Summer 2023

Regional Water Resources Plan – North West

Strategic Environmental Assessment

Appendix H: Study Area E – Environmental Review

Tionscadal Éireann Project Ireland 2040

6 CLEAN WATER AND SANITATION

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

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

Limitation: This report has been prepared on behalf of, and for the exclusive use of Jacobs' Client (Uisce Éireann), and is subject to, and issued in accordance with, the provisions of the contract between Jacobs and the Client. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party.

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1 Introduction and Background

1 Introduction and Background

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

This Study Area E 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 E within the North West Region for the options and approaches considered and as outlined in the Study Area E Technical Report (draft RWRP-NW Appendix 5). This Environmental Review applies the Strategic Environmental Assessment (SEA) objectives and environmental assessment methodology set out in the NWRP Framework Plan (Framework Plan).

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

1.1 Options Assessment Methodology

The Options Assessment Methodology as adopted in the Framework Plan and implemented as part of the RWRP-NW provides a framework to identify potential solutions to address identified need. The key stages of the process are illustrated in 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

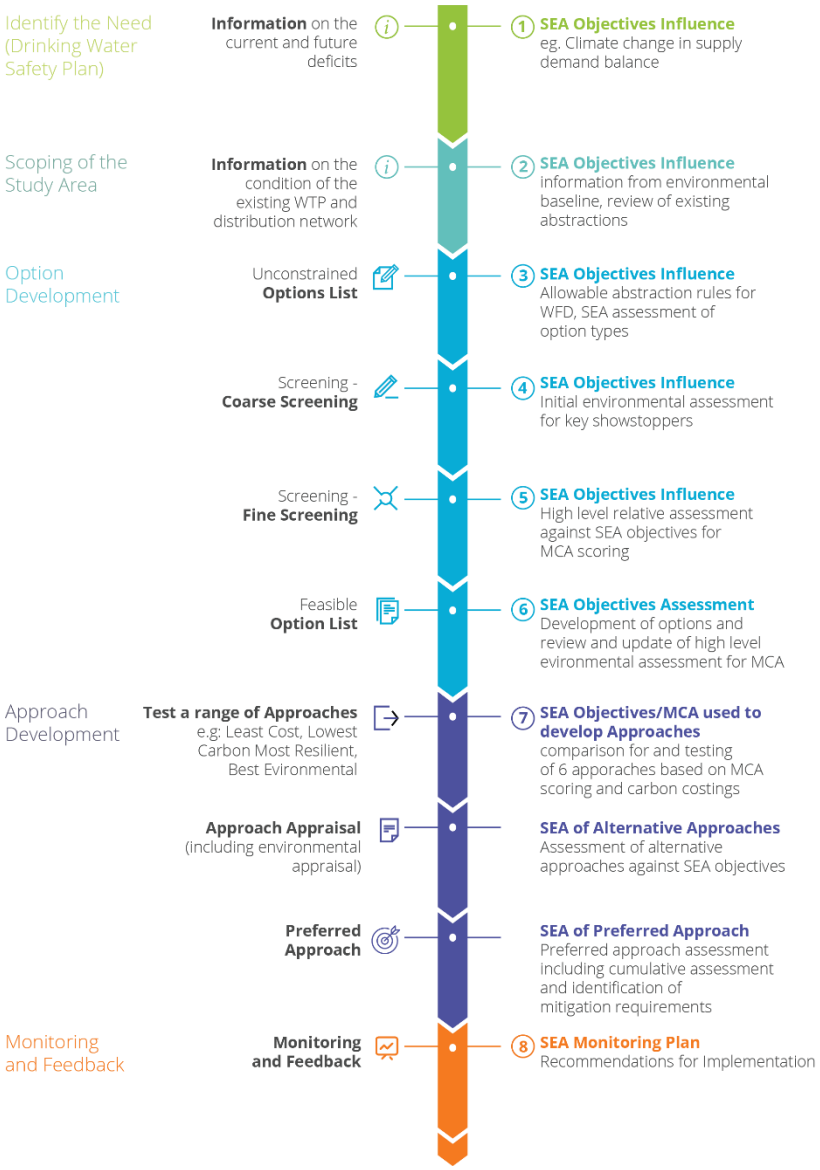

Figure 1.1 Option and Approach Development Process

the 5 year plan cycle and includes an annual review to identify actions required within the plan cycle.

1.2 Regional Plan Strategic Environmental Assessment

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

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

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

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

1.3 Study Area: Strategic Environmental Assessment

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

Table 1.1 SEA Objectives

SEA Topic	SEA Objective
Population, economy, tourism and recreation, and human health	Protect and, where possible, contribute to enhancement of human health and wellbeing and to prevent restrictions to recreation and amenity facilities in providing water services.
Water environment	<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. Minimise impacts on other material assets and existing water abstractions.

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

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

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

If appropriate, the Preferred Approach identified for SAE 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 SAE 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 SAE are provided in chapter 9 of this review.

1.6 Study Area E

The North West Region is subdivided into seven study areas based on factors such as:

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

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

Study Area E lies within the counties of Louth, Monaghan, Meath, and Cavan and its total area is approximately 1,260 km^2. There are two principal settlements (with a population of over 10,000) within SAE, namely Drogheda, and Dundalk (CSO, 2016a), as shown in Figure 1.3.

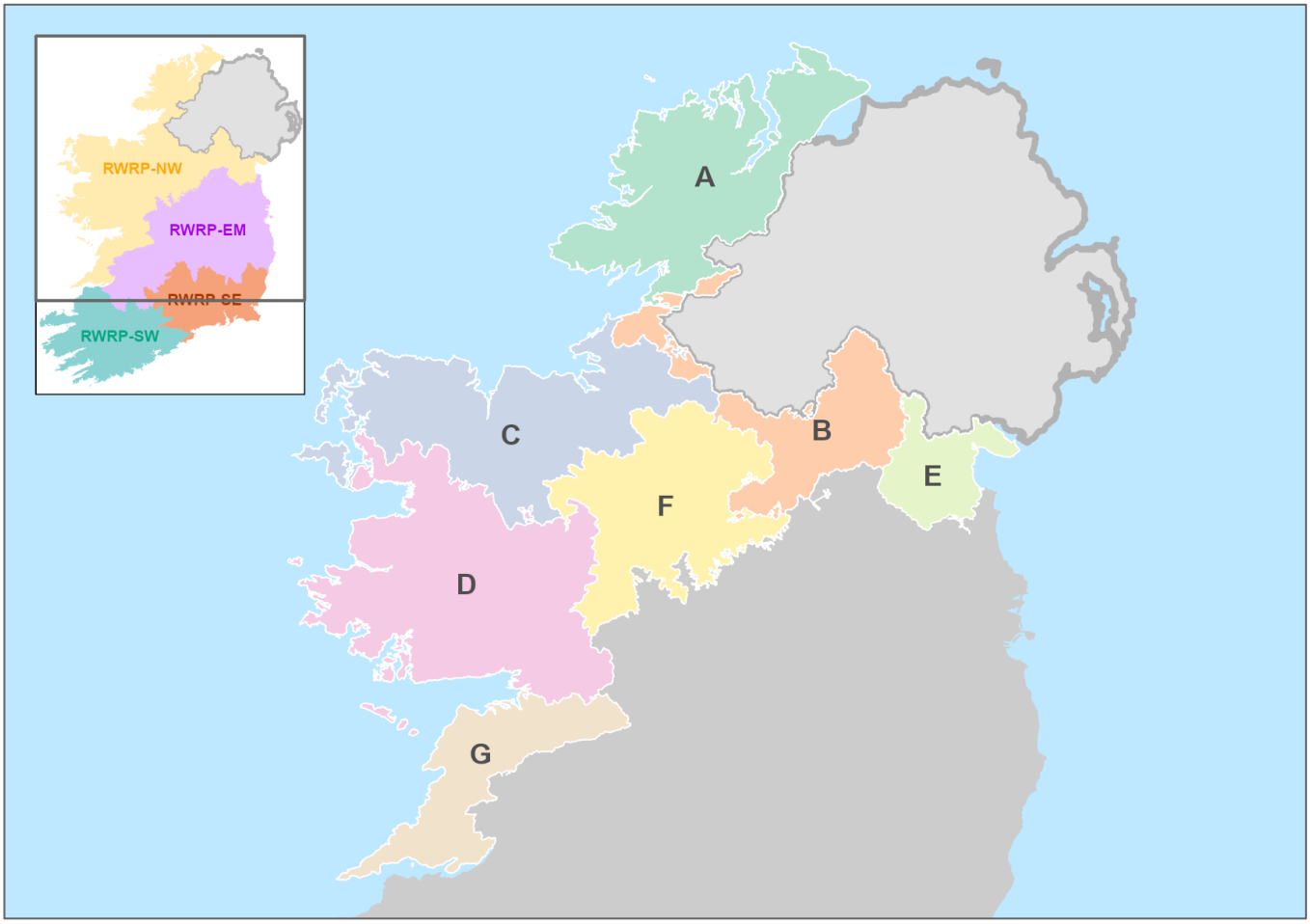

Figure 1.2 North West Region Study Areas

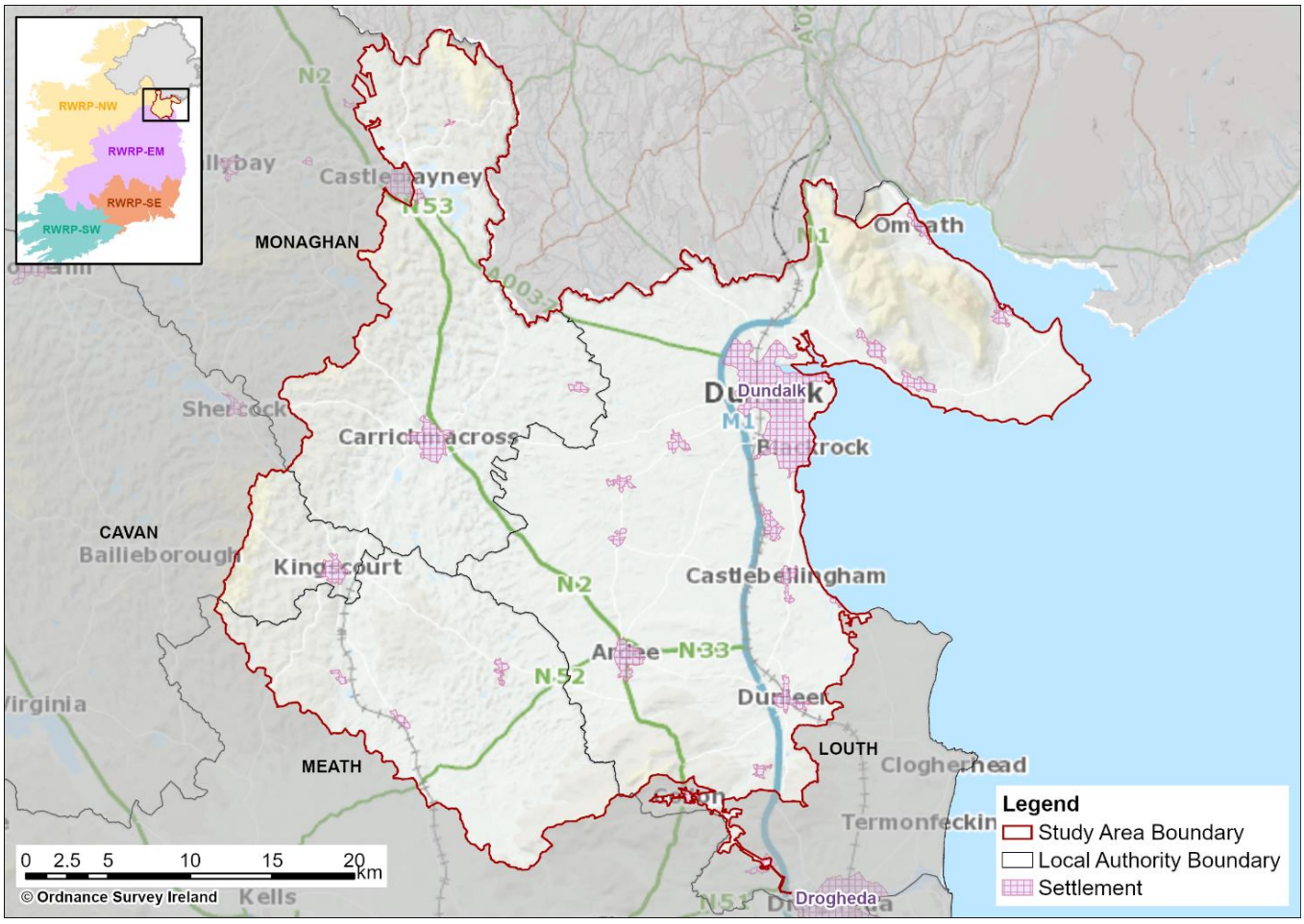

Figure 1.3 Study Area E

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Study Area E Environmental Baseline Context

2 Study Area E Environmental Baseline Context

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

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

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

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

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

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

2.1.1 Population

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

Table 2.1 Overview of the Population within the WRZs of SAE

WRZ Reference Number and Name	Total Population Served (2019)*	% Population Change (2019-2044)*
2100SC0007 - Ardee/Collon/Drybridge	12,969	21.4
2100SC0013 - Carrickarnon (Water Supplied from Northern Ireland (NI) Water Import)	5	15.3
2400SC0006 - Carrickmacross	5,229	15.3
2300SC0024 - Castletown (Meath County Council)	108	15.3
2100SC0002 - Cavanhill & North Louth	60,028	33.0
2300SC0004 - Drumcondrath	1,204	15.3
2400SC0009 - Inniskeen	509	15.3
2300SC0025 - Kilmainhamwood/Nobber	1,031	39.2
0200SC0018 - Kingscourt PWS	2,969	15.3

*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

SAE had a below average household disposable income per person in 2019 (CSO, 2022), and an unemployment rate of 4% in the Border region, and 4% in the Mid-East region of the country (CSO, 2023a).

Population increase and expected economic growth has meant that housing and sustainable urban development have been made a priority for the National Development Programme; therefore, to supply the demand there is an aim to increase housing stock. The number of new dwellings completed in Q1 2023 was 339 for the Border region, and 1,338 for the Mid-East region (CSO, 2023b).

2.1.3 Tourism and Recreation

Tourism in SAE has an important role, particularly in rural areas, with the National Planning Framework (NPF) stating that tourism is a key aspect of rural job creation now and in the future (Government of Ireland, 2018). The county of Louth has been described as "*the land of legends, and full of life*", emphasising myth, legends, family fun and adventure, vibrant towns, legendary and historic sites as key assets for the area (Visit Louth, 2012).

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). There are no National Parks within SAE. 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 Border and Mid-East regions within Ireland. Improvements in air quality, access to good quality drinking water and participation in recreational activities can all have a positive influence on human health and well-being.

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

Region	Life Expectancy (CSO, 2020a)	Participation in Sports, Fitness or Recreational Physical Activities (% of Persons Aged 15+) (CSO, 2020b)	Air Quality (EPA, 2021)
Border	Male: 79.5 Female: 83.5	35%	Good
Mid-East	Male: 80.3 Females: 84.0	49%	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 SAE.

Table 2.3 Areas Supplied by the WTPs in SAE

Water Treatment Plants	Water Resource Zone	Local Authority Supplied
Ardee WTP, Collon WTP, Drybridge WTP	2100SC0007 - Ardee/Collon/ Drybridge	Louth
Nafarty WTP	2400SC0006 - Carrickmacross	Monaghan
Castletown WTP	2300SC0024 - Castletown (Meath County Council)	Meath
Ardtullybeg WTP, Carlingford WTP, Cavanhill WTP, Cooley (Carlingford) WTP, Greenmount WTP and Tallanstown WTP	2100SC0002 - Cavanhill & North Louth	Louth
Drumcondrath WTP	2300SC0004 - Drumcondrath	Meath
Inniskeen WTP	2400SC0009 - Inniskeen	Monaghan
Kilmainhamwood WTP and Nobber WTP	2300SC0025 - Kilmainhamwood/ Nobber	Meath
Lisanisky WTP	0200SC0018 - Kingscourt PWS	Cavan

Currently for day-to-day operations, 3 out of 9 of the WRZs in the area have a current SDB deficit and 4 have a projected SDB deficit (based on a 'Do Minimum' approach – see section 4.5 for further clarification). However, under normal weather and demand conditions, the current deficit does not

manifest as an interruption to supply for all WRZs. During recent dry periods, particularly the summer of 2018 and 2020 when water conservation orders were implemented, a number of the supplies in SAE were impacted. Night-time restrictions have also been implemented in recent years for the Ardee/Collon/ Drybridge supply.

Poor water quality can be linked to risks to health. The Barrier Assessment identified 14 of the 16 WTPs within the study area at high risk of failing to achieve the Uisce Éireann's conservative Barrier Assessment standards. Particularly in relation to maintaining chlorine residual in the network (Barrier 2.1) (see Table 2.1 in the SAE 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's assessment of the need to invest in areas of the Uisce Éireann asset base through resource planning, to ensure that potential risks or emerging risks to supplies are addressed. Currently, there are three WRZs on the EPA Remedial Action List within SAE, Tallanstown, Greenmount and Drumcondrath. Uisce Éireann is currently progressing immediate corrective action in relation to a number of supplies within SAE in advance of the NWRP. Details of these are included in the SAE 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 SAE.

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

Table 2.4 Catchments within SAE (EPA, 2020)

WFD Catchments	Total Catchment Area (km^2)	Catchment Area within SAE (km^2)
Newry, Fane, Glyde and Dee	1,675	1,255
Boyne	2,690	5

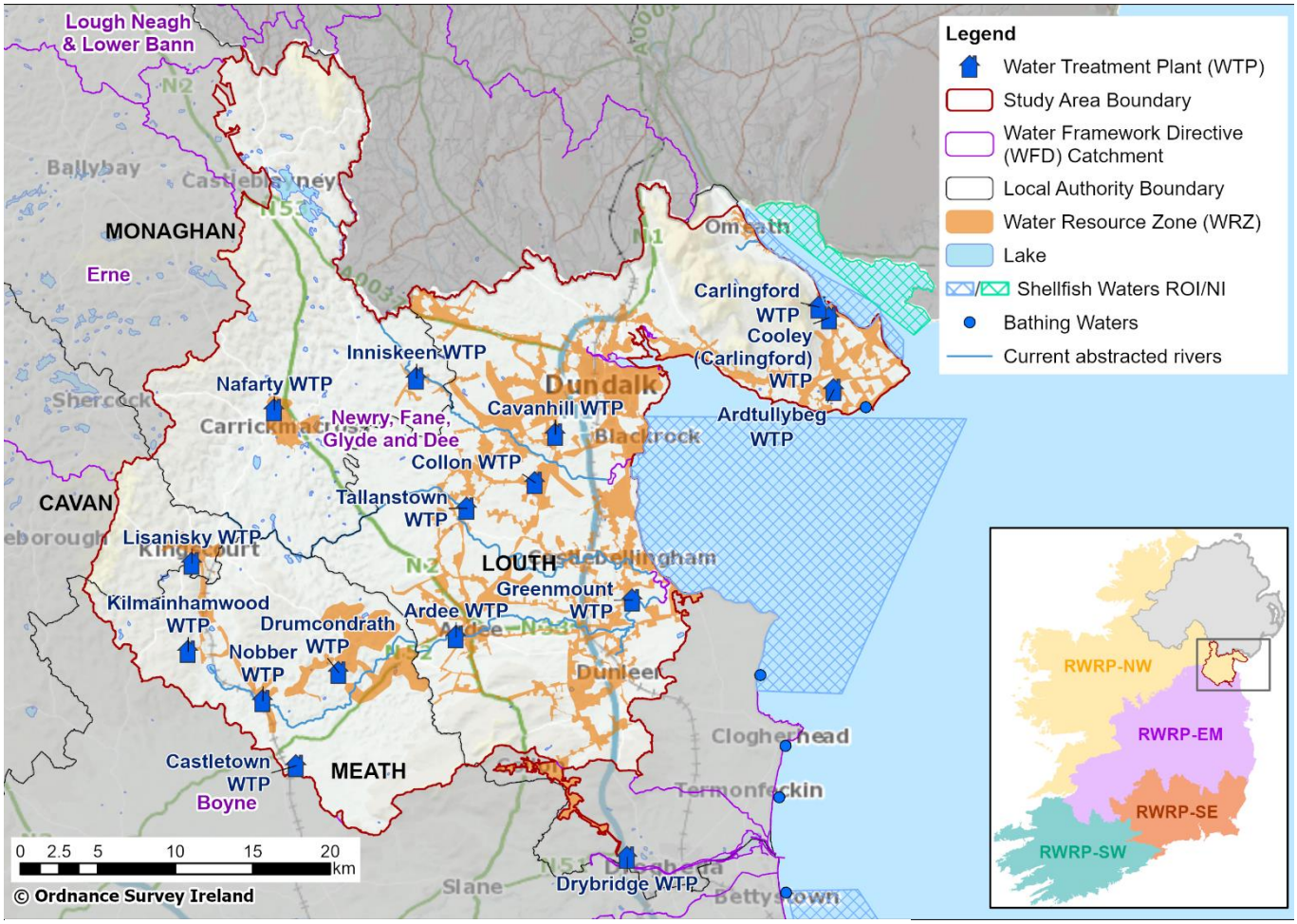

Figure 2.1 Water Environment of SAE

2.2.1 Water Framework Directive

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

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

Whilst the regulations and guidelines for the new abstraction regime are being developed, Uisce Éireann are assessing existing abstractions to identify surface water sites that may exceed future abstraction thresholds (see Appendix C of the Framework Plan for assessment methodology). Uisce Éireann have taken a precautionary approach based on their current understanding of how proposed abstraction legislation might be applied. This assessment suggests that certain schemes may be subject to reductions in abstraction under the new legislation; however, this will ultimately 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 SAE Technical Report). Over the coming years, Uisce Éireann will work with the environmental regulator, the EPA and the Geological Survey of Ireland, to develop desktop and site investigation systems to better understand the sustainability of its groundwater sources.

To understand the potential impact of the Abstraction Legislation on the SAE supplies, Uisce Éireann have assessed the potential impacts on their eight surface water abstractions: River Dee/Greenmount (Cavanhill & North Louth), Barnavave (Cavanhill & North Louth), Kilbride/River Glyde (Cavanhill & North Louth), Carlingford Mountian (Unnamed Stream) (Cavanhill & North Louth), River Fane (Stephenstown) (Cavanhill & North Louth), River Dee (Ardee) (Ardee/Collon/Drybridge), Fane River (Inniskeen), and Lough Brackan (Drumcondrath).

Based on this initial assessment, the volumes of water abstracted at Barnavave (Cavanhill & North Louth), Carlingford Mountain (Cavanhill & North Louth), River Fane (Cavanhill & North Louth), and Lough Bracken (Drumcondrath) may not meet sustainability guidelines during dry weather flows. However, under the proposed regulatory regime, this will be adjudicated by the EPA. We have assumed, given the need to maintain supplies, that a transition to new abstraction quantities would likely take place in the medium term.

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

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

There is one WFD catchment in SAE and the total number of surface and groundwater waterbodies within SAE are provided in Table 2.5 below.

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

Waterbody Type	Water Catchments	Number of Waterbodies	Number of Waterbodies Rated Below Moderate
Rivers	Boyne	4	0
	Newry, Fane, Glyde and Dee	64	21
Lakes	Boyne	0	0
	Newry, Fane, Glyde and Dee	9	3
Transitional and Coastal	N/A	13	1
Groundwater	N/A	16	1

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

- Boyne: Agriculture (68%) and Hydromorphology (41%); and

- Newry, Fane, Glyde and Dee: Agriculture (65%), and Hydromorphology (33%).

The Acurry lake, Bane Noggin Hill Lake, Fane_040 river and Bracken lake waterbodies are at particular risk of abstraction in SAE. Table 2.6 includes a summary of the 'at risk' waterbodies within SAE.

Table 2.6 Summary of 'At Risk' Waterbodies in SAE (EPA, 2023b)

Waterbody Type	Water Catchments	Number of Waterbodies Identified as 'At Risk'	Surface Waterbodies Status 'At Risk' Due to Abstraction Pressure*
Rivers	Boyne	1	3
	Newry, Fane, Glyde and Dee	34	
Lakes	Boyne	0	1
	Newry, Fane, Glyde and Dee	6	
Transitional and Coastal	N/A	2	0
Groundwater	N/A	1	N/A
Total		**44**	**4**

* Based on Uisce Éireann assessment of their current abstractions

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

Table 2.7 'Areas for Action' within SAE (catchments.ie, 2022)

Areas for Action	Key Reasons for Selection
Big River (Louth)	• One waterbody within the catchment isn't achieving it's good status objective and it is unsure the reason why
Castletown	• There is one deteriorated river water body, Castletown_030 • To build on recent improvements in the two water bodies upstream feeding into Castletown_030. • Improvements would benefit Castletown estuary. Cross Border Partnership may be required.
Glyde-Proules	• Five waterbodies in the Glyde-Proules PAA have recently reported a deterioration in water quality • One of the deteriorated waterbodies, the Glyde_050, is also not meeting its protective area objective • There is the potential to build on recent improvements which has been noted in two of the waterbodies. • The Area for Action spans across three counties which required a cross border partnership

Areas for Action	Key Reasons for Selection
	• Plans are already proposed to upgrade and carry out works at the Carrickmacross WWTP
Kilmainham (Dee)	• Part of the Office of Public Works (OPW) drainage network • Not achieving good water quality status due to increased levels of orthophosphate in the river
Moynalty	• Currently, the rivers are not reaching their potential to provide a diverse habit for animals, insects, fish and plants • All of the waterbodies in the catchment are achieving moderate or poor water quality status

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 SAE.

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 2021 to 2030. CAP 2021 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	• Protecting and improving water quality and improving water services infrastructure are major challenges in Ireland • Climate change-induced threats will increase the scale of these challenges • Risks to water quality and water infrastructure arise from changing rainfall patterns and different annual temperature profiles. The frequency and intensity of storms and sea level rise are also considered
The challenges: Water services infrastructure	• Increased surface and sewer flooding leading to pollution, water and wastewater service interruptions • Reduced availability of water resources • Hot weather increasing the demand for water • Increased drawdown from reservoirs in the autumn/winter for flood capacity, leading to resource issues • Business continuity impacts or interruptions for water services providers
Primary adaptive measures	• Fully adopt the 'integrated catchment management' approach

Summary	
	• Improve treatment capacity and network functions for water services infrastructure • Water resource planning and conservation – on both supply and demand sides • Include climate measures in monitoring programmes and research • Many of these proposed adaptation actions are already underway through existing and scheduled water sector plans and programmes

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

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

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

Table 2.9 Climate Change Risks Identified by Local Authorities in SAE

County	Key Risk Areas
Cavan (Cavan County Council, 2019)	• Increased storms and intensity of rainfall • Flooding • Drought events and water shortages • Increased temperature extremes • Increased risk of new pests and diseases • Adverse impacts on water quality • Changes to distribution and phenology of plant and animal species
Louth (Louth County Council, 2019)	• Increases in temperature • Decreases in spring-summer precipitation leading to increased dry periods/drought

County	Key Risk Areas
	• Increased frequency and intensity of winter precipitation • Increase in extreme storm events • Changes to key phenological phases of a number of species
Meath (Meath County Council, 2019)	• Increased temperatures • Increased likelihood of droughts in summer • Extreme rainfall events • Flooding • Sea level rise and coastal erosion • Increased wind speeds and frequency of storms
Monaghan (Monaghan County Council, 2019)	• More intense storms and rainfall events • Increased river and coastal flooding • Drought events and water shortages • Increased temperature extremes • Increased risk of new pests and diseases • Adverse impacts on water quality • Changes to distribution and phenology of plant and animal species

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 SAE, not all supplies within the study area meet the required levels of reserve capacity. As evidenced in the 2018 and 2020 drought, there is the potential for this deficit to affect access to water in the future. This situation could further deteriorate over time due to climate change driven reductions in water resources.

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

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

2.4 Biodiversity, Flora and Fauna

2.4.1 Designated Sites

Within SAE 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.

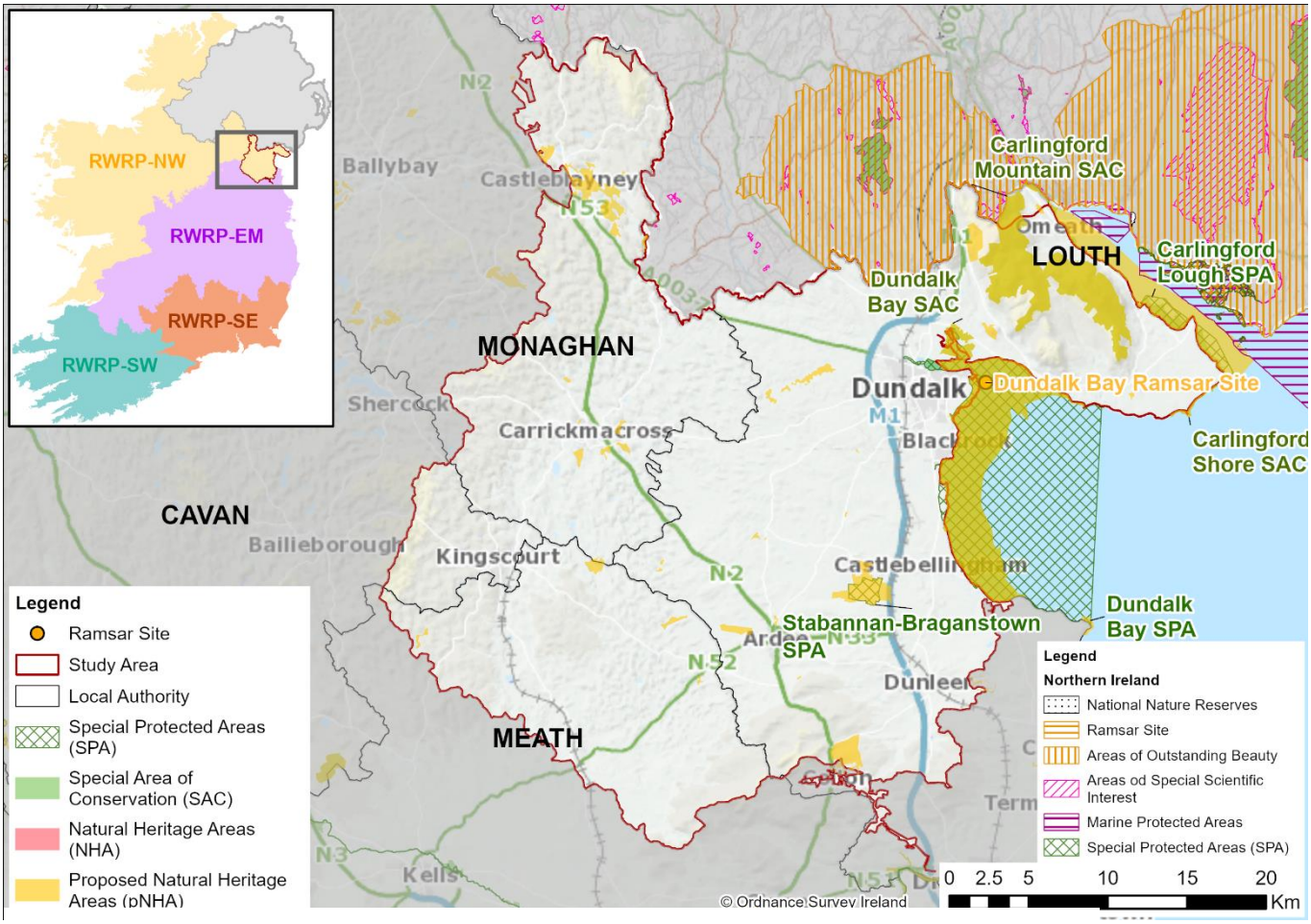

Figure 2.2 Designated Sites in SAE

Table 2.10 Designated Sites within SAE (NPWS, 2023)

Receptor	Name	Total Number
Special Protected Area (SPA)	Dundalk Bay SPA	3
	Carlingford Lough SPA	
	Stabannan-Braganstown SPA	
Special Area of Conservation (SAC)	Carlingford Mountain SAC	3
	Dundalk Bay SAC	
	Carlingford Shore SAC	
Ramsar Sites	Dundalk Bay	1
Nature Reserves	N/A	0
National Parks	N/A	0
Natural Heritage Areas (NHAs)	N/A	0
Proposed Natural Heritage Areas (pNHAs)	See Figure 2.2	31

2.4.2 Habitats

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

Table 2.11 Habitat Areas for SAE (EPA, 2018)

Habitat	Ha	% of Study Area
Agricultural Land		
Pastures	88,180	69.93%
Non-irrigated arable land	18,897	14.99%
Land principally occupied by agriculture, with significant areas of natural vegetation	5,237	4.15%
Complex cultivation patterns	1,671	1.32%
Natural Habitats		
Moors and heathland	1,955	1.55%
Peat bogs	1,514	1.20%
Water bodies	430	0.34%
Natural grasslands	310	0.25%
Salt marshes	158	0.13%
Inland marshes	132	0.10%
Intertidal flats	74	0.06%
Sea and ocean	26	0.02%
Forest		
Coniferous forest	1,115	0.88%
Mixed forest	992	0.79%
Transitional woodland-shrub	639	0.51%
Broad-leaved forest	368	0.29%

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

- Bog habitats – transition mires and quaking bog habitats;
- Alkaline fens;
- Groundwater dependant terrestrial habitats, such as blanket bogs; and
- Northern Atlantic wet heaths with *Erica tetralix.*

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

2.4.3 Species

The key species (Nelson et al, 2019) of concern within SAE are waterbirds of 'qualifying interest' e.g. Brent goose (*Branta bernicla*), Greylag goose (*Anser anser*), and winter migratory waders.

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

Animals:

- A colonial sea squirt (*Didemnum* spp.);
- American mink (*Mustela/Neovison vison*);
- Brown rat (*Rattus norvegicus*);
- Canada goose (*Branta canadensis*);
- Common carp (*Cyprinus carpio*);
- Grey squirrel (*Sciurus carolinensis*);
- Greylag goose (*Anser anser*);
- Japanese skeleton shrimp (*Caprella mutica*);
- Roach (*Rutilus rutilus*);
- Ruddy duck (*Oxyura jamaicensis*);
- Slipper limpet (*Crepidula fornicata*);
- Stalked/leathery sea squirt (*Styela clava*); and
- Zebra mussel (*Dreissena polymorpha*).

Plants:

- Cord-grasses (*Spartina* spp.);
- Dwarf eel-grass (*Zostera japonica*);
- Giant hogweed (*Heracleum mantegazzianum*);
- Giant-rhubarb (*Gunnera tinctoria*);
- Himalayan/Indian balsam (*Impatiens glandulifera*);
- Himalayan knotweed (*Persicaria wallichii*);
- Japanese knotweed (*Fallopia japonica*);
- Rhododendron (*Rhododendron ponticum*);
- Salmonberry (*Rubus spectabilis*);
- Sea-buckthorn (*Hippophae rhamnoides*);
- Spanish bluebell (*Hyacinthoides hispanica*);
- Three-cornered leek (*Allium triquetrum*);
- Wakame (*Undaria pinnatifida*);
- Water fern (*Azolla filiculoides*);
- Waterweeds (*Elodea* spp.); and
- Wireweed (*Sargassum muticum*).

2.5 Material Assets

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

Some of the natural assets within SAE are listed in Table 2.12, such as agricultural land and discontinuous urban fabric.

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 16 WTPs in SAE, meeting the average demand of 28 Ml/d in 2019.

There are no canals or ports of national or regional significance in SAE. There are no airports of local significance. Other significant transport infrastructure includes the main road network (particularly the M1, N2, N33, N52, and N53).

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

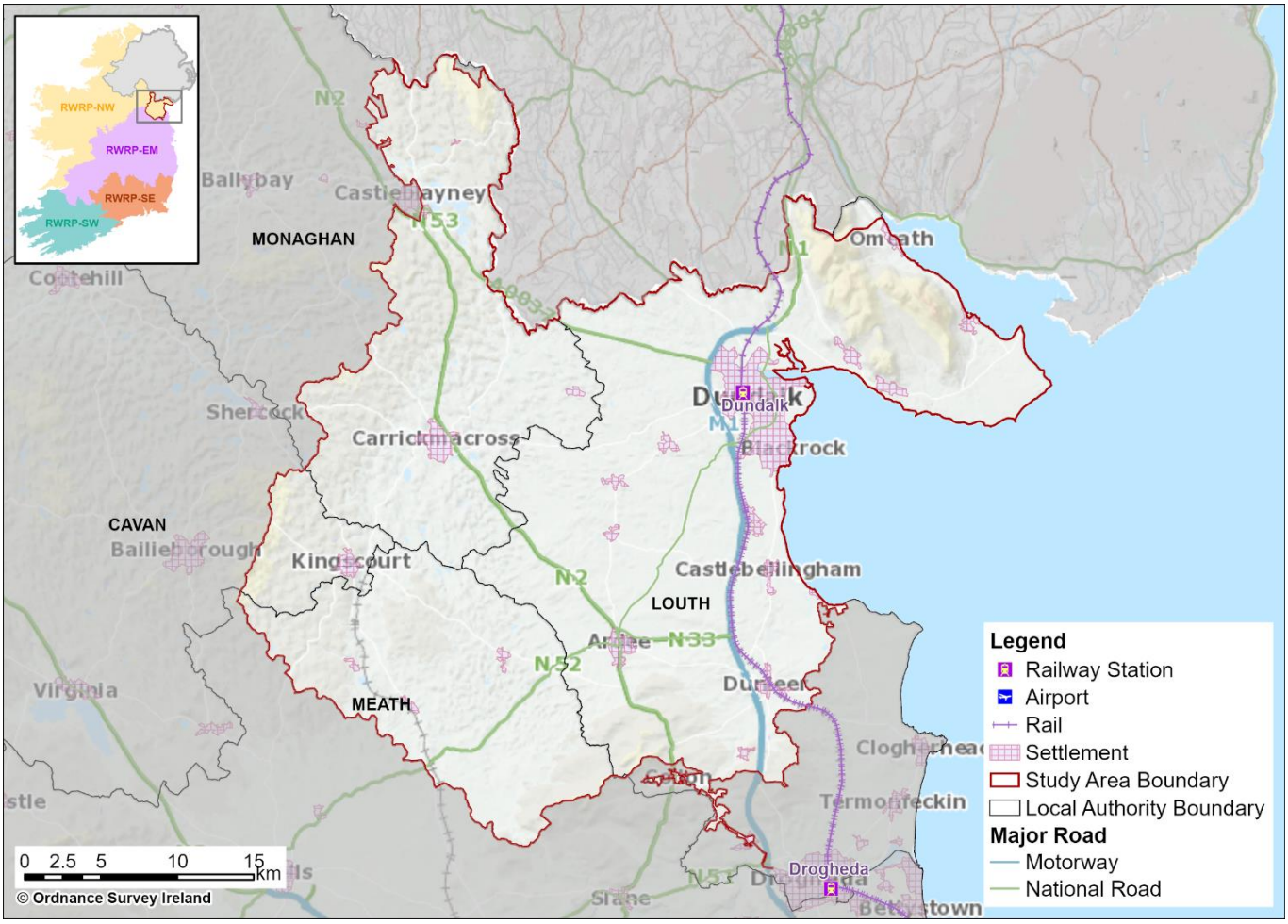

Figure 2.3 Transport Infrastructure in SAE

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

Land use	Ha	% of Study Area	Comparison to Overall North West Region %
Agriculture	113,985	90.40%	57.28%
Urban	4,129	3.27%	1.18%
Natural Habitats	4,599	3.65%	31.76%
Forest	3,114	2.47%	9.47%
Industry	210	0.17%	0.07%
Other	53	0.04%	0.24%

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

Table 2.13 gives an overview of the project developments which are available from myProjectIreland (2022) for SAE[3]. The myProjectIreland map focuses mainly on major projects with costs over €20 million. The map also includes all projects supported to date under the Government's Urban and Rural Regeneration Funds and reflects the full portfolio of projects in the pipeline at present.

Table 2.13 Proposed New Developments

Development		
Ardee bypass	Connected Medical Device Cybersecurity Transparency	Mount Avenue, Dundalk
Ardee Castle	DEFINE-AM – Disruptive Finishing using Electrochemical machining for Additive Manufacturing	Omeath Village Regeneration Strategy: Phase 1: Omeath Placemaking Strategy
Ardee Regeneration	Dublin Road, Dundalk, Co. Louth	Racecourse Meadows, Dundalk, Co. Louth -
Boyne Valley to Lakelands Greenway	Dundalk Bay Greenway - Dundalk - Templetown	St Joseph's Hospital, Ardee.
Bush Post Primary, Dundalk, Co. Louth - 71750U	Dundalk Flood Relief Scheme	St Mary's Hospital, Drogheda.
Carlingford Flood Relief Scheme	Dundalk Institute of Technology North and South Blocks	St. Nicholas Quarter Backlands and Regeneration

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

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

Development		
Carlingford Lough Greenway - Tourist Office, Carlingford - Templetown Beach	Kingscourt Town Centre Regeneration	The Kitchen Garden, Desmesne Road, Dundalk, Co. Louth
Carrickmacross Town Centre Renewal	Living in Carlingford-Visiting in Carlingford. A strategy for sustainable tourism in Carlingford	
Carrickmacross Workhouse Community Tourism & Arts Hub	Long Walk Quarter Dundalk	

2.6 Landscape and Visual Amenity

The National Landscape Strategy 2015-2025 is in the process of being implemented and will be Ireland's vehicle for complying with the EU Landscape Convention. Landscape assessment guidance is also available from the local authorities. This will be taken into account when identifying landscape character areas and protected areas at the project level in the future. Table 2.14 shows the sensitivity and value of the Landscape Character Areas (LCAs) within each of the counties listed within the study area[4].

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

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

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

Landscape Character Area	Sensitivity	Value
County: Cavan (Cavan County Council)		
No values or sensitivity information available		
County: Louth (Louth County Council, 2002)		
Cooley Lowlands & Coastal Area	Low	-
Carlingford Lough & Mountains including West Feede uplands	High	-
Lower Faughart, Castletown & Flurry River Basins	Low	-
Louth Drumlin & Lake Areas	Medium	-
Muirhevna Plain	Medium	-
Dundalk Bay Coast	Medium	-
Dunany, Boyne Estuary Close	Medium	-
Uplands of Collon, Monasterboice	Medium	-

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

Landscape Character Area	Sensitivity	Value
Boyne & Mattock Valley	High	-
County: Meath (Meath County Council, 2016)		
Boyne Valley	High	Exceptional
Nanny Valley	High	Very High
Royal Canal	Medium	High
Blackwater Valley	High	Very High
North Navan Lowlands	Medium	Moderate
Central Lowlands	Medium	High
The Ward Lowlands	High	Low
South East Lowlands	Medium	Very High
Rathmoylon Lowlands	High	High
South West Lowlands	Medium	High
West Navan Lowlands	Medium	Moderate
South West Kells Lowlands	Medium	Moderate
Teervurcher Uplands	Medium	High
North Meath Lakelands	Low	Moderate
Rathkenny Hills	High	Very High
Bellewstown Hills	Medium	Very High
Tara-Skryne Hills	High	Exceptional
Lough Sheelin Uplands	High	High
Loughcrew and Slieve na Calliagh Hills	High	Exceptional
Coastal Plains	High	Moderate
County: Monaghan (Monaghan County Council, 2008)		
Slieve Beagh Uplands	High	-
Blackwater Valley & Drumlin Farmland	Medium	-
Smithborough Hills	Low	-
Clones River Valley & Farmed Uplands	Low	-
Monaghan Drumlin Uplands	Low	-
Mullyash Uplands	Medium	-
Ballybay Castleblayney Lakelands	Medium	-
Drumlin and Upland Farmland of South Monaghan	Low	-
Carrickmacross Drumlin & Lowland Farmland	Low	-

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 SAE; Northeastern Irish Sea Islands 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 air quality index rating of the area within SAE is rated as 'good'.

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

2.7.2 Noise

The main areas that experience noise pollution are likely to be areas along the main roads, particularly around the M1, N2, N33, N52, and N53.

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

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

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

Table 2.15 Cultural Heritage Assets within SAE

Assets	Total Number
National Monuments Service Sites	2,922
National Inventory of Architectural Heritage Sites	1,358
Sites and Monuments Record Zones	1,773

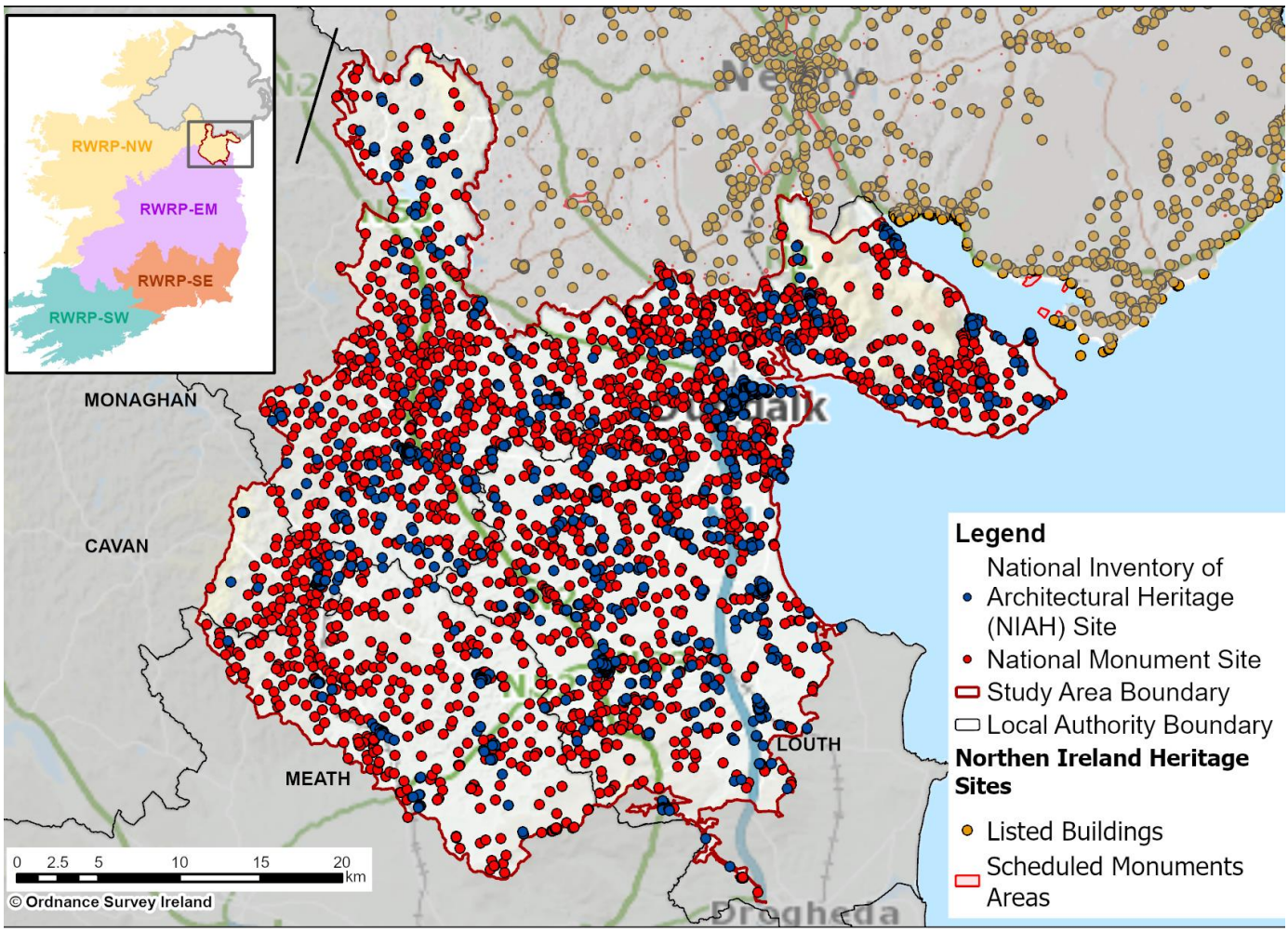

Figure 2.4 SAE Cultural Heritage Assets

2.9 Geology and Soils

Table 2.12 lists the land uses within SAE. SAE predominantly has a fine loamy soil type with areas of peaty soil to the north-east 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 SAE are shown in Figure 2.5.

The karst forms a key regionally important aquifer in some areas, most notably in the west of the study area around Carrickmacross, which consists of clean limestone that has been extensively karstified. Due

to the karstic nature of the aquifer, the permeabilities are likely to be variable. Thus, this aquifer is classified as a regionally important karstic aquifer (Rk).

The sandstone aquifers which outcrop nearby the aforementioned Carrickmacross area, are classified by the GSI as Locally Important Aquifers - generally moderately productive (Lm) and would generally offer less groundwater potential than the karst. The main units of interest here are the Kingscourt/Permian-Triassic Sandstones and the Carrickleck Sandstones. The Permian and Triassic are a very significant aquifer in Northern Ireland due to the high yields, however, they make up a much smaller area extent in the Republic. They generally consist of red shales, siltstones and sandstones. The Carrickleck Sandstones are composed of thick alternating sequences of sandstones with shales, with the Carrickleck Sandstone Member being cleaner and less shaley and are considered to be the more productive portions of the aquifer.

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

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, 47 of which have the potential to constrain water resource options in SAE.

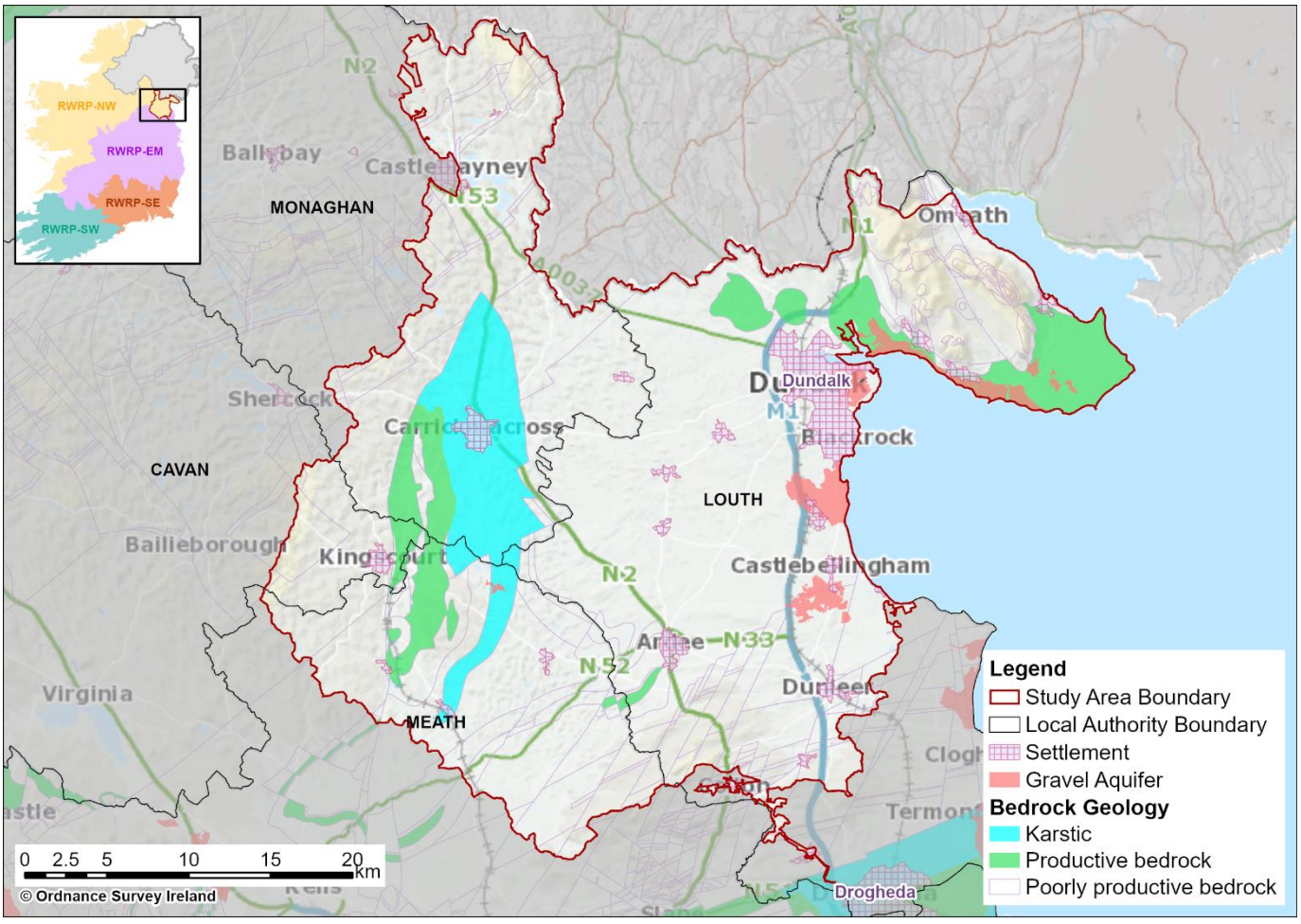

Figure 2.5 SAE Hydrogeology

2.10 Summary of Key Issues and Trends over the Plan Period

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

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

SEA Topic	Issues and Opportunities	Interrelated Topics
Population, Economy, Tourism and Recreation, and Human Health	**Issues:** Increasing population and the increased stress of climate change on water quality and water resources could affect health and well-being. **Opportunities**: Uisce Éireann will put in place plans to assess water quality and measures to address risks as part of the Regional Plan Uisce Éireann has ongoing activities to improve the Supply Demand Balance in SAE, including, leakage management and water conservation measures. Raising awareness of the importance of water conservation and efficiency measures, and the value of the environment for health and wellbeing, can play an important part in water planning. Valuing access to environment for recreation.	Climate change, biodiversity, water environment, material assets and landscape and visual amenity
Water Environment	**Issues**: The proposed abstraction licensing, aligned to WFD requirements, will require many current abstractions to be licensed and may limit future abstraction or involve significant conditions being imposed at associated sites. For SAE, 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 SAE Technical Report). This has been used to inform options identification and appraisal. 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. **Opportunities:** To take account of identified pressure on the water environment in the selection of solutions for SAE.	Biodiversity and climate change
Biodiversity, Flora and Fauna	**Issues:** For SAE, the Carlingford Mountain SAC includes surface waters in the North East of the study area. There are no High Ecological Status waterbodies within SAE.	Water resources, water quality and climate change

SEA Topic	Issues and Opportunities	Interrelated Topics
	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	
Material Assets	**Issues:** WTP assets and network infrastructure requiring improvement or replacement **Opportunities**: Improvements to support reliability of access to good quality water.	Health and wellbeing
Landscape and Visual Amenity	**Issues:** Potential for climate change to affect land use and habitats and influencing landscape quality and amenity.	Biodiversity and geology and soils, climate change, health and wellbeing
Air Quality and Noise	No specific issues identified for the baseline for SAE.	Health and wellbeing
Climate Change	**Issues**: Climate change issues regarding sea level rise, flooding, extreme weather events and changes in seasonal weather patterns. Climate change has been taken into account in supply forecasts and additional risks to infrastructure and operations will need to be taken into account in planning for drought and freeze/thaw events; and in detailed scheme design and network operation. **Opportunities:** Additional management to minimise impact on supply and the environment, vulnerability to climate change and drought is required.	Biodiversity and water environment
Cultural Heritage	**Issues:** Known cultural heritage and archaeological assets and potential unknown archaeological assets.	Health and wellbeing
Geology and Soils	**Issues**: General need for good soil conservation and retention of nutrients and carbon in soil resources **Opportunities:** Potential benefits from soil conservation for biodiversity, water quality and water retention also.	Biodiversity, water quality, landscape and climate change
Additional interrelated aspects	**Issues**: Poor water quality requiring additional water treatment and affecting aquatic biodiversity. **Opportunities:** Potential for catchment management initiatives leading to habitat, water retention, water quality enhancement and soil quality have the potential to provide wider benefits for environmental resilience and water supply; although this has not been specifically studied in this study area.	

3 Environmental Assessment – Options Appraisal

3 Environmental Assessment – Options Appraisal

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

3.1 Overview

Uisce Éireann applied its Options Assessment Methodology from the Framework Plan to identify potential solutions to meet the needs identified in the SAE 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 SAE are Stages 3-6:

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

3.2 Stage 3: Unconstrained Options

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

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

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

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

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

3.2.1 Existing Groundwater Abstractions

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

3.2.2 New Groundwater Abstractions

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

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

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

3.2.3 Sustainable Abstraction in Options Assessment

At the end of 2022, the government passed the Water Environment (Abstractions and Associated Impoundments) Act, 2022 (the Abstractions Act) which will ensure that national abstractions align with the requirements of the Water Framework Directive. The Abstractions Act has not yet commenced and the associated regulations and guidelines which will further detail the types of assessment and national methodology to be used have not yet been published and are not yet in place. Therefore, Uisce Éireann 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 63 unconstrained options were identified for SAE and subjected to coarse screening. The coarse screening process assessed the options against the criteria outlined in Table 3.1. This process is summarised in chapter 6 of the SEA Environmental Report for the RWRP-NW. The process allows the assessment of the unconstrained options to eliminate any that will not be viable. The focus at this stage is on options that would be difficult to mitigate, those with likely significant effects on European or nationally important sites, or options likely to lead to deterioration of waterbody WFD status.

Table 3.1 Coarse Screening Assessment Criteria

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

Of the 63 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 14 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 SAE. 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 SAE Technical Report.

Table 3.2 Coarse Screening Rejection Register

Option Reference	Option Description	Rejection Reasoning
SAE-012	New wellfield at Ardtullybeg site - pumps and rising main is the limiting factor here and to be upgraded as part of options assessment	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the

Option Reference	Option Description	Rejection Reasoning
SAE-015	Potential to look at bringing WTP at Castletown back into operation - Annaskeagh, supply off Cooley Mountains.	Environmental, Resilience or Deliverability criteria.
SAE-016	Rationalisation Drumcondrath to new GW supply at Ardee	
SAE-016a	GW potential from limestone aquifer at Ardee, east of plant	
SAE-023	New GW abstraction in Kingscourt GWB. Rationalise Nobber WTP to Kilmainhamwood WTP.	
SAE-023a	New GW abstraction in Carrickmacross GWB. Rationalise Kilmainhamwood WTP to Nobber WTP.	
SAE-035	Possible option of supplying/interconnecting with Tullyallen Group Water Scheme	
SAE-039	Supply Drumcondrath from new GW at Kingscourt and rationalise to Kilmainhamwood	
SAE-039b	New GW from Kingscourt GWB. Includes gravity main from Kilmainhamwood, rationalising Nobber and Drumcondrath	
SAE-040	Connect Drumcondrath to Kilmainhamwooid (New GW from Nobber (Karstic GWB).)	
SAE-040b	New GW from Nobber (Karstic GWB) and connect to and rationalise Drumcondrath	
SAE-017	Upgrade of Drumcondrath WTP to solve WQ issues (CFC package plant), WRZ not in deficit	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.
SAE-018	New SW source abstraction on the River Dee, new WTP or upgrade of existing WTP, abandon existing Lough Bracken source. Full demand required.	
SAE-046	New SW abstraction at the confluence of the River Dee and River Glyde to supply deficit at Ardee, Collon and Drybridge WRZ	Water quality issues associated with this option. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.

3.4 Stage 5: Fine Screening

A total of 38 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 SAE.

3.5 Stage 6: Feasible Options List

A total of 38 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 SAE 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

SA Approaches Tested	Description	Policy Driver
Most Resilient (MR)	This is the option or combination of options with the highest total score against the resilience criteria. (Link to SEA Objective for climate change adaptation for environment)	National Adaptation Plan
Lowest Carbon (LC)	This is the option or combination of options with the lowest embodied and operational carbon cost	Climate Change Strategy

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

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

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

4.2 Stage 7: Approach Development Process

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

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

For the Best AA Approach, the scoring on the European Sites (Biodiversity) sub-criteria question refers to the possibility for Likely Significant Effects (LSEs). A Score of 0 equates to no LSEs. If an option is identified that meets the “Objectives of the Plan” and is assessed as having no potential impact on a European Site (zero or neutral score based on desktop assessment), it is automatically adopted as the Preferred Approach at WRZ level. Furthermore, because it is possible that all of the potential impacts identified at Plan level can be entirely ruled out through project level investigation and analysis or avoided through project level mitigation, options with potential for LSEs (score of -1 to -3 for biodiversity) may be progressed as the Preferred Approach. If potential impacts cannot be ruled out or avoided, then mitigation in the form of avoidance is provided for within the NWRP to protect European site(s). Should potential adverse effects on European sites be identified at the project level from a given option/Preferred Approach the NWRP will have identified other options[5] that could be progressed at the project level if required. Therefore, no project arising from the NWRP, with Adverse Effects on Site Integrity (AESI) identified at the project stage would be implemented. Scores of -1 to -3 equates to LSEs

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

being identified. Scores of -1 to -2 are LSEs that will not result in AESI with standard best practice project specific mitigation applied as these can be addressed with general/standard mitigation measures. Scores of -3 equates to LSEs that may be difficult to mitigate, 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.

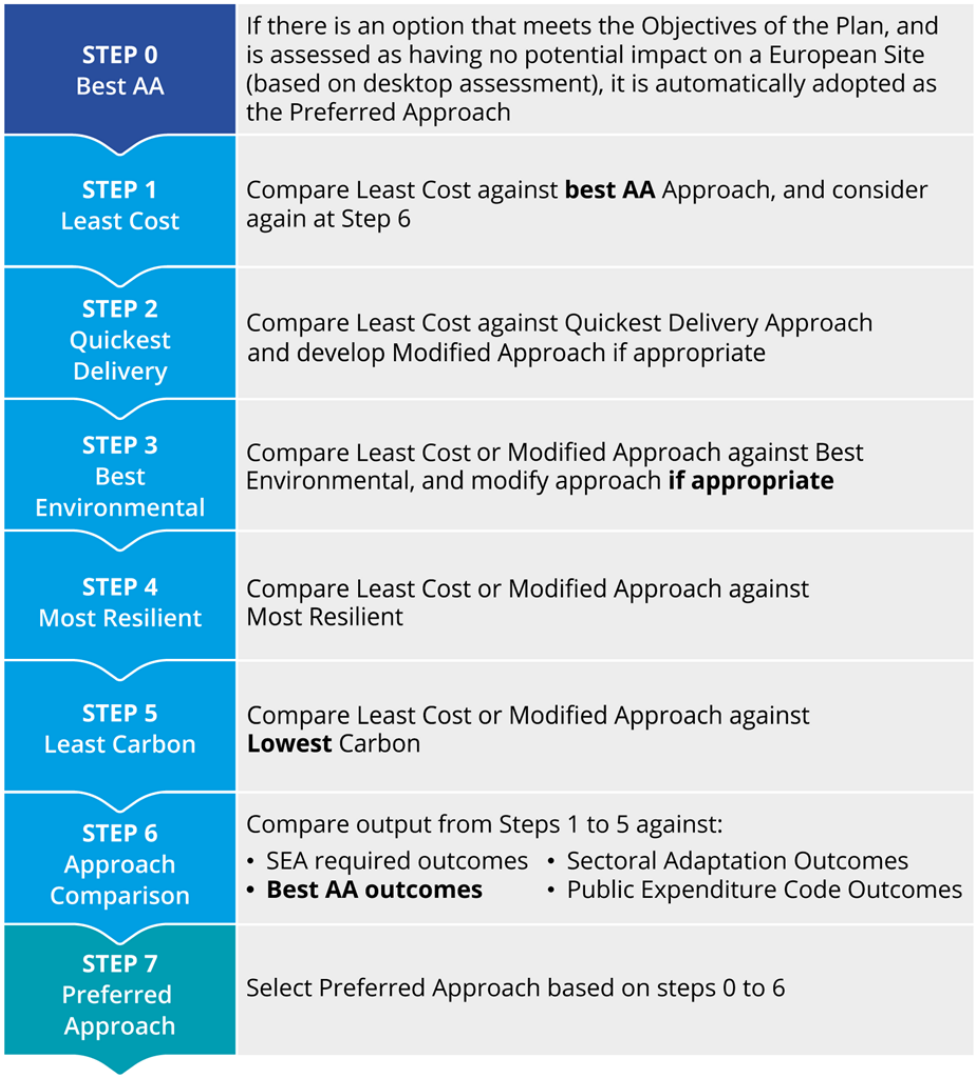

Figure 4.1 The 7 Step Process

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_2e) 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_2e) were initially assessed through qualitative assessment for fine screening as this preceded option costing, however in the approach development process the carbon emissions as total Net Present Value (NPV) costs have been used to inform the Approach Development Process. Total life- time carbon emissions and carbon efficiency per ML have been used to inform the SEA assessment.

The general process is illustrated in Figure 4.2 below.

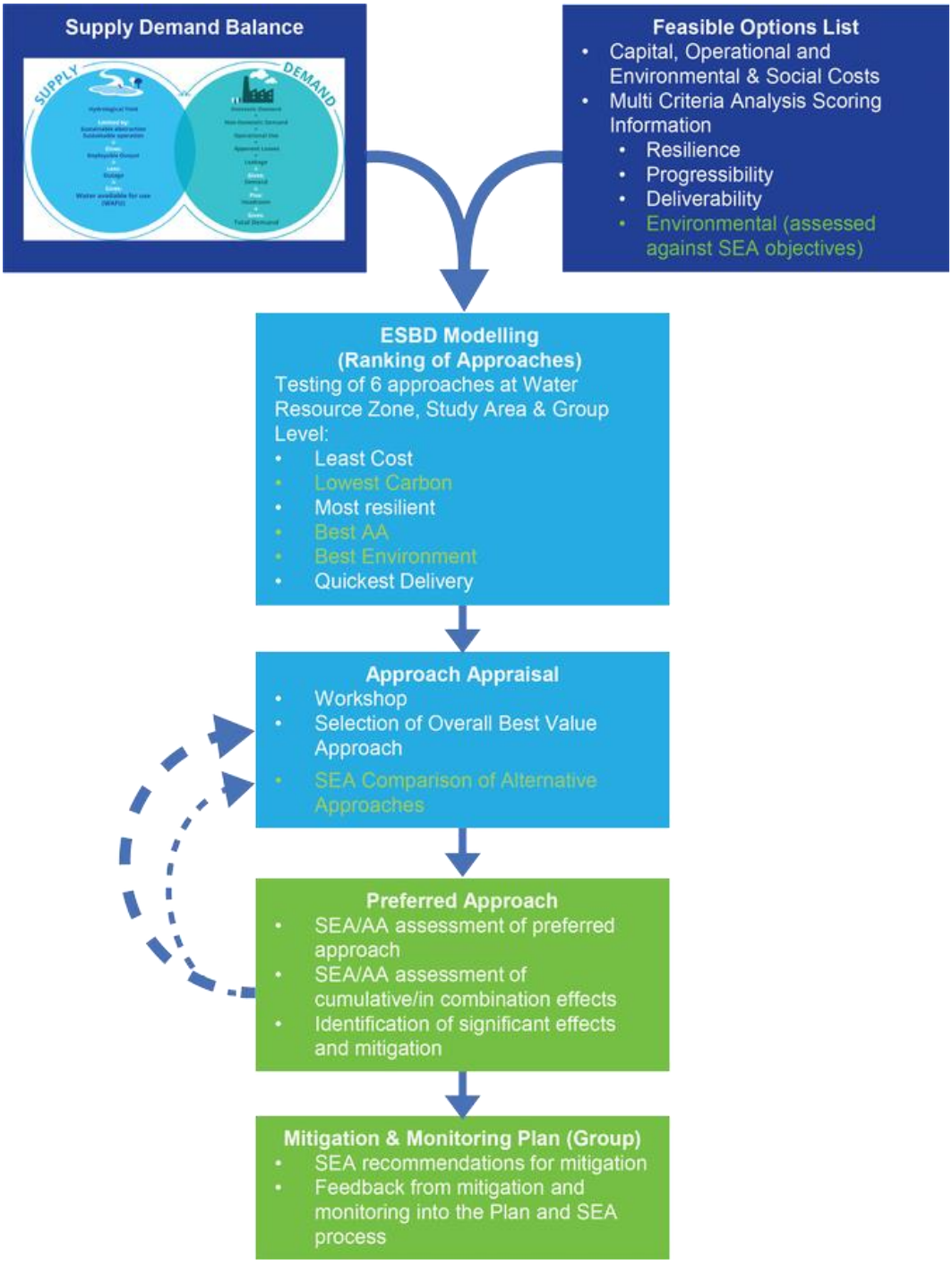

Figure 4.2 Approach Development Process

4.3 SAE 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 SAE there are 18 WRZ options and these are listed in Table 5.2 in the SAE Technical Report, providing option reference numbers and the relevant WRZ. These options were taken through the 7 step process to identify the preferred WRZ approach.

Stage 2 - creating combinations of WRZ options and SA options (group options) for comparison. These are the possible SA combinations and are presented and ranked against the approach categories (see Table 4.2).

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

Performance ranking against the assessment criteria was based on the MCA scoring, including the fine screening environmental assessments, and costings. Further environmental assessment has also been undertaken to compare the alternative approaches in line with SEA requirements and this assessment is presented in Table 4.2 and Table 4.5 below.

For SAE, a total of 12 combinations were compared and are presented in Table 4.2. The WRZ level preferred approach cannot meet the deficit for the study area as a whole, therefore, it has not been assessed and assigned a score in Table 4.2 for the purposes of determining the best performing alternative within each approach category. Note that the Preferred Approach selected at the end of the process has been outlined in red throughout this section.

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

Category	WRZ Level Approach (Cannot meet the deficit)	SA Combination 1 (SA Option 1 and 13)	SA Combination 2 (SA Option 5 and 13)	SA Combination 3 (SA Option 6 and 13)	SA Combination 4 (SA Option 1, 5 and 13)	SA Combination 5 (SA Option 1, 6 and 13)	SA Combination 6 (SA Option 7 and 13)	SA Combination 7 (SA Option 8 and 13)	SA Combination 8 (SA Option 11 and 13)	SA Combination 9 (SA Option 12 and 13)	SA Combination 10 (SA Option 13)	SA Combination 11 (SA Option 51 and 13)	SA Combination 12 (SA Option 52 and 13)
Least Cost						Worst		Best					
Quickest Delivery						Worst		Best					
Number of -3 Biodiversity Scores		No -3 Scores	No -3 Scores	No -3 Scores	No -3 Scores	No -3 Scores	No -3 Scores	No -3 Scores	No -3 Scores	No -3 Scores	No -3 Scores	No -3 Scores	No -3 Scores
Lowest Carbon						Worst	Best						
Most Resilient							Best*	Worst					
Best Environmental						Worst	Best						

Key															
Ranked order (best to worst)	Best														Worst

*Combinations 2, 3, 4, 5, 6 and 12 all have the same resilience score, however, combination 6 scores better in all other criteria in comparison with the other combinations. Therefore combination 6 has been taken forward as the most resilient approach.

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 two approaches (seeTable 4.3).

Table 4.3 Study Area Approach Categories

Category	SA Approach 1 (SA Combination 6) (BA, LC, MR, BE)	SA Approach 2 (SA Combination 7) (LCo, QD, 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 inTable 4.4. More detailed descriptions of the options are provided in Appendix A and a full list of options for each approach is given in Appendix B of this report.

Table 4.4 Study Area Approaches

Options included	Do Minimum	Least Cost Approach (SA Combination 7)	Best AA Approaches (SA Combination 6)	Best AA Approaches (SA Combination 7)	Quickest Delivery Approach (SA Combination 7)	Best Environmental Approach (SA Combination 6)	Most Resilient Approach (SA Combination 6)	Lowest Carbon Approach (SA Combination 6)
SA options (Group options)	No options	**SA option 8:** 049, 050 **SA option 13:** 037, 038	**SA option 7:** 047, 048 **SA option 13:** 037, 038	**SA option 8:** 049, 050 **SA option 13:** 037, 038	**SA option 8:** 049, 050 **SA option 13:** 037, 038	**SA option 7:** 047, 048 **SA option 13:** 037, 038	**SA option 7:** 047, 048 **SA option 13:** 037, 038	**SA option 7:** 047, 048 **SA option 13:** 037, 038
WRZ options	No options	001 021 024 033 050	001 021 024 033 050	001 021 024 033 050	001 021 024 033 050	001 021 024 033 050	001 021 024 033 050	001 021 024 033 050

Options included	Do Minimum	Least Cost Approach (SA Combination 7)	Best AA Approaches		Quickest Delivery Approach (SA Combination 7)	Best Environmental Approach (SA Combination 6)	Most Resilient Approach (SA Combination 6)	Lowest Carbon Approach (SA Combination 6)
			(SA Combination 6)	(SA Combination 7)				
		052	052	052	052	052	052	052
		061	061	061	061	061	061	061

* For the option references - all options are part of SAE e.g. SAE-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 SAE Technical Report.

Within SAE, this resulted in two approaches being selected from the twelve SA combinations identified inTable 4.2, as they were identified as the best performing against the six approach categories - Least Cost, Best Environmental, Quickest Delivery, Most Resilient, Best AA and Lowest Carbon. This means that when comparing the two identified approaches against each other (representing the Stage 3 analysis for the selection of the Preferred Approach used in the workshop - seeTable 4.5, their relative performance against categories they were not identified as “best” in in Table 4.5 may be different. This is 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. It is important to note that SA approach 1 and SA approach 2 are very similar, therefore, the differences between them can be exaggerated when looking at their direct comparison in Table 4.5 and Table 4.7.

The three stages identified above were applied through a final workshop with all of the background MCA and option costing information available for each option and the ranking from the Economic Balance of Supply and Demand (EBSD) tool.

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

Category Criteria	SA Approach 1 (SA Combination 6) (BA, LC, MR, BE)	SA Approach 2 (SA Combination 7) (LCo, QD, BA)
Least Cost Score	Worst	Best
Quickest Delivery Score	Worst	Best

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

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

4.4 Comparison of SAE Approaches

An overall summary of the infrastructure components and abstractions for each of the SA approaches identified for SAE 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 6) (BA, LC, MR, BE)	SA Approach 2 (SA Combination 7) (LCo, QD, BA)
New pipeline network (km)	0	47	30
New WTPs	0	0	0
Upgrade WTPs	0	13	13
New / upgraded abstractions	0	5	6
WTPs decommissioned	0	3	3
Abstractions abandoned	0	4	4
Raw Water Storage	0	0	0
Treated Water Storage	0	7	7

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

4.4.1 SA Approach 1 (SA Combination 6) (BA, LC, MR, BE)

SA approach 1, key comparison points:

- Identified as the best in the following categories: Best AA, Lowest Carbom, Most Resilient and Best Environmental;
- Option types included:
    - SA option (group option): 1 surface water abstraction and rationalisation option and 1 groundwater abstraction option;
    - WRZ options: 1 option to maintain an import from Northern Ireland, 1 operational regime implementation option, 3 groundwater abstraction options, and 2 WTP upgrade options;
- No -3 biodiversity scores (so no higher risk options that could impact on European sites); and
- SA approach 1 and SA approach 2 are very similar in terms of infrastructure development. The difference being a result of the SA options used. SA approach 1 uses SA option 8 which results in approximately 17km more pipeline and one less new abstraction.

4.4.2 SA Approach 2 (SA Combination 7) (LCo, QD, BA)

SA approach 2, key comparison points:

- Identified as the best in the following categories: Least Cost, Quickest Delivery and Best AA;
- Option types included:
    - SA option (group option): 1 groundwater abstraction, and 1 groundwater abstraction and rationalisation option;
    - WRZ options: 1 option to maintain an import from Northern Ireland, 1 operational regime implementation option, 3 groundwater abstraction options, and 2 WTP upgrade options;
- No -3 biodiversity scores (so no higher risk options that could impact on European sites); and
- SA approach 2 is similar to SA approach 1 in terms of infrastructure development apart from the SA option differences explained above.

4.5 SAE 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 -1,233 m^3/d in

2019, to a projected maximum of -3,228 m^3/d in 2044 during dry conditions under a 'Do Minimum' scenario. As a result, public water supplies in this area are vulnerable, particularly under drought conditions. In addition, there may be ongoing reliability issues with the supplies and the situation is expected to further deteriorate due to climate change driven reductions in water resources and increased demand growth within the area. Table 4.8 shows the SDB for the WRZs in SAE.

Table 4.8 Supply Demand Balance for SAE

WRZ Name	WRZ Code	Population	Maximum Deficit m^3/day*	
			2019	2044
Inniskeen	2400SC0009	509	No Deficit	No Deficit
Carrickmacross	2400SC0006	5,229	No Deficit	No Deficit
Kilmainhamwood / Nobber	2300SC0025	1,031	-51	-131
Castletown (Meath County Council)	2300SC0024	108	-1	-5
Drumcondrath	2300SC0004	1,204	No Deficit	No Deficit
Carrickarnon (Water Supplied from NI-Water Import)	2100SC0013	5	N/A**	N/A**
Ardee / Collon / Drybridge	2100SC0007	12,969	-1,181	-1,705
Cavanhill & North Louth	2100SC0002	60,028	No Deficit	-1,387
Kingscourt PWS	0200SC0018	2,969	No Deficit	No Deficit

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

** Note that this WRZ receives supply from Northern Ireland, therefore, Uisce Éireann do not have access to this data

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 6) (BA, LC, MR, BE)	SA Approach 2 (SA Combination 7) (LCo, QD, BA)
1. Protect public health and promote wellbeing	C	0	--	-
	O	---	++	++
2. Protect and enhance biodiversity and contribute to resilient ecosystems	C	0	-	-
	O	--	0	0
3. To protect landscapes, townscapes and visual amenity	C	0	-	-
	O	0	+	+

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

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

The overall assessment of the approaches against the SEA objectives demonstrated the similarities between the approaches. SA approach 2 (identified as the Preferred Approach) is likely to have lower population and health impacts due to the requirement for less pipeline resulting in a lesser impact on the local area. SA approach 1 is likely to have a lower water and climate change resilience impact because it does not contain the new groundwater that is part of SA option 8 in SA approach 2.

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 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 'Do Minimum'.

4.5.1 Selection of the SA Preferred Approach

It is important to note that SA approach 1 and SA approach 2 are very similar, therefore, the nuances between them in reality could not be captured by the scoring alone and further consideration was required. According to the scoring, SA approach 2 has a worse environment and resilience score, and a higher carbon cost associated. In reality, the new groundwater abstraction required as part of SA option 8 in SA approach 2 is likely to be able to be developed more quickly and the resilience and carbon differences are minimal. SA approach 2 scores worse environmentally, this is a result of the new groundwater at Ardee abstracting from an aquifer with limited storage. Therefore, the option has been designed to only supply part of the deficit, allowing for a reduction in abstraction during drier periods to retain a sustainable yield. Although the yield is variable, the aquifer would be a highly productive well which could reduce the strain on other waterbodies and would improve the resilience of supply to Uisce Éireann's customers.

Consequently, SA approach 2 has been selected through the 7 step process as the best performing approach overall across the different categories after further consideration.

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

5

SAE Preferred Approach: Strategic Environmental Assessment

5 SAE Preferred Approach Strategic Environmental Assessment

5.1 SAE Preferred Approach Options

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

The SA Preferred Approach consists of WRZ options for all but one 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. The other WRZ, Ardee, Collon and Drybridge, is covered by SA option 8 (SAE-049 and SAE-050) and involves rationalising Collon Drybridge to South Louth East Meath (located in the Eastern and Midlands region - SA3) and a new partial groundwater supply at Ardee. The SA Preferred Approach for the remaining WRZs involves maintaining a North Ireland import, operational regime implementation, new and increased groundwater abstractions, and upgrades to existing WTPs.

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

Table 5.1 Preferred Approach Breakdown

WRZ Name and Option Reference*	Option Description	Abstraction / Demand
SAE-001 2100SC0002 Cavanhill & North Louth	Dependant on operational regime implementation, increase abstraction from the River Fane and upgrade existing WTP to meet critical peak demand. SCADA and weir control system upgrade required. • Cavanhill & North Louth WRZ in deficit so increase existing SW abstraction (River Fane) to meet WRZ future deficit • Existing sources: (Dundalk Groundwater Body (GWB)) WFD status 2016-2021 – Good, (Fane River Waterbody (RWB)) WFD status 2016-2021 – Good, (Dundalk Gravels GWB) WFD status 2016-2021 – Good, (Dee RWB) WFD status 2016-2021 – Poor and (Glyde RWB) WFD status 2016-2021 – Moderate	31,183 m^3/d
SAE-021 2300SC0024 Castletown	Groundwater enhancement at Castletown • Castletown WRZ in deficit so increase existing GW abstraction to meet WRZ future deficit • Existing source: (Ardee GWB) WFD status 2016-2021 – Good	41 m^3/d
SAE-024 2300SC0025 Kilmainhamwood	Maintain both plants and new groundwater abstractions in Kingscourt GWB • Kilmainhamwood WRZ in deficit so new GW abstraction to meet WRZ future deficit	551 m^3/d

WRZ Name and Option Reference*	Option Description	Abstraction / Demand
	• Existing sources: (Kingscourt GWB) WFD status 2016-2021 – Good	
SAE-033 2100SC0013 Carrickarnon	Maintain import from Northern Ireland Water - isolated scheme • Existing import maintained from Northern Ireland Water. No information available for Northern Ireland water.	61 m^3/d
SAE-50b 2400SC0006 Carrickmacross	Upgrade Lisanisky WTP for water quality improvements • Carrickmacross WRZ in projected surplus so WTP upgrade works only • Existing source: (Carrickmacross GWB) WFD status 2016-2021 – Good	N/A
SAE-052 2400SC0009 Inniskeen	Upgrade WTP for water quality improvements • Inniskeen WRZ in projected surplus so WTP upgrade works only • Existing source: (Fane RWB) WFD status 2016-2021 – Moderate	N/A
SAE-061 0200SC0018 Kingcourt	Upgrade Lisanisky WTP for water quality improvements • Kingcourt WRZ in projected surplus so WTP upgrade works only • Existing source: (Kingscourt GWB) WFD status 2016-2021 – Good	N/A
SAE-049 & SAE-050 (SA option 8) 2100SC0007 Ardee, Collon and Drybridge	Rationalise Collon Drybridge to South Louth East Meath. New GW (partial supply) for Ardee within WTP vicinity • Ardee, Collon and Drybridge WRZ in deficit so new GW abstraction to meet WRZ partial future deficit and rationalise Collon WTP and Drybridge WTP to South Louth East Meath WRZ (Eastern and Midlands region - SA3). New Shannon Source previously assessed as part of Greater Dublin Area (Eastern and Midlands). • Existing sources: (Drogheda GWB) WFD status 2016-2021 – Good, (Wilkinstown GWB) WFD status 2016-2021 – Good, Dee RWB - WFD status 2016-2021 – Moderate • New source (Ardee GWB) WFD status 2016-2021 – Good	4,643 m^3/d
SAE-037 & SAE-038 (SA Option 13) 2300SC0004	Groundwater abstraction from locally important aquifer at Possextown and Rolagh townland	1,615 m^3/d

WRZ Name and Option Reference*	Option Description	Abstraction / Demand
Drumcondrath	• Drumcondrath WRZ in deficit so abandon existing GW and SW abstractions and provide new GW abstractions to meet WRZ future demand • Existing sources: (Ardee GWB) WFD status 2016-2021 – Good and (Brackan LWB) WFD status 2016-2021 – Moderate • New sources: (Carrickmacross GWB) WFD status 2016-2021 – Good and (Kingscourt GWB) WFD status 2016-2021 Good	

*SA Options are the same as Group Options

The SA Preferred Approach options are shown in Figure 5.1, in relation to key environmental designations. Note that SA option 8 and 13 are labelled as SAE-508 and 513 respectively.

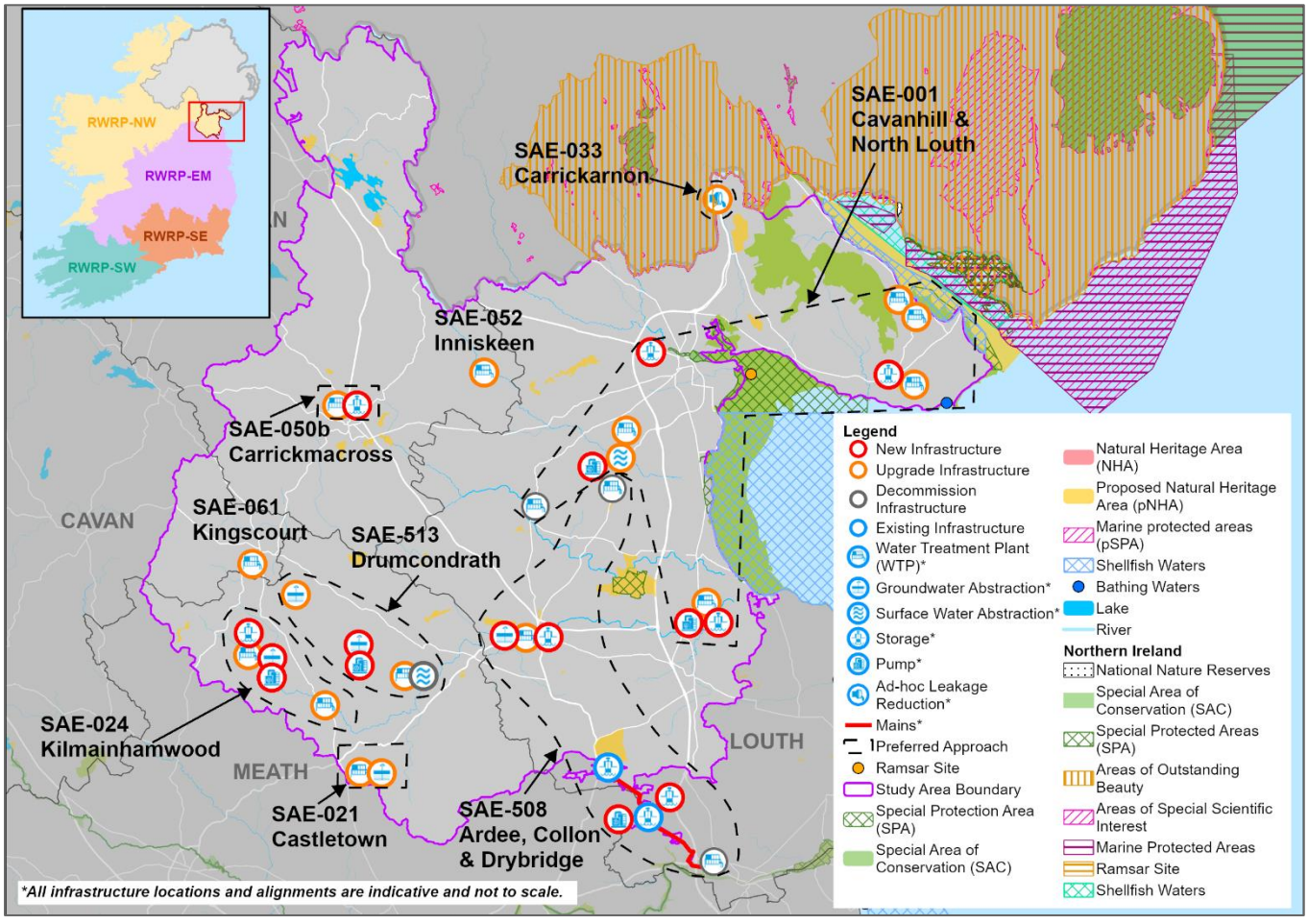

Figure 5.1 SA Preferred Approach and Key Environmental Designations

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
SAE-001	✓	-	✓	✓	✓	✓	-	✓
SAE-021	-	-	✓	✓	-	-	-	-
SAE-024	✓	-	✓	✓	-	-	-	✓
SAE-033	-	-	-	-	-	-	-	-
SAE-050	-	-	✓	-	-	-	-	✓
SAE-052	-	-	✓	-	-	-	-	-
SAE-061	-	-	✓	-	-	-	-	-
SA Option 8 (SAE-049 and SAE-050)	✓	-	✓	✓	✓	✓	-	✓
SA Option 13 (SAE-037 and SAE-038)	✓	-	✓	✓	-	✓	-	-

*SA Options are the same as Group Options

Table 5.3 Options Assessment Summary

Option Reference*	Option Description	Phase	Protect Public Health and Promote Wellbeing (P1, P2, P3)	Protect and Enhance Biodiversity and Contribute to Resilient Ecosystems (B1, B2, B3, B4, B5)	To Protect Landscapes, Townscapes and Visual Amenity (L1)	Protect and Where Appropriate Enhance, Built and Natural Assets and Reduce Waste (M1, M2)	Reduce Greenhouse Gas Emissions (C1)	Contribute to Environmental Climate Change Resilience (R1, R2, R5)	Protect and Improve Surface Water and Groundwater Status (W1, W2, W3)	Avoid Flood Risk (W5)	Protect and Where Appropriate, Enhance Cultural Heritage Assets (CH1)	Protect Quality and Function of Soils (G1)
SA option 13 (SAE-037 and SAE-038)	Groundwater from Pure Bedded Lst aquifer at Possextown and refurb of existing borehole from Rolagh townland	Construction	-	-	-	-	-	--	0	0	-	-
		Operation	+	0	+	0	-	--	--	0	0	0
SAE-001	Dependant on operational regime implementation. Increase abstraction from the River Fane	Construction	-	-	-	-	-	-	0	0	-	-

Option Reference*	Option Description	Phase	Protect Public Health and Promote Wellbeing (P1, P2, P3)	Protect and Enhance Biodiversity and Contribute to Resilient Ecosystems (B1, B2, B3, B4, B5)	To Protect Landscapes, Townscapes and Visual Amenity (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)
	and upgrade existing WTP to meet critical peak demand. SCADA and weir control system upgrade required.	Operation	++	0	+	0	-	-	-	0	0	0
SA option 8 (SAE-049 and SAE-050)	Rationalise Collon Drybridge to South Louth East Meath and new GW (partial supply) for Ardee within WTP vicinity	Construction	--	-	-	-	-	--	0	0	-	--
		Operation	+	0	+	0	-	--	---	0	0	0
SAE-021	GW (Ardee GWB poorly productive	Construction	-	-	0	0	0	--	0	0	0	0

Option Reference*	Option Description	Phase	Protect Public Health and Promote Wellbeing (P1, P2, P3)	Protect and Enhance Biodiversity and Contribute to Resilient Ecosystems (B1, B2, B3, B4, B5)	To Protect Landscapes, Townscapes and Visual Amenity (L1)	Protect and Where Appropriate Enhance, Built and Natural Assets and Reduce Waste (M1, M2)	Reduce Greenhouse Gas Emissions (C1)	Contribute to Environmental Climate Change Resilience (R1, R2, R5)	Protect and Improve Surface Water and Groundwater Status (W1, W2, W3)	Avoid Flood Risk (W5)	Protect and Where Appropriate, Enhance Cultural Heritage Assets (CH1)	Protect Quality and Function of Soils (G1)
	bedrock) enhancement at Castletown, upgrade WTP	Operation	0	0	0	0	0	--	--	0	0	0
SAE-024	Maintain both plants and new GW abstractions in Kingscourt GWB	Construction	--	-	-	-	-	--	0	0	-	-
		Operation	+	0	0	0	-	--	--	0	0	0
SAE-033	Maintain import from Northern Ireland Water - isolated scheme	Construction	-	0	0	0	0	0	0	0	0	0
		Operation	0	0	0	0	0	0	0	0	0	0
SAE-061	Upgrade Lisanisky WTP for water quality	Construction	-	-	0	0	0	0	0	0	0	0

Option Reference*	Option Description	Phase	Protect Public Health and Promote Wellbeing (P1, P2, P3)	Protect and Enhance Biodiversity and Contribute to Resilient Ecosystems (B1, B2, B3, B4, B5)	To Protect Landscapes, Townscapes and Visual Amenity (L1)	Protect and Where Appropriate Enhance, Built and Natural Assets and Reduce Waste (M1, M2)	Reduce Greenhouse Gas Emissions (C1)	Contribute to Environmental Climate Change Resilience (R1, R2, R5)	Protect and Improve Surface Water and Groundwater Status (W1, W2, W3)	Avoid Flood Risk (W5)	Protect and Where Appropriate, Enhance Cultural Heritage Assets (CH1)	Protect Quality and Function of Soils (G1)
	improvements. Kingscourt WRZ is not in deficit	Operation	+	0	0	0	0	0	0	0	0	0
SAE-050	New GW (partial supply) for Ardee within WTP vicinity	Construction	-	-	-	-	-	0	0	0	0	--
		Operation	+	0	0	0	-	0	0	0	0	0
SAE-052	Upgrade Inniskeen WTP for water quality improvements. Inniskeen WRZ is not in deficit.	Construction	-	-	0	0	0	0	0	0	0	0
		Operation	+	0	0	0	0	0	0	0	0	0

*SA Options are the same as Group Options

**Total lifetime tCO_2e 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 SAE Technical Report and include leakage reduction and water conservation.

5.2.1 Leakage Reduction

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

- Ongoing leakage management including active leakage control, pressure management, and find and fix activities to offset Natural Rate of Leakage Rise;
- Further net leakage reductions, to move towards achieving the national SELL target by 2034, in the WRZs: Cavanhill & North Louth, Ardee/Collon/Drybridge, Carrickarnon (Water Supplied from Northern Ireland Water Import), and Carrickmacross.

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 SAE 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 SAE Preferred Approach is provided in the SAE Technical Report. A high-level assessment of what this could mean for the SEA is shown in Table 5.4.

Table 5.4 SAE Sensitivity Analysis and Environmental Impacts

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

Uncertainty	Likelihood	Increase (+)/ Decrease (-) in Deficit	Environmental Impacts Relative to Assessment of Preferred Approach Key: Green - Positive Amber - Negative
	current abstractions are large compared to the waterbodies from which they abstract)	+20,000 m^3/d	existing sources, therefore, increasing the SDB deficit. There are two surface water sources in SAE that would potentially be impacted by sustainability reductions – River Fane and Lough Bracken. It has been assumed that the historical Water Order abstraction limits can be maintained for the River Fane, allowing an abstraction increase as part of the Preferred Approach. However, this is dependent on the implementation of the operational regime required for the River Fane low flow augmentation scheme. This is to ensure the protection of the Lough Muckno and River Fane system. The Preferred Approach is designed to relieve pressure on Lough Bracken by supplying from a new, more resilient groundwater source.
			The Preferred Approach reduces pressure on Lough Bracken by supplying from a more resilient groundwater source and with the implementation of the operational regime for the River Fane there are no sustainability issues predicted. However, additional sustainability reductions could increase pressure for additional supply from outside the study area.
Climate Change	High (international climate change targets have not been met)	+300 m^3/d	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. 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.
			Although the Preferred Approach provides more operational flexibility to use less sensitive water sources, this could still result in more pressure on sources.

Uncertainty	Likelihood	Increase (+)/ Decrease (-) in Deficit	Environmental Impacts Relative to Assessment of Preferred Approach Key: Green - Positive Amber - Negative
Demand Growth	Low/Moderate (growth has been based on policy)	-1,233 m^3/d	The impact of lower than expected growth would reduce the SDB deficit and the overall need requirement. The SDB deficit is currently spread across three of the nine WRZs in the area and is projected to spread across four. This is driven by quality as well as quantity issues. In this rural area, growth is relatively low.
			This could allow lower than expected energy and carbon costs and lower abstraction requirements.
Leakage Targets	Low (Uisce Éireann is focused on sustainability and aggressive leakage reduction)	+40 m^3/d	The impact of lower than expected leakage savings would increase the SDB deficit and the overall need requirement. Due to the length and condition of 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.
			This could increase carbon and the effects of abstraction pressure on the environment.
	Moderate/High (Uisce Éireann is focused on sustainability and aggressive leakage reduction)	-4,945 m^3/d	Increased leakage savings beyond SELL would reduce the SDB deficit and the overall need requirement. The need drivers in SAE are across the WRZs and are driven by quality as well as availability issues.
			This could allow lower than expected energy and carbon and reduce expected abstraction requirements.

6 SEA Cumulative Effects for SAE Preferred Approach

6 SEA Cumulative Effects for SAE Preferred Approach

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

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

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

6.1 Cumulative Effects 'Within Plan' for SAE

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

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

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

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

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

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

6.1.1 Cumulative Effects during Construction

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

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

Preferred Approach Option References	SAE-001	SAE-021	SAE-024	SAE-033	SAE-050	SAE-052	SAE-061	SA option 8
SA option 13								
SA option 8	DB M1							
SAE-061								
SAE-052								
SAE-050								
SAE-033								
SAE-024								
SAE-021								

Key	
Construction Phase	
Operation Phase	
Construction and Operation	
Dundalk Bay SPA	DB
M1 road	M1

There could be cumulative effects associated with construction in terms of traffic, noise and dust for the options located along the M1 road (indicated by M1 in Table 6.1). These could be mitigated by standard mitigation measures such as planning construction traffic routes and movements and engaging with local residents about the disruption. With these standard good practice measures in place, there are unlikely to be significant cumulative effects.

There could be cumulative effects during construction for the options that are hydrologically linked to Dundalk Bay SPA (indicated by DB in Table 6.1). Dundalk Bay regularly holds an assemblage of over 20,000 wintering waterbirds, making this a site of international importance. Cumulative construction works could cause disturbance impact to birds. However, this 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 is unlikely to be

significant cumulative effects to the Dundalk Bay SPA. The impact on the European designation is provided in the NIS and also summarised in chapter 9 of this review. Any option specific mitigation measures are included in section 6.3.4 of the NIS.

6.1.2 Cumulative Effects during Operation

The potential for cumulative effects on groundwater bodies have been considered in a hydrogeological assessment of the groundwater abstractions commissioned by Uisce Éireann (Irish Water, 2022). This hydrogeological assessment considers the abstraction quantities and proximities and concludes that four of the WFD groundwater bodies (Ardee, Carrickmacross, Louth and Kingscourt) affected by abstractions have a good quantitative status. Therefore, the likelihood of affecting their WFD objectives is low, and no interaction was identified with existing Uisce Éireann abstractions.

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

There could also be cumulative effects in terms of carbon across the SA Preferred Approach. The whole life carbon estimate (including construction and operation) for the SA Preferred Approach indicates increased contribution to carbon emissions related to carbon embodied in materials used for construction and through operational energy use and water treatment. Generally, in terms of carbon emissions, increase in carbon emissions can be considered a significant effect, as these add cumulatively across all developments and contribute to the national target for carbon. However, consideration also needs to be given to the additional water supply provided from the options and therefore the overall carbon efficiency in terms of carbon emissions per ML of supply is an appropriate metric and for SAE this averages as 0.41 tCO_2e/ML (lifetime sum). Mitigation for carbon emissions could include increased sourcing of energy from renewable sources and improving energy efficiency. This could be undertaken alongside leakage reduction and campaigns to raise awareness of measures to reduce water consumption (which in turn would reduce energy consumption). This could include the promotion of water efficient devices and working with planning authorities and developers to encourage new development to be water efficient.

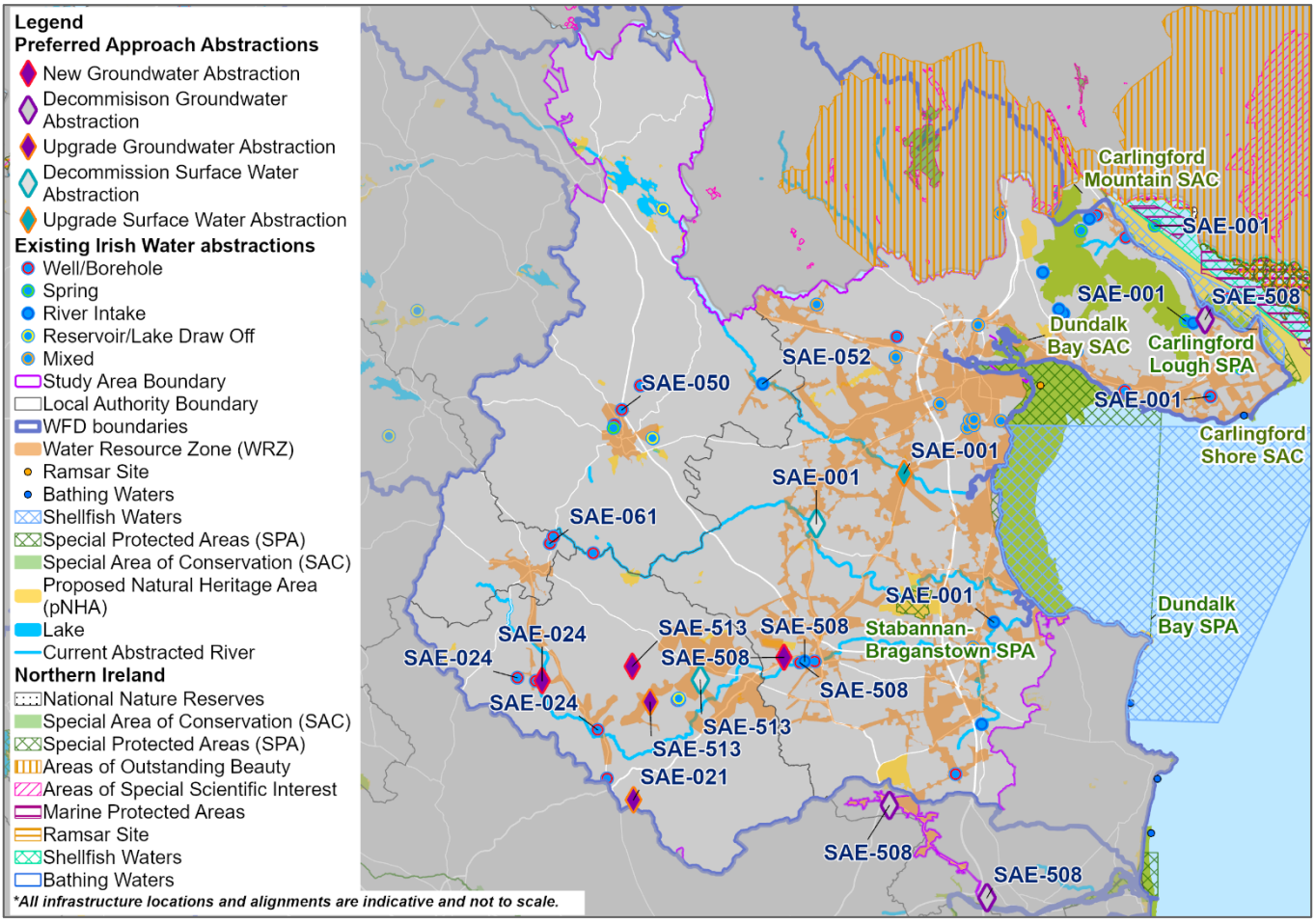

Figure 6.1 SA Preferred Approach Abstractions in SAE

6.2 Cumulative Effects with Other Developments

The SAE 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 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 SAE there are several other developments near or in Ardee, Carlingford and Dundalk. Ardee Castle Bush and Post Primary, Dundalk, County Louth - 71750U developments were not considered further due to the size. For example, only a small extension is required for the Ardee Castle development.

6.2.1 Cumulative Effects during Construction

The projects in Ardee, Carlingford and Dundalk could result in cumulative effects with the SAE Preferred Approach if they were to be constructed at the same time. This is identified in Table 6.2 as ‘A’, ‘C’ and ‘D’ respectively. Projects are located in Ardee (Ardee bypass, Ardee Regeneration and St Joseph's Hospital, Ardee), Carlingford (Carlingford Flood Relief Scheme, Carlingford Lough Greenway and Living in Carlingford-Visiting in Carlingford) and Dundalk (Dublin Road, Dundalk Bay Greenway - Dundalk – Templetown, Dundalk Flood Relief Scheme, Dundalk Institute of Technology North and South Blocks, Mount Avenue, Racecourse Meadows and The Kitchen Garden). Potential effects could include increased traffic and noise to the residential and commercial properties in Ardee, Carlingford and Dundalk. These could be mitigated by standard mitigation measures, such as planning construction

traffic routes and informing local residents about the works. With these standard good practice measures in place, there are unlikely to be significant cumulative effects.

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

If construction of the SAE Preferred Approach (SAE-001) is concurrent with the Carlingford Flood Relief Scheme and the Living in Carlingford-Visiting in Carlingford; and the Ardee Regeneration and St Joseph's Hospital developments, there is the potential for disturbance impacts on Carlingford Lough SPA & Carlingford Lough SPA (NI) and Stabannan-Braganstown SPA respectively. These are shown in Table 6.2 as 'CL' and 'SB'. There is potential for cumulative effects from pollution and disturbance impacts to the River Boyne and River Blackwater SPA and for pollution, spread of invasive non-native species and disturbance impacts to the River Boyne and River Blackwater SAC if construction of St Mary's Hospital, Boyne Valley to Lakelands Greenway and the SAE Preferred Approach (SA option 8) are concurrent. See Table 6.2 as 'RB'. If construction of the SAE Preferred Approach (SAE-001 and SA option 8) is concurrent with the Carlingford Flood Relief Scheme and the Living in Carlingford-Visiting in Carlingford projects, there is potential for disturbance impacts to the Dundalk Bay SPA. If construction of the SAE Preferred Approach (SAE-001) is concurrent with Dublin Road, Dundalk Flood Relief Scheme, Mount Avenue, Racecourse Meadows, St. Nicholas Quarter Backlands and Regeneration and The Kitchen Garden, there is potential for pollution impacts to the Dundalk Bay SAC and disturbance impacts to Dundalk Bay SPA. These are represented in Table 6.2 as 'DB1' and 'DB2'. With the implementation of mitigation measures as outlined in section 6.3.3 of the NIS, there will be no adverse cumulative effects on the integrity of any of the SACs or SPAs mentioned.

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

Preferred Approach Options									
Project Developments	**SAE-001**	**SAE-021**	**SAE-024**	**SAE-033**	**SAE-050**	**SAE-052**	**SAE-061**	**SA option 8**	**SA option 13**
Ardee bypass								A	
Ardee Regeneration	SB							A	
Boyne Valley to Lakelands Greenway								RB	
Carlingford Flood Relief Scheme	CL DB1							DB1	
Carlingford Lough Greenway - Tourist Office, Carlingford - Templetown Beach									
Carrickmacross Town Centre Renewal									

Preferred Approach Options									
Project Developments	**SAE-001**	**SAE-021**	**SAE-024**	**SAE-033**	**SAE-050**	**SAE-052**	**SAE-061**	**SA option 8**	**SA option 13**
Connected Medical Device Cybersecurity Transparency									
DEFINE-AM – Disruptive Finishing using Electrochemical machining for Additive Manufacturing									
Dublin Road, Dundalk, Co. Louth	DB1 DB2 D								
Dundalk Bay Greenway - Dundalk - Templetown	D								
Dundalk Flood Relief Scheme	DB1 DB2 D								
Dundalk Institute of Technology North and South Blocks	D								
Living in Carlingford-Visiting in Carlingford. A strategy for sustainable tourism in Carlingford	CL DB1							DB1	
Mount Avenue, Dundalk	DB1 DB2 D								
Omeath Village Regeneration Strategy: Phase 1: Omeath Placemaking Strategy									
Racecourse Meadows, Dundalk, Co. Louth -	DB1 DB2 D								
St Joseph's Hospital, Ardee.	SB							A	
St Mary's Hospital, Drogheda.								RB	
	DB1								

Preferred Approach Options									
Project Developments	**SAE-001**	**SAE-021**	**SAE-024**	**SAE-033**	**SAE-050**	**SAE-052**	**SAE-061**	**SA option 8**	**SA option 13**
St. Nicholas Quarter Backlands and Regeneration	DB2								
The Kitchen Garden, Desmesne Road, Dundalk, Co. Louth	DB1 DB2 D								

Key	
Construction Phase	
Operation Phase	
Construction and Operation	
Ardee	A
Carlingford Lough SPA & Carlingford Lough SPA (NI)	CL
Dundalk Bay SPA	DB
River Boyne and River Blackwater SAC and SPA	RB
Stabannan-Braganstown SPA	SB

6.2.2 Cumulative Effects during Operation

Potential operational cumulative effects of the SAE Preferred Approach with other developments on European designated sites were not identified.

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 SAE 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 SAE and a range of options and SA approaches have been considered and assessed, including a 'Do Minimum' approach.

Key beneficial impacts assessed include moderate (SAE-001) and minor (SA option 13, and 8, and options SAE-024, 61, 50 and 52) beneficial impacts associated with increasing the quality of water supply for local communities; and the subsequent benefits of this for public health. There are also minor beneficial impacts associated with the decommissioning of abstractions and WTPs in SA option 8 and 13, and SAE-001.

Key potential adverse impacts identified at plan level include:

- Moderate adverse effects during construction to public health and/or quality of life from dust, noise and/traffic in urban and rural areas during the construction phase associated with SA option 8 and SAE-024;
- Moderate adverse effects to environmental climate change resilience associated with options SAE-021, 024, and SA options 8 and 13 due to the new/increased rate of abstraction required for the new/existing groundwater abstractions;
- Major adverse effects during operation for SA option 8 associated with the new groundwater abstraction. High level assessment indicates that the new abstraction could cause major adverse long-term impacts to groundwater. Further studies are required to understand impacts and develop mitigation;
- Moderate adverse effects during operation for SA option 13, SAE-021 and 024 associated with the proposed rate of groundwater abstraction for the new/existing groundwater sources; and
- Moderate adverse effects during construction associated with potential damage to valuable soils with construction of the new storage (SAE-050) and network (SA option 8).

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 SAE but does 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 European and national designated sites identified as potentially affected by increased abstractions from existing surface and groundwater sources (see the NIS of the Framework Plan for further information).

Other mitigation identified includes development of construction environmental management plans, public consultation with local residents on disruption during construction and consideration of the waste hierarchy in design. Measures to address the cumulative impact for carbon emissions include sourcing the energy supply from renewable sources. All developments will aim to achieve as far as possible requirements for no net loss in biodiversity or enhancement, as set out in the Biodiversity Action Plan (Irish Water, 2021). There may be potential to also provide opportunities for carbon sequestration with

biodiversity enhancement. In addition, there are opportunities to reduce water demand (which in turn would reduce energy and carbon) by raising awareness of water issues, promoting water efficient devices and through leakage reduction.

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

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

Table 7.1 SEA Summary

SEA Objectives	SA Preferred Approach (PA) (SA Approach 2) Residual Effects Including Mitigation C – Construction (Short Term) O – Operational (Long Term)	Mitigation	Monitoring	
			Study Area Level	Scheme Level
SA Preferred Approach with interim measures as required and a programme of leakage reduction and water conservation measures, taking an adaptive approach to address uncertainty				
1. Protect public health and promote wellbeing	C Minor Adverse to Moderate Adverse O Neutral to Moderate Beneficial The PA is expected to improve overall drinking water quality reliability and sustainability through the decommissioning of failing WTPs and the replacement of abstractions vulnerable to drought conditions. The PA is expected to reduce risks to access of good quality water supply across different conditions and over the plan period.	Standard good construction practice and consultation Further assessment of risks to water quality and consideration of catchment management initiatives to improve water quality and reduce treatment cost. For example, working with landowners and managers on practices to reduce levels of sediment and pollution from entering water courses through run off.	• Level of service, and the frequency and duration of drought orders • Number of days/hours when water supply to people is disrupted due to drought, freeze-thaw or other service/infrastructure issues • Number of public rights of way closures/diversions and length of paths created compared to loss	• Duration of construction works, and number of complaints received regarding construction works • Duration of temporary closures of footpaths and other recreational assets • Number of days where recreational uses are impeded
2. Protect and enhance biodiversity and contribute to	C Neutral to Minor Adverse O Neutral Impacts from construction works for pipelines and service reservoirs on biodiversity. These can be	Routing/siting to avoid impacts. Standard good construction practice and specific measures as identified in the NIS of the Framework Plan.	• Temporary and permanent habitats lost vs habitats created/enhanced	• Monitor construction activities to ensure compliance

SEA Objectives	SA Preferred Approach (PA) (SA Approach 2) Residual Effects Including Mitigation C – Construction (Short Term) O – Operational (Long Term)	Mitigation	Monitoring	
			Study Area Level	Scheme Level
resilient ecosystems	minimised through careful routing and siting. Potential for construction and operational impacts on European and National designated sites.	Design to meet no net loss biodiversity or achieve enhancement, where possible, on or off site and in line with the Biodiversity Action Plan objectives. Further hydrological/hydrogeological assessments to determine impacts on designated sites. Operating rules to limit impacts on European and National sites.	• Site condition and population data for QI of European and National designated sites.	
3. To protect landscapes, townscapes and visual amenity	C Neutral to Minor Adverse O Neutral to Minor Beneficial Construction landscape impacts and long term impacts from above ground structures, such as new WTPs.	Routing and siting to reduce tree loss and appropriate location and design of above ground structures with landscape planting. Reinstatement of land use and vegetation.	• Total working area of pipelines non-designated landscapes • Land use/landscape features re-established for schemes over appropriate period – areas/km successfully restored to meet requirements	• Duration of construction works • Number of complaints received regarding visual impact of construction works
4. Protect and where appropriate enhance, built	C Neutral to Minor Adverse O Neutral New resources required for construction works, including	Materials management to be integrated into design to optimise use of existing resources and	• Loss of greenfield land, including agricultural, forestry or other land uses	• Construction wastes sent to landfill

SEA Objectives	SA Preferred Approach (PA) (SA Approach 2) Residual Effects Including Mitigation C – Construction (Short Term) O – Operational (Long Term)	Mitigation	Monitoring	
			Study Area Level	Scheme Level
and natural assets and reduce waste	pipeline, service reservoirs and upgraded WTPs. Ongoing maintenance requirements.	minimise waste from construction and operation.	• Disruptions to strategic infrastructure/services • Use of waste management plans • Volume of drinking water treatment residuals sent to landfill	
5. Reduce greenhouse gas emissions	C Neutral to Minor Adverse O Neutral to Minor Adverse Embodied and operational carbon contribute to national level carbon emission targets. Leakage and water efficiency can contribute to reducing carbon.	Design to minimise embodied carbon emissions and optimise operational efficiency. Seek renewable energy supply sources and optimise use of leakage and water efficiency measures to reduce carbon. Consider offsetting approaches with multiple benefits for water quality, carbon sequestration and linking with other objectives.	• Percentage of energy supply from renewable sources or reduced energy use • Carbon footprint (total tonnes) per year, predicted over plan period, lifetime of schemes and carbon intensity of water resource options (tonnes/Ml/d)	• Carbon footprint (total tonnes) during construction • Operational Carbon Intensity kgsCO_2equic/ML
6. Contribute to environmental climate	C Neutral to Moderate Adverse O Neutral to Moderate Adverse Abstractions generally reduce environmental resilience but	Consider how operation can further reduce climate change pressure on at risk sources and associated designations,	• WFD waterbody status objectives at risk and designated site condition status	• None identified

SEA Objectives	SA Preferred Approach (PA) (SA Approach 2) Residual Effects Including Mitigation C – Construction (Short Term) O – Operational (Long Term)	Mitigation	Monitoring	
			Study Area Level	Scheme Level
change resilience	overall improved flexibility for operation using regional schemes has the potential to reduce pressure on at risk local resources. SAE-021, 024, and SA options 8 and 13 require further assessment to understand their sustainability in the longer term.	particularly for SAE-021, 024, and SA options 8 and 13. Sustainability review of sources taking account of groundwater and surface water interconnections.	• Frequency of drought orders requiring change to normal abstractions/ compensation releases	
7. Protect and improve surface water and groundwater status	C Neutral O Neutral to Major Adverse Generally, new/increased abstractions are limited to allowable limits and have a low risk of adverse effect on WFD waterbody status objectives.	Further investigation to consider effects on groundwater abstraction on the surface water environment.	• WFD waterbody status objectives at risk	• Pollution incidents during construction
8. Avoid flood risk	C Neutral O Neutral	Siting and design of schemes to take account of flood risk and design for flood risk resilience.	• Number of options at risk of flooding at each AEP level	• Lost time to flooding • Lost time to power supply interruptions
9. Protect and where appropriate,	C Neutral to Minor Adverse O Neutral	Standard good practice approaches to minimise potential impacts.	• Number of archaeological assets adversely affected by water resource options	• Number of archaeological finds recorded during construction

SEA Objectives	SA Preferred Approach (PA) (SA Approach 2) Residual Effects Including Mitigation C – Construction (Short Term) O – Operational (Long Term)	Mitigation	Monitoring	
			Study Area Level	Scheme Level
enhance cultural heritage assets	Potential construction impacts on unknown archaeological interest. Impacts on known interests are expected to be avoided.		• Number of options that are rerouted to avoid cultural heritage impacts • Number of schemes including improvements to access recording of archaeological assets or communication/ interpretation of interest features	
10. Protect quality and function of soils	C Neutral to Moderate Adverse O Neutral Potential for loss and damage to valuable soils during construction but impacts to geological assets are expected to be avoided.	Standard good practice to conserve and reinstate soils.	• Soil Management Plans implemented • Volume of contaminated land restored, or soils removed	• Total volume of soil removed or reused on site

8 Water Framework Directive Summary

8 Water Framework Directive Summary

Through the options identification and assessment process new options considered have been restricted to those expected to meet estimated sustainability requirements and all options have been assessed based on conservative allowable abstraction constraints. The options identified in SAE 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 SAE abstractions have good quantitative status, therefore, the likelihood of affecting their WFD objectives in terms of quantitative status is low (Irish Water, 2022). In addition, the Kingscourt and Carrickmacross GWB's are currently 'not at risk' of failing their WFD objectives. However, 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 SAE, 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 Stabannan-Braganstown SPA, Dundalk Bay SAC, Dundalk Bay SPA, Carlingford Lough SPA and Carlingford Lough SPA (NI), River Boyne and River Blackwater SAC, and River Boyne and River Blackwater SPA. The potential effects include pollution, spread of invasive non-native species and disturbance 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 Dundalk Bay SPA through disturbance if construction of options is concurrent. With the implementation of mitigation as detailed in Appendix E of the NIS, there will be no adverse effects on the integrity of European sites.

10 Recommendations for Implementation

10 Recommendations for Implementation

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

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

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Appendix A Fine Screening Summaries

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

Table A.1 Fine Screening Summary of WTP Upgrade Options in SAE

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
SAE-50b	Upgrade Nafarty WTP for water quality improvements. Carrickmacross WRZ is not in deficit.									0	0	-3
SAE-052	Upgrade Inniskeen WTP for water quality improvements. Inniskeen WRZ is not in deficit.									0	0	-3

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
SAE-061	Upgrade Lisanisky WTP for water quality improvements. Kingscourt WRZ is not in deficit.									0	0	-2

Table A.2 Fine Screening Summary of New Shannon Source Options in SAE

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
SAE-034	Interconnection of Ardee, Collon and Drybridge with South Louth & East									2	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
	Meath WRZ - new source required to offset supply											
SAE-036	Transfer from GDA (new source required) to supply deficit at South Louth & East Meath WRZ									2	0	-21

Table A.3 Fine Screening Summary of Surface Water and Rationalisation Options in SAE

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
SAE-005	Rationalisation of Greenmount to Cavanhill									0	0	-16

Option Reference	Name	Environmental								Total -3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
	WTP - will require WTP upgrade at Cavanhill to meet critical peak demand, and upgrade of 8km of watermain											
SAE-007	Rationalisation of Tallanstown and connection with Cavanhill due to water quality issues. Long term will require increased abstraction and upgrade at Cavanhill WTP to meet critical peak demand.									0	0	-16
SAE-047	Rationalise Collon Drybridge to South Louth East Meath									0	0	-12
SAE-048	Connect Ardee to Greenmount (River Dee)									0	0	-12

Option Reference	Name	Environmental								Total -3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
SAE-054	Rationalise Inniskeen to Cavanhill WRZ									0	1	-14
SAE-058	Rationalise Kingscourt to Bailieboro for increased resilience. New SW abstraction from Lough Ramor.									0	1	-16

Table A.4 Fine Screening Summary of Surface Water and Interconnection Options in SAE

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
SAE-003	Extension from Staleen (South Louth & East Meath) to Cavanhill, offsetting supply when new source is available from GDA									0	0	-16

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

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
SAE-002	Dependent on operational regime implementation, increase abstraction from the river Fane and upgrade existing WTP to meet critical peak demand									0	0	-16
SAE-004	Increase SW abstraction from River Dee at Greenmount and upgrade WTP									0	0	-11
SAE-008	New SW abstraction from River Glyde at Castlebellingham									0	0	-18

Table A.6 Fine Screening Summary of Operational Regime Options in SAE

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
SAE-001	Dependent on operational regime implementation, increase abstraction from the River Fane and upgrade existing WTP to meet critical peak demand. SCADA and weir control system upgrade required.									0	0	-7

Table A.7 Fine Screening Summary of Import Options in SAE

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
SAE-033	Maintain import from Northern Ireland Water - isolated scheme - Land within NI jurisdiction									0	0	0

Table A.8 Fine Screening Summary of Group Water Scheme Options in SAE

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
SAE-045	Supply from Ballymakelly GWS									1	0	-16

Table A.9 Fine Screening Summary of Groundwater and Rationalisation Options in SAE

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
SAE-025	Rationalise Kilmainhamwood WTP and Nobber WTP to Kingscourt WRZ (Cavan)									0	0	-9
SAE-049	Rationalise Collon Drybridge to South Louth East Meath									1	0	-15
SAE-050	New GW (partial supply) for Ardee within WTP vicinity									1	0	-15

Table A.10 Fine Screening Summary of Groundwater Options in SAE

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
SAE-006	Potential for new GW source in the Williamstown Gravels									0	0	-15
SAE-009	GW potential from limestone aquifer at Ardee, east of plant to partly supply deficit									1	0	-19
SAE-013	New wellfield at Carlingford BH site - pumps and rising main is the limiting factor here and to be upgraded as part of options assessment									2	0	-20
SAE-014	Potential to develop wellfield in Cooley Gravel Aquifer									1	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
SAE-020	New GW abstraction in vicinity of Drumcondrath WTP on Coillte land									1	0	-12
SAE-021	GW (Ardee GWB poorly productive bedrock) enhancement at Castletown, upgrade WTP									0	0	-4
SAE-024	Maintain both plants and new GW abstractions in Kingscourt GWB.									0	0	-10
SAE-037	Groundwater from Pure Bedded Lst aquifer at Possextown (2 TW's ongoing). This is to serve as the primary option to supply full demand (subject to final BH pumping configuration)									0	0	-14

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
SAE-038	Refurb of existing borehole from Rolagh townland. Option to serve as backup if additional supply needed to meet changes in future demand.									0	0	-13
SAE-041	Potential for new GW source from Dromiskin Gravels									0	0	-14
SAE-056	Increase existing GW abstraction and supply deficit Lisanisky WTP									1	1	-12
SAE-057	Increase existing GW abstraction and supply deficit Lisanisky WTP									1	1	-12

Appendix B SA Approaches for SAE

Note: SA Options are also referred to as Group Options

WRZ	Preferred Approach - SA Approach 2		Least Cost - SA Approach 2		Best Environmental - SA Approach 1	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
2100SC0002 Cavanhill & North Louth	SAE-001 Dependent on operational regime implementation. Increase abstraction from the River Fane and upgrade existing WTP to meet critical peak demand. SCADA and weir control system upgrade required.	-	SAE-001 Dependent on operational regime implementation. Increase abstraction from the River Fane and upgrade existing WTP to meet critical peak demand. SCADA and weir control system upgrade required.	-	SAE-001 Dependent on operational regime implementation. Increase abstraction from the River Fane and upgrade existing WTP to meet critical peak demand. SCADA and weir control system upgrade required.	-
2100SC0007 Ardee, Collon and Drybridge	SAE-049 & SAE-050 Rationalise Collon Drybridge to South Louth East Meath and new GW (partial supply) for Ardee within WTP vicinity	8	SAE-049 & SAE-050 Rationalise Collon Drybridge to South Louth East Meath and new GW (partial supply) for Ardee within WTP vicinity	8	SAE-047 & SAE-048 Rationalise Collon Drybridge to South Louth East Meath and connect Ardee to Greenmount (River Dee)	7
2300SC0004 Drumcondrath	SAE-037 & SAE-038 Groundwater from Pure Bedded Lst aquifer at Possextown and refurb of existing borehole from Rolagh townland	13	SAE-037 & SAE-038 Groundwater from Pure Bedded Lst aquifer at Possextown and refurb of existing borehole from Rolagh townland	13	SAE-037 & SAE-038 Groundwater from Pure Bedded Lst aquifer at Possextown and refurb of existing borehole from Rolagh townland	13
2300SC0024 Castletown	SAE-021 Groundwater enhancement at Castletown	-	SAE-021 Groundwater enhancement at Castletown	-	SAE-021 Groundwater enhancement at Castletown	-

WRZ	Preferred Approach - SA Approach 2		Least Cost - SA Approach 2		Best Environmental - SA Approach 1	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
2300SC0025 Kilmainhamwood	SAE-024 Maintain both plants and new GW abstractions in Kingscourt GWB	-	SAE-024 Maintain both plants and new GW abstractions in Kingscourt GWB	-	SAE-024 Maintain both plants and new GW abstractions in Kingscourt GWB	-
2100SC0013 Carrickarnon	SAE-033 Maintain import from Northern Ireland Water - isolated scheme	-	SAE-033 Maintain import from Northern Ireland Water - isolated scheme	-	SAE-033 Maintain import from Northern Ireland Water - isolated scheme	-
0200SC0018 Kingcourt	SAE-061 Upgrade Lisanisky WTP for water quality improvements. Kingscourt WRZ is not in deficit.	-	SAE-061 Upgrade Lisanisky WTP for water quality improvements. Kingscourt WRZ is not in deficit.	-	SAE-061 Upgrade Lisanisky WTP for water quality improvements. Kingscourt WRZ is not in deficit.	-
2400SC0006 Carrickmacross	SAE-050 New GW (partial supply) for Ardee within WTP vicinity	-	SAE-050 New GW (partial supply) for Ardee within WTP vicinity	-	SAE-050 New GW (partial supply) for Ardee within WTP vicinity	-
2400SC0009 Inniskeen	SAE-052 Upgrade Inniskeen WTP for water quality improvements. Inniskeen WRZ is not in deficit.	-	SAE-052 Upgrade Inniskeen WTP for water quality improvements. Inniskeen WRZ is not in deficit.	-	SAE-052 Upgrade Inniskeen WTP for water quality improvements. Inniskeen WRZ is not in deficit.	-

WRZ	Quickest Delivery - SA Approach 2		Most Resilient - SA Approach 1		Lowest Carbon - SA Approach 1	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
2100SC0002 Cavanhill & North Louth	SAE-001 Dependent on operational regime implementation. Increase abstraction from the River Fane and upgrade existing WTP to meet critical peak demand. SCADA and weir control system upgrade required.	-	SAE-001 Dependent on operational regime implementation. Increase abstraction from the River Fane and upgrade existing WTP to meet critical peak demand. SCADA and weir control system upgrade required.	-	SAE-001 Dependent on operational regime implementation. Increase abstraction from the River Fane and upgrade existing WTP to meet critical peak demand. SCADA and weir control system upgrade required.	-
2100SC0007 Ardee, Collon and Drybridge	SAE-049 & SAE-050 Rationalise Collon Drybridge to South Louth East Meath and new GW (partial supply) for Ardee within WTP vicinity	8	SAE-047 & SAE-048 Rationalise Collon Drybridge to South Louth East Meath and connect Ardee to Greenmount (River Dee)	7	SAE-047 & SAE-048 Rationalise Collon Drybridge to South Louth East Meath and connect Ardee to Greenmount (River Dee)	7
2300SC0004 Drumcondrath	SAE-037 & SAE-038 Groundwater from Pure Bedded Lst aquifer at Possextown and refurb of existing borehole from Rolagh townland	13	SAE-037 & SAE-038 Groundwater from Pure Bedded Lst aquifer at Possextown and refurb of existing borehole from Rolagh townland	13	SAE-037 & SAE-038 Groundwater from Pure Bedded Lst aquifer at Possextown and refurb of existing borehole from Rolagh townland	13
2300SC0024 Castletown	SAE-021 Groundwater enhancement at Castletown	-	SAE-021 Groundwater enhancement at Castletown	-	SAE-021 Groundwater enhancement at Castletown	-
2300SC0025 Kilmainhamwood	SAE-024	-	SAE-024	-	SAE-024	-

WRZ	Quickest Delivery - SA Approach 2		Most Resilient - SA Approach 1		Lowest Carbon - SA Approach 1	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
	Maintain both plants and new GW abstractions in Kingscourt GWB		Maintain both plants and new GW abstractions in Kingscourt GWB		Maintain both plants and new GW abstractions in Kingscourt GWB	
2100SC0013 Carrickarnon	SAE-033 Maintain import from Northern Ireland Water - isolated scheme	-	SAE-033 Maintain import from Northern Ireland Water - isolated scheme	-	SAE-033 Maintain import from Northern Ireland Water - isolated scheme	-
0200SC0018 Kingcourt	SAE-061 Upgrade Lisanisky WTP for water quality improvements. Kingscourt WRZ is not in deficit.	-	SAE-061 Upgrade Lisanisky WTP for water quality improvements. Kingscourt WRZ is not in deficit.	-	SAE-061 Upgrade Lisanisky WTP for water quality improvements. Kingscourt WRZ is not in deficit.	-
2400SC0006 Carrickmacross	SAE-050 New GW (partial supply) for Ardee within WTP vicinity	-	SAE-050 New GW (partial supply) for Ardee within WTP vicinity	-	SAE-050 New GW (partial supply) for Ardee within WTP vicinity	-
2400SC0009 Inniskeen	SAE-052 Upgrade Inniskeen WTP for water quality improvements. Inniskeen WRZ is not in deficit.	-	SAE-052 Upgrade Inniskeen WTP for water quality improvements. Inniskeen WRZ is not in deficit.	-	SAE-052 Upgrade Inniskeen WTP for water quality improvements. Inniskeen WRZ is not in deficit.	-

WRZ	Best Appropriate Assessment - SA Approach 1		Best Appropriate Assessment - SA Approach 2	
	Option Description	SA Option	Option Description	SA Option
2100SC0002 Cavanhill & North Louth	SAE-001 Dependent on operational regime implementation. Increase abstraction from the River Fane and upgrade existing WTP to meet critical peak demand. SCADA and weir control system upgrade required.	-	SAE-001 Dependent on operational regime implementation. Increase abstraction from the River Fane and upgrade existing WTP to meet critical peak demand. SCADA and weir control system upgrade required.	-
2100SC0007 Ardee, Collon and Drybridge	SAE-047 & SAE-048 Rationalise Collon Drybridge to South Louth East Meath and connect Ardee to Greenmount (River Dee)	7	SAE-049 & SAE-050 Rationalise Collon Drybridge to South Louth East Meath and new GW (partial supply) for Ardee within WTP vicinity	8
2300SC0004 Drumcondrath	SAE-037 & SAE-038 Groundwater from Pure Bedded Lst aquifer at Possextown and refurb of existing borehole from Rolagh townland	13	SAE-037 & SAE-038 Groundwater from Pure Bedded Lst aquifer at Possextown and refurb of existing borehole from Rolagh townland	13
2300SC0024 Castletown	SAE-021 Groundwater enhancement at Castletown	-	SAE-021 Groundwater enhancement at Castletown	-
2300SC0025 Kilmainhamwood	SAE-024 Maintain both plants and new GW abstractions in Kingscourt GWB	-	SAE-024 Maintain both plants and new GW abstractions in Kingscourt GWB	-
2100SC0013 Carrickarnon	SAE-033 Maintain import from Northern Ireland Water - isolated scheme	-	SAE-033 Maintain import from Northern Ireland Water - isolated scheme	-
0200SC0018 Kingcourt	SAE-061	-	SAE-061	-

WRZ	Best Appropriate Assessment - SA Approach 1		Best Appropriate Assessment - SA Approach 2	
	Option Description	SA Option	Option Description	SA Option
	Upgrade Lisanisky WTP for water quality improvements. Kingscourt WRZ is not in deficit.		Upgrade Lisanisky WTP for water quality improvements. Kingscourt WRZ is not in deficit.	
2400SC0006 Carrickmacross	SAE-050 New GW (partial supply) for Ardee within WTP vicinity	-	SAE-050 New GW (partial supply) for Ardee within WTP vicinity	-
2400SC0009 Inniskeen	SAE-052 Upgrade Inniskeen WTP for water quality improvements. Inniskeen WRZ is not in deficit.	-	SAE-052 Upgrade Inniskeen WTP for water quality improvements. Inniskeen WRZ is not in deficit.	-