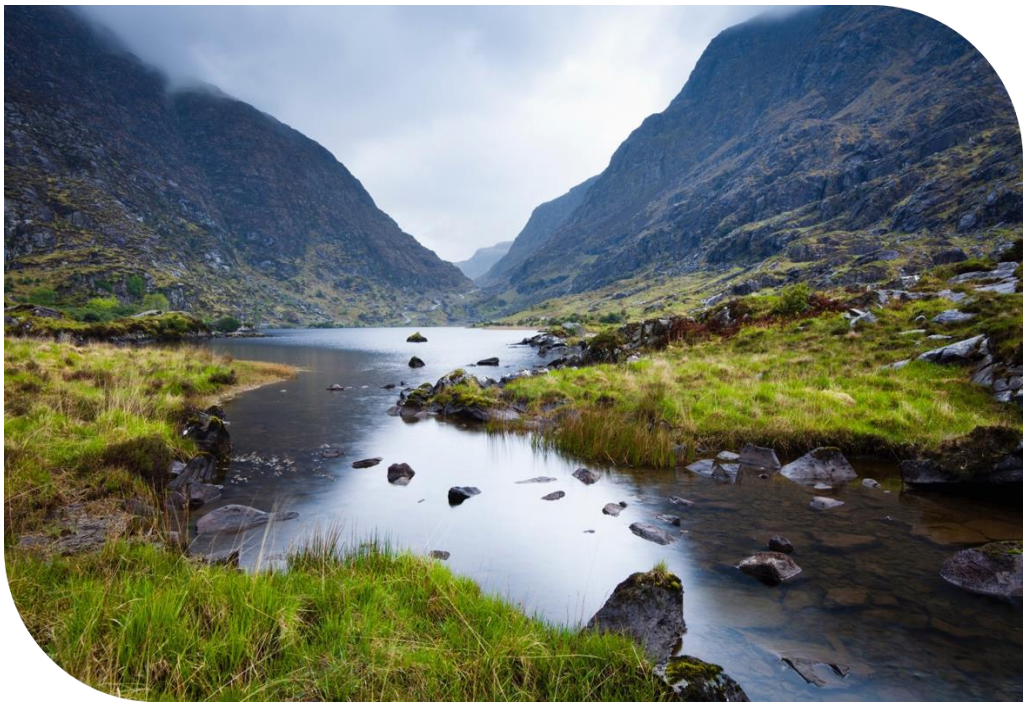
Autumn 2022

Regional Water Resources Plan – Eastern and Midlands

Appendix 5 Study Area 5 Technical Report



Tionscadal Éireann
Project Ireland
2040

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

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

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Introduction and Background

1 Introduction – Study Area 5

This is the Technical Report for Study Area 5 which applies the Options Assessment Methodology, as set out in the National Water Resources Plan Framework Plan (NWRP-FP), the final version of which was reviewed by the authors of this Technical Report Prior to finalisation of this Technical Report. This document should be reviewed in conjunction with the Framework Plan and the Regional Water Resources Plan – Eastern and Midlands (RWRP-EM), which explain key concepts and terminology used throughout the report.

This Study Area includes 10 water resource zones located in Counties Westmeath, Roscommon, Offaly and Galway. This Technical Report includes:

- The summary of Identified Need in this Study Area including Quality, Quantity, Reliability and Sustainability
- Options considered within the Study Area
- The range of approaches to resolve Identified Need
- Development of an Outline Preferred Approach for the Study Area; and
- The adaptability of our Preferred Approach.

The Preferred Approach for this Study Area feeds into the regional Preferred Approach detailed in the RWRP-EM.

1.1 Summary of Our Options Assessment Methodology

In Chapter 8 of the Framework Plan, we described the Option Assessment Methodology that will be used to develop a national programme of proposed solutions for all of our water supplies. The objective of these solutions is to resolve the needs identified through the Supply Demand Balance (SDB), Water Quality, Reliability and Sustainability assessments. These needs will be discussed in further detail in this report. In the Regional Water Resources Plan - Eastern Midlands (RWRP-EM), we apply this methodology to the Eastern Midlands Region shown in Figure 1.1.

As outlined in Section 1.9.4 of the Framework Plan, the regional boundaries have been delineated for the purpose of delivering the National Water Resources Plan. As a national plan sources outside the delivery region may be considered to meet need within a particular region.

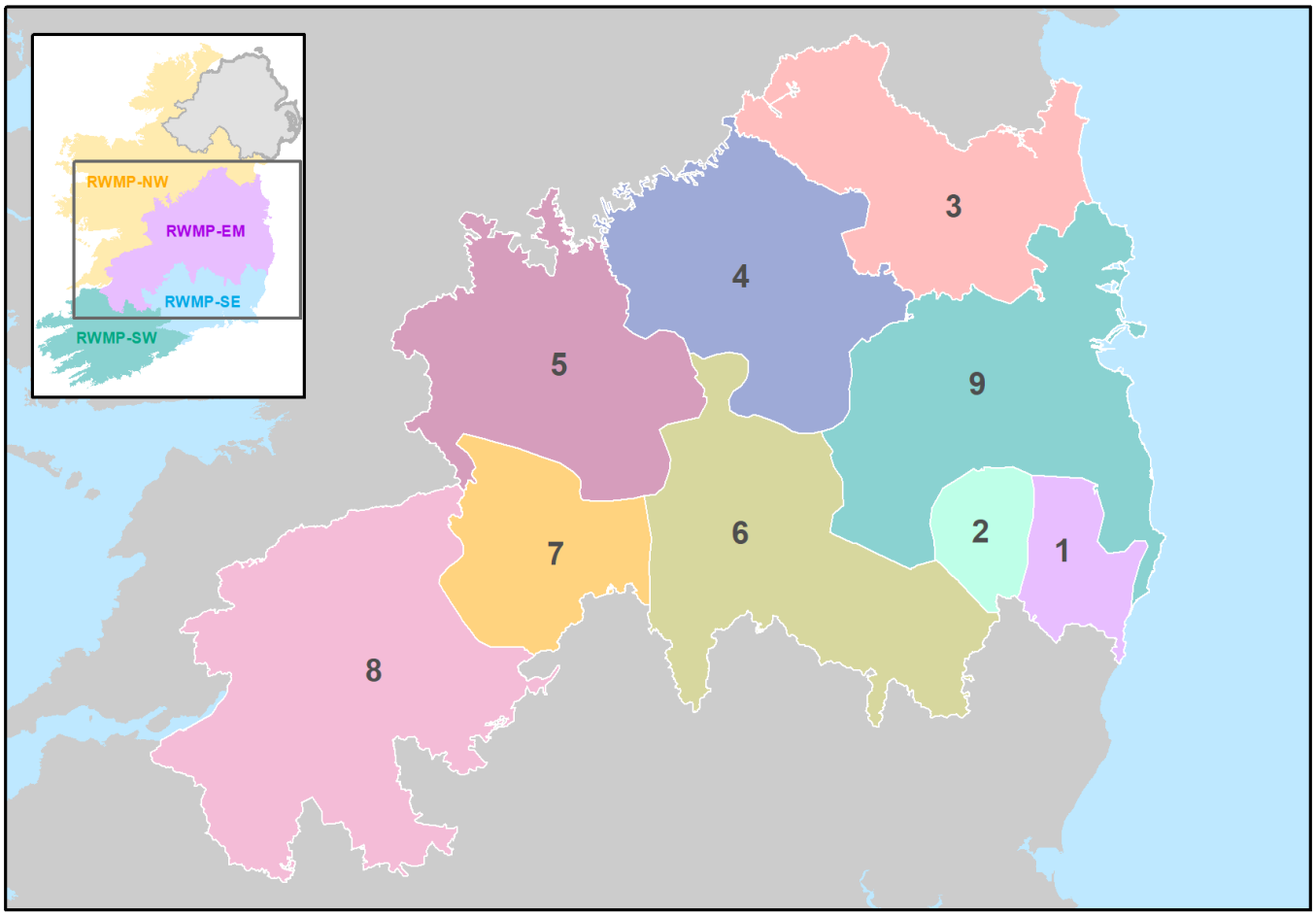


Figure 1.1: Overview of Study Areas within the Eastern and Midlands Region

This Technical Report is for Study Area 5 (SA5), which consists of 10 individual water resource zones (WRZs). Within this Study Area, the Preferred Approach has been developed following the process shown in Figure 1.2 .

In this document, Option codes are labelled using the following naming convention: SAX-00X

- SAX refers to the Study Area within which the option is located.
- 00X refers to the individual option number.
- Any references to TG4 refers the Eastern and Midlands Region (Regional Group 4).

It should be noted that assessments and preferred approaches and solutions at this stage are at a plan level. Environmental impacts and costing of projects are further reviewed at project level. No statutory consent or funding consent is conferred by inclusion in the NWRP (National Water Resource Planning) Framework. Any projects that are progressed following this plan will require individual environmental assessments, including Environmental Impact Assessment and Appropriate Assessment (as required), in support of planning applications (where a project requires planning permission) or in support of licencing applications (for example, for new abstractions). Any such applications will also be subject to public consultation.

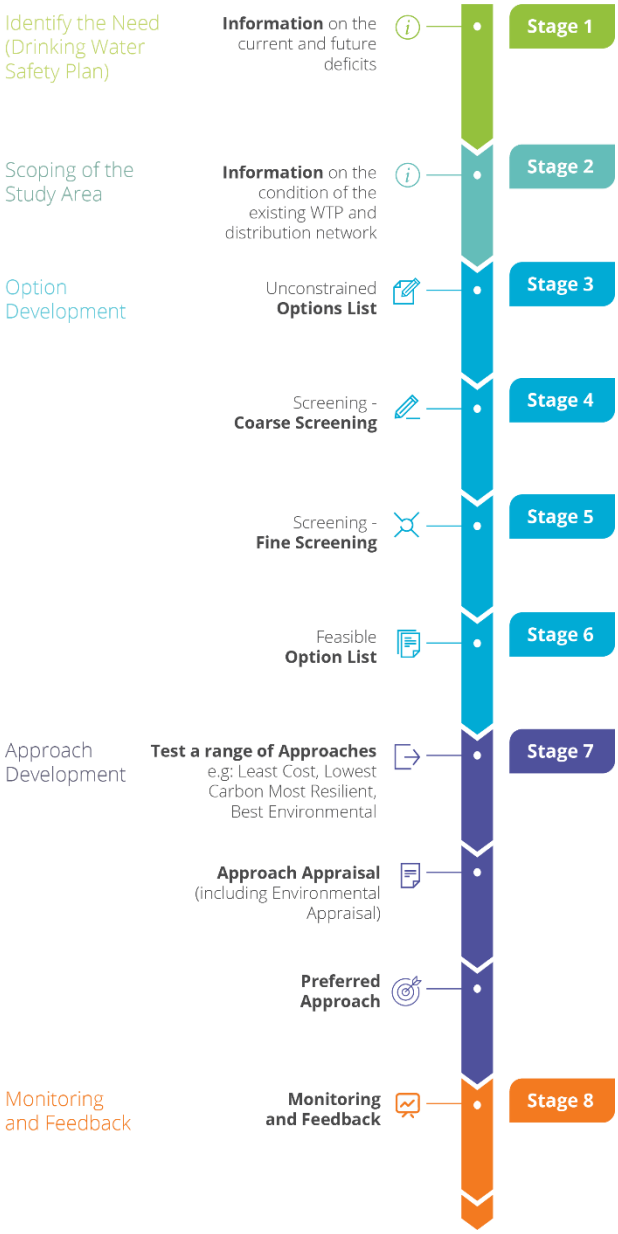


Figure 1.2 Option Assessment Methodology Process

1.2 Introduction to the Study Area

SA5 consists of 10 WRZs supplying a population of approximately 71,940 via approximately 1,123 kilometres of distribution network. The Study Area is summarised in Figure 1.3 and Table 1.1. The largest town within this Study Area is Athlone. South Roscommon Regional Water Supply Scheme, Ballinasloe, Birr, Rahan and Clara/Ferbane are other areas of high demand within the Study Area.

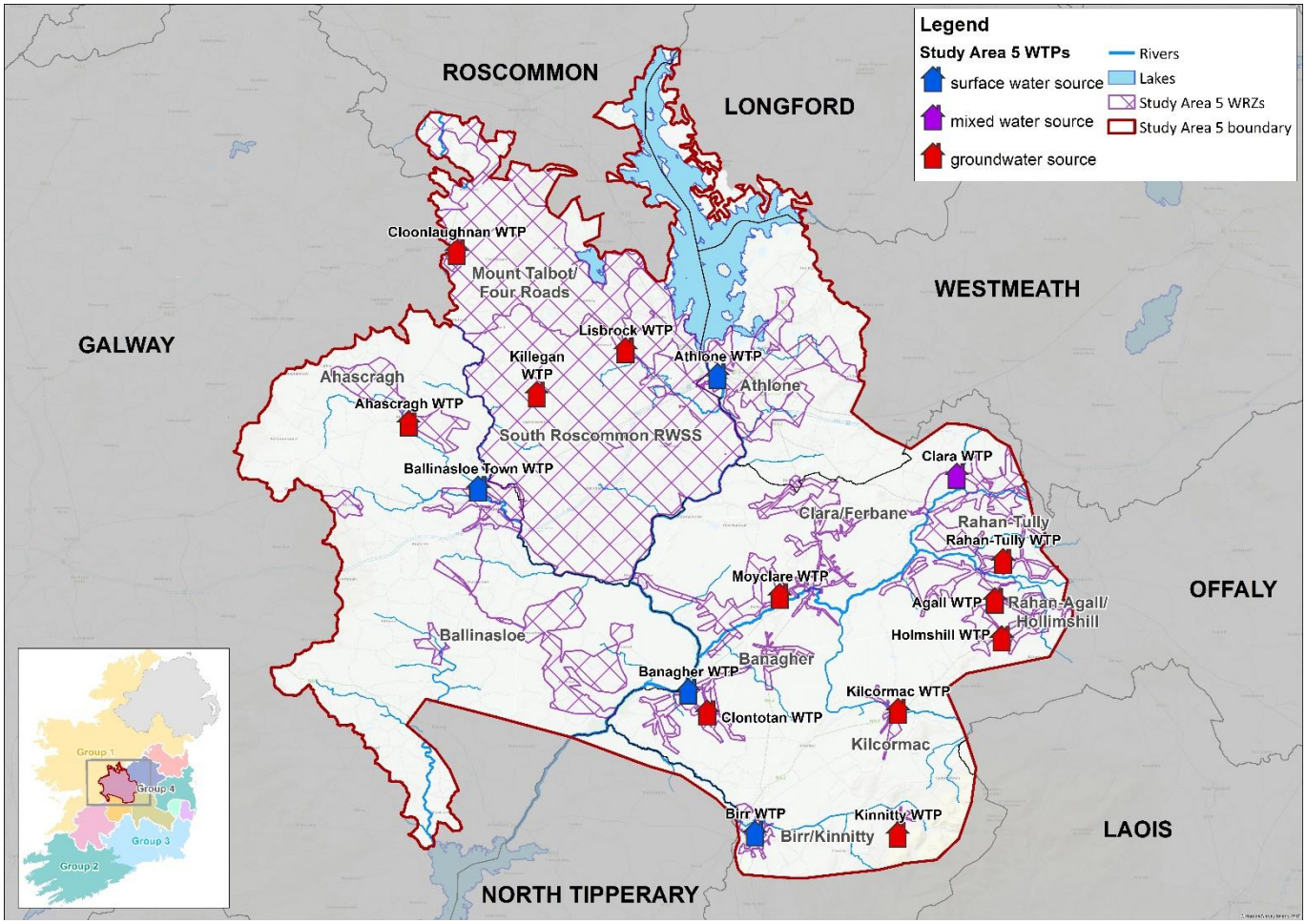


Figure 1.3 Study Area 5

The sources of water consist of 7 surface water sources and 12 groundwater abstractions in SA5.

SA5 is entirely within the boundaries of the River Shannon catchment, with WRZs divided between the Upper and Lower Shannon catchment areas. The Lough Ree waterbody is located on the main Shannon channel, to the north of the Study Area. The large tributary rivers, namely River Suck, Brosna and Little Brosna, join the main Shannon further downstream. Athlone and Banagher WRZs abstract from the main Shannon channel, at Lough Ree and further downstream, respectively. In the west of the Study Area, Ballinasloe WRZ abstracts from River Suck and Bunowen River (tributary of Suck). In the south, the Birr/Kinnitty WRZ abstracts from the River Camcor (tributary of Little Brosna) and from the Glenfelly Stream (tributary of Camcor). Whilst in the east, Clara/Ferbane WRZ abstracts from the Gageborough River (tributary of Brosna). The majority of SA5's surface water sources are within designated areas, including the River Shannon Callows SAC, Lough Ree SAC/SPA, River Suck Callows SPA, Middle Shannon Callows SPA, and River Little Brosna Callows SPA.

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

Overall, 12 groundwater sources are managed by Irish Water in the region, abstracting between approximately 30m^3/d to approximately 5,000m^3/d. The higher volumes reflect the karstified limestones and their high storage and transmissivity.

Table 1.1 also provides an overview of the risk of failure against the Quality, Quantity, Reliability, Potential Sustainability criteria. A further breakdown of these scores is provided in Section 2.

Table 1.1 SA5 Overview

Offaly / Roscommon	Total Population	71,940	Total Network Length (km)	1,123	Number of Water Resource Zones	10
Counties in Study Area	Galway, Offaly, Roscommon, Westmeath					
Principal Settlements	Athlone,Tullamore,Ballinasloe,,Birr,Clara,Ferbane,Mucklagh,Banagher,Cloghan,Athleague,Ahascragh,Kinnitty					
Number of Water Sources	19	Surface Water Sources	7		Groundwater Sources	12

Water Treatment Plant	Source	Population	WTP Capacity (m^3/day)	Quality	Quantity	Reliability	Potential Sustainability
Athlone WTP	River Shannon	22,477	13,500	●	●	●	○
Lisbrock WTP	Groundwater	7,010	4,000	○	○	○	●
Killeglan Springs WTP	Spring	6,910	5,000	○	○	○	○
Cloonlaughnan WTP	Spring	3,711	3,200	○	○	○	○
Rahan - Tully WTP	Groundwater	856	600	●	●	●	●
Rahan - Holmshill WTP	Groundwater	2,828	600	●	●	○	○
Agall WTP	Groundwater		2,200	●	○	○	○
Moyclare WTP	Groundwater	1,058	150	●	○	○	●

Clara WTP	Gageborough River & BH	7,607	5,000	●	○	○	○
Kinnitty WTP	Groundwater	447	300	●	○	○	○
Birr WTP	Camcor River & Kinnty River	5,294	2,500	◐	○	○	○
Kilcormac WTP	Groundwater	1,186	600	●	●	○	●
Clontotin WTP	Groundwater	3,492	1,000	●	○	○	○
Banagher WTP	Shannon River		2,500	●	○	○	○
Ballinasloe Town WTP	Bunowen River & River Suck	8,291	4,750	●	●	●	○
Ahascragh WTP	Spring	770	1,600	◐	●	●	●

Score	Irish Water Asset Standard Assessment
○	Low Risk
◔	Medium Risk
◑	
●	High Risk

2 Scoping the Study Area

2 Scoping the Study Area

In this chapter we summarise the current and future issues with water supplies in Study Area 5, in terms of water quality, quantity, reliability and sustainability.

To identify the issues and corresponding need with the water supplies in this Study Area, and to inform the nature, scale and scope of the solutions that we need to consider to meet them, we have assessed:

- The **water quality** that we can supply;
- The **water quantity** that we can supply;
- The **reliability** of our existing supplies; and
- Additional information that impacts the long-term **sustainability** of our sources or infrastructure.

2.1 Water Quality

We assess the water quality investment needs of our water supplies by assessing the performance of our assets against the barriers set out in Chapter 5 of the Framework Plan. As set out in Chapter 5 of the Framework Plan, Irish Water is developing scientifically robust datasets to assign risk. Irish Water are utilising the well-established 'Failure Mode Effect Analysis' which provides a step-by-step approach for identifying all possible failure modes that can result in a hazardous event. Once identified, we assess risk against the existing controls (Barriers), which we have in place for source protection within our water treatment plants and networks. This Barrier Assessment process highlights where there is a deficit or potential for future deficit in these controls or treatment process elements.

The barriers are an internal gauge and the initial desktop assessments of barrier performance for SA5 are summarised in Table 2.1

Table 2.1 Quality: Barrier Scores

Quality: Barrier Scores				
Water Treatment Plants	**Barrier 1: Bacteria & Virus**	**Barrier 2.1: Maintain chlorine Residual in the Network**	**Barrier 3 Protozoa (Crypto) Asset Potential**	**Barrier 6b THM's Leading Indicator**
Athlone WTP	●	●	●	●
Lisbrock WTP	●	●	●	●
Killeglan Springs WTP	●	●	●	●
Cloonlaughnan WTP	●	●	●	●
Rahan - Tully WTP	●	●	●	●
Rahan - Holmshill WTP	●	●	●	●

Quality: Barrier Scores				
Water Treatment Plants	**Barrier 1: Bacteria & Virus**	**Barrier 2.1: Maintain chlorine Residual in the Network**	**Barrier 3 Protozoa (Crypto) Asset Potential**	**Barrier 6b THM's Leading Indicator**
Agall WTP	●	●	●	●
Moyclare WTP	●	●	●	●
Clara WTP	●	●	●	●
Kinnitty WTP	●	●	●	●
Birr WTP	●	●	●	●
Kilcormac WTP	●	●	●	●
Clontotin WTP	●	●	●	●
Banagher WTP	●	●	●	●
Ballinasloe Town WTP	●	●	●	●
Ahascragh WTP	●	●	●	●

Score	Irish Water Asset Standard Assessment
●	Low Risk
●	Medium Risk
●	
●	High Risk

The colour coding within the outline assessment indicates the severity of the potential risk of barrier failure. It should be noted that the table is not an indicator of non-compliance with the European Union (Drinking Water) Regulations 2014 as amended (Drinking Water Regulations), but an internal Irish Water assessment of the asset capability standard compared with the asset standard set out in Section 5.7 of the Framework Plan. The assessment provides an indication of the need to invest in areas of our asset base (human and structural) through resource planning, to ensure that we can address potential risks or emerging risks to our supplies.

Based on the barrier assessment, 14 of the 16 WTPs in the Study Area are considered to be at high risk of failing to achieve the required standards in relation to bacteria and virus (Barrier 1) and maintaining chlorine residual in the network (Barrier 2.1). However, in some cases our desktop assessments can over-estimate risk, particularly when there is little available data on the catchment characteristics of our raw water sources. As our "Source to Tap" Drinking Water Safety Plan (DWSP) assessments, which are a requirement under the Recast Drinking Water Directive (2020), are developed for each water supply, the barrier scores for all of our supplies will be updated and become more reliable.

It should be noted that the "quality need" identified through the Barrier Assessment is not an indicator of compliance with the Drinking Water Regulations. It is an assessment of the need to invest in areas of our asset base (human and structural) through resource planning, to ensure that we can address potential risks or emerging risks to our supplies.

Currently, there is one WRZ within SA5 on the Environmental Protection Agency (EPA) Remedial Action List; namely Clara/Ferbane Regional Water Supply Scheme.

Irish Water is currently progressing immediate corrective action in advance of the NWRP for a number of supplies within SA5. A national programme to improve disinfection standards (Barrier 1) at water treatment facilities across Ireland was initiated by Irish Water in 2016. Details of the 'in progress' projects to address critical water quality requirements are included in Table 2.2.

Table 2.2 Critical Water Quality Requirements SA5

Critical Water Quality Requirements	Progress
1. **Ballinasloe**: WTP Upgrade to provide new and upgrade existing processes to protect against the formation of Trihalomethanes (THMs).	**Complete**
2. **Clara/ Ferbane**: WTP Upgrade to upgrade process to protect against formation of Trihalomethanes (THMs).	**Planned to commence 2022**
3. **Lead Mitigation Programme**: As part of the programme the top 400 WTP's, nationally, have been assessed for potential Orthophosphate Dosing. 138 of these have been prioritised and works will begin, subject to funding. Lead main replacement has been ongoing across the country: o Areas in SA5 where significant lead pipe removal has taken place include Athlone & Mullingar WRZs. o Areas in SA5 where lead mitigation measures will commence shortly include Ballinasloe.	**In Progress**
4. **Reservoir Cleaning Programme**: A major reservoir cleaning programme has been undertaken nationally, Kinnity Reservoir was included in this programme, this has reduced network water quality issues in the area.	**Complete**
5. **National Disinfection Programme**: In 2016, Irish Water completed a review of all WTPs where disinfection upgrades were required. This review was followed by a programme of works to complete any required upgrades. In SA5, the Athlone WTP disinfection system has	**Ongoing**

Critical Water Quality Requirements	Progress
been upgraded and commissioned as a result of this programme. Any requirements within the remaining supplies will be identified via Drinking Water Safety Plans with solutions developed as part of the NWRP	

In summary, in relation to water quality, Irish Water will:

- Continually update Barrier Performance issues in the WRZ which have the potential to impact on drinking water quality in the region;
- Improve these assessments through the development of DWSPs for all of our supplies;
- Address the priority risks identified on the EPA Remedial Action List (noting that steps have already been taken, and are ongoing, to address these risks); and

All residual need (grey dots) in relation to water quality, see Table 2.1, will be brought through our options assessment process.

Ballinasloe Water Treatment Plant Upgrade

Ballinasloe WRZ was on the EPA Remedial Action List because the water treatment process at the plant was inadequate in protecting against the formation of Trihalomethanes (THMs). The upgrades have provided additional treatment and improved the existing water treatment processes, improving the drinking water quality.

The water supply has now been removed from the EPA Remedial Action List.

Project

The project involved an upgrade of the clarifiers, the provision of two additional pressure filters, an Ultraviolet (UV) disinfection system, pipework and fittings, control and monitoring instrumentation and a SCADA system, along with new mechanical, electrical, instrumentation, control and automation equipment, and refurbishment of the existing plant.

Benefits

- Enable the removal of the Ballinasloe Regional Water Supply Scheme from the EPA's Remedial Action List;
- Reduced maintenance costs;
- UV disinfection providing verified protection against Cryptosporidium contamination; and
- Improved water quality and treatment standards.

2.2 Water Quantity – Supply Demand Balance

Irish Water assesses the water quantity investment needs of our supplies by developing SDB calculations for each of our water supplies as outlined in Chapter 3, 4 and 6 of the Framework Plan. The calculations are used to assess the amount of water available in our supplies and compare that to the current and forecast demand for water in accordance with Figure 2.1.

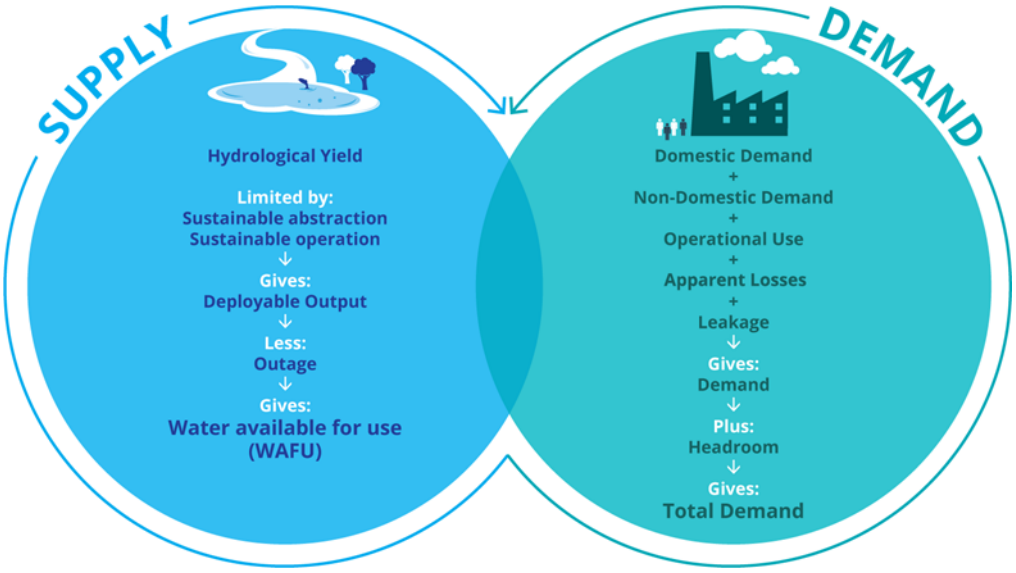


Figure 2.1 Supply Demand Balance

For each of the 10 WRZs in this Study Area, we assessed the baseline SDB and developed 25-year forecasts of supply and demand, in accordance with Figure 2.1.

The SDB assessments were carried out for each of the weather event planning scenarios described in Chapter 2 of the Framework Plan. The SDB deficits in SA5 manifest in the following ways:

1. **Inappropriate standards and levels of risk for a strategic water supply**: As water supply is essential for public health, Irish Water must 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 our supplies to provide a 1 in 50 Level of service. At present, not all supplies within this Study Area meet the required levels of reserve capacity. However, due to the lack of historical monitoring, particularly in relation to groundwater supplies, some of the deficits may be data driven.

2. **Day to day operations:** At present, 7 out of 10 of the WRZs in the area suggest a supply demand balance deficit (based on a “do nothing” approach) under present & future scenarios. While sufficient on normal weather conditions, several would fail in drought. During the drought in summer 2018 all of our groundwater supplies were monitored due to falling levels in the groundwater bodies, a number of the supplies in SA5 were affected. These include the

Ahascragh Spring and Rahan Tully boreholes, which abstract from the South Suck and Tullamore groundwater bodies respectively. The sources were noted as having a significant reduction in water availability during this period. The water levels in the River Suck, supplying Ballinasloe, were also severely impacted during the drought and low flow interventions were required to maintain continuity of the public water supply.

A summary of the SDB deficit across all 10 Water Resource Zones is summarised in Table 2.3. The water resources zones are detailed in Appendix L of the Framework Plan - Supply Demand Balance Summaries.

Table 2.3 WRZ SDB Dry Year Critical Period Estimated Deficits

Water Resource Zone Name	Water Resource Zone code	Population	Estimated Maximum Deficit m^3/day					
			2019	2025	2030	2035	2040	2044
Athlone	3200SC0002	22,477	-3,068	-3,296	-3,853	-4,123	-4,391	-4,605
South Roscommon (Lisbrock & Killeglan)	2600SC0006	13,920	-884	-1,010	-1,240	-1,367	-1,493	-1,594
Mount Talbot/Four Roads	2600SC0001	3,711	No Deficit	No Deficit	-9	-33	-55	-73
Rahan	2500SC0017	3,684	-1,499	-1,511	-1,516	-1,536	-1,559	-1,578
Clara/Ferbane / Moyclare	2500SC0016	8,665	No Deficit	No Deficit	No Deficit	No Deficit	No Deficit	No Deficit
Birr / Kinnitty	2500SC0015	5,742	-220	-89	-132	-175	-218	-252
Kilcormac PWS	2500SC0003	1,186	-175	-187	-199	-209	-218	-226
Banagher PWS	2500SC0001	3,492	No Deficit	No Deficit	No Deficit	No Deficit	No Deficit	No Deficit
Ballinasloe Public Supply	1200SC0006	8,291	-1,080	-1,202	-1,302	-1,403	-1,503	-1,583
Ahascragh P.S.	1200SC0005	770	-728	-749	-761	-768	-776	-781

As outlined in Chapter 4 of the framework plan, the estimated population currently living in each WRZ has been based on the 2016 Census data. Forecasts for future populations have been based on draft growth projections from the National Planning Framework (NPF), and updated information from the Regional Spatial and Economic Strategies (RSES) and Local Authority Planning sections (where available).

The target 1 in 50 level of service in the region were applied in each case, along with the corresponding requirements for reserves, indicating that our supplies are operating with a cumulative SDB deficit of approximately 7,654m^3/day for the Region. As a result, water supplies in this area may come under pressure, particularly in drought conditions. In addition, there may be ongoing reliability issues.

This situation will further deteriorate over time due to climate change driven reductions in water resources, together with increased demand due to population growth. If we do nothing, the SDB deficit is projected to increase to approximately 10,692m^3/day by 2044.

Our ongoing activities to improve the Supply Demand Balance in SA1 are prioritised as:

- Ongoing leakage management including active leakage control, pressure management and find and fix activities to meet target levels of Leakage.
- Water Conservation measures, including information campaigns and initiatives, and Water Conservation Orders during drought periods

2.3 Water Supply Reliability

The benefits of having sufficient water supplies in terms of quality and quantity are negated if we cannot distribute the water we produce effectively around our networks. We also need sufficient treated water storage to enable us to respond to planned or unplanned outages on our trunk main network and appropriately manage our water production.

There are a number of problematic distribution and trunk mains across this Study Area. Irish Water, in partnership with each County Council, will continue to monitor the performance of all water mains in the network to ensure the most problematic mains are replaced as required.

To date, a significant amount of watermain rehabilitation has been carried out across Study Area 4. This provides for a more reliable water supply, reducing instances of bursts and water outages. The works also improve water quality by replacing old cast iron and lead watermains, whilst reducing leakage and improving overall operation and maintenance of our supply system.

The largest WRZ in SA5, Athlone, experiences regular interruptions to supply. During periods of high demand, there are limitations on the throughput of the WTP and night-time restrictions have been introduced intermittently over the past two years to allow the levels in Annagh Reservoir to recover.

During our needs assessment, Irish Water has identified a number of critical requirements for upgrades to the existing asset base, including storage and trunk main requirements. Progress to date on these projects is summarised in Table 2.4.

Table 2.4 SA5 Critical Infrastructure Projects and Need Identification

Critical Requirement	Progress
1. **Upgrade of Athlone WTP:** The location and restricted site for the abstraction and WTP for Athlone, in the centre of the town, have implications for resilience and security of supply.	In Progress
2. **Mount Talbot/Four Roads:** Source improvements including the provision of additional boreholes. .	Planned
3. **Duplication of the Rising Main to Lackan SR (Mount Talbot WSS):** The existing pipeline from the WTP to Lackan Service Reservoir is the sole trunk main for the entire water supply of the WRZ.A significant burst on this trunk main, would impact up to 3,700 people.	Need Identified
4. **Upgrade of Abstraction for Killeglan WTP (South Roscommon RWSS):** The Killeglan WTP provides supply 55% of the South Roscommon RWSS.	Need Identified
5. **Improved connectivity between Killeglan and Lisbrock supplies (South Roscommon RWSS):** The ability to move water between the areas of the network supplied by Killeglan WTP and Lisbrock WTP is restricted due to the condition of the AC trunk mains between Bellanamullia and Taghmaconnell. This in turn impacts on the ability to distribute water effectively between supplies and respond to major incidents.	Need Identified
6. **Replacement of Raw Water Main from Kinnitty Abstraction to Birr WTP:** The existing pipeline from the Kinnitty Abstraction to Birr WTP provides over 40% of the entire water supply for the WRZ. The CI main was constructed in the 1910's and is beyond the end of its design life. As it operates continuously, it is not possible to take the raw water main out of service to carry out repairs. A significant burst on this truck main, would impact up to 5,700 people.	Need Identified
7. **Duplication of Raw Water Main from Agall to Holmshill WTP:** The existing raw water main from Agall to Holmshill has a significant burst history. As it is a single main operating continuously, it is not possible to take the raw water main out of service to carry out repairs. A significant burst on this truck main, would impact a population of up to 3,700.	Need Identified
8. **Duplication of the Rising Main to Garbally SR (Ballinasloe WSS):** The existing AC pipeline from the WTP to Garbally SR is the sole trunk main for the entire water supply of the WRZ. It was constructed in the early 1980's and is approaching the end of its design life. However, as it operates continuously, it is not possible to take the trunk main out of service to carry out repairs. A significant burst on this truck main, would impact up to 8,200 people.	Need Identified
9. **Athlone Water Mains Rehabilitation – Contract 1:** The project saw €9 million invested to rehabilitate 25 kilometres of aging and defective watermains in Athlone.	Complete
10. **Ballinasloe Water Conservation Works:** This project involved replacement of 8.3km of watermains in Ballinasloe, Athenry, Oranmore and Headford at locations where existing water mains have been identified as needing rehabilitation.	Complete

Critical Requirement	Progress
11. **Offaly Water Mains Rehabilitation & Conservation Project:** This project involved replacement of 7km of defective watermains that service Edenderry and Kilcormac.	**Complete**

In summary, there are some asset reliability issues across the distribution network within the WRZ. Some critical infrastructural projects, outlined in Table 2.4, to address these issues have been identified and are in progress. In addition to this, a continuous programme of repairs, upgrades and leakage reduction is being progressed as part of Irish Waters National Leakage Reduction Programme across all Study Areas.

2.4 Water Supply Sustainability

The water supplies within the region were developed over time to address the needs of the local populations and to support growth and development. Most of these supplies predate most modern environmental legislation and none of our current abstractions in this area were developed through any formalised abstraction process.

As outlined at Section 3.7.2 of the Framework Plan, the Government is currently developing new legislation dealing with water abstractions. As this legislation is still being developed, we do not have full visibility of the future regulatory regime. We have therefore not progressed through a theoretical licencing process on a site by site basis and cannot reliably include an estimation of sustainable abstraction within the SDB calculations. Instead, we use the hydrological yield, water treatment capacity and bulk transfer limitations in our calculation of DO. This assessment procedure is set out at Appendix C of the Framework Plan, and in line with a precautionary approach.

To understand the potential impact of the Abstraction Legislation on the SA5 supplies, we have assessed the potential impacts on our 7no. surface water abstractions: River Shannon (Athlone and Banagher), Glenfelly Stream and River Camcor (Birr), River Suck and Bunowen River (Ballinasloe), and the Gageborough River (Clara).

Table 2.5 presents these findings to show the potential reductions to our available supplies. The table presents our current abstraction levels[1], our source hydrological yield[2], and our estimated sustainable abstraction[3] amount which the source may be limited to in the future.

Based on this initial assessment, the volumes of water abstracted from the River Gageborough (Clara) may not meet sustainability guidelines during dry weather flows. However, under the proposed regulatory regime, this will be adjudicated by the EPA.

[1] Based on WTP 22hr (DYCP) capacity
[2] Our hydrological yield estimate is the 'safe' yield calculated to be available during a 1 in 50 year drought event. We use this figure in the SDB calculations to determine whether a WRZ is projected to be in deficit or surplus
[3] Our sustainable or 'allowable' abstraction estimate is based on limiting abstraction to 5-15% of the Q95 low flow for river sources or 10% of Q50 inflow for lakes. This is based on our best understanding of how the EPA may enforce future abstraction licencing applying UKTAG guidance.

Table 2.5 Comparison of Current Abstraction, Hydrological Yield and Theoretical Future Abstraction

Description	River Shannon (Athlone)	River Shannon (Banagher)	Glenfelly Stream (Birr)	River Camcor (Birr)	River Suck (Ballinasloe)	Bunowen River (Ballinasloe)	River Gageborough (Clara)
Current abstraction (m^3/day)	12,380	2,290	2,290	2,290	4,350	4,350	4,580
Hydrological yield (m^3/day)	414,160	491,200	1,240	24,730	95,500	9,930	10,900
Theoretical Future abstraction (m^3/day)	111,590	107,250	270	5,760	27,180	2,870	2,040

The potential change to the SDB for each WRZ, as a result of these potential reductions in abstraction during Dry Weather Flow are summarised in Table 2.6.

Table 2.6 Potential Change to the SDB Based on Potential Abstraction Reductions

Description	River Shannon (Athlone)	River Shannon (Banagher)	Glenfelly Stream (Birr)	River Camcor (Birr)	River Suck (Ballinasloe)	Bunowen River (Ballinasloe)	River Gageborough (Clara)
Potential change in SDB[4](m^3/d)	none	none	n/a	none	none	n/a	-700

The net impact of these potential minimum environmental flow requirements has been assessed using the outline assessment methodology described in Appendix C of the Framework Plan.

Regarding applying sustainability reductions to the Glenfelly Stream (Birr) and Bunowen River (Ballinasloe) abstractions, these would not see a change to the projected SDB because they are only used as supplementary source to the main river abstractions, River Camcor (Birr) and River Suck (Ballinasloe) respectively.

Groundwater abstractions will need to conform to the proposed new abstraction licencing regime. These abstractions will be assessed in two ways:

- Impacts on the groundwater bodies from which they abstract; and
- Impact of the groundwater abstraction on the base flow in surface waterbodies.

As noted in Section 3.2.2 of the framework plan producing robust desktop assessments of water availability from our existing groundwater abstractions is very difficult. Ideally, yield estimates would be based on a three-dimensional assessment of the geology within the vicinity of the supply, supplemented with long term records on pumping and drawdown of water levels over many years. Irish Water does not

[4] Based on potential changes to the projected 2044 Dry Year Critical Period (DYCP) scenario

have this type of information available for most of our groundwater supplies and while we will aim to complete site-specific studies of groundwater availability, this may take many years.

On an interim basis Irish Water has developed an initial assessment for existing abstractions based on best available information. For more information, please see Appendix C Supply Assessment and Appendix G Regulatory and Licensing Constraints of the NWRP - Framework Plan. Over the coming years, Irish Water will work with the environmental regulator EPA and the Geological Survey of Ireland, to develop desktop and site investigation systems to better understand the sustainability of our groundwater sources. We are not in a position to estimate changes to the groundwater availability until better data is available.

In summary, when considering the requirements of the Water Framework Directive (WFD), some of our schemes may be subject to reductions in abstraction, especially during drought periods. While we have developed a potential understanding of the impact of the legislation we cannot reliably include an estimation of sustainable abstraction within the SDB calculations.

However, we do use our sustainable abstraction estimations to assess the sensitivity of the Preferred Approach as set out in Chapter 7 of this Technical Report. This assessment determines whether the Preferred Approach is adaptable to change across a range of potential future scenarios and verifies our ability to adapt and increases our resilience to future changes.

When the new Legislation on abstraction of water has been enacted and regulatory assessments completed if an abstraction is confirmed to be affecting a waterbody status the Supply Demand Balance will be updated as outlined in the monitoring and feedback section of the RWRP, Section 9.2.2. All future abstractions considered through the Framework Plan options assessment are validated for sustainability, including options to increase abstraction at existing sites.

2.5 Water Resource Zone Needs Summary

SA5 has significant issues in relation to quality, quantity, reliability and sustainability which must be addressed as part of the Preferred Approach to future water resources planning, summarised in Table 2.7.

Table 2.7 Summary of Need Quality, Quantity, Reliability, Sustainability

Quality	Upgrades required at all WTPs, aligned with the barrier approach
Quantity	Net leakage reduction 570 m^3/d in the region Additional Leakage Targets of 7,352 m^3/d to achieve SELL and reduce leakage levels to 21% of demand in WRZs with demand in excess of 1,500m3/d Interim additional supplies of 7,654 m^3/d within 10 years
	Total of 10,692 m^3/d additional supplies beyond the 10 year horizon
Reliability (In addition to progressing projects)	Continued network upgrades and improvements in the bulk and distribution networks
Sustainability	Based on our initial desktop assessment, the volumes of water abstracted The volumes of water abstracted from the River Gageborough (Clara) may not meet sustainability guidelines during dry weather flows. However, under the proposed regulatory regime, this will be adjudicated by the EPA. Over the coming years, Irish Water will work with the environmental regulator EPA and the Geological Survey of Ireland, to develop desktop and site investigation systems to better understand the sustainability of our groundwater sources.

All of these needs will be considered within our options assessment process and in the development of the Preferred Approach.

Further details of planned, live and recently completed projects are available on our website see: https://www.water.ie/projects-plans/our-projects/

3 Solution Types Considered in Study Area 5

3 Solution Types Considered in Study Area 5

In this chapter, we summarise the type of solutions we have considered to address identified need in Study Area 5.

As outlined in Chapter 7 of the Framework Plan, we consider measures across the following three pillars: **Lose Less**, **Use Less** and **Supply Smarter** in forming our list of unconstrained options, which are assessed for short, medium and long-term solutions. For SA5 as part of our unconstrained options, the following unconstrained options have been reviewed.

3.1 Leakage Reduction

The Leakage reduction measures across the public water supply considered for SA5 are based on what we 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 (NRR); and
- Net leakage reductions targets listed in Table 3.1 have been applied to SDB deficit to move towards achieving the national Sustainable Economic Level of Leakage (SELL) target prioritised based on
    - Supply demand deficit;
    - Existing abstractions with sustainability issues; and
    - Drought impacts.
- Additional leakage Targets to achieve SELL and reduce leakage levels to 21% of demand in WRZs with demand in excess of 1,500m^3/d, see Table 3.1.

Table 3.1 SELL Targets for WRZ in SA5

WRZ	Net Leakage Reduction applied to SDB(m^3)	Additional leakage Targets to achieve SELL and reduce leakage levels to 21% of demand in WRZs with demand in excess of 1,500m^3/d (m^3)	Total Leakage Targets (m^3)
Birr/Kinnitty	125		125
Ahascragh P.S.		445	445
Ballinasloe Public Supply		970	970
Rahan		644	644
South Roscommon (Lisbrock & Killeglan)	102	244	346
Athlone	343	3,825	4,168
Clara/Ferbane / Moyclare		529	529
Mount Talbot/Four Roads		695	695

3.2 Water Conservation

At present, Irish Water is conducting pilot studies in relation to water conservation stewardship in businesses and is actively pursuing Conservation Education Awareness Campaigns and partnerships. During drought conditions in 2018 and 2020, a Water Conservation Order was implemented in order to protect our water supplies and reduce pressure on the natural environment during this period. We 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, we have not applied reductions to the SDB deficit for unquantifiable water conservation gains. However, we do assume that any gain will offset consumer usage growth factors.

3.3 Supply Smarter

The supply options considered as part of the options development are unconstrained by distance from SA5 and include:

- 37 standalone groundwater options across the Study Area;
- 21 standalone surface water options across the Study Area;
- Connection to Group Water Schemes;
- WTP Upgrades;
- Interconnection and Rationalisation[5] of WRZs within the Study Area; and
- Network connectivity and transfers from other Study Areas.

[5] Rationalisation of a WRZ includes providing part or full supply to the WRZ from another WRZ. Often some or all of the WTPs in the WRZ obtaining supply are decommissioned as part of this process.

4 Option Development

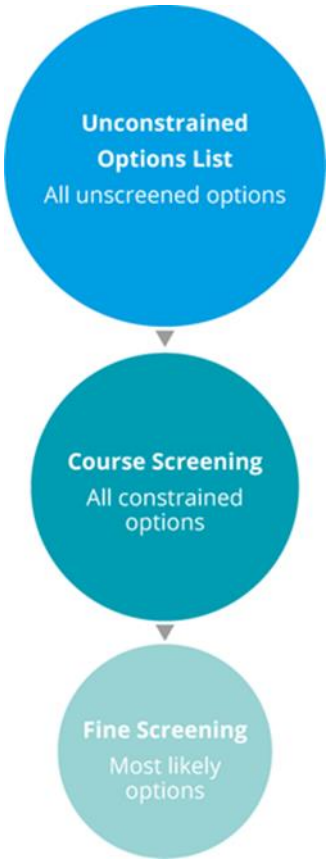
4 Option Development for Study Area 5

This chapter describes how our options assessment methodology was applied to produce a Feasible Options list to meet the identified needs.

The purpose of our options assessment process, as outlined in Chapter 8 of the Framework Plan, is to consider the widest practicable range of solutions to resolve identified need within a given area. A suitable screening criterion is then applied to filter out any options that are not feasible, based on sustainability (environmental and social impacts), resilience or deliverability. As sustainability is at the heart of our plan, 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 even before screening begins to ensure the protection of the environment. For example, having regard to WFD objectives, Irish Water does not allow for any inter-catchment raw water transfers due to the high risk of transferring invasive non-native species (INNS) between catchments and non-compliance with WFD objectives

The options assessment screening process involves the following:

- Developing a long list of unconstrained options – Unconstrained Options constitute all of the possible solutions, which either fully or partly resolve a water supply deficit, regardless of any cost, environmental or social constraints. In developing the Unconstrained List, we identify options that are applicable to meet the needs of the study area;
- Coarse Screening – We filter the unconstrained options using a coarse screening assessment where we remove any options that fail to meet desktop assessment criteria under: Resilience, Deliverability and Flexibility or Sustainability (Environmental and Social Impacts); and
- Fine Screening – We filter the remaining options from the coarse screening exercise through a fine screening assessment, which includes 33 detailed questions, related to environmental objectives identified for the SEA (including biodiversity, the water environment and requirements under climate change adaptation) as well as Resilience, Deliverability and Progressibility.



The coarse screening and fine screening questions, and the associated scoring criteria, are included in Chapter 3 and Appendix A of the Study Area Environmental Report.

4.1 Developing a List of Unconstrained Options

At the start of our screening process, we conduct a specialist desktop review of groundwater bodies and surface water catchments. This allows us to understand potential additional availability at existing water abstractions or to identify any potential new water sources within the Study Area; as summarised in Table 4.1.

Table 4.1 Desktop Assessments for Unconstrained Options

Existing and New Ground Water sources	A Hydrogeologist conducts a desktop groundwater availability assessment of all potential aquifers and aquitards within, and within a reasonable distance of, the study area.
Existing and New Surface Water sources and Conjunctive Use Options	A Hydrologist carries out a desktop surface water availability assessment of all potential catchments and waterbodies within, and within a reasonable distance of, the study area.
Water Treatment upgrades, Desalination, Rationalisation and Effluent Reuse Options	An Engineer reviews any potential increases in capacity at existing water treatment sites and any potential conjunctive use or effluent reuse options.

Based on these desktop assessments, Irish Water developed an initial list of unconstrained options for new supplies and increases and upgrades to existing supplies and assets. An unconstrained options review workshop was then held with our Local Authority Partners to identify any additional unconstrained options that may be available based on local knowledge. A total list of unconstrained options was then compiled.

For SA5, 103 Unconstrained Options were identified to address need. These unconstrained options were not limited by cost, distance from the area or feasibility. These options are summarised in Table 4.2. and shown spatially in Figure 4.1.

Table 4.2 SA5 Unconstrained Options

No. of Options	Option Type
37	Groundwater
21	Surface water
4	Transfer from scheme in surplus
2	Transfer from Group Water Scheme
6	Interconnection (GW)
10	Interconnection (SW)
8	Cross Study Area Supply
8	Rationalise to another supply
4	Upgrade Water Treatment Plant
3	Advanced Leakage Reduction

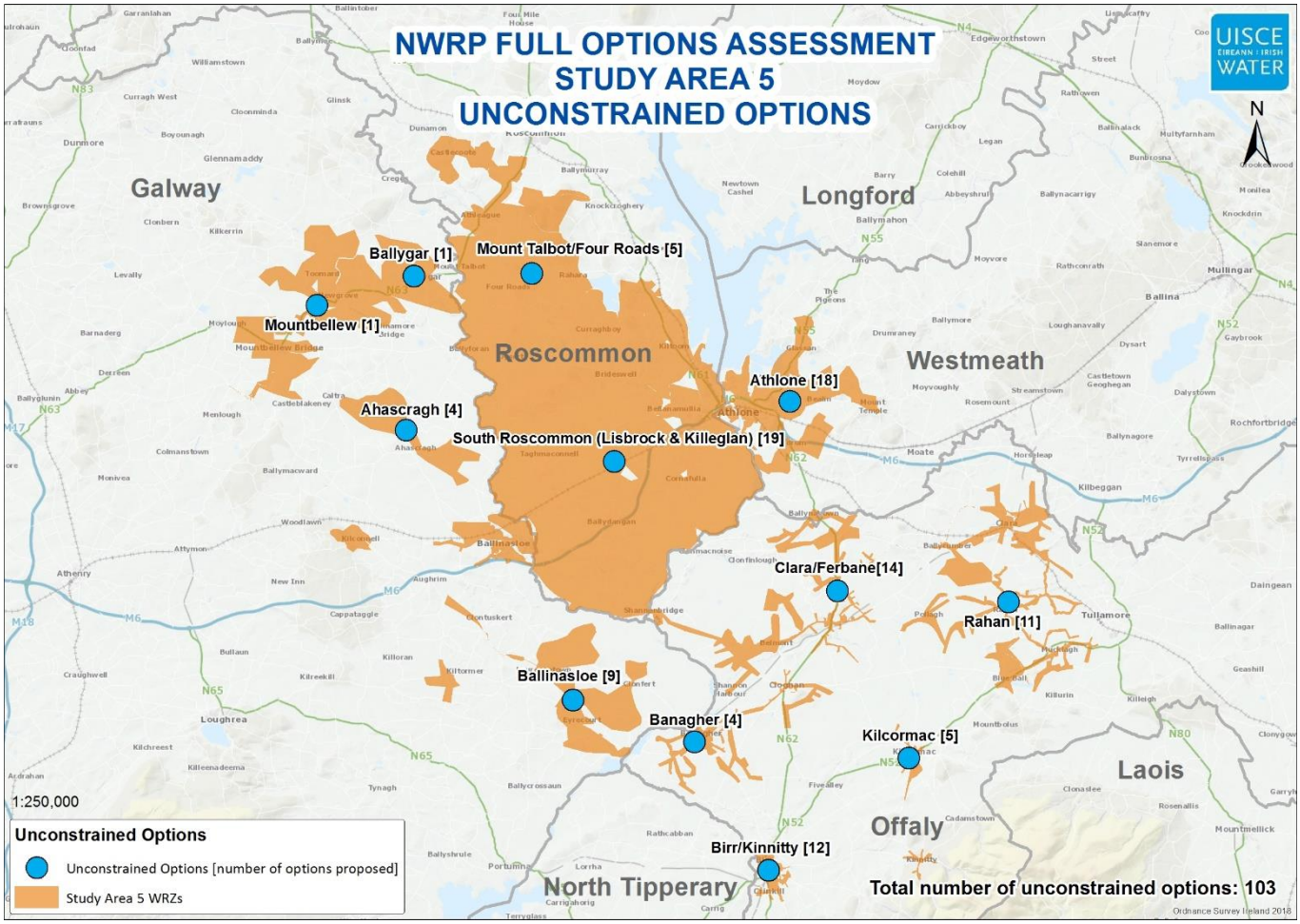


Figure 4.1 SA5 Unconstrained Options

The 103 options were filtered through our screening process to eliminate those with potentially unviable environmental impacts or feasibility issues. This process is summarised below.

4.2 Coarse Screening

The 103 identified Unconstrained Options were assessed through Coarse Screening against the criteria of:

- Resilience;
- Deliverability and Flexibility; and
- Sustainability (Environmental and Social Impacts).

The Coarse Screening process is summarised in Chapter 8 of the Framework Plan. The coarse screening assessments were conducted by a specialist team, including Engineers, Hydrologists and, Hydrogeologists, Ecologists, and Environmental Scientists.

40 Unconstrained Options were rejected at this stage as they were found to be unviable in relation to one or more assessment criteria. Details of these options and the justification for their rejection are outlined in the rejection summary, Annex B of this report. The rejection summary records the criteria against which the rejected options were assessed as having a ‘red’ score for the purposes of the coarse screening exercise (as explained in more detail in Chapter 8 of the framework plan), and accordingly were not brought forward at the coarse screening phase. The box below provides an example of a rejection justification for an option considered for the Birr/Kinnitty WRZ.

Example Rejected Option

Option SA5-56

Increase abstraction from River Kinnitty and upgrade Birr WTP to supply deficit.

Rejection Reason

It was determined that the sustainable allowable abstraction at this location is 0.27M/ld, not accounting for the existing abstraction. The deficit in the WRZ is approximately 1.3M/ld. Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving good WFD status. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.

The remaining 63 options were progressed to further assessment through the Fine Screening process. The rejected options are summarised in Annex A of this technical report. Annex A records the criteria against which the rejected options were assessed as having a “red” score for the purposes of the coarse screening exercise (as explained in more detail in Chapter 8 of the Framework Plan), and accordingly were not brought forward at the coarse screening stage. The remaining options are summarised in Table 4.3.

Table 4.3 SA5 Remaining Options after Course Screening

No. of Options	Option Type
24	Groundwater
11	Surface water
0	Transfer from scheme in surplus
1	Transfer from Group Water Scheme
3	Interconnection (GW)
8	Interconnection (SW)
7	Cross Study Area Supply
3	Rationalise to another supply
3	Upgrade Water Treatment Plant
3	Advanced Leakage Reduction

4.3 Fine Screening

The 63 remaining options were subject to a more detailed multi-criteria assessment (MCA) at the Fine Screening Stage using desktop assessments of performance against 33 specified questions relating to Sustainability (Environmental and Social Impacts), Resilience, Deliverability and Progressibility. These

questions are set out in Appendix N of the Framework Plan. The assessment for each option was based on an objective assessment with uniform scoring criteria, based on best publicly available datasets.

At Fine Screening stage, 5 further options were rejected, with the remaining 58 options considered to be feasible and brought forward to desktop outline design and costing. These are summarised in Table 4.4 and shown spatially in Figure 4.2.

Table 4.4 SA5 Remaining Options after Fine Screening (Feasible Options)

No. of Options	Option Type
24	Groundwater
11	Surface water
0	Transfer from scheme in surplus
1	Transfer from Group Water Scheme
3	Interconnection (GW)
8	Interconnection (SW)
7	Cross Study Area Supply
1	Rationalise to another supply
3	Upgrade Water Treatment Plant

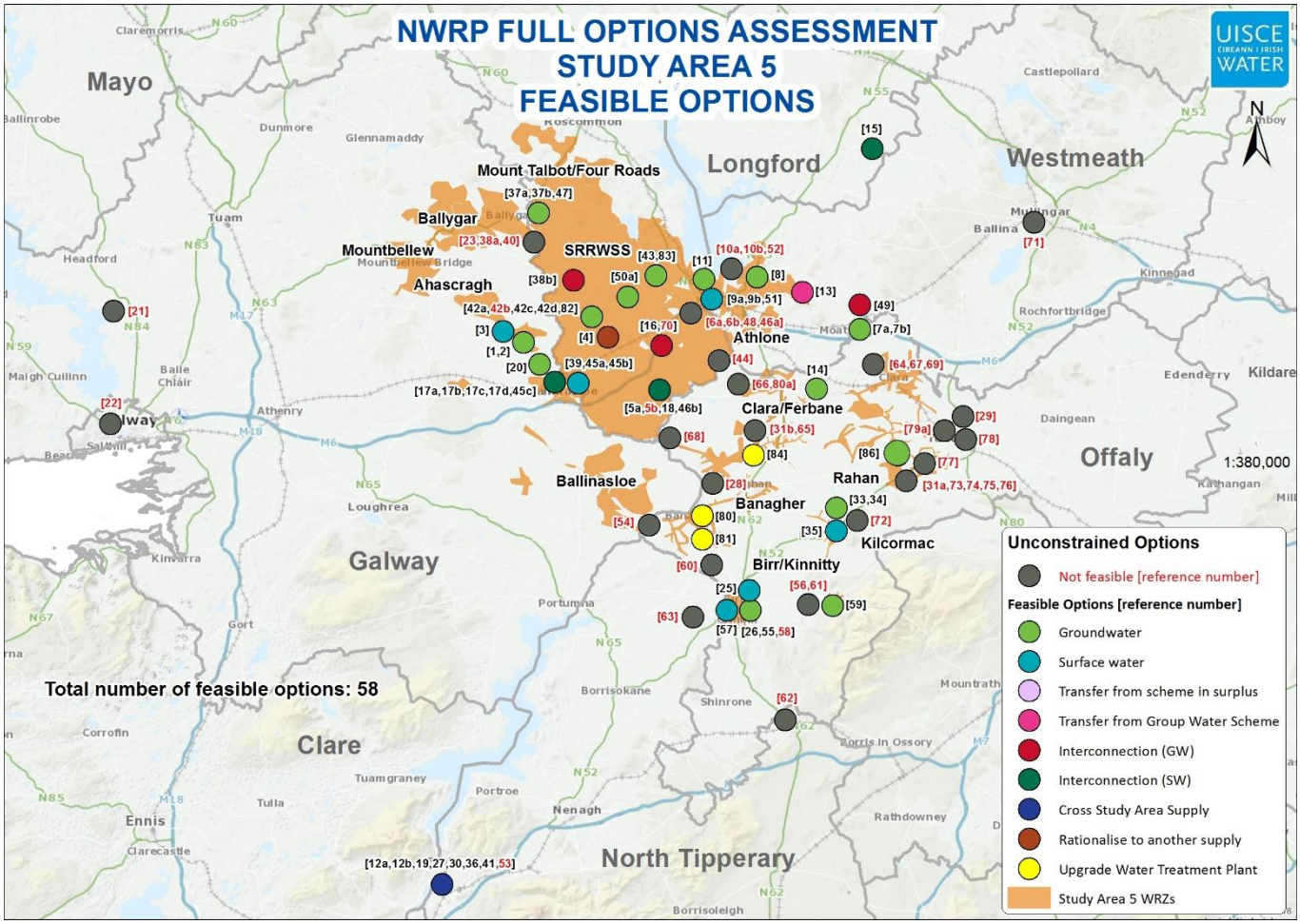


Figure 4.2 Fine Screening (Feasible Options)

For the purposes of the NWRP, outline designs have been prepared at a desktop level for each feasible option (for use as part of comparative assessments between options). The outline designs include a high level inventory of option requirements, including capacities of plants, pipelines, pumps and treatment requirements. They include comparative budget costs estimates for required site level studies (including site level environmental assessments), Capital (CAPEX), Operational (OPEX), Environmental and Social (E&S) costs and Carbon Costs for use in the next stage of the assessment process.

4.4 Options Assessment Summary

The SDB deficit in the region ranges between 7,654 m^3/d in 2019 during dry conditions, to a maximum of 10,692m^3/d in 2044 during dry conditions. During the options assessment stage, a total of 103 unconstrained options were assessed. Of these, 45 options were screened out for the reasons summarised in Table 4.5 and recorded in Annex B.

Table 4.5 Rejected Options Summary

No. of Options	Reason for Rejection
1	Resilience
3	Sustainability
15	Deliverability & Flexibility
5	Resilience, Sustainability, Deliverability & Flexibility
21	Other reasons such as repeat options or Operational Options which did not provide additional supply

The remaining 58 feasible options are categorised into options that resolve the need for one WRZ only "WRZ options" and options that resolved the need for more than one WRZ " Study Area options". Table 4.6 provides an overview of the number of WRZ options and Study Area options for the WRZs in Study Area 3. From this table it can be noted that there are 28 WRZ Options and 30 options which can be merged to form 12 Study Area Options.

A summary of the number of options and whether they are WRZ or SA options is contained in Table 4.6

Table 4.6 SA5 Feasible Options Summary

WRZ Name	Option Type	
	WRZ Option	Study Area Option
Ahascragh	2	2
Athlone	8	5
Ballinasloe	2	5
Banagher	2	0
Birr/Kinnitty	5	1
Clara/Ferbane	1	1
Kilcormac	3	1
Mount Talbot/Four Roads	1	3
Rahan	1	1
South Roscommon (Lisbrock & Killeglan)	3	11

5 Approach Development

5 Approach Development

This chapter describes how we tested different combinations of the Feasible Options to develop a Preferred Approach to meet the needs we identified for the WRZ in Study Area 5.

5.1 Approach Development

5.1.1 Introduction to Approach Development

The purpose of the NWRP is to examine all potential options that could be used to resolve issues within the water resource zone (unconstrained options) and then to eliminate those that are not feasible or that have identifiable environmental issues at a desktop level (options assessment screening). Of the remaining feasible options Irish Water's next step is to assess a number of approaches to resolve need across the Study Area. An approach is a way of configuring an option or options to meet the deficit focused on a particular outcome. For example, a "Least Carbon" approach would be the option or combination of options that would involve the least embodied and operational carbon load over the lifetime of the option. As part of the NWRP, Irish Water considers six approaches, as summarised in Table 5.1.

These six approaches have been outlined at Section 8.3.7 of the Framework Plan, and were consulted on as part of the SEA Scoping consultation conducted between 9th November 2017 and 22nd December 2017. These approaches have been specifically chosen to ensure that the NWRP aligns with all the relevant Government Policies outlined in Table 5.1

Table 5.1 The Six Approaches

Approaches Tested	Description	Policy Driver
Least Cost	Lowest Net Present Value (NPV) cost in terms of Capital, Operational, Environmental and Social and Carbon Costs.	Public Spending Code
Best Appropriate Assessment (AA)	Lowest score against the European Sites (Biodiversity) sub-criteria question: Score = 0 equates to no likely significant effects (LSEs). If, in our opinion, these 0 scoring options meet the deficit/ plan objectives, they are automatically picked as the Preferred Approach. Score = -1 or -2 equates to LSEs that can be addressed with general/standard mitigation measures. Score = -3 equates to LSEs that may be harder to mitigate or require significant project level assessment.	Habitats Directive
Quickest Delivery	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.	Statutory Obligations under the Water Supply Act and Drinking Water Regulations

Approaches Tested	Description	Policy Driver
Best Environmental	This is the option or combination of options with the highest total score across the 19 No. SEA MCA sub-criteria questions	SEA Directive and Water Framework Directive
Most Resilient	This is the option or combination of options with the highest total score against the resilience criteria.	National Adaptation Framework and Climate Action Plan
Lowest Carbon	This is the option or combination of options with the lowest embodied and operational carbon cost.	Climate Action Plan

We then compare the options identified as the best performing within each of the six approach criteria (Least Cost, Best AA, Lowest Carbon etc.) against each other as outlined in Figure 5.1 to come up with a Preferred Approach that meets the objectives of the Framework Plan and aligns with all relevant Government Policy.

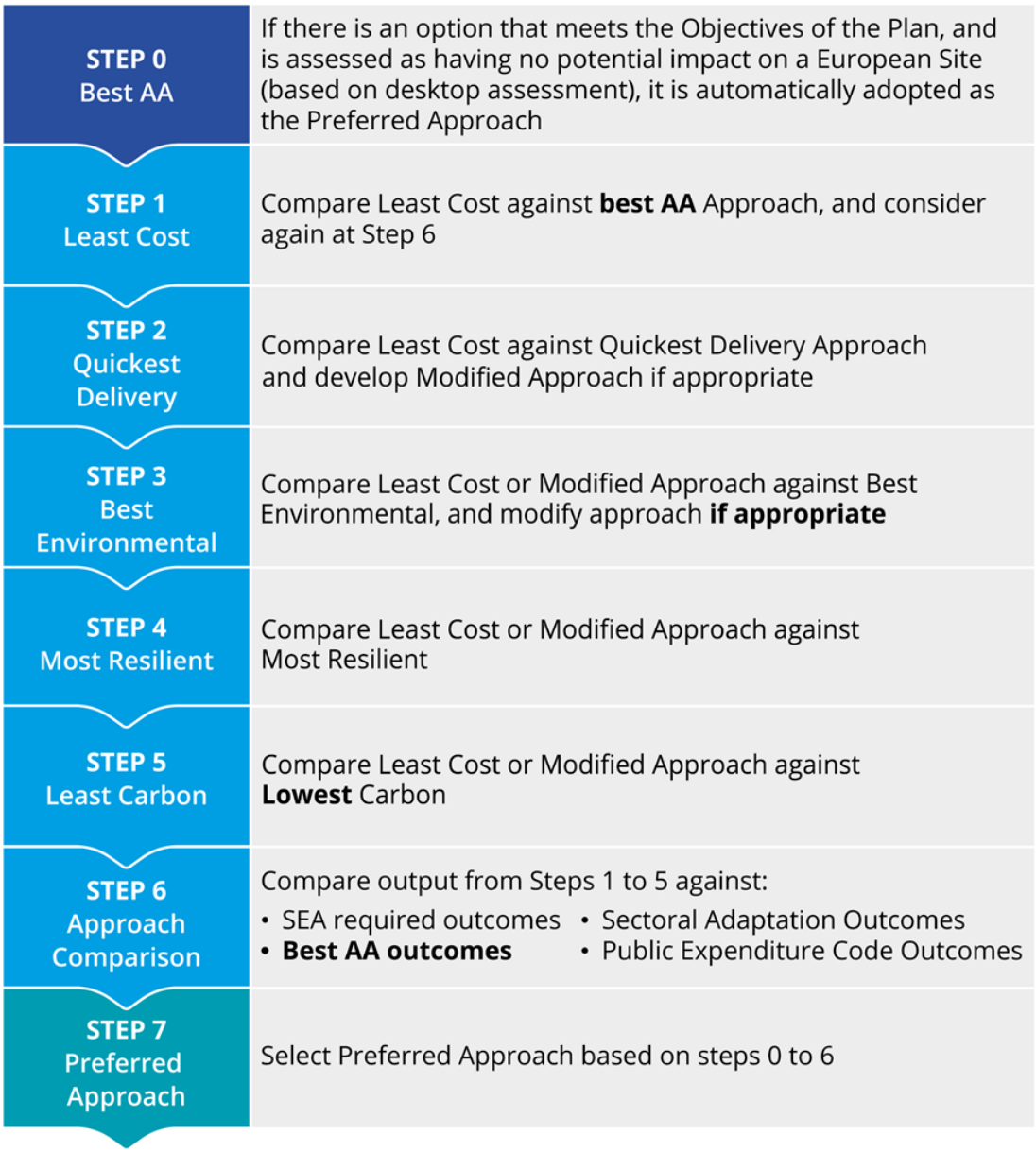


Figure 5.1 Figure of the 7 step assessment process

This methodology which is futured detailed in Chapter 7 of the RWRP -EM follows a process to develop the Preferred Approach for a Study Area across three stages;

- **Stage 1** – We assess the water resource zones individually to develop an initial Preferred Approach, the **WRZ Preferred Approach** for all of the supplies in the Study Area
- **Stage 2** – We assess whether there are any larger options that might resolve deficits across multiple WRZs within a Study Area. We then develop combinations of these options (SA Combinations).
- **Stage 3** – We assess the SA Combinations and the WRZ Level approach in order to determine the best performing combination. This is known as the Preferred Approach at SA Level.

At each stage of assessment as detailed above, we carry out an assessment of the cumulative and in-combination effects of the Preferred Approach as detailed in the SEA Environmental Report for the RWRP-EM and the Environmental Review for this Study Area.

Within the Regional Plan, we will examine the Preferred Approach at a third spatial level for the entire Eastern Midlands Strategic Study Areas and will make any required changes in order to develop a Preferred Approach across the entire Region.

Further details on these three stages is provided in Chapter 7 of the RWRP -EM. Section 5.2 provides an overview of the application of this process to SA 3.

5.2 Preferred Approach Development Process for Study Area 5

5.2.1 Stage 1 – WRZ Level Approach

As outlined in Section 4.4 of this technical report there are 58 feasible options. 27 of these options are WRZ Options while 31 options are merged to form 12 Study Area Options. Table 5.2 outlines the 27 WRZ options for SA5, providing option reference numbers and detailing the WRZs they provide a solution to. These solutions are presented as "Options" for the purposes of this plan; however, will be subject to their own regulatory, timing and budgetary constraints.

Table 5.2 SA5 Feasible Options

Water Resource Zone Name	Feasible Options SA5 Offaly Roscommon	
	Option Code	Option Description
Ahascragh	SA5-001	Increase GW abstraction for Ahascragh WRZ to supply deficit
Ahascragh	SA5-002	New GW abstraction for Ahascragh WRZ to supply deficit
Athlone	SA5-007a	Develop Moate groundwater (3 No. borehole) and transfer water from new WTP at Moate through new pumped watermain (17.5km) to SR in Athlone.
Athlone	SA5-008	New GW at Athlone WRZ
Athlone	SA5-009a	Upgrade Athlone WTP
Athlone	SA5-011	New riverbank filtration adjacent to River Shannon at Athlone to supply deficit in Athlone WRZ
Athlone	SA5-012a	New connection point from NSS connecting to Athlone
Athlone	SA5-013	Large reserve at Mount Temple GWS
Athlone	SA5-014	Gravels at Ballycumber to supply deficit
Athlone	SA5-015	Upgrade Ballymahon (Abbeyshrule WTP) and interconnect
Ballinasloe	SA5-017a	Increase abstraction from River Suck
Ballinasloe	SA5-020	New wellfield in Ballinasloe to supply the scheme (better quality water anticipated
Birr/Kinnitty	SA5-026	New GW abstraction to supply Birr and Kinnity
Kilcormac	SA5-033	Increase GW abstraction to supply deficit in Kilcormac and upgrade WTP.
Kilcormac	SA5-034	New GW abstraction to supply deficit in Kilcormac
Kilcormac	SA5-035	New SW abstraction to supply deficit in Kilcormac
Mount Talbot/Four Roads	SA5-037b	Increase GW abstraction at Mount Talbot Spring to supply deficit

Water Resource Zone Name	Feasible Options SA5 Offaly Roscommon	
	Option Code	Option Description
South Rocommon (Lisbrock & Killeglan)	SA5-042a	New GW at Killeglan and upgrade of WTP
South Rocommon (Lisbrock & Killeglan)	SA5-043	New GW at Lisbrock and upgrade of WTP
South Rocommon (Lisbrock & Killeglan)	SA5-045b	Increase SW abstraction from River Suck
Birr/Kinnitty	SA5-055	New riverbank filtration from R. Camcor to supply deficit
Birr/Kinnitty	SA5-057	New SW abstraction from River Little Brosna to supply deficit
Birr/Kinnitty	SA5-059	Increase GW abstraction at Ballyshane Bridge Borehole, Kinnity (Bredagh groundwater body
Clara/Ferbane	SA5-084	WTP Upgrade
Banagher	SA5-080	No deficit. Upgrade Banagher WTP to address WQ issue
Banagher	SA5-081	No deficit. Upgrade Clontotin BH to address WQ issue
Rahan	SA5-086	New GW and WTP Upgrade

The WRZ options are then assessed against the six approach types, outlined in Table 5.1 and the result of this process is provided in Table 5.3.

Table 5.3 SA5 Alignment of WRZ Option/s with Approach Categories

WRZ Name	No. Local Option	Option Code	Option Description	Approach Categories					
				Least Cost	Quickest Delivery	Best AA	Best Environmental	Lowest Carbon	Most Resilient
Ahascragh	2	SA5-01	Increase GW abstraction for Ahascragh WRZ to supply deficit	-	✓	-	-	-	✓
		SA5-02	New GW abstraction for Ahascragh WRZ to supply deficit	✓	-	✓	✓	✓	✓
Athlone	8	SA5-11	New riverbank filtration adjacent to River Shannon at Athlone to supply deficit in Athlone WRZ	-	-	-	-	-	-
		SA5-08	New GW at Athlone WRZ - Athlone Gravels to supply the deficit	-	-	-	-	-	-
		SA5-07a	Develop Moate groundwater (3 No. borehole) and transfer water from new WTP at Moate through new pumped watermain (17.5km) to SR in Athlone.	-	-	✓	-	-	-
		SA5-14	Gravels at Ballycumber to supply deficit	-	-	-	-	-	-
		SA5-13	Large reserve at Mount Temple GWS- supply/part supply deficit	-	-	-	-	-	-
		SA5-09a	Upgrade Athlone WTP to 18Ml/d	✓	-	-	✓	✓	✓
		SA5-12a	New connection point from NSS connecting to Athlone	-	-	-	-	-	-

WRZ Name	No. Local Option	Option Code	Option Description	Approach Categories					
				Least Cost	Quickest Delivery	Best AA	Best Environmental	Lowest Carbon	Most Resilient
		SA5-15	Upgrade Ballymahon (Abbeyshrule WTP) and interconnect	-	✓	-	-	-	-
Ballinasloe	2	SA5-20	New wellfield in Ballinasloe to supply the scheme (better quality water anticipated - lower OPEX costs)	-	-	-	-	✓	-
		SA5-17a	Increase abstraction from River Suck	✓	✓	✓	✓	-	✓
Banagher	2	SA5-81	No deficit. Upgrade Clontotin BH to address WQ issue	✓	✓	✓	✓	✓	✓
		SA5-80	No deficit. Upgrade Banagher WTP to address WQ issue	✓	✓	✓	✓	✓	✓
Birr/ Kinnitty	4	SA5-26	New GW abstraction to supply Birr and Kinnity	-	-	-	-	-	-
		SA5-59	Increase GW abstraction at Ballyshane Bridge Borehole, Kinnity (Bredagh groundwater body - productive fissured bedrock) to partly supply deficit	-	-	-	-	-	-
		SA5-25	Increase abstraction from the R. Camcor and upgrade WTP to supply Birr and Kinnity	✓	✓	✓	✓	✓	
		SA5-55	New riverbank filtration from R. Camcor to supply deficit	-	-	-	-	-	-
		SA5-57	New SW abstraction from River Little Brosna to supply deficit	-	-	-	-	-	✓

WRZ Name	No. Local Option	Option Code	Option Description	Approach Categories					
				Least Cost	Quickest Delivery	Best AA	Best Environmental	Lowest Carbon	Most Resilient
Clara/ Ferbane	1	SA5-84	WTP Upgrade	✓	✓	✓	✓	✓	✓
Kilcormac	3	SA5-35	New SW abstraction to supply deficit in Kilcormac	✓	✓	✓	-	-	-
		SA5-33	Increase GW abstraction to supply deficit in Kilcormac and upgrade WTP.	-	-	-	✓	✓	✓
		SA5-34	New GW abstraction to supply deficit in Kilcormac	-	-	-	-	-	✓
Mount Talbot/ Four Roads	1	SA5-37b	Increase GW abstraction at Mount Talbot Spring to supply deficit	✓	✓	✓	✓	✓	✓
Rahan	1	SA5-86	New GW and WTP Upgrade	✓	✓	✓	✓	✓	✓
South Roscommon (Lisbrock & Killeglan)	4	SA5-43	New GW at Lisbrock and upgrade of WTP	✓	-	-	✓	-	✓
		SA5-45b	Increase SW abstraction from River Suck	-	✓	✓	-	✓	-
		SA5-42a	New GW at Killeglan and upgrade of WTP	-	-	-	-	-	✓

The 7 Step Process outlined in Figure 5.1 was applied to each WRZ in SA5, in order to develop a WRZ level approach. A summary of the outcome of this assessment at WRZ level (i.e. WRZ options only) is shown in Table 5.4.

The findings of the Preferred Approach development for SA5 at WRZ level include the following:

- In terms of Best AA, two WRZ options score a 0 in relation to potential impact on a designated European Site;
- The Best AA approach is identified for 7 of the 10 WRZs, and the Best Environmental approach (overall SEA score) is identified in 7 of the 10 WRZs;
- Of the 10 WRZ approach options, none of these have a -3 score against biodiversity. A -3 Score against biodiversity indicates a potential high risk (without mitigation measures) under the biodiversity criterion for a European Site

Preferred Approaches at WRZ level are outlined in Table 5.4.

Table 5.4 SA5 WRZ Level Approach

Water Resource Zone Name	Feasible Options SA5 Roscommon and Offaly		Approach							
	Option Code	Option Description	Zero AA	Least Cost	Quickest Delivery	Best AA	Best Environmental	Lowest Carbon	Most Resilient	Preferred Approach
Ahascragh	SA5-002	New GW abstraction for Ahascragh WRZ to supply deficit	-	✓	-	✓	✓	✓	✓	✓
Athlone	SA5-009a	Upgrade Athlone WTP	-	✓	-	-	✓	✓	✓	✓
Ballinasloe	SA5-017a	Increase abstraction from River Suck	-	✓	✓	✓	✓	-	✓	✓
Kilcormac	SA5-033	Increase GW abstraction to supply deficit in Kilcormac and upgrade WTP.	✓	-	-	-	✓	✓	✓	✓
Mount Talbot/Four Roads	SA5-037b	Increase GW abstraction at Mount Talbot Spring to supply deficit	-	✓	✓	✓	✓	✓	✓	✓
South Rocommon (Lisbrock & Killeglan)	SA5-043	New GW at Lisbrock and upgrade of WTP	-	✓	-	-	✓	-	✓	✓
Clara/ Ferbane	SA5-084	WTP Upgrade	-	✓	✓	✓	✓	✓	✓	✓
Banagher	SA5-080	No deficit. Upgrade Banagher WTP to address WQ issue	-	✓	✓	✓	✓	✓	✓	✓
Banagher	SA5-081	No deficit. Upgrade Clontotin BH to address WQ issue	-	✓	✓	✓	✓	✓	✓	✓
Rahan	SA5-085	WTP Upgrade	✓	✓	✓	✓	✓	✓	✓	✓
Birr/Kinnitty	SA5-25	Increase abstraction from the R. Camcor and upgrade WTP to supply Birr and Kinnity	-	✓	✓	✓	✓	✓		✓

5.2.2 Stage 2 - Creation of the Study Area Combinations

The Second Stage of our Approach Development Process involves identifying the Study Area options that can address Need in more than one WRZ within the Study Area, and then develop various combinations which contain elements of the different options. These are called SA Combinations. SA Combinations will consist of a number of different projects or options; however, looking at a wider, more holistic, spatial scale benefits the plan level assessment in considering what options might work across multiple WRZ's.

For each Study Area, one of the SA Combinations will always be the WRZ Level Approach. The WRZ Level Approach is the combination of all of the individual the Preferred Approach at WRZ level for the entire Study Area. Table 5.5 below provides a summary of the 12 Study Area options.

Table 5.5 SA5 Grouped options

Option Code	Feasible Options SA5 Roscommon Offaly		
	Water Resource Zone	Water Resource Zone Code	Option Description
Group 1	Athlone	3200SC0002	Interconnect South Rocommon (Lisbrock & Killeglan), Athlone and Ballinasloe to supply deficits and increase resilience of WRZs
	Ballinasloe	1200SC0006	
	South Rocommon (Lisbrock & Killeglan)	2600SC0006	
Group 2	Ballinasloe	1200SC0006	Supply deficit from Ballinasloe (River Suck) and interconnect South Rocommon (Lisbrock & Killeglan) (existing links Increase SW abstraction from River Suck, upgrade WTP at Ballinasloe and supply deficit at Mount Talbot
	Mount Talbot/Four Roads	2600SC0001	
	South Rocommon (Lisbrock & Killeglan)	2600SC0006	
Group 3	Athlone	3200SC0002	Develop Moate groundwater (3 No. borehole) and transfer water from new WTP at Moate through new pumped watermain to SR in Athlone.
	South Rocommon (Lisbrock & Killeglan)	2600SC0006	
Group 5	Mount Talbot/Four Roads	2600SC0001	Interconnect Mount Talbot/Four Roads with South Rocommon (Lisbrock & Killeglan) and supply deficit from new GW at South Rocommon (Lisbrock & Killeglan)
	South Rocommon (Lisbrock & Killeglan)	2600SC0006	
Group 8	Ballinasloe	1200SC0006	Supply deficit from Ballinasloe (River Suck) and interconnect South Rocommon (Lisbrock & Killeglan)
	South Rocommon (Lisbrock & Killeglan)	2600SC0006	
Group 9	Athlone	3200SC0002	Upgrade Athlone WTP to 18Ml/d and supply deficit to the east of South Roscommon via new watermain, connecting into existing 400mm
	South Rocommon (Lisbrock & Killeglan)	2600SC0006	
Group 10	Athlone	3200SC0002	New GW at South Rocommon (Lisbrock & Killeglan)WRZ to supply deficit in Athlone & South Rocommon (Lisbrock & Killeglan)
	South Rocommon (Lisbrock & Killeglan)	2600SC0006	
Group 12	Mount Talbot/Four Roads	2600SC0001	Increase GW abstraction at Mount Talbot Spring to supply deficit
	South Rocommon (Lisbrock & Killeglan)	2600SC0006	
Group 14	Ahascragh	1200SC0005	Increase SW abstraction on River Suck to supply deficit and interconnect existing links
	Ballinasloe	1200SC0006	
Group 15	Ahascragh	1200SC0005	New GW at Killeglan and upgrade of WTP. Rationalise Ahascragh to South Rocommon (Lisbrock & Killeglan).
	South Rocommon (Lisbrock & Killeglan)	2600SC0006	
Group 16	Athlone	3200SC0002	New connection point from NSS connecting to Athlone, Ballinasloe, Kilcormac, Birr/Kinnitty, Clara/Ferbane and Rahan
	Ballinasloe	1200SC0006	

Option Code	Feasible Options SA5 Roscommon Offaly		
	Water Resource Zone	Water Resource Zone Code	Option Description
	Kilcormac	2500SC0003	
	Birr/Kinnitty	2500SC0015	
	Clara/Ferbane	2500SC0016	
	Rahan	2500SC0017	
Group 18	South Rocommon (Lisbrock & Killeglan)	2600SC0006	GW at Lisbrock and Killeglan for South Rocommon (Lisbrock & Killeglan)

The 12 Study Area options result in 14 SA Combinations including the WRZ level Approach. The 14 SA Combinations in terms of the types of options within each combination are summarised in Table 5.6 below.

Table 5.6 SA5 Combinations Options Summary

Key	WRZ Approach Option	○	SA Grouped Option	□

WRZ	WRZ approach options	SA combination 1 (SA grouped option 2)	SA combination 2 (SA grouped option 3)	SA combination 3 (SA grouped option 5)	SA combination 4 (SA grouped option 8)	SA combination 5 (SA grouped option 9)	SA combination 6 (SA grouped option 10)	SA combination 7 (SA grouped option 12)	SA combination 8 (SA grouped option 14)	SA combination 9 (SA grouped option 15)	SA combination 10 (SA grouped option 16)	SA combination 11 (SA grouped option 18) -	SA combination 12 (SA grouped option 12 & 14)	SA combination 13 (SA grouped option 15 & 16)
Ahascragh	○	○	○	○	○	○	○	○	□	□	○	○	□	□
Athlone	○	○	□	○	○	□	□	○	○	○	□	○	○	□
Ballinasloe	○	□	○	○	□	○	○	○	□	○	□	○	□	□
Banagher	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Birr/Kinnitty	○	○	○	○	○	○	○	○	○	○	□	○	○	□
Clara/Ferbane	○	○	○	○	○	○	○	○	○	○	□	○	○	□
Kilcormac	○	○	○	○	○	○	○	○	○	○	□	○	○	□
Mount Talbot/Four Roads	○	□	○	□	○	○	○	□	○	○	○	○	□	○
Rahan	○	○	○	○	○	○	○	○	○	○	□	○	○	□
South Roscommon (Lisbrock & Killeglan)	○	□	□	□	□	□	□	□	○	□	○	□	□	□

5.2.3 Stage 3 – Preferred Approach at Study Area Level

As part of stage three, we compare the WRZ Level Approach and the SA Combinations to determine the Preferred Approach that provides the best outcome for the Study Area.

We use the EBSD tool to rank the combinations against the assessment criteria and we then compare the best performing SA Combinations under each of the six approach types, using the 7 step process set out in Fig 5.1, to establish the Preferred Approach at Study Area level. The results of this process are provided in Table 5.7.

In accordance with Section 7.2.2 of the RWRP EM, where options or combinations of options achieve similar, although not exactly identical scores under the six approach types, IW takes a wider look at the comparable combinations /options to consider which to categorise as the "Best" approach within each category. In particular, IW takes into account whether the option or combination of options meets the SEA and Habitats objectives outlined in the Framework Plan. This is an example of the professional judgement from the multi-disciplinary teams, identified in section 8.3.7.4 of the Framework Plan.

For SA5, Grouped Option 2 (Combination 1), Grouped Option 16 (Combination 10) and Grouped Option 15 & 16 (Combination 13) have a very similar ranking under the Best Environmental category. A set out in section 7.2.1 of the RWRP EM when the combination with the lowest environmental score also scores any -3 score under the Best AA criteria we review the other combinations to determine if there are any combinations with a no -3 biodiversity score. The Best Environmental is the Combination with the lowest environmental score with the least no of -3 scores against the best AA criteria.

When we compare these three combinations against each other to identify which should go forward as the Best Environmental Approach, as Grouped Option 15 & 16 (Combination 13) had two -3 Biodiversity scores and Grouped Option 16 (Combination 10) had one -3 Biodiversity score, so we then looked to the next lowest environmental score which was Grouped Option 2 (Combination 1). This combination did not have any -3 Biodiversity scores and was also comparatively better in the majority of the categories that the other two combinations. Overall, it performs well against the SEA and Habitats Objectives of the plan and accordingly has been identified as the Best Environmental option and brought forward to the Approach Development Stage.

.

Table 5.7 SA5 Summary of SA Combination of Performance against Approach Type

Ranked order (best to worst)	Best														Worst

WRZ	WRZ approach options	SA combination 1 (SA grouped option 2)	SA combination 2 (SA grouped option 3)	SA combination 3 (SA grouped option 5)	SA combination 4 (SA grouped option 8)	SA combination 5 (SA grouped option 9)	SA combination 6 (SA grouped option 10)	SA combination 7 (SA grouped option 12)	SA combination 8 (SA grouped option 14)	SA combination 9 (SA grouped option 15)	SA combination 10 (SA grouped option 16)	SA combination 11 (SA grouped option 18) - Preferred Approach	SA combination 12 (SA grouped option 12 & 14)	SA combination 13 (SA grouped option 15 & 16)
Least Cost												Best		Worst
Quickest Delivery												Worth		
Best AA *no. of -3 scores against biodiversity	0 No. -3 scores	0 No. -3 scores	0 No. -3 scores	1 No. -3 scores	0 No. -3 scores	0 No. -3 scores	0 No. -3 scores	1 No. -3 scores	0 No. -3 scores	1 No. -3 scores	1 No. -3 scores	0 No. -3 scores	1 No. -3 scores	2 No. -3 scores
Lowest Carbon							Best							Worst
Most Resilient			Worst	Best										
Best Environmental		Best										Worst		

The 14 SA combinations including the WRZ approach outlined in Table 5.6 are assessed to determine the approach categories as summarised in Table 5.8.

Table 5.8 Best SA combinations aligned with SA approaches

Approach Categories	Best Performing Combination
Least Cost (LCo)	Group 18
Best Environmental (BE)	Group 2
Quickest Delivery (QD)	Group 15 & 16
Most Resilient (MR)	Group 5
Lowest Carbon (LC)	Group 10
Best AA (BA)	Group 2

The MCA assessment included the following assessment criteria:

- Resilience;
- Deliverability and Flexibility;
- Progressibility; and
- Sustainability (Environmental and Social Impacts).

The NPV Costs are based on four criteria:

- Capital Costs – the cost to construct the option, including all overheads, consent and land acquisition costs;
- Operational Costs – the whole life cost to operate the option, including operators, chemical requirements and energy requirements including pumping;
- Carbon Costs – the whole life embodied and operational Carbon costs of the option; and
- Environmental and Social – the whole life Environmental and Social cost of the option covering climate regulation, traffic disruption and food production (carbon emissions are covered separately in the bullet point above).

The wider range of costs used in the estimation of the NPV aligns our Plan with any future Project Level Cost Benefit Analysis, in accordance with the Public Spending Code.

In terms of NPV Cost, Group 18 approach has the lowest NPV Cost, as shown in Figure 5.2, with the lowest capital costs (CAPEX) over the solutions lifetime.

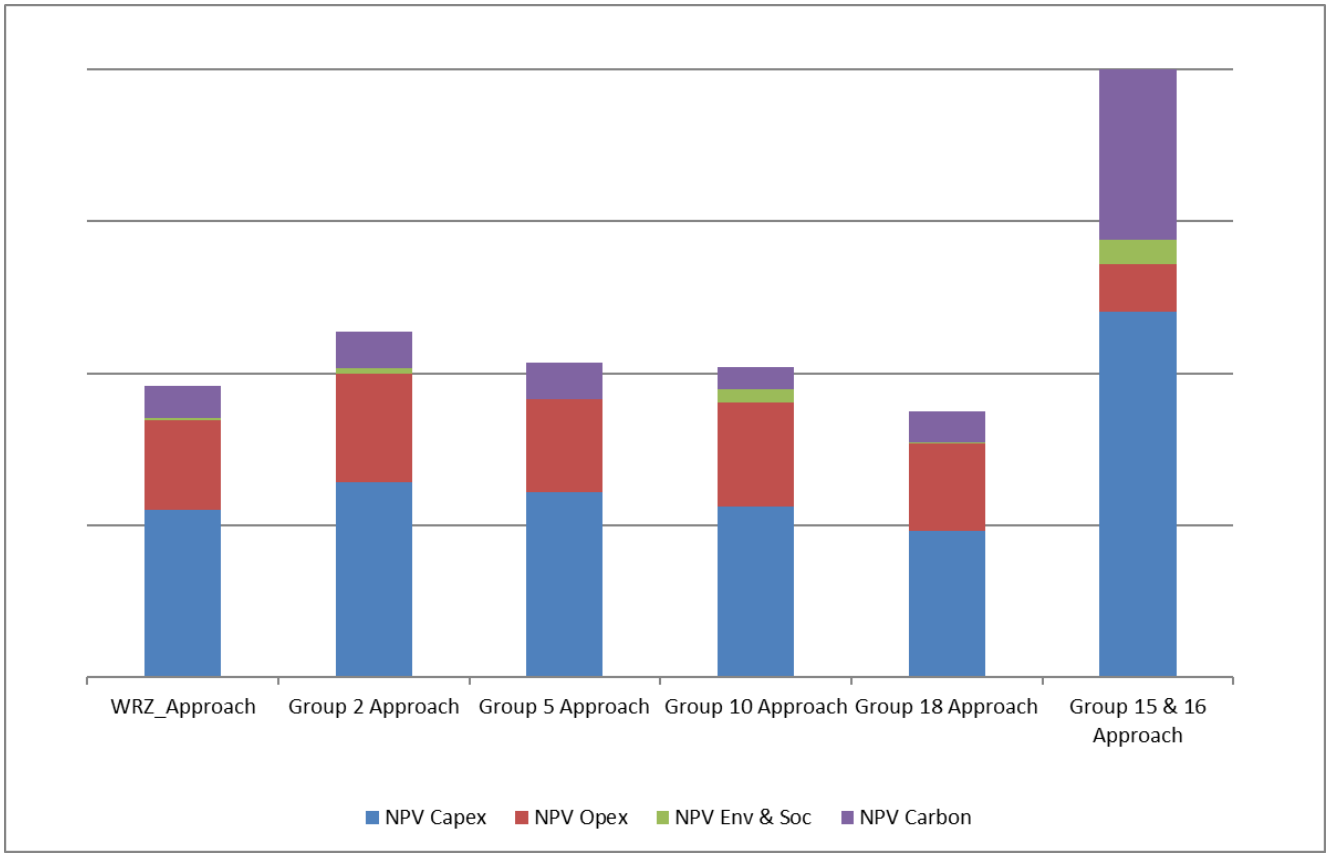


Figure 5.2 SA5 NPV Costs for WRZ and SA approaches

In accordance with the Options Methodology, These approaches are then compared against each other using the 7-Step process in Figure 5.1 to generate the best value combination of options at the Study Area level. The best value combination of options at the Study Area level is the SA Preferred Approach. The outputs from the assessment were as follows:

- Step 1 – We compared the Least Cost Approach against the Best AA approach. The least cost approach contained no options with a -3 biodiversity score and is comparable to the Best AA approach therefore the Least Cost Approach was retained at this stage.
- Step 2 – We compared the Least Cost Approach against the Quickest Delivery Approach. The Quickest Delivery approach performs poorly against the carbon and resilience criteria compared to the Least Cost Approach with Carbons costs over five times higher than the Least Cost Approach. The Quickest Delivery approach preforms well against the Environmental criteria, however, contains two options with a -3 biodiversity score. The Least Cost approach was therefore retained at this stage.
- Step 3 - We compared the Least Cost against the Best Environmental Approach. While the Least Cost Approach has the Worst Environmental Score there is not a significant difference in the environmental scores between the Least Cost Approach and the Best Environmental Approach. The Best Environmental Approach has higher Carbon Costs and higher NPV costs than the Least Cost Approach. The Least Cost Approach was retained at this stage as the difference between the environmental scores was not considered material.
- Step 4 – We compared the Least Cost against the Most Resilient Approach. The Most Resilient Approach has comparable scores against the environmental and carbon criteria compared to the Least Cost, and this combination contains one option with a -3 biodiversity score. The Least Cost approach was therefore retained at this stage.

- Step 5 - We compared the Least Cost Approach against the Lowest Carbon Approach. There is not a significant difference between the carbon costs for the Least Cost Approach and The Lowest Carbon Approach and the Lowest Carbon Approach scores poorly against the resilience criteria compared to the Least Cost Approach. The Least Cost approach was therefore retained at this stage.
- Step 6 – A final assessment of the Least Cost was completed against the Lowest Carbon, Best AA, Best Environmental and Most Resilient Approaches. The Least Cost Approach is comparable to all other approaches and contains no options with a -3 biodiversity score. While the Least Cost Approach preforms poorly against the Environmental criteria compared to other Approaches there is not a significant difference in the environmental scores between the Least Cost Approach and the Best Environmental Approach. The Least Cost approach was therefore retained at this stage as there is no material difference between the environmental scores for the Least Cost and the Best Environmental Approach.
- Step 7 – The Least Cost Approach was therefore selected as the Preferred Approach for the Water Resource and Study Area Levels.

5.3 Study Area Preferred Approach Summary

On the basis of this initial assessment at Plan level, the Group 18 approach represents the Preferred Approach for Study Area 5 Roscommon Offaly, which consists of the options listed in Table 5.9.

Table 5.9 Preferred Approach for SA5

WRZ ID	WRZ Name	Option Description
1200SC0005	Ahascragh	SA5-002: New GW abstraction for Ahascragh WRZ to supply deficit
3200SC0002	Athlone	SA5-009a: Upgrade Athlone WTP to 18Ml/d
1200SC0006	Ballinasloe	SA5-017a: Increase abstraction from River Suck
2500SC0001	Banagher	SA5-080: No deficit. Upgrade Banagher WTP to address WQ issue. SA5-081: No deficit. Upgrade Clontotin BH to address WQ issue
2500SC0015	Birr/Kinnitty	SA5-025: Increase abstraction from the River Camcor and upgrade WTP to supply Birr and Kinnity
2500SC0016	Clara/Ferbane	SA5-084: WTP Upgrade
2500SC0003	Kilcormac	SA5-033: Increase GW abstraction to supply deficit in Kilcormac and upgrade WTP.

WRZ ID	WRZ Name	Option Description
2600SC0001	Mount Talbot/Four Roads	SA5-037b: Increase GW abstraction at Mount Talbot Spring to supply deficit and upgrade of WTP for quality and capacity purposes.
2500SC0017	Rahan	SA5-086: New GW and Upgrade WTP
2600SC0006	South Rocommon (Lisbrock & Killeglan)	SA5-518: New GW at Lisbrock and upgrade of WTP for quality and capacity purposes. New GW at Killeglan and upgrade of WTP for quality and capacity purposes.

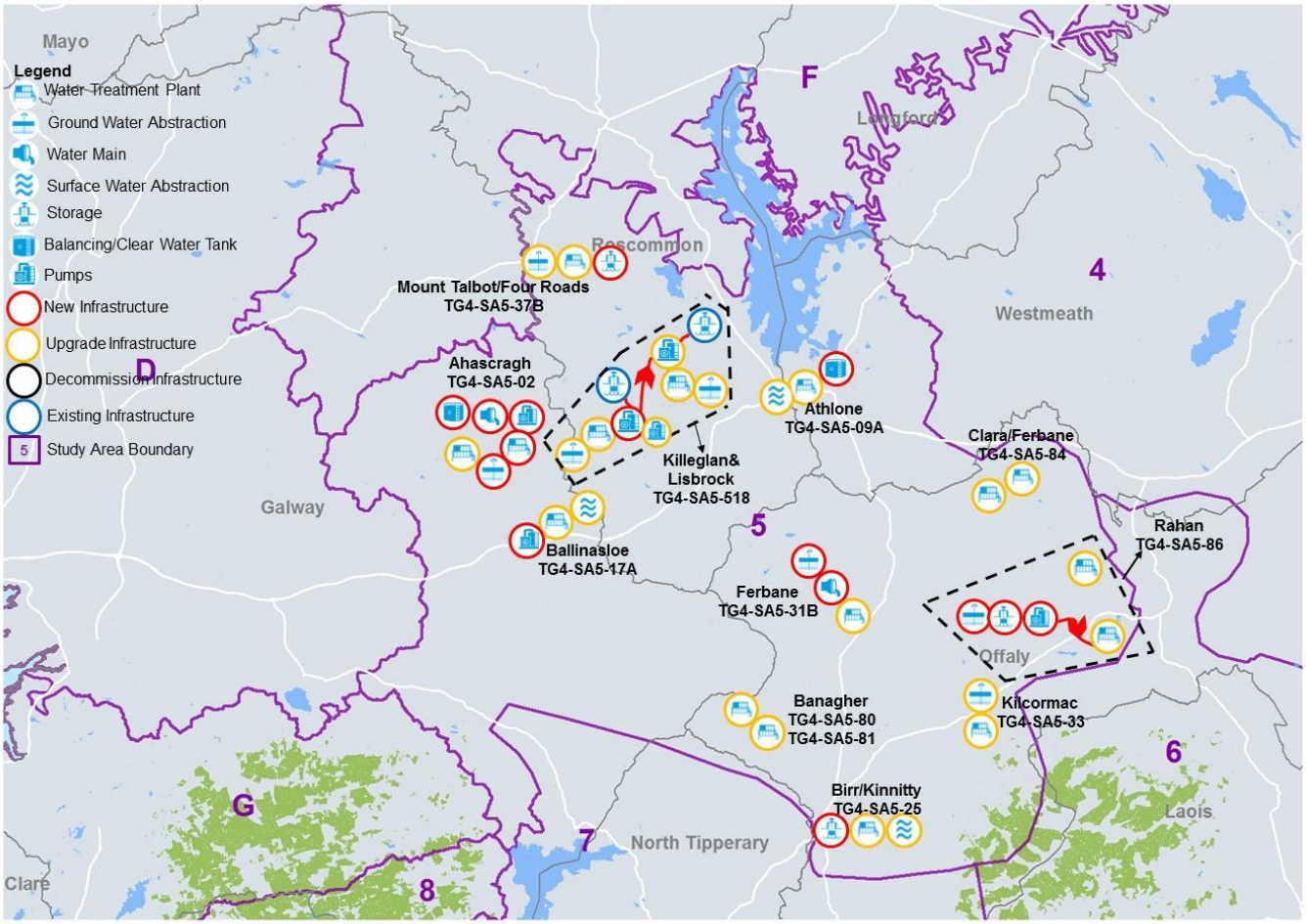


Figure 5.3 SA5 Preferred Approach

The Preferred Approach (SA Group 18 approach) is shown schematically in Figure 5.3.

As noted in Section 7 of the RWRP the PA for the Rahan WRZ was modified further to information obtained during the consultation period.

The Preferred Approach for SA5 also includes for demand side (**Lose Less** and **Use Less**) measures, including:

- Ongoing leakage management including active leakage control, pressure management and find and fix activities to offset NRR;
- Net leakage reduction in Ahascragh, Ballinasloe, Rahan and Athlone WRZ, amounting to 343 m³/day (applied to SDB Deficit) to move towards achieving the National SELL Target by 2034;
- Continuation of IW household and business water conservation campaigns, initiatives and education programmes; and
- The option to implement legally enforceable Water Conservation Orders in drought periods in order to protect the environment and our public water supplies.

Before we adopt this approach at Plan level for SA5, we must give consideration to the following:

- **Interim Solutions**: Based on scale of investment required across the entire country it is likely that it may take 5-10 investment cycles before we address all issues with the existing water supplies. Therefore, small localised options may be required on an interim basis to secure priority need in existing supplies until the SA Preferred Approach can be delivered;
- **Sensitivity Analysis**: When planning for water supplies over a medium to long term horizon, we must give consideration to adaptability of our plan to change across a range of future scenarios (for example, what if population growth rates are lower than expected or what if we are unable to secure a licence in the medium term to abstract the quantity water currently allowed for at a given location).

6

Preferred Plan Constraints – Interim Solutions

6 Interim Solutions

As outlined in more detail in Section 8.3.7.6 of the Framework Plan, the NWRP provides for an “interim solution” approach, which allows shorter term interventions to be identified and prioritised, when needed. The Preferred Approach for each WRZ, Study Area and Region will be delivered on a phased basis subject to budget and regulatory constraints. It will take many investment cycles to deliver the Preferred Approach across all WRZs, therefore, Irish Water must have a means to continue delivering safe, secure and reliable water supplies (on a short to medium term basis) while we deliver our Preferred Approach.

On this basis, interim, short term capital maintenance solutions have been identified for all WTPs and will be utilised when needed. These solutions will allow IW time to deliver the Preferred Approach, while at the same time, maintaining a sustainable water supply. These interim solutions are generally smaller in scale and rely on making best use of already existing infrastructure.

Examples of general interim measures for different water sources include the following:

- For groundwater sites, where the Preferred Approach requires that the existing WTP is to be maintained, the interim solution would typically provide for refurbishment of the existing or development of new boreholes and borehole pumps, and an upgrade of the treatment process in line with proposed growth predictions. This may require a staged upgrade of the WTP. For example, the interim solution would typically include an upgrade of the WTP to provide supply to existing customers with consideration given to a further required expansion of the WTP at a later date.
- For surface water sites, where the Preferred Approach requires that the existing WTP is to be maintained, the interim option would typically involve the upgrade of the existing WTP in line with proposed growth predictions. As for groundwater sites this may require a staged upgrade of the WTP where the interim solution would typically include an upgrade of the WTP to provide supply to existing customers with consideration given to a further required expansion of the WTP at a later date.
- For groundwater and surface water sites where the Preferred Approach involves the decommissioning of the WTP by providing supply to the customers from another WTP within the WRZ or from another WRZ/Study Area/Region, the interim solution would involve the advancement of the rationalisation of the WTP, by provision of part supply or full supply if possible. If rationalisation is not feasible at that point in time due to dependencies on Study Area or Regional options, containerised WTP upgrade solutions would be considered for the WTP. This involves the provision of a package WTP within a containerised unit. These package plants can be modified for use on other sites in the future therefore are considered “no regrets” infrastructure investment

A decision to progress any interim solution will be based on priority need to address water quality risk or supply reliability e.g. RAL, drought issues or critical need for example. The Regional Plan does not confer funding availability for any project and any interim measures will be subject to budget availability, relevant environmental assessment and other required consents in the normal way.

These solutions, in most cases, will only be used to allow time to deliver the longer-term solution. The interim solutions are determined in line with the Preferred Approach and as such, they are considered “no regrets” infrastructure investment.

Table 6.1 SA5 Interim Options

WTP Name	Interim Option
Athlone WTP	Upgrade WTP to IW Standards
Lisbrock WTP	Refurb existing Borehole, and upgrade WTP to IW Standards
Killeglan Springs WTP	Refurb existing Borehole, and upgrade WTP to IW Standards
Cloonlaughnan WTP	Refurb existing Borehole, and upgrade WTP to IW Standards
Rahan - Tully WTP	Develop new Borehole or Refurb existing Borehole, and upgrade WTP to IW Standards
Rahan - Holmshill WTP	Develop new Borehole or Refurb existing Borehole, and upgrade WTP to IW Standards
Agall WTP	Refurb existing Borehole, and upgrade WTP to IW Standards
Moyclare WTP	Refurb existing Borehole, and upgrade WTP to IW Standards
Clara WTP	Upgrade WTP to IW Standards
Kinnitty WTP	Refurb existing Borehole, and upgrade WTP to IW Standards
Birr WTP	Upgrade WTP to IW Standards
Kilcormac WTP	Refurb existing Borehole, and upgrade WTP to IW Standards
Clontotin WTP	Refurb existing Borehole, and upgrade WTP to IW Standards
Banagher WTP	Upgrade WTP to IW Standards
Ballinasloe Town WTP	Upgrade WTP to IW Standards
Ahascragh WTP	Refurb existing Borehole, and upgrade WTP to IW Standards

7

Preferred Approach – Sensitivity Analysis

7 Preferred Approach – Sensitivity Analysis

Our supply demand forecast and water quality barrier deficit assessments have been developed using the application of best practice methods within the data available. We have identified areas where we will focus improvements in data to improve the certainty of our forecasts. However, all long term forecasts are subject to uncertainty. We have explored the sensitivity of our supply and demand forecasts to some of the key factors which influence them through a range of scenarios. This enables us to test the sensitivity of the Preferred Approach to changes in need, in order to ensure that our decision making is robust and that the approach is adaptable. We describe the factors which have been considered in Chapter 8 of the Framework Plan. In summary we test our Preferred Approach against the following questions:

1) What if the deployable output across our supplies is reduced based on sustainability limits within the new legislation on abstraction resulting in a larger supply demand balance deficit?
2) What if climate change impacts on our existing supplies are greater than anticipated?
3) What if our forecasts are too great and expected demand growth does not materialise resulting in a smaller supply demand balance deficit?
4) What if we are able to achieve SELL and 21% leakage targets in our larger WRZs within the timeframe of the plan resulting in lower Needs?
5) What if we fail to achieve our leakage targets included in the SDB?

A summary of the adaptability criteria and analysis we have undertaken for SA5 is shown in Table 7.1.

Table 7.1 Sensitivity Analysis for SA5

Uncertainty	Likelihood	Increase/ Decrease in Deficit	Impact on Preferred Approach
Sustainability	Moderate/High (as our current abstractions are large compared to the water bodies from which they abstract)	+700 m^3/d	**The impact of sustainability reductions would reduce the volumes that can be abstracted from our existing sources therefore increasing the SDB deficit.** Our outline sustainability assessments would mean a potential increase in deficit for SA5 based on reductions in the sustainable abstraction amounts from the Gageborough River, affecting the Clara Ferbane WRZ. As this WRZ currently shows no deficit feasible options would have to be considered, if a sustainability issue is confirmed for the Gageborough River. Based on this scenario, a Preferred Approach would have to be determined for the Clara Ferbane WRZ.
Climate Change	High (international climate change targets have not been met)	+200 m^3/d	Higher climate change scenarios would impact our existing supplies and result in decreased water availability at certain times of year.

Uncertainty	Likelihood	Increase/ Decrease in Deficit	Impact on Preferred Approach
			Although the likelihood of this scenario is high based on climate change adaptation to date, potential impacts may be mitigated against by optimizing our operations on a more environmentally sustainable basis across the range of supplies.
			Based on this scenario, the SA Preferred Approach remains the optimal solution.
Demand Growth	Low/Moderate (growth has been based on policy)	-200 m^3/d	**The impact of lower than expected growth would reduce the SDB deficit and the overall need requirement.** The SDB deficit is spread across 10 individual water resource zones and is driven by quality as well as quantity issues. In this rural area, growth is relatively low. However, there are large growth centres such as Athlone, Tullamore, Ballinasloe and Roscommon.
			Based on this scenario, the SA Preferred Approach remains the optimal solution.
Leakage Targets	Low (Irish Water is focused on sustainability and aggressive leakage reduction)	570 m^3/d	**The impact of lower than expected leakage savings would increase the SDB deficit and the overall need requirement.** As Irish Water is committed to achieving leakage reductions, the likely scenario would be an extension in the period of time taken to achieve leakage targets as opposed to accepting lower targets.
			Based on this scenario, the SA Preferred Approach remains the optimal solution.
	Moderate/High (Irish Water is focused on sustainability and aggressive leakage reduction)	7,352 m^3/d	**The impact of achieving SELL and 21% leakage targets in our larger WRZs would reduce the supply demand balance deficit and the overall need requirement.** The need drivers in SA4 are across all 10 water resource zones and are driven by quality as well as availability issues. Therefore, the Preferred Approach is required, even accounting for increased leakage savings.

Uncertainty	Likelihood	Increase/ Decrease in Deficit	Impact on Preferred Approach
			Based on this scenario, the SA Preferred Approach remains as the optimal solution.

In reality, a combination of these scenarios may occur together. For example, growth in demand might be lower if we achieve greater leakage reductions. However, if this coincided with a reduction in permitted abstraction volume under the abstraction licensing regime, the reduction in demand may offset some or all of the loss in supply availability due to abstraction sustainability reductions.

Based on the sensitivity assessment, the Interim and Preferred Approaches perform as follows:

- Interim Approach – As the purpose of the Interim Approach is to allow for priority Quality and Quantity issues, the solutions will have a limited design life (usually less than 10 years). They allow time to assess the Preferred Approach and improve adaptability within our Plan; and
- Preferred Approach – The supplies in SA5 vary in size with a large number of small WRZs <1Ml/d as well as large growth areas such as Athlone. The majority of preferred options look to expand existing surface water and groundwater supplies which will require further investigation at project level.

In summary, our sensitivity assessment of the Interim and Preferred Approaches demonstrates that they are both highly adaptable to a range of futures, and therefore represent ‘no regrets’ infrastructure.

8 Summary of Study Area 5

8 Summary of Study Area 5

The Preferred Approach for SA5 (summarised in Table 5.9 and Figure 5.3 in Section 5.3.3) consists of local WRZ supplies for all of the WRZs in the Study Area, primarily driven by the small scale of the supplies and difficulties in transporting small volumes of water over long distances.

Delivery of the Preferred Approach will secure all of the supplies in the area in terms of Quality, Quantity, Sustainability and Resilience. The Preferred Approach for SA5 also includes for demand side (**Lose Less** and **Use Less**) measures, including:

- Ongoing leakage management including active leakage control, pressure management and find and fix activities to offset NRR;
- Net leakage reduction in Birr / Kinnitty, South Roscommon (Lisbrock & Killeglan) and Athlone Water Resource Zones, amounting to 570 m^3/day (applied to SDB Deficit) to move towards achieving the National SELL Target by 2034;
- Continuation of IW household and business water conservation campaigns, initiatives and education programmes; and
- The option to implement legally enforceable Water Conservation Orders in drought periods in order to protect the environment and our public water supplies.

As part of our Preferred Approach we have also identified a range of interim solutions for SA5, as summarised in Table 6.1 in Section 6. The measures will only be progressed in the event of critical need and/or public health impact and to allow time for delivery of the required Preferred Approach solutions in the Study Area.

Annex A Study Area 5 Water Treatment Plants

WTP Asset Name	Local Plant Names
Ballinasloe Town WTP	Ballinasloe Town WTP
Ahascragh WTP	Ahascragh WTP
Clara WTP	Clara WTP
Banagher WTP	Banagher WTP
Birr WTP	Birr WTP
Agall WTP	#N/A
Clontotin WTP	Clontotan WTP
Kilcormac WTP	Holmshill WTP
Rahan - Holmshill WTP	Holmshill WTP
Rahan - Tully WTP	Rahan - Tully WTP
Kinnitty WTP	Kinnitty WTP
Moyclare WTP	Moyclare WTP
Killeglan Springs WTP	Killegan WTP
Lisbrock WTP	Lisbrock WTP
Cloonlaughnan WTP	Cloonlaughnan WTP
Athlone WTP	Athlone WTP

Annex B Study Area 5 Rejection Register Summary

Study Area 5 - CS Rejection

Option Reference	Option Description	Rejection Reasoning	Resilience	Deliverability & Flexibility	Sustainability (Environmental and Social Impacts)
TG4-SA5-05b	Interconnect South Roscommon and Athlone to supply deficits and increase resilience of WRZs	This option is a repeat of Group 9 and as a result will not be assessed. Group 9 is taken forward to fine screening stage.	This option is a repeat and is assessed as part of a different feasible option.		
TG4-SA5-10a	New WTP at Killinure Lake for Athlone	A planning applications for new abstraction from this source was withdrawn in 2020 for environmental reasons and as a result was not taken forward to fine screening stage.			•
TG4-SA5-10b	New WTP at Killinure Lake to supply deficit in Athlone, and South Roscommon	A planning applications for new abstraction from this source was withdrawn in 2020 for environmental reasons and as a result was not taken forward to fine screening stage.			•
TG4-SA5-23	Interconnect Mount Talbot/Four Roads, Mountbellew and Ballygar (Co. Galway; SA F) and supply deficit from new GW in South Roscommon	This option was identified as an unconstrained option as part of it was located in the Eastern Midlands region. However, this option is dependent on the preferred approach determination of a WRZ (Mount Talbot/ Four Roads) in the Eastern Midlands Region, supplying the deficit to WRZs in the North West region. This option will be assessed as part of the North West Regional Water Resources Plan, and the cumulative impact will be assessed later, at a National level. Therefore, this option was not brought forward to the fine screening stage.	Option to be assessed as part of the North West Plan, as part of Study Area F		
TG4-SA5-53	New connection point from WSP connecting to Banagher	This option involves the connection of Clontotan WTP to a New Shannon Source and requires the transfer of water via a pipeline over 15Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of water. As a result, the option is not considered feasible at coarse screening stage and was not taken forward to fine screening stage.		•	
TG4-SA5-54	Interconnect Banagher and Ballinasloe WRZs for increased resilience and supply spare capacity at Banagher to Ballinasloe WRZ	This option involves the connection of Banagher WTP and Ballinasloe network and requires the transfer of water via a pipeline c.a 6Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of water. As a result, the option is not considered feasible at coarse screening stage and was not taken forward to fine screening stage.		•	

Option Reference	Option Description	Rejection Reasoning	Resilience	Deliverability & Flexibility	Sustainability (Environmental and Social Impacts)
	(approx. distance 5.5km via Esker/Eyrecourt GWS), new watermains and network upgrades required)				
TG4-SA5-56	Increase abstraction from River Kinnitty and upgrade Birr WTP to supply deficit	In this option, the estimated sustainable abstraction from Kinnity can only supply a portion of the identified deficit in the WRZ. It was considered a high cost for a small supply that is unlikely to remedy the deficit and as a result would not be assessed at coarse screening stage and not taken forward to fine screening stage.	•		
TG4-SA5-58	New GW abstraction/wellfield from Birr Gravels to supply full deficit to Birr and Kinnitty and abandon existing sources	This option is assessed as part of option TG4-SA5-26 and as a result would not be considered at coarse screening stage and not taken forward to fine screening stage. TG4-SA5-26 is advanced to fine screening stage.	This option is a repeat and is assessed as part of a different feasible option.		
TG4-SA5-60	Interconnect Birr/Kinnitty and Banagher for increased resilience and supply deficit from Banagher (approx. 9km; new watermains and network upgrades required)	This option involves the connection of Banagher and Birr/Kinnity and requires the transfer of water via a pipeline c.a 11Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of water. As a result, the option is not considered feasible at coarse screening stage and would not be taken forward to fine screening stage.		•	
TG4-SA5-61	Rationalise Kinnitty to Birr and decommission Kinnitty WTP (network upgrades of 13km required)	This option is assessed as part of option TG4-SA5-25 and as a result would not be considered at coarse screening stage and not taken forward to fine screening stage. TG4-SA5-25 is advanced to fine screening stage.	This option is a repeat and is assessed as part of a different feasible option.		

Option Reference	Option Description	Rejection Reasoning	Resilience	Deliverability & Flexibility	Sustainability (Environmental and Social Impacts)
TG4-SA5-62	Rationalise Birr/Kinnitty to Roscrea (approx. 3.5km; new watermains and network upgrades required)	This option involves the rationalisation of Birr/Kinnity to Roscrea and requires the transfer of water via a pipeline c.a 28Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of water. As a result, the option is not considered feasible at coarse screening stage due to age of water and sedimentation and would not be taken forward to fine screening stage.		•	
TG4-SA5-63	Rationalise Birr/Kinnitty to Lorrha/Rathcabbin (approx. 1.5km via Ballindarra GWS; new watermains and network upgrades required)	This option involves the rationalisation of Birr/Kinnity to Lorrha/Rathcabbin and requires the transfer of water via a pipeline c.a 32Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of water. As a result, the option is not considered feasible at coarse screening stage due to age of water and sedimentation and would not be taken forward to fine screening stage.		•	
TG4-SA5-28	Supply deficit from Banagher WRZ to Clara Ferbrane Moyclare via new watermain (6.4km)	When unconstrained options list were originally drawn up this WRZ was identified as having a deficit; however, due to an updated SDB, which takes into account data improvements, there is no longer an identified deficit in this WRZ. Therefore, no new supply option is required.	No deficit at Clara/Ferbane WRZ with updated SDB		
TG4-SA5-29	Supply deficit at Clara/Ferbane from Tullamore (develop Tullamore wellfield and upgrade existing WTP)	When unconstrained options list were originally drawn up this WRZ was identified as having a deficit; however, due to an updated SDB, which takes into account data improvements, there is no longer an identified deficit in this WRZ. Therefore, no new supply option is required.	No deficit at Clara/Ferbane WRZ with updated SDB		
TG4-SA5-31a	Increase GW abstraction at Rahan to supply deficit and transfer spare capacity to Clara/Ferbane into service reservoir via new pumped watermain (12.9km)	When unconstrained options list were originally drawn up this WRZ was identified as having a deficit; however, due to an updated SDB, which takes into account data improvements, there is no longer an identified deficit in this WRZ. Therefore, no new supply option is required.	No deficit at Clara/Ferbane WRZ with updated SDB		

Option Reference	Option Description	Rejection Reasoning	Resilience	Deliverability & Flexibility	Sustainability (Environmental and Social Impacts)
TG4-SA5-64	Increase GW abstraction at Clara Plant BH and upgrade Clara WTP to supply deficit	When unconstrained options list were originally drawn up this WRZ was identified as having a deficit; however, due to an updated SDB, which takes into account data improvements, there is no longer an identified deficit in this WRZ. Therefore, no new supply option is required.	No deficit at Clara/Ferbane WRZ with updated SDB		
TG4-SA5-65	Increase GW abstraction at Moyclare Wells and Moyclare WTP to supply deficit (Gageborogh-Brosna Gavels groundwater body)	When unconstrained options list were originally drawn up this WRZ was identified as having a deficit; however, due to an updated SDB, which takes into account data improvements, there is no longer an identified deficit in this WRZ. Therefore, no new supply option is required.	No deficit at Clara/Ferbane WRZ with updated SDB		
TG4-SA5-66	New GW abstraction at Clonfinlough area and new WTP for Clara/ Ferbane	This option involves a new abstraction from a poorly productive bedrock and requires the transfer of water via a pipeline over 6Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of water. As a result, the option is not considered feasible at coarse screening stage and would not be taken forward to fine screening stage.		•	
TG4-SA5-67	Increase SW abstraction from Gageborough River and upgrade Clara WTP to supply deficit for Clara/ Ferbane	When unconstrained options list were originally drawn up this WRZ was identified as having a deficit; however, due to an updated SDB, which takes into account data improvements, there is no longer an identified deficit in this WRZ. Therefore, no new supply option is required.	No deficit at Clara/Ferbane WRZ with updated SDB		
TG4-SA5-68	New SW abstraction from River Shannon at Shannonbridge and new WTP for Clara/ Ferbane	This option requires the transfer of water via a pipeline over 12Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of water. As a result, the option is not considered feasible at coarse screening stage and would not be taken forward to fine screening stage.		•	
TG4-SA5-69	New SW abstraction from River Brosna to supply deficit for Clara/ Ferbane	When unconstrained options list were originally drawn up this WRZ was identified as having a deficit; however, due to an updated SDB, which takes into account data improvements, there is no longer an identified deficit in this WRZ. Therefore, no new supply option is required.	No deficit at Clara/Ferbane WRZ with updated SDB		

Option Reference	Option Description	Rejection Reasoning	Resilience	Deliverability & Flexibility	Sustainability (Environmental and Social Impacts)
TG4-SA5-70	Interconnect Clara/Ferbane/Moyclare and South Roscommon Regional Water Supply Scheme (South Roscommon) (neighbouring scheme) for increased resilience and supply deficit from South Roscommon (network upgrade required)	This option involves the connection of Clara/Ferbane/Moyclare and South Roscommon WSS and requires the transfer of water via a pipeline over 16Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of water. As a result, the option is not considered feasible at coarse screening stage and would not be taken forward to fine screening stage.		•	
TG4-SA5-71	Interconnect Clara/Ferbane/Moyclare and Mullingar Regional for increased resilience and supply deficit from Mullingar (new source and network upgrades required)	This option involves the connection of Clara/Ferbane/Moyclare and Mullingar Regional and requires the transfer of water via a pipeline c.a 8Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of water. As a result, the option is not considered feasible at coarse screening stage and would not be taken forward to fine screening stage.		•	
TG4-SA5-31b	New GW abstraction in Ferbane Gravels for Clara/ Ferbane	When unconstrained options list were originally drawn up this WRZ was identified as having a deficit; however, due to an updated SDB, which takes into account data improvements, there is no longer an identified deficit in this WRZ. Therefore, no new supply option is required.	No deficit at Clara/Ferbane WRZ with updated SDB		
TG4-SA5-72	Supply deficit in Kilcormac WRZ from Ballyboy GWS (network upgrades required)	There is no data available on existing yield or existing infrastructure for this Group Water Scheme. To supply the Kilcormac WRZ, IW are currently abstracting from the same ground water body (Tulllamore) as the private scheme, and increased and new GW options have been assessed in other options. As a result, this option cannot be assessed fully at coarse screening stage and not taken forward to fine screening stage.		•	

Option Reference	Option Description	Rejection Reasoning	Resilience	Deliverability & Flexibility	Sustainability (Environmental and Social Impacts)
TG4-SA5-38a	Interconnect Mount Talbot/Four Roads, Mountbellew and Ballygar and supply deficit from new GW at South Roscommon	This option was identified as an unconstrained option as part of it was located in the Eastern Midlands region. However, this option is dependent on the preferred approach determination of a WRZ (Mount Talbot/ Four Roads) in the Eastern Midlands Region, supplying the deficit to WRZs in the North West region. This option will be assessed as part of the North West Regional Water Resources Plan, where the cumulative impact will be assessed	Option to be assessed as part of the North West Plan, as part of Study Area F		
TG4-SA5-40	Interconnect Mount Talbot/Four Roads, Mountbellew and Ballygar and supply deficit from new GW at South Roscommon	This option was identified as an unconstrained option as part of it was located in the Eastern Midlands region. However, this option is dependent on the preferred approach determination of a WRZ (Mount Talbot/ Four Roads) in the Eastern Midlands Region, supplying the deficit to WRZs in the North West region. This option will be assessed as part of the North West Regional Water Resources Plan, where the cumulative impact will be assessed	Option to be assessed as part of the North West Plan, as part of Study Area F		
TG4-SA5-73	Increase abstraction at Hollimshill BHs and upgrade Rahan - Holmshill WTP (Tullamore groundwater body - karstic bedrock)	Great uncertainty around groundwater availability for the full demand requirement. Option unlikely to address the full deficit. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG4-SA5-74	Increase abstraction at Agall Spring and upgrade Agall WTP (Tullamore groundwater body - karstic bedrock)	Great uncertainty around groundwater availability for the full demand requirement. Option unlikely to address the full deficit. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG4-SA5-75	Increase abstraction at Tully BHs and upgrade Rahan - Tully WTP (Tullamore groundwater body - karstic bedrock)	Great uncertainty around groundwater availability for the full demand requirement. Option unlikely to address the full deficit. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG4-SA5-76	New GW abstraction/wellfield at Holimshill-Killeigh Gavels groundwater body for Rahan	Great uncertainty around groundwater availability for the full demand requirement. Option unlikely to address the full deficit. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•

Option Reference	Option Description	Rejection Reasoning	Resilience	Deliverability & Flexibility	Sustainability (Environmental and Social Impacts)
TG4-SA5-77	New SW abstraction from River Clodiagh to supply deficit for Rahan	This option requires a new WTP and, although there is available yield, this option involves a high cost for new WTP for a relatively small supply (<50m3/day). It was therefore considered not feasible at coarse screening stage and would not be taken forward to fine screening stage.		•	
TG4-SA5-78	Rationalise Rahan WRZ to Tullamore (neighbouring scheme) and supply deficit from Tullamore WRZ (network upgrades required)	Great uncertainty around groundwater availability for the full demand requirement. Option unlikely to address the full deficit. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG4-SA5-79a	Interconnect Rahan and Tullamore WRZs for increased resilience (network upgrades required for improved connectivity of WRZs)	This option involves the upgrade of the network for 5 km (southern Raha-Tully P.W.S.). It also utilises an existing 6" and 100mm connections. Plan level assessments indicate that it is unlikely that the small deficit <100m3/day can be transferred through the existing connection. It was therefore considered not feasible at coarse screening stage and not taken forward to fine screening stage.		•	
TG4-SA5-80a	Rationalise Rahan WRZ to Clara/Ferbane/Moyclare and supply deficit (new source required, network upgrades required)	This option involves the rationalisation of Rahan WRZ to Clara/Ferbane/Moyclare and requires the transfer of water via a pipeline over 38Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of water. As a result, the option is not considered feasible at coarse screening stage due to age of water and possible sedimentation issues and was not taken forward to fine screening stage.		•	
TG4-SA5-85	WTP upgrade only	When unconstrained options list were originally drawn up this WRZ was not identified as having a deficit; however, due to an updated SDB, which takes into account data improvements, there is now an identified deficit in this WRZ. Therefore, a new supply option is required.	Rahan WRZ is not in deficit with updated SDB		
TG4-SA5-42b	New GW at Killeglan and upgrade of WTP for South Roscommon	This option was identified as an unconstrained option as part of it was located in the Eastern Midlands region. However, this option is dependent on the preferred approach determination of a WRZ (South Roscommon) in the Eastern Midlands Region, supplying the deficit to WRZs in the North West region. This option will be	Option to be assessed as part of the North West Plan, as part of Study Area F		

Option Reference	Option Description	Rejection Reasoning	Resilience	Deliverability & Flexibility	Sustainability (Environmental and Social Impacts)
		assessed as part of the North West Regional Water Resources Plan, where the cumulative impact will be assessed			
TG4-SA5-44	New SW abstraction from River Shannon for South Roscommon	This option is a repeat of Group 9 and as a result will not be assessed. Group 9 is taken forward to fine screening stage.	This option is a repeat and is assessed as part of a different feasible option.		
TG4-SA5-46a	Interconnect for South Roscommon and Athlone to supply deficits and increase resilience of WRZs	This option is a repeat of Group 9 and as a result will not be assessed. Group 9 is taken forward to fine screening stage.	This option is a repeat and is assessed as part of a different feasible option.		
TG4-SA5-52	New WTP at Killinure Lake to supply deficit in Athlone and for South Roscommon	A planning application for a new abstraction from Killinue Lake was withdrawn in 2020 for environmental reasons and, as a result, it was not taken forward to fine screening stage.			•

Study Area 5 - FS Rejection

Option Reference	Option Description	Rejection Reasoning	Resilience	Deliverability & Flexibility	Sustainability
TG4-SA5-06a	Leakage reduction targets for Athlone to partly remove deficit for Athlone WRZ and connect to South Roscommon via 1.6km of new watermain for	This option refers to a "Tactical Option" as planned works are underway across all our WRZs as part of the National Leakage Reduction Programme. However it is unlikely to meet the full deficit on its own. IW is committed to Leakage reduction and targets are included in SDB. As leakage reduction targets will progress in conjunction with other supply options, this option was screened out of the Preferred Approach development phase at coarse screening	This option is a tactical option and is unlikely to meet the full deficit. This will likely be implemented along with a new supply option.		

	resilience, connecting into existing 4mm				
TG4-SA5-06b	Advanced leakage reduction targets for Athlone to partly remove deficit for Athlone WRZ	This option refers to a “Tactical Option” as planned works are underway across all our WRZs as part of the National Leakage Reduction Programme. However it is unlikely to meet the full deficit on its own. IW is committed to Leakage reduction and targets are included in SDB. As leakage reduction targets will progress in conjunction with other supply options, this option was screened out of the Preferred Approach development phase at coarse screening	This option is a tactical option and is unlikely to meet the full deficit. This will likely be implemented along with a new supply option.		
TG4-SA5-21	New connection point from Tuam Regional Water Supply Scheme connecting Ballinasloe with total length of 46 km	This option requires a transfer of water via a pipeline over 69Km for a relatively small supply. Transferring small amount of water over long distances can affect the quality of water. It is also a high cost option. It is therefore considered not feasible due to age of water and sedimentation and would not be considered at the fine screening stage.		•	
TG4-SA5-22	New connection point from Galway City PWS connecting Ballinasloe with total length of 67 km	This option requires a transfer of water via a pipeline over 76Km for a relatively small supply. Transferring small amount of water over long distances can affect the quality of water. It is also a high cost option. It is therefore considered not feasible due to age of water and sedimentation and would not be considered at the fine screening stage.		•	
TG4-SA5-48	Leakage reduction targets for Athlone to partly remove deficit for Athlone WRZ and connect to South Roscommon via 1.6km of new watermain for resilience, connecting into existing 4mm	This option refers to a “Tactical Option” as planned works are underway across all our WRZs as part of the National Leakage Reduction Programme. However it is unlikely to meet the full deficit on its own. IW is committed to Leakage reduction and targets are included in SDB. As leakage reduction targets will progress in conjunction with other supply options, this option was screened out of the Preferred Approach development phase at coarse screening	This option is a tactical option and is unlikely to meet the full deficit. This will likely be implemented along with a new supply option.		