

# Regional Water Resources Plan South East

Strategic Environmental  
Assessment Appendix H:  
Study Area L – Environmental  
Review



Tionscadal Éireann  
Project Ireland  
**2040**



Data disclaimer: This document uses best available data at time of writing. As data relating to population forecasts and trends are based on information gathered before the Covid-19 Pandemic, monitoring and feedback will be used to capture any updates. The National Water Resources Plan will also align to relevant updates in applicable policy. In December 2022, the Water Services (Amendment) (No. 2) Act, 2022 was signed into law. This act provides that, from the 31 December 2022, Irish Water will only be known as Uisce Éireann. It also provides that, from that date, all references in any enactment, legal proceedings or other document to Irish Water shall be construed as references to Uisce Éireann only. The SEA Environmental Report and Appendices including this Environmental Review reflects this transition from Irish Water to Uisce Éireann.

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

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# 1

# Introduction and Background

# 1 Introduction and Background

This Study Area Environmental Review forms part of the SEA Environmental Report for the Regional Water Resources Plan (RWRP) for the South East Region (referred to as the Regional Plan). The Regional Plan includes three individual study area reviews (SAK, SAL, and SAM) as appendices.

This Study Area L Environmental Review includes:

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

This Environmental Review summarises the environmental assessment undertaken for Study Area L within the South East Region for the options and approaches considered and as outlined in the Study Area L Technical Report (RWRP-SE Appendix 2). This Environmental Review applies the Strategic Environmental Assessment (SEA) objectives and environmental assessment methodology set out in the NWRP Framework Plan (Framework Plan).

Environmental Reviews have been undertaken for each study area and form appendices to the SEA Environmental Report for the Regional Plan as part of Phase 2 of the National Water Resources Plan (NWRP). Phase 1 in the development of the NWRP was the preparation of the Framework Plan, which was adopted in Spring 2021 following SEA, Appropriate Assessment (AA) and extensive public consultation.

Three regional plans, the RWRP for the Eastern and Midlands region, the RWRP for the South West region and the RWRP for the North West region have been taken through the assessment and consultation process and have been finalised and adopted. The RWRP for the South East region, which this SEA Environmental Report addresses, will be the final region for the Phase 2 NWRP and has been consulted on and is expected to be adopted in Winter 2023. The Framework Plan, Regional Plans and supporting documentation are available at <https://www.water.ie/projects/strategic-plans/national-water-resources/>.

## 1.1 Options Assessment Methodology

The Options Assessment Methodology as adopted in the Framework Plan and implemented as part of the RWRP-SE 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 (Water Resource Zones (WRZs)) – understanding the study area and the existing conditions of assets, supply and demand issues; as well as environmental constraints and opportunities;
- 3) Identifying potential options for consideration relevant to the study area;
- 4) Coarse screening – assessing the unconstrained options and eliminate any that will not be viable;
- 5) Further option definition, information collection and preliminary costing;

- 6) Fine screening – options assessment and scoring against the key criteria with further removal of options identified as unviable and development of feasible options for costing and scoring assessment update;
- 7) Approach appraisal – comparison and assessment of combinations of options identified to meet the predicted supply demand deficit to determine the Preferred Approach; and
- 8) Monitoring and Feedback – a process for monitoring the implementation of the plan and responding to changes to policy and guidelines and to information changes which will feed into the 5 year plan cycle and includes an annual review to identify actions required within the plan cycle.

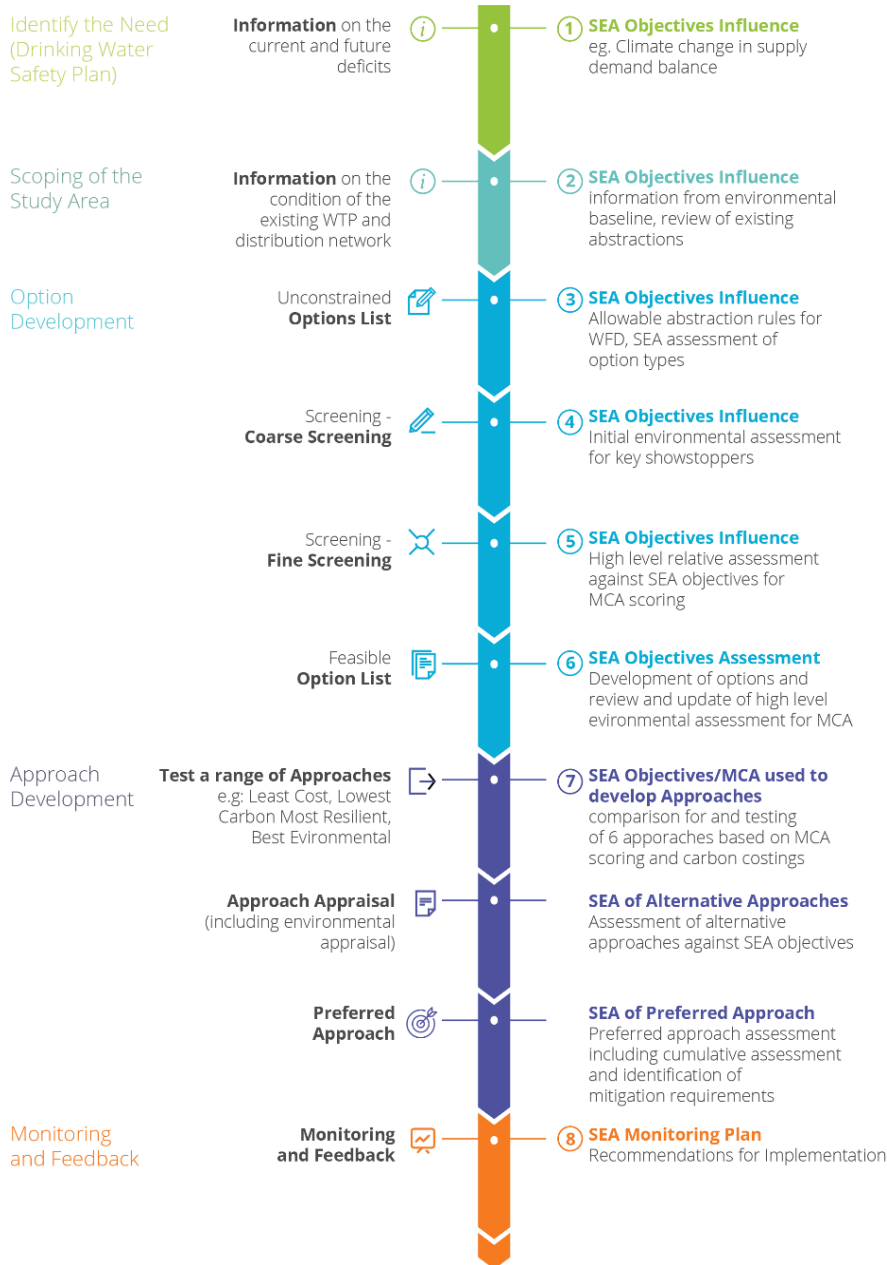


Figure 1.1 Option and Approach Development Process

## 1.2 Regional Plan Strategic Environmental Assessment

The four RWRPs, implementing Phase 2 of the NWRP, are each subject to a separate SEA process. The study area assessments follow the outline methodology established by the Framework Plan. The SEA Environmental Reports are published for consultation alongside the Regional Plans for each of the



four regions. As indicated in section 1.1, this consultation process has been completed for four of the regions and the South East Region is the final region in Phase 2 of the NWRP that is to be adopted in Winter 2023.

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

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

### 1.3 Study Area: Strategic Environmental Assessment

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

Table 1.1 SEA Objectives

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

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

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

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

If appropriate, the Preferred Approach identified for SAL 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 SAL is provided in chapter 8 of this review.

## 1.5 Study Area: Appropriate Assessment

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

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

## 1.6 Study Area L

The South East Region is subdivided into three 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 SAL, the location of SAL in relation to the South East Region is shown in Figure 1.2.

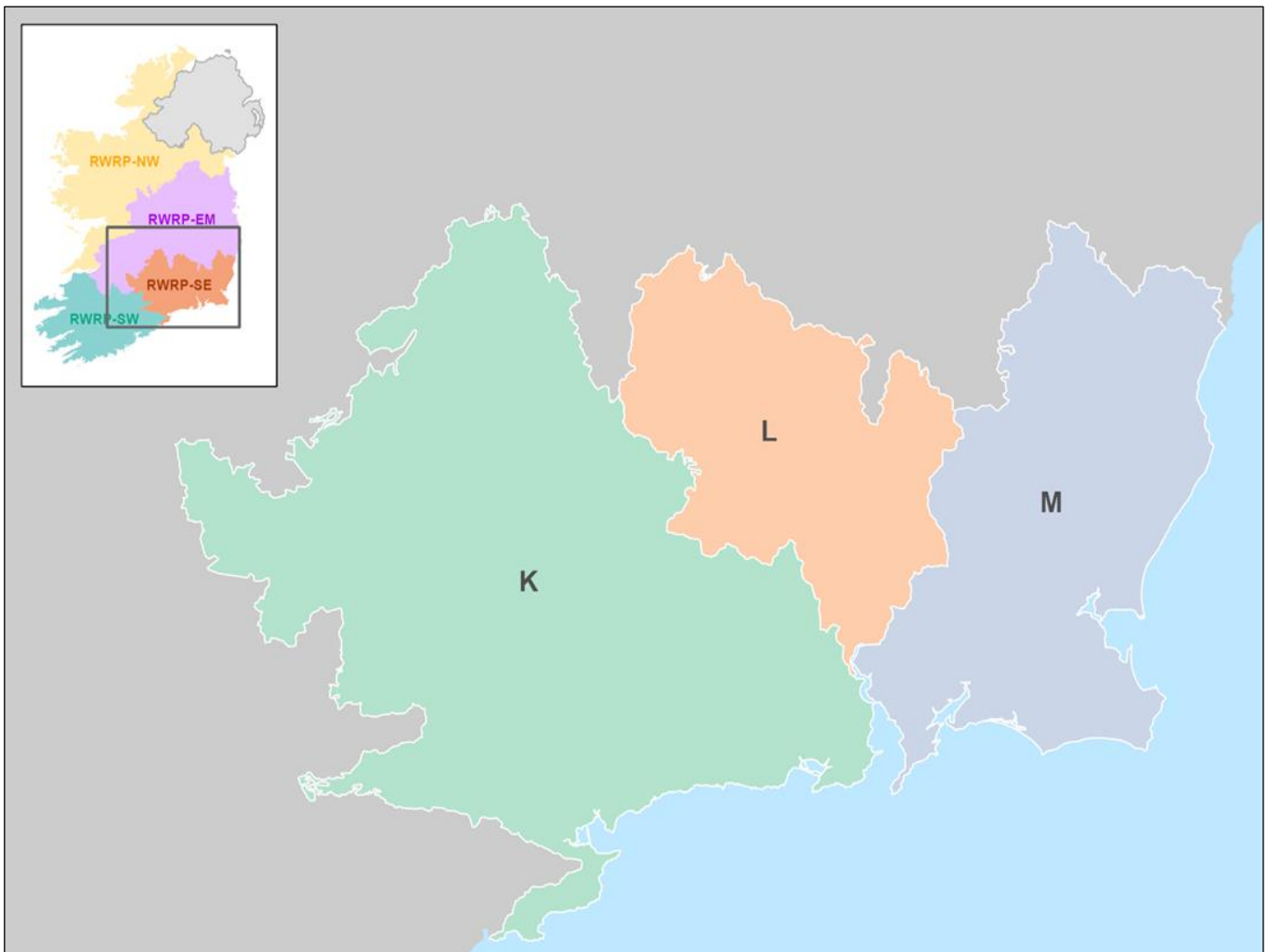


Figure 1.2 South East Region Study Areas

Study Area L lies within the counties of Carlow, Kilkenny, Laois, Tipperary and Wexford and its total area is approximately 1,699km<sup>2</sup>. There is one principal settlement (with a population of over 10,000) within SAL, namely Kilkenny, as shown in Figure 1.3, with a population of 26,512 (CSO, 2016).

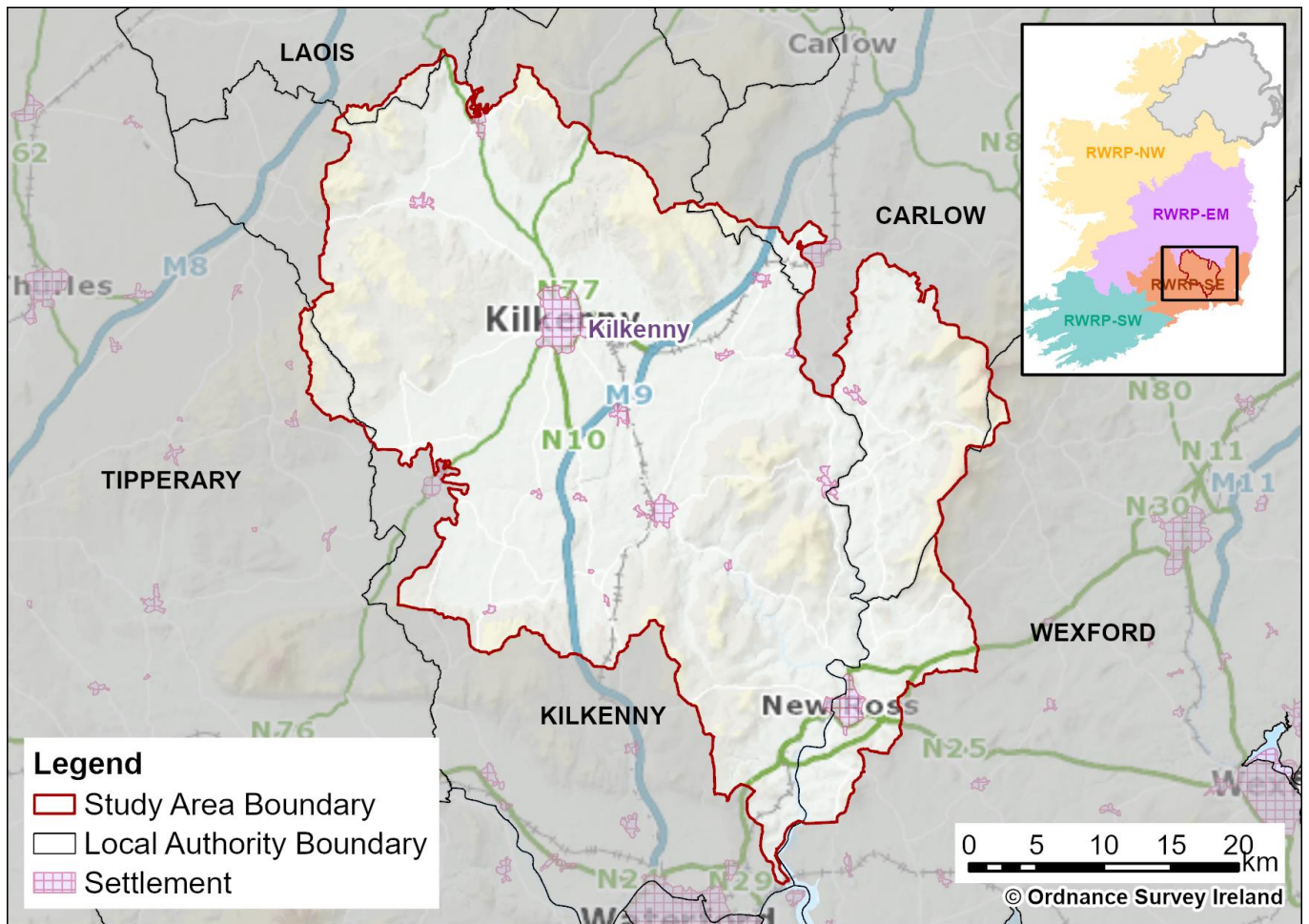


Figure 1.3 Study Area L

# 2

## **Study Area L Environmental Baseline Context**

## 2 Study Area L Environmental Baseline Context

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

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

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

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

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

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

#### 2.1.1 Population

Table 2.1 provides a general overview of the WRZ's population and the projected percentage change in population between 2019 and 2044. The estimated population currently living in each WRZ has been based on the 2016 Census data. The 2016 population was assigned to District Metering Areas (DMAs) by mapping the Central Statistics Office (CSO) data to DMA boundaries. Uisce Éireann have projected the 2016 population forward to 2019 using the growth projections in the National Planning Framework, updated information from the Regional Spatial and Economic Strategies, and Local Authority Planning sections (where available). Uisce Éireann is working closely with CSO on the update of 2022 Census population data as per Uisce Éireann's District Meter Areas boundaries. The Supply Demand Balance will be updated with the 2022 Census population data once the population update of Uisce Éireann's District Meter Areas boundaries is completed. Updated data and information will be incorporated via the monitoring and feedback process as set out in section 8.3.8 of the Framework Plan.

**Table 2.1 Overview of the Population within the WRZs of SAL**

WRZ Reference Number and Name	Total Population Served (2019)*	% Population Change (2019-2044)*
0100SC0010 - Ballinkillen	103	15
1500SC0007 - Ballyragget PWS	1,306	15
1500SC0020 - Bennettsbridge & Kilmaganny	5,222	23
0100SC0009 - Borris	562	15
1500SC0002 - Glenmore PWS	140	15
1500SC0012 - Gowran-Goresbridge-Paulstown	2,477	15
1500SC0013 - Graiguenamanagh PWS	1,462	15
1500SC0003 - Kilkenny City	29,836	27
3300SC0025 - New Ross	8,035	15
1500SC0017 - Thomastown/Inistioge	4,475	21

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

### 2.1.2 Economy and Employment

SAL had a below average household disposable income per person in 2019 (CSO, 2023a). The unemployment rate was 6.0% in the South East, 3.6% in the Midland and 4.8% in the Mid West regions of the country in Q2 of 2023 (CSO, 2023b).

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 Q2 2023 was 556 for the South East, 416 in the Midland, and 354 in the Mid-West regions (NUTS3) of Ireland (CSO, 2023c).

### 2.1.3 Tourism and Recreation

Tourism in SAL 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). While only a small portion of the county is included in the RWRP-SE, the county of Kilkenny is home to one of the most recognisable landmarks in Ireland: the 12th-century Kilkenny Castle. Kilkenny also includes Ireland’s Medieval Mile Trail (Visit Kilkenny, 2022). The county of Laois (SAK and L) has been described as an “outdoor enthusiasts paradise” with emphasis also placed on the county’s cultural and historical attractions (Laois Tourism, 2020). The county of Wexford (SAK, L and M) is known as ‘The Sunny Southeast’. Alongside being a Viking town, it offers coasts and beaches, and is said to be one of the best places to see puffins in the wild (Visit Wexford, 2022).

Additionally, the study area is located within Ireland’s Ancient East, which is part of a tourism development strategy that covers the South, East and part of the Midlands. This strategy places emphasis on the importance of historic sites in the area (National Tourism Development Authority, 2016).

Ireland’s natural heritage is also recognised as an important tourism asset by the Department of Transport, Tourism and Sport (2019). For SAL, rivers, loughs, and coastal areas all make an important contribution to tourism and recreational opportunities and support important fisheries.

#### 2.1.4 Human Health

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

**Table 2.2 Well-Being Indicators for the South-East Region within Ireland**

Region	Life Expectancy (CSO, 2020a)	Participation in Sports, Fitness or Recreational Physical Activities (% of Persons Aged 15+) (CSO, 2020b)	Air Quality (EPA, 2023c)
Midland	Male: 80.0 Female: 83.2	47%	Good
Mid West	Male: 79.1 Female: 83.2	52%	Good
South East	Male: 79.3 Female: 83.1	44%	Good

A key issue for public health is reliable access to good quality drinking water. Regulated water service providers have to ensure appropriate standards of supply and be able to cope with drought conditions, peak events, and maintenance of assets. This requires adequate reserve capacity in Uisce Éireann’s 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 SAL.

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

Water Treatment Plants	Water Resource Zone	Local Authority Supplied
Ballinkillin WTP	0100SC0010 - Ballinkillen	Carlow
Ballyragget WTP	1500SC0007 - Ballyragget PWS	Kilkenny
Bennettsbridge WTP and Kilmaganny WTP	1500SC0020 - Bennettsbridge & Kilmaganny	Kilkenny
Borris WTP	0100SC0009 - Borris	Carlow
Castlemoyle WTP	3300SC0025 - New Ross	Wexford
Choill Rua WTP and Gowran Goresbridge Paulstown WTP	1500SC0012 - Gowran-Goresbridge-Paulstown	Kilkenny
Glenmore WTP	1500SC0002 – Glenmore PWS	Kilkenny



Water Treatment Plants	Water Resource Zone	Local Authority Supplied
Graiguenamanagh (Coolroe) WTP	1500SC0013 - Graiguenamanagh PWS	Kilkenny
Radestown WTP	1500SC0003 - Kilkenny City	Kilkenny
Thomastown WTP	1500SC0017 - Thomastown/Inistioge	Kilkenny
Troyswood WTP	1500SC0003 - Kilkenny City	Kilkenny

Currently for day-to-day operations, six out of ten of the WRZs in the area have a current SDB deficit and seven have a projected SDB deficit for 2044 (based on a 'Do Minimum' approach – see section 4.4 for further clarification). However, under normal weather and demand conditions, the current deficit does not manifest as an interruption to supply for all WRZs.

Poor water quality can be linked to risks to health. The Uisce Éireann Barrier Assessment indicates eleven of the thirteen WTPs within the study area are at high risk of failing to achieve the Uisce Éireann's conservative Barrier Assessment standards, primarily in relation to Barrier 1 (Bacteria and Virus) (see Table 2.1 in the SAL Technical Report).

The "quality need" identified through the Barrier Assessment is not an indicator of compliance with the Drinking Water Regulations. It is an internal Uisce Éireann assessment of the need to invest in areas of the Uisce Éireann asset base through resource planning, to ensure that potential risks or emerging risks to supplies are addressed. At present, there is one WRZ within SAL on the EPA Remedial Action List, namely Kilkenny City (Radestown). Uisce Éireann is currently progressing immediate corrective action in relation to a number of supplies within SAL in advance of the NWRP. Details of these are included in the SAL 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 SAL.

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

Table 2.4 Catchments within SAL (EPA, 2020)

WFD Catchments	Total Catchment Area (km <sup>2</sup> )	Catchment Area within SAL (km <sup>2</sup> )
Barrow	3,016	535
Nore	2,585	1,158

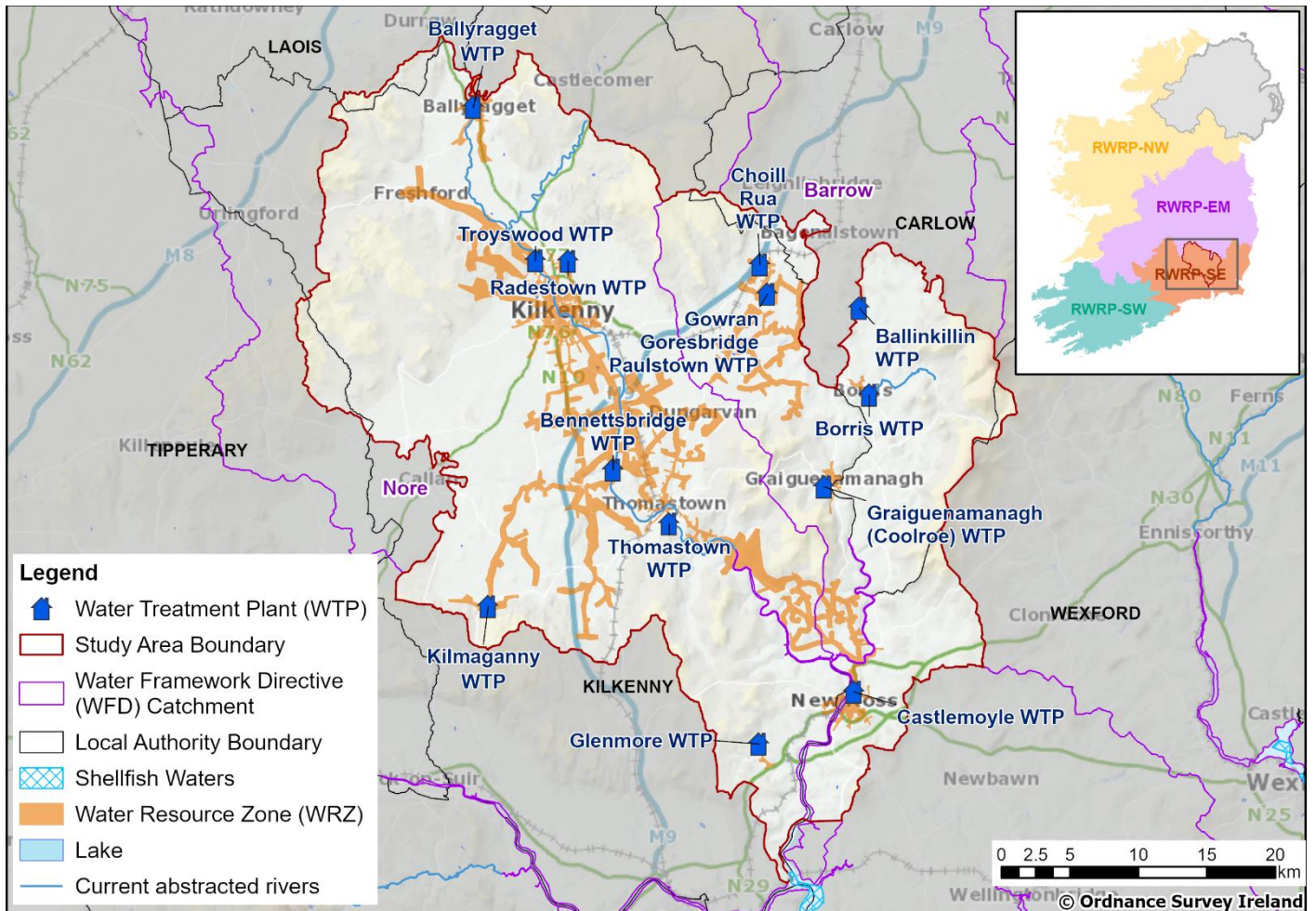


Figure 2.1 Water Environment of SAL

### 2.2.1 Water Framework Directive

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

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

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

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

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

On an interim basis, Uisce Éireann has developed an initial desktop assessment based on available information (see SAL Technical Report). Over the coming years, Uisce Éireann will work with 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 SAL supplies, Uisce Éireann has assessed its seven surface water abstraction for Borris WTP (Mountain River intake) (Borris), Duiske Intake (Graiguenamanagh PWS), River Dinan (Kilkenny City), River Douglas (Kilkenny City), River Nore (Kilkenny City), River Pollmounty (New Ross), and Dranagh (New Ross). Based on this initial assessment, the volumes of water abstracted at River Dinan, River Douglas, River Pollmounty and Dranagh may not meet sustainability guidelines during dry weather flows. However, under the proposed regulatory regime, this will be adjudicated on by the EPA.

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

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

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

**Table 2.5 WFD Waterbodies within SAL (EPA, 2023a)**

Waterbody Type	Water Catchments	Number of Waterbodies	Number of Waterbodies Rated Below Moderate
Rivers	Barrow	31	2
	Nore	54	10
Lakes	Barrow	0	0
	Nore	0	0
Transitional and Coastal	N/A	4	0
Groundwater	N/A	28	3

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

- Barrow: Agriculture (75%), and Hydromorphology (31%); and
- Nore: Agriculture (78%).

The Dinin (Main Channel) 020 waterbody is at particular risk due to abstraction pressures in SAL. Table 2.6 includes a summary of the ‘at risk’ waterbodies within SAL.

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

Waterbody Type	Water Catchments	Number of Waterbodies Identified as ‘At Risk’	Surface Waterbodies Status ‘At Risk’ Due to Abstraction Pressure*
Rivers	Barrow	11	3
	Nore	24	
Lakes	Barrow	0	1
	Nore	0	
Transitional and Coastal	N/A	3	0
Groundwater	N/A	9	0
<b>Total</b>		<b>47</b>	<b>4</b>

\* Based on Uisce Éireann assessment of their current abstractions

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

**Table 2.7 ‘Areas for Action’ within SAL (catchments.ie, 2021c)**

Areas for Action	Key Reasons for Selection
Bannow	<ul style="list-style-type: none"> <li>• Bannow bay is failing to meet its Protected Area objective for shellfish.</li> <li>• Three deteriorated waterbodies.</li> <li>• Building on ongoing work by Wexford County Council.</li> <li>• Active community groups.</li> <li>• Strong coast watch group.</li> <li>• Potential to work with local CLAM (coordinated local aquaculture management) scheme.</li> <li>• Most important sea trout fishery in the south of the county.</li> <li>• Important sea angling.</li> <li>• Important wild fowl in the bay. Preserving zoster grass, which geese feed on, and preventing it from being swamped by algae.</li> <li>• Two potential ‘quick wins’.</li> </ul>
Bregagh (Kilkenny)	<ul style="list-style-type: none"> <li>• Amenity value - close to city where a linear park is planned.</li> <li>• Community group - actively removing invasive species and looking at starting a Rivers Trust.</li> <li>• Also involved in Nore Vision Strategy.</li> <li>• Opportunity to address water quality and hydromorphology issues caused by a historical spill issue of Polychlorinated Biphenyls</li> </ul>

Areas for Action	Key Reasons for Selection
Brownstown (Pococke)	<ul style="list-style-type: none"> <li>• Important amenity value, close to the Kilkenny city.</li> <li>• First wetland to deal with diffuse urban issues.</li> <li>• Important for salmon spawning, potential to work with fisheries.</li> <li>• One deteriorated waterbody.</li> <li>• Protected area objective not met (crayfish).</li> </ul>
Burren	<ul style="list-style-type: none"> <li>• Flows into Carlow town - important for local amenity.</li> <li>• Sub catchment project.</li> <li>• Building on improvement works completed by Inland Fisheries Ireland.</li> <li>• One potential 'quick win'.</li> <li>• One At Risk High Ecological Status objective waterbody.</li> <li>• One deteriorated waterbody.</li> </ul>
Dinin (South, Main and Muckalee)	<ul style="list-style-type: none"> <li>• Active community groups in the area.</li> <li>• Important for salmon spawning.</li> <li>• Three potential 'quick wins'.</li> <li>• Three deteriorated waterbodies.</li> <li>• One of the three deteriorated waterbodies has a High Ecological Status objective.</li> </ul>
Duiske River and Powerstown Stream	<ul style="list-style-type: none"> <li>• Not available</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 blue way.</li> <li>• Potential to work with active group water schemes.</li> <li>• Two deteriorated waterbodies.</li> </ul>
Mountain (Carlow)	<ul style="list-style-type: none"> <li>• Two waterbodies are failing to meet protected area objectives for Freshwater Pearl Mussel (19 of 27 catchments of S.I. 296 2009).</li> <li>• Important fish habitat.</li> <li>• Recently formed community group.</li> <li>• Strong local tidy towns.</li> <li>• Native oak woodland at downstream end of the Mountain River.</li> <li>• Woodland riparian scheme to improve riparian zone around the native woodland.</li> <li>• Teagasc European Innovation Partnerships looking at sheep farming practices.</li> <li>• Building on completed and ongoing works by Blackstairs farming group.</li> <li>• One deteriorated waterbody.</li> </ul>

Areas for Action	Key Reasons for Selection
	<ul style="list-style-type: none"> <li>• One potential 'quick win'.</li> </ul>
Nuenna	<ul style="list-style-type: none"> <li>• Building on completed upgrades at Freshford WwTP.</li> <li>• Potential pilot project to examine nitrate issues from pasture.</li> <li>• Lots of historical information from pathways project.</li> <li>• Potential to work with a recently established, active tidy towns group.</li> <li>• Six group water schemes in the area. Lots of zone of contribution work completed recently.</li> <li>• Two potential 'quick wins'.</li> <li>• Two of the three waterbodies are deteriorated waterbodies.</li> </ul>
Urrin	<ul style="list-style-type: none"> <li>• Building on completed and planned improvements from Enniscorthy upgrade works.</li> <li>• Three deteriorated waterbodies.</li> <li>• Two of the three deteriorated waterbodies are At Risk, High Ecological Status objective waterbodies.</li> <li>• One potential 'quick win'.</li> </ul>
Waterford Harbour	<ul style="list-style-type: none"> <li>• Waterford Harbour Shellfish area has recently downgraded.</li> <li>• Locals have commented on die off of the local mussel population.</li> <li>• Building on planned Uisce Éireann works at Duncannon, Arthurstown, Ballyhack).</li> <li>• Building on completed and ongoing work by Wexford County Council.</li> <li>• Discharges into designated bathing area (Duncannon).</li> <li>• Important habitats, including the second largest Honeycomb coral habitat in Europe and wild shellfish fisheries.</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 Office of Public Works (OPW) has been implementing the European Communities (Assessment and Management of Flood Risks) Regulations 2010 mainly through the Catchment Flood Risk Assessment and Management (CFRAM) Programme, through which draft Flood Risk Management Plans have been developed. Approximately 300 'Areas for Further Assessment' have been established along with a range of measures to reduce or manage the flood risk within each catchment. CRFAMS mapping for all Areas for Further Assessment is available to view on the CFRAMS website (OPW, 2018). Figure 5.4 in the SEA Environmental Report (Appendix A) provides a summary of surface water and groundwater flood risk from the OPW CFRAMS data for the region including SAL.

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

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

## 2.3 Climate Change

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

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

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

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

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

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

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

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

Summary	
Key Points	<ul style="list-style-type: none"> <li>Protecting and improving water quality and improving water services infrastructure are major challenges in Ireland</li> </ul>

## Summary

	<ul style="list-style-type: none"> <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 climate change adaptation and community resilience;
- **Informed decision making:** That effective and informed decision making is based on a reliable and robust evidence base of the key impacts, risks and vulnerabilities of the area. This will support long term financial planning, effective management of risks and help to prioritise actions;
- **Building Resilience:** That the needs of vulnerable communities are prioritised and addressed, encourage awareness to reduce and adapt to anticipated impacts of climate change, and promote a sustainable and robust action response; and
- **Capitalising on Opportunities:** Projected changes in climate may result in additional benefits and opportunities for the local area and these should be explored and capitalised upon to maximise the use of resources and influence positive behavioural changes.



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

**Table 2.9 Climate Change Risks Identified by Local Authorities in SAL**

County	Key Risk Areas
Carlow County (Carlow County Council, 2019))	<ul style="list-style-type: none"> <li>• Flooding</li> <li>• Extreme rainfall</li> <li>• Extreme cold/Heavy snowfall and ice</li> <li>• Extreme heat/Drought conditions</li> </ul>
Kilkenny County (Kilkenny County Council, 2019)	<ul style="list-style-type: none"> <li>• Flooding</li> <li>• Extreme rainfall</li> <li>• Rising sea levels and Storm Surges</li> <li>• Storm frequency and intensity</li> <li>• Extreme cold/Heavy snowfall and ice</li> <li>• Extreme heat/Drought conditions</li> <li>• Air quality or pollution</li> </ul>
Laois County (Laois County Council, 2019)	<ul style="list-style-type: none"> <li>• Extreme rainfall</li> <li>• Extreme cold/Heavy snowfall and ice</li> <li>• Extreme heat/Drought conditions</li> <li>• Bog, Sand, Dune, Gorse or Forest Fires</li> <li>• Wind speeds</li> </ul>
Tipperary (Tipperary County Council, 2019)	<ul style="list-style-type: none"> <li>• Flooding</li> <li>• Extreme cold/Heavy snowfall and ice</li> </ul>
Wexford County (Wexford County Council, 2019)	<ul style="list-style-type: none"> <li>• Flooding</li> <li>• Extreme rainfall</li> <li>• Rising sea levels and Storm Surges</li> <li>• Storm frequency and intensity</li> <li>• Extreme cold/Heavy snowfall and ice</li> <li>• Extreme heat/Drought conditions</li> <li>• Bog, Sand, Dune, Gorse or Forest Fires</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 SAL, not all supplies within the study area meet the required levels of reserve capacity. As evidenced in the 2018, 2020 and 2022 droughts, there is the potential for this deficit to affect access to water in the future. This situation could further deteriorate over time due to climate change driven reductions in water resources.

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

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

## 2.4 Biodiversity, Flora and Fauna

### 2.4.1 Designated Sites

Within SAL there are a number of European, national and locally designated sites, including Special Protected Areas (SPAs), Special Areas of Conservation (SACs), National Parks, Nature Reserves, and proposed Natural Heritage Areas (see Table 2.10 and Figure 2.2). The European sites (SPAs and SACs), and the potential impacts on them, are discussed in more detail in the NIS.

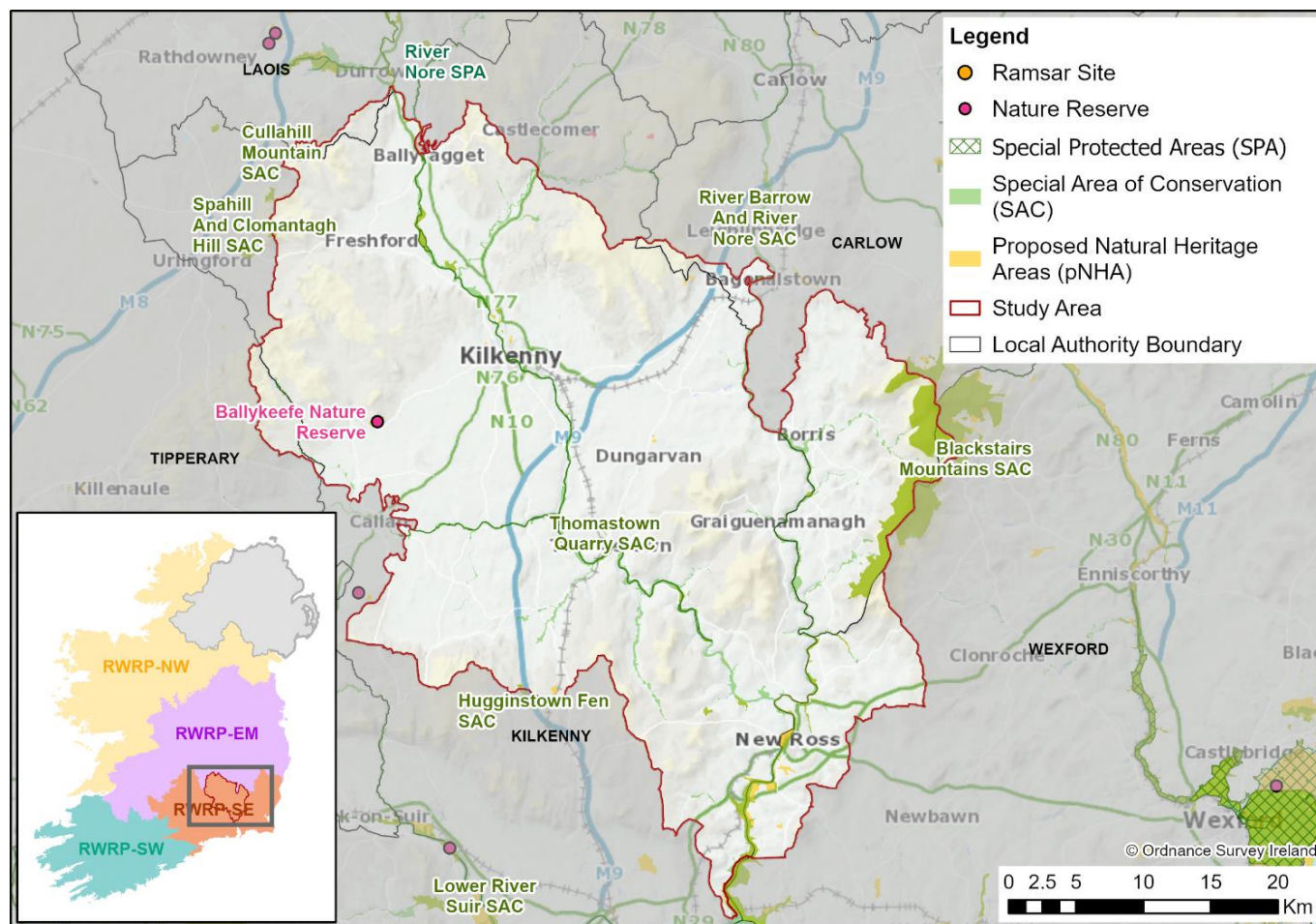


Figure 2.2 Designated Sites in SAL

Table 2.10 Designated Sites within SAL (NPWS, May 2023)

Receptor	Name	Total Number
Special Protected Area (SPA)	River Nore SPA	1
Special Area of Conservation (SAC)	Blackstairs Mountains SAC	7
	Cullahill Mountain SAC	
	Hugginstown Fen SAC	
	Lower River Suir SAC	
	River Barrow And River Nore SAC	
	Spahill And Clomantagh Hill SAC	

Receptor	Name	Total Number
	Thomastown Quarry SAC	
Ramsar Sites	N/A	0
Nature Reserves	Ballykeefe	1
National Parks	N/A	0
Natural Heritage Areas (NHAs)	N/A	0
Proposed Natural Heritage Areas (pNHAs)	See Figure 2.2	42

## 2.4.2 Habitats

Table 2.11 lists the percentage of the study area, and the number of hectares, covered by each habitat within SAL; as reported in the Corine land use dataset<sup>1</sup>.

**Table 2.11 Habitat Areas for SAL (EPA, 2018)**

Habitat	Ha	% of Study Area
<b>Agricultural Land</b>		
Pastures	129,894	76.49%
Non-irrigated arable land	13,798	8.13%
Complex cultivation patterns	3,370	1.98%
Land principally occupied by agriculture, with significant areas of natural vegetation	3,203	1.89%
<b>Natural Habitats</b>		
Moors and heathland	1,982	1.17%
Peat bogs	1,716	1.01%
Water courses	518	0.31%
Inland marshes	186	0.11%
Natural grasslands	27.5	0.02%
<b>Forest</b>		
Coniferous forest	6,981	4.11%
Transitional woodland-shrub	1,911	1.13%
Broad-leaved forest	1,729	1.02%
Mixed forest	1,585	0.93%

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

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

- Alkaline fens;
- Groundwater dependant terrestrial habitats, such as petrifying springs with tufa formation;
- Northern Atlantic wet heaths with *Erica tetralix*; and
- Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation

### 2.4.3 Species

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

- Otter (*Lutra lutra*);
- Fish species - Atlantic Salmon (*Salmo salar*), Twaité shad (*Alosa fallax fallax*), Lamprey species;
- Freshwater pearl mussel (*Margaritifera margaritifera*);
- White-clawed Crayfish (*Austropotamobius pallipes*);
- Nore pearl mussel (*Margaritifera durrovensis*);
- Killarney Fern (*Trichomanes speciosum*); and
- ‘Qualifying interest’ bird species e.g. kingfisher (*Alcedo atthis*)

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

- Japanese knotweed (*Fallopia japonica*);
- Himalayan balsam (*Impatiens glandulifera*);
- Giant hogweed (*Heracleum mantegazzianum*); and
- Waterweed species (*Elodea spp.*)

## 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 SAL are listed in Table 2.12, such as agricultural land and coniferous forest.

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

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

Uisce Éireann has thirteen WTPs in SAL, meeting the demand of 19.8 MI/d as of 2019.

There is one canal of national or regional significance in SAL, Barrow Navigation, and no ports. There is one airport of local significance, namely Kilkenny Airport. Other significant transport infrastructure includes the main road network (particularly the N10, N25, N30, N76, N77, N78 and M9).

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

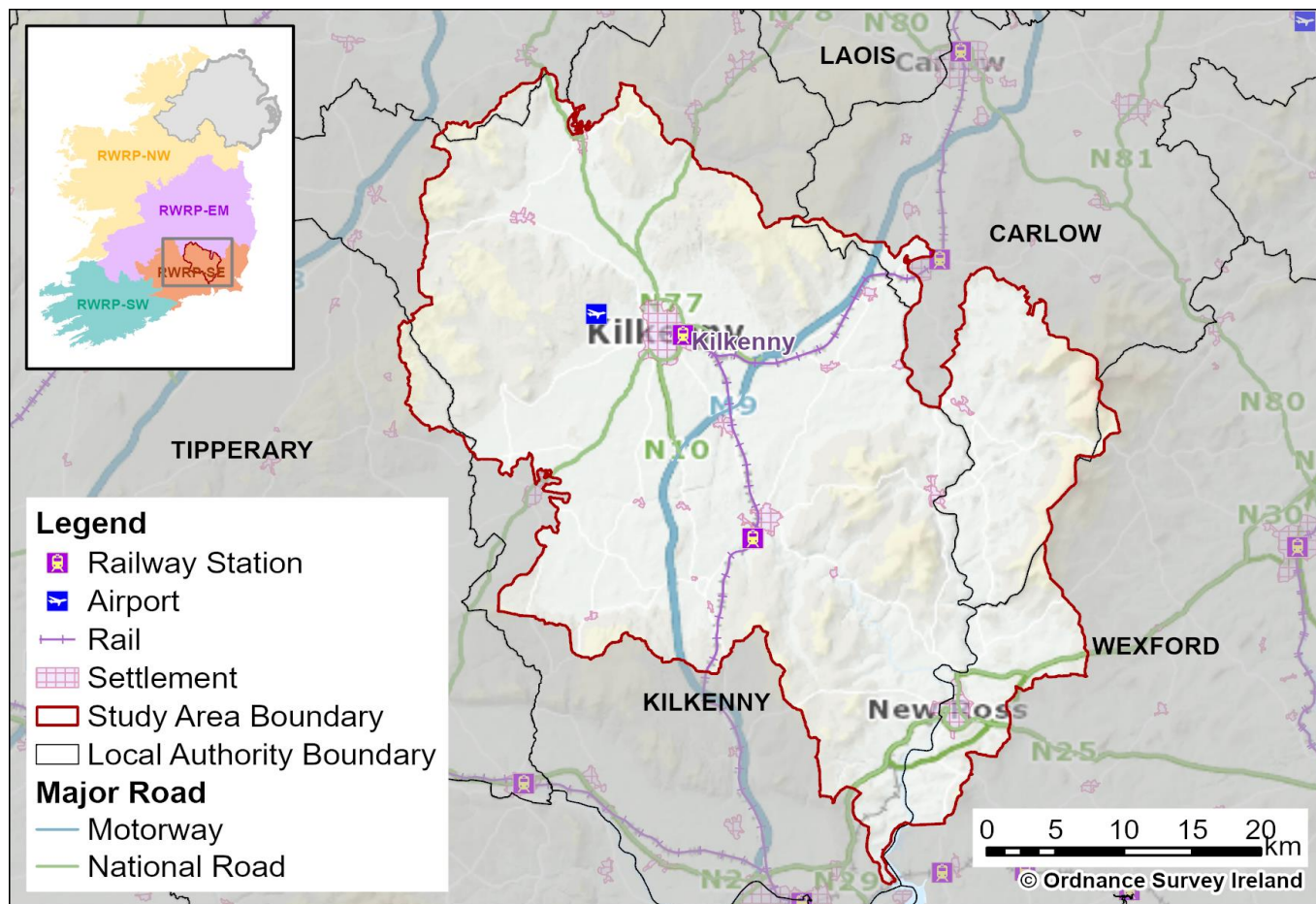


Figure 2.3 Transport Infrastructure in SAL

Table 2.12 Land Use within SAL (EPA, 2018)<sup>2</sup>

Land use	Ha	% of Study Area	Comparison to Overall South East Region %
Agriculture	150,292	88.51%	84.50%
Urban	2,464	1.45%	1.81%
Natural Habitats	4,457	2.62%	4.92%
Forest	12,205	7.19%	8.56%
Industry	351	0.21%	0.18%
Other	41	0.02%	0.03%

Proposals for other strategic developments within SAL 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.

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

Table 2.13 gives an overview of the project developments which are available from myProjectIreland (2022) for SAL<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 2.13 Proposed New Developments**

Development	
Abbey Quarter and Abbey Quarter Phase 2	Kilkenny Wastewater Network
Barrow Valley - Bagenalstown to Place East	Libraries Capital Programme - Kilkenny Library
Callan Friary Complex/Upper Bridge St Regeneration & Masterplan for the historic core of Callan Town	South East Greenway- Section from New Ross to Waterford
Callan Town Regeneration	St Columba's Hospital, Thomastown.
Carlow Public Realm and Pedestrian Linkage Project	Thomastown Regeneration Phase 2
Community Shops Kilkenny	Trinity Wharf
Crokers Hill, Kennyswell Road, Kilkenny	Waterford City and Environs - North Quays
Enniscorthy Flood Relief Scheme	Waterford City Regeneration
Kilkenny City Enhanced Livability Study	Wexfordia - the New Ross Tourism Transformation
Kilkenny Regional Water Supply Scheme - Upgrade of Troyswood Water Treatment Plant	

## 2.6 Landscape and Visual Amenity

The National Landscape Strategy 2015-2025 is in the process of being implemented and will be Ireland’s vehicle for complying with the EU Landscape Convention. Landscape assessment guidance is also available from the local authorities. This will be taken into account when identifying landscape character areas and protected areas at the project level in the future. Table 2.14 shows, where possible, the sensitivity and value of the Landscape Character Areas (LCAs) within each of the counties listed within the study area. No data is available for the LCAs within the counties of Laois and Wexford and no value information is available for the counties of Carlow and Tipperary<sup>4</sup>.

The value of the landscape in SAL is reflected in baseline data sections 0 (Tourism and Recreation), 2.4 (Biodiversity, Flora and Fauna) and 2.8 (Cultural Heritage).

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

<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 SAL being the 10/11/22.

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

**Table 2.14 Value and Sensitivity of Landscape Character Areas in the Counties of SAL (Ordnance Survey Ireland, 2021.)**

Landscape Character Area	Value	Sensitivity
<b>County: Carlow (Carlow County Council, 2015)</b>		
Killeshin Hills	-	Medium
Central Lowlands	-	Low
Blackstairs and Mount Leinster Uplands	-	High
River Slaney - East Rolling Farmland	-	Medium
<b>County: Kilkenny (Kildare County Council, 2017)</b>		
The Slieveardagh Uplands	No significant landscape value but high ecological value in the northern hills	Low but High in the northern hills
The Castlecomer Plateau	Special scenic value	High
Brandon Hill Uplands	Significant visual amenity value	High
The South Western Uplands	Certain landscape value, in particular the western hills of the unit	High
The South Eastern Hills	Generally, no special value except environs of Glenmore have special scenic value	Medium
The Kilkenny Basin	No significant landscape value	Low
South Kilkenny Lowlands	Special	High
The Nore Valley	Scenic and special	High
The Barrow Valley	Scenic and special	High
The Suir Valley	Scenic and special	Medium
The Slieveardagh Transition	No significant landscape value	Low
The Castlecomer Transition	Scenic and special	High
The Brandon Hill Transition	No significant landscape value	Low
The South Western Transition	No significant landscape value	Medium

Landscape Character Area	Value	Sensitivity
<b>County: Laois (Laois County Council, 2016)</b>		
No values or sensitivity information available.		
<b>County: Tipperary (Tipperary County Council, 2016)</b>		
Urban and Fringe Areas	-	Low
Thurles Hinterland	-	Low
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



Landscape Character Area	Value	Sensitivity
Glen of Aherlow Uplands	-	Dominant Unique with some Moderate, High and Special
Galtee Mountains Mosaic	-	Dominant Unique with some Moderate, High and Special
Devilsbit Uplands	-	Dominant Unique with some Moderate, High and Special
Knockmealdown Mountain Mosaic	-	Dominant Unique with some Moderate, High and Special

**County: Wexford (Wexford County Council, 2013)**

No values or sensitivity information available.

### 2.6.1 Seascape

The Regional Seascape Character Assessment for Ireland (2020) presents the Regional Seascape Character Areas (SCAs) for the entire Republic of Ireland. An SCA is defined as “*an area of sea, coastline and land, as perceived by people, whose character results from the actions and interactions of land with sea, by natural and/or human factors*”. The assessment identifies one SCA in SAL, namely Celtic Sea Bays and Beaches.

## 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 majority of SAL falls within Air Zone D: Rural Ireland, with Kilkenny falling within Air Zone C: Other Cities and Large Towns. The air quality index rating of the core baseline area is rated as ‘good’ (EPA, 2023c).

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

### 2.7.2 Noise

The main areas that experience noise pollution are likely to be areas along the main roads, particularly around the N10, N25, N30, N76, N77, N78 and M9.

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 SAL, 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, the Wreck Inventory of Ireland Database, and the National Inventory of Architectural Heritage (NIAH) (see Table 2.15).

Figure 2.4 shows the location of the individual cultural heritage records from the National Monuments Service and the NIAH. Given the number of small sites, these can be better viewed on the Department of Culture, Heritage and the Gaeltacht's (2020) 'Historic Environment Viewer' website and the National Monuments Service's 'Wreck Viewer' (2023).

The database of Irish excavation reports (<https://excavations.ie/>) contains summaries of archaeological excavations carried out on the island of Ireland since 1969. There are also potentially unknown, undesignated archaeological and architectural remains throughout Ireland. Water supply can affect cultural heritage through, direct loss or construction of infrastructure involving disturbance of soils, above ground structures close to existing heritage sites affecting setting or changes due abstraction changing drainage and affecting interests within wetland sites.

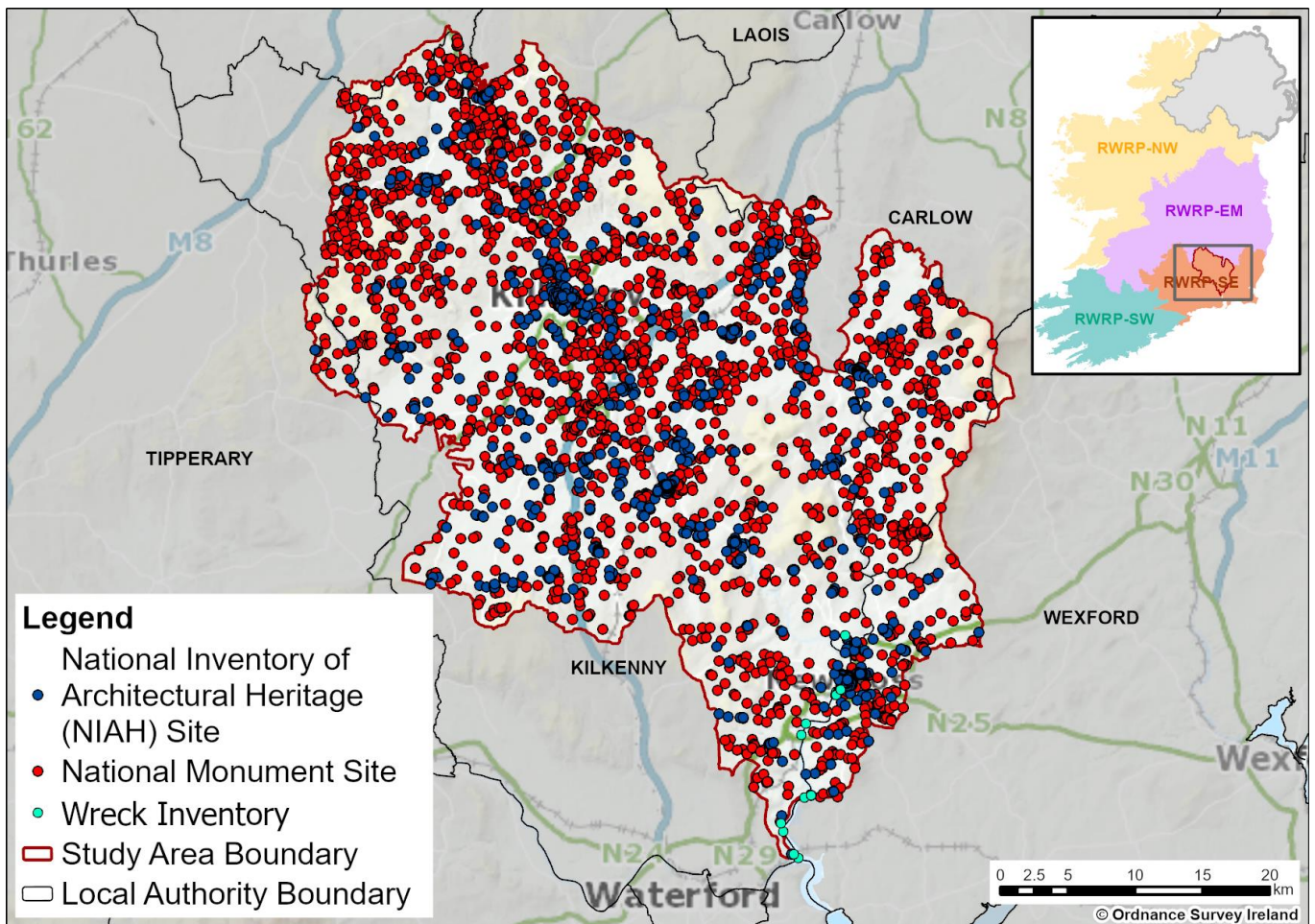


Figure 2.4 SAL Cultural Heritage Assets

Section 3 of the National Monuments (Amendment) Act 1987 protects wrecks over 100 years old and archaeological objects underwater, irrespective of their age or location. The placement of an underwater heritage order may also protect the potential location of wrecks or archaeological objects and wrecks that are less than 100 years old if the wreck, area or object is considered to be of sufficient historical, archaeological or artistic importance to merit such protection. Previously unrecorded wreck sites may yet be discovered in the rivers and coastal waters under consideration in the Plan. Uisce Éireann note that the Historic and Archaeological Heritage and Miscellaneous Provisions Act 2023 was passed on the 13<sup>th</sup> October 2023 which, once enacted, will replace the existing National Monuments Act 1930 to 2014 and other related legislation to provide for the protection and conservation of Ireland's historic heritage.

**Table 2.15 Cultural Heritage Assets within SAL**

Assets	Total Number
National Monuments Service Sites	3,766
National Inventory of Architectural Heritage Sites	1,879
Sites and Monuments Record Zones	1,854

## 2.9 Geology and Soils

Table 2.12 lists the land uses within SAL. SAL predominantly has a coarse loamy soil type with areas of fine loamy to the north of the study area (EPA, 2019).

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

The poorly productive rocks consist of a combination of Namurian Shales and Sandstones, Granites, Ordovician Metasediments and Dinantian Upper Impure Limestones. The Granites, which feature in the south-east, are characterised by the absence of an intergranular permeability and the presence of low fissure permeability. Although fractured the Ordovician rocks generally have a low permeability and are mostly regarded as a poor aquifer. The Namurian rocks can often result in groundwaters high in iron, manganese and hydrogen sulphide. This can be from contamination but more often results from a combination of natural iron sulphide within the shalier elements coupled with slow groundwater circulation.

The karst forms a key regionally important aquifer in some areas. The pure bedded limestones make up a relatively minor proportion of the bedrock in this study area. The distribution of permeability and yield is more homogenous where the development of karst has resulted in a more diffuse network of flow pathways. Previous groundwater exploration in the area showed the productive limestone zones to be relatively localised and associated with areas of dolomitization. The regionally important aquifers are generally smaller in extent in this part of the country and are banded by locally important, less permeable bedrock.

The productive fissured bedrock (Rf) and sand and gravel aquifers make up a relatively small proportion of the areas for potential groundwater development. The Rf aquifer comprises a relatively thin band of Devonian Kiltorcan-type Sandstones running through the centre of the study area. There are a number of locally important sand and gravel aquifers in the region, namely at Bennetsbridge and Thomastown and a large gravel body stretching northwards from Kilkenny city which remains largely underdeveloped.

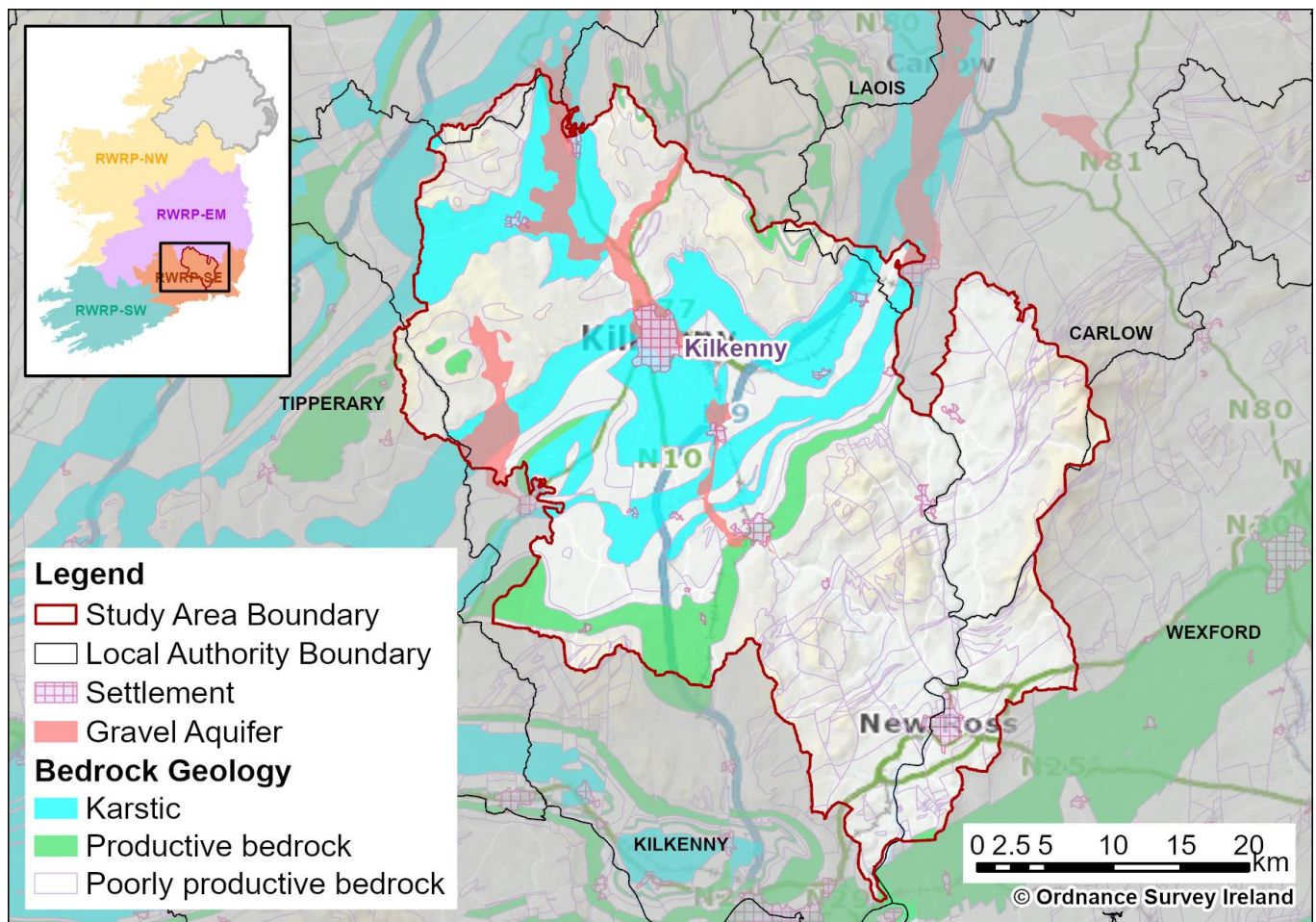


Figure 2.5 SAL Hydrogeology

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, nineteen of which have the potential to constrain water resource options in SAL.

## 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 SAL are listed in Table 2.16.

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

SEA Topic	Issues and Opportunities	Interrelated Topics
Population, Economy, Tourism and Recreation, and Human Health	<p><b>Issues:</b> Increasing population and the increased stress of climate change on water quality and water resources could affect health and well-being. Tourism can add to peak demand for water.</p> <p><b>Opportunities:</b> Uisce Éireann will put in place plans to assess water quality and measures to address risks as part of the NWRP.</p> <p>Uisce Éireann has ongoing activities to improve the Supply Demand Balance in SAK, including, leakage management and water conservation measures.</p>	Climate change, biodiversity, water environment, material assets and landscape and visual amenity

SEA Topic	Issues and Opportunities	Interrelated Topics
	<p>Raising awareness of the importance of water conservation and efficiency measures, and the value of the environment for health and wellbeing, can play an important part in water planning along with valuing water as part of access to environment for recreation.</p>	
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 SAL, some of the existing abstractions may not meet sustainability guidelines in the medium term; specifically, during drought periods. On an interim basis, Uisce Éireann has developed an initial conservative assessment based on available information (see SAL Technical Report). This has been used to inform options identification and appraisal.</p> <p>Uisce Éireann will update its sustainability analysis and impact on their baseline Supply Demand Balance (SDB) calculations when regulatory assessment for the new legislation is undertaken.</p> <p>Groundwater and flood risks and vulnerability are potential issues for water supply and environment. The plan assessment aims to identify strategic level risk but detailed siting and design through the project development stages is expected to take account.</p> <p><b>Opportunities:</b> To take account of identified pressure on the water environment in the selection of solutions for SAL and opportunities for reducing pressure on resources and improving water quality.</p>	Biodiversity and climate change
Biodiversity, Flora and Fauna	<p><b>Issues:</b> For SAL, the River Barrow and River Nore are designated as part of the large River Barrow and River Nore SAC. Furthermore, three sub-catchments of the Barrow are designated for <i>Margaritifera</i> (Freshwater Pearl Mussel) SAC catchment: Mountain, Ballymurphy and Aughavaud.</p> <p>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. Tourism can bring issues of marine litter and water transport can add to spread of invasive non-native species.</p>	Water resources, water quality and climate change

SEA Topic	Issues and Opportunities	Interrelated Topics
	<p><b>Opportunities:</b> Potential to reduce pressure on habitats affected by abstraction pressure, for example through rationalisation. Potential for enhancement through reducing pressure on sensitive sites or building in requirements such as habitat enhancement in to schemes and identifying potential for nature-based solutions and catchment management.</p>	
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	<p><b>Issues:</b> Potential for climate change to affect land use and habitats and influencing landscape quality and amenity and potential for construction and infrastructure development to result in landscape and visual amenity change and loss of features.</p> <p><b>Opportunities:</b> Potential to include enhancements in reinstatement through appropriate planting schemes and screening.</p>	Biodiversity and geology and soils, climate change, health and wellbeing
Air Quality and Noise	No specific issues identified for the baseline for SAL.	Health and wellbeing
Climate Change	<p><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 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>	Biodiversity and water environment
Cultural Heritage	<p><b>Issues:</b> Known cultural heritage and archaeological assets (underwater and terrestrial) and potential unknown archaeological assets could be affected by construction works or change to setting or access. Potential for hydrological changes to affect heritage and archaeological assets.</p>	Health and wellbeing
Geology and Soils	<p><b>Issues:</b> Potential loss of soils or pollution from runoff. General need for good soil conservation and retention of nutrients and carbon in soil resources</p> <p><b>Opportunities:</b> Improve soil carbon and retention of nutrients contributing to improving water quality.</p>	Biodiversity, water quality, landscape and climate change

SEA Topic	Issues and Opportunities	Interrelated Topics
Additional interrelated aspects	<p><b>Issues:</b> Poor water quality requiring additional water treatment and affecting aquatic 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 this has not been specifically studied in this study area.</p>	

# 3

## **Environmental Assessment – Options Appraisal**



## 3 Environmental Assessment – Options Appraisal

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

### 3.1 Overview

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

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

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

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

### 3.2 Stage 3: Unconstrained Options

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

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

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

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

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

### **3.2.1 Existing Groundwater Abstractions**

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

### **3.2.2 New Groundwater Abstractions**

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

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

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

### **3.2.3 Sustainable Abstraction in Options Assessment**

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

full visibility of the future regulatory regime. As the objective of the plan is to achieve safe, secure, reliable and sustainable supplies, any new abstractions proposed to be developed by Uisce Éireann as part of this plan will be based on conservative assessments of sustainable abstraction. This will ensure that water supplies continually improve in terms of environmental sustainability.

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

### 3.3 Stage 4: Coarse Screening

A total of 88 unconstrained options were identified for SAL and subjected to coarse screening. The coarse screening process assessed the options against the criteria outlined in Table 3.1. This process is summarised in chapter 6 of the SEA Environmental Report for the RWRP-SE. 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 88 unconstrained options, 25 were rejected after being analysed against the coarse screening criteria of resilience, deliverability and environment.

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

**Table 3.2 Coarse Screening Rejection Register**

Option Reference	Option Description	Rejection Reasoning
SAL-019	Increase existing GW abstraction from Tobergoorlick Pool and upgrade Gowran Goresbridge Paulstown WTP to supply deficit.	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the

Option Reference	Option Description	Rejection Reasoning	
SAL-031	Increase GW abstraction and upgrade Graiguenamanagh (Coolroe) WTP to supply deficit.	Environmental, Resilience or Deliverability criteria.	
SAL-032	Increase SW abstraction from Duiske River and upgrade Graiguenamanagh (Coolroe) WTP to supply deficit.		
SAL-044	Rationalise Thomastown to New Ross WRZ.		
SAL-046	Interconnect Thomastown with New Ross WRZ for increased resilience and supply deficit from New Ross.		
SAL-058	Increase abstraction from River Dinan and River Douglas and upgrade Radestown WTP to supply deficit.		
SAL-059	Increase GW abstraction at Bennettsbridge WTP and new WTP to supply deficit. New WTP is required for Bennettsbridge. Decommission existing Bennettsbridge WTP.		
SAL-068	Increase SW abstraction from Dranagh impoundment/raw water storage and upgrade Castlemoyle WTP to supply deficit.		
SAL-069	Increase SW abstraction from River Pollmounty and upgrade Castlemoyle WTP (including new fish pass) to supply deficit.		
SAL-070	Increase SW abstraction from River Pollmounty and upgrade Castlemoyle WTP (including new fish pass) to supply deficit.		
SAL-071	Increase SW abstraction from River Pollmounty and upgrade Castlemoyle WTP (including new fish pass) to supply deficit.		
SAL-034	Riverbank filtration from River Barrow and new WTP to supply deficit.		Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.

### 3.4 Stage 5: Fine Screening

A total of 63 options passed the coarse screening stage; these options were subjected to further consideration as part of a multi-criteria assessment (MCA) at the fine screening stage.

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

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

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

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

No further options were rejected at fine screening in SAL.

### **3.5 Stage 6: Feasible Options List**

A total of 63 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 SAL Technical Report.

# 4

## Environmental Assessment – Approach Development

## 4 Environmental Assessment – Approach Development

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

### 4.1 Introduction to Approach Development

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

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

Table 4.1 The Six SA Approaches

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

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

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

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

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

## 4.2 Stage 7: Approach Development Process

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

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 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.

<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).



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

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

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

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

<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 Uisce Éireann to compare and optimise the options against different elements to create a range of approaches capable of meeting the deficit.

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

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

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

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

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

The general process is illustrated in Figure 4.2 below.

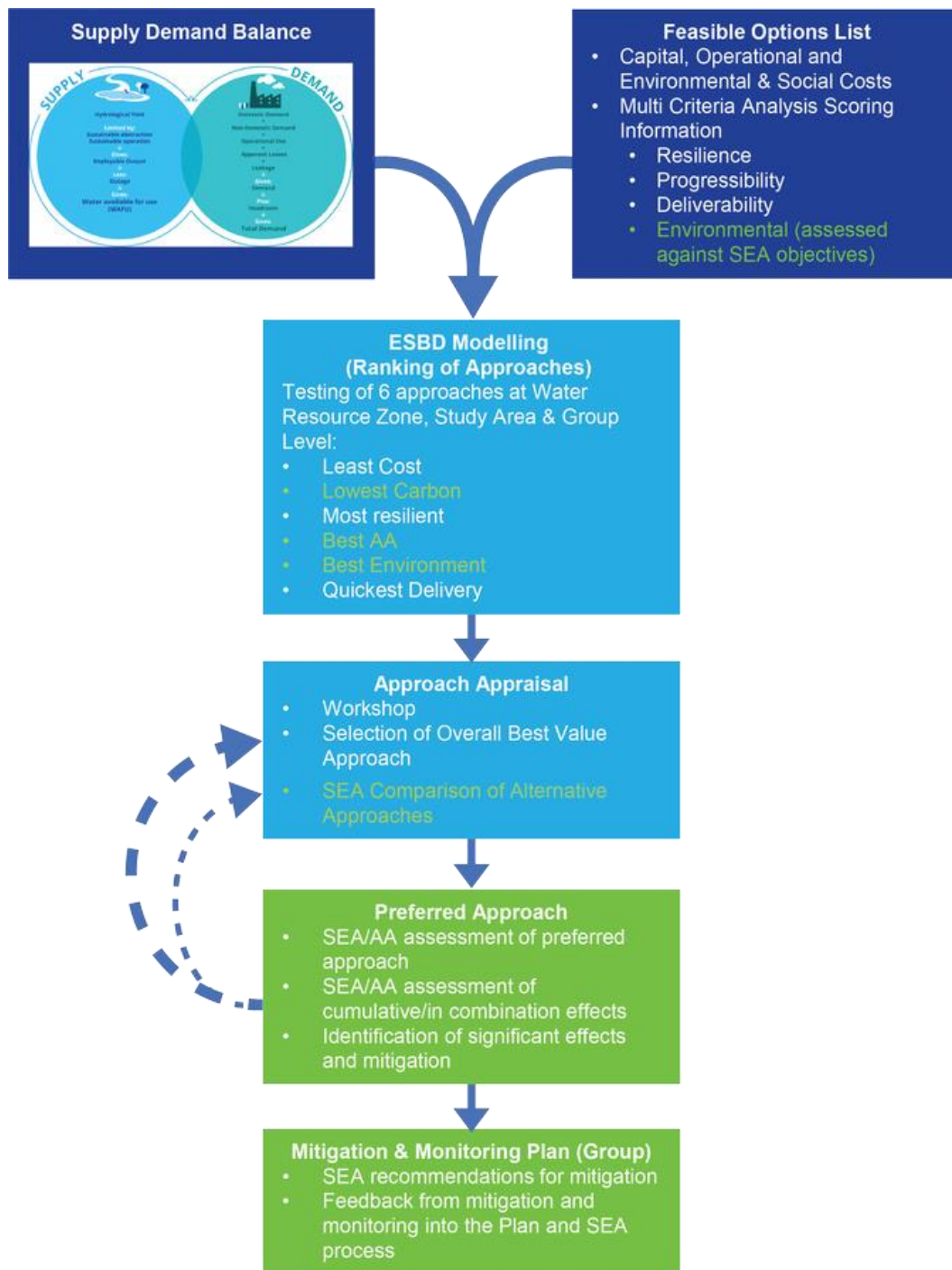


Figure 4.2 Approach Development Process

#### 4.2.2 SAL Approach Development Process

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

**Stage 1** - comparing WRZ options and identify the preferred WRZ level approach. For SAL there are 18 WRZ options and these are listed in Table 5.2 in the SAL Technical Report, providing option reference

numbers and the relevant WRZ. These options were taken through the 7 step process to identify the preferred WRZ approach.

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

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

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

For SAL, a total of 26 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 SAL Summary of SA Combination of Performance against Approach Category

Category	WRZ Level Approach	SA Combination 1 (SA Options 11, 21 and 26)	SA Combination 2 (SA Options 5 and 20)	SA Combination 3 (SA Options 14 and 16)	SA Combination 4 (SA Option 16)	SA Combination 5 (SA Option 1)	SA Combination 6 (SA Option 5)	SA Combination 7 (SA Option 6)	SA Combination 8 (SA Option 10)	SA Combination 9 (SA Option 11)	SA Combination 10 (SA Option 12)	SA Combination 11 (SA Option 13)	SA Combination 12 (SA Option 14)	SA Combination 13 (SA Option 15)	SA Combination 14 (SA Option 17)	SA Combination 15 (SA Option 18)	SA Combination 16 (SA Option 20)	SA Combination 17 (SA Option 21)	SA Combination 18 (SA Option 23)	SA Combination 19 (SA Option 25)	SA Combination 20 (SA Option 26)	SA Combination 21 (SA Option 27)	SA Combination 22 (SA Option 28)	SA Combination 23 (SA Option 3)	SA Combination 24 (SA Option 8)	SA Combination 25 (SA Option 9)
Least Cost		Best																	Worst							
Quickest Delivery		Worst	Best																							
Number of -3 Biodiversity Scores	One -3 Score	Two -3 Score	One -3 Score	No -3 Score	No -3 Score	No -3 Score	One -3 Score	No -3 Score	One -3 Score	One -3 Score	One -3 Score	One -3 Score	One -3 Score	No -3 Score	One -3 Score	One -3 Score	One -3 Score	Two -3 Score	One -3 Score	One -3 Score	One -3 Score	One -3 Score	One -3 Score	One -3 Score	One -3 Score	One -3 Score
Lowest Carbon		Best																	Worst							
Most Resilient				Best			Worst																			
Best Environmental	Worst			Best																		Worst				

Key																										
Ranked order (best to worst)		Best																								Worst

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

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

Table 4.4 Study Area Approaches

Options included	Do Minimum	Least Cost SA Approach 1 (SA Combination 1)	Best Appropriate Assessment SA Approach 3 (SA Combination 3)	Quickest Delivery SA Approach 2 (SA Combination 2)	Best Environmental SA Approach 3 (SA Combination 3)	Most Resilient SA Approach 3 (SA Combination 3)	Lowest Carbon SA Approach 1 (SA Combination 1)
<b>SA options</b> (Group options)	No options	<b>SA option 11:</b> 007, 052 <b>SA option 21:</b> 036, 039 <b>SA option 26:</b> 083, 084, 085	<b>SA option 14:</b> 024, 037 <b>SA option 16:</b> 042, 055, 079	<b>SA option 5:</b> 030 <b>SA option 20:</b> 047, 075	<b>SA option 14:</b> 024, 037 <b>SA option 16:</b> 042, 055, 079	<b>SA option 14:</b> 024, 037 <b>SA option 16:</b> 042, 055, 079	<b>SA option 11:</b> 007, 052 <b>SA option 21:</b> 036, 039 <b>SA option 26:</b> 083, 084, 085
<b>WRZ options</b>	No options	015 073 078	001 005 009 015 073	001 005 009 015 035 050 078	001 005 009 015 073	001 005 009 015 073	015 073 078

\* For the option references - all options are part of SAL e.g. SAL-001 is shown as 001 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, Uisce Éireann has only considered the options that were identified as the "best" performing options for each approach category. The identification of the approaches and 7 step process are outlined in detail in section 5 of the SAL Technical Report.

Within SAL, this resulted in three approaches being selected from the twenty-six SA combinations identified in Table 4.3, as they were identified as the best performing against the six approach categories - Least Cost, Best Environmental, Quickest Delivery, Most Resilient, Best AA and Lowest Carbon. This means that when comparing the 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 D) tool.

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

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

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

### 4.3 Comparison of SAL Approaches

An overall summary of the infrastructure components and abstractions for each of the SA approaches identified for SAL 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 1) (LCo, LC)	SA Approach 2 (SA Combination 2) (QD)	SA Approach 3 (SA Combination 3) (BE, MR, BA)
New pipeline network (km)	0	56	37	64
New WTPs	0	3	4	3
Upgrade WTPs	0	5	9	8



Infrastructure Summary	Do Minimum	SA Approach 1 (SA Combination 1) (LCo, LC)	SA Approach 2 (SA Combination 2) (QD)	SA Approach 3 (SA Combination 3) (BE, MR, BA)
New/upgraded abstractions	0	5	5	8
WTPs decommissioned	0	8	4	5
Abstractions abandoned	0	9	3	2
Raw Water Storage	0	0	0	0
Treated Water Storage	0	5	7	8

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 1) (LCo, LC)	SA Approach 2 (SA Combination 2) (QD)	SA Approach 3 (SA Combination 3) (BE, MR, BA)	Range (Difference between Lowest and Highest Score)
Population, health, economy and recreation	-3 scores	Best	Worst	Best	1
	MCA score		Best	Worst	10
Water Environment: quality and resources	-3 scores	Worst	Best	Worst	1
	MCA score	Best	Worst	Best	3
Biodiversity, Flora and Fauna	-3 scores	Worst		Best	2
	MCA score		Worst	Best	20

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

### Key

MCA/No. of -3 scores against each criterion

Worst

Best

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

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

#### 4.3.1 SA Approach 1 (SA Combination 1) (LCo, LC)

SA approach 1, key comparison points:

- Identified as the best in the Least Cost and Lowest Carbon categories;

- Option types included:
  - SA option (group option): 1 surface water abstraction and rationalisation option, and 2 groundwater abstraction and rationalisation options;
  - WRZ options: 3 groundwater abstraction options;
- Two -3 biodiversity scores associated with SAL-078 and SA option 21 which both have the potential for impacts on the River Barrow and River Nore SAC which contains a number of groundwater dependent Qualifying Interests (QIs); and
- In terms of key difference in infrastructure development SA Approach 1 requires:
  - The lowest number of WTP upgrades;
  - The highest number of WTPs decommissioned;
  - The highest number of abstractions abandoned; and
  - The lowest number of treated water storage facilities.

#### 4.3.2 SA Approach 2 (SA Combination 2) (QD)

SA approach 2, key comparison points:

- Identified as the best in the Quickest Delivery category;
- Option types included:
  - SA option (group option): 2 groundwater abstraction and interconnection options;
  - WRZ options: 3 groundwater abstraction options, 1 groundwater abstraction and rationalisation option, 1 surface water abstraction option, and 2WTP upgrade options;
- One -3 biodiversity score for option SAL-078 associated with the potential for impacts on the River Barrow and River Nore SAC which contains a number of groundwater dependent QIs; and
- In terms of key difference in infrastructure development SA Approach 2 requires:
  - The lowest length of pipeline;
  - The lowest number of WTP's decommissioned;
  - The highest number of WTPs upgraded; and
  - The highest number of new WTP's.

#### 4.3.3 SA Approach 3 (SA Combination 3) (BE, MR, BA)

SA approach 3, key comparison points:

- Identified as the best in the following categories: Best Environmental, Most Resilient, and Best AA categories;
- Option types included:
  - SA option (group option): 1 groundwater abstraction option and 1 surface water abstraction and interconnection option;
  - WRZ options: 3 groundwater abstraction options, and 2 WTP upgrade options;
- No -3 biodiversity scores (no higher risk options that could impact on European sites); and
- In terms of key difference in infrastructure development SA Approach 3 requires:
  - The longest length of pipeline;
  - The highest number of new/upgraded abstractions;
  - The lowest number of abstractions abandoned; and
  - The highest number of treated water storage facilities.

## 4.4 SAL 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 -2,822 m<sup>3</sup>/d in 2019 during normal conditions, to a projected maximum of -3,836 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 SAL.

**Table 4.8 Supply Demand Balance for SAL**

WRZ Name	WRZ Code	Population	Maximum Deficit m <sup>3</sup> /day*	
			2019	2044
New Ross	3300SC0025	8,035	-873	-1,142
Bennettsbridge & Kilmaganny	1500SC0020	5,222	-1,049	-1,472
Thomastown/Inistioge	1500SC0017	4,475	-387	-583
Graiguenamanagh PWS	1500SC0013	1,462	-366	-416
Gowran-Goresbridge-Paulstown	1500SC0012	2,477	-119	-189
Ballyragget PWS	1500SC0007	1,306	No Deficit	No Deficit
Kilkenny City	1500SC0003	29,836	No Deficit	No Deficit
Glenmore PWS	1500SC0002	140	-29	-33
Ballinkillin	0100SC0010	103	No Deficit	-1
Borris	0100SC0009	562	No Deficit	No Deficit

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

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

Table 4.9 Assessment of the SA Approaches and the 'Do Minimum' Approach

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

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

The overall assessment of the approaches against the SEA objectives indicates that SA approach 1 (identified as the Preferred Approach) has the potential to have moderate beneficial operational impacts against landscape and visual as it decommissions more WTPs. SA approach 1 and SA approach 2 have the potential for more adverse impacts during construction against population and health as there is a greater extent of construction work required in urban areas. These two approaches also have the potential for more adverse impacts against biodiversity as they require construction within the River Barrow and River Nore SAC and River Nore SPA and have the potential for impacts to the SAC associated with the new groundwater abstraction (SAL-078). SA approach 2 has the potential for more adverse impacts against landscape as it requires a new WTP to be built in a landscape amenity area. SA approach 3 has the potential to have more adverse impacts against climate change resilience as it does not rationalise the WRZs to as many sources that are considered to be more resilient. SA approach 1 and SA approach 2 have the potential to result in more adverse cultural heritage impacts due to required assets being in close proximity to NIAH/SMR sites.

Mitigation for the Preferred Approach is taken into account in the individual options assessments presented in chapter 5, identified in chapter 6 in terms of cumulative assessment and in chapter 7 for the SEA summary. 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 deficits and risk remaining with the 'Do Minimum' approach.

#### 4.4.1 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 includes one -3 Biodiversity score option associated with SAL-078 and its uncertainty over baseflow impact at higher abstraction rates.

For options identified as having some level of risk for LSEs, mitigation measures to address these are set out in the NIS. No AESI are identified for the SA Preferred Approach.

**5**

**SAL Preferred  
Approach:  
Strategic  
Environmental  
Assessment**

## 5 SAL Preferred Approach Strategic Environmental Assessment

### 5.1 SAL 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 three 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 these WRZs. The other seven WRZs are covered by SA options 11, 21 and 26.

SA option 11 (Kilkenny City (SAL-052), Ballyragget PWS (SAL-007)) involves rationalising these two WRZs, upgrading Troyswood WTP and abandoning Radestown WTP. SA option 21 (Graigenamanagh PWS (SAL-036), and Thomastown/Inistioge (SAL-039)) involves rationalising these two WRZs, a new groundwater abstraction and an upgrade to Thomastown WTP. SA option 26 (Gowran-Goresbridge-Paulstown (SAL-085), Ballinkillin (SAL-084) and Borris (SAL-083)) involves rationalising the three WRZs, a new groundwater abstraction and a new WTP.

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

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

**Table 5.1 Preferred Approach Breakdown**

WRZ Name and Option Reference*	Option Description	Abstraction/Demand
SAL-015 1500SC0002 Glenmore PWS	Increase GW abstraction from Busherstown Springs and upgrade Glenmore WTP <ul style="list-style-type: none"> <li>Increase groundwater (GW) abstraction from Busherstown Springs and upgrade Glenmore WTP to supply deficit</li> <li>Existing GW source: Inistioge groundwater body (GWB) WFD status 2016-2021 – Good</li> </ul>	117 m <sup>3</sup> /d
SAL-078 1500SC0020 Bennettsbridge & Kilmaganny	New GW abstraction at existing site and new WTP to supply deficit. <ul style="list-style-type: none"> <li>New GW abstraction and WTP to supply future demand</li> <li>Existing GW sources: Thomastown GWB WFD status 2016-2021 – Good, and Stoneyford Gravels GWB WFD status 2016-2021 – Good</li> <li>New GW source: Stoneyford Gravels GWB WFD status 2016-2021 – Good</li> </ul>	4,242 m <sup>3</sup> /d
SAL-073 3300SC0025 New Ross	New GW abstraction/wellfield located south of New Ross WRZ and new WTP to supply deficit <ul style="list-style-type: none"> <li>New GW abstraction and WTP to supply future deficit</li> </ul>	4,442 m <sup>3</sup> /d

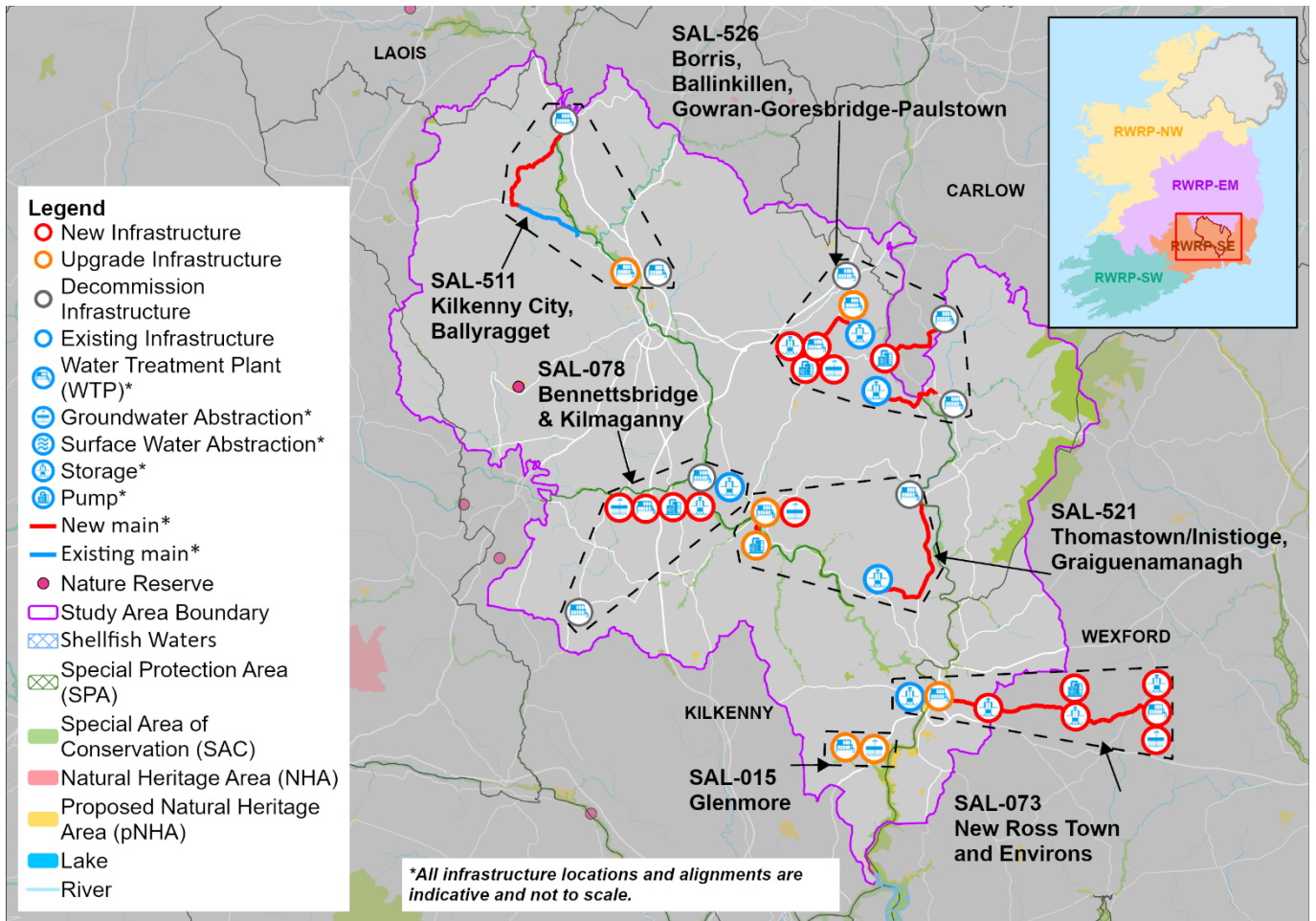


WRZ Name and Option Reference*	Option Description	Abstraction/Demand
	<ul style="list-style-type: none"> <li>New GW source: Enniscorthy GWB WFD status 2016-2021 – Good</li> </ul>	
SAL-052 (SA Option 11) 1500SC0003 Kilkenny City	<p>Upgrade Troyswood WTP and abandon Radestown WTP. Rationalise Ballyragget to Kilkenny City WRZ for increased resilience.</p> <ul style="list-style-type: none"> <li>Existing Radestown WTP surface water (SW) abstraction to be decommissioned.</li> <li>Existing Troyswood WTP SW abstraction to be maintained.</li> <li>Existing SW sources: Dinin (Main channel) river waterbody (RWB) WFD status 2016-2021 – Moderate, and Nore RWB WFD status 2016-2021 – Good</li> </ul>	14,622 m <sup>3</sup> /d
SAL-007 (SA Option 11) 1500SC0007 Ballyragget PWS	<p>Increase abstraction at Troyswood WTP and abandon Radestown WTP. Rationalise Ballyragget to Kilkenny City WRZ for increased resilience</p> <ul style="list-style-type: none"> <li>Existing GW abstraction to be decommissioned</li> <li>Existing GW source: Kilkenny-Ballynakill Gravels GWB WFD status 2016-2021 – Good</li> </ul>	565 m <sup>3</sup> /d
SAL-036 (SA Option 21) 1500SC0013 Graiguenamanagh PWS	<p>New GW abstraction and upgrade Thomastown WTP to supply deficit. Rationalise Graiguenamanagh to Thomastown WRZ</p> <ul style="list-style-type: none"> <li>Existing GW and SW abstractions to be decommissioned</li> <li>Existing GW source: New Ross GWB WFD status 2016-2021 – Good</li> <li>Existing SW source: (Duiske RWB) WFD status 2016-2021 – Moderate</li> </ul>	586 m <sup>3</sup> /d
SAL-039 (SA Option 21) 1500SC0017 Thomastown/Inistioige	<p>New GW abstraction and upgrade Thomastown WTP to supply deficit. Rationalise Graiguenamanagh to Thomastown WRZ</p> <ul style="list-style-type: none"> <li>Existing GW abstraction maintained</li> <li>Existing GW sources: Stoneyford Gravels GWB WFD status 2016-2021 – Good and Inistioige GWB WFD status 2016-2021 – Good</li> <li>New GW source: Inistioige GWB WFD status 2016-2021 – Good</li> </ul>	2,875m <sup>3</sup> /d
SAL-083 (SA Option 26) 0100SC0009	Rationalise Borris WRZ to Gowran-Goresbridge-Paulstown WRZ	219 m <sup>3</sup> /d

WRZ Name and Option Reference*	Option Description	Abstraction/Demand
Borris	<ul style="list-style-type: none"> <li>WRZ in projected surplus but is to be rationalised to Gowran-Goresbridge-Paulstown WRZ</li> <li>Existing SW abstraction to be decommissioned</li> <li>Existing SW source: Mountain (Carlow) RWB WFD status 2016-2021 – Good</li> </ul>	
SAL-084 (SA Option 26) 0100SC0010 Ballinkillen	<p>Rationalise Ballinkillen WRZ to Gowran-Goresbridge-Paulstown WRZ</p> <ul style="list-style-type: none"> <li>WRZ in deficit and is to be rationalised to Gowran-Goresbridge-Paulstown WRZ</li> <li>Existing GW source: New Ross GWB WFD status 2016-2021 – Good</li> </ul>	24 m <sup>3</sup> /d
SAL-085 (SA Option 26) 1500SC0012 Gowran-Goresbridge-Paulstown	<p>New GW abstraction and new WTP located at Woodquater to supply full demand - currently under development and maintain existing abstraction</p> <ul style="list-style-type: none"> <li>Existing GW abstractions to be decommissioned</li> <li>Existing GW sources: Bagenalstown Lower GWB WFD status 2016-2021 – Good and Goresbridge North GWB WFD status 2016-2021 – Good</li> <li>New GW source: Bagenalstown Lower GWB WFD status 2016-2021 – Good</li> </ul>	1,201 m <sup>3</sup> /d

\*SA Options are the same as Group Options

The SA Preferred Approach options are shown in Figure 5.1, in relation to key environmental designations. Note that SA options 11, 21 and 26 are labelled as SAL-511, 521 and 526 respectively.



**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
SAL-015	-	-	✓	✓	-	-	-	-
SAL-073	✓	✓	✓	✓	-	-	-	✓
SAL-078	-	✓	-	✓	✓	✓	-	✓

Option Reference*	New / Refurbished Pipeline	New WTP	Upgrade WTPs	New / Upgraded Abstractions	WTPs Decommissioned	Abstractions Abandoned	Raw Water Storage	Treated Water Storage
SA Option 11 (SAL-007 and SAL-052)	✓	-	✓	-	✓	✓	-	-
SA Option 21 (SAL-036 and SAL-039)	✓	-	✓	✓	✓	✓	-	-
SA Option 26 (SAL-083, SAL-084 and SAL-085)	✓	✓	✓	✓	✓	✓	-	✓

\*SA Options are the same as Group Options

Table 5.3 Options Assessment Summary

Option Reference*	Option Description	Phase	Protect Public Health and Promote Wellbeing (P1, P2, P3)	Protect and Enhance Biodiversity and Contribute to Resilient Ecosystems (B1, B2, B3, B4, B5)	To Protect Landscapes, Townscapes and Visual Amenity (L1)	Protect and Where Appropriate Enhance, Built and Natural Assets and Reduce Waste (M1, M2)	Reduce Greenhouse Gas Emissions (C1)	Contribute to Environmental Climate Change Resilience (R1, R2, R5)	Protect and Improve Surface Water and Groundwater Status (W1, W2, W3)	Avoid Flood Risk (W5)	Protect and Where Appropriate, Enhance Cultural Heritage Assets (CH1)	Protect Quality and Function of Soils (G1)
SAL-015	Increase GW abstraction from Busherstown Springs and upgrade Glenmore WTP to supply deficit	Construction	-	--	-	0	0	--	0	-	-	-
		Operation	-	--	0	-	0	--	--	0	0	0
SAL-073	New GW abstraction/wellfield located south of New Ross WRZ and new WTP to supply deficit	Construction	-	--	-	-	-	--	0	0	-	-
		Operation	--	--	0	-	-	--	--	0	0	0
SAL-078	New GW abstraction and new WTP for Bennettesbridge	Construction	-	--	-	-	-	-	0	-	-	-
		Operation	+	--	+	-	-	-	-	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 11 (SAL-007 and SAL-052)	Rationalise Ballyragget to Kilkenny City WRZ for increased resilience. Upgrade Troyswood WTP and abandon Radestown WTP.	Construction	-	--	-	-	-	-	0	-	-	-
		Operation	+	0	0	-	-	-	0	0	0	0
SA Option 21 (SAL-036 and SAL-039)	Rationalise Graiguenamanagh to Thomastown WRZ. New GW abstraction and upgrade Thomastown WTP to supply deficit.	Construction	--	--	-	-	-	--	0	-	-	-
		Operation	--	--	+	-	-	--	--	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 26 (SAL-083, SAL-084 and SAL-085)	New GW abstraction and new WTP located at Woodquater to supply full demand - currently under development. Rationalise Borris and Ballinkillen to Gowran and maintain existing abstraction.	Construction	-	--	-	-	-	--	0	0	--	0
		Operation	+	0	+	0	-	--	--	0	0	0

\*SA Options are the same as Group Options

\*\*Total lifetime comparative 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, Uisce Éireann is already implementing measures across the three pillars of Lose Less, Use Less and Supply Smarter to improve the level of service to their customers in this study area. These are described in the SAL Technical Report and include leakage reduction and water conservation.

### 5.2.1 Leakage Reduction



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

- Ongoing leakage management including active leakage control, pressure management, and find and fix activities to offset Natural Rate of Leakage Rise; and
- Further net leakage reductions, to move towards achieving the national SELL target by 2034, in the Kilkenny City WRZ.

### 5.2.2 Water Conservation



At present, Uisce Éireann is conducting pilot studies in relation to water conservation stewardship in businesses and is actively progressing water conservation messaging campaigns. During drought conditions in 2018, a Water Conservation Order was implemented, in order to protect their water supplies and reduce pressure on the natural environment during this period. Uisce Éireann will continue to promote 'Water Conservation Activities', collecting and monitoring data over a number of years to assess the benefits. As part of the Framework Plan, Uisce Éireann have not applied reductions to the SDB for unquantifiable water conservation gains. However, they do assume that any gain will offset consumer usage growth factors.

## 5.3 Interim Solutions

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

## 5.4 Approach Uncertainty and Adaptability

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

Table 5.4 SAL Sensitivity Analysis and Environmental Impacts

Uncertainty	Likelihood	Increase (+) / Decrease (-) in Deficit	Environmental Impacts Relative to Assessment of Preferred Approach Key: Green - Positive Amber - Negative
Sustainability	Moderate/High (as Uisce Éireann's current)	+1,400 m <sup>3</sup> /d	The impact of sustainability reductions would reduce the volumes that can be abstracted from Uisce Éireann's existing sources, therefore, increasing the SDB deficit.



Uncertainty	Likelihood	Increase (+) / Decrease (-) in Deficit	Environmental Impacts Relative to Assessment of Preferred Approach Key: Green - Positive Amber - Negative
	abstractions are large compared to the waterbodies from which they abstract)		<p>There are some surface water sources in SAL that would be impacted through sustainability reductions. However, the Preferred Approach is designed to relieve pressure on these sources by supplementing from sources that are more resilient. The existing River Nore abstraction at Kilkenny City WRZ, has the potential to be further developed as it is a large resilient source. This could allow Uisce Éireann to abandon the smaller River Dinan and River Douglas sources, as well as the rationalisation of Ballyragget WRZ.</p> <p>Groundwater sustainability is more difficult to assess at desktop level, however, as the abstractions in SAL are small in scale any impacts are likely to be minimal.</p> <p>The SA Preferred Approach addresses reductions and Uisce Éireann have identified alternative supplies to supplement the abstractions at the River Dinan and River Douglas sources. However, additional sustainability reductions could increase pressure for additional supply from outside the study area.</p>
Climate Change	High (international climate change targets have not been met)	+300 m <sup>3</sup> /d	<p>Higher climate change scenarios would impact Uisce Éireann's existing supplies and result in decreased water availability at certain times of year. Although the likelihood of this scenario is high based on climate change adaptation to date, potential impacts may be mitigated against by optimising Uisce Éireann's operations on a more environmentally sustainable basis across the range of supplies.</p> <p>Regarding the existing and proposed new groundwater abstractions, there is more difficulty and uncertainty in assessing increased climate change impacts. However, it is generally understood that groundwater will be more resilient than surface water sources.</p> <p>Although the Preferred Approach provides more operational flexibility to use less sensitive water sources, this could still result in more pressure on sources overall.</p>
Demand Growth		-3,836 m <sup>3</sup> /d	The impact of lower than expected growth would reduce the SDB deficit and the overall need requirement. The SDB deficit is currently spread across six of the ten WRZs in the

Uncertainty	Likelihood	Increase (+) / Decrease (-) in Deficit	Environmental Impacts Relative to Assessment of Preferred Approach Key: Green - Positive Amber - Negative
	Low/Moderate (growth has been based on policy)		<p>area and is projected to spread across seven. This is driven by quality as well as quantity issues. In this rural area, growth is relatively low.</p> <p>This could allow lower than expected energy and carbon costs and lower increased abstraction requirements</p>
Leakage Targets	Low (Uisce Éireann is focused on sustainability and aggressive leakage reduction)	+321 m <sup>3</sup> /d	<p>The impact of lower than expected leakage savings would increase the SDB deficit and the overall need requirement. Due to the length and condition of Uisce Éireann's networks, Uisce Éireann could potentially fail to achieve target leakage reductions within the timeframes set out. However, as Uisce Éireann is committed to achieving leakage reductions, the likely scenario would be an extension in the period of time taken to achieve leakage targets as opposed to accepting lower targets.</p> <p>This could increase carbon and the effects of abstraction pressure on the environment.</p>
	Moderate/High (Uisce Éireann is focused on sustainability and aggressive leakage reduction)	-3,831 m <sup>3</sup> /d	<p>Increased leakage savings beyond SELL would reduce the SDB deficit and the overall need requirement. The need drivers span across the WRZs in SAL and are driven by quality as well as availability issues.</p> <p>This could allow lower than expected energy and carbon emissions and lower increased abstraction requirements.</p>

# 6

## SEA Cumulative Effects for SAL Preferred Approach

## 6 SEA Cumulative Effects for SAL Preferred Approach

Secondary, cumulative and the synergistic nature of the effects of the SAL 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 three study areas within the South East 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 SAL

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

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

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

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

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

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

### 6.1.1 Cumulative Effects during Construction

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

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

Preferred Approach Option References	SAL-078	SAL-073	SAL-015	SA Option 26	SA Option 21
SA Option 11	RBN	RBN	RBN	RBN	RBN
	RN				RN
SA Option 21	RBN	RBN	RBN	RBN	
	RN				
SA Option 26	RBN	RBN	RBN		
SAL-015	RBN	RBN			
SAL-073	RBN				

Key	
Construction Phase	
Operation Phase	
Construction and Operation	
River Barrow And River Nore SAC	RBN
River Nore SPA	RN

There could be cumulative effects during construction for the options located close to the River Barrow And River Nore SAC (indicated by RBN in Table 6.1). The River Barrow And River Nore SAC is a potential supporting habitat for alluvial wet woodland, a qualifying interest (QI) of the SAC. Cumulative construction works within the river valley have the potential to result in habitat loss, mortality, pollution and spread of invasive non-native species if construction phases are concurrent. There could be cumulative effects during construction for the options located close to the River Nore SPA (indicated by RN in Table 6.1). Cumulative construction works within the river valley have the potential to result in pollution and disturbance impacts if construction phases are concurrent.

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

### 6.1.2 Cumulative Effects during Operation

The potential for cumulative effects on groundwater bodies have been considered in a hydrogeological assessment of the groundwater abstractions commissioned by Uisce Éireann (Irish Water, 2022). All of the WFD groundwater bodies affected by abstractions have a good quantitative status. The hydrogeological assessment considers the abstraction quantities and proximities and concludes that there is no indication of cumulative impact or impact on quantitative status of the groundwater bodies. The proposed increase for Bennetsbridge & Kilmaganny (SAL-078) will require further investigation to determine feasibility and effects. Initial screening assessment suggests the proposed increase is expected to be within sustainable limits.

The potential for beneficial cumulative effects on the River Barrow And River Nore SAC through the decommissioning of the River Dinan (surface water) and Ballyragget Infiltration Gallery (groundwater) abstractions. The River Dinan abstraction is currently unsustainable, and both abstractions are proposed to be decommissioned as part of the rationalisation of the Ballyragget and Kilkenny City WRZs (SA option 11) within the Preferred Approach.

There could be adverse cumulative effects during operation for the options located close to the River Barrow And River Nore SAC (indicated by RBN in Table 6.1). Cumulative effects during operation could result in habitat degradation (options SAL-015, SAL-078, SA option 11 and SA option 21) and water table/availability (options SAL-015, SAL-078, SA option 11 and SA option 21). Reduction in water levels has potential to impact the hydrological regime within the River Barrow And River Nore SAC. See Figure 6.1 for the Preferred Approach abstractions in SAL.

The impacts on the European designations are provided in the NIS and are also summarised in chapter 9 of this review. The NIS concluded that with general mitigation measures, option specific mitigation, hydrological modelling and hydrogeological modelling, there will be no adverse cumulative effects on the integrity of River Barrow And River Nore SAC.

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; for SAL this averages as 0.34 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.

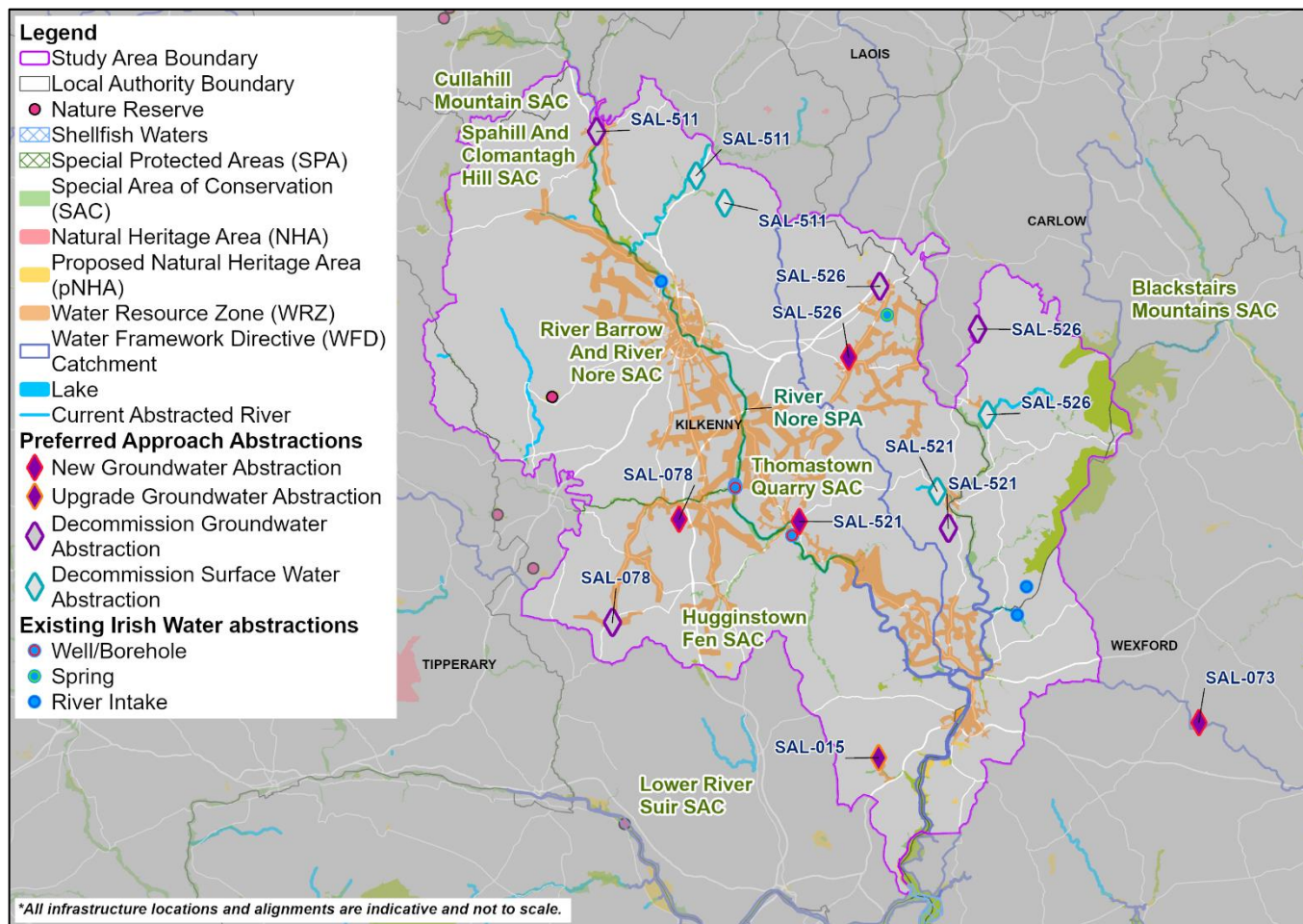


Figure 6.1 SA Preferred Approach Abstractions in SAL

## 6.2 Cumulative Effects with Other Developments

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

Table 6.2 shows that within SAL there are sixteen developments that have been considered for cumulative effects with the SA Preferred Approach. Other developments that were not considered further due to the small extent of development required and the distance of the developments from the SA Preferred Approach are the: Community Shops Kilkenny; Crokers Hill, Kennyswell Road, Kilkenny; Libraries Capital Programme - Kilkenny Library; St Columba's Hospital, Thomastown; Carlow WwTP; Waterford City WwTP; Kilbarry Waterford; Clonhasten Enniscorthy Wexford, Kerlogue Manor Roxborough Drinagh Wexford, Roxborough Mulgannon Wexford; Wexford General Hospital Ward Block; Whiterock Hill Wexford Phase 1; and IT Carlow Science & Health Building.

### 6.2.1 Cumulative Effects during Construction

The projects near or in New Ross could result in cumulative effects with the SA Preferred Approach if they were to be constructed at the same time (represented in Table 6.2 as 'NR'). Potential effects could include increased traffic and noise to the residential and commercial properties in New Ross. This 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.

There is potential for cumulative effects from habitat loss, mortality, spread of invasive non-native species, pollution and disturbance impacts on the River Barrow And River Nore SAC (represented in Table 6.2 'RBN') if the construction phase of the Barrow Valley - Bagenalstown to Place East; Carlow Public Realm and Pedestrian Linkage Project; Abbey Quarter and Abbey Quarter Phase 2; Callan Town Regeneration; Callan Friary Complex/Upper Bridge St Regeneration & Masterplan for the historic core of Callan Town; Kilkenny City Enhanced Livability Study; Thomastown Regeneration Phase 2; Waterford City Regeneration; Waterford City and Environs - North Quays; and Wexfordia - the New Ross Tourism Transformation are concurrent with the SA Preferred Approach.

There is potential for cumulative effects from habitat loss, mortality, pollution and disturbance on the River Nore SPA (represented in Table 6.2 'RN') if the construction phase of the Abbey Quarter and Abbey Quarter Phase 2; Callan Town Regeneration; Callan Friary Complex/Upper Bridge St Regeneration & Masterplan for the historic core of Callan Town; Kilkenny City Enhanced Livability Study, Kilkenny Regional Water Supply Scheme - Upgrade of Troyswood Water Treatment Plant, Kilkenny Wastewater Network and Thomastown Regeneration Phase 2 are concurrent with the SA Preferred Approach.

There is potential for cumulative effects from pollution and disturbance on the Wexford Harbour and Slobbs SPA (represented in Table 6.2 'WHS') if the construction phase of the Barrow Valley Greenway - Bagenalstown to Place East; Enniscorthy Flood Relief Scheme and South East Greenway- Section from New Ross to Waterford are concurrent with the SA Preferred Approach.

There is potential for cumulative effects from disturbance on Bannow Bay SPA (represented in Table 6.2 'BAN') if the construction phase of the Barrow Valley Greenway - Bagenalstown to Place East and South East Greenway- Section from New Ross to Waterford are concurrent with the SA Preferred Approach.

The impacts on the European designations are provided in the NIS and are also summarised in chapter 9 of this review. The NIS concluded that with general mitigation measures, option specific mitigation, hydrological modelling and hydrogeological modelling, there will be no adverse cumulative effects on the integrity of European sites. Any option specific mitigation measures are included in section 6.3.4 of the NIS.

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.

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

Project Developments	SAL-015	SAL-073	SAL-078	SA Option 11	SA Option 21	SA Option 26
Barrow Valley - Bagenalstown to Place East	RBN	RBN	RBN	RBN	RBN	RBN
		WHS				
		BAN				



Project Developments	SAL-015	SAL-073	SAL-078	SA Option 11	SA Option 21	SA Option 26
Carlow Public Realm and Pedestrian Linkage Project	RBN	RBN	RBN	RBN	RBN	RBN
Abbey Quarter and Abbey Quarter Phase 2	RBN	RBN	RBN RN	RBN RN	RBN RN	RBN
Callan Town Regeneration	RBN	RBN	RBN RN	RBN RN	RBN RN	RBN
Callan Friary Complex/Upper Bridge St Regeneration & Masterplan for the historic core of Callan Town	RBN	RBN	RBN RN	RBN RN	RBN RN	RBN
Kilkenny City Enhanced Livability Study	RBN	RBN	RBN RN	RBN RN	RBN RN	RBN
Kilkenny Regional Water Supply Scheme - Upgrade of Troyswood Water Treatment Plant	RBN	RBN	RBN RN	RBN RN	RBN RN	RBN
Kilkenny Wastewater Network	RBN	RBN	RBN RN	RBN RN	RBN RN	RBN
Thomastown Regeneration Phase 2	RBN	RBN	RBN RN	RBN RN	RBN RN	RBN
Waterford City Regeneration	RBN	RBN	RBN	RBN	RBN	RBN
Waterford City and Environs - North Quays	RBN	RBN	RBN	RBN	RBN	RBN
Enniscorthy Flood Relief Scheme		WHS				
South East Greenway- Section from New Ross to Waterford	RBN	WHS BAN NR	RBN	RBN	RBN	RBN
Trinity Wharf						
Wexfordia - the New Ross Tourism Transformation	RBN	RBN NR	RBN	RBN	RBN	RBN

Key	
Construction Phase	
Operation Phase	

Key	
Construction and Operation	
River Barrow And River Nore SAC	RBN
River Nore SPA	RN
Wexford Harbour and Slobbs SPA	WHS
Bannow Bay SPA	BAN
New Ross Town	NR

### 6.2.2 Cumulative Effects during Operation

There is potential for cumulative effects on the River Barrow And River Nore SAC from habitat degradation and water table/availability if operation of the Carlow Public Realm and Pedestrian Linkage Project; Kilkenny City Enhanced Livability Study, Kilkenny Regional Water Supply Scheme - Upgrade of Troyswood Water Treatment Plant, Kilkenny Wastewater Network and Waterford City Regeneration if operation is concurrent with the SA Preferred Approach. However, with the implementation of standard good practice measures there will be no adverse effects on the integrity of these European sites.

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



**7**

**Strategic  
Environmental  
Assessment  
Summary**

## 7 Strategic Environmental Assessment Summary

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

Key beneficial impacts assessed include minor beneficial impacts for SA option 26, SA option 11 and SAL-078 associated with increasing resilience and the quality of water supply for local communities; and the subsequent benefits for public health. There are minor beneficial impacts associated with the decommissioning of WTPs on the landscape for SA option 26, SA option 21 and SAL-078. There is also the potential for beneficial effects on the River Douglas and River Dinan river waterbodies. These waterbodies currently have unsustainable abstractions that are proposed to be decommissioned as part of the Preferred Approach through the use of rationalisation options.

Key potential adverse impacts identified at plan level include:

- Moderate adverse effects during construction for SA option 21 due to impacts on public health and/or quality of life from dust, noise and traffic in urban areas. There is also potential for moderate adverse effects during operation for SA option 21 and SAL-073 due to the requirement of new above ground assets in urban areas and amenity area loss;
- Moderate adverse effects during construction for SAL-015, SAL-073, SAL-078, SA option 11, SA option 21 and SA option 26 for biodiversity. SAL-078, SA option 11 and 21 are within the River Barrow And River Nore SAC, and the River Nore SPA. SA option 26 is within the River Barrow And River Nore SAC only. For these options there is the potential for the loss and pollution of QI habitats and supporting habitats, disturbance and mortality of QI species and their prey, and the spread of invasive species within the SAC. SAL-015 is hydrologically linked to the River Barrow And River Nore SAC and there is the potential for the pollution of QI habitats and supporting habitats, and disturbance to QI species. SAL-073 is hydrologically linked to the River Barrow And River Nore SAC, Bannow Bay SAC and SPA, and is within the Zone of Influence of Wexford Harbour and Slobbs SPA, and Ballyteige Burrow SPA where there is the potential for the pollution of QI habitats and supporting habitats, disturbance to birds given the proximity of works, and potential for disturbance to QI species;
- Moderate adverse effects during operation for SA option 21, SAL-015, and SAL-078 for biodiversity where there is the potential for habitat degradation and a reduction in flow and water availability for the River Barrow And River Nore SAC. SAL-073 has the potential for moderate effects against Annex species and local biodiversity due to the high abstraction rate (in terms of available recharge);
- Moderate adverse effects to environmental climate change resilience for SA option 26, SA option 21, SAL-015 and SAL-073 due to existing/new groundwater abstractions being taken at a potentially unsustainable rate;
- Moderate adverse effects during operation are indicated in the assessments for SA option 26, SA option 21, SAL-015, and SAL-073 as a result of potential risks to groundwater quality and quantity and WFD status of hydrologically linked groundwater waterbodies from new or increased abstractions; and
- Moderate adverse effects during construction for cultural heritage for SA option 26 as the option involves construction of new assets within a known archaeological/heritage site.

There is the potential for beneficial cumulative effects on the River Barrow And River Nore SAC through the decommissioning of the River Dinan and Ballyragget Infiltration Gallery abstractions. These

abstractions are currently unsustainable but are proposed to be decommissioned as part of the rationalisation of the Ballyragget and Kilkenny City WRZs (SA option 11) within the Preferred Approach.

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

SEA mitigation identified to address the key adverse impacts identified above includes further hydrological or hydrogeological modelling (as appropriate) to further inform understanding of potential impacts on the European and national designated sites identified as potentially affected by increased abstractions from existing surface and groundwater sources (see the NIS of the Framework Plan for further information). Other mitigation identified includes development of construction environmental management plans, public consultation with local residents on disruption during construction and consideration of the waste hierarchy in design. Measures to address the cumulative impact for carbon emissions include sourcing the energy supply from renewable sources. All developments will aim to achieve as far as possible requirements for no net loss in biodiversity or enhancement, as set out in the Biodiversity Action Plan (Irish Water, 2021). There may be potential to also provide opportunities for carbon sequestration with biodiversity enhancement. In addition, there are opportunities to reduce water demand (which in turn would reduce energy and carbon) by raising awareness of water issues, promoting water efficient devices and through leakage reduction.

In general, these are standard mitigation measures with some specific measures and additional requirements for further assessment or monitoring (see the SEA Appendix and the NIS for SEA and AA 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 <b>Moderate Adverse</b> to <b>Minor 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> <li>Number of days where recreational uses are impeded</li> </ul>
2. Protect and enhance biodiversity and	<p>C <b>Moderate Adverse</b></p> <p>O Neutral to <b>Moderate Adverse</b></p> <p>Impacts from construction works for pipelines and service reservoirs</p>	<p>Routing/siting to avoid impacts.</p> <p>Standard good construction practice and specific measures as</p>	<ul style="list-style-type: none"> <li>Temporary and permanent habitats lost vs habitats created/enhanced</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
contribute to resilient ecosystems	<p>on biodiversity. These can be minimised through careful routing and siting.</p> <p>Potential for construction and operational impacts on European and National designated sites, most notably the River Barrow and River Nore SAC.</p>	<p>identified in the NIS of the Framework Plan.</p> <p>Design to meet no net loss biodiversity or achieve enhancement, where possible, on or off site and in line with the Biodiversity Action Plan objectives.</p> <p>Further hydrological/hydrogeological assessments to determine impacts on designated sites.</p> <p>Operating rules to limit impacts on European and National sites.</p>	<ul style="list-style-type: none"> <li>Site condition and population data for QI of European and National designated sites</li> </ul>	
3. To protect landscapes, townscapes and visual amenity	<p>C <b>Minor Adverse</b></p> <p>O Neutral to <b>Minor Beneficial</b></p> <p>Construction landscape impacts and long term impacts from above ground structures, such as new WTPs.</p>	<p>Routing and siting to reduce tree loss and appropriate location and design of above ground structures with landscape planting.</p> <p>Reinstatement of land use and vegetation.</p>	<ul style="list-style-type: none"> <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>

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
4. Protect and where appropriate enhance, built and natural assets and reduce waste	C Neutral to <b>Minor Adverse</b> O Neutral to <b>Minor Adverse</b> New resources required for construction works, including extensive lengths of pipeline, service reservoirs and new/upgraded WTPs. Ongoing maintenance requirements.	Materials management to be integrated into design to optimise use of existing resources and minimise waste from construction and operation.	<ul style="list-style-type: none"> <li>Loss of greenfield land, including agricultural, forestry or other land uses</li> <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>	<ul style="list-style-type: none"> <li>Construction wastes sent to landfill</li> </ul>
5. Reduce greenhouse gas emissions	C Neutral to <b>Minor Adverse</b> O Neutral to <b>Minor Adverse</b> 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>



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
6. Contribute to environmental climate change resilience	<p>C Neutral to <b>Moderate Adverse</b></p> <p>O Neutral to <b>Moderate Adverse</b></p> <p>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 SAL-015, SAL-073, and SA options 26 and 21 require further assessment to understand their sustainability in the longer term.</p>	<p>Consider how operation can further reduce climate change pressure on at risk sources and associated designations, particularly for options SAL-015, SAL-073, and SA options 26 and 21.</p> <p>Sustainability review of sources taking account of groundwater and surface water interconnections for options SAL-015, SAL-073, and SA options 26 and 21</p>	<ul style="list-style-type: none"> <li>WFD waterbody status objectives at risk and designated site condition status</li> <li>Frequency of drought orders requiring change to normal abstractions/ compensation releases</li> </ul>	<ul style="list-style-type: none"> <li>None identified</li> </ul>
7. Protect and improve surface water and groundwater status	<p>C Neutral</p> <p>O Neutral to <b>Moderate Adverse</b></p> <p>Generally, new/increased abstractions are limited to allowable limits and have a low risk of adverse effect on WFD waterbody status objectives.</p>	<p>Further investigation to consider effects on groundwater abstraction on the surface water environment.</p>	<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> </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 to <b>Minor Adverse</b> O Neutral Potential loss of flood plain increasing flood risk from construction and location of above ground structures for SAL-015, SAL-078, and SA options 11 and 21.	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 <b>Minor Adverse</b> to <b>Moderate 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	C Neutral to <b>Minor Adverse</b> O Neutral	Standard good practice to conserve and reinstate soils.	<ul style="list-style-type: none"> <li>Soil Management Plans implemented</li> </ul>	<ul style="list-style-type: none"> <li>Total volume of soil removed or reused on site</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
function of soils	Potential for loss and damage to valuable soils during construction but impacts to geological assets are expected to be avoided.		<ul style="list-style-type: none"> <li>Volume of contaminated land restored, or soils removed</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 SAL are also expected to be sustainable, based on additional plan-level desk-based assessment, in terms of avoiding deterioration of WFD status or avoiding conflict with meeting WFD objectives.

All groundwater bodies used for the SAL abstractions have good quantitative status (Irish Water, 2022) and there is no indication of cumulative impact or impact on quantitative status of the groundwater bodies. Although initial screening assessment suggests that the proposed increase for Bennetsbridge & Kilmaganny (SAL-078) is within sustainable limits, more investigation will be required to determine its feasibility and effects. Any potential impacts, including cumulative effects with non Uisce Éireann abstractions, will need to be considered in further detail as part of project level consenting to demonstrate both sustainability for any connected surface waterbodies and groundwater dependent habitats and protected areas.

# 9

## Appropriate Assessment Summary

## 9 Appropriate Assessment Summary

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

Potential in-combination effects with other projects and plans were identified for the preferred options on the River Barrow And River Nore SAC, River Nore SPA, Ballyteige Burrow SPA, Wexford Harbour and Slobs SPA, and the Bannow Bay SPA. The potential effects include habitat loss, mortality of Qualifying Interest (QI) species, pollution, spread of invasive non-native species, disturbance, habitat degradation and water table/availability impacts. 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 River Nore SPA and the River Barrow And River Nore SAC. The potential impacts include habitat loss, habitat degradation, mortality of QI species, spread of invasive non-native species, pollution and disturbance. With the implementation of mitigation as detailed in Appendix E of the NIS, there will be no adverse effects on the integrity of European sites.



**10**



**Recommendations  
for Implementation**



## 10 Recommendations for Implementation

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

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

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## Appendix A Fine Screening Summaries

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

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

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
SAL-001	Increase GW abstraction and upgrade Ballinkillen WTP to supply deficit.									1	0	-14
SAL-008	New GW source and new WTP to address nitrate issues in this WRZ to supply full demand.									1	0	-24
SAL-011	New GW abstraction and new WTP to supply full demand.									1	0	-22

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
SAL-015	Increase GW abstraction from Busherstown Springs and upgrade Glenmore WTP to supply deficit.									1	0	-19
SAL-020	Increase GW abstraction (no.1 borehole) and upgrade Choill Rua WTP to partly supply deficit.									1	0	-16
SAL-021	New GW abstraction and new WTP located at Woodquater to supply deficit - currently under development and maintain existing abstraction.									2	0	-22
SAL-022	New GW abstraction and new WTP located at Woodquater to supply deficit - currently under development.									1	1	-15

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
SAL-023	New GW abstraction and new WTP located at Woodquater to supply deficit - currently under development.									1	1	-16
SAL-024	New GW abstraction and new WTP located at Woodquater to supply full demand - currently under development.									1	0	-20
SAL-035	New GW abstraction and new WTP to supply deficit.									1	0	-22
SAL-038	New GW abstraction and upgrade Thomastown WTP to supply deficit.									1	0	-23
SAL-039	New GW abstraction and upgrade Thomastown WTP to supply deficit.									2	0	-24



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
SAL-060	New GW source for Bennettsbridge at Woolengrange and new WTP located at Rathduff to supply full demand.									3	0	-28
SAL-061	New GW source for Bennettsbridge at Woolengrange and new WTP located at Rathduff to supply full demand.									2	0	-21
SAL-062	New GW source for Bennettsbridge at Woolengrange and new WTP located at Rathduff to supply full demand.									3	0	-25
SAL-063	New GW source for Bennettsbridge at Woolengrange and new WTP located at Rathduff to supply full demand.									3	0	-25

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
SAL-064	Increase GW abstraction and upgrade Kilmaganny WTP to partly supply deficit.									1	0	-17
SAL-073	New GW abstraction/wellfield located south of New Ross WRZ and new WTP to supply deficit.									1	0	-21
SAL-074	New GW abstraction/wellfield located south of New Ross WRZ and new WTP to supply deficit.									1	0	-25
SAL-075	New GW abstraction/wellfield located south of New Ross WRZ and new WTP to supply deficit.									2	0	-28

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
SAL-078	New GW abstraction and new WTP for Bennettesbridge.									1	0	-23
SAL-081	New GW abstraction/wellfield located south of New Ross WRZ and new WTP to supply deficit.									1	0	-25
SAL-085	New GW abstraction and new WTP located at Woodquater to supply full demand - currently under development and maintain existing abstraction.									1	1	-16

Table A.2 Fine Screening Summary of Ground Water and Interconnection Options in SAL

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
SAL-030	Interconnect Gowran-Goresbridge-Paulstown with Bagenalstown WRZ (Study Area 6) for increased resilience and supply deficit.									0	0	-12
SAL-043	Interconnect Thomastown with Bennettsbridge WRZ for increased resilience and supply deficit									3	0	-25
SAL-047	Interconnect Thomastown with New Ross WRZ for increased resilience and supply deficit from New Ross.									2	0	-28

Table A.3 Fine Screening Summary of Ground Water and Rationalisation Options in SAL

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
SAL-002	Rationalise Ballinkillen to Gowran-Goresbridge-Paulstown WRZ.									1	1	-15
SAL-004	Rationalise Ballinkillen to Bagenalstown WRZ (SA6).									1	1	-11
SAL-012	Rationalise Borris to Paulstown (Gowran-Goresbridge-Paulstown WRZ).									1	1	-16
SAL-013	Rationalise Borris to Bagenalstown WRZ (SA6) via Ballinkillen WRZ.									1	1	-11
SAL-026	Rationalise Gowran-Goresbridge-Paulstown to Bennettsbridge WRZ.									2	0	-21
SAL-036	Rationalise Graiguenamanagh to Thomastown WRZ									2	0	-24

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
SAL-037	Rationalise Graiguenamanagh to Gowran-Goresbridge-Paulstown WRZ									1	0	-20
SAL-041	Rationalise Thomastown to Bennettsbridge WRZ.									3	0	-25
SAL-045	Rationalise Thomastown to New Ross WRZ.									2	0	-28
SAL-082	Rationalise Graiguenamanagh to Thomastown WRZ									1	0	-25
SAL-083	Rationalise Borris WRZ to Gowran-Goresbridge-Paulstown WRZ.									1	1	-16
SAL-084	Rationalise Ballinkillen WRZ to Gowran-Goresbridge-Paulstown WRZ.									1	1	-16

Option Reference	Name	Environmental								Total -3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
SAL-086	Rationalise Borris to Carlow Central Regional WRZ.									1	1	-10
SAL-087	Rationalise Borris to Leighlinbridge WRZ.									1	1	-10
SAL-088	Rationalise Ballinkillen to Leighlinbridge WRZ.									1	1	-10

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

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
SAL-033	New SW abstraction from River Barrow and new WTP to supply deficit.	Red	Orange	Red	Orange	Orange	Light Orange	Light Orange	Light Orange	2	0	-25
SAL-048	Increase abstraction from River Nore and upgrade WTP Troyswood to supply deficit. Decommission Radestown WTP (RAL).	Orange	Red	Orange	Orange	Red	Orange	Light Orange	Light Orange	2	0	-27
SAL-049	Increase abstraction from River Nore and upgrade WTP Troyswood to supply deficit. Decommission Radestown WTP (RAL).	Orange	Light Orange	Orange	Orange	Red	Orange	Light Orange	Light Orange	1	0	-26
SAL-050	Upgrade Troyswood WTP. WRZ is not in deficit. Decommission Radestown WTP.	Orange	Light Orange	Orange	Light Orange	Red	Orange	Light Orange	Light Orange	1	0	-21



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
SAL-051	Increase abstraction from River Nore and upgrade WTP Troyswood to supply deficit. Decommission Radestown WTP (RAL).									0	0	-17
SAL-052	Upgrade Troyswood WTP and abandon Radestown WTP.									0	0	-17
SAL-053	Increase abstraction from River Nore and upgrade WTP Troyswood to supply deficit. Decommission Radestown WTP (RAL).									0	0	-18
SAL-054	Increase abstraction from River Nore and upgrade WTP Troyswood to supply deficit. Decommission Radestown WTP (RAL).									0	0	-20
SAL-055	Increase abstraction from River Nore and upgrade									0	0	-19

Option Reference	Name	Environmental								Total -3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
	WTP Troyswood to supply deficit. Decommission Radestown WTP (RAL).											
SAL-065	New SW abstraction from River Nore at Bennettsbridge and new WTP to supply full demand.									2	0	-25
SAL-077	New SW abstraction from River Barrow and upgrade Castlemoyle WTP to supply deficit.									1	0	-26

Table A.5 Fine Screening Summary of Surface Water and Interconnection Options in SAL

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
SAL-006	Interconnect Ballyragget with Kilkenny City WRZ for increased resilience - not in deficit.									0	0	-17
SAL-042	Interconnect Bennetsbridge and Thomastown with Kilkenny City WRZ for increased resilience and supply deficit.									0	0	-19
SAL-066	Upgrade interconnection between Kilkenny City and Bennettsbridge WRZs. New WTP is required for Bennettesbridge. Decommission existing Bennettsbridge WTP.									2	0	-27
SAL-079	Interconnect Bennetsbridge and									0	0	-19

Option Reference	Name	Environmental								Total -3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
	Thomastown with Kilkenny City WRZ for increased resilience and supply deficit. New WTP is required for Bennettesbridge. Decommission existing Bennettsbridge WTP.											

Table A.6 Fine Screening Summary of Surface Water and Rationalisation Options in SAL

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
SAL-007	Rationalise Ballyragget to Kilkenny City WRZ for increased resilience and long term OPEX savings.									0	0	-17
SAL-025	Rationalise Gowran-Goresbridge-Paulstown to Kilkenny City WRZ.									0	0	-18
SAL-040	Rationalise Bennetsbridge and Thomastown to Kilkenny City WRZ.									0	0	-20
SAL-067	Rationalise Bennetsbridge to Kilkenny City WRZ (Troyswood WTP).									1	0	-26
SAL-080	Rationalise Bennetsbridge and Thomastown to Kilkenny City WRZ.									0	0	-20

Table A.7 Fine Screening Summary of WTP Upgrade Options in SAL

Option Reference	Name	Environmental								Total -3 Scores	Environmental Scoring	
		Population, Health, Economy and	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
SAL-005	Upgrade WTPs for water quality improvements. Prevent flooding of existing infiltration gallery.									0	0	-11
SAL-009	New WTP at green field site for Mountain River source to supply full demand and decommission existing Borris WTP.									0	1	-10

## Appendix B SA Approaches for SAL

Note: SA Options are also referred to as Group Options

WRZ	Preferred Approach - SA Approach 1		Least Cost - SA Approach 1		Best Environmental - SA Approach 3	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
0100SC0009: Borris	SAL-083 Rationalise Borris WRZ to Gowran-Goresbridge-Paulstown WRZ.	26	SAL-083 Rationalise Borris WRZ to Gowran-Goresbridge-Paulstown WRZ.	26	SAL-009 New WTP at green field site for Mountain River source to supply full demand and decommission existing Borris WTP.	-
0100SC0010: Ballinkillen	SAL-083 Rationalise Borris WRZ to Gowran-Goresbridge-Paulstown WRZ.	26	SAL-083 Rationalise Borris WRZ to Gowran-Goresbridge-Paulstown WRZ.	26	SAL-001 Increase GW abstraction and upgrade Ballinkillen WTP to supply deficit.	-
1500SC0002: Glenmore PWS	SAL-015 Increase GW abstraction from Busherstown Springs and upgrade Glenmore WTP to supply deficit.	-	SAL-015 Increase GW abstraction from Busherstown Springs and upgrade Glenmore WTP to supply deficit.	-	SAL-015 Increase GW abstraction from Busherstown Springs and upgrade Glenmore WTP to supply deficit.	-
1500SC0003: Kilkenny City	SAL-052 Upgrade Troyswood WTP and abandon Radestown WTP.	11	SAL-052 Upgrade Troyswood WTP and abandon Radestown WTP.	11	SAL-055 Increase abstraction from River Nore and upgrade WTP Troyswood to supply deficit. Decommission Radestown WTP (RAL).	16

WRZ	Preferred Approach - SA Approach 1		Least Cost - SA Approach 1		Best Environmental - SA Approach 3	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
1500SC0007: Ballyragget PWS	SAL-007 Rationalise Ballyragget to Kilkenny City WRZ for increased resilience and long term OPEX savings.	11	SAL-007 Rationalise Ballyragget to Kilkenny City WRZ for increased resilience and long term OPEX savings.	11	SAL-005 Upgrade WTPs for water quality improvements. Prevent flooding of existing infiltration gallery.	-
1500SC0012: Gowran-Goresbridge-Paulstown	SAL-085 New GW abstraction and new WTP located at Woodquater to supply full demand - currently under development and maintain existing abstraction.	26	SAL-085 New GW abstraction and new WTP located at Woodquater to supply full demand - currently under development and maintain existing abstraction.	26	SAL-024 New GW abstraction and new WTP located at Woodquater to supply full demand - currently under development.	14
1500SC0013: Graiguenamanagh PWS	SAL-036 Rationalise Graiguenamanagh to Thomastown WRZ	21	SAL-036 Rationalise Graiguenamanagh to Thomastown WRZ	21	SAL-037 Rationalise Graiguenamanagh to Gowran-Goresbridge-Paulstown WRZ	14
1500SC0017: Thomastown/Inistioge	SAL-036 Rationalise Graiguenamanagh to Thomastown WRZ	21	SAL-036 Rationalise Graiguenamanagh to Thomastown WRZ	21	SAL-042 Interconnect Bennetsbridge and Thomastown with Kilkenny City WRZ for increased resilience and supply deficit.	16
1500SC0020: Bennetsbridge & Kilmaganny	SAL-078 New GW abstraction and new WTP for Bennettesbridge.	-	SAL-078 New GW abstraction and new WTP for Bennettesbridge.	-	SAL-079 Interconnect Bennetsbridge and Thomastown with Kilkenny City WRZ for increased resilience and	16



WRZ	Preferred Approach - SA Approach 1		Least Cost - SA Approach 1		Best Environmental - SA Approach 3	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
					supply deficit. New WTP is required for Bennettesbridge. Decommission existing Bennettsbridge WTP.	
3300SC0025: New Ross	SAL-073 New GW abstraction/wellfield located south of New Ross WRZ and new WTP to supply deficit.	-	SAL-073 New GW abstraction/wellfield located south of New Ross WRZ and new WTP to supply deficit.	-	SAL-073 New GW abstraction/wellfield located south of New Ross WRZ and new WTP to supply deficit.	-

WRZ	Quickest Delivery - SA Approach 2		Most Resilient - SA Approach 3		Lowest Carbon - SA Approach 1	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
0100SC0009: Borris	SAL-009 New WTP at green field site for Mountain River source to supply full demand and decommission existing Borris WTP.	-	SAL-009 New WTP at green field site for Mountain River source to supply full demand and decommission existing Borris WTP.	-	SAL-083 Rationalise Borris WRZ to Gowran-Goresbridge-Paulstown WRZ.	26
0100SC0010: Ballinkillen	SAL-001 Increase GW abstraction and upgrade Ballinkillen WTP to supply deficit.	-	SAL-001 Increase GW abstraction and upgrade Ballinkillen WTP to supply deficit.	-	SAL-083 Rationalise Borris WRZ to Gowran-Goresbridge-Paulstown WRZ.	26

WRZ	Quickest Delivery - SA Approach 2		Most Resilient - SA Approach 3		Lowest Carbon - SA Approach 1	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
1500SC0002: Glenmore PWS	SAL-015 Increase GW abstraction from Busherstown Springs and upgrade Glenmore WTP to supply deficit.	-	SAL-015 Increase GW abstraction from Busherstown Springs and upgrade Glenmore WTP to supply deficit.	-	SAL-015 Increase GW abstraction from Busherstown Springs and upgrade Glenmore WTP to supply deficit.	-
1500SC0003: Kilkenny City	SAL-050 Upgrade Troyswood WTP. WRZ is not in deficit. Decommission Radestown WTP.	-	SAL-055 Increase abstraction from River Nore and upgrade WTP Troyswood to supply deficit. Decommission Radestown WTP (RAL).	16	SAL-052 Upgrade Troyswood WTP and abandon Radestown WTP.	11
1500SC0007: Ballyragget PWS	SAL-005 Upgrade WTPs for water quality improvements. Prevent flooding of existing infiltration gallery.	-	SAL-005 Upgrade WTPs for water quality improvements. Prevent flooding of existing infiltration gallery.	-	SAL-007 Rationalise Ballyragget to Kilkenny City WRZ for increased resilience and long term OPEX savings.	11
1500SC0012: Gowran-Goresbridge-Paulstown	SAL-30 Interconnect Gowran-Goresbridge-Paulstown with Bagenalstown WRZ (Study Area 6) for increased resilience and supply deficit.	05	SAL-024 New GW abstraction and new WTP located at Woodquater to supply full demand - currently under development.	14	SAL-085 New GW abstraction and new WTP located at Woodquater to supply full demand - currently under development and maintain existing abstraction.	26
1500SC0013: Graiguemanagh PWS	SAL-035 New GW abstraction and new WTP to supply deficit.	-	SAL-037 Rationalise Graiguemanagh to Gowran-Goresbridge-Paulstown WRZ	14	SAL-036 Rationalise Graiguemanagh to Thomastown WRZ	21

WRZ	Quickest Delivery - SA Approach 2		Most Resilient - SA Approach 3		Lowest Carbon - SA Approach 1	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
1500SC0017: Thomastown/Inistioge	SAL-047 Interconnect Thomastown with New Ross WRZ for increased resilience and supply deficit from New Ross.	20	SAL-042 Interconnect Bennetsbridge and Thomastown with Kilkenny City WRZ for increased resilience and supply deficit.	16	SAL-036 Rationalise Graiguenamanagh to Thomastown WRZ	21
1500SC0020: Bennetsbridge & Kilmaganny	SAL-078 New GW abstraction and new WTP for Bennettesbridge.	-	SAL-079 Interconnect Bennetsbridge and Thomastown with Kilkenny City WRZ for increased resilience and supply deficit. New WTP is required for Bennettesbridge. Decommission existing Bennetsbridge WTP.	16	SAL-078 New GW abstraction and new WTP for Bennettesbridge.	-
3300SC0025: New Ross	SAL-075 New GW abstraction/wellfield located south of New Ross WRZ and new WTP to supply deficit.	20	SAL-073 New GW abstraction/wellfield located south of New Ross WRZ and new WTP to supply deficit.	-	SAL-073 New GW abstraction/wellfield located south of New Ross WRZ and new WTP to supply deficit.	-

WRZ	Best Appropriate Assessment - SA Approach 3	
	Option Description	SA Option
0100SC0009: Borris	SAL-009 New WTP at green field site for Mountain River source to supply full demand and decommission existing Borris WTP.	-
0100SC0010: Ballinkillen	SAL-001 Increase GW abstraction and upgrade Ballinkillen WTP to supply deficit.	-
1500SC0002: Glenmore PWS	SAL-015 Increase GW abstraction from Busherstown Springs and upgrade Glenmore WTP to supply deficit.	-
1500SC0003: Kilkenny City	SAL-055 Increase abstraction from River Nore and upgrade WTP Troyswood to supply deficit. Decommission Radestown WTP (RAL).	16
1500SC0007: Ballyragget PWS	SAL-005 Upgrade WTPs for water quality improvements. Prevent flooding of existing infiltration gallery.	-
1500SC0012: Gowran-Goresbridge-Paulstown	SAL-024 New GW abstraction and new WTP located at Woodquater to supply full demand - currently under development.	14
1500SC0013: Graiguenamanagh PWS	SAL-037 Rationalise Graiguenamanagh to Gowran-Goresbridge-Paulstown WRZ	14
1500SC0017: Thomastown/Inistioge	SAL-042	16

WRZ	Best Appropriate Assessment - SA Approach 3	
	Option Description	SA Option
	Interconnect Bennetsbridge and Thomastown with Kilkenny City WRZ for increased resilience and supply deficit.	
1500SC0020: Bennettsbridge & Kilmaganny	SAL-079 Interconnect Bennetsbridge and Thomastown with Kilkenny City WRZ for increased resilience and supply deficit. New WTP is required for Bennettesbridge. Decommission existing Bennettsbridge WTP.	16
3300SC0025: New Ross	SAL-073 New GW abstraction/wellfield located south of New Ross WRZ and new WTP to supply deficit.	-