Summer 2023

Regional Water Resources Plan – North West

Strategic Environmental Assessment

Appendix H: Study Area D – 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.

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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 D 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 D (SAD) within the North West Region for the options and approaches considered and as outlined in the Study Area D Technical Report (Draft RWRP-NW Appendix 4). 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 the 5 year plan cycle and includes an annual review to identify actions required within the plan cycle.

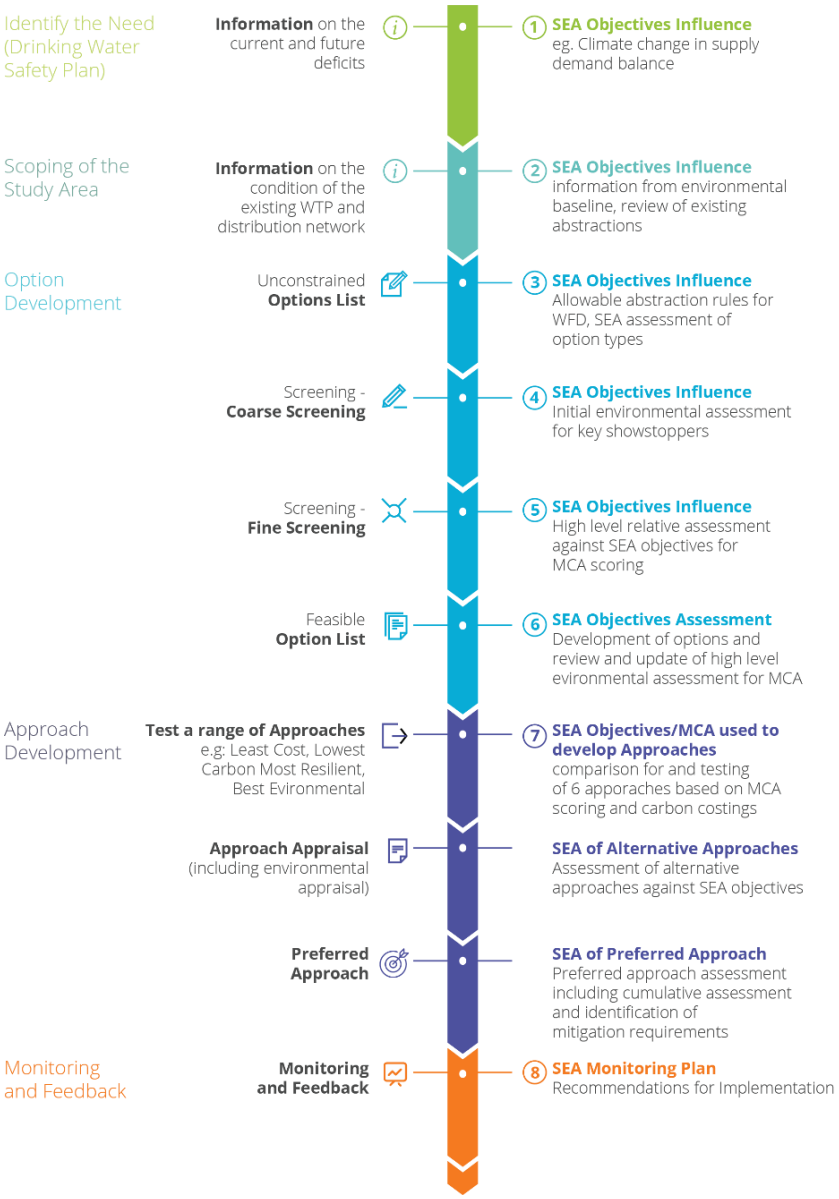

Figure 1.1 Option and Approach Development Process

1.2 Regional Plan Strategic Environmental Assessment

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

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

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

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

1.3 Study Area: Strategic Environmental Assessment

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

Table 1.1 SEA Objectives

SEA Topic	SEA Objective
Population, economy, tourism and recreation, and human health	Protect and, where possible, contribute to enhancement of human health and wellbeing and to prevent restrictions to recreation and amenity facilities in providing water services.
Water environment	<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 SAD 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 and a summary of the assessment for SAD 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 SAD are provided in chapter 9 of this review.

1.6 Study Area D

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 SAD, the location of SAD in relation to the North West Region is shown in Figure 1.2.

Study Area D lies within the counties of Galway, Galway City, Mayo, and Roscommon, including several islands off of the coast of Ireland such as the Aran Islands (Inishmore, Inishmean, Inishere), Inisboffin, Inishturk and Clare Island. The total areaof SAD is approximately 6,720 km^2. There are two principal settlements (with a population of over 10,000) within SAD, namely Galway city and suburbs, and Castlebar (CSO, 2016a), as shown in Figure 1.2.

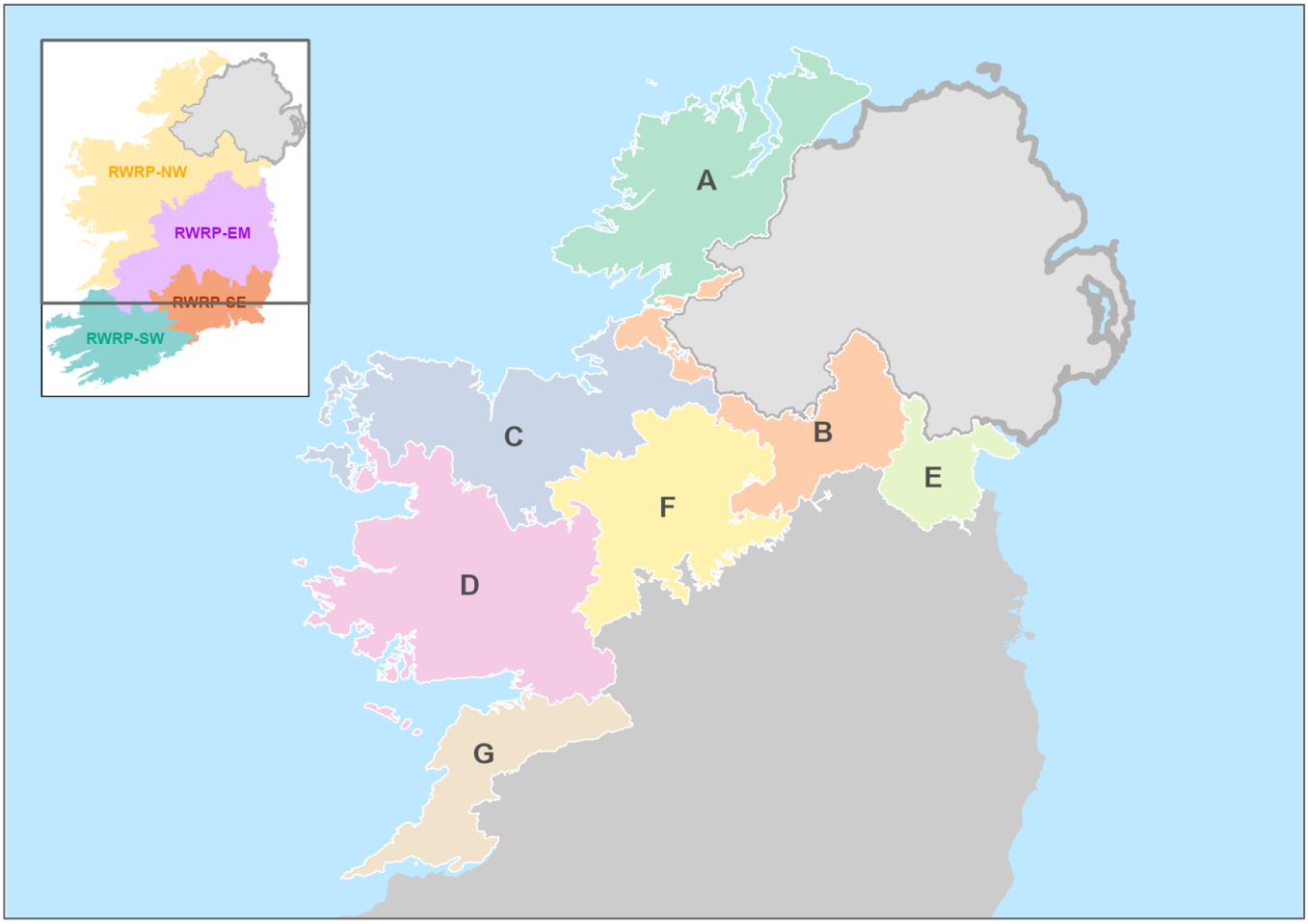

Figure 1.2 North West Region Study Areas

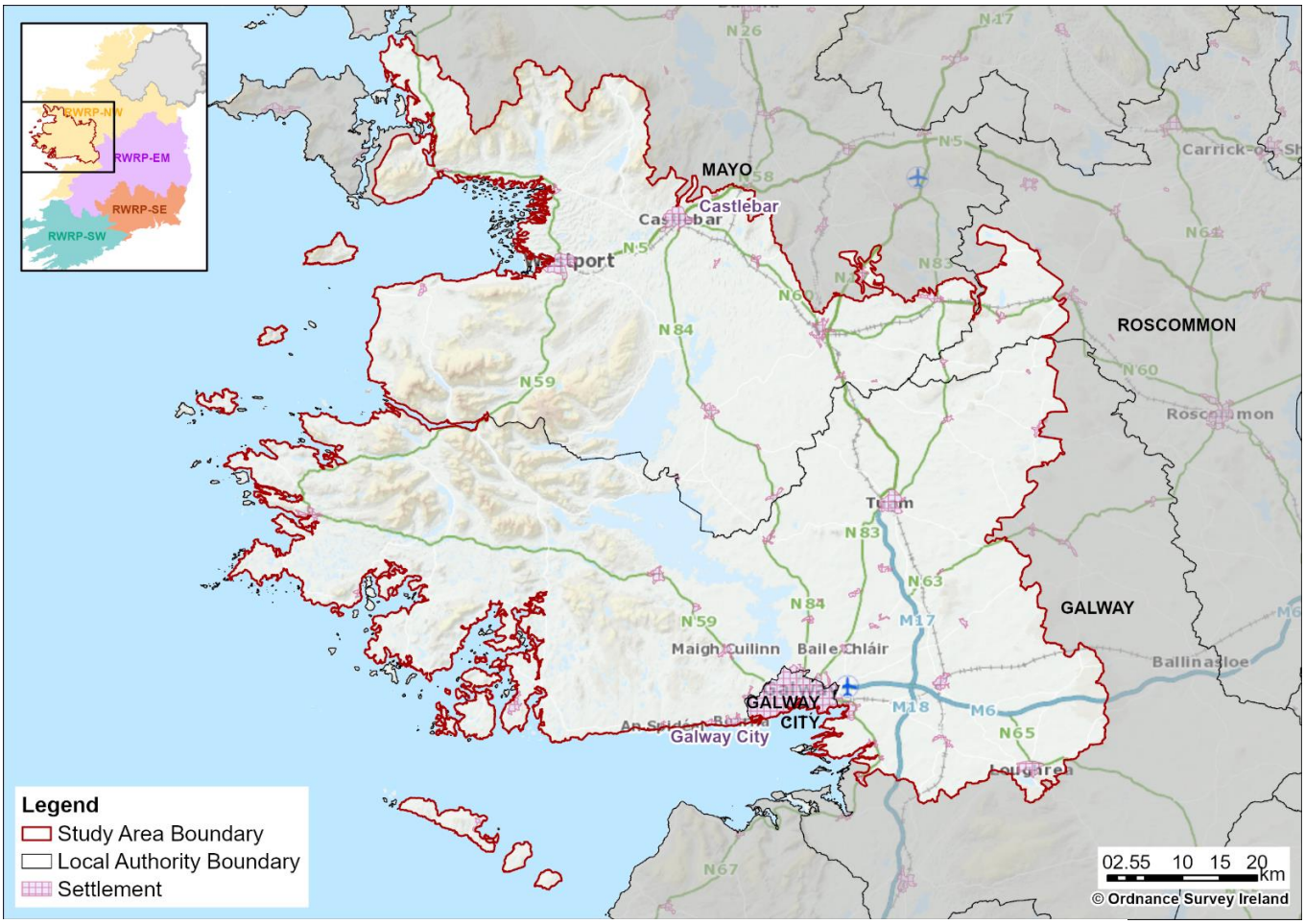

Figure 1.3 Study Area D

2 Study Area D Environmental Baseline Context

2 Study Area D Environmental Baseline Context

This chapter provides environmental baseline information for SAD 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 SAD

WRZ Reference Number and Name	Total Population Served (2019)*	% Population Change (2019-2044)*
1200SC0007 – Ballyconneely P.S.	157	15.3
1100SC0001_B – Carna KilKieran RWSS	2,349	15.3
1200SC0037 – Carraroe	3,198	15.3
2200SC0002 – Clare Island	163	15.3
1200SC0010 – Cleggan Claddaghduff	517	15.3
1200SC0011 – Clifden	1,524	15.3
1200SC0012 – Clonbur P.S.	1,380	15.3
1100SC0001_D – Dunmore Glenamaddy P.S.	2,572	15.3
1200SC0004 – IN Inishmean	173	15.3
1200SC0017 – Inisboffin P.S.	158	15.3
1200SC0018 – Inishere	281	15.3
1200SC0019 – Inishmore	696	15.3
2200SC0003 – Inishturk	48	15.3
1200SC0024 – Leenane P.S.	101	15.3
1100SC0001 – Lough Corrib (Galway City, Tuam, Loughrea)	139,313	38.2
2200SC0001 – Lough Mask & Westport	49,642	20.8
2200SC0015 – Louisburgh	808	15.3
1100SC0001_H – Mid-Galway	8,082	15.3
2200SC0016 – Mulranny	678	15.3
2200SC0017 – Newport	697	15.3
1100SC0001_J – Oughterard	5,668	15.3
1100SC0001_K – Rosmuc P.S.	450	15.3
1200SC0038 – Spiddal	8,538	22.5
1100SC0001_M – Teeranea Lettermore P.S.	928	15.3
1200SC0035 – Tully-Tullycross	487	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

SAD had a below average household disposable income per person in 2019 (CSO, 2022), and an unemployment rate of 3.8% in the West region of the country (CSO, 2023a).

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

2.1.3 Tourism and Recreation

Tourism in SAD 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 Galway has been described as "*a place where stunning natural landscapes are intertwined with ancient history, culture and heritage*", with the diverse landscape offering incredible recreational activities and views while also brimming with history, culture, and heritage (Visit Galway, 2022).

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

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

2.1.4 Human Health

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

Table 2.2 Well-Being Indicators for the West Region within Ireland

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

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

Table 2.3 Areas Supplied by the WTPs in SAD

Water Treatment Plants	Water Resource Zone	Local Authority Supplied
Ballyconnelly WTP	1200SC0007 – Ballyconneely P.S.	Galway
Carna Kilkieran WTP	1100SC0001_B – Carna Kilkieran RWSS	Galway
Carraroe WTP	1200SC0037 – Carraroe	Galway
Clare Island WTP	2200SC0002 – Clare Island	Mayo
Cleggan WTP	1200SC0010 – Cleggan Claddaghduff	Galway
Clifden WTP	1200SC0011 – Clifden	Galway
Clonbur WTP	1200SC0012 – Clonbur P.S.	Galway
Dunmore/Glenamaddy (Gortgarrow) WTP, Glenamaddy WTP	1100SC0001_D – Dunmore Glenamaddy P.S.	Galway
Inishmean WTP	1200SC0004 – IN Inishmean	Galway
Inisboffin WTP	1200SC0017 – Inisboffin P.S.	Galway
Inis Oirr WTP	1200SC0018 – Inishere	Galway
Creggacareen WTP, Oghill WTP and Kilcarna WTP	1200SC0019 – Inishmore	Galway
Inishturk WTP	2200SC0003 – Inishturk	Mayo
Leenane WTP	1200SC0024 – Leenane P.S.	Galway
Loughrea (Knockanima) WTP, Loughrea (Lake Rd) WTP and Tuam (Luimnagh) WTP	1100SC0001 – Lough Corrib (Galway City, Tuam, Loughrea)	Galway
Terryland WTP	1100SC0001 – Lough Corrib (Galway City, Tuam, Loughrea)	Galway City
Tourmakeady WTP and Westport WTP	2200SC0001 – Lough Mask & Westport	Mayo
Danganbeg WTP	1100SC0001_H – Mid-Galway	Galway
Mulranny WTP	2200SC0016 – Mulranny	Mayo
Newport WTP	2200SC0017 – Newport	Mayo
Oughterard WTP	1100SC0001_J – Oughterard	Galway
Rosmuc WTP	1100SC0001_K – Rosmuc P.S.	Galway
Spiddal WTP	1200SC0038 – Spiddal	Galway
Teeranea WTP	1100SC0001_M – Teeranea Lettermore P.S.	Galway

Water Treatment Plants	Water Resource Zone	Local Authority Supplied
Letterfrack WTP and Tullycross WTP	1200SC0035 – Tully-Tullycross	Galway

Currently for day-to-day operations, 20 out of 25 of the WRZs in the area have a current and 23 have a projected future SDB deficit (based on a 'Do Minimum' approach – see section 4.5 for further clarification). While sufficient on normal weather conditions, several would fail in drought. During recent dry periods, particularly the summer of 2018 and 2020 when water conservation orders were implemented, a number of the supplies in SAD were impacted. Ahascragh required sandbagging of the Bunowen River to help counteract low levels in the spring, while night time restrictions were imposed on the Aran Islands for a number of months in 2020.

Poor water quality can be linked to risks to health. The Barrier Assessment identified that 16 of the 33 WTPs within the study area are at high risk of failing to achieve Uisce Éireann's conservative Barrier Assessment standards. Particularly in relation to to bacteria and viruses (Barrier 1) (see Table 2.1 in the SAD Technical Report).

The "quality need" identified through the Barrier Assessment is not an indicator of compliance with the Drinking Water Regulations. It is an internal Uisce Éireann assessment of the need to invest in areas of the Uisce Éireann asset base through resource planning, to ensure that potential risks or emerging risks to supplies are addressed. Currently, there are two WRZs on the EPA Remedial Action List within SAD, namely Louisburgh and Newport PWS. Uisce Éireann is currently progressing immediate corrective action in relation to a number of supplies within SAD in advance of the NWRP. Details of these are included in the SAD 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 SAD.

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

Table 2.4 Catchments within SAD (EPA, 2020)

WFD Catchments	Total Catchment Area (km^2)	Catchment Area within SAD (km^2)
Corrib	3,114	3,092
Erriff-clew Bay	1,509	1,486
Galway Bay North	1,019	1,017
Galway Bay South East	1,268	609
Lower Shannon (25C)	1,820	1
Moy & Killala Bay	2,352	298
Upper Shannon (26B)	674	21
Upper Shannon (26D)	1,598	179

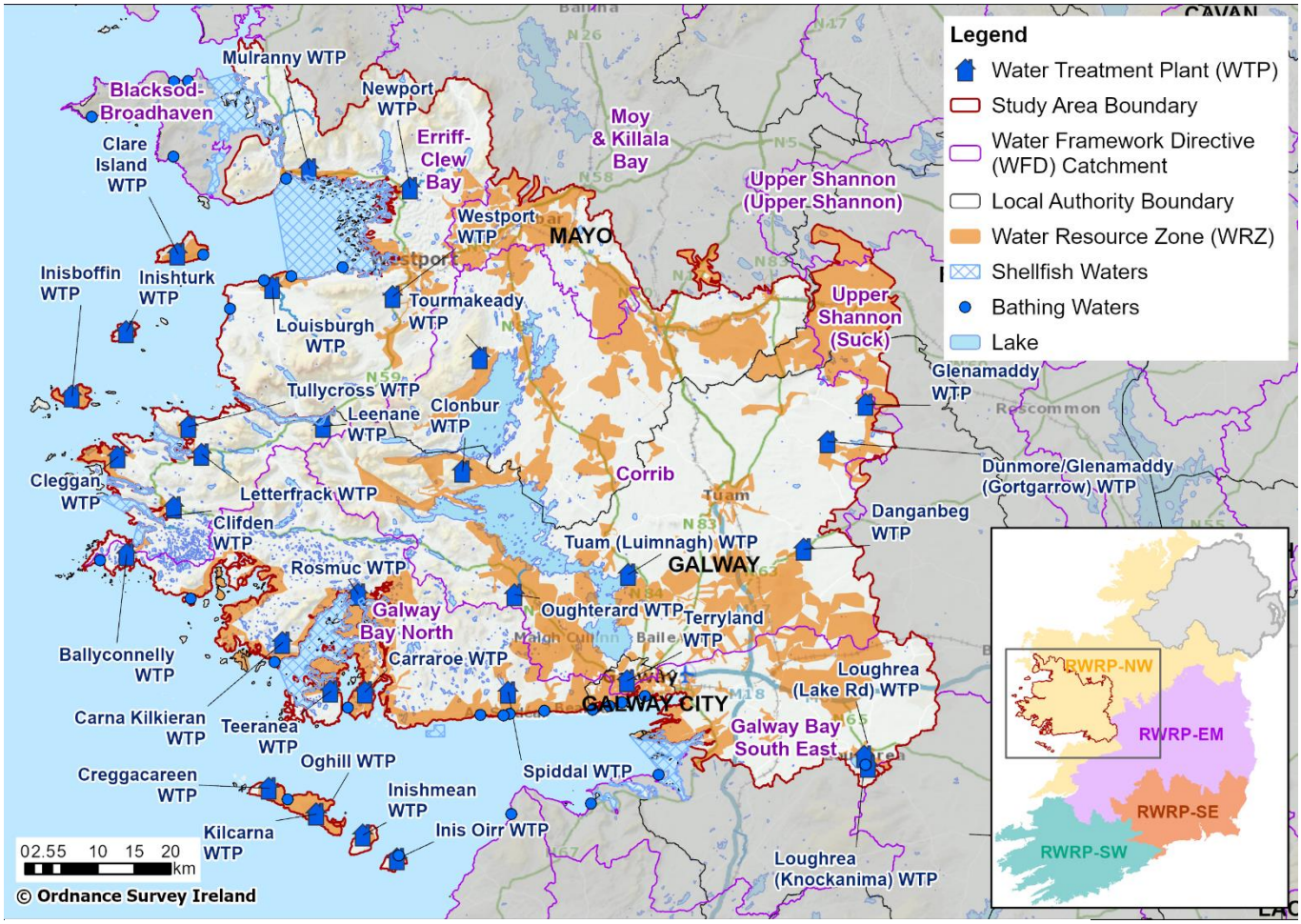

Figure 2.1 Water Environment of SAD

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 SAD 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 pending Abstraction Legislation on the SAD Supplies, Uisce Éireann have assessed their 26 surface water abstractions. Based on this initial assessment, the volumes of water abstracted at Bunnahowna River (Mulranny), Coolacknick Lake Intake (Inishturk), Coolin Lough (Clonbur P.S.), Corrib (Lough Corrib (Galway City, Tuam, Loughrea)), Diamond Hill Stream (Tully-Tullycross), Knockmore (Clare Island), Lake Anaserd (Ballyconneely P.S.), Lough Aroolagh (Rosmuc P.S.), Lough Courhoor (Cleggan Claddaghduff), Lough Fawna (Inisboffin P.S.), Lough Illauntrasna (Teeranea Lettermore P.S.), Lough Lerin (Carna Kilkieran Rwss), Lough Nambrackeagh (Clifden), Lough Rea (Lough Corrib (Galway City, Tuam, Loughrea)), Lough Rea (Lough Corrib (Galway City, Tuam, Loughrea)), Loughaunore Intake (Carna Kilkieran Rwss), Loughaunwillan (Carraroe), Moher Lake (Lough Mask & Westport), and Mountain Stream (Unnamed) (Leenane P.S.) may not meet sustainability guidelines during dry weather flows. However, under the proposed regulatory regime, sustainable abstraction quantities will be adjudicated by the EPA.

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

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

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

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

Waterbody Type	Water Catchments	Number of Waterbodies	Number of Waterbodies Rated Below Moderate
Rivers	Corrib	97	8
	Erriff-Clew Bay	81	3
	Galway Bay North	43	5
	Galway Bay South East	21	7
	Lower Shannon (25C)	1	0
	Moy & Killala Bay	16	2
	Upper Shannon (26B and 26D)	17	1
Lakes	Corrib	31	1
	Erriff-Clew Bay	77	1

Waterbody Type	Water Catchments	Number of Waterbodies	Number of Waterbodies Rated Below Moderate
	Galway Bay North	148	0
	Galway Bay South East	1	0
	Lower Shannon (25C)	0	0
	Moy & Killala Bay	4	0
	Upper Shannon (26B and 26D)	2	0
Transitional and Coastal	N/A	57	0
Groundwater	N/A	54	4

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

- Corrib: Hydromorphology (60%) and Agriculture (38%);
- Erriff-Clew Bay: Agriculture (30%) and Forestry (30%);
- Galway Bay North: Forestry (42%), Agriculture (25%) and Peat (25%);
- Galway Bay South East: Agriculture (33%), Domestic Wastewater (30%) and Other (abstractions, aquaculture, atmospheric, anthropogenic pressures, historically polluted sites, waste, water treatment and invasive species) (30%);
- Lower Shannon (25C): Agriculture (66%) and Hydromorphology (34%);
- Moy & Kilalla Bay: Hydromorphology (69%) and Agriculture (45%);
- Upper Shannon (26B): Hydromorphology (58%), Other (abstractions, aquaculture, atmospheric, anthropogenic pressures, historically polluted sites, waste, water treatment and invasive species) (50%) and Agriculture (42%); and
- Upper Shannon (26D): Agriculture (73%) and Hydromorphology (42%).

The groundwater body GWDTE-Lough Corrib Fens 3 & 4 is at particular risk of abstraction in SAD. Table 2.6 includes a summary of the ‘at risk’ waterbodies within SAD.

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

Waterbody Type	Water Catchments	Number of Waterbodies Identified as ‘At Risk’	Surface Waterbodies Status ‘At Risk’ Due to Abstraction Pressure*
Rivers	Corrib	32	4
	Erriff-Clew Bay	22	
	Galway Bay North	11	
	Galway Bay South East	11	
	Lower Shannon (25C)	1	
	Moy & Killala Bay	10	

Waterbody Type	Water Catchments	Number of Waterbodies Identified as 'At Risk'	Surface Waterbodies Status 'At Risk' Due to Abstraction Pressure*
	Upper Shannon (26B and 26D)	5	
Lakes	Corrib	5	15
	Erriff-Clew Bay	6	
	Galway Bay North	1	
	Galway Bay South East	0	
	Lower Shannon (25C)	0	
	Moy & Killala Bay	2	
	Upper Shannon (26B and 26D)	0	
Transitional and Coastal	N/A	2	0
Groundwater	N/A	8	N/A
Totals		**116**	**19**

* 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 SAD 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 SAD (catchments.ie, 2022)

Areas for Action	Key Reasons for Selection
Bundorragha	• The Bundorragha River (Bundorragha_010 and Bundorragha_020) together with the Glenummera River are also part of the Blue Dot Catchments Programme • Waterbodies must achieve Good or High status, however, one has declined due to dissolved oxygen • The water quality status of one waterbody is unknown
Bunowen (Louisburgh)	• It is a deteriorated waterbody that discharges to a designated bathing water to Carrowmore Beach • It is failing to meet its protected area objective for drinking water
Cashla	• The Cashla River (Cashla_010) is also part of the Blue Dot Catchments Programme thus needs to achieve high water quality status • Cashla_010 is currently at good status, therefore status needs to improve to high

Areas for Action	Key Reasons for Selection
	• A number of other waterbodies are unmonitored so their status is unknown
Castlebar/Lannagh	• Walshpool lake is part of the Blue Dot Catchments Programme meaning it requires special protection • A number of waterbodies in the area are currently at Moderate or Poor water quality and ecological status • There are a number of sources of pollution in the Castlebar Lannagh Area of Action
Castlegar	• The Shiven (South)_050 are part of the Blue Dot Catchments Programme thus needs to achieve high water quality status • Shiven (South)_050 is currently at good ecological status thus is failing to meet its high status objective • A number of other waterbodies within the catchment are achieving Poor or Moderate status with a need to improve
Cloonlavis/Glore	• Local authority currently working to address water quality issues associated with agriculture • Deteriorated waterbodies • One At Risk High Ecological Status objective waterbody • One waterbody failing to meet protected area objectives for drinking water (MCPA) • Two At Risk waterbodies with protected area objectives for Salmon • Subcatchment headwaters – which eventually lead to the River Moy
Dawros	• The Dawros_010 waterbody is part of the Dawros Margaritifera Sensitive Area and is one of the top 8 freshwater pearl mussel catchments in the country that supports the endangered species • The Dawros River is part of the Blue Dot Catchments Programme thus needs to achieve and maintain a high water quality status • Traheen_010 is currently at Good Status, and therefore failing to meet it's high status objective • Aughrusbeg: This lake is currently at Poor Status due to the presence of a non-native fish species impacting the native brown trout population • A number of other waterbodies in the catchment are unmonitored and thus their status is unknown
Failmore	• Part of a number of SACs and SPAs for wildlife • The Failmore_010 is also part of the Blue Dot Catchments Programme thus needs to achieve and maintain a high water quality status • Some waterbodies in the catchment are failing to meet their high-quality status objectives

Areas for Action	Key Reasons for Selection
Island	• There are Special Areas of Conservation (SAC), National Heritage Areas (NHAs) and Proposed National Heritage Areas (pNHAs) within the catchment • The Island_030 is part of the Blue Dot Catchments Programme thus needs to achieve and maintain a high water quality status • Some waterbodies in the catchment are failing to meet their high or good quality status objectives
Lough Conn and Lough Cullin	• Lough Cullin is important for both tourism and drinking water • Both Lough Conn and Lough Cullin are part of a number of important fisheries • The Addergoole river and Lough Cullin deteriorated in water quality as well as the Crumlin River which is currently failing to meet its High status objective.
Lough Mask and Lough Carra	• Lough Mask is an important drinking water source and several of its tributaries as well as the lake itself have deteriorated in water quality • Lough Mask is a Blue Dot lake • Lough Carra is one of the best examples of a hard water marl lake in Europe. However, the lake's ecology is under threat from excess nutrients • The water quality of the lake's tributaries is also unsatisfactory
Nephin Beg/Owengarve	• Needs to achieve Good water quality status • Deterioration of a number of waterbodies from Good to Moderate or Poor • Water quality of a number of waterbodies within the catchment is unknown, but with aims to build up data to assess their quality
Newport	• The Glenisland River and Skerdagh River are also part of the Blue Dot Catchments Programme • Waterbodies within the catchment are not reaching High status and are suffering significant decline
Owenriff (Oughterard)	• The Owenriff river is part of the Lough Corrib Special Area of Conservation (SAC) and includes a population of Freshwater Pearl Mussel (FPM) • Owenriff_010 and Owenriff_020 are also part of the Blue Dot Catchments Programme thus needs to achieve and maintain a high water quality status • A number of waterbodies within the catchment are not meeting their water quality and ecological standards, with multiple achieving a bad status
Raford	• There is one protected area in the catchment, Raford Bog Natural Heritage Area (NHA), and several downstream of the area

Areas for Action	Key Reasons for Selection
	• The water quality of a number of waterbodies within the catchment has declined
St Clerans Stream	• There are several protected areas within or downstream of the catchment • A number of waterbodies within the catchment have declined and are not meeting their water quality and ecological standards

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 SAD.

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

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

2.3 Climate Change

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

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

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

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

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

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

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

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

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

Summary	
	• 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 SAD

County	Key Risk Areas
Galway (Galway County Council, 2019)	• Extreme rainfall • Flooding • Strong winds • Higher temperatures and droughts • Lower temperatures and snowfall
Mayo (Mayo County Council, 2019)	• Extreme precipitation • Increased temperature extremes • Increased intensity and frequency of wind/storms • Increased frequency and intensity of coastal inundation and erosion Changes to distribution and phenology of plant and animal species
Roscommon (Roscommon County Council, 2019)	• Extreme rainfall • Strong winds

County	Key Risk Areas
	• Higher temperatures and droughts • Lower temperatures and snowfall

Climate change is expected to influence weather conditions, such as frequency of droughts and extreme events such as storms, and is likely to affect habitats and species, water availability for supply and water demand and water quality. For SAD, 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 SAD there are a number of European, national and locally designated sites, including Special Protected Areas (SPAs), Special Areas of Conservation (SACs), National Parks, Nature Reserves, and proposed Natural Heritage Areas (see Table 2.10 and Figure 2.2 - note that an index key for Figure 2.2 is provided in Appendix C). The European sites (SPAs and SACs), and the potential impacts on them, are discussed in more detail in the NIS.

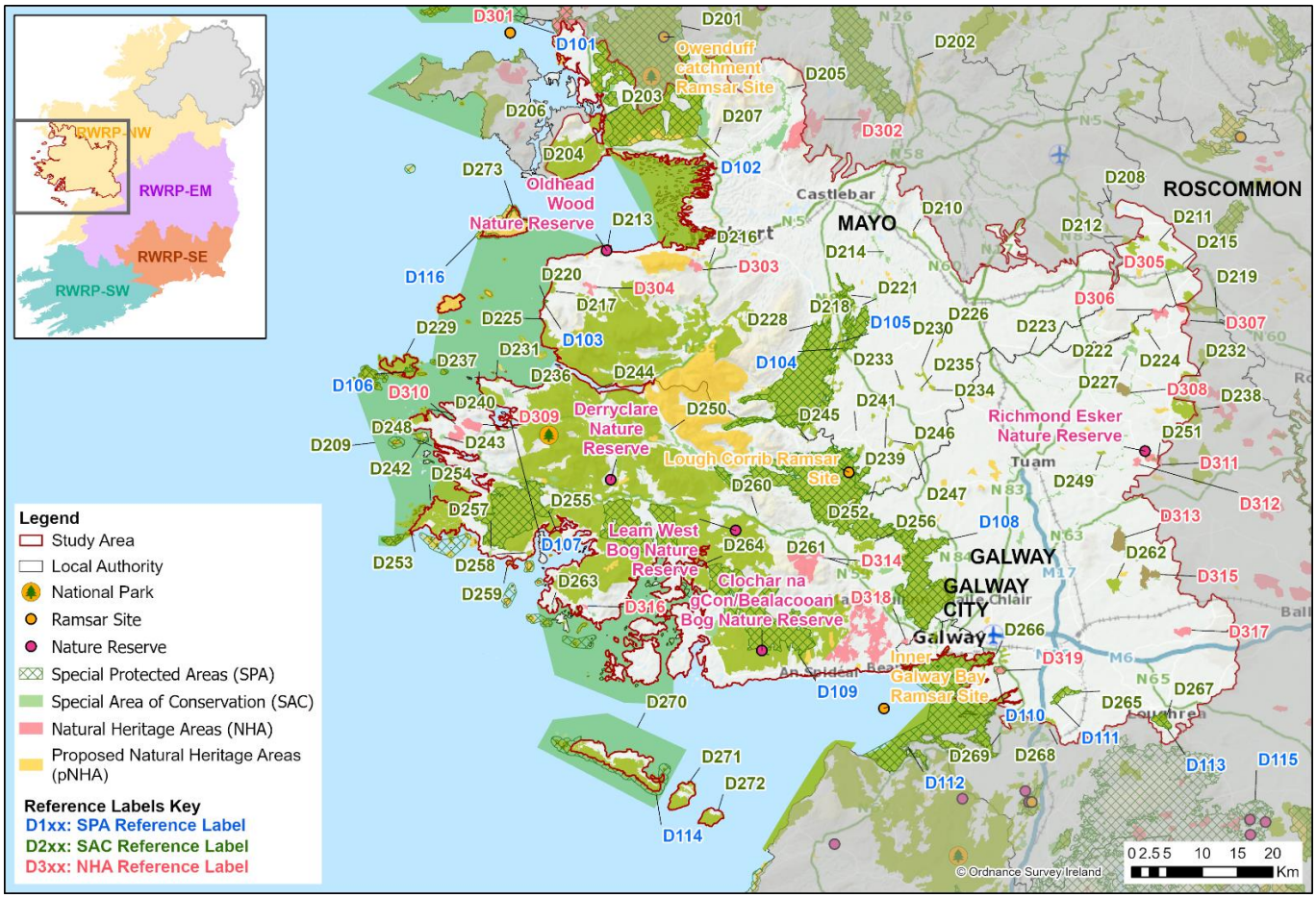

Figure 2.2 Designated Sites in SAD

Table 2.10 Designated Sites within SAD (NPWS, 2023)

Receptor	Name	Total Number
Special Protected Area (SPA)	Lough Corrib SPA	16
	Lough Carra SPA	
	Lough Mask SPA	
	Rahasane Turlough SPA	
	Owenduff/Nephin Complex SPA	
	Lough Rea SPA	
	Slieve Aughty Mountains SPA	
	Connemara Bog Complex SPA	
	Cross Lough (Killadoon) SPA	
	Illaunnanoon SPA	
	Inishmore SPA	
	Inishbofin, Omey Island and Turbot Island SPA	
	Cregganna Marsh SPA	
	Inner Galway Bay SPA	

Receptor	Name	Total Number
	Blacksod Bay/Broad Haven SPA	
	Clare Island SPA	
Special Area of Conservation (SAC)	Galway Bay Complex SAC	73
	Inishbofin And Inishshark SAC	
	Lough Corrib SAC	
	Lough Lurgeen Bog/Glenamaddy Turlough SAC	
	Clyard Kettle-Holes SAC	
	Cross Lough (Killadoon) SAC	
	Lough Gall Bog SAC	
	Owenduff/Nephin Complex SAC	
	Cloonchambers Bog SAC	
	Lough Fingall Complex SAC	
	Aughrusbeg Machair And Lake SAC	
	Omey Island Machair SAC	
	Rusheenduff Lough SAC	
	Ross Lake and Woods SAC	
	Clew Bay Complex SAC	
	Lough Cahasy, Lough Baun and Roonah Lough SAC	
	Lough Carra/Mask Complex SAC	
	Mweelrea/Sheeffry/Erriff Complex SAC	
	Maumturk Mountains SAC	
	The Twelve Bens/Garraun Complex SAC	
	Connemara Bog Complex SAC	
	Slyne Head Peninsula SAC	
	Corliskea/Trien/Cloonfelliv Bog SAC	
	Murvey Machair SAC	
	Newport River SAC	
	River Moy SAC	
	Drumalough Bog SAC	
	Monivea Bog SAC	
	Croaghill Turlough SAC	
	Levally Lough SAC	

Receptor	Name	Total Number
	Brackloon Woods SAC	
	Ballymaglancy Cave, Cong SAC	
	Moore Hall (Lough Carra) SAC	
	Oldhead Wood SAC	
	Ballinafad SAC	
	Barnahallia Lough SAC	
	Lough Nageeron SAC	
	Tully Lough SAC	
	Towerhill House SAC	
	Kildun Souterrain SAC	
	Dog's Bay SAC	
	Kingstown Bay SAC	
	Kilkieran Bay and Islands SAC	
	Lisnageeragh Bog and Ballinastack Turlough SAC	
	Derrinlough (Cloonkeenleananode) Bog SAC	
	Cloughmoyne SAC	
	Tully Mountain SAC	
	Ardkill Turlough SAC	
	Corraun Plateau SAC	
	Greaghans Turlough SAC	
	Kilglassan/Caheravoostia Turlough Complex SAC	
	Skealoghan Turlough SAC	
	Carrowbehy/Caher Bog SAC	
	Derrinea Bog SAC	
	Cregduff Lough SAC	
	Lough Rea SAC	
	Coolcam Turlough SAC	
	Rahasane Turlough SAC	
	Carrowkeel Turlough SAC	
	Williamstown Turloughs SAC	
	Castletaylor Complex SAC	
	Bellacragher Saltmarsh SAC	

Receptor	Name	Total Number
	Inishmaan Island SAC	
	Balla Turlough SAC	
	Gortnandarragh Limestone Pavement SAC	
	Mocorha Lough SAC	
	Shrule Turlough SAC	
	Inishmore Island SAC	
	Inisheer Island SAC	
	West Connacht Coast SAC	
	Slyne Head Islands SAC	
	Rosroe Bog SAC	
	Clare Island Cliffs SAC	
Ramsar Sites	Inner Galway Bay	3
	Lough Corrib	
	Owenduff catchment	
Nature Reserves	Oldhead Wood Nature Reserve	5
	Derryclare Nature Reserve	
	Leam West Bog Nature Reserve	
	Richmond Esker Nature Reserve	
	Clochar na gCon Bog Nature Reserve	
National Parks	Connemara National Park	1
Natural Heritage Areas (NHAs)	Lough Namucka Bog NHA	19
	Moorfield Bog/Farm Cottage NHA	
	Bracklagh Bog NHA	
	Slieve Bog NHA	
	Cregganna Marsh NHA	
	Lough Tee Bog NHA	
	Raford River Bog NHA	
	Tawnymackan Bog NHA	
	Carna Heath And Bog NHA	
	Derrinlough Bog NHA	
	Derrynagran Bog and Esker NHA	
	Killaclogher Bog NHA	

Receptor	Name	Total Number
	Tullaghan Bay and Bog NHA	
	Cloon And Laghtanabba Bog NHA	
	Croaghmoyle Mountain NHA	
	Tooreen Bog NHA	
	Lough Greney Bog NHA	
	Oughterard District Bog NHA	
	Moycullen Bogs NHA	
Proposed Natural Heritage Areas (pNHAs)	See Figure 2.2	107

2.4.2 Habitats

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

Table 2.11 Habitat Areas for SAD (EPA, 2018)

Habitat	Ha	% of Study Area
Agricultural Land		
Pastures	275,647	41.00%
Land principally occupied by agriculture, with significant areas of natural vegetation	55,384	8.24%
Complex cultivation patterns	949	0.14%
Non-irrigated arable land	328	0.05%
Natural Habitats		
Peat bogs	205,386	30.55%
Water bodies	35,181	5.23%
Sparsely vegetated areas	12,979	1.93%
Moors and heathland	10,517	1.56%
Natural grasslands	8,265	1.23%
Inland marshes	5,534	0.82%
Bare rocks	2,557	0.38%
Beaches, dunes, sands	962	0.14%

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

Habitat	Ha	% of Study Area
Sea and ocean	156	0.02%
Water courses	110	0.02%
Intertidal flats	67	0.01%
Coastal lagoons	56	0.01%
Salt marshes	50	0.01%
Forest		
Coniferous forest	23,196	3.45%
Transitional woodland-shrub	15,288	2.27%
Broad-leaved forest	3,560	0.53%
Mixed forest	3,285	0.49%

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

- Oligotrophic waters containing very few minerals of sandy plains;
- Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea;*
- Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.;
- Natural dystrophic lakes and ponds;
- Bog habitats – Active raised bogs, degraded raised bogs still capable of natural regeneration, *Rhynchosporion* depressions, transition mires and quaking bog habitats;
- Bog woodland;
- Alkaline fens;
- Groundwater dependant terrestrial habitats, such as petrifying springs with tufa formation and blanket bogs;
- Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae;*
- Northern Atlantic wet heaths with *Erica tetralix;*
- Turlough ecosystems;
- Coastal lagoons;
- *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*);
- Machairs; and
- Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho–Batrachion* vegetation.

2.4.3 Species

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

- Otter (*Lutra lutra*);
- Bat species – Lesser Horseshoe Bat (*Rhinolophus hipposideros*);
- Fish species - Atlantic Salmon (*Salmo salar*), Lamprey species;
- Fresh-water pearl mussel (*Margaritifera margaritifera*);
- White-clawed Crayfish (*Austropotamobius pallipes*);
- Marsh Fritillary (*Euphydryas aurinia*);
- Slender Naiad (*Najas flexilis*);

- Narrow-mouthed Whorl Snail (*Vertigo angustior*);
- Slender green feather-moss (*Hamatocaulis vernicosus*);
- Geyer's Whorl Snail (*Vertigo geyeri*);
- Marsh Saxifrage (*Saxifraga hirculus*);
- Petalwort (*Petalophyllum ralfsii*);
- 'Qualifying interest' bird species e.g. merlin (*Falco columbarius*), corncrake (*Crex crex*) and hen harrier (*Circus cyaneus*); and
- Waterbirds of 'qualifying interest' e.g. Brent goose (*Branta bernicla*), whooper swan (*Cygnus cygnus*), Greenland white-fronted goose (*Anser albifrons flavirostris*), Little Tern (*Sterna albifrons*) and winter migratory waders.

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

Animals:

- A colonial sea squirt (*Didemnum* spp.);
- American mink (*Mustela/Neovison vison*);
- Brown rat (*Rattus norvegicus*);
- Canada goose (*Branta canadensis*);
- Greylag goose (*Anser anser*);
- Harlequin ladybird (*Harmonia axyridis*);
- Roach (*Rutilus rutilus*);
- Ruddy duck (*Oxyura jamaicensis*);
- Slipper limpet (*Crepidula fornicata*);
- Stalked/leathery sea squirt (*Styela clava*);
- Wild boar (*Sus scrofa*); and
- Zebra mussel (*Dreissena polymorpha*).

Plants:

- American skunk-cabbage (*Lysichiton americanus*);
- Brazilian giant-rhubarb (*Gunnera manicata*);
- Broad-leaved rush (*Juncus planifolius*);
- Cord-grasses (*Spartina* spp.);
- Curly waterweed (*Lagarosiphon major*);
- Fringed water-lily (*Nymphoides peltata*);
- Giant hogweed (*Heracleum mantegazzianum*);
- Giant knotweed (*Fallopia sachalinensis*);
- Giant-rhubarb (*Gunnera tinctoria*);
- Himalayan/Indian balsam (*Impatiens glandulifera*);
- Himalayan knotweed (*Persicaria wallichii*);
- Japanese knotweed (*Fallopia japonica*);
- New Zealand pigmyweed (*Crassula helmsii*);
- Rhododendron (*Rhododendron ponticum*);
- Salmonberry (*Rubus spectabilis*);
- Sea-buckthorn (*Hippophae rhamnoides*);
- Spanish bluebell (*Hyacinthoides hispanica*);
- Three-cornered leek (*Allium triquetrum*);

- 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 SAD are listed in Table 2.12, such as agricultural land and bog areas.

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

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

Uisce Éireann has 33 WTPs in SAD, meeting the average demand of 128 Ml/d in 2019.

There are no canals or ports of national or regional significance in SAD. There are four airports of local significance, namely Connemara Airport, Inishmore Aerodrome, Inishmaan Aerodrome and Inisheer Aerodrome. Other significant transport infrastructure includes the main road network (particularly the M6, N59, N60, N83, and N84).

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

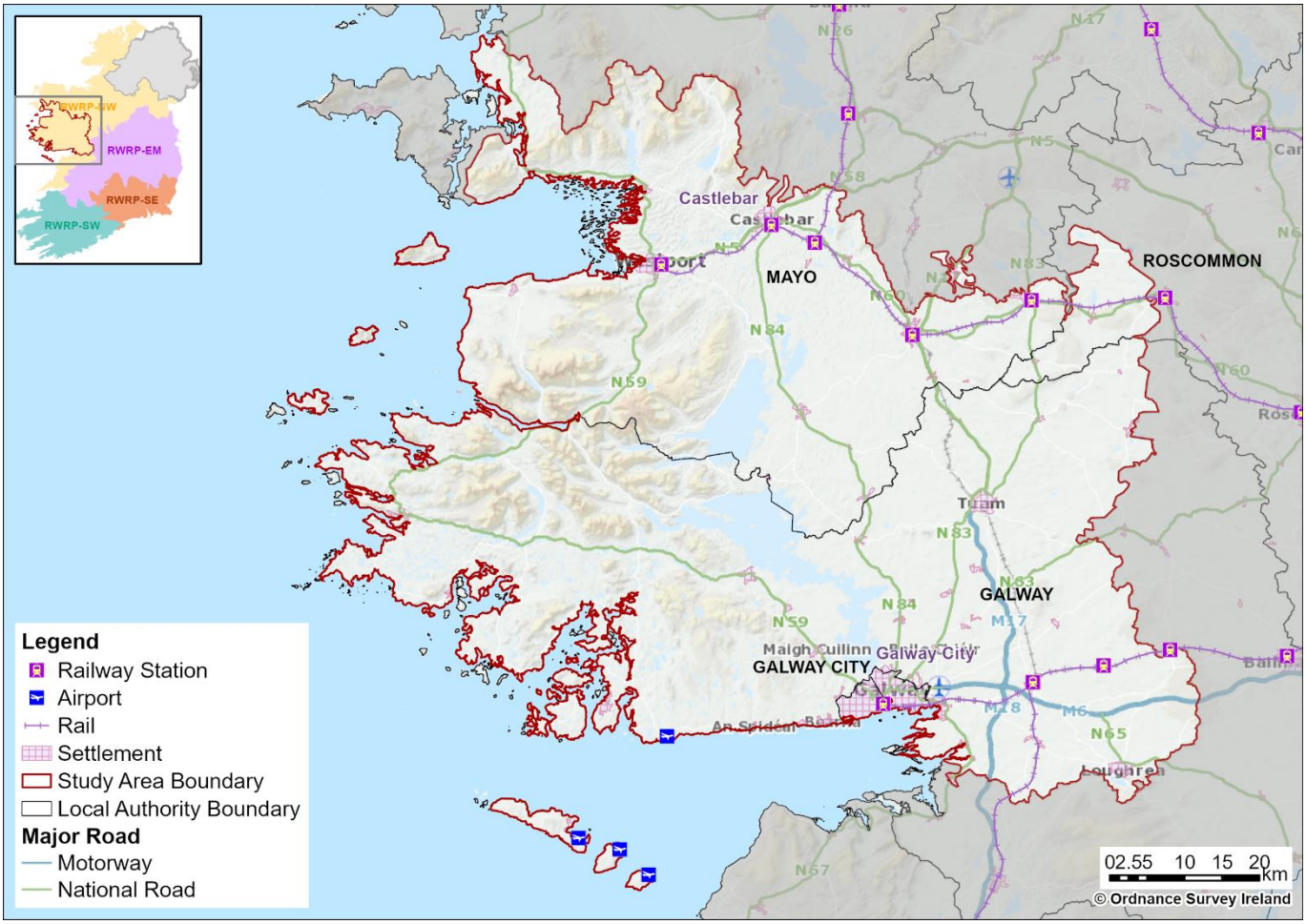

Figure 2.3 Transport Infrastructure in SAD

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

Land use	Ha	% of Study Area	Comparison to Overall North West Region %
Agriculture	332,308	49.43%	57.28%
Urban	8,231	1.22%	1.18%
Natural Habitats	281,819	41.92%	31.76%
Forest	45,329	6.74%	9.47%
Industry	426	0.06%	0.07%
Other	4,222	0.63%	0.24%

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

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

Table 2.13 gives an overview of the project developments which are available from myProjectIreland (2021) for SAD[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		
Áras Ronáin Community Nursing Unit, Aran Islands.	EmboSure	Oranmore Railway Station
Ardaun Upgrade of Martin Roundabout	Enact	Phase 1 Regeneration of Sisters of Mercy Convent Site and Adjacent Lands
ARDENT II	FreeSpace project	PolyValve
Athenry to Milltown Greenway	Galway City Ring Road	Regeneration Loughrea, Breaking Through
Athenry/Bia Innovator	Galway City Wastewater Network	Regeneration of Galway City Inner Harbour
AuriGen Solution for Persistent Atrial Fibrillation	Galway Emergency Department and Ward Block	RELAY
Ballina-Castlebar-Westport Interurban Greenway (BCWIG)	Galway Public Spaces and Streets Project	Releaze
Ballinrobe Regeneration	Geopark Development	RestOAre
Ballintubber Abbey Culture and Heritage Visitor Centre	GMIT STEM building	Sandy Road Liosbán
Ballyhaunis Community Vision	GTeic Hubs - Location #1 of 6 - Tourmakead	Smart-Cardio - a paradigm shift in Cardiac Arrythmia Treatment
BioHealx	Innovation and Creativity District	St Annes Community Nursing Unit, Clifden.
Castlebar Historic Core	INSPIRE	STROKE-CIS, developing Clot Ingestion System medical technology to treat stroke
Castlebar Military Barracks	Ireland's National Parks - Location #3 of 6 - Ballycroy	Terryland Water Treatment Plant*
Castlebar Military Barracks 2	Ireland's National Parks - Location #4 of 6 - Connemara	Tourism Experiences

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

Development		
Castlebar Urban Greenway Link	Libraries Capital Programme - Westport Library	Towards safe and effective off the shelf cellular therapy for cancer
Clew Bay Greenway Project	Mayo University Hospital Emergency Department and Medical Assessment Unit	Transport Connectivity Project
Clifden Town Centre	Merlin Park University Hospital, Theatre Block	Tuam Community Nursing Unit.
Connected Enteral Feeding Healthcare System for Integrated & Co-ordinated Care	MI_DRONE	Tuam Regeneration Strategy
Connemara Greenway - Clifden to Recess	N5 Westport to Turlough	Tullycross Residential Education Centre
Connemara Greenway - Derrygimlagh - Clifden - Kylemore Abbey	N59 Moycullen Bypass	Units 5 and 6 - Merlin Park Hospital.
Connemara Greenway- Galway to Moycullen (Oughterard)	National Parks - Location #4 of 8 - Ballycroy	University College Hospital Galway, Radiation Oncology Unit
Cycling and Walking	Newport Regeneration Project	University Hospital Galway, Blood Science Project
Data-center Audio/Visual Intelligence on-Device (DAVID), will develop 'privacy by design' AI platform, capable of multi-modal, ultra-low power consumption, 'data centre' level processing of audio and	NUI Galway Learning Commons	University Hospital Galway, Cardiac Cath Laboratory - Phase 1
Dunmore Regeneration	Nun's Island Masterplanning	

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 SAD is reflected in baseline data sections 2.1.3 (Tourism and Recreation), 2.4 (Biodiversity, Flora and Fauna) and 2.8 (Cultural Heritage).

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

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 SAD (Ordnance Survey Ireland. n.d.)

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

Landscape Character Area	Sensitivity	Value
Bertraghboy bay and eastern banks	Special	High
West Coast (Gorteen bay to Clifden)	Special	Outstanding
West Coast (Clifden to mouth of Killary Harbour)	High with a coastal edge of Special	Outstanding
Killary Harbour and southern banks	Unique with pockets of Special	Outstanding
Connemara National Park (including Lough Fee, Lough Inagh and Derryclare Lough)	Unique	Outstanding
Joyces Country (including Lehanagh Loughs and south Lough Mask)	Unique with pockets of Special	Outstanding
Aran Islands	Unique with pockets of Special	Outstanding
Lough Rea	Special	High
County: Mayo (Mayo County Council)		
No values or sensitivity information available		
County: Roscommon (Roscommon County Council, 2014)		
Lough Allen and Arigna foothills	High	Very High
Upper Shannon and Derreenannagh Drumlin Belt	High	Very High
Lough Corry Drumlin Basin	High	Very High
Kilglass Drumlin Lakelands	High	Very High
Slieve Bawn and Feirish Bogland Basin	High	Very High
Upper Lough Ree Bogland	High	Very High
Mid Lough Ree Pastureland	High	Very High
Lower Lough Ree and Athlone Environs	High	Very High
Cloonown and Shannon Callows	High	Very High
Suck River Source and Lough O'Flynn Boglands and Esker Ridges	High	High
Castlerea and Upper Suck Valley	High	High
Athleague and Lower Suck Valley	High	High
Suck Callows	High	High
Arigna Mountains	High	Very High
Lough Meelagh Drumlins	High	Very High
Lough Key and Boyle River Network	High	Exceptional

Landscape Character Area	Sensitivity	Value
Boyle and Curlew Mountains	High	Very High
Plains of Boyle	Medium	Moderate
Elphin Drumlins	Medium	Moderate
Breedoge Bogland Basin	Medium	Moderate
Mullaghnashee Wet Farmland Plateau	Medium	Moderate
Cloona Lough and Lung River Bogland basin	Medium	Moderate
Ballaghaderreen and Bockagh Hill Uplands	Medium	Moderate
Ballinlough Bogland and Esker Ridges	Medium	Moderate
Cloonfad Hills and Esker Ridges	Medium	Moderate
Cloonfad Bog and Upland	Medium	Moderate
Castlerea Raised Bogland	High	High
Tulsk and Rathcroghan Plateau	High	Exceptional
Strokestown Drumlin and Turlough Belt	Medium	Moderate
Oran Undulating Open Farmland	Medium	Moderate
Scramoge River Basin	Medium	Moderate
Roscommon Town and Hinterland	High	High
Skrine Hill and Limestone Pavement	High	High
Lough Funshinagh, Stone Wall Grasslands and Esker Ridges	Medium	Moderate
Brideswell Esker Belt	Medium	Moderate
Ballydangan Pastures	Medium	Moderate

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 two SCAs in SAD; Atlantic North Mayo and Galway, and Atlantic Galway Bay and Islands.

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 SAD 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 M6, N59, N60, N83, and N84.

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

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

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

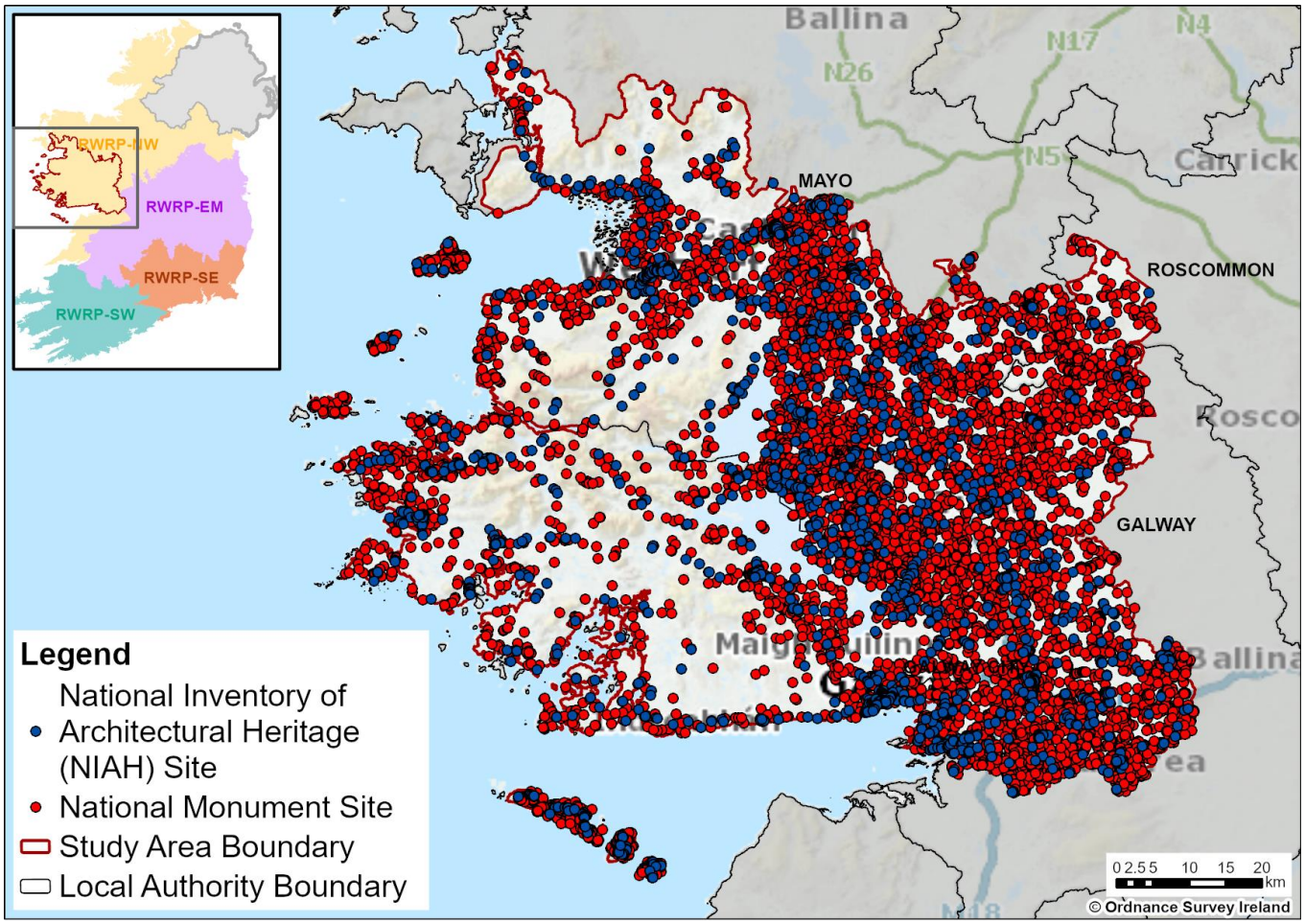

Figure 2.4 SAD Cultural Heritage Assets

Table 2.15 Cultural Heritage Assets within SAD

Assets	Total Number
National Monuments Service Sites	11,180
National Inventory of Architectural Heritage Sites	2,646
Sites and Monuments Record Zones	6,002

2.9 Geology and Soils

Table 2.12 lists the land uses within SAD. SAD predominantly has a peat soil type with areas of fine loam soil to the 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 SAD are shown in Figure 2.5.

This area is characterised by its more mountainous regions of Connemara, which are composed of Precambrian quartzites, with Ordovician igneous and volcanic rocks also present. Silurian Metasediments and Volcanics can be found to the northwest near Louisburgh and Westport, while Granites and other Igneous intrusive rocks make up the bedrock to the south of Connemara, stretching

towards the coastline of Galway Bay. The Precambrian rocks and Granites are characterised by the absence of an intergranular permeability and the presence of low fissure permeability. The karst forms a key regionally important aquifer in some areas, underlying much of central and east Galway, which consists of clean limestone that has been extensively karstified. The majority of the larger abstractions occur in this setting and mainly appear as spring overflows, which serve as points of groundwater discharge. Limestone dissolution during karstification causes groundwater flow to concentrate along certain pathways/conduits (Rkc type aquifers), making it difficult to locate successful wells. Locating high yielding wells in Rkc aquifers can be difficult due to the uneven distribution of permeability; failed and high yielding wells can occur close together. Both point and diffuse recharge occur. Diffuse recharge occurs via rainfall percolating through permeable subsoil and rock outcrops. Despite the presence of peat and till, point recharge to the underlying aquifer occurs by means of swallow holes and collapse features/dolines.

In the lowlands of East Galway and southeast Mayo, where the elevation rarely exceeds 70 m above sea level, most drainage is underground in solutionally enlarged fissures and conduits, and in several areas groundwater catchments do not match the surface water catchments. Groundwater flow is dominantly westward, to Loughs Mask and Corrib or to Galway Bay. The area is characterised by sinking rivers, losing rivers during periods of lower groundwater levels and gaining rivers in the winter, as seen with the Robe. In the River Clare–Lough Corrib catchment, no gaining streams are known, so all groundwater discharge is via springs. Oftentimes the spring abstraction can be augmented by drilling a borehole, however the nature of the Rkc flow regime makes well success unpredictable. Both borehole and spring supplies are highly vulnerable to contamination from any pollutants that are allowed to enter the karstic aquifers. The same karstic bedrock is mirrored in the Aran Islands, with various existing natural groundwater discharge seeps on the islands.

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, 166 of which have the potential to constrain water resource options in SAD.

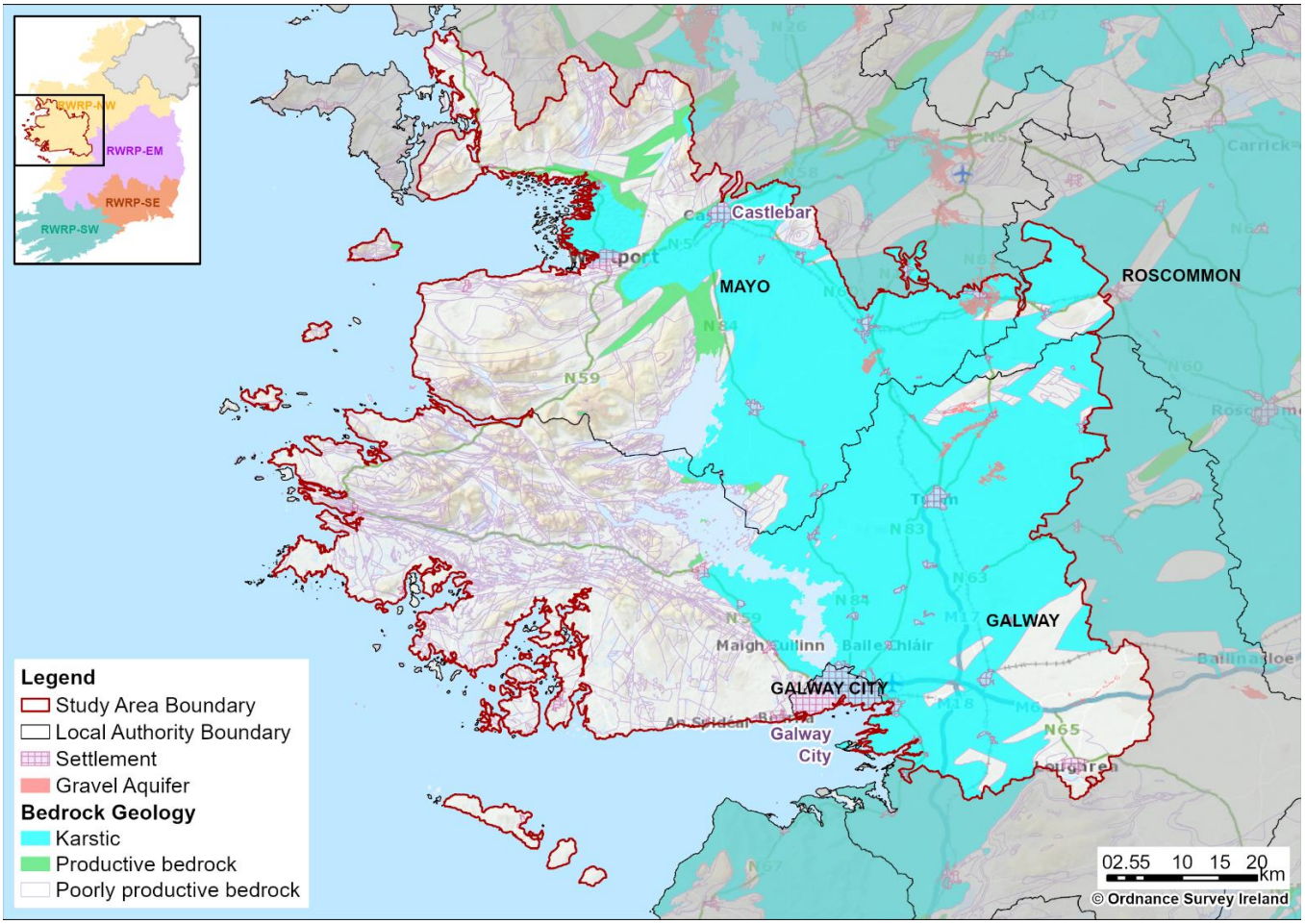

Figure 2.5 SAD Hydrogeology

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 SAD 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 SAD, including, leakage management and water conservation measures. Raising awareness of the importance of water conservation and efficiency measures, and the value of the environment for health and wellbeing, can play an	Climate change, biodiversity, water environment, material assets and landscape and visual amenity

SEA Topic	Issues and Opportunities	Interrelated Topics
	important part in water planning. Valuing access to environment for recreation.	
Water Environment	**Issues**: The proposed abstraction licensing, aligned to WFD requirements, will require many current abstractions to be licensed and may limit future abstraction or involve significant conditions being imposed at associated sites. For SAD, 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 SAD 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 SAD.	Biodiversity and climate change
Biodiversity, Flora and Fauna	**Issues:** SAD has a number of designated area sites, including several large, water dependent Special Areas of Conservation (SAC) such as the Lough Corrib SAC, Lough Carra/ Mask Complex SAC and Connemara Bog Complex SAC. It has three SAC catchments designated for *Margaritifera* (Freshwater Pearl Mussel) - the Owenriff, Dawros, and Bundorragha. SAD also has several waterbodies with WFD High Status Objectives, including the large Lough Mask source. 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	Water resources, water quality and climate change
Material Assets	**Issues:** WTP assets and network infrastructure requiring improvement or replacement **Opportunities**: Improvements to support reliability of access to good quality water.	Health and wellbeing
Landscape and Visual Amenity	**Issues:** Potential for climate change to affect land use and habitats and influencing landscape quality and amenity.	Biodiversity and geology and soils, climate change, health and wellbeing
Air Quality and Noise	No specific issues identified for the baseline for SAD.	Health and wellbeing

SEA Topic	Issues and Opportunities	Interrelated Topics
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 SAD 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 SAD are Stages 3-6:

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

3.2 Stage 3: Unconstrained Options

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

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

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

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

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

3.2.1 Existing Groundwater Abstractions

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

3.2.2 New Groundwater Abstractions

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

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

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

3.2.3 Sustainable Abstraction in Options Assessment

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

secure, reliable and sustainable supplies, any new abstractions proposed to be developed by Uisce Éireann as part of this plan will be based on conservative assessments of sustainable abstraction. This will ensure that water supplies continually improve in terms of environmental sustainability.

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

3.3 Stage 4: Coarse Screening

A total of 281 unconstrained options were identified for SAD 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 281 unconstrained options, 108 were rejected after being analysed against the coarse screening criteria of resilience, deliverability and environment.

Sustainability reasons for rejecting options were identified for 33 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 SAD. 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 SADTechnical Report.

Table 3.2 Coarse Screening Rejection Register

Option Reference	Option Description	Rejection Reasoning
SAD-007	Increase existing SW abstraction from Lough Lerin to supply deficit at Carna Kilkieran, upgrade Carna Kilkieran WTP	Abstracting the volume of water required to make this a feasible option is considered likely to result in the

Option Reference	Option Description	Rejection Reasoning
SAD-008	Increase existing SW abstraction from Lough Loughaunore to supply deficit at Carna Kilkieran, upgrade Carna Kilkieran WTP	waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.
SAD-028	New SW abstraction from Derrylea Lough to supply deficit at Clifden WRZ, upgrade WTP	
SAD-032	Increase existing SW abstraction from Lough Coolin to supply deficit at Colnbur WRZ, upgrade WTP	
SAD-045B	Increase existing SW abstraction from Lough Haunwillan (Carraroe source) to supply deficit at Carraroe ERZ, upgrade WTP	
SAD-045C	Increase existing SW abstraction from Lough Haunwillan (Carraroe source) to supply deficit at Carraroe ERZ, upgrade WTP	
SAD-045D	Increase existing SW abstraction from Lough Haunwillan (Carraroe source) to supply deficit at Carraroe ERZ, upgrade WTP	
SAD-052	Increase existing SW abstraction from Lough Fawna to supply deficit at Inisboffin WRZ, upgrade WTP	
SAD-056	Connect Inisbofin to mainland (Cleggan-Claddaduff)	
SAD-065	Connect Inish Oirr to mainland (Carraroe - Lough Corrib WRZ)	
SAD-072	Connect Inishmean to mainland (Carraroe)	
SAD-079	Connect Inishmore to mainland	
SAD-086	Increase SW existing abstraction from River to supply deficit at Leenane WRZ, upgrade WTP	
SAD-094	Increase SW abstraction from existing Lake Moher (Westport WSS source) to supply deficit at Lough Mask & Westport WRZ, upgrade WTP	
SAD-097B	New GW abstraction (Poorly productive clifden castlebar GWB) to supply deficit at Louisburgh WRZ, upgrade WTP	
SAD-098	Supply deficit from neighbouring GWS - Laughta GWS; Killeen GWS (GW Clifden Castlebar)	
SAD-106	Take off section of Farmablake from Mid-Galway and connect to Loughrea	
SAD-107	Supply deficit from GWS (DBO schemes) Kilkieran GWS	

Option Reference	Option Description	Rejection Reasoning
SAD-109	Increase SW abstraction from existing River Bunnahowna to supply deficit at Mulranny WRZ, upgrade WTP	
SAD-120	Supply deficit from neighbouring GWS - Kilmeena GWS	
SAD-126	Increase SW abstraction from existing Lough Aroolagh to supply deficit at Rosmuc WRZ, upgrade Rosmuc WTP	
SAD-130	Increase SW abstraction from existing Lough Illauntrasna to supply deficit at Teeranea Lettermore WRZ, upgrade Tiernee WTP	
SAD-133	New SW abstraction and new WTP from lake - Lough Ballynakill	
SAD-135	Supply deficit from neigbouring GWSs - Lettermullen GWS; Lettermullen GWS No.2	
SAD-138	Increase existing SW abstraction from Diamond Hill River to supply deficit at Tully-Tullycross WRZ, upgrade WTP	
SAD-150	Connect to Cuilmore GWS (increase abstraction from Skerdagh River)	
SAD-082	Increase SW abstraction from existing Lake Coolacknick impoundment	
SAD-001	Increase existing SW abstraction from Lake Anaserd to supply deficit at Ballyconneely WRZ, upgrade WTP	Sustainability issues associated with this option. 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.
SAD-013	Increase SW abstraction from existing River Knockmore to supply deficit at Clare Island WRZ, upgrade WTP	
SAD-017A	Increase existing SW abstraction from Lough Courhoor to supply deficit at Cleggan Claddaghduff WRZ, upgrade Cleggan WTP	
SAD-017B		
SAD-023	Increase existing SW abstraction from Lough Nambrackeagh to supply deficit at Clifden WRZ, upgrade WTP	Sustainability 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 173 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 SAD.

3.5 Stage 6: Feasible Options List

A total of 173 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 SAD Technical Report.

4 Environmental Assessment – Approach Development

4 Environmental Assessment – Approach Development

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

4.1 Introduction to Approach Development

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

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

Table 4.1 The Six SA Approaches

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

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

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

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

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

4.2 Stage 7: Approach Development Process

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

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

For the Best AA Approach, the scoring on the European Sites (Biodiversity) sub-criteria question refers to the possibility for Likely Significant Effects (LSEs). A Score of 0 equates to no LSEs. If an option is identified that meets the “Objectives of the Plan” and is assessed as having no potential impact on a European Site (zero or neutral score based on desktop assessment), it is automatically adopted as the Preferred Approach at WRZ level. Furthermore, because it is possible that all of the potential impacts identified at Plan level can be entirely ruled out through project level investigation and analysis or avoided through project level mitigation, options with potential for LSEs (score of -1 to -3 for biodiversity) may be progressed as the Preferred Approach. If potential impacts cannot be ruled out or avoided, then mitigation in the form of avoidance is provided for within the NWRP to protect European site(s). Should potential adverse effects on European sites be identified at the project level from a given option/Preferred Approach the NWRP will have identified other options[5] that could be progressed at the project level if required. Therefore, no project arising from the NWRP, with Adverse Effects on Site Integrity (AESI) identified at the project stage would be implemented. Scores of -1 to -3 equates to LSEs being identified. Scores of -1 to -2 are LSEs that will not result in AESI with standard best practice project specific mitigation applied as these can be addressed with general/standard mitigation measures.

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

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

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

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

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

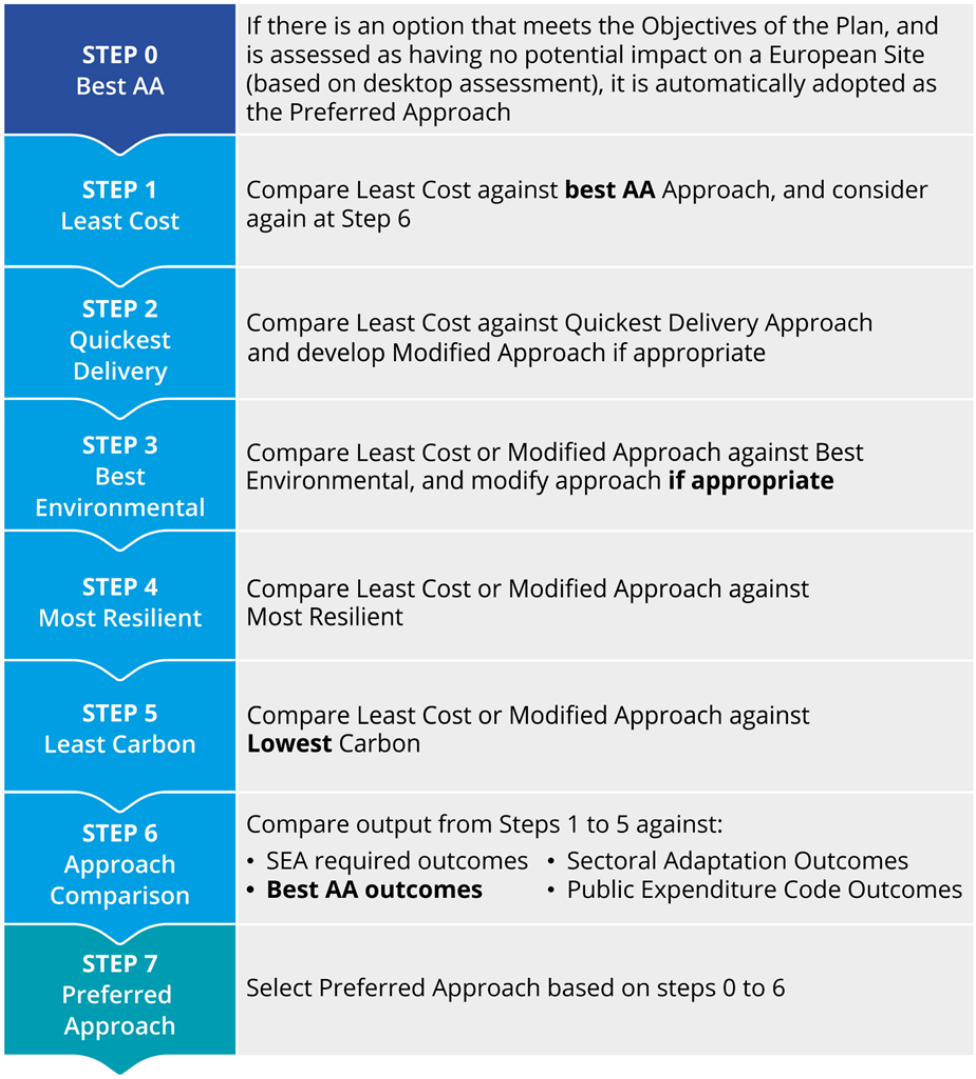

Figure 4.1 The 7 Step Process

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:

- Climate regulation – woodland;
- Traffic impacts – opportunity cost of time due to road congestion from roadworks;
- Food – crops and livestock; and
- 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.

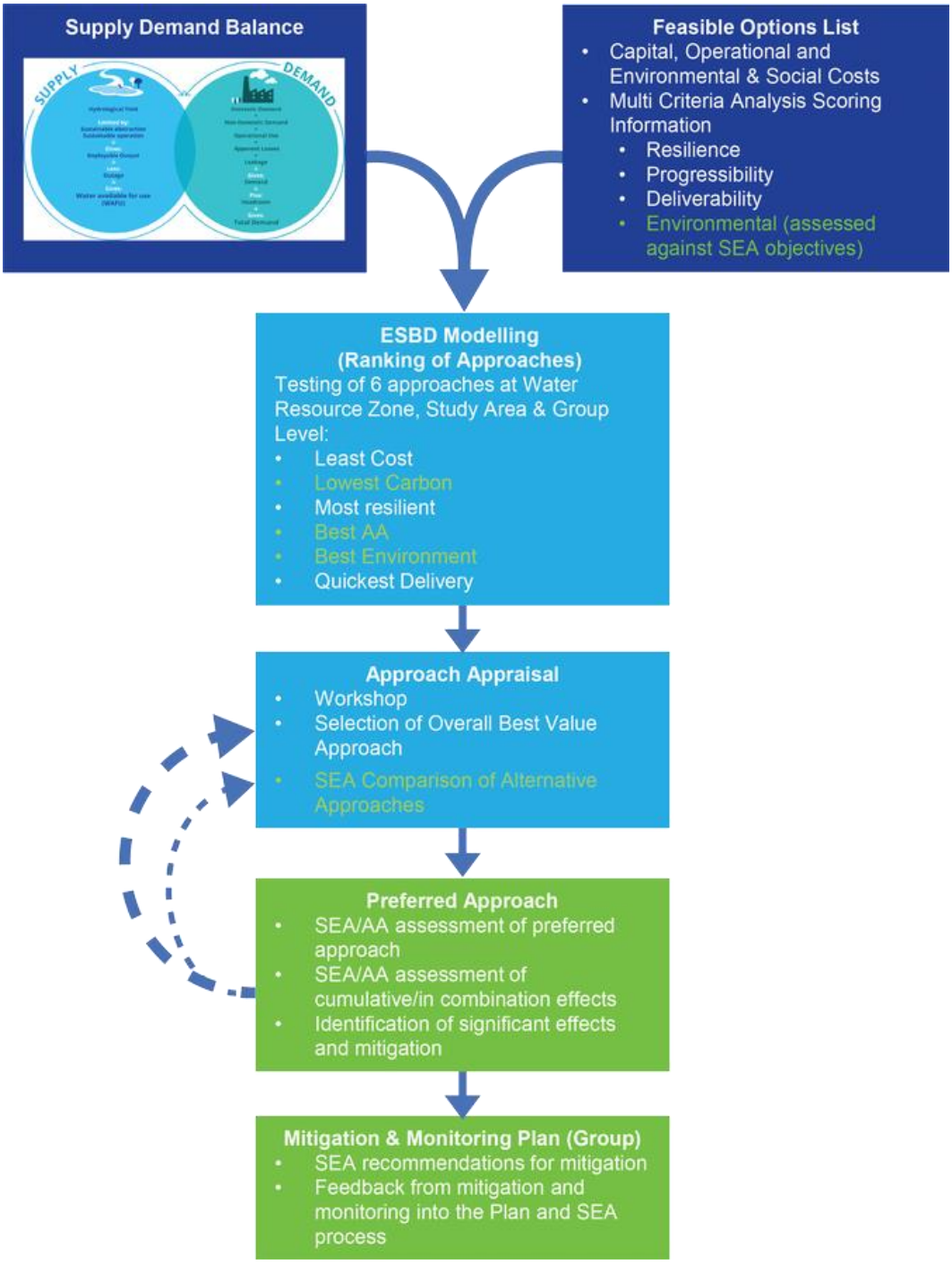

Figure 4.2 Approach Development Process

4.3 SAD 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 SAD there are 59 WRZ options and these are listed in Table 5.2 in the SAD Technical Report, providing option reference numbers and the relevant WRZ. These options were taken through the 7 step process to identify the preferred WRZ approach.

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

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

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

For SAD, a total of 22 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 SAD Summary of SA Combination of Performance against Approach Category

Category	WRZ Level Approach (Cannot meet the deficit)	SA Combination 1 (SA Option 3 and 35)	SA Combination 2 (SA Option 8 and 35)	SA Combination 3 (SA Option 10 and 35)	SA Combination 4 (SA Option 14 and 35)	SA Combination 5 (SA Option 15 and 35)	SA Combination 6 (SA Option 16 and 35)	SA Combination 7 (SA Option 17 and 35)	SA Combination 8 (SA Option 19 and 35)	SA Combination 9 (SA Option 20 and 35)	SA Combination 10 (SA Option 22 and 35)	SA Combination 11 (SA Option 23 and 35)	SA Combination 12 (SA Option 24 and 35)	SA Combination 13 (SA Option 31 and 35)	SA Combination 14 (SA Option 32 and 35)	SA Combination 15 (SA Option 33 and 35)	SA Combination 16 (SA Option 17, 23, 32 33 and 35)	SA Combination 17 (SA Option 1 and 33)	SA Combination 18 (SA Option 32 and 37)	SA Combination 19 (SA Option 23, 24, 32 and 35)	SA Combination 20 (SA Option 1, 17, 22 and 31)	SA Combination 21 (SA Option 41, 43, 45 and 48)	SA Combination 22 (SA Option 35)
Least Cost													Worst									Best**	
Quickest Delivery							Worst										Best						
Number of -3 Biodiversity Scores		Four -3 Scores	Four -3 Scores	Four -3 Scores	Two -3 Scores	Three -3 Scores	Four -3 Scores	Four -3 Scores	Four -3 Scores	Four -3 Scores	Four -3 Scores	Five -3 Scores	Five -3 Scores	Five -3 Scores	Five -3 Scores	Five -3 Scores	Seven -3 Scores	Three -3 Scores	Four -3 Scores	Seven -3 Scores	Three -3 Scores	Five -3 Scores	Four -3 Scores
Lowest Carbon																					Worst	Best	
Most Resilient					Worst															Best			
Best Environmental										Worst											Best		

Key																					
Ranked order (best to worst)	Best																				Worst

*SA options are also known as SA grouped options

**Overall combination 21 is within 5% of the lowest cost combination and performs better against other categories. Hence, it has been identified as the least cost approach. Further explanation can be found in section 5.2.3 of the SAD Technical Report.

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 five approaches (see Table 4.3).

Table 4.3 Study Area Approach Categories

Category	SA Approach 1 (SA Combination 4) (BA)	SA Approach 2 (SA Combination 16) (QD)	SA Approach 3 (SA Combination 19) (MR)	SA Approach 4 (SA Combination 20) (BE)	SA Approach 5 (SA Combination 21) (LCo, LC)
Least Cost (LCo)	-	-	-	-	✓
Quickest Delivery (QD)	-	✓	-	-	-
Best Environmental (BE)	-	-	-	✓	-
Most Resilient (MR)	-	-	✓	-	-
Lowest Carbon (LC)	-	-	-	-	✓
Best AA (BA)	✓	-	-	-	-

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

Table 4.4 Study Area Approaches

Options included	Do Minimum	Least Cost Approach (SA Approach 5) (SA Combination 21)	Best Appropriate Assessment Approach (SA Approach 1) (SA Combination 4)	Quickest Delivery Approach (SA Approach 2) (SA Combination 16)	Best Environmental Approach (SA Approach 4) (SA Combination 20)	Most Resilient Approach (SA Approach 3) (SA Combination 19)	Lowest Carbon Approach (SA Approach 5) (SA Combination 21)
SA options (Group options)	No options	**SA option 41:** 195, 196 **SA option 43:** 199, 200, 201, 202 **SA option 45:** 209, 210, 211	**SA option 14:** 038d, 043c, 093k **SA option 35:** 164, 165	**SA option 17:** 016, 093e, 100a **SA option 23:** 115b, 121 **SA option 32:** 154, 155, 156, 157	**SA option 1:** 005b, 011b, 029b, 037c, 047d, 128b, 136c, 168, 169 **SA option 17:** 016, 093e, 100A	**SA option 23:** 115b, 121 **SA option 24:** 063, 070, 077 **SA option 32:** 154, 155, 156, 157	**SA option 41:** 195, 196 **SA option 43:** 199, 200, 201, 202 **SA option 45:** 209, 210, 211

Options included	Do Minimum	Least Cost Approach (SA Approach 5) (SA Combination 21)	Best Appropriate Assessment Approach (SA Approach 1) (SA Combination 4)	Quickest Delivery Approach (SA Approach 2) (SA Combination 16)	Best Environmental Approach (SA Approach 4) (SA Combination 20)	Most Resilient Approach (SA Approach 3) (SA Combination 19)	Lowest Carbon Approach (SA Approach 5) (SA Combination 21)
		SA option 48: 217, 218		**SA option 33:** 088, 142 **SA option 35:** 164, 165	**SA option 22:** 115a, 117b **SA option 31:** 151, 152, 152	**SA option 35:** 164, 165	**SA option 48:** 217, 218
WRZ options	No options	014 027 033 040 046a 055 058 069 074 158 101 111 117a 122	002 009 014 019 027 046a 055 058 069 074 158 089 097a 101 111 117a 122 127 132 140	019 027 033 040 046a 055 058 069 074 158 101 122	040 055 058 069 074 158 101 122	014 019 027 033 040 046a 055 158 089 093a 097a 101 122 140	014 027 033 040 046a 055 058 069 074 158 101 111 117a 122

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

For the purposes of the Approach Development Process as set out in the SA Technical Report and for the purpose of the SEA comparison as set out in this Environmental Review, 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 SAD Technical Report.

Within SAD, this resulted in five approaches being selected from the 22 SA combinations identified in Table 4.3, as they were identified as the best performing against the six approach categories - Least Cost, Best Environmental, Quickest Delivery, Most Resilient, Best AA and Lowest Carbon. This means that when comparing the five identified approaches against each other (representing the Stage 3 analysis for the selection of the Preferred Approach used in the workshop - see Table 4.5), their relative performance against categories they were not identified as “best” in Table 4.2 may be different. This because Table 4.2 compares all of the combinations to give a wider ranking, whereas Table 4.5 only compares the best performing combinations that have been selected as approaches. For example, an option identified as the "worst" performer against a particular approach category in Table 4.5 may not be the overall worst performing option when considered alongside all of the combinations in Table 4.2

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

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

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

Category Criteria	SA Approach 1 (SA Combination 4) (BA)	SA Approach 2 (SA Combination 16) (QD)	SA Approach 3 (SA Combination 19) (MR)	SA Approach 4 (SA Combination 20) (BE)	SA Approach 5 (SA Combination 21) (LCo, LC)
Least Cost Score			Worst		Best*
Quickest Delivery Score	Worst	Best			
Best AA Score	Two -3 Biodiversity Scores	Seven -3 Biodiversity Scores	Seven -3 Biodiversity Scores	Three -3 Biodiversity Scores	Five -3 Biodiversity Scores
Lowest Carbon Score				Worst	Best
Most Resilient Score	Worst		Best		
Best Environmental Score	Worst			Best	

Key
Ranked order (best to worst) within the five selected approaches
*Overall combination 21 is within 5% of the lowest cost combination and performs better against the carbon and environment criteria. Therefore, combination 21 is progressed as the Least Cost.

Key				
Worst				Best

4.4 Comparison of SAD Approaches

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

Table 4.6 Study Area Approach Components Summary

Infrastructure Summary	Do Minimum	SA Approach 1 (SA Combination 4) (BA)	SA Approach 2 (SA Combination 16) (QD)	SA Approach 3 (SA Combination 19) (MR)	SA Approach 4 (SA Combination 20) (BE)	SA Approach 5 (SA Combination 21) (LCo, LC)
New pipeline network (km)	0	82	163	147	254	149
New WTPs	0	9	7	9	3	6
Upgrade WTPs	0	26	27	25	22	21
New / upgraded abstractions	0	24	19	19	14	20
WTPs decommissioned	0	7	6	8	11	12
Abstractions abandoned	0	10	6	9	12	12
Raw Water Storage	0	0	0	0	0	0
Treated Water Storage	0	18	21	21	26	17

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

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

Table 4.7 Study Area Approach Comparison Summary

Topic	Total No. of	SA Approach 1 (BA) (SA combination 4)	SA Approach 2 (QD) (SA combination 16)	SA Approach 3 (MR) (SA combination 19)	SA Approach 4 (BE) (SA combination 20)	SA Approach 5 (LCo, LC) (SA combination 21)	Range (Difference between Lowest and Highest Score)
Population, health, economy and recreation	-3 scores	Worst	Worst	Worst	Best	Worst	2
	MCA score	Worst			Best		44
Water Environment: quality and resources	-3 scores	Best		Worst		Best	2
	MCA score	Worst			Best		19
Biodiversity, Flora and Fauna	-3 scores	Best	Worst				6
	MCA score	Worst			Best		79
Material Assets	-3 scores		Worst	Worst		Best	3
	MCA score			Worst	Best		26
Landscape and Visual	-3 scores		Worst	Worst	Best	Best	3
	MCA score	Worst			Best		19
Climate Change	-3 scores		Worst	Worst	Best	Best	2
	MCA Score		Best	Worst			14
Culture, Heritage and Archaeology	-3 scores	No difference					0
	MCA Score	Worst			Best		10
Geology and Soils	-3 scores	No difference					0
	MCA Score	Worst		Worst	Best		12

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

Key

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

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

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

SA approach 1, key comparison points:

- Identified as the best in the Best AA category;
- Option types included:
    - SA options (group options): 1 surface water abstraction and rationalisation option, and 1 desalination plant option;
    - WRZ options: 9 groundwater abstraction options, 9 surface water abstraction options, 1 group water scheme option and 1 desalination plant option;
- Two -3 biodiversity scores associated with:
    - SAD-055: Potenial for impacts associated with proposed new infrastructure within Inishbofin SAC/Inishbofin SPA and the proposed desalinisation. The potential impacts associated with the desalination are not fully understood and require further assessment; and
    - SA Option 35: Potential impacts associated with the dealination brine output are unknown and will be difficult to mitigate at Galway Bay SAC.
- The key differences in infrastructure for SA Approach 1 include:
    - The lowest length of pipeline;
    - The highest number of WTP upgrades (same number as SA approach 5);
    - More WTP upgrades;
    - The highest number of new/upgraded abstractions;
    - Fewer WTPs decommissioned,
    - More abstractions abandoned; and
    - The lowest number of treated water storage facilities.

4.4.2 SA Approach 2 (SA Combination 16) (QD)

SA approach 2, key comparison points:

- Identified as the best in the Quickest Delivery category;
- Option types included:
    - SA options (group options): 2 interconnection options, 2 surface water abstraction options and 2 desalination plants;
    - WRZ options: 5 groundwater abstraction options, 5 surface water abstraction options, 1 group water scheme option and 1 desalination plant option;
- Eight -3 biodiversity scores associated with:

- SAD-033: Potential for direct impact on the Lough Corrib SAC SPA. However, there are some unknowns regarding the full impact of the scheme footprint and further studies will be required;
- SAD-040: Proposed new abstraction is adjacent to the Lough Corrib SAC. There is potential to impact the water table level and further hydrological monitoring will be required;
- SAD-055: Potenial for impacts associated with the dealination and the proposed new infrastructure within Inishbofin SAC/Inishbofin SPA. The potential impacts associated with the desalination are not fully understood and require further assessment;
- SA Option 23: Potential for the abstraction from Lough Feeagh to directly impact the Owenduff/Nephin Complex SAC;
- SA Option 24: Potential for direct impacts as the desalination is located on one of the three Aran islands that are designated SACs. The full impact of desalination on Qis, including 'Coastal lagoons' and 'Reefs', is not fully understood at this stage and will require further assessment;
- SA Option 32: Potential for impacts associated with the proposed new abstraction, WTP and network within Connemara Bog Complex SAC;
- SA Option 33: Potential for the abstraction from Kylemore Lough to directly impact the Twelve Bens SAC;
- SA Option 35: Potential impacts associated with the dealination brine output are unknown and will be difficult to mitigate at Galway Bay SAC.

- SA approach 2 and SA approach 3 are similar in terms of infrastructure development. The difference being a result of the SA option used in SA approach 2, which requires:
  Longer length of pipeline;
  Fewer new WTPs;
  More WTP upgrades; and
  Fewer WTPs decommissioned and abstractions abandoned.

4.4.3 SA Approach 3 (SA Combination 19) (MR)

SA approach 3, key comparison points:

- Identified as the best in the Most Resilient category;
- Option types included:
  - SA option (group option): 1 surface water abstraction, 1 surface water abstraction and rationalisation option, and 2 desalination plants;
  - WRZ options: 4 groundwater abstraction options, 8 surface water abstraction options and 1 group water scheme option and 1 desalination plant option;
- Seven -3 biodiversity scores associated with:
  - SAD-033: Potential for direct impact on the Lough Corrib SAC SPA. However, there are some unknowns regarding the full impact of the scheme footprint and further studies will be required;
  - SAD-040: Proposed new abstraction is adjacent to the Lough Corrib SAC. There is potential to impact the water table level and further hydrological monitoring will be required;
  - SAD-055: Potenial for impacts associated with the dealination and the proposed new infrastructure within Inishbofin SAC/Inishbofin SPA. The potential impacts associated with the desalination are not fully understood and require further assessment;

- SA Option 23: Potential for the abstraction from Lough Feeagh to directly impact the Owenduff/Nephin Complex SAC;
- SA Option 24: Potential for direct impacts as the desalination is located on one of the three Aran islands that are designated SACs. The full impact of desalination on Qis, including 'Coastal lagoons' and 'Reefs', is not fully understood at this stage and will require further assessment;
- SA Option 32: Potential for impacts associated with the proposed new abstraction, WTP and network within Connemara Bog Complex SAC; and
- SA Option 35: Potential impacts associated with the dealination brine output are unknown and will be difficult to mitigate at Galway Bay SAC.

- SA approach 2 is similar to SA approach 3 in terms of infrastructure development apart from the SA option differences explained above.

4.4.4 SA Approach 4 (SA Combination 20) (BE)

SA approach 4, key comparison points:

- Identified as the best in the Best Environmental category;
- Option types included:
  - SA option (group option): 1 surface water abstraction option, 2 surface water and rationalisation options, and 1 interconnect options;
  - WRZ options: 5 groundwater abstraction options, 2 surface water abstraction options and 1 desalination plant option;
- Three -3 biodiversity scores associated with:
  - SAD-040: Proposed new abstraction is adjacent to the Lough Corrib SAC. There is potential to impact the water table level and further hydrological monitoring will be required;
  - SAD-055: Potenial for impacts associated with the dealination and the proposed new infrastructure within Inishbofin SAC/Inishbofin SPA. The potential impacts associated with the desalination are not fully understood and require further assessment;
  - SAD-040: Proposed new abstraction is adjacent to the Lough Corrib SAC. There is potential to impact the water table level and further hydrological monitoring will be required;
  - SAD-055: Potenial for impacts associated with the dealination and the proposed new infrastructure within Inishbofin SAC/Inishbofin SPA. The potential impacts associated with the desalination are not fully understood and require further assessment;
  - SA Option 31: Potential impacts associated with the new WTP and abstraction from Lough Inagh that is within the Twelve Bens/Garraun Complex SAC and is also the boundary site of Maumturk mountains SAC.
- SA approach 4 and SA approach 5 are similar in terms of infrastructure development. The difference being a result of different SA options used. Compared to SA approach 5, SA approach 4 requires:
  - Longer length of pipeline;
  - Half as many new WTPs;
  - Fewer WTP upgrades;
  - Fewer new/upgraded abstractions and WTPs decommissioned; and
  - More treated water storage facilities.

4.4.5 SA Approach 5 (SA Combination 21) (LCo, LC)

SA approach 5, key comparison points:

- Identified as the best in the following categories: Least Cost and Lowest Carbon;
- Option types included:
    - SA option (group option): 3 surface water abstraction options and 1 surface water abstraction and group water scheme option;
    - WRZ options: 7 groundwater abstraction options, 6 surface water abstraction options and 1 desalination plant options;
- Five -3 biodiversity scores associated with:
    - SAD-033: Potential for direct impact on the Lough Corrib SAC and SPA. However, there are some unknowns regarding the full impact of the scheme footprint and further studies will be required;
    - SAD-040: Proposed new abstraction is adjacent to the Lough Corrib SAC. There is potential to impact the water table level and further hydrological monitoring will be required;
    - SAD-055: Potenial for impacts associated with the dealination and the proposed new infrastructure within Inishbofin SAC/Inishbofin SPA. The potential impacts associated with the desalination are not fully understood and require further assessment;
    - SA Option 43: Potential impacts associated with the proposed abstraction from Lough Boliska within the Connemara Bog Complex SAC. Further hydrological monitoring will be required to determine the full impacts. Unknown risks associated with the construction of new watermains across the sea bed. This may lead to changes in the hydrological regime and degradation of habitat;
    - SA Option 45: Potential impacts associated with the proposed new abstraction from Kylemore Lake within the Twelve Bens/Garraun Complex SAC. Hydrological monitoring will be required to ensure there are no significant changes to water levels.
- SA approach 1 and SA approach 2 are similar in terms of infrastructure development apart from the SA option differences explained above.

4.5 SAD 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 -29,504 m^3/d in 2019, to a projected maximum of -44,123 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 SAD.

Table 4.8 Supply Demand Balance for SAD

WRZ Name	WRZ Code	Population	Maximum Deficit m^3/day*	
			2019	2044
Newport	2200SC0017	697	-35	-57
Mulranny	2200SC0016	678	No Deficit	-13
Louisburgh	2200SC0015	808	-25	-45
Inishturk	2200SC0003	48	-15	-16
Clare Island	2200SC0002	163	-118	-128
Lough Mask & Westport	2200SC0001	49,642	-15,531	-17,121
Spiddal	1200SC0038	8,538	-997	-1,404
Carraroe	1200SC0037	3,198	No Deficit	No Deficit
Tully-Tullycross	1200SC0035	487	-124	-153
Leenane P.S.	1200SC0024	101	-10	-26
Inishmore	1200SC0019	696	-691	-754
Inishere	1200SC0018	281	-150	-160
Inisboffin P.S.	1200SC0017	158	-135	-145
Clonbur PS	1200SC0012	1,380	-156	-237
Clifden	1200SC0011	1,524	-541	-631
Cleggan_Claddaghduff	1200SC0010	517	No Deficit	-14
Ballyconneely P.S.	1200SC0007	157	No Deficit	No Deficit
IN_Inishmean	1200SC0004	173	-14	-22
Teeranea_Lettermore P.S.	1100SC0001_M	928	-145	-186
Rosmuc P.S.	1100SC0001_K	450	-249	-275
Oughterard	1100SC0001_J	5,668	-309	-524
Mid-Galway	1100SC0001_H	8,082	-926	-1,170
Dunmore_Glenamaddy P.S.	1100SC0001_D	2,572	-207	-368
Carna_KilKieran RWSS	1100SC0001_B	2,349	No Deficit	-79
Lough Corrib (Galway City, Tuam, Loughrea)	1100SC0001	139,313	-9,127	-20,593

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

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

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

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

SEA Objectives	Phase (Construction (C) / Operation (O))	Do Minimum	SA Approach 1 (BA)	SA Approach 2 (QD)	SA Approach 3 (MR)	SA Approach 4 (BE)	SA Approach 5 (LCo, LC)
9. Protect and where appropriate, enhance cultural heritage assets	O	0	0	0	0	0	0
10. Protect quality and function of soils	C	0	-	-	-	-	-
	O	0	0	0	0	0	0

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

The overall assessment of the approaches against the SEA objectives indicates that SA approach 4 and SA approach 5 (identified as the Preferred Approach) are likely to have more beneficial landscape impacts during operation as it decommissions more WTPs. SA approach 2 and 3 are likely to have more adverse landscape impacts during construction as they include more new significant above ground assets in landscape amenity areas. SA approach 1 and 4 are likely to have less adverse impacts to biodiversity during operation as there are less -3 biodiversity impacts regarding abstraction and pipeline being within European sites. SA approach 2, 3 and 4 are likely to have more adverse material assets and waste impacts during operation as infrastructure will be developed below ground on land with strategic use. SA approach 2, 4 and 5 are likely to have more resilience benefits due to the use of more resilient sources.

Mitigation for the Preferred Approach is taken into account in the individual options assessments presented in chapter 5, identified in chapter 6 in terms of cumulative assessment and in chapter 7 for the SEA summary. All the approaches address the identified water supply quantity and quality requirements to secure a level of service important for public health and wellbeing compared with the 'Do Minimum'.

4.5.1 Selection of the SA Preferred Approach

SA approach 5 has been selected through the 7 step process as the best performing approach overall across the different categories.

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

5

SAD Preferred Approach: Strategic Environmental Assessment

5 SAD Preferred Approach Strategic Environmental Assessment

5.1 SAD 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 fourteen of the WRZs in the study area. For the other eleven WRZs, SA options 41, 43, 45 and 48 are selected. These SA options include:

- SA option 41: Proposes to add a new SW abstraction, upgrade of Carna Kilkieran WTP, rationalisatioon of Carna Kilkieran, and decomissionng of Ballyconnelly WTP;
- SA option 43: Proposes to increase SW abstraction from Lough Boliska, rationalise Carraroe and Rosmuc to Spiddal, upgrade of Spiddal WTP, and Carraroe, Rosmuc and Tiernee WTP will be decommissioned.
- SA option 45: Proposes to add a new SW abstraction from Kylemore Lough, new watermains, a new WTP, and Cleggan, Leenane, Letterfrack and Tullycross WTP will be decommissioned; and
- SA option 48: Proposes to increase SW abstraction from existing Lough Mask, an upgrade of Tourmakeady WTP, rationalise Louisburgh to group water scheme, Louisburgh WTP will be decommissioned, and Westport WTP will be upgraded.

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

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

Table 5.1 Preferred Approach Breakdown

WRZ Name and Option Reference*	Option Description	Abstraction / Demand
SAD-541 (SA option 41) 1200SC0007 Ballyconneely	New SW abstraction from Lough Skannive and upgrade existing WTP. Rationalise Ballyconeely to Carna Kilkieran • New SW abstraction. • New source (Lough Skannive lake waterbody (LWB)) WFD status 2016-2021 – High	742 m^3/d
SAD-541 (SA option 41) 1100SC0001_B Carna kilkieran RWSS		2,554 m^3/d
SAD-543 (SA option 43) 1200SC0037 Carraroe	Increase existing SW abstraction from Lough Bouliska and rationalise Carraroe, Rosmuc and Teeranea Lettermore to Spiddal. • Increase existing SW abstraction.	1,960 m^3/d

WRZ Name and Option Reference*	Option Description	Abstraction / Demand
SAD-543 (SA option 43) 1200SC0038 Spiddal	• Existing source (Boliska LWB) WFD status 2016-2021 – Good	1,960 m^3/d
SAD-543 (SA option 43) 1100SC0001_K Rosmuc		1,960 m^3/d
SAD-543 (SA option 43) 1100SC0001_M Teeranea Lettermore		1,960 m^3/d
SAD-545 (SA option 45) 1200SC0035 Tully-Tullycross	New Connemara RWSS (Kylemore Lough) - abandon existing WTPs • New SW abstraction. • New source (Kylemore LWB) WFD status 2016-2021 – Good	272 m^3/d
SAD-545 (SA option 45) 1200SC0010 Cleggan Claddaghduff		335 m^3/d
SAD-545 (SA option 45) 1200SC0024 Leenane		123 m^3/d
SAD-548 (SA option 48) 2200SC0015 Louisburgh	Increase SW abstraction from existing Lough Mask and upgrade Tourmakeady WTP. Rationalise Louisburgh to Lough Mask. • Increase existing SW abstraction. • Existing source (Lough Mask LWB) WFD status 2016-2021 – Good	52,504 m^3/d
SAD-548 (SA option 48) 2200SC0001 Lough Mask & Westport		52,504 m^3/d
SAD-014 2200SC0002 Clare Island	New GW abstraction (poorly productive bedrock - Clare Island groundwater body) • New GW abstraction.	159 m^3/d

WRZ Name and Option Reference*	Option Description	Abstraction / Demand
	• New source (Clare Island groundwater body (GWB)) WFD status 2016-2021 – Good	
SAD-027 1200SC0011 Clifden	New SW abstraction from Lough Auna and new WTP • New SW abstraction. • New source (Lough Auna LWB) WFD status 2016-2021 – Unassigned	1,112 m^3/d
SAD-033 1200SC0012 Clonbur	New SW abstraction from Lough Corrib and new WTP • New SW abstraction. • New source (Lough Corrib Upper LWB) WFD status 2016-2021 – Good	1,365m^3/d
SAD-040 1100SC0001_D Dunmore/Glenamaddy (Glenamaddy)	New GW abstracton from Gortgarogh GWB (Sean, Robbie spring) spring • New GW abstraction. • New source (Clare Corrib GWB) WFD status 2016-2021 – Good	2,481 m^3/d
SAD-46a 1100SC0001 Galway City (Terryland & Lumineagh)	Increase existing SW abstraction at Terryland from River Corrib • Increase existing SW abstraction. • Existing source (Lough Corrib Upper LWB) WFD status 2016-2021 – Good	103,780 m^3/d
SAD-055 1200SC0017 Inisbofin	Desalination plant to supply full deficit. No blending, chemical remineralization only • Desalination Plant • Existing source (Fawna LWB) WFD status 2016-2021 – Good	245 m^3/d
SAD-058 1200SC0018 Inishere	Optimise GW abstraction from current springs (includes GW harvesting/raw water storage) • Optimise GW abstraction • Existing source (Inishmore GWB) WFD status 2016-2021 – Good	160 m^3/d
SAD-069 1200SC0004 Inishmean	Optimise GW abstraction from current springs (includes GW harvesting/raw water storage) • Optimise GW abstraction • Existing source (Inishmore GWB) WFD status 2016-2021 – Good	106 m^3/d
SAD-074 1200SC0019	Increase GW abstraction from existing boreholes and new raw water storage to maximise GW availability in winter months	1,086 m^3/d

WRZ Name and Option Reference*	Option Description	Abstraction / Demand
Inishmore	• Increase GW abstraction • Existing source (Inishmore GWB) WFD status 2016-2021 – Good	
SAD-158 2200SC0003 Inishturk	Raise existing dam height and new impoundment on the other side of the lake. Increase SW abstraction from existing Lake Coolacknick impoundment and WTP upgrade. • Increase SW abstraction • Existing source (Lough Coolaknick LWB) WFD status 2016-2021 – Unassigned	44 m^3/d
SAD-101 1100SC0001_H Mid-Galway	Increase existing GW abstraction from existing spring (karstic bedrock - Clare-Corrib groundwater body) • Increase existing GW abstraction. • Existing source (Clare-Galway GWB) WFD status 2016-2021 – Good	1,086 m^3/d
SAD-111 2200SC0016 Mulranny	New GW abstraction (Newport GWB) • New GW abstraction. • New source (Beltra Lough South GWB) WFD status 2016-2021 – Good	600 m^3/d
SAD-117a 2200SC0017 Newport	Increase SW abstraction from existing River Newport • Increase SW abstraction. • New source (Newport river waterbody (RWB)) WFD status 2016-2021 – High	431 m^3/d
SAD-122 1100SC0001_J Oughterard	Increase SW abstraction from existing Lough Buffy • Increase SW abstraction. • Existing source (Lough Buffy LWB) WFD status 2016-2021 – Good	3,274 m^3/d

*SA Options are the same as Group Options

The SA Preferred Approach options are shown in Figure 5.1, in relation to key environmental designations. Note that SA option 41, 43, 45 and 48 are labelled as SAD-541, 543, 545 and 548.

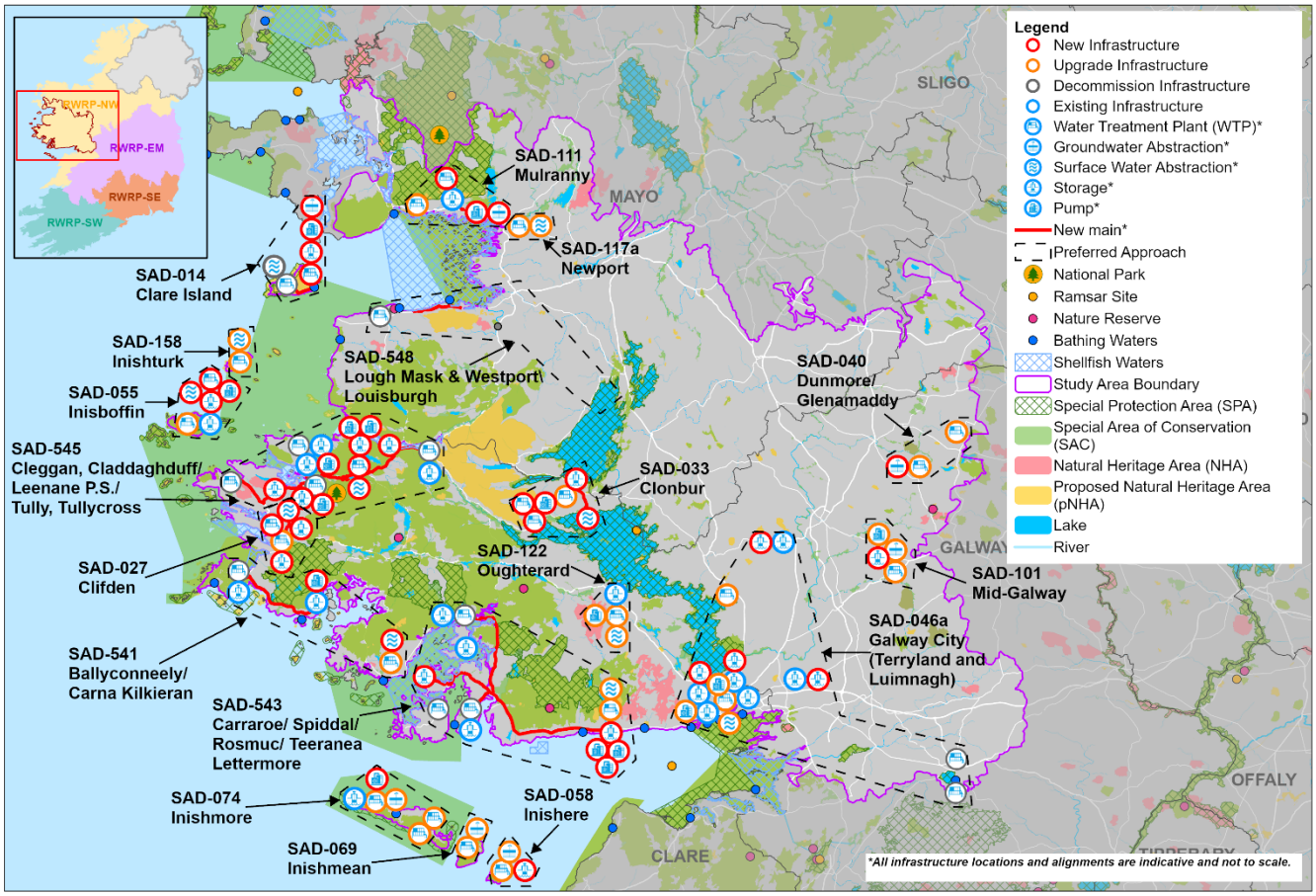

Figure 5.1 SA Preferred Approach and Key Environmental Designations

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
SAD-014	✓	✓	-	✓	✓	✓	-	✓
SAD-027	✓	✓	✓	✓	-	-	-	✓
SAD-033	✓	✓	✓	✓	-	-	-	✓

Option Reference*	New / Refurbished Pipeline	New WTP	Upgrade WTPs	New / Upgraded Abstractions	WTPs Decommissioned	Abstractions Abandoned	Raw Water Storage	Treated Water Storage
SAD-040	-	-	✓	✓	-	-	-	-
SAD-046a	✓	-	✓	✓	✓	✓	-	✓
SAD-055	✓	✓	✓	✓	-	-	-	✓
SAD-058	-	-	✓	✓	-	-	-	-
SAD-069	-	-	✓	✓	-	-	-	-
SAD-074	✓	-	✓	✓	-	-	-	-
SAD-101	-	-	✓	✓	-	-	-	✓
SAD-111	✓	✓	✓	✓	-	-	-	-
SAD-117a	-	-	✓	✓	-	-	-	-
SAD-122	-	-	✓	✓	-	-	-	-
SAD-158	✓	-	✓	✓	-	-	-	-
SA Option 41 (SAD-195 & 196)	✓	-	✓	✓	✓	✓	-	-
SA Option 43 (SAD-199, 200, 201 & 202)	✓	-	✓	✓	✓	✓	-	✓
SA Option 45 (SAD-209, 210 & 211)	✓	✓	-	✓	✓	✓	-	✓
SA Option 48 (SAD-217 & 218)	✓	-	✓	✓	✓	✓	-	-

*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 41 (SAD-195 & 196)	New SW abstraction from Lough Skannive, upgrade existing Carna Kilkieran WTP and rationalise to Carna Kilkieran	Construction	-	--	-	-	-	--	0	0	-	-
		Operation	+	--	+	0	-	--	---	0	0	0
SA Option 43 (SAD-199, 200, 201 & 202)	Increase existing SW abstraction from Lough Bouliska and rationalise Carraroe and Rosmuc to Spiddal (Lough Bouliska)	Construction	-	--	-	---	-	-	0	0	--	-
		Operation	+	-	+	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)
SA Option 45 (SAD-209, 210 & 211)	New Connemara RWSS (Kylemore Lough)	Construction	-	--	-	--	-	-	0	0	--	-
		Operation	--	-	+	-	-	-	-	0	0	0
SA Option 48 (SAD-217 & 218)	Rationalise Louisburgh via new Community/GWS being developed to take water from Westport to Murrisk and increase SW abstraction from existing Lough Mask and upgrade Tourmakeady WTP	Construction	-	--	-	-	--	-	0	0	-	-
		Operation	+	-	+	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)
SAD-014	New GW abstraction (poorly productive bedrock - Clare Island groundwater body)	Construction	-	--	-	--	-	--	0	-	-	-
		Operation	-	-	+	-	-	--	--	0	0	0
SAD-027	New SW abstraction from Lough Auna and upgrade existing Clifden WTP	Construction	-	-	-	--	-	-	0	0	-	-
		Operation	--	0	-	-	-	-	-	0	0	0
SAD-033	New SW abstraction from Lough Corrib and new WTP	Construction	-	--	--	--	-	-	0	0	-	--
		Operation	-	-	-	-	-	-	-	0	0	0
SAD-040		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)
	New GW abstracton from Gortgarogh GWB spring	Operation	++	--	0	0	-	--	--	0	0	0
SAD-046a	Increase existing SW abstraction at Terryland from River Corrib	Construction	--	-	--	-	---	--	0	0	-	-
		Operation	+	--	+	0	---	--	--	0	0	0
SAD-055	Desalination plant to supply full deficit. No blending, chemical remineralization only.	Construction	-	--	-	---	-	-	0	0	--	--
		Operation	-	--	-	-	-	-	-	0	0	0
SAD-058	Optimise GW abstraction from current	Construction	-	--	-	-	---	-	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)
	springs (includes GW harvesting/raw water storage)	Operation	+	-	0	0	---	-	-	0	0	0
SAD-069	Optimise GW abstraction from current springs (includes GW harvesting/raw water storage)	Construction	-	--	0	0	--	-	0	0	-	-
		Operation	0	-	0	0	--	-	-	0	0	0
SAD-074	Increase GW abstraction from existing boreholes and	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)
	new raw water storage to maximise GW availability in winter months	Operation	++	--	0	0	-	--	---	0	0	0
SAD-158	Raise exisitng dam height and new impoundment on the other side of the lake. Increase SW abstraction from existing Lake Coolacknick impoundment and WTP upgrade.	Construction	-	-	-	-	0	--	0	0	-	-
		Operation	0	0	0	0	0	--	---	0	0	0

Option Reference*	Option Description	Phase	Protect Public Health and Promote Wellbeing (P1, P2, P3)	Protect and Enhance Biodiversity and Contribute to Resilient Ecosystems (B1, B2, B3, B4, B5)	To Protect Landscapes, Townscapes and Visual Amenity (L1)	Protect and Where Appropriate Enhance, Built and Natural Assets and Reduce Waste (M1, M2)	Reduce Greenhouse Gas Emissions (C1)	Contribute to Environmental Climate Change Resilience (R1, R2, R5)	Protect and Improve Surface Water and Groundwater Status (W1, W2, W3)	Avoid Flood Risk (W5)	Protect and Where Appropriate, Enhance Cultural Heritage Assets (CH1)	Protect Quality and Function of Soils (G1)
SAD-101	Increase existing GW abstraction from existing spring (karstic bedrock - Clare-Corrib groundwater body)	Construction	-	-	-	-	-	--	0	0	-	-
		Operation	0	--	0	0	-	--	--	0	0	0
SAD-111	New GW abstraction (karstic bedrock - Newport groundwater body)	Construction	-	-	-	--	-	-	0	0	-	-
		Operation	+	0	-	-	-	-	-	0	0	0
SAD-117a	Increase SW abstraction from exsiting River Newport and upgrade exixting Newport WTP	Construction	-	--	0	0	0	-	0	0	0	0
		Operation	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)
SAD-122	Increase SW abstraction from existing Lough Buffy	Construction	-	-	0	0	-	--	0	0	0	--
		Operation	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 SAD 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: Lough Corrib (Galway City, Tuam, Loughrea), Carna Kilkieran RWSS, Dunmore Glenamaddy P.S., Mid-Galway, Oughterard, Rosmuc P.S., Teeranea Lettermore P.S., Ballyconneely P.S., Inisboffin P.S., Inishmore, Spiddal, and Lough Mask & Westport.

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

Table 5.4 SAD Sensitivity Analysis and Environmental Impacts

Uncertainty	Likelihood	Increase (+)/ Decrease (-) in Deficit	Environmental Impacts Relative to Assessment of Preferred Approach Key: Green - Positive Amber - Negative
Sustainability	Moderate/High (as Uisce Éireann's current abstractions are large compared to the waterbodies from which they abstract)	+10,000 m^3/d	The impact of sustainability reductions would reduce the volumes that can be abstracted from Uisce Éireann's existing sources, therefore, increasing the SDB deficit. There are some surface water sources in SAD that would be impacted by sustainability reductions. However, the Preferred Approach is designed to rationalise or supplement these sources by supplying from larger, more resilient surface water and groundwater sources. The Lough Aroolagh, Lough Rea and Moher Lake sources, and the Knockmore river source, that have been noted as being potentially unsustainable in the long term, have also been decommissioned as part of the Preferred Approach. Groundwater sustainability is more difficult to assess at desktop level, however, as the abstractions in SAD are small in scale any impacts are likely to be minimal.
			The SA Preferred Approach addresses reductions and decommissions several abstractions that have the potential to be unsustainable. 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)	+400 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.
			Although the Preferred Approach provides more operational flexibility to use less sensitive water sources, this could still result in more pressure on sources.
Demand Growth	Low/Moderate (growth has been based on policy)	-29,504 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 twenty of the twenty-five WRZs in the area and is projected to spread across twenty-three. This is driven by quality as well as quantity issues. In this rural area, growth is relatively low.

Uncertainty	Likelihood	Increase (+)/ Decrease (-) in Deficit	Environmental Impacts Relative to Assessment of Preferred Approach Key: Green - Positive Amber - Negative
			This could allow lower than expected energy and carbon costs and lower increased abstraction requirements
Leakage Targets	Low (Uisce Éireann is focused on sustainability and aggressive leakage reduction)	+1,448 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)	-40,107 m^3/d	Increased leakage savings beyond SELL would reduce the SDB deficit and the overall need requirement. The need drivers span across the WRZs in SAD and are driven by quality as well as availability issues.
			This could allow lower than expected energy and carbon emissions and lower increased abstraction requirements.

6 SEA Cumulative Effects for SAD Preferred Approach

6 SEA Cumulative Effects for SAD Preferred Approach

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

The potential 'within plan' cumulative effects for SAD 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 SAD

Preferred Approach	SA Option 48	SA Option 45	SA Option 43	SA Option 41	SAD-158	SAD-122	SAD-117a	SAD-111	SAD-101	SAD-074	SAD-069	SAD-058	SAD-055	SAD-046a	SAD-040	SAD-033	SAD-027
SAD-014		WC											WC				
SAD-027	N59	TB CI HD SH N59	SH	CI HD SH	HD	N59	N59	N59		SH			CI HD	N59			
SAD-033	LM LMa LCa	LCa LMa	LCa			LC LCa			LC					LC LCa	LC		
SAD-040						LC			LC					LC			
SAD-046a	LCa N84 N59	LCa N59	IG LCa			LC LCa IG N59	N59	N59	LC								
SAD-055	CBa	WC CI HD		KB CI HD	HD		CBa	CBa									
SAD-058																	
SAD-069																	
SAD-074		SH	SH	SH													
SAD-101						LC											
SAD-111	CBa N59	N59				N59	CBa N59										
SAD-117a	CBa WP N59	N59				N59											
SAD-122	LCa N59	LCa N59	IG LCa														

Preferred Approach	SA Option 48	SA Option 45	SA Option 43	SA Option 41	SAD-158	SAD-122	SAD-117a	SAD-111	SAD-101	SAD-074	SAD-069	SAD-058	SAD-055	SAD-046a	SAD-040	SAD-033	SAD-027
SAD-158		HD		HD													
SA Option 41		CI HD SH	CBo CB SH KB														
SA Option 43	Lca	LCa SH															
SA Option 45	LCa LMa N59																

Key	
Construction Phase	
Operation Phase	
Construction and Operation	
Clew Bay Complex SAC	CBa
Connemara Bog Complex SAC	CBo
Kilkieran Bay and Islands SAC	KB
Lough Corrib SAC	LC
Lough Carra/Mask Complex SAC	LM
The Twelve Bens/Garraun Complex SAC	TB
West Connacht Coast SAC	WC
Connemara Bog Complex SPA	CB
Cruagh Island SPA	CI
High Island, Inishshark and Davillaun SPA	HD
Inner Galway Bay SPA	IG
Lough Corrib SPA	LCa
Lough Mask SPA	LMa
Slyne Head to Ardmore Point Islands SPA	SH
Westport	WP
N59 road	N59
N84 road	N84
Inner Galway Bay SPA	IG

There could be cumulative effects associated with construction in terms of traffic, noise and dust for the options located along the N59 and N84 roads (indicated by N59 and N84 in Table 6.1). These could be mitigated by standard mitigation measures such as planning of construction traffic routes and movements and engaging with local residents about the disruption. With these standard good practice measures in place, there are unlikely to be significant cumulative effects.

There is potential for cumulative effects from spread of invasive non-native species, disturbance and pollution effects on Clew Bay Complex SAC if construction of options SAD-055, SAD-111, SAD-117a and SA option 48 is concurrent (indicated by CBa in Table 6.1). There is potential for cumulative effects from habitat loss, mortality, disturbance and pollution effects on Connemara Bog Complex SAC if construction of options SA option 41 and SA option 43 is concurrent (indicated by CBo in Table 6.1). There is potential for cumulative effects from the spread of invasive non-native species, disturbance and pollution effects on Kilkieran Bay and Islands SAC if construction of options SA option 41 and SA option 43 is concurrent. There is potential for cumulative effects from mortality, spread of invasive non-native species, disturbance and pollution effects on Lough Corrib SAC if construction of options SAD-033, SAD-040, SAD-046a, SAD-101 and SAD-122 is concurrent. There is potential for cumulative effects from

mortality, spread of invasive non-native species, disturbance and pollution effects on Lough Corrib SAC (indicated by LC in Table 6.1) if construction of options SAD-033, SAD-040, SAD-046a, SAD-101 and SAD-122 is concurrent. There is potential for cumulative effects from spread of invasive non-native species, disturbance and pollution effects on Lough Carra/Mask Complex SAC (indicated by LM in Table 6.1) if construction of options SAD-033 and SA option 48 is concurrent.There is potential for cumulative effects from mortality, spread of invasive non-native species, disturbance and pollution effects on The Twelve Bens/Garraun Complex SAC (indicated by TB in Table 6.1) if construction of options SAD-027 and SA option 45 is concurrent. There is potential for cumulative effects from disturbance effects on West Connacht Coast SAC (indicated by WC in Table 6.1) if construction of options SAD-014, SAD-055 and SA option 45 is concurrent.There is potential for cumulative effects from habitat loss, disturbance and pollution effects on Connemara Bog Complex SPA (indicated by CB in Table 6.1) if construction of options options SA option 41 and SA option 43 is concurrent.There is potential for cumulative effects from disturbance effects on Cruagh Island SPA (indicated by CI in Table 6.1) if construction of options SAD-027, SAD-055, SA option 41 and SA option 45 is concurrent.There is potential for cumulative effects from disturbance effects on High Island, Inishshark and Davillaun SPA (indicated by HD in Table 6.1) if construction of options SAD-027, SAD-055, SAD-158, SA option 41 and SA option 45 is concurrent. There is potential for cumulative effects from disturbance effects on Inner Galway Bay SPA (indicated by IG in Table 6.1) if construction of options SAD-046a, SAD-122, and SA option 43 is concurrent. There is potential for cumulative effects from disturbance and pollution effects on Lough Corrib SPA (indicated by LCa in Table 6.1) if construction of options SAD-033 and SAD-46a is concurrent. There is potential for cumulative effects from disturbance and pollution effects on Lough Mask SPA (indicated by LMa in Table 6.1) if construction of options SAD-033, SA option 45 and SA option 48 is concurrent. There is potential for cumulative effects from disturbance effects on Slyne Head to Ardmore Point Islands SPA (indicated by SH in Table 6.1) if construction of options SAD-027, SAD-074, SA option 41, SA option 43 and SA option 45 is concurrent. Cumulative effects to European designated sites during construction could be mitigated with good practice mitigations, such as having buffers along the edge of the river and an emergency plan in place during construction. The impacts on the European designated sites are provided in the NIS and are also summarised in chapter 9 of this review. Any option specific mitigation measures are included in section 6.3.4 of the NIS.

6.1.2 Cumulative Effects during Operation

The SEA has identified that, at a plan level, there is potential for cumulative effects during the operational phase of the SA Preferred Approach on Kilkieran Bay and Islands from habitat degradation (option SAD-055 and SA option 41). There is potential for cumulative effects during the operational phase on Lough Corrib SAC from from habitat degradation and water table/availability given that options SAD-033, SAD-040, SAD-046a, SAD-101 and SAD-122 have the potential for hydrological changes and water table impacts to the sites. There is potential for cumulative effects during the operational phase on Lough Corrib SPA from from habitat degradation and water table/availability given that options SAD-033 and SAD-040a have the potential for hydrological changes and water table impacts to the sites. The impacts on the European designations are provided in the NIS and also summarised in chapter 9 of this review. The NIS concluded that with general mitigation measures and hydrogeological modelling, there will be no adverse cumulative effects on the integrity of Cloghernagore Bog and Glenveagh National Park SAC and Derryveagh and Glendowan Mountains SPA.

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).

However, there are no groundwater abstractions proposed in SAD and therefore no potential cumulative effect.

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

There could also be cumulative effects in terms of carbon across the SA Preferred Approach. The whole life carbon estimate (including construction and operation) for the SA Preferred Approach indicates increased contribution to carbon emissions related to carbon embodied in materials used for construction and through operational energy use and water treatment. Generally, in terms of carbon emissions, increase in carbon emissions can be considered a significant effect, as these add cumulatively across all developments and contribute to the national target for carbon. However, consideration also needs to be given to the additional water supply provided from the options and therefore the overall carbon efficiency in terms of carbon emissions per ML of supply is an appropriate metric and for SAD this averages as 2.21 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.

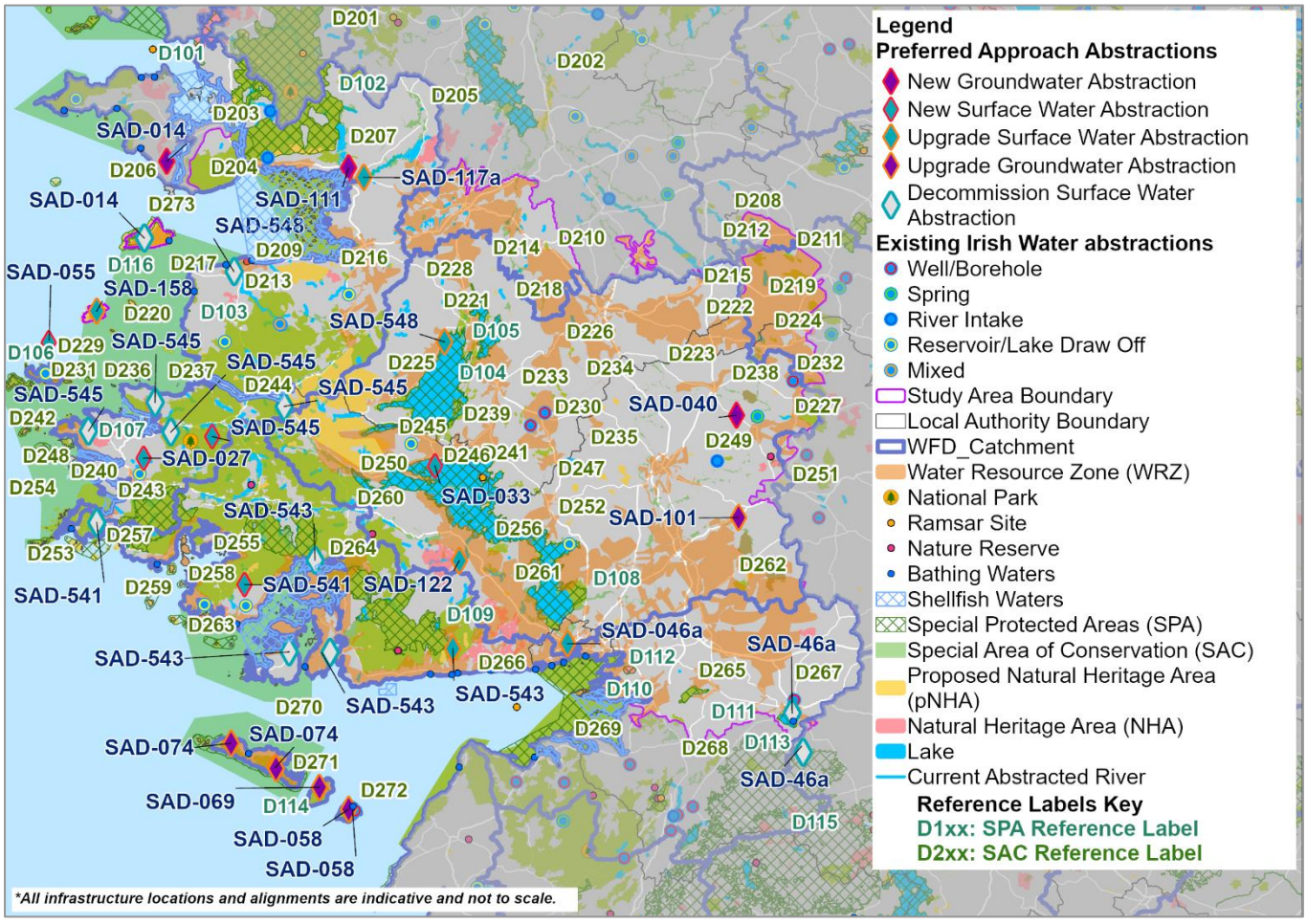

Figure 6.1 SA Preferred Approach Abstractions in SAD

6.2 Cumulative Effects with Other Developments

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

Table 6.2 shows that within SAD there are 20 developments that could cause cumulative effects with the SA Preferred Approach. Other developments that were not considered further due to the size and the distance of the developments from the SA Preferred Approach are the ARDENT II; Athenry to Milltown; Greenway; AuriGen Solution for Persistent Atrial Fibrillation; Ballina-Castlebar-Westport Interurban Greenway (BCWIG); BioHealx; Castlebar Military Barracks; Castlebar Military Barracks 2; Connected; Enteral Feeding Healthcare System for Integrated & Co-ordinated Care; Connemara Greenway - Clifden to Recess; Connemara Greenway - Derrygimlagh - Clifden - Kylemore Abbey; Connemara Greenway-Galway to Moycullen (Oughterard); Data-center Audio/Visual Intelligence on-Device (DAVID), will develop 'privacy by design' AI platform, capable of multi-modal, ultra-low power consumption, 'data centre' level processing of audio and; EmboSure; Enact; FreeSpace project; Galway City Wastewater Network; Geopark Development; GTeic Hubs - Location #1 of 6 – Tourmakead; Innovation and Creativity District; INSPIRE; Ireland's National Parks - Location #3 of 6 – Ballycroy; Ireland's National Parks - Location #4 of 6 – Connemara; MI_DRONE; National Parks - Location #4 of 8 – Ballycroy; PolyValve; Regeneration Loughrea, Breaking Through; RELAY; Releaze; RestOAre; Sandy Road Liosbán; Smart-Cardio - a paradigm shift in Cardiac Arrythmia Treatment; STROKE-CIS, developing Clot Ingestion; System medical technology to treat stroke; Terryland Water Treatment Plant; Tourism Experiences; Towards safe and effective off the shelf cellular therapy for cancer; Tullycross Residential Education Centre; University Hospital Galway, Blood Science Project and University Hospital Galway, Cardiac Cath Laboratory - Phase 1.

6.2.1 Cumulative Effects during Construction

The projects near or in Galway, Wesport and along N59 road could result in cumulative effects with the SAD Preferred Approach if they were to be constructed at the same time (represented in Table 6.2 as GA, WP and N59 respectively). Potential effects could include increased traffic and noise to the residential and commercial properties near or in Letterkenny and along the N59 road. These could be mitigated by standard mitigation measures, such as planning construction traffic routes and informing local residents about the works. With these standard good practice measures in place, there are unlikely to be significant cumulative effects.

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

There is potential for cumulative effects from pollution and disturbance effects to the West Connacht Coast SAC if the construction phase of the SAD Preferred Approach is concurrent with the Clew Bay Greenway Project: Belcare to Murrisk works; pollution effects from Clifden Town Centre works, and the St Annes Community Nursing Unit and Westport Library works, Regeneration of Sisters of Mercy Convent Site and Adjacent Lands works and N5 Westport to Turlough works.

There is potential for cumulative effects from pollution, mortality, disturbance and spread of invasive species effects to The Twelve Bens/Garraun Complex SAC if construction phase is concurrent with the Clifden Town Centre works and the St Annes Community Nursing Unit works and Clifden Town Centre works and the St Annes Community Nursing Unit works.

There is potential for cumulative effects from pollution effects on the Lough Carra/Mask Complex SAC if construction phase is concurrent with the Ballinrobe Regeneration works and Ballinrobe Regeneration works; pollution, mortality, spread of invasive non-native species and disturbance effects from Ballintubber Abbey Culture and Heritage Visitor Centre works; pollution, spread of invasive non-native species and disturbance effects from Ballintubber Abbey Culture and Heritage Visitor Centre works.

There is potential for cumulative effects from pollution and disturbance effects on the Lough Mask SPA if construction phase is concurrent with the Ballinrobe Regeneration works and Ballintubber Abbey Culture and Heritage Visitor Centre works; disturbance effects from N5 Westport to Turlough works, Ballinrobe Regeneration works and Ballintubber Abbey Culture and Heritage Visitor Centre works.

There is potential for cumulative effects from pollution effects on the Lough Corrib SAC and Lough Corrib SPA if construction phase is concurrent with the Ballyhaunis Community Vision works; habitat loss, pollution, mortality, disturbance and spread of invasive species effects from Dunmore Regeneration works and Cycling and Walking Scheme works, the new GMIT STEM building works, the new Merlin Park University Hospital Theatre Block works, the new Merlin Park Hospital Units 5 and 6 works, the new NUIG Learning Commons works, the Nun's Island master plan works, the Regeneration of Galway City Inner Harbour works, the Transport Connectivity Project works, the University College Hospital Galway Emergency Department and Ward Block works, and the University College Hospital Galway New Radiation Oncology Unit works, Galway City Ring Road works, Galway Public Spaces and Streets Project works, N59 Moycullen Bypass works; pollution effects from Tuam Community Nursing Unit works, and the Tuam Regeneration Strategy works.

There is potential for cumulative effects from pollution and disturbance effects on the Lough Mask SPA if construction phase is concurrent with the Ballinrobe Regeneration works; disturbance effects from N5 Westport to Turlough works, Ballinrobe Regeneration works, Ballintubber Abbey Culture and Heritage Visitor Centre works.

There is potential for cumulative effects from pollution effects on the Galway Bay Complex SAC and from pollution and disturbance effects on the Inner Galway Bay SPA if construction phase is concurrent with the Athenry regeneration/Bia Innovator works, Cycling and Walking Scheme works, the new GMIT STEM building works, the new Merlin Park University Hospital Theatre Block works, the new Merlin Park Hospital Units 5 and 6 works, the new NUIG Learning Commons works, the Nun's Island master plan works, the Regeneration of Galway City Inner Harbour works, the Transport Connectivity Project works, the University College Hospital Galway Emergency Department and Ward Block works, and the University College Hospital Galway New Radiation Oncology Unit works, Galway City Ring Road works, Galway Public Spaces and Streets Project works, Kinvara Boardwalk and Walkway works and Oranmore Railway Station works.

There is potential for cumulative effects from pollution and disturbance effects on the Cregganna Marsh SPA and the Rahasane Turlough SPA if construction phase is concurrent with the Kinvara Boardwalk and Walkway works.

There is potential for cumulative effects from pollution and disturbance effects on the Clew Bay Complex SAC if construction phase is concurrent with the Clew Bay Greenway Project works and N5 Westport to Turlough works; from pollution, spread of invasive species and disturbance effects from Newport

Regeneration Project works and Westport Library works and the Phase 1 Regeneration of Sisters of Mercy Convent Site and Adjacent Lands works

There is potential for cumulative effects from pollution, mortality, spread of invasives and disturbance effects on the Newport River SAC if construction phase is concurrent with the Newport Regeneration Project works.

There is potential for cumulative effects from pollution effects on the Slyne Head Peninsula SAC if construction phase is concurrent with the Clifden Town Centre works and the St Annes Community Nursing Unit works.

There is potential for cumulative effects from disturbance impacts on the Connemara Bog Complex SPA if construction phase is concurrent with the Clifden Town Centre works and the St Annes Community Nursing Unit works, N59 Moycullen Bypass works and Clifden Town Centre works and the St Annes Community Nursing Unit works.

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

Preferred Approach Options																	
Project Developments	**SAD-014**	**SAD-027**	**SAD-033**	**SAD-040**	**SAD-046a**	**SAD-055**	**SAD-058**	**SAD-069**	**SAD-074**	**SAD-101**	**SAD-111**	**SAD-117a**	**SAD-122**	**SAD-158**	**SA Option 41**	**SA Option 43**	**SA Option 45**	**SA Option 48**
Athenry regeneration/Bia Innovator					GB IG								IG			IG		
Ballinrobe Regeneration			LM LMa														LMa	LM LMa
Ballintubber Abbey Culture and Heritage Visitor Centre			LM LMa														LMa	LM LMa
Ballyhaunis Community Vision			LC		LC					LC			LC					
Castlebar Historic Core; Castlebar Urban Greenway Link; and Mayo University Hospital Emergency Department and Medical Assessment Unit																		
	WC					WC					CBa	CBa					WC	CBa

Preferred Approach Options																		
Project Developments	**SAD-014**	**SAD-027**	**SAD-033**	**SAD-040**	**SAD-046a**	**SAD-055**	**SAD-058**	**SAD-069**	**SAD-074**	**SAD-101**	**SAD-111**	**SAD-117a**	**SAD-122**	**SAD-158**	**SA Option 41**	**SA Option 43**	**SA Option 45**	**SA Option 48**
Clew Bay Greenway Project: Belcare to Murrisk						CBa												
Clifden Town Centre; and St Annes Community Nursing Unit, Clifden.		TB				WC									SH CB	CB	TB	
Dunmore Regeneration			LC	LC LL	LC					LC			LC					
Cycling and Walking Scheme; Galway MIT new STEM building; Merlin Park University Hospital New Theatre Block; Merlin Park Hospital New Units 5 and 6; NUI Galway New			LC LCa	LC	LC LCa					LC			LCa IG			LCa	LCa	LCa

Preferred Approach Options																		
Project Developments	**SAD-014**	**SAD-027**	**SAD-033**	**SAD-040**	**SAD-046a**	**SAD-055**	**SAD-058**	**SAD-069**	**SAD-074**	**SAD-101**	**SAD-111**	**SAD-117a**	**SAD-122**	**SAD-158**	**SA Option 41**	**SA Option 43**	**SA Option 45**	**SA Option 48**
Learning Commons; Nun's Island Master planning; Regeneration of Galway City Inner Harbour; Transport Connectivity Project; University College Hospital Galway Emergency Department and Ward Block; and University College Hospital Galway New Radiation Oncology Unit			LCa		GB IG GA								LC			IG		
Galway City Ring Road			LC LCa	LC	LC LCa GB IG GA					LC			LCa IG LC			LCa IG	LCa	LCa

Preferred Approach Options																		
Project Developments	**SAD-014**	**SAD-027**	**SAD-033**	**SAD-040**	**SAD-046a**	**SAD-055**	**SAD-058**	**SAD-069**	**SAD-074**	**SAD-101**	**SAD-111**	**SAD-117a**	**SAD-122**	**SAD-158**	**SA Option 41**	**SA Option 43**	**SA Option 45**	**SA Option 48**
Galway Public Spaces and Streets Project			LC LCa	LC	LC LCa GB IG GA					LC			LCa IG LC			LCa IG	LCa	LCa
Ardaun Upgrade of Martin Roundabout																		
Áras Ronáin Community Nursing Unit, Aran Islands.																		
Kinvara Boardwalk and Walkway					GB IG CM RT								IG			IG		
N59 Moycullen Bypass		N59	LC	LC	LC LCa					LC	N59	N59	LCa IG		CB	CB IG	LCa	LCa

Preferred Approach Options																		
Project Developments	**SAD-014**	**SAD-027**	**SAD-033**	**SAD-040**	**SAD-046a**	**SAD-055**	**SAD-058**	**SAD-069**	**SAD-074**	**SAD-101**	**SAD-111**	**SAD-117a**	**SAD-122**	**SAD-158**	**SA Option 41**	**SA Option 43**	**SA Option 45**	**SA Option 48**
			LCa		IG N59								N59 LC			LCa	N59	N59
Newport Regeneration Project						CBa					CBa	NR CBa						CBa
Oranmore Railway Station					GB IG								IG			IG		
Tuam Community Nursing Unit; and Tuam Regeneration Strategy			LC LCa	LC	LC LCa					LC			LC					
Libraries Capital Programme - Westport Library; and Phase 1 Regeneration of Sisters of Mercy Convent Site and Adjacent Lands, Westport						WC CBa					CBa	CBa WP						CBa WP
			LMa			WC					CBa	CBa					LCa	CBa

Preferred Approach Options																		
Project Developments	**SAD-014**	**SAD-027**	**SAD-033**	**SAD-040**	**SAD-046a**	**SAD-055**	**SAD-058**	**SAD-069**	**SAD-074**	**SAD-101**	**SAD-111**	**SAD-117a**	**SAD-122**	**SAD-158**	**SA Option 41**	**SA Option 43**	**SA Option 45**	**SA Option 48**
N5 Westport to Turlough						CBa						WP						LM WP

Key			
Construction Phase		Rahasane Turlough SPA	RT
Operation Phase		Clew Bay Complex SAC	CBa
Construction and Operation		Newport River SAC	NR
West Connacht Coast SAC	WC	Inner Galway Bay SPA	IG
Twelve Bens/Garraun Complex SAC	TB	Slyne Head to Ardmore Point Islands SPA	SH
Lough Carra/Mask Complex SAC	LM	Connemara Bog Complex SPA	CB
Lough Mask SPA	LMa	Inner Galway Bay SPA	IG
Lough Corrib SAC	LC	Cregganna Marsh SPA	CM
Lough Corrib SPA	LCa	N59 road	N59
Lough Mask SPA	LMa	Westport	WP
Lough Lurgeen Bog/Glenamaddy Turlough SAC	LL	Galway	GA
Galway Bay Complex SAC	GB		

6.2.2 Cumulative Effects during Operation

There could be cumulative effects on Lough Corrib SAC from habitat degradation and water table/availability if operation of the SAD Preferred Approach and Ballyhaunis Community Vision works, Dunmore Regeneration works, Cycling and Walking Scheme works, the new GMIT STEM building works, the new Merlin Park University Hospital Theatre Block works, the new Merlin Park Hospital Units 5 and 6 works, the new NUIG Learning Commons works, the Nun's Island master plan works, the Regeneration of Galway City Inner Harbour works, the Transport Connectivity Project works, the University College Hospital Galway Emergency Department and Ward Block works, and the University College Hospital Galway New Radiation Oncology Unit works, Galway City Ring Road works, Galway Public Spaces and Streets Project works, N59 Moycullen Bypass works, Tuam Regeneration Strategy works are concurrent.

There could be cumulative effects on Lough Corrib SPA, Inner Galway Bay SPA and Galway Bay Complex SAC from habitat degradation and water table/availability if operation of the SAD Preferred Approach and N59 Moycullen Bypass works, Tuam Community Nursing Unit works, and the Tuam Regeneration Strategy works, Dunmore Regeneration works, Cycling and Walking Scheme works, the new GMIT STEM building works, the new Merlin Park University Hospital Theatre Block works, the new Merlin Park Hospital Units 5 and 6 works, the new NUIG Learning Commons works, the Nun's Island master plan works, the Regeneration of Galway City Inner Harbour works, the Transport Connectivity Project works, the University College Hospital Galway Emergency Department and Ward Block works, and the University College Hospital Galway New Radiation Oncology Unit works, Galway City Ring Road works, Galway Public Spaces and Streets Project works are concurrent.

There could be cumulative effects on West Connacht Coast SAC and Clew Bay Complex SAC from habitat degradation if operation of the SAD Preferred Approach and Clew Bay Greenway Project works, St Annes Community Nursing Unit works, Regeneration of Sisters of Mercy Convent Site and Adjacent Lands works, Westport Library works, and the Regeneration of Sisters of Mercy Convent Site and

Adjacent Lands works, N5 Westport to Turlough works, Newport Regeneration Project works are concurrent.

There could be cumulative effects on Inishmore Island SAC from habitat degradation and water table/availability if operation of the SAD Preferred Approach and Áras Ronáin Community Nursing Unit works is concurrent.

There could be cumulative effects on The Twelve Bens/Garraun Complex SAC from habitat degradation and water table/availability if operation of the SAD Preferred Approach and Clifden Town Centre works and the St Annes Community Nursing Unit works is concurrent.

There could be cumulative effects on Lough Carra/Mask Complex SAC and Lough Mask SPA from habitat degradation and water table/availability if operation of the SAD Preferred Approach and Ballinrobe Regeneration works and Ballintubber Abbey Culture and Heritage Visitor Centre works is concurrent.

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

Key beneficial impacts assessed include moderate beneficial impacts for SAD-040 and 074 and minor beneficial impacts for SAD-046a, 058 and 111 during operation associated with the quality of water supply for local communities; and the subsequent benefits of this for public health. There are also minor beneficial impacts during operation associated with SA options 41, 43 and 48, and SAD-046a through the decommissioning of WTPs reducing noise and traffic disruption in the localised rural area. There are minor beneficial impacts for landscape and visual against SA options 41, 43, 45 and 48, and SAD-014 and 046a during operation as a result of localised benefits associated with the decommissioning of WTPs.

Key potential adverse impacts identified at plan level include:

- Moderate adverse effects during construction for SAD-046a against public health as there is the potential for short-term adverse impacts to public health and/or quality of life from dust, noise and/traffic in urban and rural areas during the construction phase;
- Moderate adverse effects during operation for public health against SAD-027 and SA option 45 as there are above ground assets located near sensitive receptors and the potential for the partial loss of recreational area;
- Moderate adverse effects during construction against biodiversity for SA options 41, 43 and 48, and SAD-014, 033, 055, 058, 069, 074 and 117a as the options are within/adjacent to the European designated sites with the potential for disturbance to QI species (excluding SAD-058, 069), and loss (excluding SA option 41 and SAD-055, 058, 117a) and pollution of QI habitats and protected/supporting habitats;
- Moderate adverse effects during operation against biodiversity for SA option 41 and options SAD-040, 046a, 055, 074, 101 and 122 as there is the potential for reduction in water availability/flow (excluding SAD-055) and habitat degradation within European designated sites. SAD-055 will have ongoing operational discharges of brine and chemicals to marine biodiversity receptors as a result of the treatment of salt water. The full impact of brine release back into the sea is unknown but it is linked with potential adverse effects on biodiversity e.g. brine toxicity to some species. The long term effects of the brine discharge will require further survey assessment;
- Moderate adverse effects during construction of new above ground assets within options SAD-033 and 046a associated with the visual impact to landscape amenity areas;
- Major adverse effects associated with option SAD-055 and SA option 43 against materials due to the length of new pipeline required (SA option 43) and the new desalination plant (SAD-055);
- Moderate adverse effects to environmental climate change resilience with options SAD-014, 040, 046a, 074, 158, 101 and 122, and SA option 41 associated with the rate of abstraction or the requirement for a new abstraction point;
- Major adverse effects against water as a result of potential risks to water quality, quantity and WFD status for SAD-074, 122 and 158, and SA option 41. This is associated with the rate of abstraction required for these options. Further studies are required to understand impacts and develop mitigation;

- Major adverse effects for greenhouse gas emissions associated with SAD-058 and 069 as a result of their requirement for raw water storages;
- Moderate adverse effects against cultural heritage associated with SA options 43 and 45, and SAD-055 due to them being located at a known NIAH/SMR or archaeological site. Therefore, there is the potential for moderate short-term visual impacts during construction; and
- Moderate adverse effects against geology and soils associated with SAD-033, 055 and 122 due to them being located at a known geological heritage site. There is also the potential risk of moderate damage to valuable soils with construction of the network.

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

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

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

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

Table 7.1 SEA Summary

SEA Objectives	SA Preferred Approach (PA) (SA Approach 5) 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 Moderate Adverse 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	C Minor Adverse to Moderate Adverse O Neutral to Moderate Adverse	Routing/siting to avoid impacts. Standard good construction practice and specific measures as	• Temporary and permanent habitats lost vs habitats created/enhanced	• Monitor construction activities to ensure compliance

SEA Objectives	SA Preferred Approach (PA) (SA Approach 5) Residual Effects Including Mitigation C – Construction (Short Term) O – Operational (Long Term)	Mitigation	Monitoring	
			Study Area Level	Scheme Level
contribute to resilient ecosystems	Impacts from construction works for pipelines and service reservoirs on biodiversity. These can be minimised through careful routing and siting. Potential for construction and operational impacts on European and National designated sites.	identified in the NIS of the Framework Plan. 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 Moderate Adverse O Minor Adverse 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

SEA Objectives	SA Preferred Approach (PA) (SA Approach 5) Residual Effects Including Mitigation C – Construction (Short Term) O – Operational (Long Term)	Mitigation	Monitoring	
			Study Area Level	Scheme Level
4. Protect and where appropriate enhance, built and natural assets and reduce waste	C Neutral to Major Adverse O Neutral to Minor Adverse New resources required for construction works, including extensive lengths of pipeline, service reservoirs and new/upgraded WTPs. Ongoing maintenance requirements.	Materials management to be integrated into design to optimise use of existing resources and minimise waste from construction and operation.	• Loss of greenfield land, including agricultural, forestry or other land uses • Disruptions to strategic infrastructure/services • Use of waste management plans • Volume of drinking water treatment residuals sent to landfill	• Construction wastes sent to landfill
5. Reduce greenhouse gas emissions	C Neutral to Major Adverse O Neutral to Major Adverse Embodied and operational carbon contribute to national level carbon emission targets. Leakage and water efficiency can contribute to reducing carbon.	Design to minimise embodied carbon emissions and optimise operational efficiency. Seek renewable energy supply sources and optimise use of leakage and water efficiency measures to reduce carbon. Consider offsetting approaches with multiple benefits for water quality, carbon sequestration and linking with other objectives.	• Percentage of energy supply from renewable sources or reduced energy use • Carbon footprint (total tonnes) per year, predicted over plan period, lifetime of schemes and carbon intensity of water resource options (tonnes/Ml/d)	• Carbon footprint (total tonnes) during construction • Operational Carbon Intensity kgsCO_2equic/ML

SEA Objectives	SA Preferred Approach (PA) (SA Approach 5) Residual Effects Including Mitigation C – Construction (Short Term) O – Operational (Long Term)	Mitigation	Monitoring	
			Study Area Level	Scheme Level
6. Contribute to environmental climate change resilience	C Minor Adverse to Moderate Adverse O Minor Adverse to Moderate Adverse Abstractions generally reduce environmental resilience but overall improved flexibility for operation using regional schemes has the potential to reduce pressure on at risk local resources. SAD-046a, 074, 158, 101 and 122, and SA option 41 require further assessment to understand their sustainability in the longer term.	Consider how operation can further reduce climate change pressure on at risk sources and associated designations, particularly for SAD-046a, 074, 158, 101 and 122, and SA option 41. Sustainability review of sources taking account of groundwater and surface water interconnections.	• WFD waterbody status objectives at risk and designated site condition status • Frequency of drought orders requiring change to normal abstractions/ compensation releases	• None identified
7. Protect and improve surface water and groundwater status	C Neutral O Minor Adverse 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

SEA Objectives	SA Preferred Approach (PA) (SA Approach 5) Residual Effects Including Mitigation C – Construction (Short Term) O – Operational (Long Term)	Mitigation	Monitoring	
			Study Area Level	Scheme Level
8. Avoid flood risk	C Neutral to Minor Adverse O Neutral Potential ltemporary loss of flood plain increasing flood risk from construction and location of above ground structures for SAD-014.	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, enhance cultural heritage assets	C Neutral to Moderate Adverse O Neutral Potential construction impacts on unknown archaeological interest. Impacts on known interests are expected to be avoided.	Standard good practice approaches to minimise potential impacts.	• Number of archaeological assets adversely affected by water resource options • Number of options that are rerouted to avoid cultural heritage impacts • Number of schemes including improvements to access recording of archaeological assets or communication/ interpretation of interest features	• Number of archaeological finds recorded during construction
10. Protect quality and function of soils	C Neutral to Moderate Adverse O Neutral Potential for loss and damage to valuable soils during construction	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

SEA Objectives	SA Preferred Approach (PA) (SA Approach 5) Residual Effects Including Mitigation C – Construction (Short Term) O – Operational (Long Term)	Mitigation	Monitoring	
			Study Area Level	Scheme Level
	but impacts to geological assets are expected to be avoided.			

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 SAD 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.

There are no groundwater abstractions proposed in SAD (Irish Water, 2022). 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 SAD, 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 West Connacht Coast SAC, The Twelve Bens/Garraun Complex SAC, Lough Carra/Mask Complex SAC, Lough Mask SPA, Lough Corrib SAC, Lough Corrib SPA, Lough Lurgeen Bog/Glenamaddy Turlough SAC, Galway Bay Complex SAC, Inner Galway Bay SPA, Cregganna Marsh SPA, Rahasane Turlough SPA, Clew Bay Complex SAC, Inishmore Island SAC, Inishmore SPA, Newport River SAC, Slyne Head Peninsula SAC, and Connemara Bog Complex SPA. The potential effects include pollution, habitat loss, mortality, disturbance, habitat degradation,water table/availability and spread of invasive species effects. 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 Clew Bay Complex SAC, Connemara Bog Complex SAC, Kilkieran Bay and Islands SAC, Lough Corrib SAC, Lough Carra/Mask Complex SAC, The Twelve Bens/Garraun Complex SAC, West Connacht Coast SAC, Cruagh Island SPA, High Island, Inishshark and Davillaun SPA, Inner Galway Bay SPA, Lough Corrib SPA, Lough Mask SPA, and Slyne Head to Ardmore Point Islands SPA. The potential impacts include spread of invasive non-native species, habitat loss, mortality, disturbance, habitat degradation,water table/availability, and pollution effects. 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 Connection to Mainland Options in SAD

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
SAD-016	Connect Clare Island to mainland (Louisburgh)									0	0	-18
SAD-064	Connect all three islands to the mainland (via Carraroe PWS)									4	0	-27
SAD-071	Connect all three islands to the mainland (via Carraroe PWS)									4	0	-27

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
SAD-078	Connect all three islands to the mainland (via Carraroe PWS)									4	0	-27

Table A.2 Fine Screening Summary of Desalination Plant Options in SAD

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**
SAD-015	Desalination plant to supply full deficit. No blending, chemical remineralization only.									4	0	-25
SAD-055	Desalination plant to supply full deficit. No									4	0	-27

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**
	blending, chemical remineralization only.											
SAD-060	Desalination plant to supply full deficit. No blending, chemical remineralization only.									4	0	-23
SAD-063	Desalination plant to supply full deficit located on 1 of the Aran Island and distribute the supply to other 2 islands									5	0	-27
SAD-068	Desalination plant to supply full deficit. Based on 2:1 blending during desal remineralization for taste using existing RW storage.									4	0	-23
SAD-070	Desalination plant to supply full deficit located on 1 of of the Aran Island									5	0	-27

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
	and distribute the supply to other 2 islands											
SAD-076	Desalination plant to supply full deficit. No blending, chemical remineralization only.									5	0	-26
SAD-077	Desalination plant to supply full deficit located on 1 of of the Aran Island and distribute the supply to other 2 islands									5	0	-27
SAD-164	Desalination plant to supply Carraroe and Spiddal									4	0	-25
SAD-165	Desalination plant to supply Carraroe and Spiddal									4	0	-27

Table A.3 Fine Screening Summary of Ground Water Options in SAD

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
SAD-002	New GW abstraction (close to poorly productive bedrock - Clifden Castlebar groundwater body)									0	0	-18
SAD-010	New GW abstraction (poorly productive bedrock - Spiddal groundwater body)									0	0	-15
SAD-014	New GW abstraction (poorly productive bedrock - Clare Island groundwater body)									0	0	-21
SAD-018	New GW abstraction (poorly productive bedrock - Clifden									0	0	-13

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
	Castlebar groundwater body)											
SAD-025	New GW abstraction (poorly productive bedrock - Clifden Castlebar groundwater body)									1	0	-18
SAD-035	New GW abstraction (karstic bedrock - Cong-Robe groundwater body)									1	0	-18
SAD-039	Increase GW abstraction at Glenamaddy WRZ to supply deficit									2	0	-15
SAD-040	New GW abstracton from Gortgarogh GWB (Sean, Robbie spring) spring									1	0	-16
SAD-044	New wellfiled supplying part of the deficit (karstics bedrock - Northern Area									3	0	-28

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
SAD-049	Abstract water from spring source on site of Luimnagh WTP (karstic bedrock - Clare-Corrib groundwater body)									2	0	-16
SAD-050	New GW source (2 'good' karstic GW options -Clare Corrib, Suck South)									2	0	-22
SAD-054	New GW abstraction (poorly productive bedrock - Inishbofin groundwater body)									1	0	-17
SAD-058	Optimise GW abstraction from current springs (includes GW harvesting/raw water storage)									0	0	-14
SAD-059	New GW abstraction - to target the shallow epikarst layer (no									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
	expected saline intrusion). Back up to SAD-058											
SAD-069	Optimise GW abstraction from current springs (includes GW harvesting/raw water storage)									0	0	-12
SAD-074	Increase GW abstraction from existing boreholes and new raw water storage to maximise GW availability in winter months									1	0	-14
SAD-083	New GW abstraction (poorly productive bedrock - Inishbofin groundwater body)									0	0	-12
SAD-087	New GW abstraction (poorly productive									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
	bedrock - Clifden Castlebar groundwater body)											
SAD-101	Increase existing GW abstraction from existing spring (karstic bedrock - Clare-Corrib groundwater body)									0	0	-12
SAD-103	New GW abstraction (karstic bedrock - Clare-Corrib groundwater body)									1	0	-18
SAD-104	New GW abstraction (karstic bedrock - Clarinbridge groundwater body)									1	0	-16
SAD-111	New GW abstraction (karstic bedrock - Newport groundwater body)									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
SAD-112	New GW abstraction (productive fissured bedrock bedrock - Beltra Lough South groundwater body)									0	0	-16
SAD-118	New GW abstraction (karstic bedrock - Newport groundwater body)									0	0	-17
SAD-119	New GW abstraction (productive fissured bedrock bedrock - Beltra Lough South groundwater body)									0	0	-15
SAD-124	New GW abstraction (karstic bedrock - Ross Lake groundwater body)									1	0	-20
SAD-127	New GW abstraction (poorly productive									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
	bedrock - Spiddal groundwater body)											
SAD-134	New GW abstraction (poorly productive bedrock - Spiddal groundwater body)									0	0	-19
SAD-140	New GW abstraction (poorly productive bedrock - Clifden Castlebar groundwater body)									0	0	-20
SAD-153	New Connemara RWSS									3	0	-21
SAD-159	New wellfiled supplying part of the deficit (karstics bedrock - Kilcornan Spring									1	0	-20
SAD-160	New wellfiled supplying part of the deficit (karstics									0	0	-18

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
	bedrock - Near Craughwell GWS											
SAD-212	Increase GW abstraction from existing boreholes and new raw water storage to maximise GW availability in winter months									2	0	-22

Table A.4 Fine Screening Summary of Ground Water and Interconnection Options in SAD

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
SAD-213	Interconnect with Inishmore									2	0	-22
SAD-214	Interconnect with Inishmore									2	0	-22

Table A.5 Fine Screening Summary of Group Water Scheme Options in SAD

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
SAD-019	Supply deficit from neighbouring Ballinakill Moyard GWS									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**
SAD-041	Supply deficit from Keelogues GWS (WRZ also influenced by Clare Corrib)									1	0	-21
SAD-100A	Interconnect with new Community/GWS being developed to take water from Westport to Murrisk									0	0	-18
SAD-100C	Interconnect with new Community/GWS being developed to take water from Westport to Murrisk									0	0	-18
SAD-143	Interconnect Ballinakill GWS with Tully-Tullycrosss PWS (GW Clifden Castlebar)									0	0	-13
SAD-217	Rationalise Louisburgh via new Community/GWS being developed to take									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
	water from Westport to Murrisk											
SAD-219	Interconnect Cleggan Claddaghduff WRZ and Tully-Tullycross WRZ with Ballinakill GWS to supply deficits from Lough Ballinakill source.									0	0	-13
SAD-220	Interconnect Cleggan Claddaghduff WRZ and Tully-Tullycross WRZ with Ballinakill GWS to supply deficits from Lough Ballinakill source.									0	0	-13

Table A.6 Fine Screening Summary of Interconnection Options in SAD

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
SAD-042C	Interconnect with Tuam RWSS via Dublin Road									0	0	-20

Table A.7 Fine Screening Summary of New Uisce Éireann Supply Options in SAD

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
SAD-142	New West Connemara RWSS with source from Kylemore Lough									1	0	-21

Table A.8 Fine Screening Summary of Rationalisation Options in SAD

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
SAD-011C	Rationalise Carna Kilkieran RWSS scheme to Galway City WRZ via Rosmuc WRZ									1	0	-21
SAD-038D	Rationalise Clonbur WRZ to Lough Mask WRZ									0	0	-18
SAD-043B	Rationalise Dunmore/Glenamaddy to Lough Mask WRZ									0	0	-16
SAD-043C	Rationalise Dunmore/Glenamaddy to Lough Mask WRZ									0	0	-18
SAD-051	Rationalise Glenamaddy to Dunmore Glenamaddy scheme									0	0	-16
SAD-095	Rationalise Wesport water supply to Lough Mask									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
SAD-096	Rationalise Wesport water supply to Lough Mask									1	0	-19
SAD-108B	Rationalise Mid-Galway WRZ to Galway City WRZ via link to Tuam RWSS									0	0	-20
SAD-108C	Rationalise Mid-Galway WRZ to Galway City WRZ via link to Tuam RWSS									0	0	-18
SAD-115A	Rationalise Mulranny to Newport via Burroshoole GWS (approx. distance 10km)									0	0	-15
SAD-115B	Rationalise Mulranny to Newport via Burroshoole GWS (approx. distance 10km)									1	0	-20

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
SAD-116B	Rationalise Newport to Lough Mask & Westport WRZ (approx. distance - 12km)									0	0	-16
SAD-125	Rationalise Oughterard to Galway City WRZ									0	0	-18
SAD-128C	Rationalise Rosmuc WRZ to Galway City WRZ									0	0	-20
SAD-128D	Rationalise Rosmuc WRZ to Galway City WRZ									1	0	-21
SAD-136B	Rationalise Tir an Fhia WRZ to Galway City WRZ									0	0	-20

Table A.9 Fine Screening Summary of Split WRZ Options in SAD

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
SAD-105	Split Mid Galway WRZ into 3 three part and connect each part to the following schemes: Tuam RWSS - connection point at Athenry; Tuam RWSS - connection to Loughrea pipeline, connection at Tuam									0	0	-19

Table A.10 Fine Screening Summary of Surface Water Options in SAD

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
SAD-009	New SW abstraction from Lough Skannive and upgrade existing Carna Kilkieran WTP									1	0	-20
SAD-024	New SW abstraction from River Owenglin and new WTP									1	0	-23
SAD-027	New SW abstraction from Lough Auna and upgrade existing Clifden WTP									1	0	-18
SAD-033	New SW abstraction from Lough Corrib and new WTP									2	0	-22
SAD-034	New SW abstraction from Lough Mask and new WTP									0	0	-17

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
SAD-046A	Increase existing SW abstraction at Terryland from River Corrib									1	0	-19
SAD-046B	Increase existing SW abstraction at Terryland from River Corrib									4	0	-26
SAD-046D	Increase existing SW abstraction at Terryland from River Corrib									1	0	-21
SAD-046E	Increase existing SW abstraction at Terryland from River Corrib									1	0	-21
SAD-047	Increase abstraction from Luimnagh for water transfer to Galway city - increase resilience and many new developments planned around area (GW Clare Corrib)									0	0	-18

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
SAD-047A	Increase existing SW abstraction at Luimnagh from Lough Corrib									0	0	-20
SAD-047B	Increase existing SW abstraction at Luimnagh from Lough Corrib									0	0	-18
SAD-047C	Increase existing SW abstraction at Luimnagh from Lough Corrib									0	0	-15
SAD-047D	Increase existing SW abstraction at Luimnagh from Lough Corrib									0	0	-18
SAD-047E	Increase existing SW abstraction at Luimnagh from Lough Corrib									0	0	-18
SAD-048	Increase existing SW abstraction from Lough Bouliska									2	0	-20

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
SAD-089	New SW abstraction from tributary of Leenane River									0	0	-18
SAD-093A	Increase SW abstraction from existing Lough Mask and upgrade Tourmakeady WTP									0	0	-16
SAD-093B	Increase SW abstraction from existing Lough Mask and upgrade Tourmakeady WTP									0	0	-16
SAD-093E	Increase SW abstraction from existing Lough Mask and upgrade Tourmakeady WTP									0	0	-18
SAD-093F	Increase SW abstraction from existing Lough Mask and upgrade Tourmakeady WTP									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
SAD-093h	Increase SW abstraction from existing Lough Mask and upgrade Tourmakeady WTP									0	0	-18
SAD-093j	Increase SW abstraction from existing Lough Mask and upgrade Tourmakeady WTP									0	0	-16
SAD-093K	Increase SW abstraction from existing Lough Mask and upgrade Tourmakeady WTP									0	0	-18
SAD-097A	Increase SW abstraction from exsiting River Bunnahowen. Option to include relocating abstraction intake to deeper part of river.									0	0	-10
SAD-117A	Increase SW abstraction from exsiting River									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
	Newport and upgrade exixting Newport WTP											
SAD-117B	Increase SW abstraction from exsiting River Newport and upgrade exixting Newport WTP									0	0	-15
SAD-121	New supply to solve Mulranny and Newport - Lough Feeagh									1	0	-20
SAD-122	Increase SW abstraction from existing Lough Buffy									1	0	-20
SAD-123	New SW abstraction from Lough Corrib and new WTP									1	0	-23
SAD-132	New SW abstraction and new WTP from lake - Lough Awillia									2	0	-25

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
SAD-136D	Rationalise Teeranea Lettermore WRZ to Galway City WRZ									0	0	-20
SAD-137	Increase existing SW abstraction from Lough Tully									2	0	-22
SAD-139	New SW abstraction from River Dawros and new WTP									1	0	-23
SAD-149	New SW abstraction from Maumeen Lough and upgrade existing Ballyconnelly WTP									3	0	-24
SAD-151	New Connemara RWSS									4	0	-24
SAD-152	New Connemara RWSS									4	0	-24
SAD-154	New SW abstraction from Glenicmurrin Lough and upgrade existing Carna Kilkieran WTP									3	0	-23

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
SAD-155	New SW abstraction from Glenicmurrin Lough and upgrade existing Ballyconnelly WTP									3	0	-23
SAD-156	New SW abstraction from Glenicmurrin Lough and upgrade existing Rosmuc WTP									3	0	-23
SAD-157	New SW abstraction from Glenicmurrin Lough and upgrade existing Tiernee WTP									3	0	-23
SAD-158	Raise exisitng dam height and new impoundment on the other side of the lake. Increase SW abstraction from existing Lake Coolacknick									2	0	-19

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
	impoundment and WTP upgrade.											
SAD-161	Rationalise Carraroe from Terryland WTP									0	0	-20
SAD-162	Rationalise Spiddal from Terryland WTP									1	0	-24
SAD-163	Increase SW abstraction at Terryland and upgrade WTP, Upgrade network to supply out to Spiddal and Carraroe.									1	0	-24
SAD-166	New SW abstraction from Glenicmurrin Lough and new WTP to supply Carraroe and Spiddal									2	0	-24
SAD-167	New SW abstraction from Glenicmurrin Lough and new WTP to supply Carraroe and Spiddal									1	0	-21

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
SAD-168	Rationalise Carraoe to Galway City									0	0	-18
SAD-169	Rationalise Spiddal to Galway City									0	0	-18
SAD-170	Rationalise Carraoe to Galway City									0	0	-20
SAD-171	Rationalise Spiddal to Galway City									0	0	-20
SAD-172	Rationalise Carraoe to Galway City									1	0	-21
SAD-173	Rationalise Spiddal to Galway City									1	0	-21
SAD-174	Rationalise Carraoe to Galway City									1	0	-21
SAD-175	Rationalise Spiddal to Galway City									1	0	-21
SAD-176	Interconnect Carraroe and Terryland WTP									1	0	-25

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
SAD-177	Interconnect Spiddal and Terryland WTP									1	0	-25
SAD-178	Increase SW abstraction at Terryland and upgrade WTP, Upgrade network to supply out to Spiddal and Carraroe.									1	0	-25
SAD-184	New SW abstraction from Glenicmurrin Lough and upgrade existing Tiernee WTP									1	0	-24
SAD-185	New SW abstraction from Glenicmurrin Lough and new WTP									1	0	-24
SAD-187	New SW abstraction from Glenicmurrin Lough and upgrade existing Tiernee WTP									1	0	-24

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
SAD-188	New SW abstraction from Glenicmurrin Lough and new WTP									1	0	-24
SAD-189	New SW abstraction from Glenicmurrin Lough and upgrade existing Carna Kilkieran WTP									1	0	-24
SAD-191	New SW abstraction from Glenicmurrin Lough and upgrade existing Tiernee WTP									2	0	-25
SAD-192	New SW abstraction from Glenicmurrin Lough and new WTP									2	0	-25
SAD-193	New SW abstraction from Glenicmurrin Lough and upgrade existing Carna Kilkieran WTP									2	0	-25
SAD-194	New SW abstraction from Glenicmurrin Lough and									2	0	-25

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
	upgrade existing Ballyconnelly WTP											
SAD-195	New SW abstraction from Lough Skannive and upgrade existing WTP and upgrade existing Carna Kilkieran WTP									1	0	-17
SAD-196	Rationalise to Carna Kilkieran									1	0	-18
SAD-197	Increase existing SW abstraction from Lough Bouliska and connect with neighbouring WRZs									0	0	-18
SAD-198	Rationalise Carraroe to Spiddal (Lough Bouliska)									0	0	-18
SAD-199	Increase existing SW abstraction from Lough Bouliska and connect with neighbouring WRZs									1	0	-18

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
SAD-200	Rationalise Carraroe to Spiddal (Lough Bouliska)									1	0	-18
SAD-202	Rationalise to Spiddal (Lough Bouliska)									1	0	-18
SAD-203	Increase existing SW abstraction from Lough Bouliska and connect with neighbouring WRZs									2	0	-20
SAD-204	Rationalise Carraroe to Spiddal (Lough Bouliska)									2	0	-20
SAD-206	Rationalise to Spiddal (Lough Bouliska)									2	0	-20
SAD-208	Rationalise to Spiddal (Lough Bouliska)									2	0	-20
SAD-209	New Connemara RWSS (Kylemore Lough)									2	0	-24
SAD-210	New Connemara RWSS (Kylemore Lough)									2	0	-24

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
SAD-211	New Connemara RWSS (Kylemore Lough)									2	0	-24
SAD-216	Increase SW abstraction from existing Lough Mask and upgrade Tourmakeady WTP									0	0	-17
SAD-218	Increase SW abstraction from existing Lough Mask and upgrade Tourmakeady WTP									0	0	-14

Table A.11 Fine Screening Summary of Surface Water and Interconnection Options in SAD

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
SAD-088	New West Connemara RWSS with source from Kylemore Lough									1	0	-17
SAD-207	Interconnect with Spiddal (Lough Bouliska)									2	0	-20
SAD-215	Interconnect with Lough Mask									0	0	-17

Table A.12 Fine Screening Summary of Surface Water and Rationalisation Options in SAD

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
SAD-005B	Rationalise Ballyconneely WRZ to Galway City PWS									0	0	-18
SAD-011B	Rationalise Carna Kilkieran RWSS scheme to Galway City WRZ via Rosmuc WRZ									0	0	-18
SAD-029B	Rationalise Clifden WRZ to Galway City PWS via Ballyconneely									0	0	-18
SAD-037C	Rationalise Clonbur WRZ to Galway City WRZ									0	0	-18
SAD-128B	Rationalise Rosmuc WRZ to Galway City WRZ									0	0	-18
SAD-136C	Rationalise Teeranea Lettermore WRZ to Galway City WRZ									0	0	-18

Option Reference	Name	Environmental								Total - 3 Scores	Environmental Scoring	
		Population, Health, Economy and Recreation	Water Environment: Quality and Resources	Biodiversity, Flora and Fauna	Material Assets	Landscape and Visual	Climate Change	Culture, Heritage and Archaeology	Geology and Soils		Positive Score - Potential Beneficial Effects	Negative Scores - Potential Adverse Effects
SAD-183	Rationalise Rosmuc to new Glenicmurrin Lough Scheme									1	0	-24
SAD-186	Rationalise Rosmuc to new Glenicmurrin Lough Scheme									1	0	-24
SAD-190	Rationalise Rosmuc to new Glenicmurrin Lough Scheme									2	0	-25
SAD-201	Rationalise Rosmuc to Spiddal (Lough Bouliska)									1	0	-18
SAD-205	Rationalise Rosmuc to Spiddal (Lough Bouliska)									2	0	-20

Appendix B SA Approaches for SAD

Note: SA Options are also referred to as Group Options

WRZ	Preferred Approach - SA Approach 5		Least Cost - SA Approach 5		Best Environmental - SA Approach 4	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
1200SC0007: Ballyconneely	SAD-196 Rationalise to Carna Kilkieran	41	SAD-196 Rationalise to Carna Kilkieran	41	SAD-005B Rationalise Ballyconneely WRZ to Galway City PWS	1
1100SC0001_B: Carna Kilkieran RWSS	SAD-195 New SW abstraction from Lough Skannive and upgrade existing WTP and upgrade existing Carna Kilkieran WTP	41	SAD-195 New SW abstraction from Lough Skannive and upgrade existing WTP and upgrade existing Carna Kilkieran WTP	41	SAD-011B Rationalise Carna Kilkieran RWSS scheme to Galway City WRZ via Rosmuc WRZ	1
2200SC0002: Clare Island	SAD-014 New GW abstraction (poorly productive bedrock - Clare Island groundwater body)	-	SAD-014 New GW abstraction (poorly productive bedrock - Clare Island groundwater body)	-	SAD-016 Connect Clare Island to mainland (Louisburgh)	17
1200SC0010: Cleggan Claddaghduff	SAD-209 New Connemara RWSS (Kylemore Lough)	45	SAD-209 New Connemara RWSS (Kylemore Lough)	45	SAD-153 New Connemara RWSS	31
1200SC0011: Clifden	SAD-027 New SW abstraction from Lough Auna and upgrade existing Clifden WTP	-	SAD-027 New SW abstraction from Lough Auna and upgrade existing Clifden WTP	-	SAD-029B Rationalise Clifden WRZ to Galway City PWS via Ballyconneely	1

WRZ	Preferred Approach - SA Approach 5		Least Cost - SA Approach 5		Best Environmental - SA Approach 4	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
1200SC0012: Clonbur	SAD-033 New SW abstraction from Lough Corrib and new WTP	-	SAD-033 New SW abstraction from Lough Corrib and new WTP	-	SAD-037C Rationalise Clonbur WRZ to Galway City WRZ	1
1100SC0001_D: Dunmore/Glenamaddy (Glenamaddy)	SAD-040 New GW abstracton from Gortgarogh GWB (Sean, Robbie spring) spring	-	SAD-040 New GW abstracton from Gortgarogh GWB (Sean, Robbie spring) spring	-	SAD-040 New GW abstracton from Gortgarogh GWB (Sean, Robbie spring) spring	-
1100SC0001: Galway City (Terryland & Lumineagh)	SAD-046A Increase existing SW abstraction at Terryland from River Corrib	-	SAD-046A Increase existing SW abstraction at Terryland from River Corrib	-	SAD-047D Increase existing SW abstraction at Luimnagh from Lough Corrib	1
1200SC0037: Carraroe	SAD-200 Rationalise Carraroe to Spiddal (Lough Bouliska)	43	SAD-200 Rationalise Carraroe to Spiddal (Lough Bouliska)	43	SAD-168 Rationalise Carraoe to Galway City	1
1200SC0038: Spiddal	SAD-199 Increase existing SW abstraction from Lough Bouliska and connect with neighbouring WRZs	43	SAD-199 Increase existing SW abstraction from Lough Bouliska and connect with neighbouring WRZs	43	SAD-169 Rationalise Spiddal to Galway City	1
1200SC0017: Inisboffin	SAD-055 Desalination plant to supply full deficit. No blending, chemical remineralization only.	-	SAD-055 Desalination plant to supply full deficit. No blending, chemical remineralization only.	-	SAD-055 Desalination plant to supply full deficit. No blending, chemical remineralization only.	-
1200SC0018: Inishere	SAD-058	-	SAD-058	-	SAD-058	-

WRZ	Preferred Approach - SA Approach 5		Least Cost - SA Approach 5		Best Environmental - SA Approach 4	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
	Optimise GW abstraction from current springs (includes GW harvesting/raw water storage)		Optimise GW abstraction from current springs (includes GW harvesting/raw water storage)		Optimise GW abstraction from current springs (includes GW harvesting/raw water storage)	
1200SC0004: Inishmean	SAD-069 Optimise GW abstraction from current springs (includes GW harvesting/raw water storage)	-	SAD-069 Optimise GW abstraction from current springs (includes GW harvesting/raw water storage)	-	SAD-069 Optimise GW abstraction from current springs (includes GW harvesting/raw water storage)	-
1200SC0019: Inishmore	SAD-074 Increase GW abstraction from existing boreholes and new raw water storage to maximise GW availability in winter months	-	SAD-074 Increase GW abstraction from existing boreholes and new raw water storage to maximise GW availability in winter months	-	SAD-074 Increase GW abstraction from existing boreholes and new raw water storage to maximise GW availability in winter months	-
2200SC0003: Inishturk	SAD-158 Raise existing dam height and new impoundment on the other side of the lake. Increase SW abstraction from existing Lake Coolacknick impoundment and WTP upgrade.	-	SAD-158 Raise existing dam height and new impoundment on the other side of the lake. Increase SW abstraction from existing Lake Coolacknick impoundment and WTP upgrade.	-	SAD-158 Raise existing dam height and new impoundment on the other side of the lake. Increase SW abstraction from existing Lake Coolacknick impoundment and WTP upgrade.	-
1200SC0024: Leenane	SAD-210 New Connemara RWSS (Kylemore Lough)	45	SAD-210 New Connemara RWSS (Kylemore Lough)	45	SAD-151 New Connemara RWSS	31
2200SC0001: Lough Mask & Westport	SAD-218	48	SAD-218	48	SAD-093E	17

WRZ	Preferred Approach - SA Approach 5		Least Cost - SA Approach 5		Best Environmental - SA Approach 4	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
	Increase SW abstraction from existing Lough Mask and upgrade Tourmakeady WTP		Increase SW abstraction from existing Lough Mask and upgrade Tourmakeady WTP		Increase SW abstraction from existing Lough Mask and upgrade Tourmakeady WTP	
2200SC0015: Louisburgh	SAD-217 Rationalise Louisburgh via new Community/GWS being developed to take water from Westport to Murrisk	48	SAD-217 Rationalise Louisburgh via new Community/GWS being developed to take water from Westport to Murrisk	48	SAD-100A Interconnect with new Community/GWS being developed to take water from Westport to Murrisk	17
1100SC0001_H: Mid-Galway	SAD-101 Increase existing GW abstraction from existing spring (karstic bedrock - Clare-Corrib groundwater body)	-	SAD-101 Increase existing GW abstraction from existing spring (karstic bedrock - Clare-Corrib groundwater body)	-	SAD-101 Increase existing GW abstraction from existing spring (karstic bedrock - Clare-Corrib groundwater body)	-
2200SC0016: Mulranny	SAD-111 New GW abstraction (karstic bedrock - Newport groundwater body)	-	SAD-111 New GW abstraction (karstic bedrock - Newport groundwater body)	-	SAD-115A Rationalise Mulranny to Newport via Burroshoole GWS (approx. distance 10km)	22
2200SC0017: Newport	SAD-117A Increase SW abstraction from existing River Newport and upgrade existing Newport WTP	-	SAD-117A Increase SW abstraction from existing River Newport and upgrade existing Newport WTP	-	SAD-117B Increase SW abstraction from existing River Newport and upgrade existing Newport WTP	22
1100SC0001_J: Oughterard	SAD-122	-	SAD-122	-	SAD-122	-

WRZ	Preferred Approach - SA Approach 5		Least Cost - SA Approach 5		Best Environmental - SA Approach 4	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
	Increase SW abstraction from existing Lough Buffy		Increase SW abstraction from existing Lough Buffy		Increase SW abstraction from existing Lough Buffy	
1100SC0001_K: Rosmuc	SAD-201 Rationalise Rosmuc to Spiddal (Lough Bouliska)	43	SAD-201 Rationalise Rosmuc to Spiddal (Lough Bouliska)	43	SAD-128B Rationalise Rosmuc WRZ to Galway City WRZ	1
1100SC0001_M: Teeranea Lettermore	SAD-202 Rationalise to Spiddal (Lough Bouliska)	43	SAD-202 Rationalise to Spiddal (Lough Bouliska)	43	SAD-136C Rationalise Teeranea Lettermore WRZ to Galway City WRZ	1
1200SC0035: Tully-Tullycross	SAD-211 New Connemara RWSS (Kylemore Lough)	45	SAD-211 New Connemara RWSS (Kylemore Lough)	45	SAD-152 New Connemara RWSS	31

WRZ	Quickest Delivery - SA Approach 2		Most Resilient - SA Approach 3		Lowest Carbon - SA Approach 5	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
1200SC0007: Ballyconneely	SAD-155 New SW abstraction from Glenicmurrin Lough and upgrade existing Ballyconnelly WTP	32	SAD-155 New SW abstraction from Glenicmurrin Lough and upgrade existing Ballyconnelly WTP	32	SAD-196 Rationalise to Carna Kilkieran	41

WRZ	Quickest Delivery - SA Approach 2		Most Resilient - SA Approach 3		Lowest Carbon - SA Approach 5	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
1100SC0001_B: Carna Kilkieran RWSS	SAD-154 New SW abstraction from Glenicmurrin Lough and upgrade existing Carna Kilkieran WTP	32	SAD-154 New SW abstraction from Glenicmurrin Lough and upgrade existing Carna Kilkieran WTP	32	SAD-195 New SW abstraction from Lough Skannive and upgrade existing WTP and upgrade existing Carna Kilkieran WTP	41
2200SC0002: Clare Island	SAD-016 Connect Clare Island to mainland (Louisburgh)	17	SAD-014 New GW abstraction (poorly productive bedrock - Clare Island groundwater body)	-	SAD-014 New GW abstraction (poorly productive bedrock - Clare Island groundwater body)	-
1200SC0010: Cleggan Claddaghduff	SAD-019 Supply deficit from neighbouring Ballinakill Moyard GWS	-	SAD-019 Supply deficit from neighbouring Ballinakill Moyard GWS	-	SAD-209 New Connemara RWSS (Kylemore Lough)	45
1200SC0011: Clifden	SAD-027 New SW abstraction from Lough Auna and upgrade existing Clifden WTP	-	SAD-027 New SW abstraction from Lough Auna and upgrade existing Clifden WTP	-	SAD-027 New SW abstraction from Lough Auna and upgrade existing Clifden WTP	-
1200SC0012: Clonbur	SAD-033 New SW abstraction from Lough Corrib and new WTP	-	SAD-033 New SW abstraction from Lough Corrib and new WTP	-	SAD-033 New SW abstraction from Lough Corrib and new WTP	-
1100SC0001_D: Dunmore/Glenamaddy (Glenamaddy)	SAD-040	-	SAD-040	-	SAD-040	-

WRZ	Quickest Delivery - SA Approach 2		Most Resilient - SA Approach 3		Lowest Carbon - SA Approach 5	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
	New GW abstracton from Gortgarogh GWB (Sean, Robbie spring) spring		New GW abstracton from Gortgarogh GWB (Sean, Robbie spring) spring		New GW abstracton from Gortgarogh GWB (Sean, Robbie spring) spring	
1100SC0001: Galway City (Terryland & Lumineagh)	SAD-046A Increase existing SW abstraction at Terryland from River Corrib	-	SAD-046A Increase existing SW abstraction at Terryland from River Corrib	-	SAD-046A Increase existing SW abstraction at Terryland from River Corrib	-
1200SC0037: Carraroe	SAD-164 Desalination plant to supply Carraroe and Spiddal	35	SAD-164 Desalination plant to supply Carraroe and Spiddal	35	SAD-200 Rationalise Carraroe to Spiddal (Lough Bouliska)	43
1200SC0038: Spiddal	SAD-165 Desalination plant to supply Carraroe and Spiddal	35	SAD-165 Desalination plant to supply Carraroe and Spiddal	35	SAD-199 Increase existing SW abstraction from Lough Bouliska and connect with neighbouring WRZs	43
1200SC0017: Inisboffin	SAD-055 Desalination plant to supply full deficit. No blending, chemical remineralization only.	-	SAD-055 Desalination plant to supply full deficit. No blending, chemical remineralization only.	-	SAD-055 Desalination plant to supply full deficit. No blending, chemical remineralization only.	-
1200SC0018: Inishere	SAD-058 Optimise GW abstraction from current springs (includes GW harvesting/raw water storage)	-	SAD-063 Desalination plant to supply full deficit located on 1 of of the Aran Island and distribute the supply to other 2 islands	24	SAD-058 Optimise GW abstraction from current springs (includes GW harvesting/raw water storage)	-

WRZ	Quickest Delivery - SA Approach 2		Most Resilient - SA Approach 3		Lowest Carbon - SA Approach 5	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
1200SC0004: Inishmean	SAD-069 Optimise GW abstraction from current springs (includes GW harvesting/raw water storage)	-	SAD-070 Desalination plant to supply full deficit located on 1 of of the Aran Island and distribute the supply to other 2 islands	24	SAD-069 Optimise GW abstraction from current springs (includes GW harvesting/raw water storage)	-
1200SC0019: Inishmore	SAD-074 Increase GW abstraction from existing boreholes and new raw water storage to maximise GW availability in winter months	-	SAD-077 Desalination plant to supply full deficit located on 1 of of the Aran Island and distribute the supply to other 2 islands	24	SAD-074 Increase GW abstraction from existing boreholes and new raw water storage to maximise GW availability in winter months	-
2200SC0003: Inishturk	SAD-158 Raise existing dam height and new impoundment on the other side of the lake. Increase SW abstraction from existing Lake Coolacknick impoundment and WTP upgrade.	-	SAD-158 Raise existing dam height and new impoundment on the other side of the lake. Increase SW abstraction from existing Lake Coolacknick impoundment and WTP upgrade.	-	SAD-158 Raise existing dam height and new impoundment on the other side of the lake. Increase SW abstraction from existing Lake Coolacknick impoundment and WTP upgrade.	-
1200SC0024: Leenane	SAD-088 New West Connemara RWSS with source from Kylemore Lough	33	SAD-089 New SW abstraction from tributary of Leenane River	-	SAD-210 New Connemara RWSS (Kylemore Lough)	45
2200SC0001: Lough Mask & Westport	SAD-093E Increase SW abstraction from existing Lough Mask and upgrade Tourmakeady WTP	17	SAD-093A Increase SW abstraction from existing Lough Mask and upgrade Tourmakeady WTP	-	SAD-218 Increase SW abstraction from existing Lough Mask and upgrade Tourmakeady WTP	48

WRZ	Quickest Delivery - SA Approach 2		Most Resilient - SA Approach 3		Lowest Carbon - SA Approach 5	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
2200SC0015: Louisburgh	SAD-100A Interconnect with new Community/GWS being developed to take water from Westport to Murrisk	17	SAD-097A Increase SW abstraction from existing River Bunnahowen. Option to include relocating abstraction intake to deeper part of river.	-	SAD-217 Rationalise Louisburgh via new Community/GWS being developed to take water from Westport to Murrisk	48
1100SC0001_H: Mid-Galway	SAD-101 Increase existing GW abstraction from existing spring (karstic bedrock - Clare-Corrib groundwater body)	-	SAD-101 Increase existing GW abstraction from existing spring (karstic bedrock - Clare-Corrib groundwater body)	-	SAD-101 Increase existing GW abstraction from existing spring (karstic bedrock - Clare-Corrib groundwater body)	-
2200SC0016: Mulranny	SAD-115B Rationalise Mulranny to Newport via Burroshoole GWS (approx. distance 10km)	23	SAD-115B Rationalise Mulranny to Newport via Burroshoole GWS (approx. distance 10km)	23	SAD-111 New GW abstraction (karstic bedrock - Newport groundwater body)	-
2200SC0017: Newport	SAD-121 New supply to solve Mulranny and Newport - Lough Feeagh	23	SAD-121 New supply to solve Mulranny and Newport - Lough Feeagh	23	SAD-117A Increase SW abstraction from existing River Newport and upgrade existing Newport WTP	-
1100SC0001_J: Oughterard	SAD-122 Increase SW abstraction from existing Lough Buffy	-	SAD-122 Increase SW abstraction from existing Lough Buffy	-	SAD-122 Increase SW abstraction from existing Lough Buffy	-

WRZ	Quickest Delivery - SA Approach 2		Most Resilient - SA Approach 3		Lowest Carbon - SA Approach 5	
	Option Description	SA Option	Option Description	SA Option	Option Description	SA Option
1100SC0001_K: Rosmuc	SAD-156 New SW abstraction from Glenicmurrin Lough and upgrade existing Rosmuc WTP	32	SAD-156 New SW abstraction from Glenicmurrin Lough and upgrade existing Rosmuc WTP	32	SAD-201 Rationalise Rosmuc to Spiddal (Lough Bouliska)	43
1100SC0001_M: Teeranea Lettermore	SAD-157 New SW abstraction from Glenicmurrin Lough and upgrade existing Tiernee WTP	32	SAD-157 New SW abstraction from Glenicmurrin Lough and upgrade existing Tiernee WTP	32	SAD-202 Rationalise to Spiddal (Lough Bouliska)	43
1200SC0035: Tully-Tullycross	SAD-142 New West Connemara RWSS with source from Kylemore Lough	33	SAD-140 New GW abstraction (poorly productive bedrock - Clifden Castlebar groundwater body)	-	SAD-211 New Connemara RWSS (Kylemore Lough)	45

WRZ	Best Appropriate Assessment - SA Approach 1	
	Option Description	SA Option
1200SC0007: Ballyconneely	SAD-002 New GW abstraction (close to poorly productive bedrock - Clifden Castlebar groundwater body)	-

WRZ	Best Appropriate Assessment - SA Approach 1	
	Option Description	SA Option
1100SC0001_B: Carna Kilkieran RWSS	SAD-009 New SW abstraction from Lough Skannive and upgrade existing Carna Kilkieran WTP	-
2200SC0002: Clare Island	SAD-014 New GW abstraction (poorly productive bedrock - Clare Island groundwater body)	-
1200SC0010: Cleggan Claddaghduff	SAD-019 Supply deficit from neighbouring Ballinakill Moyard GWS	-
1200SC0011: Clifden	SAD-027 New SW abstraction from Lough Auna and upgrade existing Clifden WTP	-
1200SC0012: Clonbur	SAD-038D Rationalise Clonbur WRZ to Lough Mask WRZ	14
1100SC0001_D: Dunmore/Glenamaddy (Glenamaddy)	SAD-043C Rationalise Dunmore/Glenamaddy to Lough Mask WRZ	14
1100SC0001: Galway City (Terryland & Lumineagh)	SAD-046A Increase existing SW abstraction at Terryland from River Corrib	-
1200SC0037: Carraroe	SAD-164 Desalination plant to supply Carraroe and Spiddal	35
1200SC0038: Spiddal	SAD-165	35

WRZ	Best Appropriate Assessment - SA Approach 1	
	Option Description	SA Option
	Desalination plant to supply Carraroe and Spiddal	
1200SC0017: Inisboffin	SAD-055 Desalination plant to supply full deficit. No blending, chemical remineralization only.	-
1200SC0018: Inishere	SAD-058 Optimise GW abstraction from current springs (includes GW harvesting/raw water storage)	-
1200SC0004: Inishmean	SAD-069 Optimise GW abstraction from current springs (includes GW harvesting/raw water storage)	-
1200SC0019: Inishmore	SAD-074 Increase GW abstraction from existing boreholes and new raw water storage to maximise GW availability in winter months	-
2200SC0003: Inishturk	SAD-158 Raise existing dam height and new impoundment on the other side of the lake. Increase SW abstraction from existing Lake Coolacknick impoundment and WTP upgrade.	-
1200SC0024: Leenane	SAD-089 New SW abstraction from tributary of Leenane River	-
2200SC0001: Lough Mask & Westport	SAD-093K	14

WRZ	Best Appropriate Assessment - SA Approach 1	
	Option Description	SA Option
	Increase SW abstraction from existing Lough Mask and upgrade Tourmakeady WTP	
2200SC0015: Louisburgh	SAD-097A Increase SW abstraction from exsiting River Bunnahowen. Option to include relocating abstraction intake to deeper part of river.	-
1100SC0001_H: Mid-Galway	SAD-101 Increase existing GW abstraction from existing spring (karstic bedrock - Clare-Corrib groundwater body)	-
2200SC0016: Mulranny	SAD-111 New GW abstraction (karstic bedrock - Newport groundwater body)	-
2200SC0017: Newport	SAD-117A Increase SW abstraction from exsiting River Newport and upgrade exixting Newport WTP	-
1100SC0001_J: Oughterard	SAD-122 Increase SW abstraction from existing Lough Buffy	-
1100SC0001_K: Rosmuc	SAD-127 New GW abstraction (poorly productive bedrock - Spiddal groundwater body)	-
1100SC0001_M: Teeranea Lettermore	SAD-132 New SW abstraction and new WTP from lake - Lough Awillia	-
1200SC0035: Tully-Tullycross	SAD-140	-

WRZ	Best Appropriate Assessment - SA Approach 1	
	Option Description	SA Option
	New GW abstraction (poorly productive bedrock - Clifden Castlebar groundwater body)	

Appendix C Figure Index Tables

Designated Site	Label	Designated Site	Label	Designated Site	Label
SACs (Figure 2.2)					
Owenduff/Nephin Complex SAC	D201	Carrowkeel Turlough SAC	D226	Derrinlough (Cloonkeenleananode) Bog SAC	D251
River Moy SAC	D202	Williamstown Turloughs SAC	D227	Cloughmoyne SAC	D252
Bellacragher Saltmarsh SAC	D203	Lough Carra/Mask Complex SAC	D228	Slyne Head Peninsula SAC	D253
Lough Gall Bog SAC	D204	Inishbofin And Inishshark SAC	D229	Slyne Head Islands SAC	D254
Newport River SAC	D205	Kilglassan/Caheravoostia Turlough Complex SAC	D230	Rosroe Bog SAC	D255
Corraun Plateau SAC	D206	Rusheenduff Lough SAC	D231	Gortnandarragh Limestone Pavement SAC	D256
Clew Bay Complex SAC	D207	Lisnageeragh Bog and Ballinastack Turlough SAC	D232	Murvey Machair SAC	D257
Derrinea Bog SAC	D208	Skealoghan Turlough SAC	D233	Cregduff Lough SAC	D258
West Connacht Coast SAC	D209	Greaghans Turlough SAC	D234	Dog's Bay SAC	D259
Balla Turlough SAC	D210	Ardkill Turlough SAC	D235	Connemara Bog Complex SAC	D260
Drumalough Bog SAC	D211	Tully Lough SAC	D236	Ross Lake And Woods SAC	D261
Carrowbehy/Caher Bog SAC	D212	Tully Mountain SAC	D237	Monivea Bog SAC	D262
Oldhead Wood SAC	D213	Lough Lurgeen Bog/Glenamaddy Turlough SAC	D238	Lough Nageeron SAC	D263
Ballinafad SAC	D214	Clyard Kettle-Holes SAC	D239	Kilkieran Bay And Islands SAC	D264
Cloonchambers Bog SAC	D215	Aughrusbeg Machair And Lake SAC	D240	Rahasane Turlough SAC	D265

Designated Site	Label	Designated Site	Label	Designated Site	Label
Brackloon Woods SAC	D216	Kildun Souterrain SAC	D241	Galway Bay Complex SAC	D266
Lough Cahasy, Lough Baun And Roonah Lough SAC	D217	Omey Island Machair SAC	D242	Lough Rea SAC	D267
Towerhill House SAC	D218	Barnahallia Lough SAC	D243	Castletaylor Complex SAC	D268
Corliskea/Trien/Cloonfelliv Bog SAC	D219	The Twelve Bens/Garraun Complex SAC	D244	Lough Fingall Complex SAC	D269
Cross Lough (Killadoon) SAC	D220	Ballymaglancy Cave, Cong SAC	D245	Inishmore Island SAC	D270
Moore Hall (Lough Carra) SAC	D221	Mocorha Lough SAC	D246	Inishmaan Island SAC	D271
Coolcam Turlough SAC	D222	Shrule Turlough SAC	D247	Inisheer Island SAC	D272
Lough Corrib SAC	D223	Kingstown Bay SAC	D248	Clare Island Cliffs SAC	D273
Croaghill Turlough SAC	D224	Levally Lough SAC	D249		
Mweelrea/Sheeffry/Erriff Complex SAC	D225	Maumturk Mountains SAC	D250		
SPAs (Figure 2.2)					
Blacksod Bay/Broad Haven SPA	D101	Illaunnanoon SPA	D107	Lough Rea SPA	D113
Owenduff/Nephin Complex SPA	D102	Lough Corrib SPA	D108	Inishmore SPA	D114
Cross Lough (Killadoon) SPA	D103	Connemara Bog Complex SPA	D109	Slieve Aughty Mountains SPA	D115
Lough Carra SPA	D104	Cregganna Marsh SPA	D110	Clare Island SPA	D116
Lough Mask SPA	D105	Rahasane Turlough SPA	D111		
Inishbofin, Omey Island and Turbot Island SPA	D106	Inner Galway Bay SPA	D112		
NHAs (Figure 2.2)					

Designated Site	Label	Designated Site	Label	Designated Site	Label
Tullaghan Bay And Bog NHA	D301	Slieve Bog NHA	D308	Lough Tee Bog NHA	D315
Croaghmoyle Mountain NHA	D302	Tooreen Bog NHA	D309	Carna Heath And Bog NHA	D316
Lough Greney Bog NHA	D303	Cloon And Laghtanabba Bog NHA	D310	Raford River Bog NHA	D317
Tawnymackan Bog NHA	D304	Derrinlough Bog NHA	D311	Moycullen Bogs NHA	D318
Moorfield Bog/Farm Cottage NHA	D305	Derrynagran Bog And Esker NHA	D312	Cregganna Marsh NHA	D319
Lough Namucka Bog NHA	D306	Killaclogher Bog NHA	D313		
Bracklagh Bog NHA	D307	Oughterard District Bog NHA	D314		