.....</b>	<b>51</b>
4.5.1	Selection of the SA Preferred Approach.....	53
<b>4.6</b>	<b>Without Regional Transfer Alternative .....</b>	<b>53</b>
<b>5</b>	<b>SA7 Preferred Approach Strategic Environmental Assessment .....</b>	<b>58</b>
<b>5.1</b>	<b>SA7 Preferred Approach Options.....</b>	<b>58</b>
<b>5.2</b>	<b>Additional Measures.....</b>	<b>65</b>
5.2.1	Leakage Reduction.....	65
5.2.2	Water Conservation.....	65
<b>5.3</b>	<b>Interim Solutions .....</b>	<b>65</b>
<b>5.4</b>	<b>Approach Uncertainty and Adaptability .....</b>	<b>65</b>
<b>6</b>	<b>SEA Cumulative Effects for SA7 Preferred Approach.....</b>	<b>69</b>
<b>6.1</b>	<b>Cumulative Effects ‘Within Plan’ for SA7 .....</b>	<b>69</b>
6.1.1	Cumulative Effects during Construction.....	70
6.1.2	Cumulative Effects during Operation.....	71
<b>6.2</b>	<b>Cumulative Effects with Other Developments .....</b>	<b>72</b>
6.2.1	Cumulative Effects during Construction.....	72
6.2.2	Cumulative Effects during Operation.....	73
<b>7</b>	<b>Strategic Environmental Assessment Summary .....</b>	<b>76</b>
<b>8</b>	<b>Water Framework Directive Summary .....</b>	<b>84</b>
<b>9</b>	<b>Appropriate Assessment Summary.....</b>	<b>86</b>

<b>10</b>	<b>Recommendations for Implementation</b> .....	<b>88</b>
	<b>References</b> .....	<b>89</b>
<b>Appendix A</b>	<b>Fine Screening Summaries</b> .....	<b>A-1</b>
<b>Appendix B</b>	<b>SA Approaches for SA7</b> .....	<b>B-1</b>



# 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 7 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 7 within the Eastern and Midlands Region, for the options and approaches considered and as outlined in the Study Area 7 Technical Report (RWRP-EM Appendix 7). This Environmental Review applies the Strategic Environmental Assessment (SEA) objectives and environmental assessment methodology set out in the NWRP Framework Plan (Framework Plan).

Environmental Reviews will be 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.

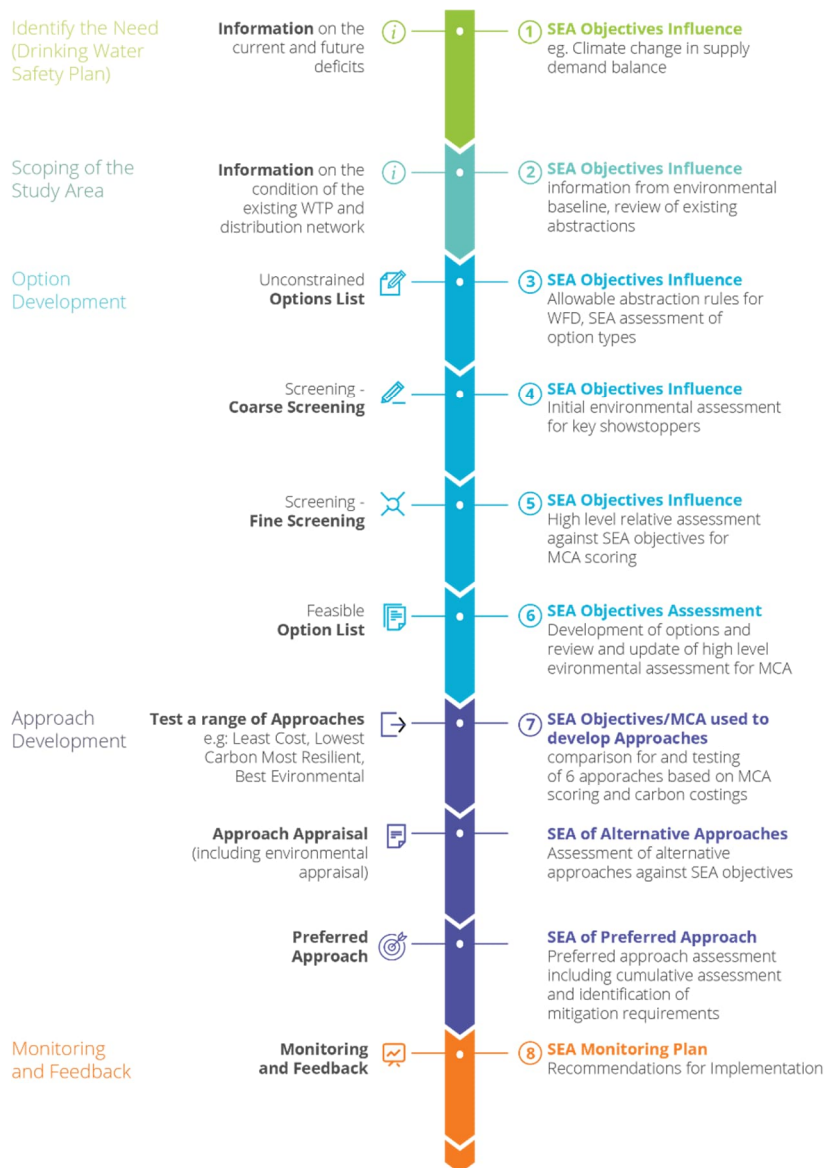


Figure 1.1 Option and Approach Development Process

## 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	<u>Water quality and resources</u> 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.
	<u>Flood risk</u> Protect and, where possible, reduce risk from ground water and surface water flooding as a result of Irish Water's activities.
Biodiversity	<u>Water quality and resources</u> 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.
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	<u>Climate change mitigation</u>

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

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

The Regional Plan SEA Environmental Report was completed only after all study area reports for the 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 SA7 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 SA7 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 SA7 are provided in chapter 9 of this review.

## 1.6 Study Area 7

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 SA7, the location of SA7 in relation to the Eastern and Midlands Region is shown in Figure 1.2.

Study Area 7 lies within the counties of Clare, Galway, Laois, Tipperary, and Offaly and its total area is approximately 1,455 km<sup>2</sup>. There are no principal settlements (settlements with a population of over 10,000) within SA7, however, the main settlements (settlements with a population of over 5,000) are Nenagh and Roscrea (CSO, 2016a), as shown in Figure 1.3.

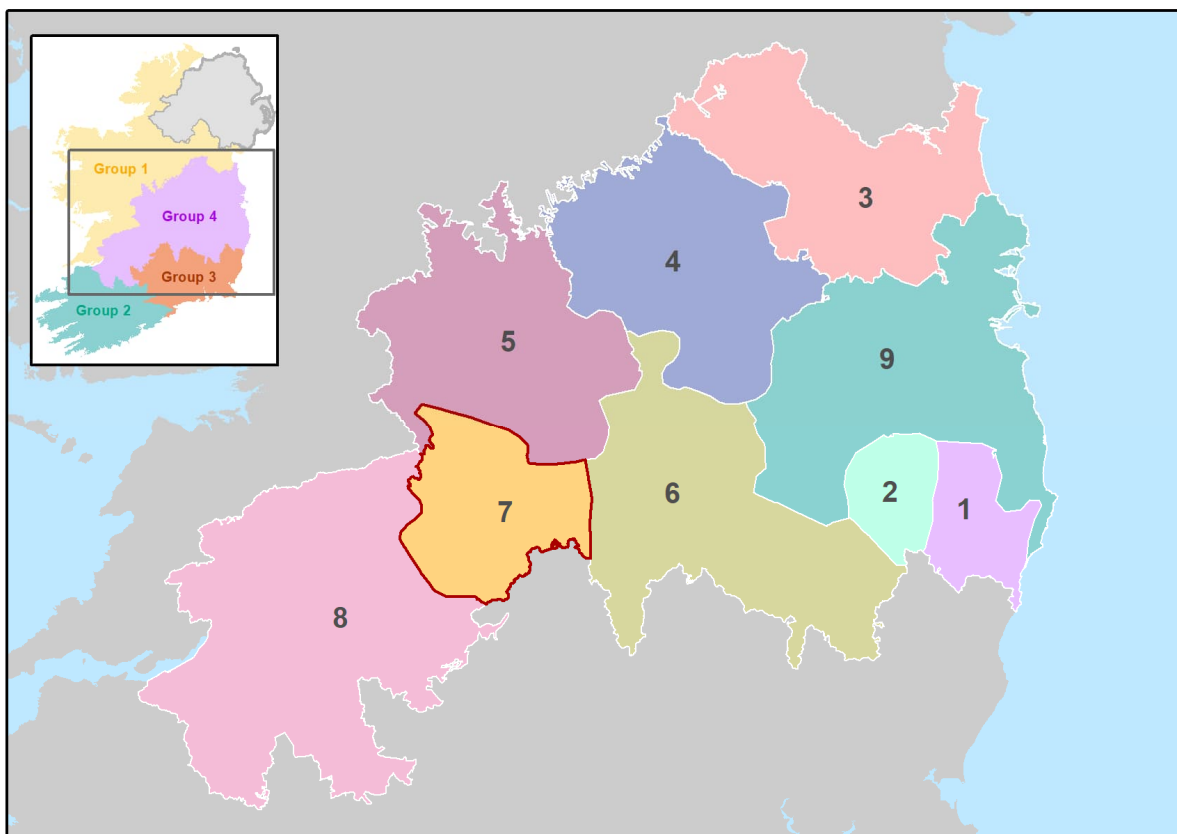


Figure 1.2 Eastern and Midlands Region Study Areas

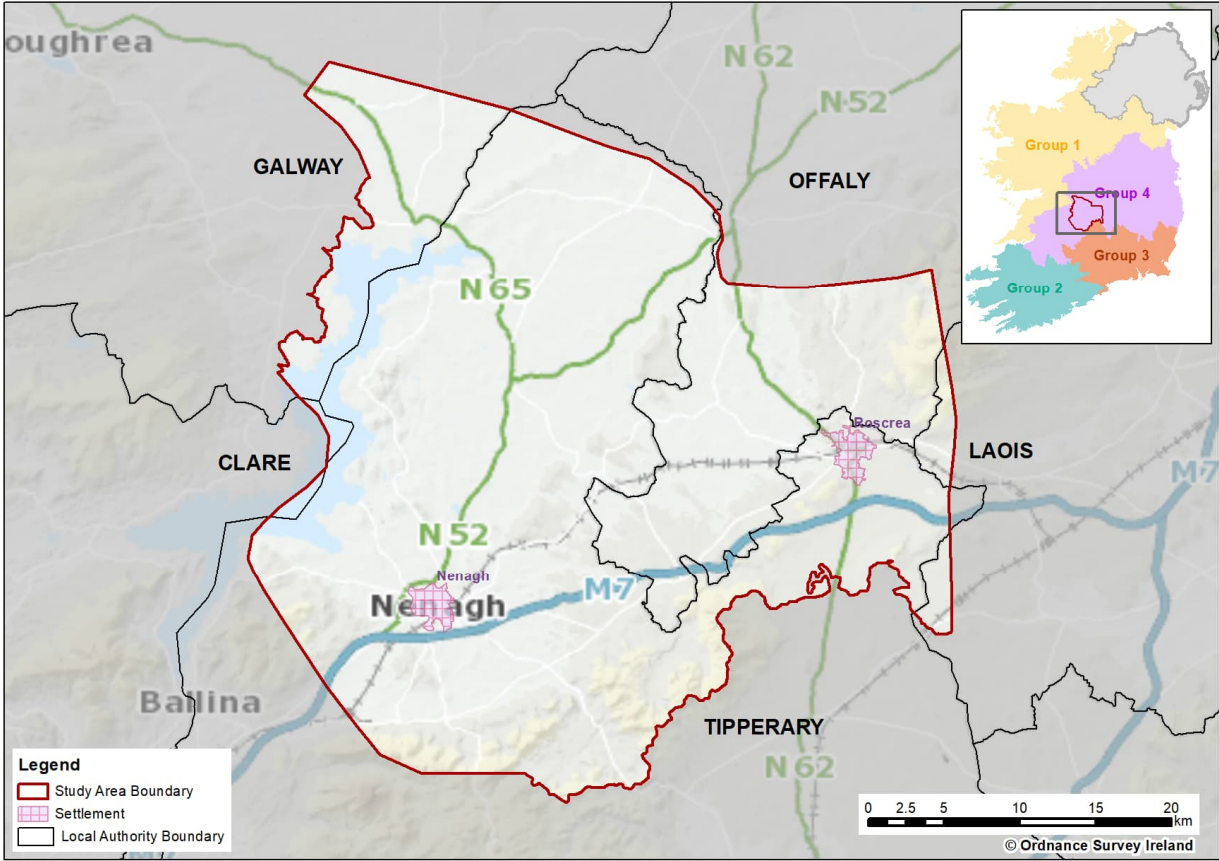


Figure 1.3 Study Area 7



2

# **Study Area 7 Environmental Baseline Context**

## 2 Study Area 7 Environmental Baseline Context

This chapter provides environmental baseline information for SA7 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 increase in population is expected in the WRZ Nenagh RWSS (2900SC0050). 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 SA7

WRZ Reference Number and Name	Total Population Served (2019)*	% Population Change (2019-2044)*
1200SC0030 - Portumna	2,020	+15.3%

WRZ Reference Number and Name	Total Population Served (2019)*	% Population Change (2019-2044)*
2500SC0010 - Dunkerrin/Moneygall	1,581	+15.3%
2500SC0012 - Coolderry PWS	95	+15.3%
2900SC0002 - Roscrea RWSS	7,868	+15.3%
2900SC0003 - Templederry	286	+15.3%
2900SC0043 - Lorrha/Rathcabbin	1,370	+15.3%
2900SC0045 - Greyford Source to Crotta	1,785	+15.3%
2900SC0046 - Cloughjordan	1,228	+15.3%
2900SC0050 - Nenagh RWSS	14,866	+24.8%
2900SC0051 - Terryglass	139	+15.3%

\*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

Majority of SA7 lies within the Mid-West region and some lies within the Midlands region of Ireland. SA7 had an above average (Mid-West) and below average (Midlands) household disposable income per person in 2016 (CSO, 2016b) and an unemployment rate of 8.7% in the Mid-West and 10.1% in the Midlands 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 347 for the Mid-West region and 214 for the Midlands region (CSO, 2020a).

### 2.1.3 Tourism and Recreation

Tourism in SA7 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 Tipperary has been described as the *“farming heartland of Ireland”* with emphasis also placed on the county’s cultural and historical attractions (Tipperary Tourism, 2020). Additionally, the county of Offaly highlights the importance of the county’s natural assets, such as bog lands and mountains (Visit Offaly, 2020).

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

Ireland’s natural heritage is 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). Rivers, loughs and coastal areas also making an important contribution to tourism and recreational

opportunities, and the support of important fisheries. Lough Derg is particularly popular for recreational activities.

#### 2.1.4 Human Health

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

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

Life Expectancy (CSO, 2017b)	Participation in Sports, Fitness or Recreational Physical Activities (% of Persons Aged 15+) (CSO, 2020b)	Air Quality (EPA, 2020a)
<b>Mid-West:</b> Male: 76.3 Female: 80.4	<b>Mid-West:</b> 52%	Good
<b>Midlands:</b> Male: 77.2 Female: 81.5	<b>Midlands:</b> 47%	Good

A key issue for public health is reliable access to good quality drinking water. Regulated water service providers have to ensure appropriate service 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 SA7.

**Table 2.3 Areas Supplied by the WTPs in SA7**

WTP	WRZ	Local Authority Supplied
Portumna WTP	Portumna	Galway
Lisduff Spring WTP, Jones Well WTP, Dunkerrin WTP and Busherstown WTP	Dunkerrin/Moneygall	Offaly
Coolderry WTP	Coolderry PWS	Offaly
Niamhs Well WTP, Shinrone WTP, Roscrea WTP and Glenbehagh WTP	Roscrea RWSS	Tipperary
Quans Cross WTP	Templederry	Tipperary
Riverstown WTP and Lorrha Annagh WTP	Lorrha/Rathcabbin	Tipperary
Kylebeg WTP	Greyford Source to Crotta	Tipperary



WTP	WRZ	Local Authority Supplied
Matty's Well WTP	Cloughjordan	Tipperary
Coolbawn WTP	Nenagh RWSS	Tipperary
Crossanagh WTP and Old School Source	Terryglass	Tipperary

Currently for day-to-day operations, four out of ten WRZs in SA7 have a current SDB deficit and six 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 seventeen of the eighteen 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 the effectiveness of Irish Water’s protozoa removal processes (Barrier 3) (see Table 2.1 in the SA7 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 are two WRZs on the EPA Remedial Action List, namely, Nenagh and Greyford Source to Crotta. There are no WRZs that are subject to a Direction from the EPA within SA7.

Irish Water is currently progressing immediate corrective action in relation to a number of supplies in advance of the NWRP. Details of these are included in the SA7 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 SA7.

Table 2.4 provides a summary of the WFD catchments within SA7.

**Table 2.4 Catchments within SA7 (EPA, 2020b)**

WFD Catchments	Total Catchment Area (km <sup>2</sup> )	Catchment Area within SA7 (km <sup>2</sup> )
Lower Shannon (Little Brosna)	1,248	834
Lower Shannon (Lough Derg)	982	475
Lower Shannon & Mulkear	1,041	43
Nore	2,595	103

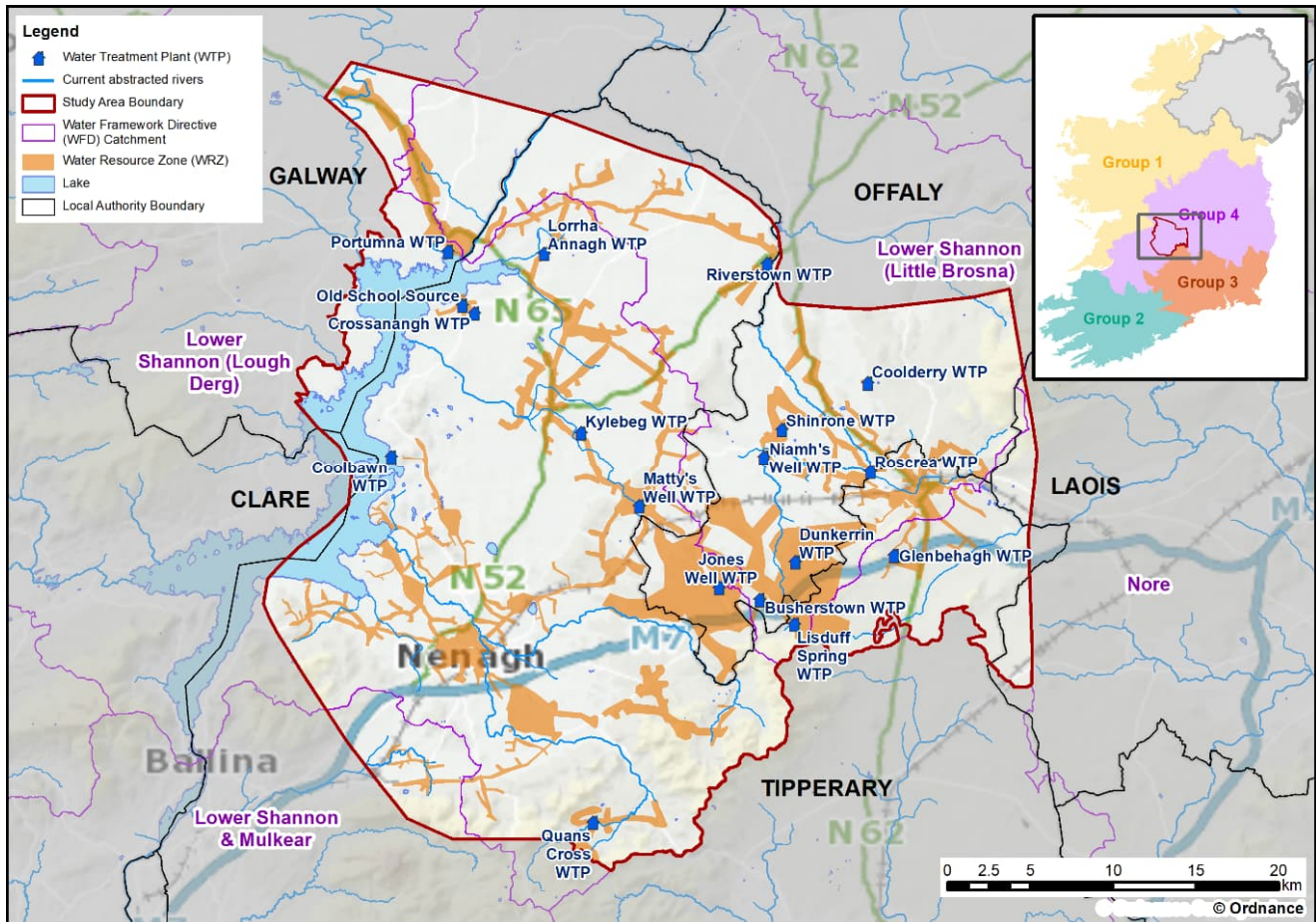


Figure 2.1 Water Environment of SA7

### 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 SA7 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 SA7 supplies, Irish Water has assessed its surface water abstractions and summarised the potential impact on the Lough Derg (Portumna and Nenagh) and on the Little River Brosna (Roscrea). Based on this initial assessment, the volumes of water abstracted from the Little Brosna River (Roscrea), 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 (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 four WFD catchments in SA7 and the total number of surface and groundwater waterbodies within SA7 are provided in Table 2.5 below.

**Table 2.5 WFD Waterbodies within SA7 (EPA, 2019b, 2019c, 2019d, 2019e and 2019f)**

Waterbody Type	Water Catchments	Number of Waterbodies	Number of Waterbodies Rated Below Moderate
Rivers	Lower Shannon (Little Brosna, Lough Derg, and Lower Shannon & Mulkear)	72	16
	Nore	9	0
Lakes	Lower Shannon (Little Brosna, Lough Derg, and Lower Shannon & Mulkear)	2	0
	Nore	0	0
Transitional and Coastal	N/A	0	0
Groundwater	N/A	27	1

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

- Lower Shannon (Little Brosna): Agriculture (80%);
- Lower Shannon (Lough Derg): Agriculture (66%), Hydromorphology (34%) and Forestry (28%);
- Lower Shannon & Mulkear: Agriculture (50%); and
- Nore: Agriculture (78%).

Table 2.6 includes a summary of the 'at risk' waterbodies within SA7.

**Table 2.6 Summary of 'At Risk' Waterbodies in SA7 (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 (Little Brosna, Lough Derg, and Lower Shannon & Mulkear)	35	1
	Nore	1	
Lakes	Lower Shannon (Little Brosna, Lough Derg, and Lower Shannon & Mulkear)	1	0

Waterbody Type	Water Catchments	Number of Waterbodies Identified as 'At Risk'	Surface Waterbodies Status 'At Risk' Due to Abstraction Pressure*
	Nore	0	
Transitional and Coastal	N/A	0	0
Groundwater	N/A	1	0
<b>Total</b>		<b>38</b>	<b>1</b>

\* 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 SA7 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 SA7 (catchments.ie, 2021a, 2021b, 2021c and 2021d)**

Areas for Action	Key Reasons for Selection
Clareen	<ul style="list-style-type: none"> <li>• Building on existing knowledge from works completed by Offaly County Council</li> <li>• Manageable area</li> <li>• Large group water scheme in the area</li> </ul>
Little Brosna	<ul style="list-style-type: none"> <li>• Little Brosna_040 returned to good in 2010-12</li> <li>• Sharavoge Bog is in the area - important raised bog</li> <li>• Riverstown drinking water abstraction in area</li> </ul>
Bunow	<ul style="list-style-type: none"> <li>• Build on ongoing work by Tipperary County Council</li> <li>• Important for rural town (Roscrea) that it flows through</li> </ul>
Lower Nenagh and Clareen	<ul style="list-style-type: none"> <li>• Active angling group</li> <li>• Opportunity to build on work completed by Tipperary County Council</li> <li>• Important trout fishery, Nenagh trout have very high genetic biodiversity</li> <li>• One potential 'quick win'</li> </ul>
Erkina	<ul style="list-style-type: none"> <li>• Groundwater abstraction at Durrow is failing for nitrates</li> <li>• Potential to work with active community groups</li> <li>• Important amenity – local groups are in the process of trying to establish a blueway</li> <li>• Potential to work with active group water schemes</li> <li>• Two deteriorated waterbodies</li> </ul>

### 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 SA7.

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 2.9. 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)

**Table 2.9 Summary of Key Points from the 'Water Quality and Water Services Infrastructure' Sectoral Climate Change Plan (Department of Housing, Planning and Local Government, 2019b)**

Summary	
Key Points	<ul style="list-style-type: none"> <li>Protecting and improving water quality and improving water services infrastructure are major challenges in Ireland</li> <li>Climate change-induced threats will increase the scale of these challenges</li> <li>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</li> </ul>
The challenges: Water services infrastructure	<ul style="list-style-type: none"> <li>Increased surface and sewer flooding leading to pollution, water and wastewater service interruptions</li> <li>Reduced availability of water resources</li> <li>Hot weather increasing the demand for water</li> <li>Increased drawdown from reservoirs in the autumn/winter for flood capacity, leading to resource issues</li> <li>Business continuity impacts or interruptions for water services providers</li> </ul>
Primary adaptive measures	<ul style="list-style-type: none"> <li>Fully adopt the 'integrated catchment management' approach</li> <li>Improve treatment capacity and network functions for water services infrastructure</li> <li>Water resource planning and conservation – on both supply and demand sides</li> <li>Include climate measures in monitoring programmes and research</li> <li>Many of these proposed adaptation actions are already underway through existing and scheduled water sector plans and programmes</li> </ul>

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 2.10.

**Table 2.10 Climate Change Risks Identified by Local Authorities in SA7**

County	Key Risk Areas
Tipperary (Tipperary County Council, 2019)	<ul style="list-style-type: none"> <li>• Low level lands along rivers where fluvial flooding may increase</li> <li>• Bogs and peatlands that may be impacted by drought</li> <li>• Road Infrastructure in the upland areas</li> </ul>
Offaly (Offaly County Council, 2019)	<ul style="list-style-type: none"> <li>• Rising temperatures and drought</li> <li>• Wetter winters and drier summers</li> <li>• More intense rainfall and storm events</li> <li>• Increased flood risk</li> </ul>
Clare (Clare County Council, 2019)	<ul style="list-style-type: none"> <li>• Increased temperatures and drought</li> <li>• Increased precipitation</li> <li>• Coastal inundation and increased flood risk</li> <li>• Increased frequency and intensity of storms</li> </ul>
Galway (Galway County Council, 2019)	<ul style="list-style-type: none"> <li>• Flood risk</li> <li>• Increased temperatures - heat waves and drought</li> <li>• Heavy rainfall events</li> <li>• Increased storm intensity</li> <li>• Changes to natural ecosystems</li> <li>• Ocean warming and acidification</li> <li>• Sea level rise and inundation</li> </ul>
Laois (Laois County Council, 2019)	<ul style="list-style-type: none"> <li>• Heat wave and drought conditions</li> <li>• Risk of bog, gorse or forest fires</li> <li>• Extreme wind events</li> <li>• Extreme rainfall</li> </ul>

County	Key Risk Areas
	<ul style="list-style-type: none"> <li>Extreme cold and snow events</li> </ul>

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 SA7, 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.

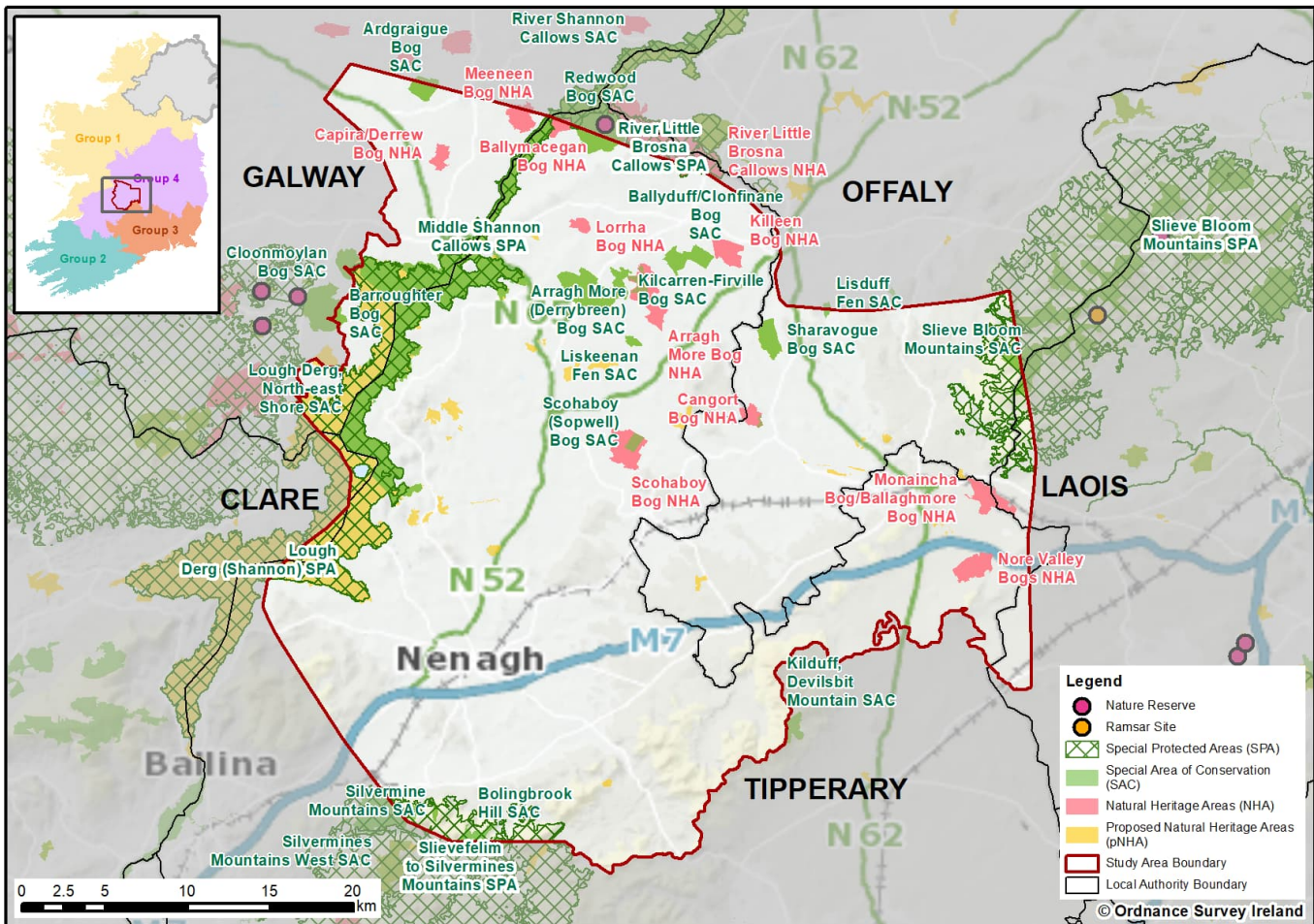
A key aspect of Irish Water’s strategy is to ‘Supply Smarter’, by improving the quality, resilience and security of their supply through infrastructural improvements. One of the high-level goals taken from the national level is building resilience, with water services being a key factor.

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 SA7 there are a number of European, national and locally designated sites, including Special Protected Areas (SPAs), Special Areas of Conservation (SACs), Natural Heritage Areas, and proposed Natural Heritage Areas (see



**Figure 2.2 Designated Sites in SA7**



Table 2.11 and Figure 2.2). The European sites (SPAs and SACs), and the potential impacts on them, are discussed in more detail in the NIS.

**Table 2.11 Designated Sites within SA7 (NPWS, 2019a)**

Receptor	Name	Total Number
Special Protected Area (SPA)	Lough Derg (Shannon) SPA	5
	Middle Shannon Callows SPA	
	River Little Brosna Callows SPA	
	Slieve Bloom Mountains SPA	
	Slievefelim to Silvermines Mountains SPA	
Special Area of Conservation (SAC)	Ardgraique Bog SAC	18
	Arragh More (Derrybreen) Bog SAC	
	Ballyduff/Clonfinane Bog SAC	
	Barroughter Bog SAC	
	Bolingbrook Hill SAC	
	Cloonmoylan Bog SAC	
	Kilcarren-Firville Bog SAC	
	Kilduff, Devilsbit Mountain SAC	
	Lisduff Fen SAC	
	Liskeenan Fen SAC	
	Lough Derg, North-east Shore SAC	
	Redwood Bog SAC	
	River Shannon Callows SAC	
	Scohaboy (Sopwell) Bog SAC	
	Sharavogue Bog SAC	
	Silvermine Mountains SAC	
Silvermine Mountains West SAC		
Slieve Bloom Mountains SAC		
Ramsar sites	N/A	0
Nature reserves	N/A	0
National Parks	N/A	0
Natural Heritage Areas (NHAs)	Arragh More Bog NHA	11
	Ballymacegan Bog NHA	
	Cangort Bog NHA	

Receptor	Name	Total Number
	Capira/Derrew Bog NHA	
	Killeen Bog NHA	
	Lorrha Bog NHA	
	Meeneen Bog NHA	
	Monaincha Bog/Ballaghmore Bog NHA	
	Nore Valley Bogs NHA	
	River Little Brosna Callows NHA	
	Scohaboy Bog NHA	
Proposed Natural Heritage Areas (pNHAs)	See Figure 2.2	35

## 2.4.2 Habitats

Table 2.12 lists the percentage of the study area, and the number of hectares, covered by each habitat within SA7; as reported in the Corine land use dataset<sup>1</sup>.

Table 2.12 Habitat Areas for SA7 (EPA, 2018)

Habitat	Ha	% of Study Area
<b>Agricultural Land</b>		
Pastures	108,201	74.35%
Land principally occupied by agriculture, with significant areas of natural vegetation	4,615	3.17%
Non-irrigated arable land	4,586	3.15%
Complex cultivation patterns	1,318	0.91%
<b>Natural Habitats</b>		
Water bodies	6,759	4.64%
Peat bogs	6,515	4.48%
Inland marshes	1,051	0.72%
Water courses	195	0.13%
Moors and heathland	135	0.09%
Natural grasslands	45	0.03%
<b>Forest</b>		
Coniferous forest	3,503	2.41%
Transitional woodland-shrub	2,917	2.00%

<sup>1</sup> The EPA land use dataset will be used once this is available

Habitat	Ha	% of Study Area
Mixed forest	2,902	1.99%
Broad-leaved forest	1,043	0.72%

Particularly relevant habitats that depend on the water quality and/or quantity in SA7 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 SA7 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. whooper swan and winter migratory waders;
- Other 'qualifying interest' bird species e.g. hen harrier;
- Protected whorl snails (*Vertigo geyeri* (particularly high sensitivity to changes) and *Vertigo moulinsiana*);
- Freshwater white-clawed crayfish.

The key invasive species to consider (European Communities (Birds and Natural Habitats) Regulations, 2011) for developing options within SA7 include:

- Japanese knotweed;
- Himalayan balsam;
- Giant hogweed; and
- *Elodea* spp.;
- Fringed water-lily (*Nymphoides peltata*);
- Himalayan knotweed (*Persicaria wallichii*); 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 SA7 are listed in Table 2.13, such as agricultural land, bog and forest 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 eighteen WTPs in SA7, meeting the demand of 15.6 Ml/d in 2019.

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 SA7 is the Grand Canal.

There are no ports of national or regional significance within SA7. There is one airport of regional significance, namely Erinagh Airport.

Other significant transport infrastructure includes the main road (particularly the M7) and rail network (Dublin Heuston - Limerick via Nenagh).

Any new infrastructure considered for SA7 will need to take, existing as well as planned land zoning and local development into consideration.

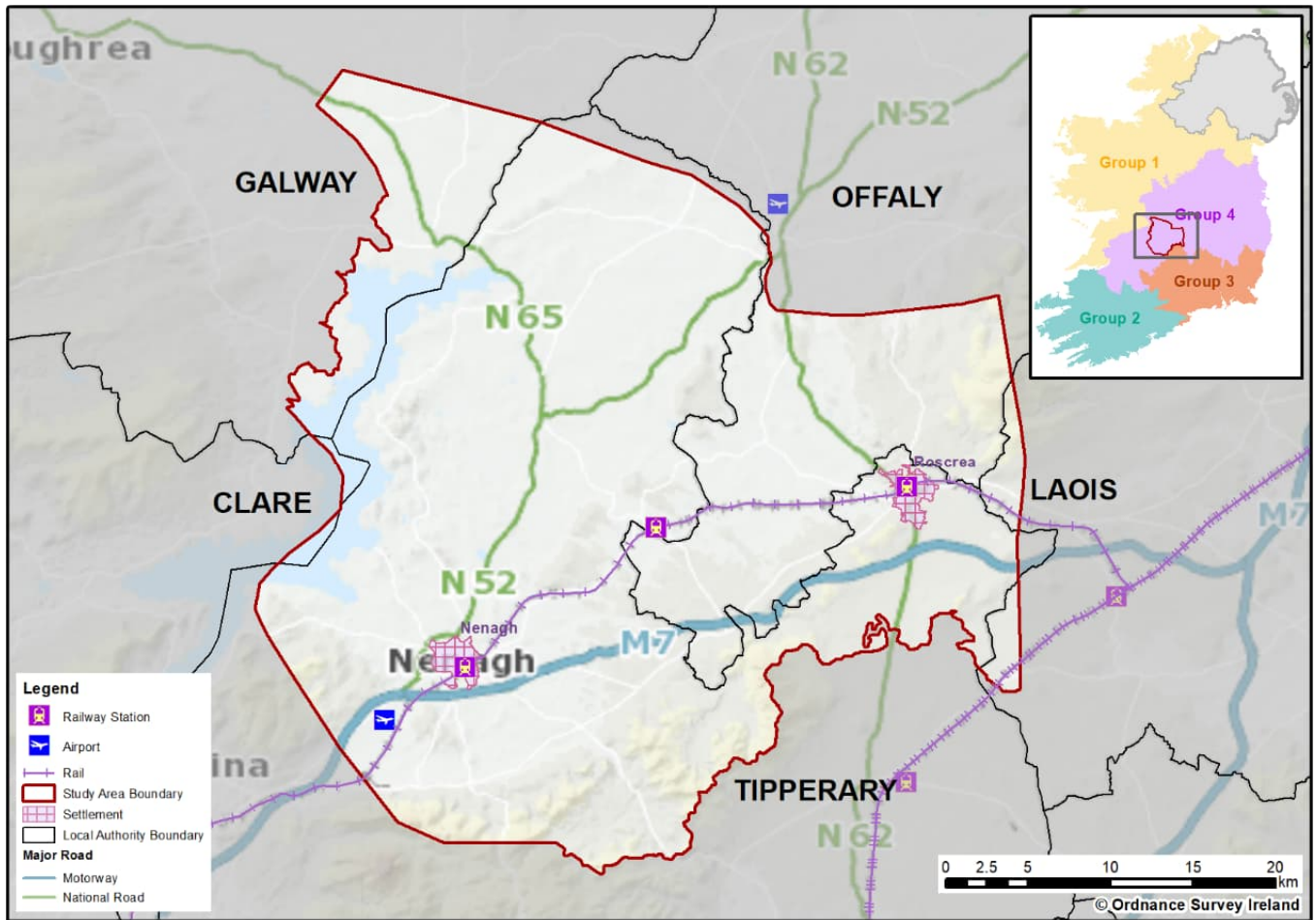


Figure 2.3 Transport Infrastructure in SA7

Table 2.13 Land Use within SA7 (EPA, 2018)<sup>2</sup>

Land use	Ha	% of Study Area	Comparison to Overall Eastern and Midlands Region %
Agriculture	118,720	81.58%	75.52%
Forest	14,700	10.10%	9.42%
Natural habitats	10,366	7.12%	10.61%

<sup>2</sup> The EPA land use dataset will be used once it has been made available

Land use	Ha	% of Study Area	Comparison to Overall Eastern and Midlands Region %
Urban	1,311	0.90%	3.69%
Industry	416	0.29%	0.70%
Other	14	0.01%	0.06%

Proposals for other strategic developments within SA7 are considered for the assessment. These are primarily identified from the National Planning Framework and from myProjectIreland, where any relevant projects for the study area are included (other local developments may also be included that are not listed in myProjectIreland if they are considered to be of an appropriate scale). Small scale housing and business development are not considered for this plan level assessment.

Table 2.14 gives an overview of the project developments which are available from myProjectIreland (2021) for SA7<sup>3</sup>. 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 2.14 Proposed New Developments**

Development		
Portumna Vision 2030	Nenagh Historic and Cultural Quarter - A Tourism Led Regeneration Plan	R498 Latteragh realignment
St Conlon's Community Nursing Unit, Nenagh.	Dean Maxwell Community Nursing Unit, Roscrea.	Roscrea Enterprise, Digital and Social Impact Hub

## 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 2.15 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 counties of Offaly or Tipperary. No data is available for the values or the sensitivity of the LCAs within the county of Laois<sup>4</sup>.

The value of the landscape in SA7 is reflected in baseline data sections 2.1.3 (Tourism and Recreation), 2.4 (Biodiversity, Flora and Fauna) and 2.8 (Cultural Heritage).

Water supply infrastructure 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.

<sup>3</sup> Note that the myProjectIreland dataset was taken at a fixed point in time to allow for assessment of cumulative effects. The date for SA7 being the 15/01/21.

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

**Table 2.15 Value and Sensitivity of Landscape Character Areas in the Counties of SA7 (Ordnance Survey Ireland. n.d.)**

Landscape Character Area	Value	Sensitivity
<b>County: Clare (Clare County Council, 2004)</b>		
Burren Uplands	-	High
Low Burren	-	High
Cliffs of Moher and Lahinch	-	High
Fergus Loughlands	-	-
Slieve Aughty Uplands	-	Medium
Lough Graney	-	High
Lough Derg Basin	-	High
Slieve Bernagh Uplands	-	Low
River Shannon Farmlands	-	Low
Sixmilebridge Farmlands	-	Low
East Clare Loughlands	-	Medium
Tulla Drumlin Farmland	-	High
Ennis Drumlin Farmland	-	Low
Fergus Estuary	-	High
Kilnamona High Drumlin Farmland	-	Low
Cullenagh River Farmlands	-	-
Slieve Callan Uplands	-	Medium
Shannon Estuary Farmlands	-	-
Kilmihil Farmlands	-	Low
Malbay Coastal Farmland	-	High
Loop Head Peninsula	-	Medium
<b>County: Galway (Galway County Council, 2015)</b>		
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

Landscape Character Area	Value	Sensitivity
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
Killary Harbour and southern banks	Outstanding	Unique with pockets of Special
Connemara National Park (including Lough Fee, Lough Inagh and Derryclare Lough)	Outstanding	Unique
<b>County: Laois (Laois County Council, 2017)</b>		
No values or sensitivity information available		
<b>County: Tipperary (Tipperary County Council, 2016)</b>		
Urban and Fringe Areas	-	Low
Thurles Hinterland	-	Low

Landscape Character Area	Value	Sensitivity
Nenagh Corridor	-	Low
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
<b>County: Offaly (Offaly County Council, 2014)</b>		
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

## 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 SA7 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.

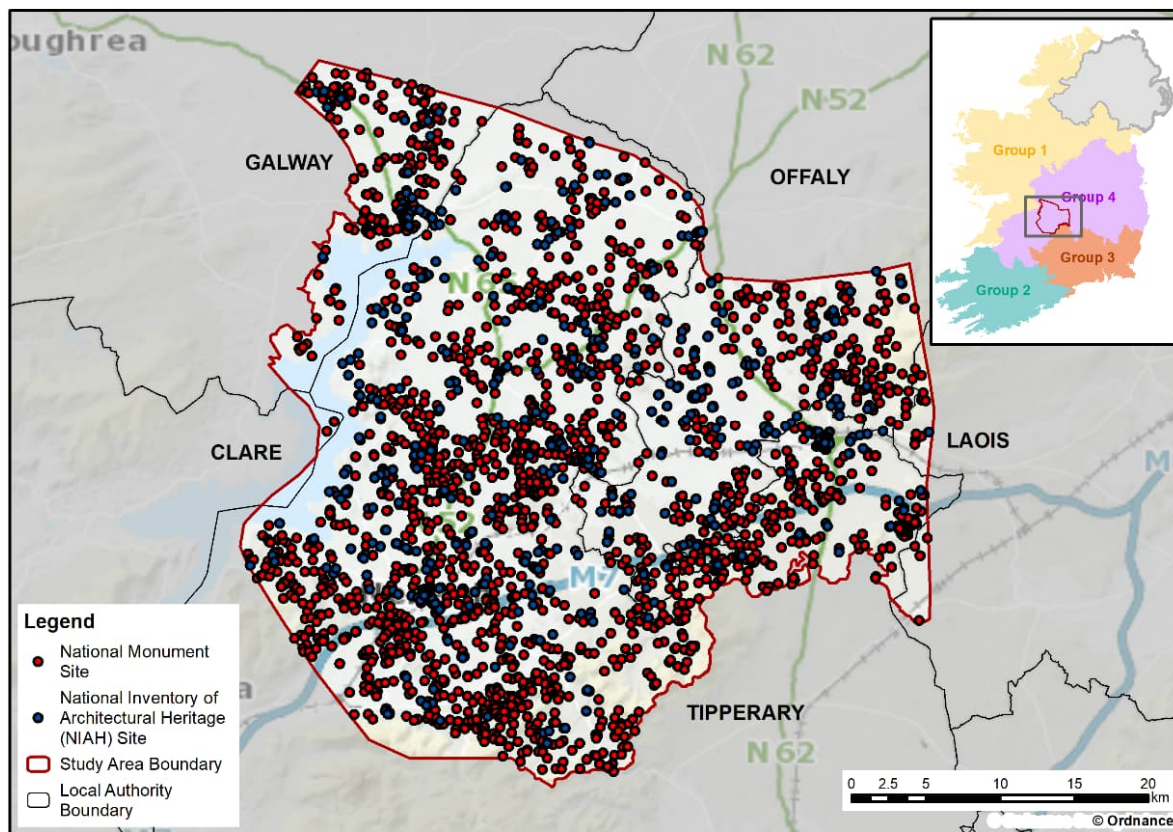
### 2.7.2 Noise

The main areas that experience noise pollution are likely to be areas along the main roads, particularly around the M7.

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 SA7, 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 2.16).



**Figure 2.4 SA7 Cultural Heritage Assets**

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.

**Table 2.16 Cultural Heritage Assets within SA7**

Assets	Total Number
National Monuments Service sites	2,780
National Inventory of Architectural Heritage sites	719
Sites and Monuments Record Zones	1,635

## 2.9 Geology and Soils

Table 2.13 lists the land uses within SA7. SA7 predominantly has a fine loamy soil type with areas of peat to the north-east of the study area (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 SA7 are shown in Figure 2.5.

The natural geology varies across the area with a regionally important karst aquifer running south-east and north-east across the study area through Birr, and three regional gravel aquifers lie to the eastern edge of the study area. A larger proportion of the region is considered to be of poorly productive aquifer status. Much of the bedrock geology here is of a local aquifer class due to the poor quality lime-mudstone. Many of the thirty groundwater abstractions were historically developed in the mudstones to supply water to the rural populations on the east shores of Lough Derg, and the urban areas of Moneygall/Roscrea. Nevertheless, the scale of the abstractions is small, ranging from 250m<sup>3</sup>/d to 500m<sup>3</sup>/d. Recent mapping by the Geological Survey of Ireland show that better availability of groundwater is present in the three gravel aquifers close to Roscrea and Birr towns, and some of the future groundwater options have been positioned here.

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, 21 of which have the potential to constrain water resource options in SA7.

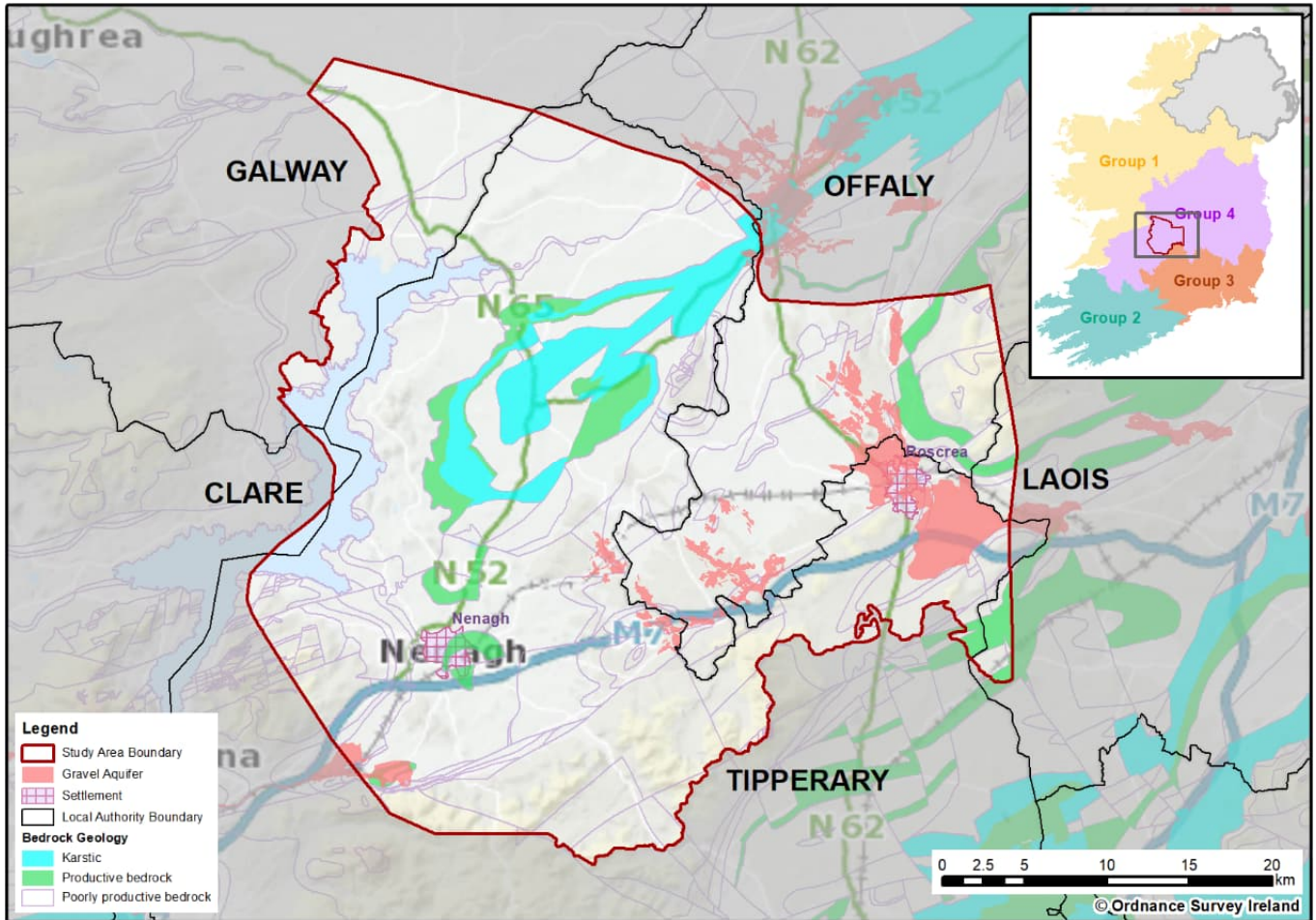


Figure 2.5 SA7 Hydrogeology

## 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 SA7 are listed in Table 2.17.

Table 2.17 Summary of Key Issues and Trends over the Plan Period

SEA Topic	Issues and Opportunities	Interrelated Topics
Population, Economy, Tourism and Recreation, and Human Health	<p><b>Issues:</b> Increasing population and the increased stress of climate change on water quality and water resources could affect health and well-being.</p> <p><b>Opportunities:</b> Irish Water will put in place plans to assess water quality and put in place measures to address risks as part of the NWRP.</p> <p>Irish Water has ongoing activities to improve the SDB in SA7, including, leakage management and water conservation measures.</p> <p>Raising awareness of the importance of water conservation and efficiency measures, and the value of the environment for health and wellbeing, can play an</p>	Climate Change, Water environment, Biodiversity, 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	<p><b>Issues:</b> 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 SA7, some of our existing abstractions may not meet sustainability guidelines in the medium term, during drought periods. On an interim basis, Irish Water has developed an initial conservative assessment based on available information (see SA7 Technical Report). This has been used to inform options identification and appraisal.</p> <p>Irish Water will update its sustainability analysis and impact on their baseline SDB calculations when regulatory assessment for the new legislation is undertaken.</p> <p><b>Opportunities:</b> To take account of identified pressure on the water environment in the selection of solutions for SA7.</p>	Biodiversity and climate change
Biodiversity, Flora and Fauna	<p><b>Issues:</b> SA7 has several designated areas including the Middle Shannon Callows SPA, River Little Brosna Callows SPA, Lough Derg (Shannon) SPA, River Shannon Callows SAC, and Lough Derg (NE Shore) SAC. Therefore, the combined abstractions in the region need to be reviewed collectively. It is also considered especially important to avoid the loss of irreplaceable or rare habitats and increasing pressure on vulnerable species; potentially through direct land take or indirect such as through increased abstraction pressure.</p>	Water resources, water quality and climate change
Material Assets	<p><b>Issues:</b> WTP assets and network infrastructure requiring improvement or replacement.</p> <p><b>Opportunities:</b> Improvements to support reliability of access to good quality water.</p>	Health and Wellbeing
Landscape and Visual Amenity	<b>Issues:</b> 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 SA7.	Health and well being
Climate Change	<b>Issues:</b> 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	Biodiversity and water environment

SEA Topic	Issues and Opportunities	Interrelated Topics
	<p>account in planning for drought and freeze/thaw events; and in detailed scheme design and network operation.</p> <p><b>Opportunities:</b> additional management to minimise impact on supply and the environment, vulnerability to climate change and drought is required.</p>	
Cultural Heritage	<p><b>Issues:</b> known cultural heritage and archaeological assets and potential unknown archaeological assets.</p>	Health and wellbeing
Geology and Soils	<p>No specific issues although general need for good soil conservation and retention of nutrients and carbon in soil resources.</p>	Biodiversity and Landscape and climate change
Additional interrelated aspects	<p><b>Issues:</b> poor water quality requiring additional water treatment and affecting biodiversity.</p> <p><b>Opportunities:</b> 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 not specifically studied in this study area.</p>	



**3**

# **Environmental Assessment – Options Appraisal**

## 3 Environmental Assessment – Options Appraisal

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

### 3.1 Overview

Irish Water applied its Options Assessment Methodology from the Framework Plan to identify potential solutions to meet the needs identified in the SA7 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 SA7 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 identifying the potential sustainable yield at existing sources where abstraction is to be increased. 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 82 unconstrained options were identified for SA7 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 82 unconstrained options, 48 were rejected after being analysed against the coarse screening criteria of resilience, deliverability and environment. None of the options were rejected on a sustainability basis.

### 3.4 Stage 5: Fine Screening

A total of 34 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 2 options were rejected. Table 3.2 provides the options that were rejected from the fine screening and not considered suitable to meet the needs identified for the WRZ located in SA7.

**Table 3.2 Fine Screening Rejection Register**

Option Reference	Option Description	Rejection Reasoning
SA7-01e	Transfer spare capacity from Roscrea to Dunkerrin/Moneygall	This is an SA option (group option). Following more detailed analysis at fine screening, it was determined that the sustainable allowable abstraction at this location is 2.34Ml/d, not accounting for the existing abstraction. The deficit in the WRZ is approximately 0.54Ml/d and could be greater, based on the calculated sustainable limits.
SA7-053	Rationalise Dunkerrin/Moneygall WRZ to Roscrea WRZ (approx. distance is 800m; new watermains and network upgrades required)	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving 'good' WFD status. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.

### 3.5 Stage 6: Feasible Options List

A total of 32 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 SA7 Technical Report.



**4**

# **Environmental Assessment – Approach Development**

## 4 Environmental Assessment – Approach Development

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

### 4.1 Introduction to Approach Development

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

An SA combination is a way of configuring an option, or options, to meet either an SDB deficit or water quality requirements. As set out in the Framework Plan, 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

SA Approaches Tested	Description	Policy Driver
Most Resilient (MR)	This is the option or combination of options with the highest total score against the resilience criteria. (Link to SEA Objective for climate change adaptation for environment)	National Adaptation Plan
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<sup>5</sup> 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

<sup>5</sup> 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).

being identified. Scores of -1 to -2 are LSEs that will not result in AESI with standard best practice project specific mitigation applied as these can be addressed with general/standard mitigation measures. 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) 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.

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

Figure 4.1 The 7 Step Process

#### 4.2.1 Environmental Assessment in the Approach Development process

Combinations of feasible options are identified to balance the water demand and predicted baseline supply and address the remaining deficit over the plan period. The Approach Development process

allows 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<sub>2</sub>e) and carbon costs are calculated alongside construction and operational costs. As part of the environmental assessment carbon efficiency has also been calculated to identify carbon emissions per ML of water supply.

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

Carbon emissions (tCO<sub>2</sub>e) initially were 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.



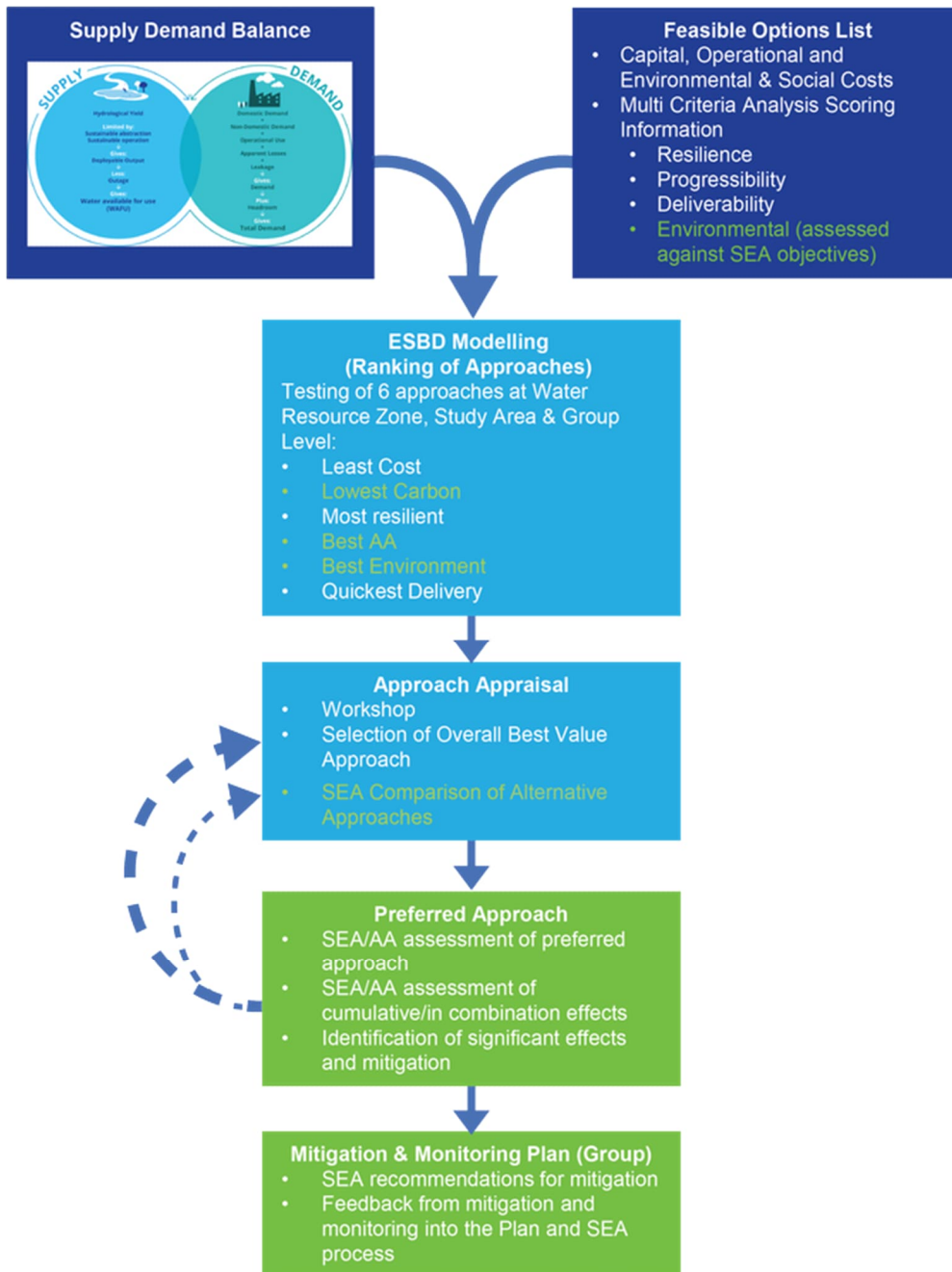


Figure 4.2 Approach Development Process

### 4.3 SA7 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 SA7 there are 19 WRZ options and these are listed in Table 5.2 in the SA7 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 SA7, a total of 5 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 SA7 Summary of SA Combination of Performance against Approach Category**

Category	WRZ level approach	SA combination 2 (SA option 4)	SA combination 3 (SA option 5)	SA combination 4 (SA option 10)	SA combination 5 (SA option 15)
Least Cost			Worst	Best	
Quickest Delivery		Worst	Best		
Number of -3 Biodiversity Scores	No -3 scores	No -3 scores	No -3 scores	No -3 scores	No -3 scores
Lowest Carbon				Best	Worst
Most Resilient		Best		Worst	
Best Environmental	Worst	Best			

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 three approaches (see Table 4.3).

**Table 4.3 Study Area Approach Categories**

Category	SA Approach 1 (SA Combination 2) (BE, MR, BA)	SA Approach 2 (SA Combination 3) (QD)	SA Approach 3 (SA Combination 4) (LCo, LC)
Least cost (LCo)	-	-	✓

Category	SA Approach 1 (SA Combination 2) (BE, MR, BA)	SA Approach 2 (SA Combination 3) (QD)	SA Approach 3 (SA Combination 4) (LCo, LC)
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 4)	Best Appropriate Assessment Approach (SA Combination 2)	Quickest Delivery Approach (SA Combination 3)	Best Environmental Approach (SA Combination 2)	Most Resilient Approach (SA Combination 2)	Lowest Carbon Approach (SA Combination 4)
<b>SA options</b> (Group options)	No options	<b>SA option 10:</b> 027, 55a	<b>SA option 4:</b> 36b, 43a, 54b	<b>SA option 5:</b> 30b, 041	<b>SA option 4:</b> 36b, 43a, 54b	<b>SA option 4:</b> 36b, 43a, 54b	<b>SA option 10:</b> 027, 55a
<b>WRZ options</b>	No options	014 029 43b 044 047 060 061 063	014 023 044 055 060 061 063	014 023 044 047 055 060 061 063	014 023 044 055 060 061 063	014 023 044 055 060 061 063	014 029 43b 044 047 060 061 063

\* For the option references - all options are part of SA7 e.g. SA7-014 is shown as 014 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 SA7 Technical Report.

Within SA7, this resulted in three approaches being selected from the 5 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 three 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 (EBS) tool. Table 4.5 shows all three approaches SA approach 1, SA approach 2 and SA approach 3 as the best AA because they have the same number of -3 biodiversity scores. SA approach 1 was selected as the best AA approach in Table 4.3 after comparing the number of -2 and -1 biodiversity scores.

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

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

Key
Ranked order (best to worst) within the 3 selected approaches

## 4.4 Comparison of SA7 Approaches

An overall summary of the infrastructure components and abstractions for each of the SA approaches identified for SA7 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 2) (BE, MR, BA)	SA Approach 2 (SA Combination 3) (QD)	SA Approach 3 (SA Combination 4) (LCo, LC)
New pipeline network (km)	0	36	26	19
New WTPs	0	0	0	0
Upgrade WTPs	0	11	13	11
New/upgraded abstractions	0	4	6	5
WTPs decommissioned	0	7	5	7
Abstractions abandoned	0	7	1	1
Raw water storage	0	0	0	0
Treated water storage	0	4	4	3

A comparative assessment of the three 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 2) (BE, MR, BA)	SA Approach 2 (SA Combination 3) (QD)	SA Approach 3 (SA Combination 4) (LCo, LC)	Range (Difference between Lowest and Highest Score)
Population, health, economy and recreation	-3 scores	No Difference			0
	MCA score	Best	Worst	Worst	1
Water Environment: quality and resources	-3 scores	No Difference			0
	MCA score	Best	Worst	Best	1

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

### Key

MCA/No. of -3 scores against each criterion

Worst

Best

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

## Key

\*\* 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 2) (BE, MR, BA)

SA approach 1, key comparison points:

- Identified as the best for the following categories: Best Environmental, Most Resilient and Best AA;
- Option types included:
  - SA option (group option): 1 New Shannon Source option;
  - WRZ options: 3 groundwater abstraction options, 1 surface water abstraction option and 3 WTP upgrade options;
- No -3 biodiversity scores (higher risk options that could impact on European sites); and
- Similar in terms of infrastructure development to SA approach 2 and SA approach 3. The main difference being that SA approach 1 has the longest pipeline length and the most abandoned abstractions. In addition, SA approach 1 has one less new/upgraded abstraction than SA approach 3 and two fewer new/upgraded abstractions than SA approach 2.

### 4.4.2 SA Approach 2 (SA Combination 3) (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 option;
  - WRZ options: 3 groundwater abstraction options, 1 rationalisation option, 1 surface water abstraction option and 3 WTP upgrade options;
- No -3 biodiversity scores (higher risk options that could impact on European sites); and
- Similar in terms of infrastructure development to SA approach 1 and SA approach 3. The main difference being that SA approach 2 has the highest number of WTP upgrades and new/upgraded abstractions. SA approach 2 also has the lowest number of decommissioned WTPs.

### 4.4.3 SA Approach 3 (SA Combination 4) (LCo, LC)

SA approach 3, key comparison points:

- Identified as the best in the Least Cost and Lowest Carbon categories;
- Option types included:
  - SA option (group option): 1 rationalisation option;
  - WRZ options: 3 groundwater abstraction options, 1 rationalisation option, 1 New Shannon Source option, and 3 WTP upgrade options;
- No -3 biodiversity scores (higher risk options that could impact on European sites); and
- Similar in terms of infrastructure development to SA approach 2 and SA approach 3. The main difference being that SA approach 3 has the shortest length of pipeline and the lowest number of treated water storages.

## 4.5 SA7 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 773 m<sup>3</sup>/d in 2019, to a projected maximum of 985 m<sup>3</sup>/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 SA7.

Table 4.8 Supply Demand Balance for SA7

WRZ Name	WRZ Code	Population	Maximum Deficit m <sup>3</sup> /day*	
			2019	2044
Nenagh	2900SC0050	14,866	No Deficit	No Deficit
Roscrea	2900SC0002	7,868	No Deficit	No Deficit
Portumna PS	1200SC0030	2,020	-199	-284
Greyford Source to Crotta	2900SC0045	1,785	No Deficit	-2
Dunkerrin / Moneygall	2500SC0010	1,581	-337	-400
Lorrha	2900SC0043	1,370	-206	-260
Cloughjordan	2900SC0046	1,228	No Deficit	No Deficit
Templederry	2900SC0003	286	No Deficit	No Deficit
Terryglass	2900SC0051	139	No Deficit	-5
Coolderry PWS	2500SC0012	95	-31	-33

\*Based on the Cry 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 2) (BE, MR, BA)	SA Approach 2 (SA Combination 3) (QD)	SA Approach 3 (SA Combination 4) (LCo, LC)
1. Protect public health and promote wellbeing	C	0	-	-	-
	O	--	++	++	++



SEA Objectives	Phase (Construction (C) / Operation (O))	Do Minimum	SA Approach 1 (SA Combination 2) (BE, MR, BA)	SA Approach 2 (SA Combination 3) (QD)	SA Approach 3 (SA Combination 4) (LCo, LC)
3. Protect and enhance biodiversity and contribute to resilient ecosystems	C	0	-	-	-
	O	--	-	-	-
4. To protect landscapes, townscapes and visual amenity	C	0	-	-	-
	O	0	+	+	+
2. Protect and where appropriate enhance, built and natural assets and reduce waste	C	0	-	-	-
	O	-	0	0	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
	O	--	-	-	-
8. Avoid flood risk	C	0	0	0	0
	O	0	0	0	0
9. Protect and where appropriate, enhance cultural heritage assets	C	0	-	-	-
	O	0	0	0	0
10. Protect quality and function of soils	C	0	-	-	-
	O	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 suggests that there is no difference between them, this is because the differences between the options in the SA approaches present similarly when viewed collectively and compared against the “Do Minimum”. Under closer scrutiny of the comparison between the SA approaches alone (see Table 4.3 and Table 4.5), SA approach 1 is identified as being better in terms of the environment score and resilience.

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 across the different categories.

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.

## 4.6 Without Regional Transfer Alternative

The approach development process at study area level identifies a number of locations where a supply from outside the study area is likely to represent a better solution than relying on local supply solutions only. The SA7 Preferred Approach includes options that are dependent on the development of the SA9 Preferred Approach. Alternatives for these options need to be considered in the event that the Preferred Approach for SA9 cannot advance, the alternative options are outlined in Table 4.10. Note that the options for the other WRZs that are not specified in Table 4.10 will remain the same as those in the current SA7 Preferred Approach.

**Table 4.10 Alternative Options for WRZs Dependent on the SA9 Preferred Approach**

WRZ	SA7 Preferred Approach Option	SA7 Alternative Option
Dunkerrin / Moneygall	SA Option 4 New connection point from WSP connecting to Dunkerrin / Moneygall.	SA7-047 Decommission 3 of the existing 4 WTPs and increase GW abstractions at Jones Well WTP.
Borrisokane		SA7-029 Maintain and increase output at existing WTP by increasing GW abstraction.
Cloughjordan		SA7-062 Upgrade to existing WTP no increase in output required.

An overall infrastructure summary of the Preferred Approach options and the alternative options listed in Table 4.10 are provided in Table 4.11, covering the main components of the options.

**Table 4.11 Alternative and Preferred Approach Options Infrastructure Summary**

Infrastructure Summary	Preferred Approach Options	Alternative Approach Options
New pipeline network (km)	29	13
New WTPs	0	0
Upgrade WTPs	0	3
New/upgraded abstractions	0	2
WTPs decommissioned	6	3
Abstractions abandoned	6	0
Raw water storage	0	0
Treated water storage	1	1

Table 4.12 provides an overall comparative assessment between the SA7 Preferred Approach options and the alternative options listed in Table 4.10 against the SEA objectives.

**Table 4.12 Assessment of the Preferred Approach Options and the Alternatives**

SEA Objectives	Phase (Construction (C) / Operation (O))	Preferred Approach Options (PA)	Alternative Approach Options (Alt)	Summary
1. Protect public health and promote wellbeing	C	--	-	Both the PA and the Alt options have the potential to cause disruption to rural areas, however the PA options have over two times the length of pipeline.
	O	++	+	Both the PA and Alt options decommission failing WTPs, however the PA options involve six decommissions and the Alt options involve three decommissions and three upgrades to the failing WTPs to provide benefits during operation.
2. Protect and enhance biodiversity and contribute to resilient ecosystems	C	--	-	Both the PA and the Alt options may result in potential species disturbance and the PA option involves a number of river crossings that may impact Lough Derg SAC and SPA due to hydrological links.
	O	0	-	The PA option pipeline has multiple river crossings and has indirect links to European sites. The Alt options have hydrological links to European sites resulting in potential risks due to abstraction pressures during operation.
3. To protect landscapes, townscapes and visual amenity	C	--	-	The PA options have over two times the length of pipeline. Both have the potential to cause visual impacts to rural areas during construction.

SEA Objectives	Phase (Construction (C) / Operation (O))	Preferred Approach Options (PA)	Alternative Approach Options (Alt)	Summary
	O	++	+	The PA options include decommissioning of six WTPs whereas the Alt options include decommissioning of three WTPs.
4. Protect and where appropriate enhance, built and natural assets and reduce waste	C	--	-	The PA options require approximately 30 km of new pipeline; however, the Alt options require WTP upgrades which may result in temporary loss of access to land.
	O	0	0	Land for both the PA and the Alt options will be reinstated after construction and no long term impacts are predicted.
5. Reduce greenhouse gas emissions	C	---	---	There is a high level of carbon emissions associated with both the PA and Alt options in relation to the Deployable Output created.
	O	---	---	
6. Contribute to environmental climate change resilience	C	0	0	No construction impacts are predicted.
	O	++	--	The PA options use a large resilient supply whereas the Alt options utilise several smaller supplies that are more vulnerable to climate change impacts. The PA options would also help to reduce pressure on existing environmental sources within these WRZs through rationalising the supply.
7. Protect and improve surface water and groundwater status	C	0	0	No construction impacts are predicted.
	O	0	-	The PA options do not include any new or increased abstractions whereas the Alt options include two new/increased groundwater abstractions.
8. Avoid flood risk	C	0	0	No impediment to surface water flow paths or increase to flood risk anticipated.
	O	0	0	
9. Protect and where appropriate, enhance cultural heritage assets	C	-	-	No cultural heritage, assets benefiting from protection or at risk of damage as a result of option. However, due to new network required, risk of unknown archaeology is assessed as minor.
	O	0	0	No operational impacts are predicted.

SEA Objectives	Phase (Construction (C) / Operation (O))	Preferred Approach Options (PA)	Alternative Approach Options (Alt)	Summary
10. Protect quality and function of soils	C	-	-	There is potential risk of minor damage to valuable soils with construction of the network.
	O	0	0	Soils will be reinstated after construction and no operation impacts are predicted.

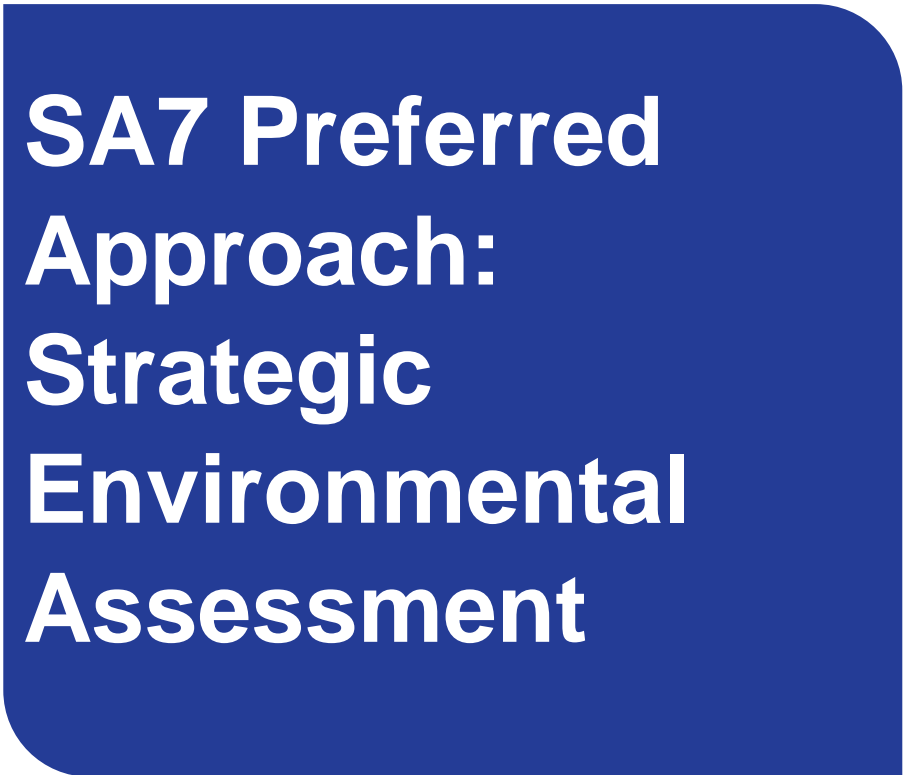
Key			
Major beneficial	+++	Minor adverse	-
Moderate beneficial	++	Moderate adverse	--
Minor beneficial	+	Major adverse	---
Neutral	0		

The Preferred Approach options are assessed in Table 4.12 as performing better against two of the ten SEA objectives, a summary of the key reasoning behind this is also provided.


In the event that the SA9 Preferred Approach cannot progress, the alternatives above will be required to replace those options that are reliant on it. These alternatives will be subject to their own planning and regulatory processes and it will take a number of investment cycles to progress these projects; hence, they may change in later iterations of the plan.



**5**



**SA7 Preferred  
Approach:  
Strategic  
Environmental  
Assessment**



## 5 SA7 Preferred Approach Strategic Environmental Assessment

### 5.1 SA7 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 seven 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 three of the WRZs, namely Dunkerrin/Moneygall, Greyford Source to Crotta and Cloughjordan, the SA Preferred Approach involves improving the interconnection between these three WRZs. The SA Preferred Approach for the remaining WRZs involves new and increased groundwater abstractions, along with increased surface water abstractions and WTP upgrades.

Table 5.1 gives a breakdown of the options in SA7 and the associated abstractions/demand.

**Table 5.1 Preferred Approach Breakdown**

WRZ Name and Option Reference*	Option Description	Abstraction / Demand
SA7-055 1200SC0030 Portumna	Increase abstraction and upgrade WTP <ul style="list-style-type: none"> <li>Increase SW abstraction to meet WRZ deficit (DYCP 2044)</li> <li>WFD status - Lough Derg TN LWB; 2013-2018 – Moderate</li> </ul>	1,659 m <sup>3</sup> /d
SA7-54b (SA option 4) 2500SC0010 Dunkerrin/ Moneygall	New connection point from New Shannon Source connecting to Dunkerrin/Moneygall <ul style="list-style-type: none"> <li>SA option 4 involves Matty's Well WTP, Kylebeg WTP, Lisduff Spring WTP, Jones Well WTP, Dunkerrin WTP and Bushertown WTP and their abstractions will be decommissioned as part of this option. A new storage will be required at Jones Well WTP. Proposed transfer is from New Shannon Source, meeting the total demand requirement in Dunkerrin / Moneygall.</li> <li>WFD status - Derg HMWB: 2013-2018 – Good</li> </ul>	1,637 m <sup>3</sup> /d
SA7-36b (SA option 4) 2900SC0045 Greyford Source to Crotta	New connection point from New Shannon Source connecting to Greyford Source to Crotta <ul style="list-style-type: none"> <li>SA option 4 involves Matty's Well WTP, Kylebeg WTP, Lisduff Spring WTP, Jones Well WTP, Dunkerrin WTP and Bushertown WTP and their abstractions will be decommissioned as part of this option. A new storage will be required at Jones Well WTP. Proposed transfer is</li> </ul>	1,057 m <sup>3</sup> /d

WRZ Name and Option Reference*	Option Description	Abstraction / Demand
	<p>from New Shannon Source, meeting the total demand requirement in Greyford Source to Crotta</p> <ul style="list-style-type: none"> <li>WFD status - Derg HMWB: 2013-2018 – Good</li> </ul>	
SA7-43a (SA option 4) 2900SC0046 Cloughjordan	<p>New connection point from New Shannon Source connecting to Cloughjordan</p> <ul style="list-style-type: none"> <li>SA option 4 involves Matty's Well WTP, Kylebeg WTP, Lisduff Spring WTP, Jones Well WTP, Dunkerrin WTP and Bushertown WTP and their abstractions will be decommissioned as part of this option. A new storage will be required at Jones Well WTP. Proposed transfer is from New Shannon Source, meeting the total demand requirement in Cloughjordan</li> <li>WFD status - Derg HMWB: 2013-2018 – Good</li> </ul>	853 m <sup>3</sup> /d
SA7-044 2500SC0012 Coolderry PWS	<p>Increase abstraction from Coolderry Well and upgrade Coolderry WTP</p> <ul style="list-style-type: none"> <li>Existing GW source at Coolderry PWS</li> <li>WFD status - Shinrone GWB: 2013 -2018 – Good</li> </ul>	79 m <sup>3</sup> /d
SA7-060 2900SC0003 Templederry	<p>WTP Upgrade - no deficit</p> <ul style="list-style-type: none"> <li>WRZ not in deficit, option to upgrade Templederry WTP for water quality purposes</li> <li>WFD status - Nenagh GWB: 2013-2018 – Good</li> <li>WFD status - Nenagh RWB: 2013-2018 – High</li> </ul>	N/A
SA7-061 2900SC0045 Nenagh	<p>WTP Upgrade - no deficit</p> <ul style="list-style-type: none"> <li>WRZ not in deficit, option to upgrade WTP for water quality purposes</li> <li>WFD status - Lough Derg TN LWB: 2013–2018 – Moderate</li> </ul>	N/A
SA7-063 2900SC0002 Roscrea RWSS	<p>No Deficit - Upgrade WTPs</p> <ul style="list-style-type: none"> <li>WRZ not in deficit, option to upgrade WTPs</li> <li>WFD status – Roscrea gravels GWB: 2013-2018 – Good</li> </ul>	N/A
SA7-023 2900SC0043 Lorrha/ Rathcabbin	<p>New GW abstraction from Birr and upgrade WTP to supply deficit</p> <ul style="list-style-type: none"> <li>New GW abstraction and upgrade WTP to supply deficit</li> <li>WFD status – Birr gravels GWB: 2013-2018 – Good</li> </ul>	1,149 m <sup>3</sup> /d
SA7-014 2900SC0051 Terryglass	<p>New GW abstraction to supply full demand and abandon existing sources</p>	134 m <sup>3</sup> /d



WRZ Name and Option Reference*	Option Description	Abstraction / Demand
	<ul style="list-style-type: none"> <li>New GW abstraction to supply full demand and abandon existing sources and Terryglass WTP</li> <li>WFD status - Nenagh GWB: 2013-2018 – Good</li> </ul>	

\* 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 4 is labelled as SA7-504.

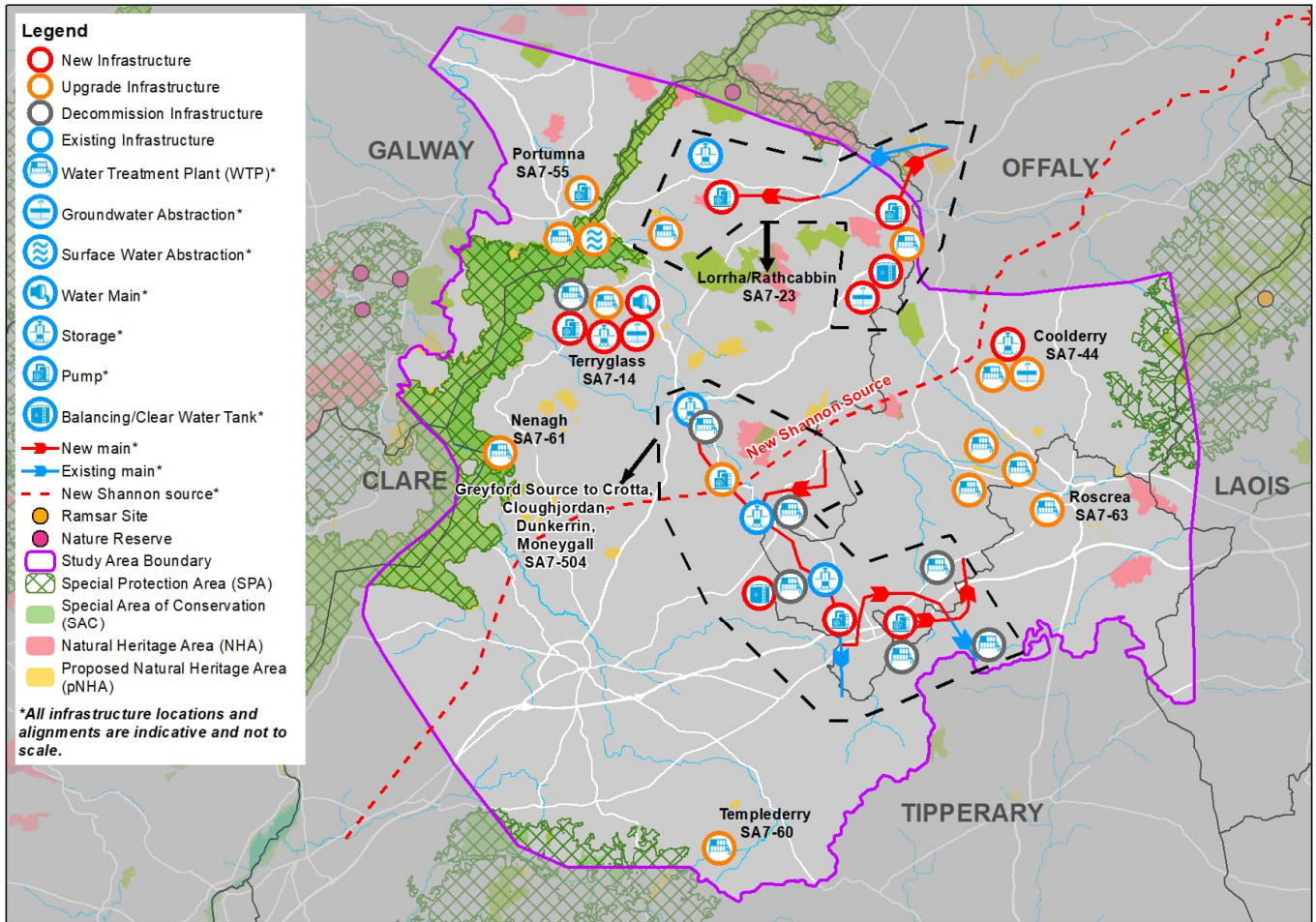


Figure 5.1 SA Preferred Approach and Key Environmental Designations

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

**Table 5.2 Component Table**

Option Reference	New / Refurbished Pipeline	New WTP	Upgrade WTPs	New / Upgraded Abstractions	WTPs Decommissioned	Abstractions Abandoned	Raw water Storage	Treated water Storage
SA7-014	✓	-	✓	✓	✓	✓	-	✓
SA Option 4 (SA7-36b, SA7-43a and SA7-54b)	✓	-	-	-	✓	✓	-	✓
SA7-023	✓	-	✓	✓	-	-	-	✓
SA7-044	-	-	✓	✓	-	-	-	✓
SA7-055	-	-	✓	✓	-	-	-	-
SA7-060	-	-	✓	-	-	-	-	-
SA7-061	-	-	✓	-	-	-	-	-
SA7-063	-	-	✓	-	-	-	-	-

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)
SA7-055	Increase abstraction and Upgrade WTP	Construction	-	-	0	0	-	-	0	0	0	0
		Operation	0	-	0	0	-	-	-	0	0	0
SA7-044	Increase abstraction from Coolderry Well and upgrade Coolderry WTP (Roscrea Gravels groundwater body)	Construction	-	-	-	0	-	-	0	0	0	0
		Operation	++	0	0	0	-	-	-	0	0	0
SA7-063	No Deficit - Upgrade WTP	Construction	-	-	0	0	-	0	0	0	0	0
		Operation	++	0	0	0	-	0	0	0	0	0
SA7-060	No Deficit - Upgrade WTP	Construction	-	-	0	0	0	0	0	0	0	0
		Operation	+	0	0	0	0	0	0	0	0	0

Option Reference*	Option Description	Phase	Protect Public Health and Promote Wellbeing (P1, P2, P3)	Protect and Enhance Biodiversity and Contribute to Resilient Ecosystems (B1, B2, B3, B4, B5)	To Protect Landscapes, Townscapes and Visual Amenity (L-1)	Protect and Where Appropriate Enhance, Built and Natural Assets and Reduce Waste (M1, M2)	Reduce Greenhouse Gas Emissions (C1)	Contribute to Environmental Climate Change Resilience (R1, R2, R5)	Protect and Improve Surface Water and Groundwater Status (W1, W2, W3)	Avoid Flood Risk (W5)	Protect and Where Appropriate, Enhance Cultural Heritage Assets (CH1)	Protect Quality and Function of Soils (G1)
SA7-023	New GW abstraction from Birr groundwater body (karstic bedrock) and upgrade Riverstown WTP to supply deficit	Construction	-	-	-	-	-	-	0	0	-	-
		Operation	+	0	0	0	-	-	-	0	0	0
SA7-061	No Deficit - Upgrade WTP	Construction	-	-	0	0	-	0	0	0	0	0
		Operation	+	0	0	0	-	0	0	0	0	0
SA7-014	New GW abstraction (poorly productive aquifer) to supply full demand and abandon existing sources	Construction	-	-	-	-	-	-	0	0	-	-
		Operation	++	0	+	0	-	-	-	0	0	0

Option Reference*	Option Description	Phase	Protect Public Health and Promote Wellbeing (P1, P2, P3)	Protect and Enhance Biodiversity and Contribute to Resilient Ecosystems (B1, B2, B3, B4, B5)	To Protect Landscapes, Townscapes and Visual Amenity (L-1)	Protect and Where Appropriate Enhance, Built and Natural Assets and Reduce Waste (M1, M2)	Reduce Greenhouse Gas Emissions (C1)	Contribute to Environmental Climate Change Resilience (R1, R2, R5)	Protect and Improve Surface Water and Groundwater Status (W1, W2, W3)	Avoid Flood Risk (W5)	Protect and Where Appropriate, Enhance Cultural Heritage Assets (CH1)	Protect Quality and Function of Soils (G1)
SA Option 4 (SA7-54b, SA7-36b and SA7-43a)	New connection point from New Shannon Source connecting to Dunkerrin / Moneygall	Construction	--	--	--	--	---	0	0	0	-	-
		Operation	++	0	++	0	---	++	0	0	0	0

\* Note SA Option is the same as Group Option

\*\* Total lifetime tCO<sub>2</sub>e 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 SA7 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: Dunkerrin/Moneygall, Coolderry PWS, Roscrea, Nenagh and Lorrha.

### 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 SA7 Technical Report identifies potential interim solutions that allow shorter term interventions to be identified and prioritised, when needed. These are expected to be small scale, within site works and are not likely to give rise to significant environmental effects. However, they would need to be subject to relevant assessments, including AA screening as and when they are required.

## 5.4 Approach Uncertainty and Adaptability

A summary of the adaptability criteria and sensitivity analysis Irish Water have undertaken for the SA7 Preferred Approach is provided in the SA7 Technical report. A high-level assessment of what this could mean for the SEA is shown in Table 5.4.

**Table 5.4 SA7 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)	+1,035 m <sup>3</sup> /d	<p>The impact of sustainability reductions would reduce the volumes that can be abstracted from Irish Water's existing sources, therefore, increasing the SDB deficit.</p> <p>Irish Water's outline sustainability assessments would mean a potential increase in deficit for SA7 based on reductions in the sustainable abstraction amounts from the Little Brosna River supplying Roscrea WRZ. As this WRZ currently shows no projected deficit, feasible options would have to be considered if a sustainability issue is confirmed for the Little Brosna River.</p> <p>The SA Preferred Approach addresses potential for some sustainability reduction, although additional sustainability reductions could add pressure for additional supply from outside the study area.</p>
Climate Change	High (international climate change targets have not been met)	+100 m <sup>3</sup> /d	<p>Higher climate change scenarios would impact Irish Water's existing supplies and result in decreased water availability at certain times of year.</p> <p>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.</p> <p>Potential for additional abstraction pressure unless optimisation can address.</p>
Demand Growth	Low/Moderate (growth has been based on policy)	-200 m <sup>3</sup> /d	<p>The impact of lower than expected growth would reduce the SDB deficit and the overall need requirement.</p> <p>The SDB deficit is currently spread across four out of ten of the WRZs in SA7 and six have a projected SDB deficit. This is driven by quality and quantity issues. In this rural area, growth is relatively low.</p> <p>This could allow lower than expected energy and carbon and reduce expected abstraction requirements</p>
Leakage Targets	Moderate/High (Irish Water is	-2,078 m <sup>3</sup> /d	<p>Increased leakage savings beyond SELL would reduce the SDB deficit and the overall need requirement.</p>

Uncertainty	Likelihood	Increase/ Decrease in Deficit	Environmental Impacts Relative to Assessment of Preferred Approach Key: Green - Positive Amber - Negative
	focused on sustainability and aggressive leakage reduction)		<p>The need drivers in SA7 are across all WRZs and are driven by quality as well as availability issues.</p> <p>This could allow lower than expected energy and carbon and reduce expected abstraction requirements</p>





# 6

## **SEA Cumulative Effects for SA7 Preferred Approach**

## 6 SEA Cumulative Effects for SA7 Preferred Approach

Secondary, cumulative and the synergistic nature of the effects of the SA7 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 SA7

The potential 'within plan' cumulative effects for SA7 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
- 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 in 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 SA7**

Preferred Approach option references	SA7-055	SA7-044	SA7-063	SA7-060	SA7-023	SA7-061	SA7-014
SA option 4 (Group option 4)	LDNS					LDNS	LDNS
SA7-014	LDS	LDNS				LDS	LDNS
SA7-061	LDS	LDNS					
SA7-023	RSC						
SA7-060							
SA7-063							
SA7-044							
SA7-055							

Key	
Construction Phase	
Operation Phase	
Construction and Operation	
Lough Derg (Shannon) SPA	LDS
Lough Derg, North-east Shore SAC	LDNS
River Shannon Callows SAC	RSC

There could be cumulative effects during construction associated with options located around the Lough Derg SAC and SPA. Lough Derg is a major freshwater body on the Lower Shannon catchment and these European protected sites are designated for its fen type habitats and bird species. Table 6.1 identifies three options (SA7-055, 061 and 014) with potential for cumulative effects from disturbance to the Lough Derg (Shannon) SPA, and four options (SA7-055, 061, 014 and SA option 4) with potential cumulative effects from habitat degradation, spread of invasive species and pollution to the Lough Derg, North-east Shore SAC. There could also be potential for cumulative effects to River Shannon Callows

SAC from spread of invasive species and habitat degradation if construction of options SA7-055 and 023 is concurrent.

These cumulative effects can be managed by standard good practice mitigation, such as having buffers along the edge of the waterbody and having an emergency plan in place during construction. With these standard good practice measures in place, there are unlikely to be significant cumulative effects to the designated sites. 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, potential for cumulative effects from water table or availability impacts during operation of options SA7-055 and 014 to Lough Derg, North-east Shore SAC. Option SA7-055 includes increase surface water abstraction from Lough Derg and option SA7-014 includes new groundwater abstraction at Crossanagh near Terryglass. The two water bodies are hydrologically linked, see Figure 6.1 for the Preferred Approach abstractions in SA7. 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 SAC.

The potential for cumulative effects on groundwater bodies have been considered in 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 three of the WFD groundwater bodies (Birr, Nenagh and Roscrea Gravels) 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 SA7 this averages as 2.99 tCO<sub>2</sub>e/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.

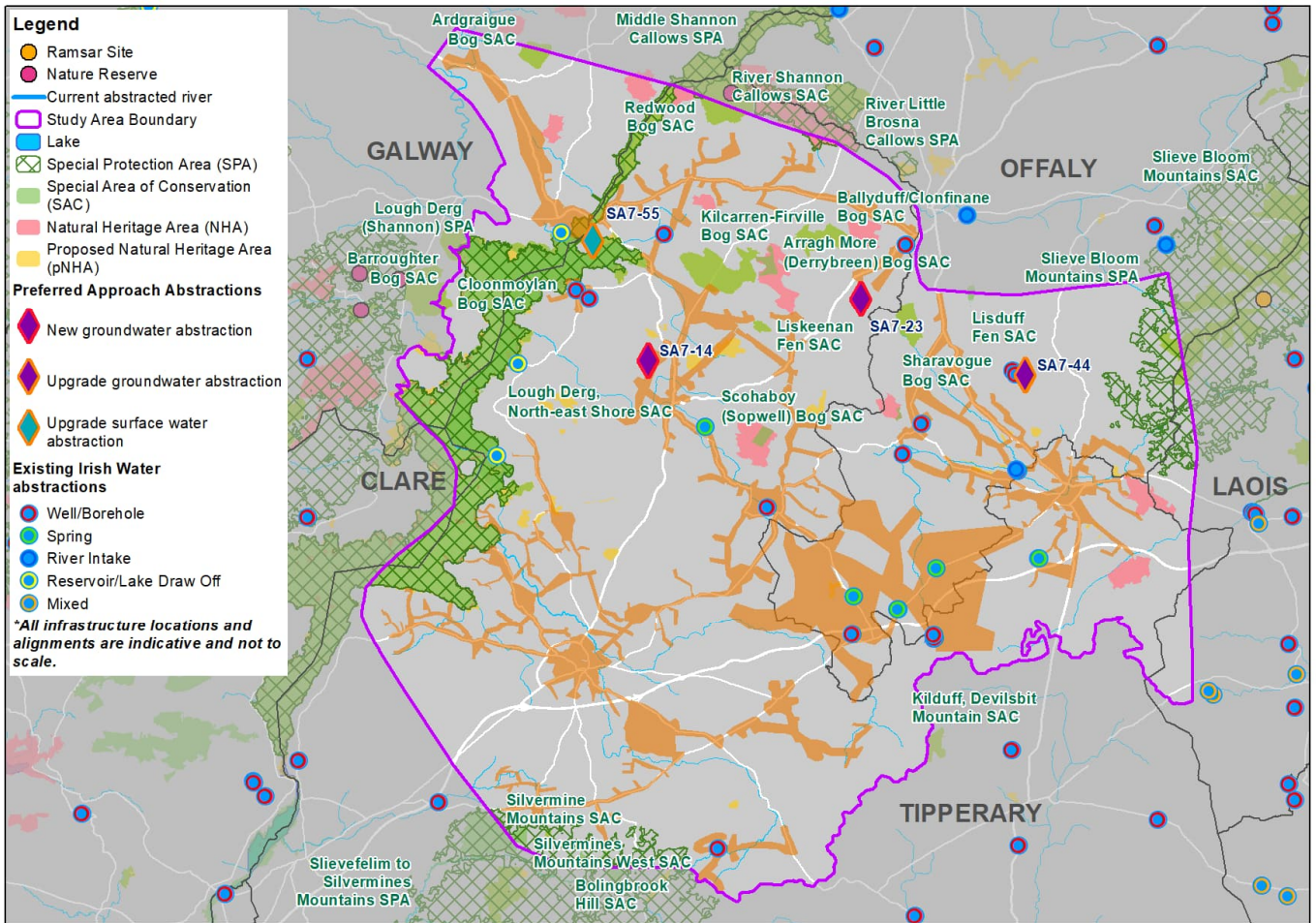


Figure 6.1 SA Preferred Approach Abstractions in SA7

## 6.2 Cumulative Effects with Other Developments

The SA7 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 SA7 there are three other developments that could cause cumulated effects with the SA Preferred Approach. No potential for cumulative effects are identified with the other remaining three developments mentioned in Table 2.14 and the SA Preferred Approach. Other developments that were not considered further due to their smaller size at this plan level are the improvements to the boat mooring facilities at Lough Derg Yacht Club.

### 6.2.1 Cumulative Effects during Construction

The Dean Maxwell Community Nursing Unit and Roscrea Enterprise, Digital and Social Impact Hub could result in cumulative effects with the SA Preferred Approach (option SA7-063) if they were to be constructed at the same time (Table 6.2). All of these developments are within Roscrea. Potential effects could include increased traffic, noise and dust on the local roads in and around Roscrea, and its residence and residential or commercial properties. Same cumulative effects could occur at Portumna if the Portumna Vision 2030 development and the SA Preferred Approach (option SA7-055) were to be constructed concurrently. 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. 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.

Sharavogue Bog SAC is approximately 8km north of and hydrologically linked to the Roscrea Enterprise, Digital and Social Impact Hub development. There is potential for cumulative effects from pollution to the designated site if construction of the development and the SA Preferred Approach (option SA7-063) were to be constructed at the same time. With the implementation of standard good practice measures there will be no adverse effects on the integrity of this European site.

**Table 6.2 Potential Cumulative Effects between Preferred Options and Other Developments in SA7**

Project Developments	Preferred Approach Options							
	SA7-055	SA7-044	SA7-063	SA7-060	SA7-023	SA7-061	SA7-014	SA Option 4 (Group option 4)
Dean Maxwell Community Nursing Unit, Roscrea			R					
Nenagh Historic and Cultural Quarter - A Tourism Led Regeneration Plan								
Portumna Vision 2030	P							
R498 Latteragh realignment								
Roscrea Enterprise, Digital and Social Impact Hub			R	SB				
St Conlon's Community Nursing Unit, Nenagh								

Key	
Construction Phase	
Operation Phase	
Construction and Operation	
Sharavogue Bog SAC	SB
Roscrea Town Centre	R
Portumna Town Centre	P

### 6.2.2 Cumulative Effects during Operation

The plan level assessment indicates that there could be cumulative effects to the Sharavogue Bog SAC from habitat degradation with operation of the SA Preferred Approach (option SA7-063) and the Roscrea Enterprise, Digital and Social Impact Hub development at the same time. However, with the

implementation of standard good practice measures there will be no adverse effects on the integrity of this European site.

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 SA7 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 SA7 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 Lough Derg, North-east Shore SAC and Lough Derg (Shannon) SPA during operation of option SA7-055 because of the increase direct abstraction from Lough Derg and the likely high association between surface water and groundwater flows at the abstraction point. River Shannon Callows SAC is also approximately 0.53km away from the option and is hydrologically linked to the abstraction. The increase in abstraction could lead to hydrological changes (reduced flows – impacting on water quality) that could impact QI species of these sites. There is potential for impacts on aquatic QI species utilising watercourse hydrologically linked to these European sites through a reduction in flows/water levels. The AA reported in the NIS identifies mitigation measures to avoid AESI for these sites;
- Moderate adverse impacts on Scohaboy Bog SAC and Ballintemple Bog pNHA as the proposed pipeline of SA option 4 will be routed adjacent to these sites. Construction of a number of river crossings are also required with this option with hydrological links and potential impacts to Lough Derg SAC and SPA. The NIS identifies mitigation measures to avoid AESI for these sites;
- Moderate adverse impacts to the resilience of Bir and Nenagh groundwater bodies to climate change as new abstractions are required with options SA7-023 and 014. However, both of the groundwater bodies currently have a good quantitative status with low likelihood that the proposed increase abstractions will impact their respective WFD objectives; and
- Moderate adverse effects on routes connecting Greyford Source to Crotta, Cloughjordan and Moneygall, and the adjacent residential and commercial properties from visual impacts and increased traffic, noise and dust during the construction of SA option 4. SA option 4 include construction of extensive new pipelines, pumps and a new storage reservoir as well as upgrading of an existing pump and demolition of six WTPs.

Cumulative effects assessment identifies potential significant effects in relation to carbon emissions, although the individual options are assessed only as neutral to major adverse in relation to this SEA. 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 SA7 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 the 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. 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
<b>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</b>				
1. Protect public health and promote wellbeing	<p>C <b>Minor Adverse</b> to <b>Moderate Adverse</b></p> <p>O Neutral to <b>Moderate Beneficial</b></p> <p>The PA is expected to improve overall drinking water quality reliability and sustainability through the decommissioning of failing WTPs and the replacement of abstractions vulnerable to drought conditions. The PA is expected to reduce risks to access of good quality water supply across different conditions and over the plan period.</p>	<p>Standard good construction practice and consultation</p> <p>Further assessment of risks to water quality and consideration of catchment management initiatives to improve water quality and reduce treatment cost. For example, working with landowners and managers on practices to reduce levels of sediment and pollution from entering water courses through run off.</p>	<ul style="list-style-type: none"> <li>Level of service, and the frequency and duration of drought orders</li> <li>Number of days/hours when water supply to people is disrupted due to drought, freeze-thaw or other service/infrastructure issues</li> <li>Number of public rights of way closures/diversions and length of paths created compared to loss</li> </ul>	<ul style="list-style-type: none"> <li>Duration of construction works, and number of complaints received regarding construction works</li> <li>Duration of temporary closures of footpaths and other recreational assets</li> </ul>
2. Protect and enhance biodiversity and contribute to	<p>C <b>Minor Adverse</b> to <b>Moderate Adverse</b></p> <p>O Neutral to <b>Minor Adverse</b></p> <p>Impacts from construction works for pipelines and service reservoirs</p>	<p>Routing/siting to avoid impacts. Standard good construction practice and specific measures as identified in the NIS.</p>	<ul style="list-style-type: none"> <li>Temporary and permanent habitats lost vs habitats created/enhanced</li> <li>Site condition and population data for QI of European and</li> </ul>	<ul style="list-style-type: none"> <li>Monitor construction activities to ensure compliance</li> </ul>

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	on biodiversity. These can be minimised through careful routing and siting. Operational impacts on habitats of Lough Derg.  Potential for construction and operational impacts on European and National designated sites, most notably the Lough Derg North-East Shore SAC, Lough Derg (Shannon) SPA and Lough Derg NHA.	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 Derg North-East Shore SAC, Lough Derg (Shannon) SPA and Lough Derg NHA.	
3. To protect landscapes, townscapes and visual amenity	C Neutral to <b>Minor Adverse</b> O Neutral to <b>Moderate Beneficial</b>  Construction landscape impacts and long term impacts from decommissioning above ground structures, such as 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.	<ul style="list-style-type: none"> <li>Total working area of pipelines non-designated landscapes</li> <li>Land use/landscape features re-established for schemes over appropriate period – areas/km successfully restored to meet requirements</li> </ul>	<ul style="list-style-type: none"> <li>Duration of construction works</li> <li>Number of complaints received regarding visual impact of construction works</li> </ul>
4. Protect and where appropriate	C Neutral to <b>Minor Adverse</b> O Neutral	Materials management to be integrated into design to optimise use of existing resources and	<ul style="list-style-type: none"> <li>Loss of greenfield land, including agricultural, forestry or other land uses</li> </ul>	<ul style="list-style-type: none"> <li>Construction wastes sent to landfill</li> </ul>

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, built and natural assets and reduce waste	New resources required for construction works, including lengths of pipeline, service reservoirs and upgraded WTPs. Ongoing maintenance requirements.	minimise waste from construction and operation.	<ul style="list-style-type: none"> <li>Disruptions to strategic infrastructure/services</li> <li>Use of waste management plans</li> <li>Volume of drinking water treatment residuals sent to landfill</li> </ul>	
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.	<ul style="list-style-type: none"> <li>Percentage of energy supply from renewable sources or reduced energy use</li> <li>Carbon footprint (total tonnes) per year, predicted over plan period, lifetime of schemes and carbon intensity of water resource options (tonnes/ML/d)</li> </ul>	<ul style="list-style-type: none"> <li>Carbon footprint (total tonnes) during construction</li> <li>Operational Carbon Intensity kgsCO<sub>2</sub>equic/ML</li> </ul>
6. Contribute to environmental climate	C Neutral to Moderate Adverse O Moderate Adverse to Moderate Beneficial	Consider how operation can further reduce climate change pressure on at risk sources and associated designations,	<ul style="list-style-type: none"> <li>WFD waterbody status objectives at risk and designated site condition status</li> </ul>	<ul style="list-style-type: none"> <li>None identified</li> </ul>

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	Abstractions generally reduce environmental resilience but overall improved flexibility for operation using regional schemes has the potential to reduce pressure on at risk local resources. WRZ options SA7-055, SA7-023 and SA7-014 and SA7-044 require further assessment to understand their sustainability in the longer term.	particularly for SA7-023 and SA7-014.  Sustainability review of sources taking account of groundwater and surface water interconnections for WRZ options SA7-055, SA7-023 and SA7-014 and SA7-044.	<ul style="list-style-type: none"> <li>Frequency of drought orders requiring change to normal abstractions/ compensation releases</li> </ul>	
7. Protect and improve surface water and groundwater status	C Neutral O Neutral to <b>Minor Adverse</b>  Generally, new/increased abstractions are limited to allowable limits and have a low risk of adverse effect on WFD waterbody status objectives, with the potential exception of the Little Brosna River.	Further investigation to consider effects on groundwater abstraction on the surface water environment.	<ul style="list-style-type: none"> <li>WFD waterbody status objectives at risk</li> </ul>	<ul style="list-style-type: none"> <li>Pollution incidents during construction</li> <li>Additional monitoring of the Little Brosna River if needed</li> </ul>

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
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.	<ul style="list-style-type: none"> <li>Number of options at risk of flooding at each AEP level</li> </ul>	<ul style="list-style-type: none"> <li>Lost time to flooding</li> <li>Lost time to power supply interruptions</li> </ul>
9. Protect and where appropriate, enhance cultural heritage assets	C Neutral to <b>Minor Adverse</b> O Neutral Potential construction impacts on unknown archaeological interest. Impacts on known interests are expected to be avoided.	Standard good practice approaches to minimise potential impacts.	<ul style="list-style-type: none"> <li>Number of archaeological assets adversely affected by water resource options</li> <li>Number of options that are rerouted to avoid cultural heritage impacts</li> <li>Number of schemes including improvements to access recording of archaeological assets or communication/ interpretation of interest features</li> </ul>	<ul style="list-style-type: none"> <li>Number of archaeological finds recorded during construction</li> </ul>
10. Protect quality and function of soils	C Neutral to <b>Minor Adverse</b> O Neutral Potential for loss and damage to valuable soils during construction but impacts to geological assets are expected to be avoided.	Standard good practice to conserve and reinstate soils.	<ul style="list-style-type: none"> <li>Soil Management Plans implemented</li> <li>Volume of contaminated land restored, or soils removed</li> </ul>	<ul style="list-style-type: none"> <li>Total volume of soil removed or reused on site</li> </ul>



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 SA7 are 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 SA7 abstractions have good quantitative status (Irish Water, 2022). The abstractions are not located in close proximity and 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 SA7, 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 Lough Derg, North-east Shore SAC, Lough Derg (Shannon) SPA and Sharavogue Bog SAC. The potential effects included disturbance, habitat degradation, mortality of Qualifying Interest (QI) species 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 the following European sites if construction of options is concurrent:

- Lough Derg, North-east Shore SAC - habitat degradation (also during operation), habitat loss and spread of invasive species;
- Lough Derg, (Shannon) SPA - disturbance impacts; and
- River Shannon Callows SAC - spread of invasive species and habitat degradation.

With the implementation of mitigation as detailed in Appendix E of the NIS, there will be no adverse effects on the integrity of the European sites.



**10**

# **Recommendations for Implementation**

## 10 Recommendations for Implementation

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

- SEA Environmental Report of the Framework Plan – this includes general proposals and standard mitigation requirements (also see SEA Environmental Report Appendix); and
- SEA Environmental Report of the Regional Plan - this will include 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 Interconnection Options in SA7

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
SA7-10a	Transfer spare capacity to neighbouring schemes in deficit									0	0	-11
SA7-039	Transfer spare capacity to neighbouring schemes in deficit									0	0	-11

Table A.2 Fine Screening Summary of Group Water Scheme Options in SA7

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
SA7-016	Supply deficit from nearby Carrigahorig GWS									0	0	-12

Table A.3 Fine Screening Summary of Transfer Options in SA7

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
SA7-10b	Transfer spare capacity to neighboring schemes in deficit; Rationalise Cloughjordan									0	0	-10

Table A.4 Fine Screening Summary of Rationalisation Options in SA7

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
SA7-027	Increase Abstraction and Upgrade Portumna WTP; Rationalise Lorrha/Rathcabbin									0	0	-11
SA7-40b	Transfer spare capacity to neighboring schemes in deficit; Rationalise Cloughjordan									0	0	-10
SA7-041	New GW abstraction at Borrisokane and Rationalisation of Cloughjordan									0	0	-11
SA7-047	Develop Jones Well into Production Wells. Rationalise Dunkerrin and Lisduff and Moneygall									0	0	-9

**Table A.5 Fine Screening Summary of Surface Water Options in SA7**

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
SA7-024	New SW abstraction from River Little Brosna									0	0	-15
SA7-055	Increase abstraction and Upgrade WTP									0	0	-9
SA7-55a	Increase abstraction and Upgrade WTP									0	0	-10

Table A.6 Fine Screening Summary of Groundwater Options in SA7

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
SA7-014	New GW abstraction to supply full demand and abandon existing sources									0	0	-11
SA7-020	Increase GW abstraction at Riverstown sources and upgrade Riverstown WTP									1	0	-12
SA7-021	Increase GW abstraction at Lorrha source and upgrade Lorrha Annagh PS WTP									1	0	-12
SA7-022	New GW abstraction from Birr gravels groundwater body and new WTP									0	0	-12
SA7-023	New GW abstraction from Birr groundwater body (karstic bedrock) and upgrade Riverstown WTP to supply deficit									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
SA7-029	Increase GW abstraction at Greyford source and upgrade existing Borrisokane WTP									0	0	-10
SA7-30a	New GW abstraction from Borrisokane groundwater body (karstic bedrock)									0	0	-11
SA7-30b	New GW abstraction at Borrisokane and Rationalisation of Cloughjordan									0	0	-11
SA7-031	New GW abstraction from Lismaline groundwater body (productive fissured bedrock)									0	0	-12
SA7-044	Increase abstraction from Coolderry Well and upgrade Coolderry WTP									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
SA7-049	Increase abstraction at Jones Well and upgrade Jones Well WTP									0	0	-9

Table A.7 Fine Screening Summary of New Shannon Source Options in SA7

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
SA7-36b	New Shannon Source Connection									0	0	-9
SA7-43a	New Shannon Source Connection									0	0	-10
SA7-43b	New connection point from New Shannon									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
	Source connecting to Cloughjordan											
SA7-54b	New Shannon Source Connection									0	0	-11
SA7-01f	New Shannon Source Connection to Roscrea and Cloughjordan									0	0	-11
SA7-43e	New Shannon Source Connection to Roscrea and Cloughjordan									0	0	-11

**Table A.8 Fine Screening Summary of WTP Options in SA7**

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
SA7-060	Templederry WTP Upgrade									0	0	-6
SA7-061	Nenagh WTP Upgrade									0	0	-6
SA7-062	Cloughjordan WTP Upgrade									0	0	-7
SA7-063	No Deficit - Upgrade WTP									0	0	-7

## Appendix B SA Approaches for SA7

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

WRZ	Preferred Approach - SA Approach 1		Least Cost - SA Approach 3		Quickest Delivery - SA Approach 2	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
1200SC0030: Portumna	SA7-055 Increase abstraction and Upgrade WTP	-	SA7-55a Increase abstraction and Upgrade WTP	10	SA7-055 Increase abstraction and Upgrade WTP	-
2500SC0010: Dunkerrin / Moneygall	SA7-54b New Shannon Source Connection	5	SA7-047 Develop Jones Well into Production Wells. Rationalise Dunkerrin and Lisduff and Moneygall	-	SA7-047 Develop Jones Well into Production Wells. Rationalise Dunkerrin and Lisduff and Moneygall	-
2500SC0012: Coolderry PWS	SA7-044 Increase abstraction from Coolderry Well and upgrade Coolderry WTP (Roscrea Gravels groundwater body)	-	SA7-044 Increase abstraction from Coolderry Well and upgrade Coolderry WTP	-	SA7-044 Increase abstraction from Coolderry Well and upgrade Coolderry WTP	-
2900SC0002: Roscrea RWSS	SA7-063 No Deficit - Upgrade WTP	-	SA7-063 No Deficit - Upgrade WTP	-	SA7-063 No Deficit - Upgrade WTP	-
2900SC0003: Templederry	SA7-060 Templederry WTP Upgrade	-	SA7-060 Templederry WTP Upgrade	-	SA7-060 Templederry WTP Upgrade	-
2900SC0043: Lorrha/Rathcabbin	SA7-023	-	SA7-027	10	SA7-023	-

WRZ	Preferred Approach - SA Approach 1		Least Cost - SA Approach 3		Quickest Delivery - SA Approach 2	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
	New GW abstraction from Birr groundwater body (karstic bedrock) and upgrade Riverstown WTP to supply deficit		Increase Abstraction and Upgrade Portumna WTP; Rationalise Lorrha/ Rathcabbin		New GW abstraction from Birr groundwater body (karstic bedrock) and upgrade Riverstown WTP to supply deficit	
2900SC0045: Greyford Source to Crotta	SA7-36b New Shannon Source Connection	4	SA7-029 Increase GW abstraction at Greyford source and upgrade existing Borrisokane WTP	-	SA7-30b New GW abstraction at Borrisokane and Rationalisation of Cloughjordan	5
2900SC0046: Cloughjordan	SA7-43a New Shannon Source Connection	4	SA7-43b New connection point from New Shannon Source connecting to Cloughjordan	-	SA7-041 New GW abstraction at Borrisokane and Rationalisation of Cloughjordan	5
2900SC0050: Nenagh RWSS	SA7-061 Nenagh WTP Upgrade	-	SA7-061 Nenagh WTP Upgrade	-	SA7-061 Nenagh WTP Upgrade	-
2900SC0051: Terryglass	SA7-014 New GW abstraction to supply full demand and abandon existing sources	-	SA7-014 New GW abstraction to supply full demand and abandon existing sources	-	SA7-014 New GW abstraction to supply full demand and abandon existing sources	-

WRZ	Best Environmental - SA Approach 1		Most Resilient - SA Approach 1		Lowest Carbon - SA Approach 3	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
1200SC0030: Portumna	SA7-055 Increase abstraction and Upgrade WTP	-	SA7-055 Increase abstraction and Upgrade WTP	-	SA7-55a Increase abstraction and Upgrade WTP	10
2500SC0010: Dunkerrin / Moneygall	SA7-54b New Shannon Source Connection	5	SA7-54b New Shannon Source Connection	5	SA7-047 Develop Jones Well into Production Wells. Rationalise Dunkerrin and Lisduff and Moneygall	-
2500SC0012: Coolderry PWS	SA7-044 Increase abstraction from Coolderry Well and upgrade Coolderry WTP	-	SA7-044 Increase abstraction from Coolderry Well and upgrade Coolderry WTP	-	SA7-044 Increase abstraction from Coolderry Well and upgrade Coolderry WTP	-
2900SC0002: Roscrea RWSS	SA7-063 No Deficit - Upgrade WTP	-	SA7-063 No Deficit - Upgrade WTP	-	SA7-063 No Deficit - Upgrade WTP	-
2900SC0003: Templederry	SA7-060 Templederry WTP Upgrade	-	SA7-060 Templederry WTP Upgrade	-	SA7-060 Templederry WTP Upgrade	-
2900SC0043: Lorrha/Rathcabbin	SA7-023 New GW abstraction from Birr groundwater body (karstic bedrock) and upgrade Riverstown WTP to supply deficit	-	SA7-023 New GW abstraction from Birr groundwater body (karstic bedrock) and upgrade Riverstown WTP to supply deficit	-	SA7-027 Increase Abstraction and Upgrade Portumna WTP; Rationalise Lorrha/Rathcabbin	10

WRZ	Best Environmental - SA Approach 1		Most Resilient - SA Approach 1		Lowest Carbon - SA Approach 3	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
2900SC0045: Greyford Source to Crotta	SA7-36b New Shannon Source Connection	4	SA7-36b New Shannon Source Connection	4	SA7-029 Increase GW abstraction at Greyford source and upgrade existing Borrisokane WTP	-
2900SC0046: Cloughjordan	SA7-43a New Shannon Source Connection	4	SA7-43a New Shannon Source Connection	4	SA7-43b New connection point from New Shannon Source connecting to Cloughjordan	-
2900SC0050: Nenagh RWSS	SA7-061 Nenagh WTP Upgrade	-	SA7-061 Nenagh WTP Upgrade	-	SA7-061 Nenagh WTP Upgrade	-
2900SC0051: Terryglass	SA7-014 New GW abstraction to supply full demand and abandon existing sources	-	SA7-014 New GW abstraction to supply full demand and abandon existing sources	-	SA7-014 New GW abstraction to supply full demand and abandon existing sources	-

WRZ	Best Appropriate Assessment - SA Approach 1	
	Option Description	SA Option
1200SC0030: Portumna	SA7-055 Increase abstraction and Upgrade WTP	-

WRZ	Best Appropriate Assessment - SA Approach 1	
	Option Description	SA Option
2500SC0010: Dunkerrin / Moneygall	SA7-54b New Shannon Source Connection	5
2500SC0012: Coolderry PWS	SA7-044 Increase abstraction from Coolderry Well and upgrade Coolderry WTP	-
2900SC0002: Roscrea RWSS	SA7-063 No Deficit - Upgrade WTP	-
2900SC0003: Templederry	SA7-060 Templederry WTP Upgrade	-
2900SC0043: Lorrha/Rathcabbin	SA7-023 New GW abstraction from Birr groundwater body (karstic bedrock) and upgrade Riverstown WTP to supply deficit	-
2900SC0045: Greyford Source to Crotta	SA7-36b New Shannon Source Connection	4
2900SC0046: Cloughjordan	SA7-43a New Shannon Source Connection	4
2900SC0050: Nenagh RWSS	SA7-061 Nenagh WTP Upgrade	-
2900SC0051: Terryglass	SA7-014	-

WRZ	Best Appropriate Assessment - SA Approach 1	
	Option Description	SA Option
	New GW abstraction to supply full demand and abandon existing sources	