Summer 2023

Regional Water Resources Plan

North West

Appendix 1 Study Area A Technical Report

Data Disclaimer:

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

Baseline data included in the RWRP-NW has been incorporated from numerous sources including but not limited to National Planning Framework, Central Statistics Office, Regional Spatial and Economic Strategies, Local Authority data sets, Regional Assembly data sets and Uisce Éireann data sets. Data sources will be detailed in the relevant sections of the RWRP-NW. 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 A

This is the Technical Report for Study Area A 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 Framework Plan and the Regional Water Resources Plan –North West (RWRP-NW), which explain key concepts and terminology used throughout the report.

This Study Area includes 21 water resource zones located in County Donegal. 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-NW.

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 RWRP-NW, we apply this methodology to the North West 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.

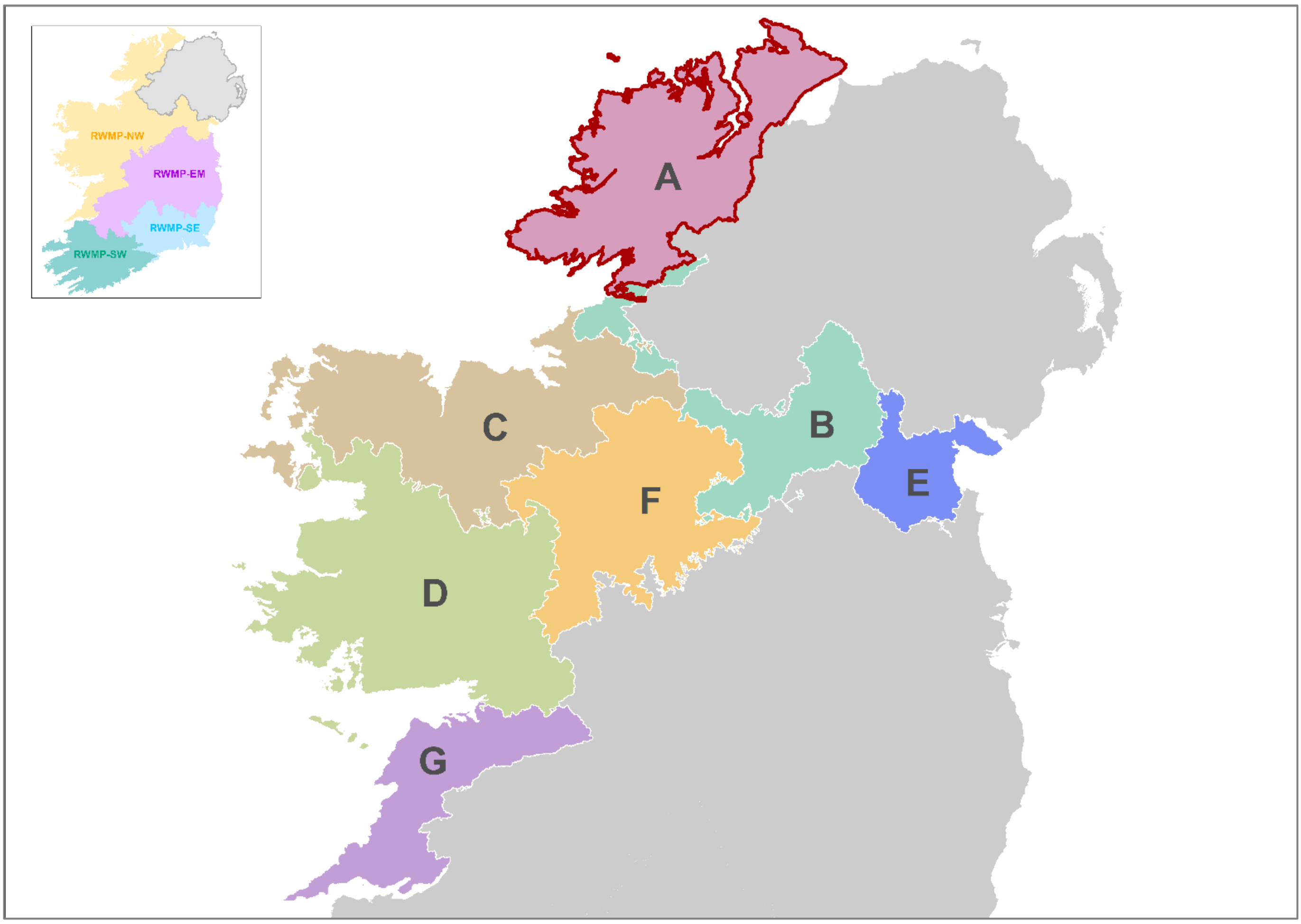

Figure 1.1 Overview of Study Areas within the North West Region

This Technical Report is for Study Area A (SAA), which consists of 21 individual water resource zones (WRZs). Within this Study Area, the Preferred Approach has been developed following the process shown in Figure 1.2 and as outlined in Section 8.3 of the Framework Plan.

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 TG1 refers the North West Region (Regional Group 1).

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 national plan. 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.

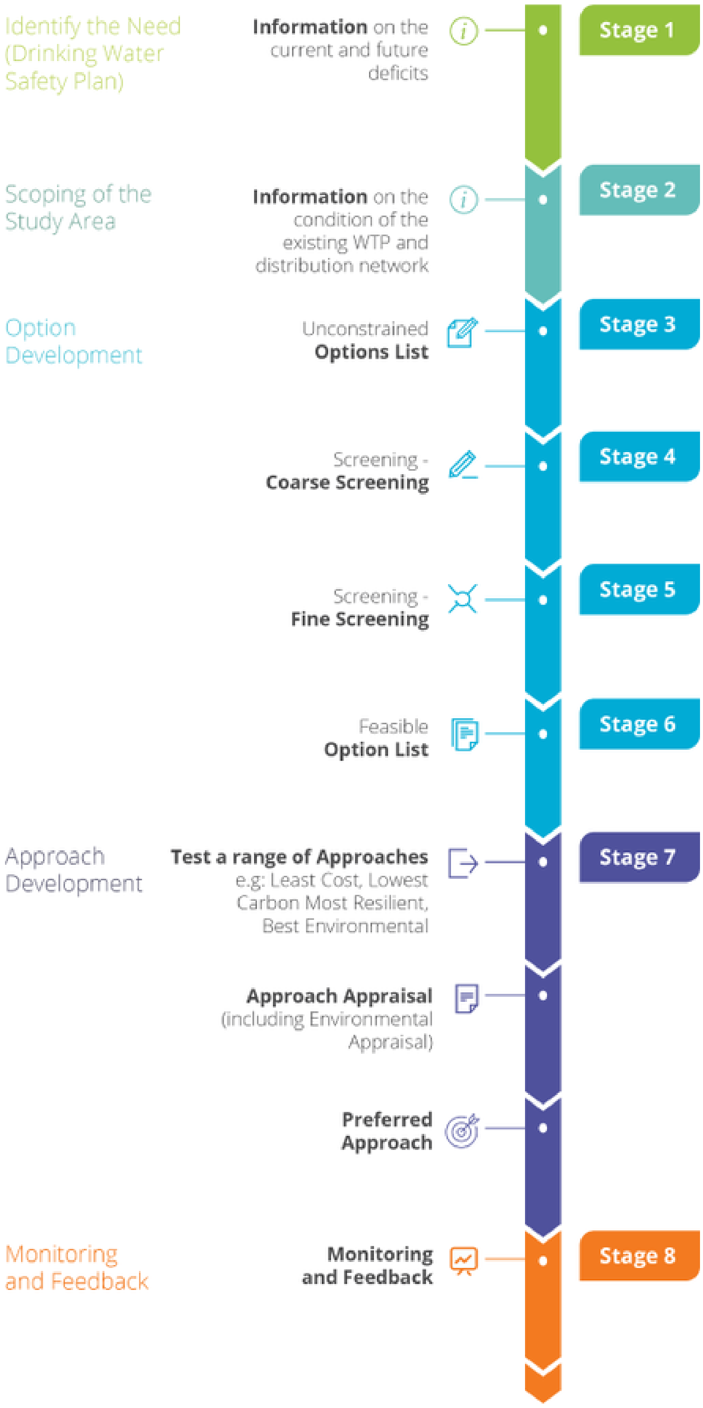

Figure 1.2 Option Assessment Methodology Process

1.2 Introduction to the Study Area

Study Area A consists of 21 WRZs supplying a population of approximately 149,598 people via approximately 4,012 kilometres of distribution network. SAA extends across the whole of County Donegal including Arranmore Island as the Study Area and County boundaries are aligned. Donegal is the most rural / least urbanised county in Ireland, with only around a third of the population living in urban areas. The town of Letterkenny is the largest demand centre, with other towns elsewhere including Buncrana, Ballybofey/ Stranorlar and Donegal Town. The sources of water supply consist of 31 surface water abstractions and 4 groundwater sites. The Study Area's water treatment plants (WTPs) and their associated source type are summarised in Figure 1.3. and Table 1.1.

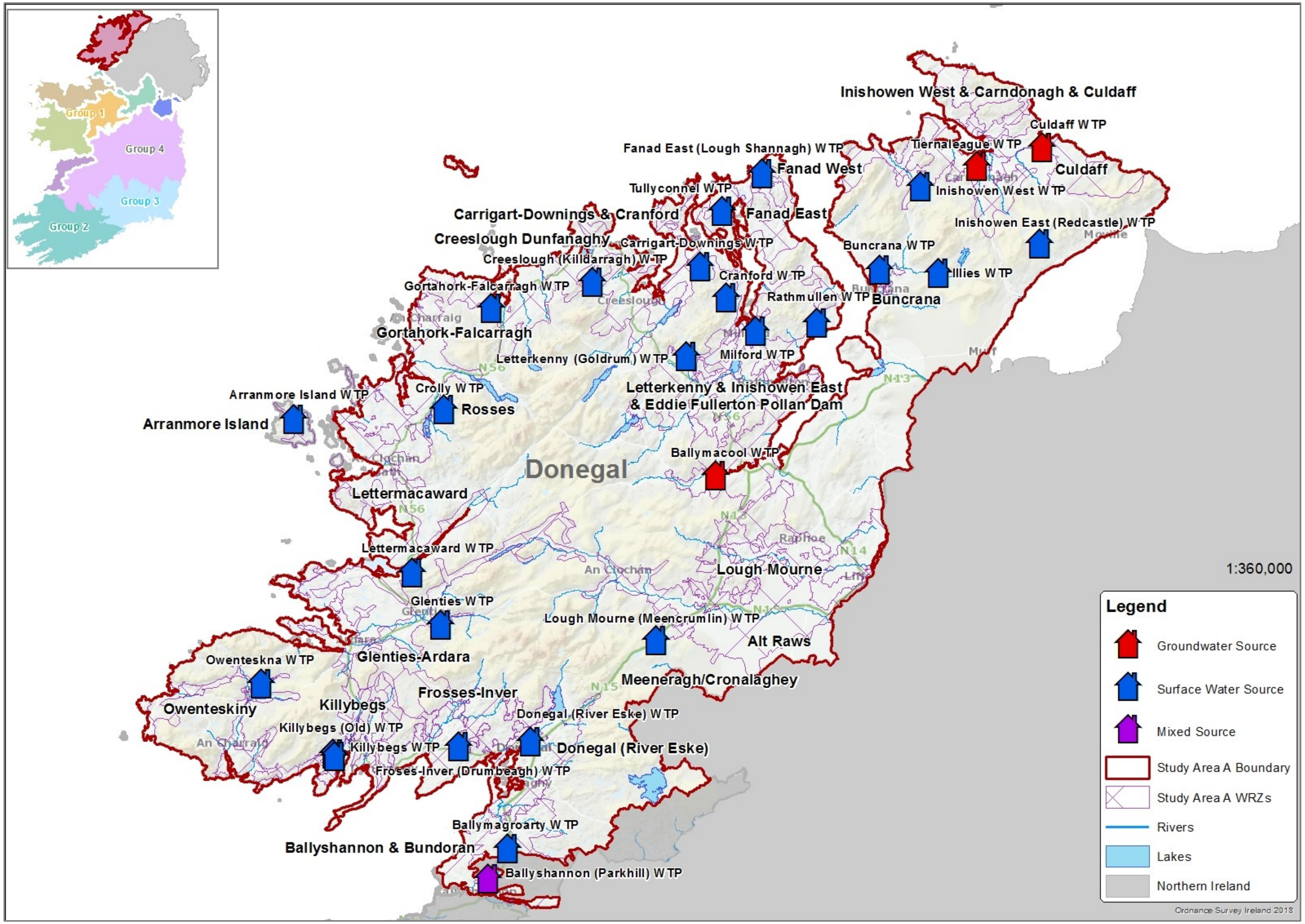

Figure 1.3 SA A Donegal Water Supply Study Area

Past glaciation processes have carved out a rugged landscape criss-crossed with mountains, blanket bog land and a deeply indented coastline with large sea inlets. Regarding surface water availability in SAA, the mountainous landscape and wet North Atlantic climate has formed a huge number of natural lake and river sources, mainly located around the Derryveagh Mountains and Blue Stack Mountains, two mountain ranges which dominate large parts of the Study Area. In the north of the Study Area, some larger lakes surrounding the Derryveagh Mountains include Lough Beagh (Veagh) and Glen Lough in the River Lackagh sub-catchment, Gartan Lough and Lough Fern in the Leannan River sub-catchment, and Lough Nacung in the River Clady sub-catchment which has been impounded as part of an ESB hydro scheme. In the south of the Study Area, the huge cross border River Erne catchment (HA 36) travels through SAA for a small distance as the Erne flows through Assaroe Lake, another reservoir created by ESB with their hydro scheme at Kathleen Falls dam, before entering the sea at Ballyshannon. Whilst in the east of the Study Area, the landscape is dominated by the large cross border River Foyle catchment (HA 01) as the tributary rivers Finn, Mourne and Deel flow east to join the Foyle along the Northern Ireland border before turning north out to sea at the Lough Foyle estuary. Over the last 50 years many of the smaller natural lake sources around the Study Area have been impounded and raised to provide secure water supply sources for the region. With 21no. registered impounding reservoir supply sources, SAA has far more than any other Study Areas in the country.

SAA has an expansive network of designated areas including 46no. Special Areas of Conservation (SACs) and Ireland's second biggest National Park, Glenveagh. Notable SACs including the large Cloghernagore Bog and Glenveagh National Park SAC, River Finn SAC, and Leannan River SAC. Furthermore, SAA has several waterbodies with High Status Objectives (HSOs) including 6no. *Margaritifera* (Freshwater Pearl Mussel) SAC catchments designated for the protection of the species by the National Parks and Wildlife Service (NPWS).

Regarding the surface water supplies, around 95% of the total water supplies for SAA come from surface water sources with the majority being from small lake sources, both natural and impounding reservoirs. The largest abstraction in the Study Area is the Eddie Fullerton Pollan Dam source on Inishowen peninsula, which feeds the Illies WTP to supply the Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam WRZ which is by far the largest zone in the Study Area. The Eddie Fullerton Pollan Dam reservoir was created from impounding Crana River, currently supplying up to 14,000 m^3/day but has an existing water abstraction order allowing up to 20,500 m^3/day when in conjunction with maintaining compensation flow releases from the dam to the downstream. Also suppling this large Letterkenny zone, is the Goldrum Letterkenny WTP, which can supply up to 12,000 m^3/day by abstracting from 3no. small reservoir sources – Lough Salt, Keel and Greenan. Elsewhere in the Study Area, there is another significant surface water abstraction at the Lough Mourne source, which feeds the Lough Mourne (Meencrumlin) WTP to supply up to 9,200 m^3/day to the Lough Mourne WRZ – the second largest zone in the Study Area.

Regarding groundwater availability, the predominant aquifer type of the area is made up of poorly productive bedrock (91%), followed by, productive fissured (3%), karstic (2%) and sand and gravel (0.5%). Surface water abstractions dominate the total water supply for the region, highlighting the vast areas underlain by poorly productive aquifers with lower potential.

The geology of Co. Donegal most closely resembles that of Co. Mayo, with Dalradian age metamorphic rocks dominant. These rocks were metamorphosed or altered into gneiss, schists and quartzites during the Grenvillian Orogeny (700 Ma) and gave rise to some of the areas more mountainous regions, including Errigal Mountain. Around 405 Ma, six granite masses were injected into the older rocks, with the main Donegal Granite being the largest. There are no Ordovician or Silurian rocks in Donegal and only a small patch of Devonian sandstones along the northern shore of Donegal Bay. The Precambrian rocks and Granites are characterised by the absence of an intergranular permeability and the presence of low fissure permeability. The marbles may contain some enhanced permeability zones which could provide a domestic or farm supply or small group scheme. Yields are lowest in the fine-grained schists (pelites) where wells may fail to provide even a domestic yield. Well yields are greater in the coarser grained rocks such as the quartzites, but even in these rocks yields greater than 100 m^3/day would be unusual.

Overall, 9 groundwater sources (4 sites) are managed by Uisce Éireann in the region, with the majority of the larger abstractions (100-400 m^3/day) taking place from boreholes either sited in sand and gravels or from karstic bedrock. The karst, although considered a regionally important aquifer, represents less than 2% of the Study Area. These Dinantian Pure Bedded Limestones are largely unexplored in Donegal. Locating high yielding wells in Rkc aquifers can be difficult due to the uneven distribution of permeability; failed and high yielding wells can occur close together. Aquifer storage is low, and rapid flow-through means that the conduit karst aquifers are typified by erratic and unpredictable groundwater supplies. Where the development of karst has resulted in a more diffuse network of flow pathways (Rkd type aquifers), the distribution of permeability, and hence yield, is more homogenous. This is observed further south near Ballyshannon, which consists of a spring and two boreholes, used to augment the spring supply at times of low flow. The scheme abstracts in the region of 450 m^3/day. The gravels at Letterkenny are classified as a locally important aquifer (Lg), with the scheme originally able to supply upwards of 2,200 m^3/day. It should be noted the local classification here, which would suggest long term resilience from these relatively small gravels may pose a risk. A relatively large abstraction does take place at Culdaff, which consists of a borehole sited in the generally poorly productive Precambrian marbles. The scheme abstracts in the region of 550 m^3/day, however a large fracture/cavity zone is likely providing significant pathways for groundwater movement.

Table 1.1 Study Area A Donegal

Donegal	Total Population	149,598	Total Network Length (km)	4,012	Number of Water Resource Zones		21
Counties in Study Area	Donegal						
Principal Settlements	Letterkenny, Buncrana, Ballybofey-Stranorlar, Carndonagh, Donegal, Moville, Lifford, Ballyshannon, An Clochán Liath, An Bun Beag-Doirí Beaga, Raphoe, Greencastle, Muff, Castlefin, Killygordan, Convoy, St. Johnston, Burnfoot, Bun Na Leaca, Newtowncunningham, Ardara, Glenties, Ramelton, An Fál Carrach, Laghy, Anagaire, Kilmacrennan, Carrigans, Ballyliffin, Dunkineely, Killybegs, Mountcharles, Clonmany, Manorcunningham, An Charraig, Ballindrait, Tievebane, Carrowkeel, Creeslough, Bridge End, Rathmullan						
Number of Water Sources	35	Surface Water Sources	31		Groundwater Sources	4	
Water Treatment Plant	**Source**	**Population**	**WTP Capacity (m³/day)**	**Quality**	**Quantity**	**Reliability**	**Potential Sustainability**
Ballymagroarty WTP	Lough Gorman	770	800	●	●	●	●
Owenteskna WTP	Lough Nalughraman	2,871	2,400	●	●	●	●
Ballymacool WTP	Groundwater	1,971	1,600	●	●	●	●
Culdaff WTP	Groundwater	1,068	500	●	●	●	●
Letterkenny (Goldrum) WTP	Lough Salt, Keel, Greenan	26,630	12,000	●	●	●	●
Bundoran (Lough Melvin) WTP	Lough Melvin	3,438	3,500	●	●	●	●
Ballyshannon (Parkhill) WTP	Lough Unshin & Groundwater	2,894	1,450	●	●	●	●
Donegal (River Eske) WTP	River Eske	6,092	3,000	●	●	●	●

Water Treatment Plant	Source	Population	WTP Capacity (m³/day)	Quality	Quantity	Reliability	Potential Sustainability
Frosses - Inver (Drumbeagh) WTP	Glencoagh Lough & St. Peters Lough	4,425	2,200	●	●	●	●
Killybegs (Old) WTP	Lough Aroshin Intake	4,567	-	●	●	●	●
Killybegs WTP	Lough Aderry Intake	4,567	6,800	●	●	●	●
Lough Mourne (Meencrumlin) WTP	Lough Mourne	21,689	9,200	●	●	●	●
Creeslough (Killdarragh) WTP	Lough Agher & Muckish	3,065	3,333	●	●	●	●
Glenties WTP	Lough Anna	3,602	1,400	●	●	●	●
Lettermacaward WTP	Lough Derkmore-Impoundment	2,241	1,200	●	●	●	●
Arranmore Island WTP	Lough Shore	471	600	●	●	●	●
Crolly WTP	Lough Keel Intake	9,390	4,900	●	●	●	●
Gortahork - Falcarragh WTP	Lough Lagha	3,936	2,280	●	●	●	●
Rathmullan WTP	Gort lough	436	1,800	●	●	●	●
Milford WTP	Lough Columbkille	2,609	2,500	●	●	●	●
Cranford WTP	Lough Nacreaght	828	733	●	●	●	●
Carrigart - Downings WTP	Lough Nambraddan & Lough Nameeltoge	1,518	800	●	●	●	●

Water Treatment Plant	Source	Population	WTP Capacity (m³/day)	Quality	Quantity	Reliability	Potential Sustainability
Fanad East (Lough Shannagh) WTP	Shannagh Lake	305	550	●	●	●	●
Tullyconnel WTP	Lough Naglea	1,108	900	●	●	●	●
Inishowen East (Redcastle) WTP	Lough Fag	5,713	1,320	●	●	●	●
Illies WTP	Crana River Eddie Fullerton Pollan Dam	19,967	14,000	●	●	●	●
Buncrana WTP	Lough Doo	3,775	1,920	●	●	●	●
Tiernaleague WTP	Groundwater	6,229	1,300	●	●	●	●
Inishowen West WTP	Lough Fad	3,265	2,750	●	●	●	●

Score	Uisce Éireann 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 A, 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, Uisce Éireann is developing scientifically robust datasets to assign risk. Uisce Éireann 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 SAA 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**
Ballymagroarty WTP	●	●	●	●
Owenteskna WTP	●	●	●	●
Ballymacool WTP	●	●	●	●
Culdaff WTP	●	●	●	●
Letterkenny (Goldrum) WTP	●	●	●	●
Bundoran (Lough Melvin) 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**
Ballyshannon (Parkhill) WTP	●	●	●	●
Donegal (River Eske) WTP	●	●	●	●
Frosses - Inver (Drumbeagh) WTP	●	●	●	●
Killybegs (Old) WTP	●	●	●	●
Killybegs WTP	●	●	●	●
Lough Mourne (Meencrumlin) WTP	●	●	●	●
Creeslough (Killdarragh) WTP	●	●	●	●
Glenties WTP	●	●	●	●
Lettermacaward WTP	●	●	●	●
Arranmore Island WTP	●	●	●	●
Crolly WTP	●	●	●	●
Gortahork - Falcarragh WTP	●	●	●	●
Rathmullan WTP	●	●	●	●
Milford WTP	●	●	●	●
Cranford WTP	●	●	●	●
Carrigart - Downings WTP	●	●	●	●
Fanad East (Lough Shannagh) WTP	●	●	●	●
Tullyconnel WTP	●	●	●	●
Inishowen East (Redcastle) WTP	●	●	●	●
Illies WTP	●	●	●	●
Buncrana 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**
Tiernaleague WTP	●	●	●	●
Inishowen West WTP	●	●	●	●

Score	Uisce Éireann 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 Uisce Éireann assessment of the asset capability standard compared with the asset standard set out in Section 5.7 of the Framework Plan.

Based on the barrier assessment, 23 of the 29 WTPs in the Study Area are considered to be at high risk of failing to achieve the required standards in relation to barrier and viruses (Barrier 1) chlorine residuals in our networks (Barrier 2.1) and effectiveness of our Protozoa removal processes (Barrier 3). 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.

At present, there are 3 WRZs in SAA on the EPA RAL, which are Glenties-Ardara, Letterkenny/Milford & Inishowen RWSS & Inishowen East and Lettermacaward.

Uisce Éireann is currently progressing immediate corrective action in advance of the NWRP for a number of supplies within SAA. A national programme to improve disinfection standards (Barrier 1) at water treatment facilities across Ireland was initiated by Uisce Éireann 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 SAA

Critical Water Quality Requirements	Progress
1. **Rosses:** Crolly WTP Upgrade to improve drinking water treatment standards at the WTP that will benefit over 12,500 people.	Ongoing
2. **Letterkenny Regional Water Supply Scheme:** Project to improve drinking water quality, reduce disruption to supply and improve water supply security and water pressure for businesses and residents in Letterkenny and the surrounding area. Project has resulted in the Letterkenny Regional Water Supply Scheme being removed from the EPA's RAL.	Ongoing
3. **Glenties Ardara RAL Proposed Action:** Installation of membrane filtration system to address the raw water colour and organic content and minimise THM formation.	Ongoing
4. **Ballymagroarty RAL Proposed Action:** Installation of GAC system for removal of organics to minimise THM formation	Complete
5. **Milford RAL Proposed Action** Trials are ongoing to identify the preferred solution to address elevated levels of THMs.	Ongoing
6. **Lettermacaward RAL:** Uisce Éireann to develop the plan to address the issue.	Scoping
7. **Owenteskna Water Supply Scheme** Construction of new WTP and reservoir ensuring a reliable supply of high quality drinking water and security of supply. The project resulted in removal from EPA's Remedial Action List.	Complete
8. **Gortahork/Falcarragh Water Supply Scheme** Project involves construction of a new water treatment plant immediately adjacent to the current site, and on site treated water storage. The project resulted in removal from EPA's Remedial Action List.	Complete
9. **Killybegs** A project is currently progressing to upgrade the Water Treatment Plant at the existing site as well as provision of sludge treatment facilities and ensuring compliance with EU Drinking Water Regulations in improvements to the local environment and surface water.	Ongoing
10. **Culdaff** Upgrade of this WTP is underway	Ongoing
11. **Reservoir Cleaning Programme:** A major reservoir cleaning programme has been undertaken at 40 sites, which has reduced network water quality issues.	Complete
12. **Donegal Water Main Rehabilitation Project:** Replacement and rehabilitation of approximately 40 kilometres of old water mains across multiple sites in County Donegal to improve water supply and tackle the high levels of leakage.	Complete

Critical Water Quality Requirements	Progress
13. Disinfection Programme: In 2016, Uisce Éireann completed a national review of all water treatment plants where disinfection upgrades were required. This review was followed by a programme of works to complete any required upgrades. To date, the disinfection programme has completed upgrade works at 10 of the 21 WRZs in SAA, based on assessed priority basis. • Arranmore Island WTP • Buncrana WTP • Bundoran (Lough Melvin) WTP • Carrigart - Downings WTP • Cranford WTP • Crolly WTP • Donegal (River Eske) WTP • Fanad East (Lough Shannagh) WTP • Frosses - Inver (Drumbeagh) WTP • Inishowen East (Redcastle) WTP • Inishowen West WTP • Lough Mourne (Meencrumlin) WTP • Milford WTP • Tiernaleague WTP • Tullyconnel WTP Any requirements within the remaining 11 supplies will be identified via Drinking Water Safety Plans with solutions developed as part of the NWRP.	**Complete**

In summary, in relation to water quality, Uisce Éireann 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.

2.2 Water Quantity – Supply Demand Balance

Uisce Éireann 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.

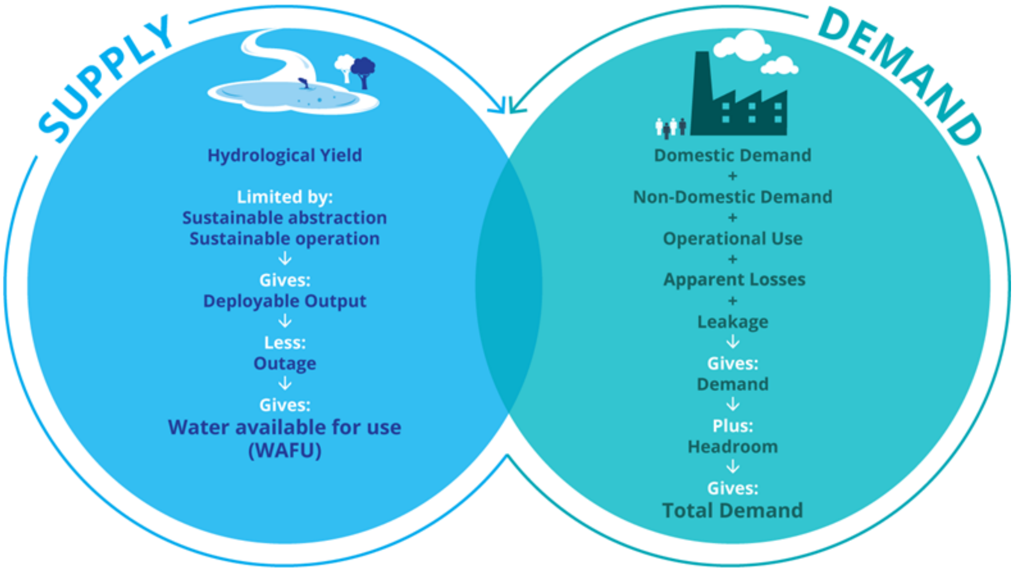

Figure 2.1 Supply Demand Balance

For each of the 21 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 (Normal Year Annual Average, Dry Year Annual Average, Dry Year Critical Period, Winter Critical Period) which described in Chapter 2 of the Framework Plan. The SDB deficits in SAA 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, Uisce Éireann 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:** 18 out of 21 water resource zones 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 recent drought periods, a number of sources in SAA had issues. In summer 2018, low water levels were experienced for surface water sources supplying Carrigart Downings and Lettermacaward, and instream pumping was required.

A summary of the SDB deficit across all 21 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 (DYCP)

Water Resource Zone Name	Water Resource Zone code	Population	Maximum Deficit m^3/day					
			2019	2025	2030	2035	2040	2044
Fanad East	0600SC0047	305	-895	-902	-909	-915	-921	-926
Fanad West	0600SC0046	1,108	-566	-578	-587	-594	-601	-606
Buncrana	0600SC0045	3,775	-1,364	-1,395	-1,423	-1,448	-1,473	-1,493
Carrigart-Downings & Cranford	0600SC0043	2,346	-295	-318	-343	-419	-445	-467
Creeslough Dunfanaghy	0600SC0039	3,065	-1,903	-1,949	-1,990	-2,024	-2,058	-2,084
Lettermacaward	0600SC0038	2,241	-1,380	-1,400	-1,414	-1,437	-1,462	-1,482
Frosses-Inver	0600SC0036	4,425	-1,183	-1,240	-1,286	-1,320	-1,354	-1,380
Glenties-Ardara	0600SC0035	3,602	-1,144	-1,174	-1,200	-1,226	-1,253	-1,273
Ballyshannon &Bundoran	0600SC0030	7,103	-1,688	-1,579	-1,636	-1,701	-1,767	-1,820
Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam	0600SC0029	62,049	-13,982	-14,529	-15,273	-16,025	-16,785	-17,393
Lough Mourne	0600SC0028	21,689	-4,751	-4,921	-5,173	-5,338	-5,493	-5,616
Gortahork-Falcarragh	0600SC0026	3,936	-580	-616	-651	-685	-719	-746
Owenteskiny	0600SC0013	2,871	-2,197	-2,301	-2,375	-2,413	-2,444	-2,469
Culdaff	0600SC0012	1,068	-488	-499	-509	-518	-528	-535
Donegal (River Eske)	0600SC0010	6,092	-2,024	-2,058	-2,153	-2,208	-2,252	-2,288
Killybegs	0600SC0009	4,567	No Deficit	No Deficit	No Deficit	No Deficit	No Deficit	No Deficit

Water Resource Zone Name	Water Resource Zone code	Population	Maximum Deficit m³/day					
			2019	2025	2030	2035	2040	2044
Water Resource Zone Name	Water Resource Zone code	Population	Maximum Deficit m³/day					
			2019	2025	2030	2035	2040	2044
Arranmore Island	0600SC0007	471	-206	-219	-230	-238	-246	-252
Rosses	0600SC0006	9,390	-3,026	-3,051	-3,192	-3,299	-3,402	-3,484
Inishowen West & Carndonagh & Culdaff	0600SC0001	9,494	-2,785	-2,897	-2,995	-3,072	-3,147	-3,207
Alt Raws	0600PRI3077	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Meeneragh/ Cronalaghey	0600PRI3078	No Data	No Data	No Data	No Data	No Data	No Data	No Data

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 40,455 m^3/day. As a result, while we can continue to supply water, the 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 supply demand balance deficit will increase to approximately 47,522 m^3/day by 2044.

Our ongoing activities to improve the Supply Demand Balance in SAA 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 throughout SAA. Uisce Éireann & the Local Authority Water Services sections will continue to monitor the performance of all water mains in the network to ensure that the most problematic mains are replaced as required.

A significant amount of watermain rehabilitation has been carried out, to date, across Study Area A. 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.

During the drought in summer 2018, a number of water sources experienced issues including the source for Carrigart Downings and Lettermacaward, and instream pumping was required.

During our needs assessment Uisce Éireann identified a number of these critical requirements and progress to date on these projects is summarised in Table 2.4

Table 2.4 SAA Critical Infrastructure Projects and Need Identification

Critical Requirement	Progress
1. **Lettermacaward:** Low levels during DYCP and instream pumping has been required in a past. A project is currently progressing to upgrade the existing Water Treatment Plant as well as increasing storage on site. The project will also involve the construction of a new watermain from Derkmore Lough to the WTP. This project will improve security of supply, along with drinking water quality.	Ongoing
2. **Distribution Network Repairs and Upgrades:** Rolling programme of active leakage control, pressure management, find and fix and network upgrades	In Progress

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 Uisce Éireanns 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 Deployable Output. 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 pending Abstraction Legislation on the SAA supplies, we have assessed the potential impacts on our 31 no. surface water abstractions: Lough Shore (Arranmore Island), Lough Melvin (Ballyshannon & Bundoran), Lough Unshin (Ballyshannon & Bundoran), Lough Gorman (Ballyshannon & Bundoran), Lough Doo (Buncrana), Lough Nambraddan (Carrigart-Downings & Cranford), Lough Nameeltoge (Carrigart-Downings & Cranford), Lough Nacreaght (Carrigart-Downings & Cranford), Muckish (Creeslough Dunfanaghy), Lough Agher (Creeslough Dunfanaghy), River Eske (Donegal (River Eske)), Shannagh Lake (Fanad East), Lough Naglea (Fanad West), St. Peters Lough (Frosses-Inver), Glencoagh Lough (Frosses-Inver), Lough Anna (Glenties-Ardara), Lough Lagha (Gortahork-Falcarragh), Lough Fad (Inishowen West & Carndonagh & Culdaff), Lough Aderry Intake (Killybegs), Crana River/Eddie Fullerton Pollan Dam (Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam), Lough Salt (Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam), Lough Keel (Letterkenny/Milford & Inishowen RWSS & Inishowen East Lough Greenan (Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam), Lough Columbkille (Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam), Gort lough (Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam), Lough Fag (Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam), Lough Derkmore-Impoundment (Lettermacaward), Lough Mourne (Lough Mourne), Lough Nalughraman (Owenteskiny), and Lough Keel Intake (Rosses).

Table 2.5 presents the findings of this assessment in order to indicate the potential reductions to abstraction that may be required at our existing surface water sources. These reductions are based on estimates of the level of reductions that a potential future regulatory regime may require, taking a conservative and precautionary approach. 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 during dry weather flows.

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

Table 2.6 shows the Letterkenny/Milford & Inishowen RWSS & Inishowen East WRZ could have the most significant impacts to SDB based on the theoretical future abstraction at the Eddie Fullerton Pollan Dam reservoir source. However, it is assumed that under the new regulatory regime the existing historical abstraction licence conditions (up to 20,500 m^3/d) may be preserved, allowing the current abstraction rates to be maintained and additionally for the source to be potentially developed to meet future projected deficits. This assumption is based on the appropriate enforcement of the compensation flow releases from the dam to the downstream, as detailed in the existing licence.

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[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

Source (WRZ)	Current abstraction (m^3/day)	Hydrological yield (m^3/day)	Theoretical future abstraction limit (m^3/day)
Lough Shore (Arranmore Island)	550	402	64
Lough Melvin (Ballyshannon & Bundoran)	3,208	192,700	39,061
Lough Unshin (Ballyshannon & Bundoran)	1,329	2,011	411
Lough Gorman (Ballyshannon & Bundoran)	733	1,024	289
Lough Doo (Buncrana)	1,760	293	26
Lough Nambraddan (Carrigart-Downings & Cranford)	733	414	127
Lough Nameeltoge (Carrigart-Downings & Cranford)		355	27
Lough Nacreaght (Carrigart-Downings & Cranford)	672	697	157
Muckish (Creeslough Dunfanaghy)	3,055	54	17
Lough Agher (Creeslough Dunfanaghy)		902	88
River Eske (Donegal (River Eske))	2,750	4,830	1,549
Shannagh Lake (Fanad East)	504	2,065	396
Lough Naglea (Fanad West)	825	271	39
St. Peters Lough (Frosses-Inver)	2,017	807	121
Glencoagh Lough (Frosses-Inver)		942	242
Lough Anna (Glenties-Ardara)	1,283	2,515	103
Lough Lagha (Gortahork-Falcarragh)	2,090	2,499	356
Lough Fad (Inishowen West & Carndonagh & Culdaff)	2,521	2,065	231
Lough Aderry Intake (Killybegs)	6,233	12,326	1,826
Crana River Eddie Fullerton Pollan Dam (Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam)	12,833	21,999	2,296

Source (WRZ)	Current abstraction (m^3/day)	Hydrological yield (m^3/day)	Theoretical future abstraction limit (m^3/day)
Lough Salt (Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam)	11,000	1,022	136
Lough Keel (Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam)		2,237	310
Lough Greenan (Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam)		788	75
Lough Columbkille (Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam)	2,292	588	100
Gort lough (Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam)	1,650	633	167
Lough Fag (Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam)	1,210	365	85
Lough Derkmore-Impoundment (Lettermacaward)	1,100	1,598	343
Lough Mourne (Lough Mourne)	8,433	7,549	1,892
Lough Nalughraman (Owenteskiny)	2,200	1,686	231
Lough Keel Intake (Rosses)	4,492	3,800	921

The potential change to the SDB[4] for each WRZ, as a result of these potential reductions in abstraction during dry weather flows are summarised in Table 2.6.

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

Source (WRZ)	Potential change in SDB (m^3/day)
Lough Shore (Arranmore Island)	-300
Lough Melvin (Ballyshannon & Bundoran)	-967
Lough Unshin (Ballyshannon & Bundoran)	
Lough Gorman (Ballyshannon & Bundoran)	

[4] Based on the potential changes to the projected WRZ supply demand balance (SDB) figure for the dry year critical period (DYCP) 2044 future scenario.

Source (WRZ)	Potential change in SDB (m^3/day)
Lough Doo (Buncrana)	-236
Lough Nambraddan (Carrigart-Downings & Cranford)	-1,076
Lough Nameeltoge (Carrigart-Downings & Cranford)	
Lough Nacreaght (Carrigart-Downings & Cranford)	
Muckish (Creeslough Dunfanaghy)	-791
Lough Agher (Creeslough Dunfanaghy)	
River Eske (Donegal (River Eske))	-1,486
Shannagh Lake (Fanad East)	None
Lough Naglea (Fanad West)	-215
St. Peters Lough (Frosses-Inver)	-1,229
Glencoagh Lough (Frosses-Inver)	
Lough Anna (Glenties-Ardara)	-1,187
Lough Lagha (Gortahork-Falcarragh)	-1,774
Lough Fad (Inishowen West & Carndonagh & Culdaff)	-1,624
Lough Aderry Intake (Killybegs)	-3,005
Crana River_Eddie Fullerton Pollan Dam (Letterkenny/Milford & Inishowen RWSS & Inishowen East)	-15,349
Lough Salt (Letterkenny/Milford & Inishowen RWSS & Inishowen East)	
Lough Keel (Letterkenny/Milford & Inishowen RWSS & Inishowen East & Eddie Fullerton Pollan Dam)	
Lough Greenan ((Letterkenny/Milford & Inishowen RWSS & Inishowen East & Eddie Fullerton Pollan Dam)	
Lough Columbkille (Letterkenny/Milford & Inishowen RWSS & Inishowen East & Eddie Fullerton Pollan Dam)	
Gort lough ((Letterkenny/Milford & Inishowen RWSS & Inishowen East & Eddie Fullerton Pollan Dam)	
Lough Fad (Letterkenny/Milford & Inishowen RWSS & Inishowen East & Eddie Fullerton Pollan Dam)	

Source (WRZ)	Potential change in SDB (m^3/day)
Lough Derkmore-Impoundment (Lettermacaward)	-796
Lough Mourne (Lough Mourne)	-5,013
Lough Nalughraman (Owenteskiny)	-1,289
Lough Keel Intake (Rosses)	-2,551

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.

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. Uisce Éireann does not 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, Uisce Éireann has developed an initial assessment based on available information, included in Appendix G of the Framework Plan. Over the coming years, Uisce Éireann 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.

On an interim basis Uisce Éireann 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, Uisce Éireann 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

Study Area A has 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 and Sustainability

Quality	Upgrades required at all WTPs.
Quantity	Nett leakage reduction 634 m^3/day in the region. Additional Leakage Targets of 20,605 m^3/day to achieve SELL and reduce leakage levels to 21% of demand in WRZs with demand in excess of 1,500 m^3/day.
	Interim additional supplies of 40,455 m^3/day within 10 years.
	Total of 47,522 m^3/day additional supplies beyond the 10-year horizon.
Reliability	Continued network upgrades and improvements in the bulk and distribution networks and storage.
Sustainability	Based on this initial assessment, the volumes of water abstracted at Lough Shore (Arranmore Island), Lough Unshin (Ballyshannon & Bundoran), Lough Gorman (Ballyshannon & Bundoran), Lough Doo (Buncrana), Lough Nambraddan (Carrigart-Downings & Cranford), Lough Nameeltoge (Carrigart-Downings & Cranford), Lough Nacreaght (Carrigart-Downings & Cranford), Muckish (Creeslough Dunfanaghy), Lough Agher (Creeslough Dunfanaghy), River Eske (Donegal (River Eske)), Shannagh Lake (Fanad East), Lough Naglea (Fanad West), St. Peters Lough (Frosses-Inver), Glencoagh Lough (Frosses-Inver), Lough Anna (Glenties-Ardara), Lough Lagha (Gortahork-Falcarragh), Lough Fad (Inishowen West & Carndonagh & Culdaff), Lough Aderry Intake (Killybegs), Crana River Eddie Fullerton Pollan Dam (Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam), Lough Salt (Letterkenny/Milford& Inishowen RWSS & Inishowen East), Lough Keel (Letterkenny/Milford & Inishowen RWSS & Inishowen East & Eddie Fullerton Pollan Dam)), Lough Greenan (Letterkenny/Milford & Inishowen RWSS & Inishowen East& Eddie Fullerton Pollan Dam)), Lough Columbkille (Letterkenny/Milford & Inishowen RWSS & Inishowen East & Eddie Fullerton Pollan Dam)), Gort lough (Letterkenny/Milford & Inishowen RWSS & Inishowen East & Eddie Fullerton Pollan Dam)), Lough Fad (Letterkenny/Milford & Inishowen RWSS & Inishowen East & Eddie Fullerton Pollan Dam)), Lough Derkmore-Impoundment (Lettermacaward), Lough Mourne (Lough Mourne), Lough Nalughraman (Owenteskiny), and Lough Keel Intake (Rosses) 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, Uisce Éireann 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 A

3 Solution Types Considered in Study Area A

In this chapter, we summarise the type of solutions we have considered to address identified need for treated drinking water supply in Study Area A.

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 SAJ as part of our unconstrained options, the following options have been reviewed.

3.1 Leakage Reduction

The Leakage reduction measures across the public water supply considered for SAA 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);
- Net leakage reductions targets listed in **Error! Reference source not found.** have been a pplied 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/day, see Table 3.1.

Table 3.1 SELL Targets for WRZ in SAA

WRZ	Net Leakage Reduction applied to SDB (m^3/day)	Additional leakage Targets to achieve SELL and reduce leakage levels to 21% of demand in WRZs with demand in excess of 1,500 m^3/day (m^3/day)	Total Leakage Targets (m^3/day)
Inishowen West & Carndonagh & Culdaff		1,104	1,104
Rosses	95	1,119	1,214
Arranmore Island		17	17
Killybegs		604	604
Donegal (River Eske)	63	1,227	1,290
Owenteskiny		1,678	1,678
Gortahork-Falcarragh		620	620
Lough Mourne	95	1,623	1,718
Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam	254	7,974	8,228

WRZ	Net Leakage Reduction applied to SDB (m^3/day)	Additional leakage Targets to achieve SELL and reduce leakage levels to 21% of demand in WRZs with demand in excess of 1,500 m^3/day (m^3/day)	Total Leakage Targets (m^3/day)
Ballyshannon & Bundoran	127	1,815	1,942
Glenties-Ardara		594	594
Frosses-Inver		785	785
Lettermacaward		786	786
Creeslough Dunfanaghy		659	659

3.2 Water Conservation

At present, Uisce Éireann 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 SAA and include:

- Standalone groundwater options across the region
- Standalone surface water options across the region
- Rationalisations
- Transfers
- Water Treatment Plant Upgrades for water quality purposes
- Desalination
- Other

4

Option Development SAA

4 Option Development for Study Area A

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, Uisce Éireann 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 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, Uisce Éireann 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 SAA, 350 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 SAA Unconstrained Options

No. of Options	Option Type
37	Groundwater
168	Surface water
82	Rationalisation
59	Transfers
1	Upgrade WTP (WQ only)
1	Desalination
2	Other

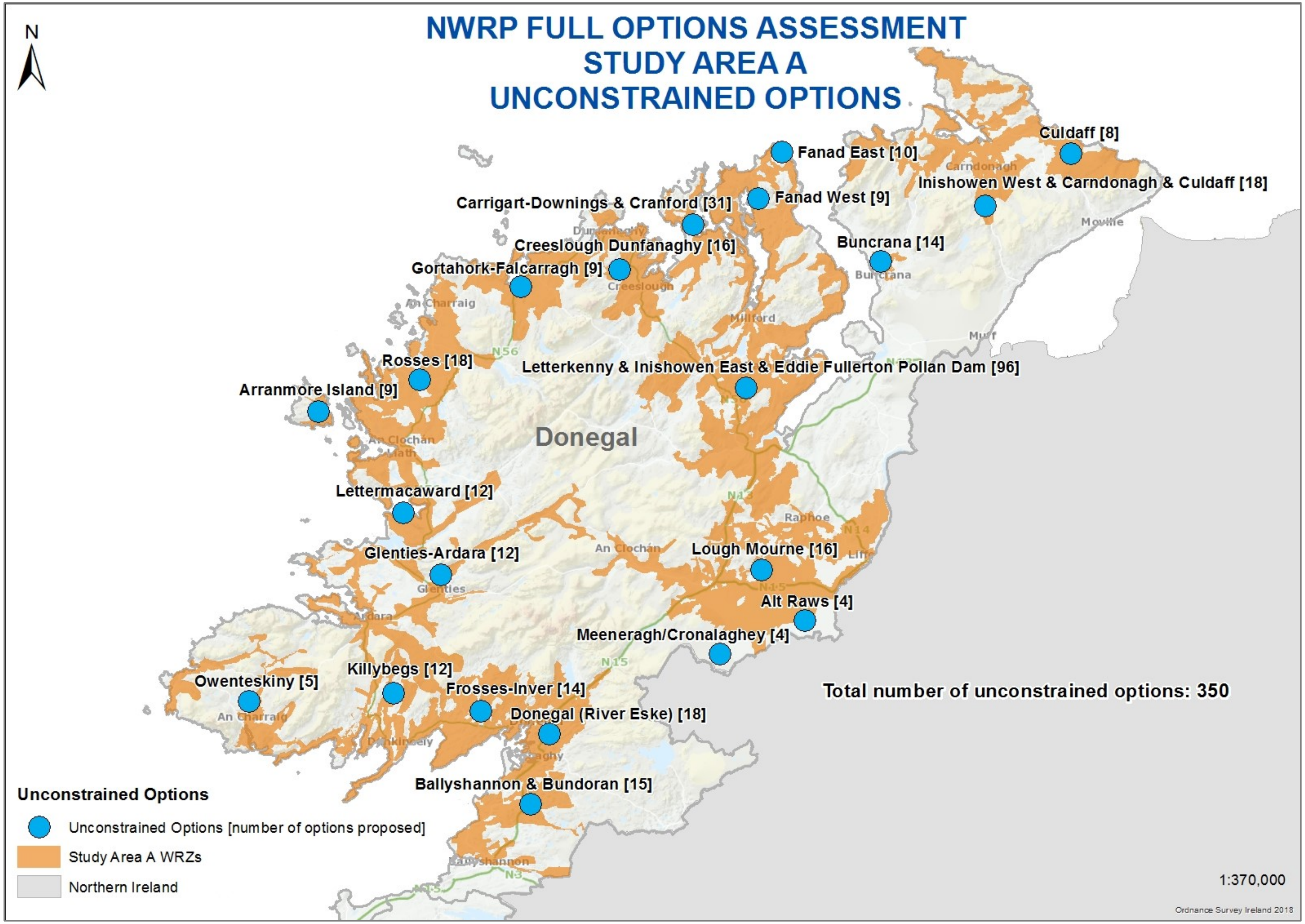

Figure 4.1 SAA Unconstrained Options

The 350 options were filtered through our screening process to eliminate those with potentially unviable environmental impacts or feasibility issues.

4.2 Coarse Screening

The 350 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, Hydrologist, Hydrogeologist, Ecologists and Environmental Scientists.

159 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 Lough Mourne WRZ.

Example Rejected Option

Option SAA-024:

New SW abstraction from Lough Finn and new WTP.

Rejection Reason:

Based on applying a high-status objective of 5% Q50 allowable abstraction, 1.3 Ml/d could only meet approximately 20% of the deficit and would require a long transfer. There are better alternatives.

The remaining 191 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 SAA Remaining Options after Course Screening

No. of Options	Option Type
28	Groundwater
90	Surface water
29	Rationalisation
42	Transfers

No. of Options	Option Type
1	Upgrade WTP (WQ only)
1	Desalination

4.3 Fine Screening

The 191 remaining options were subject to a more detailed multi-criteria assessment (MCA) at the Fine Screening Stage using desktop assessments of performance against 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, no further options were rejected, and the 191 options considered to be feasible were 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 SAA Remaining Options after Fine Screening (Feasible Options)

No. of Options	Option Type
28	Groundwater
90	Surface water
29	Rationalisation
42	Transfers
1	Upgrade WTP (WQ only)
1	Desalination

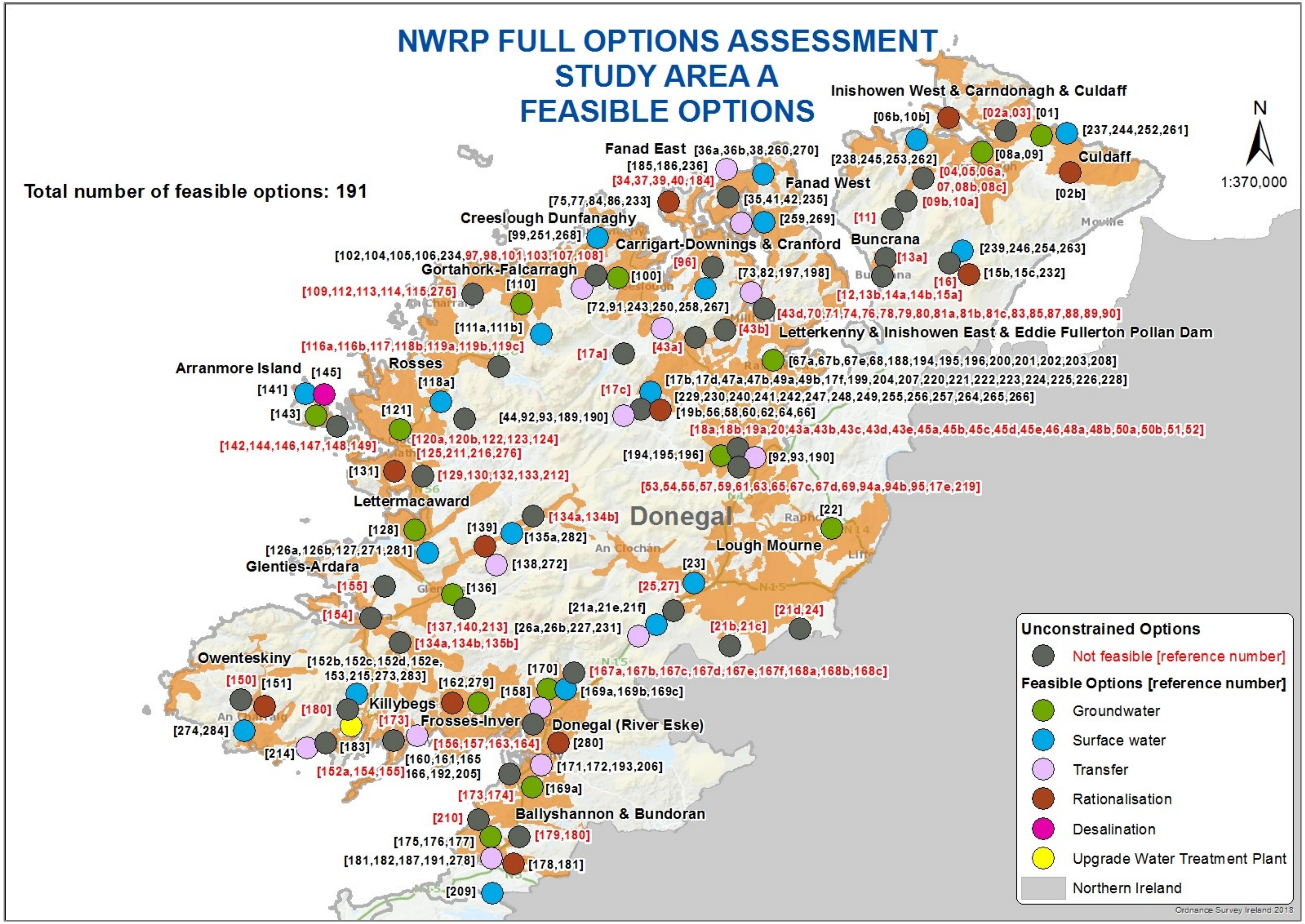

Figure 4.2 Fine Screening (Feasible Options)

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 supply demand balance deficit in the region ranges between approximately 40,455 m^3/day in 2019 during dry conditions, to a maximum of approximately 47,522 m^3/day in 2044 during dry conditions. During the options assessment stage, a total of 350 unconstrained options were assessed. Of these 159 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
139	Deliverability & Flexibility, Resilience and Sustainability
5	Deliverability & Flexibility
15	Other

The remaining 191 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 A. From this table it can be noted that there are 41 WRZ Options and 150 options which can be merged to form 32 Study Area Options.

Table 4.6 SAA Feasible Options Summary

Water Resource Zone Name	Option Type	
	WRZ Option	SA Grouped Option
Fanad East	2	6
Fanad West	0	6
Buncrana	0	7
Carrigart-Downings & Cranford	2	13
Creeslough Dunfanaghy	2	7
Lettermacaward	3	4
Frosses-Inver	2	8
Glenties-Ardara	2	4
Ballyshannon & Bundoran	5	5

Water Resource Zone Name	Option Type	
	WRZ Option	SA Grouped Option
Letterkenny/Milford & Inishowen RWSS & Inishowen East	5	52
Lough Mourne	3	7
Gortahork-Falcarragh	2	1
Owenteskiny	0	4
Culdaff	1	5
Donegal (River Eske)	2	7
Killybegs	1	8
Arranmore Island	3	0
Rosses	2	0
Inishowen West & Carndonagh & Culdaff	2	6
Alt Raws	1	0
Meeneragh/Cronalaghey	1	0

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 A.

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 Uisce Éireann'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, Uisce Éireann 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
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

Approaches Tested	Description	Policy Driver
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.

STEP 0 Best AA	If there is an option that meets the Objectives of the Plan, and is assessed as having no potential impact on a European Site (based on desktop assessment), it is automatically adopted as the Preferred Approach
STEP 1 Least Cost	Compare Least Cost against **best AA** Approach, and consider again at Step 6
STEP 2 Quickest Delivery	Compare Least Cost against Quickest Delivery Approach and develop Modified Approach if appropriate
STEP 3 Best Environmental	Compare Least Cost or Modified Approach against Best Environmental, and modify approach **if appropriate**
STEP 4 Most Resilient	Compare Least Cost or Modified Approach against Most Resilient
STEP 5 Least Carbon	Compare Least Cost or Modified Approach against **Lowest** Carbon
STEP 6 Approach Comparison	Compare output from Steps 1 to 5 against: • SEA required outcomes • Sectoral Adaptation Outcomes • **Best AA outcomes** • Public Expenditure Code Outcomes
STEP 7 Preferred Approach	Select Preferred Approach based on steps 0 to 6

Figure 5.1 Figure of the 7 step assessment process

This methodology which is futured detailed in Chapter 7 of the RWRP - NW 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-NW and the Environmental Review for this Study Area.

Within the Regional Plan, we will examine the Preferred Approach at a third spatial level across all of the Study Areas in the North West Region 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-NW. Section 5.2 provides an overview of the application of this process to SA A.

5.2 Preferred Approach Development Process for Study Area A

5.2.1 Stage 1 – WRZ Level Approach

As outlined in Section 4.4 of this technical report there are 191 feasible options. 41 of these options are WRZ Options while 150 options are merged to form 32 Study Area Options. Table 5.2 outlines the 41 WRZ options for SAA, 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 SAA Feasible Options

Water Resource Zone Name	Feasible Options SAA	
	Option Code	Option Description
Alt Raws	SAA-217	Rationalise Alt Raws to Lough Mourne WRZ.
Arranmore Island	SAA-141	Increase existing SW abstraction from Lough Shore. Involves rebuilding dam structure to increase operational lake storage volume
Arranmore Island	SAA-143	New GW abstraction to supply deficit.
Arranmore Island	SAA-145	Desalination plant to supply full deficit.
Ballyshannon & Bundoran	SAA-175	New GW abstraction to supply deficit.
Ballyshannon & Bundoran	SAA-176	New GW abstraction to supply deficit.
Ballyshannon & Bundoran	SAA-177	New GW abstraction to supply deficit.
Ballyshannon & Bundoran	SAA-178	New Ballyshannon WTP at Knaddar on River Erne/ESB Dam-Kathleen Falls and supply deficit.
Ballyshannon & Bundoran	SAA-209	Increase existing SW abstraction from Lough Melvin and upgrade Bundoran WTP.
Carrigart-Downings & Cranford	SAA-072a	New abstraction and WTP from Glen Lough and supply Carrigart-Downings & Cranford WRZ
Carrigart-Downings & Cranford	SAA-072b	New abstraction at Glen Lough and pump to Carrigart-Downings WTP to treat
Carrigart-Downings & Cranford	SAA-091	New SW abstraction from Lough Natooey.
Creeslough Dunfanaghy	SAA-099	New SW abstraction from Glen Lough.
Creeslough Dunfanaghy	SAA-100	New GW abstraction to partly supply deficit.
Culdaff	SAA-001	Increase existing GW abstraction from Culdaff borehole.
Donegal (River Eske)	SAA-169a	New SW abstraction from Lough Eske and new WTP. To supplement existing river abstraction. Operate two sources conjunctively, applying compensation flow release requirements from lake to river.

Water Resource Zone Name	Feasible Options SAA	
	Option Code	Option Description
Donegal (River Eske)	SAA-170	New GW abstraction to partly supply deficit.
Fanad East	SAA-036a	Increase existing SW abstraction from Shannagh Lake.
Fanad East	SAA-038	New SW abstraction from Kindrum Lough and new WTP.
Frosses-Inver	SAA-158	New GW abstraction to partly supply deficit at existing Frosses - Inver WTP site.
Frosses-Inver	SAA-159	New SW abstraction from Lough Eske and new WTP.
Glenties-Ardara	SAA-135a	New SW abstraction from Lough Finn and new WTP.
Glenties-Ardara	SAA-136	New GW abstraction to partly supply deficit.
Gortahork-Falcarragh	SAA-110	New GW abstraction to partly supply deficit.
Gortahork-Falcarragh	SAA-111a	New SW abstraction from Lough Altan and new WTP.
Inishowen West/Carndonagh/ Culdaff	SAA-008a	Increase GW abstraction from existing BHs to partly supply deficit.
Inishowen West/Carndonagh/ Culdaff	SAA-009a	New GW abstraction/wellfield to partly supply deficit.
Killybegs	SAA-183	No deficit - Upgrade WTP.
Letterkenny Millford & Inishowen RWSS & Inishowen East	SAA-047a	New SW abstraction from Glen Lough to supplement new Letterkenny WTP and increase capacity of new Letterkenny WTP.
Letterkenny Millford & Inishowen RWSS & Inishowen East & Eddie Fullerton Pollan Dam	SAA-049a	New SW abstraction from Gartan Lough to supplement new Letterkenny WTP and increase capacity of new Letterkenny WTP.
Letterkenny Millford & Inishowen RWSS & Inishowen East & Eddie Fullerton Pollan Dam	SAA-067a	Increase GW abstraction from existing BHs to partly supply deficit. Recent work has shown potential to get 1-3Ml/d more from this supply.
Letterkenny Millford & Inishowen RWSS & Inishowen East & Eddie Fullerton Pollan Dam	SAA-068	New GW abstraction/wellfield to partly supply deficit.
Letterkenny Millford & Inishowen RWSS & Inishowen East & Eddie Fullerton Pollan Dam	SAA-188	New GW abstraction/wellfield to partly supply deficit. Including new WTP.
Lettermacaward	SAA-126a	Increase existing SW abstraction from Lough Derkmore impoundment. Involves significant project to raise dam.
Lettermacaward	SAA-127	New SW abstraction from Lough Finn and new WTP.
Lettermacaward	SAA-128	New GW abstraction to partly supply deficit.
Lough Mourne	SAA-021a	Increase existing SW abstraction from Lough Mourne. It would require significant increase to impoundment.
Lough Mourne	SAA-022	New GW abstraction/wellfield to partly supply deficit.

Water Resource Zone Name	Feasible Options SAA	
	Option Code	Option Description
Lough Mourne	SAA-023	New SW abstraction from River Finn. Pump to Lough Mourne WTP.
Meeneragh/ Cronalaghey	SAA-218	Rationalise Meeneragh to Lough Mourne WRZ.
Rosses	SAA-118a	New SW abstraction from Loch an Luir and new WTP.
Rosses	SAA-121	New GW abstraction to partly supply deficit.

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 SAA Alignment of WRZ Options with Approach Categories

Water Resource Zone Name	Feasible Options SAA		Approach					
	No. WRZ Options	Option Description	Least Cost	Quickest Delivery	Best AA	Best SEA	Lowest Carbon	Most Resilient
Alt Raws	1	Rationalise Alt Raws to Lough Mourne WRZ.	✓	✓	✓	✓	✓	✓
Arranmore Island	3	Increase existing SW abstraction from Lough Shore. Involves rebuilding dam structure to increase operational lake storage volume	-	-	✓	-	-	-
		New GW abstraction to supply deficit.	✓	✓	✓	✓	✓	-
		Desalination plant to supply full deficit.	-	-	-	-	-	✓
Ballyshannon & Bundoran	5	New GW abstraction to supply deficit.	-	-	✓	-	-	-
		New GW abstraction to supply deficit.	✓	✓	✓	-	-	-
		New GW abstraction to supply deficit.	-	-	✓	-	-	-

Water Resource Zone Name	Feasible Options SAA		Approach					
	No. WRZ Options	Option Description	Least Cost	Quickest Delivery	Best AA	Best SEA	Lowest Carbon	Most Resilient
		New Ballyshannon WTP at Knaddar on River Erne/ESB Dam-Kathleen Falls and supply deficit.	-	✓	✓	-	-	✓
		Increase existing SW abstraction from Lough Melvin and upgrade Bundoran WTP.	-	✓	-	✓	✓	✓
Carrigart-Downings & Cranford	2	New abstraction and WTP from Glen Lough and supply Carrigart-Downings & Cranford WRZ	-	✓	-	-	-	✓
		New SW abstraction from Lough Natooey.	✓	✓	✓	✓	✓	-
Creeslough Dunfanaghy	2	New SW abstraction from Glen Lough.	✓	✓	✓	✓	✓	✓
		New GW abstraction to partly supply deficit.	-	-	-	-	-	-
Culdaff	1	Increase existing GW abstraction from Culdaff borehole.	✓	✓	✓	✓	✓	✓
Donegal (River Eske)	2	New SW abstraction from Lough Eske and new WTP. To supplement existing river abstraction. Operate two sources conjunctively, applying compensation flow release requirements from lake to river.	✓	✓	✓	✓	✓	✓
		New GW abstraction to partly supply deficit.	-	-	-	-	-	-
Fanad East	2	Increase existing SW abstraction from Shannagh Lake.	✓	✓	✓	✓	✓	-

Water Resource Zone Name	Feasible Options SAA		Approach					
	No. WRZ Options	Option Description	Least Cost	Quickest Delivery	Best AA	Best SEA	Lowest Carbon	Most Resilient
		New SW abstraction from Kindrum Lough and new WTP.	-	✓	✓	-	-	✓
Frosses-Inver	2	New GW abstraction to partly supply deficit at existing Frosses - Inver WTP site.	-	-	-	-	-	-
		New SW abstraction from Lough Eske and new WTP.	✓	✓	✓	✓	✓	✓
Glenties-Ardara	2	New SW abstraction from Lough Finn and new WTP.	✓	✓	✓	✓	✓	✓
		New GW abstraction to partly supply deficit.	-	-	-	-	-	-
Gortahork-Falcarragh	2	New GW abstraction to partly supply deficit.	-	-	-	-	-	-
		New SW abstraction from Lough Altan and new WTP.	✓	✓	✓	✓	✓	✓
Inishowen West/Carndonagh/ Culdaff	2	Increase GW abstraction from existing BHs to partly supply deficit.	✓	✓	✓	✓	✓	✓
		New GW abstraction/wellfield to partly supply deficit.	-	-	✓	-	-	✓
Killybegs	1	No deficit - Upgrade WTP	✓	✓	✓	✓	✓	✓
Letterkenny/Millford & Inishowen RWSS & Inishowen East	5	New SW abstraction from Glen Lough to supplement new Letterkenny WTP and increase capacity of new Letterkenny WTP.	✓	✓	-	✓	✓	✓
		New SW abstraction from Gartan Lough to supplement new Letterkenny WTP and increase capacity of new Letterkenny WTP.	-	-	-	-	-	-

Water Resource Zone Name	Feasible Options SAA		Approach					
	No. WRZ Options	Option Description	Least Cost	Quickest Delivery	Best AA	Best SEA	Lowest Carbon	Most Resilient
		Increase GW abstraction from existing BHs to partly supply deficit. Recent work has shown potential to get 1-3Ml/d more from this supply.	-	-	✓	-	-	-
		New GW abstraction/wellfield to partly supply deficit.	-	-	✓	-	-	-
		New GW abstraction/wellfield to partly supply deficit. Including new WTP.	✓	✓	✓	✓	✓	✓
Lettermacaward	3	Increase existing SW abstraction from Lough Derkmore impoundment. Involves significant project to raise dam.	✓	-	✓	✓	-	-
		New SW abstraction from Lough Finn and new WTP.	-	✓	-	✓	✓	✓
		New GW abstraction to partly supply deficit.	-	-	-	-	-	-
Lough Mourne	3	Increase existing SW abstraction from Lough Mourne. It would require significant increase to impoundment.	-	-	-	-	✓	-
		New GW abstraction/wellfield to partly supply deficit.	-	-	-	-	-	-
		New SW abstraction from River Finn. Pump to Lough Mourne WTP	✓	✓	✓	✓	-	✓
Meeneragh/ Cronalaghey	1	Rationalise Meeneragh to Lough Mourne WRZ	✓	✓	✓	✓	✓	✓
Rosses	2	New SW abstraction from Loch an Luir and new WTP.	✓	✓	✓	✓	✓	✓
		New GW abstraction to partly supply deficit.	-	-	-	-	-	-

The 7 Step Process outlined in Figure 5.1 was then applied to each WRZ in SAA, 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 SAA at WRZ level, include the following:

- In terms of Best AA, no WRZ options scores a 0 in relation to potential impact on a designated European Site;
- The Best AA and the Best Environmental (overall SEA score) approach is identified as the Preferred Approach for 13 of the 21 WRZs;
- Of the 21 WRZ level preferred approaches, 1 WRZ has a -3 score against biodiversity.
    - No WRZ level preferred approaches have been identified for Inishowen West Carndonagh Culdaff, Owenteskiny, Buncrana and Fanad West because there are no feasible options that can meet the full deficit for these WRZs.

The WRZ level approaches for each WRZ in SAA are outlined in Table 5.4

Table 5.4 SAA WRZ Level Approach

Water Resource Zone Name	Feasible Options SAA Donegal		Approach							
	Option Code	Option Description	Zero AA	Least Cost	Quickest Delivery	Best AA	Best SEA	Lowest Carbon	Most Resilient	Preferred Approach
Alt Raws	SAA-217	Rationalise Alt Raws to Lough Mourne WRZ.	-	✓	✓	✓	✓	✓	✓	✓
Arranmore Island	SAA-141	Increase existing SW abstraction from Lough Shore. Involves rebuilding dam structure to increase operational lake storage volume	-	-	-	✓		-	-	✓
Ballyshannon & Bundoran	SAA-209	Increase existing SW abstraction from Lough Melvin and upgrade Bundoran WTP.	-	-	✓	-	✓	✓	✓	✓
Buncrana	**No local solution**									
Carrigart-Downings & Cranford	SAA-072b	New abstraction at Glen Lough and pump to Carrigart-Downings WTP to treat.	-	-	✓	-	-	-	-	✓
Creeslough Dunfanaghy	SAA-099	New SW abstraction from Glen Lough.	-	✓	✓	✓	✓	✓	✓	✓
Culdaff	SAA-001	Increase existing GW abstraction from Culdaff borehole.	-	✓	✓	✓	✓	✓	✓	✓
Donegal (River Eske)	SAA-169a	New SW abstraction from Lough Eske and new WTP. To supplement existing river abstraction. Operate two sources conjunctively, applying compensation flow release requirements from lake to river.	-	✓	✓	✓	✓	✓	✓	✓
Fanad East	SAA-036a	Increase existing SW abstraction from Shannagh Lake.	-	✓	✓	✓	✓	✓	-	✓

Water Resource Zone Name	Feasible Options SAA Donegal		Approach							
	Option Code	Option Description	Zero AA	Least Cost	Quickest Delivery	Best AA	Best SEA	Lowest Carbon	Most Resilient	Preferred Approach
Fanad West	**No local solution**									
Frosses-Inver	SAA-159	New SW abstraction from Lough Eske and new WTP.	-	✓	✓	✓	✓	✓	✓	✓
Glenties-Ardara	SAA-135a	New SW abstraction from Lough Finn and new WTP.	-	✓	✓	✓	✓	✓	✓	✓
Gortahork-Falcarragh	SAA-111a	New SW abstraction from Lough Altan and new WTP.	-	✓	✓	✓	✓	✓	✓	✓
Inishowen West/Carndonagh/ Culdaff	**No local solution**									
Killybegs	SAA-183	No deficit - Upgrade WTP	-	✓	✓	✓	✓	✓	✓	✓
Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam	SAA-047a	New SW abstraction from Glen Lough to supplement new Letterkenny WTP and increase capacity of new Letterkenny WTP.	-	✓	✓	-	✓	✓	✓	✓
Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam	SAA-188	New GW abstraction/wellfield to partly supply deficit. Including new WTP.	-	✓	✓	✓	✓	✓	✓	✓
Lettermacaward	SAA-126a	Increase existing SW abstraction from Lough Derkmore impoundment. Involves significant project to raise dam.	-	✓	-	✓	✓	-	-	✓

Water Resource Zone Name	Feasible Options SAA Donegal		Approach							
	Option Code	Option Description	Zero AA	Least Cost	Quickest Delivery	Best AA	Best SEA	Lowest Carbon	Most Resilient	Preferred Approach
Lough Mourne	SAA-023	New SW abstraction from River Finn. Pump to Lough Mourne WTP	-	✓	✓	-	✓	-	✓	✓
Meeneragh/ Cronalaghey	SAA-218	Rationalise Meeneragh to Lough Mourne WRZ	-	✓	✓	✓	✓	✓	✓	✓
Owenteskiny	**No local solution**									
Rosses	SAA-118a	New SW abstraction from Loch an Luir and new WTP.	-	✓	✓	✓	✓	✓	✓	✓

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 32 Study Area options.

Table 5.5 SAA Grouped Options

Water Resource Zone	Feasible Options SAA		
	Option Code	Option Description	SA Grouped Option
Culdaff Inishowen West/Carndonagh/ Culdaff Buncrana Letterkenny & Inishowen East & Inishowen RWSS Creeslough Dunfanaghy Carrigart-Downings & Cranford	SAA-502	Increase existing SW abstraction from Crana River and increase capacity of Illies WTP. Additional 7.6 Ml/d supply available to meet rationalised nearby WRZs. New SW abstraction from Glen Lough to supplement new Letterkenny WTP and increase capacity of new Letterkenny WTP Rationalise Culdaff WRZ, Inishowen West WSZ, Carndonagh WSZ, Slavery WTP, Inishowen East to Illies WTP (Letterkenny 25-year plan) Interconnect Creeslough Dunfanaghy, Cranford and Carrigart-Downings WRZs with Goldrum/Letterkenny (Supplement Letterkenny with additional import from the Illies WTP). Increase GW abstraction from existing BHs to partly supply deficit. Recent work has shown potential to get 1-3Ml/d more from this supply. New GW abstraction/wellfield to partly supply deficit. Including upgrade of Ballymacool WTP for treatment. New GW abstraction/wellfield to partly supply deficit. Including new WTP on site.	Group 2
Fanad West Fanad East	SAA-512	Improve interconnectivity between Fanad West and Fanad East and supply deficit from Fanad East. Increase existing SW abstraction from Shannagh Lake.	Group 12

Water Resource Zone	Feasible Options SAA		
	Option Code	**Option Description**	**SA Grouped Option**
Lough Mourne Letterkenny/Milford & Inishowen East & Inishowen RWSS Creeslough Dunfanaghy Buncrana	SAA-517	Increase existing SW abstraction from Lough Mourne. It would require significant increase to impoundment. Additional 16.8 Ml/d supply available to both meet local deficit and transfer to partially supply Letterkenny/ Eddie Fullerton Pollan Dam. Interconnect Letterkenny Milford WRZ with Lough Mourne WRZ (supplement Lough Mourne with additional impoundment at Lough Mourne) Interconnect Creeslough Dunfanaghy WRZ with Lough Mourne WRZ (supplement Lough Mourne with additional impoundment at Lough Mourne) Interconnect Inishowen East & Eddie Fullerton Pollan Dam WRZ with Lough Mourne WRZ (supplement Lough Mourne with additional impoundment at Lough Mourne) Rationalise Slavery WTP to Illies WTP. Increase existing SW abstraction from Crana River and increase capacity of Illies WTP. Additional 7.6 Ml/d supply available to partially meet local deficit. Increase GW abstraction from existing BHs to partly supply deficit. Recent work has shown potential to get 1-3Ml/d more from this supply.	Group 17
Creeslough Dunfanaghy Gortahork-Falcarragh	SAA-518	Interconnect Creeslough Dunfanaghy WRZ with Gortahork-Falcarragh WRZ and supply from new Lough Altan WTP to meet deficit New SW abstraction from Lough Altan and the WTP.	Group 18
Lettermacaward Glenties-Ardara Killybegs	SAA-522	Increase existing SW abstraction from Lough Derkmore impoundment. Involves significant project to raise dam. Split WRZ and supply part of the WRZ from Killybegs and another part from Lettermacaward and decommission existing source. Increase existing SW abstraction from Lough Aderry.	Group 22
Lettermacaward Glenties-Ardara Killybegs	SAA-523	Rationalise Lettermacaward to Killybegs and decommission existing source. Rationalise Glenties-Ardara to Killybegs and decommission existing source. Increase existing SW abstraction from Lough Aderry. Rationalise Lettermacaward and Glenties-Ardara WRZs (decommission existing sources) to Killybegs and create a single WRZ.	Group 23
Owenteskiny Killybegs	SAA-530	Rationalise Owenteskiny WRZ to Killybegs WRZ. Increase existing SW abstraction from Lough Aderry.	Group 30
Killybegs Frosses-Inver	SAA-531	Increase existing SW abstraction from Lough Aderry. Interconnect Frosses-Inver and Killybegs and supply deficit from Killybegs.	Group 31

Water Resource Zone	Feasible Options SAA		
	Option Code	Option Description	SA Grouped Option
Killybegs Frosses-Inver	SAA-532	Increase existing SW abstraction from Lough Aderry. Rationalise Frosses-Inver to Killybegs WRZ	Group 32
Frosses-Inver Donegal (River Eske)	SAA-536	Interconnect Frosses-Inver and Donegal (new Lough Eske source) supply deficit from Donegal (River Eske) WRZ. New SW abstraction from Lough Eske and new WTP. To supplement existing river abstraction. Operate two sources conjunctively, applying compensation flow release requirements from lake to river.	Group 36
Lough Mourne Frosses-Inver Donegal (River Eske)	SAA-537	Increase existing SW abstraction from Lough Mourne. It would require significant increase to impoundment. Interconnect Frosses-Inver WRZ with Lough Mourne WRZ and supply deficit from Lough Mourne. Interconnect Donegal (River Eske) WRZ with Lough Mourne WRZ and supply deficit from Lough Mourne.	Group 37
Donegal (River Eske) Ballyshannon & Bundoran	SAA-540	New SW abstraction from Lough Eske and new WTP. To supplement existing river abstraction. Operate two sources conjunctively, applying compensation flow release requirements from lake to river. Rationalise Ballyshannon/ Ballymagroarty to Donegal (new Lough Eske WTP) WRZ.	Group 40
Frosses-Inver Donegal (River Eske) Ballyshannon & Bundoran	SAA-5	Interconnect Frosses-Inver WRZ with new Ballyshannon WTP at Knaddar on River Erne/ESB Dam-Kathleen Falls and supply deficit. Interconnect Donegal (River Eske) WRZ with new Ballyshannon WTP at Knaddar on River Erne/ESB Dam-Kathleen Falls and supply deficit. New Ballyshannon WTP at Knaddar on River Erne/ESB Dam-Kathleen Falls and supply deficit.	Group 41
Lough Mourne Ballyshannon & Bundoran Frosses-Inver Donegal (River Eske)	SAA-542	Interconnect Lough Mourne with new WTP at Knaddar, Balllyshannon on River Erne/Kathleen Falls (ESB) and supply deficit. New Ballyshannon WTP at Knaddar on River Erne/ESB Dam-Kathleen Falls and supply deficit. Interconnect Frosses-Inver WRZ with new Ballyshannon WTP at Knaddar on River Erne/ESB Dam-Kathleen Falls and supply deficit. Interconnect Donegal (River Eske) WRZ with new Ballyshannon WTP at Knaddar on River Erne/ESB Dam-Kathleen Falls and supply deficit.	Group 42

Water Resource Zone	Feasible Options SAA		
	Option Code	Option Description	SA Grouped Option
Lough Mourne Fanad West Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam Creeslough Dunfanaghy Fanad East Ballyshannon & Bundoran Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam Frosses-Inver Donegal (River Eske)	SAA-543	Interconnect Lough Mourne with new WTP at Knaddar, Balllyshannon on River Erne/Kathleen Falls (ESB) and supply deficit. Interconnect Fanad WRZ with Lough Mourne WRZ (supplement Lough Mourne with additional import from the new WTP at Knaddar Ballyshannon) Interconnect Letterkenny Milford WRZ with Lough Mourne WRZ (supplement Lough Mourne with additional import from the new WTP at Knaddar Ballyshannon) Interconnect Creeslough Dunfanaghy WRZ with Lough Mourne WRZ (supplement Lough Mourne with additional import from the new WTP at Knaddar Ballyshannon) Interconnect Fanad East WRZ with Lough Mourne WRZ (supplement Lough Mourne with additional import from the new WTP at Knaddar Ballyshannon) New Ballyshannon WTP at Knaddar on River Erne/ESB Dam-Kathleen Falls and supply deficit. Interconnect Inishowen WRZ with Lough Mourne WRZ (supplement Lough Mourne with additional import from the new WTP at Knaddar Ballyshannon) Interconnect Frosses-Inver WRZ with new Ballyshannon WTP at Knaddar on River Erne/ESB Dam-Kathleen Falls and supply deficit. Interconnect Donegal (River Eske) WRZ with new Ballyshannon WTP at Knaddar on River Erne/ESB Dam-Kathleen Falls and supply deficit.	Group 43
Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam Fanad West Carrigart-Downings & Cranford Fanad East	SAA-544	Increase existing SW abstraction from Crana River and increase capacity of Illies WTP. Interconnect Fanad West with Goldrum/Letterkenny (supplement Letterkenny with additional import from the Illies WTP) as part of grouped solution including Carrigart/Downings and Cranford WSZs. Interconnect Goldrum/Letterkenny with Illies WTP and supplement Letterkenny with additional import from the Illies WTP as part of grouped solution including Carrigart/Downings and Cranford WSZs. Interconnect Carrigart-Downings with Goldrum/Letterkenny (supplement Letterkenny with additional import from the Illies WTP) as part of grouped solution including Fanad and Cranford WSZs. Interconnect Cranford with Goldrum/Letterkenny (supplement Letterkenny with additional import from the Illies WTP) as part of grouped solution including Fanad and Carrigart-Downings WSZs. Interconnect Fanad East with Goldrum/Letterkenny (supplement Letterkenny with additional import from the Illies WTP) as part of grouped solution including Carrigart/Downings and Cranford WSZs.	Group 44

Water Resource Zone	Feasible Options SAA		
	Option Code	Option Description	SA Grouped Option
		New SW abstraction from Glen Lough to supplement new Letterkenny WTP and increase capacity of new Letterkenny WTP.	
Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam	SAA-546	Rationalise Milford to Ballymacool WTP. Increase GW abstraction from existing BHs to partly supply deficit. Recent work has shown potential to get 1-3Ml/d more from this supply.	Group 46
Letterkenny & Inishowen East & P Eddie Fullerton Pollan Dam	SAA-548	Rationalise Rathmullen to Ballymacool WTP Increase GW abstraction from existing BHs to partly supply deficit. Recent work has shown potential to get 1-3Ml/d more from this supply.	Group 48
Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam Carrigart-Downings & Cranford	SAA-553	New SW abstraction from Glen Lough to supplement new Letterkenny WTP and increase capacity of new Letterkenny WTP. Rationalise Milford to new Letterkenny WTP. New SW abstraction from Glen Lough to supplement new Letterkenny WTP. Rationalise Rathmullen to new Letterkenny WTP. New SW abstraction from Glen Lough to supplement new Letterkenny WTP. Rationalise Carrigart-Downings to new Letterkenny WTP. New SW abstraction from Glen Lough to supplement new Letterkenny WTP. Rationalise Cranford to new Letterkenny WTP. New SW abstraction from Glen Lough to supplement new Letterkenny WTP. Increase GW abstraction from existing BHs to partly supply deficit. Recent work has shown potential to get 1-3Ml/d more from this supply. New GW abstraction/wellfield to partly supply deficit. Including upgrade of Ballymacool WTP for treatment. New GW abstraction/wellfield to partly supply deficit. Including new WTP on site.	Group 53
Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam Carrigart-Downings & Cranford	SAA-555	New SW abstraction from Gartan Lough to supplement new Letterkenny WTP and increase capacity of new Letterkenny WTP. Rationalise Milford to new Letterkenny WTP. New SW abstraction from Gartan Lough to supplement new Letterkenny WTP. Rationalise Rathmullen to new Letterkenny WTP. New SW abstraction from Gartan Lough to supplement new Letterkenny WTP. Rationalise Carrigart-Downings to new Letterkenny WTP. New SW abstraction from Gartan Lough to supplement new Letterkenny WTP.	Group 55

Water Resource Zone	Feasible Options SAA		
	Option Code	**Option Description**	**SA Grouped Option**
		Rationalise Cranford to new Letterkenny WTP. New SW abstraction from Gartan Lough to supplement new Letterkenny WTP. Increase existing SW abstraction from Crana River and increase capacity of Illies WTP. New GW abstraction/wellfield to partly supply deficit.	
Owenteskiny Killybegs	SAA-558	Interconnect Owenteskiny WRZ to Killybegs WRZ to meet deficit. Increase existing SW abstraction from Lough Aderry.	Group 58
Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam	SAA-559	Increase existing SW abstraction from Crana River and increase capacity of Illies WTP. New SW abstraction from Glen Lough to supplement new Letterkenny WTP and increase capacity of new Letterkenny WTP.	Group 59
Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam	SAA-560	New SW abstraction from Gartan Lough to supplement new Letterkenny WTP and increase capacity of new Letterkenny WTP. Increase existing SW abstraction from Crana River and increase capacity of Illies WTP.	Group 60
Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam Lough Mourne	SAA-561	Increase existing SW abstraction from Crana River and increase capacity of Illies WTP. New SW abstraction from Glen Lough and a new WTP at Glen Lough. New SW abstraction from Gartan Lough to treat at Letterkenny Goldrum WTP including increasing WTP capacity. Interconnect Lough Mourne WRZ with Letterkenny/ Eddie Fullerton Pollan Dam WRZ and supply deficit from new Letterkenny/ Eddie Fullerton Pollan Dam sources.	Group 61

Water Resource Zone	Feasible Options SAA		
	Option Code	Option Description	SA Grouped Option
Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam Lough Mourne Buncrana Carrigart-Downings & Cranford Creeslough Dunfanaghy Fanad West Fanad East	SAA-562	Increase existing SW abstraction from Crana River and increase capacity of Illies WTP. New SW abstraction from Glen Lough and a new WTP at Glen Lough New SW abstraction from Gartan Lough to treat at Letterkenny Goldrum WTP including increasing WTP capacity. Interconnect Lough Mourne WRZ with Letterkenny/ Eddie Fullerton Pollan Dam WRZ and supply deficit from new sources Glen Lough and Gartan Lough Rationalise Buncrana WRZ (Slavery WTP) to Letterkenny / Eddie Fullerton Pollan Dam WRZ and supply from Illies WTP Eddie Fullerton Pollan Dam source Rationalise Carrigart-Downings WRZ to Letterkenny/ Eddie Fullerton Pollan Dam WRZ and supply from Letterkenny Goldrum WTP new sources Glen Lough and Gartan Lough Interconnect Creeslough Dunfanaghy WRZ with Letterkenny/ Eddie Fullerton Pollan Dam WRZ and supply from Letterkenny Goldrum WTP new sources Glen Lough and Gartan Lough Interconnect Fanad West with Letterkenny/ Eddie Fullerton Pollan Dam WRZ and supply from Letterkenny Goldrum WTP new sources Glen Lough and Gartan Lough Interconnect Fanad East with Letterkenny/ Eddie Fullerton Pollan Dam WRZ and supply from Letterkenny Goldrum WTP new sources Glen Lough and Gartan Lough	Group 62
Culdaff Inishowen West/Carndonagh/ Culdaff Buncrana Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam Carrigart-Downings & Cranford	SAA-563	Rationalise Culdaff to new sources developed near Letterkenny. Rationalise Inishowen West/Carndonagh/ Culdaff to new sources developed near Letterkenny. Rationalise Buncrana to new sources developed near Letterkenny. Develop Eddie Fullerton Pollan Dam, Glen Lough and Gartan Lough for Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam WRZ and surrounding WRZs. Develop Eddie Fullerton Pollan Dam, Glen Lough and Gartan Lough for Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam WRZ and surrounding WRZs. Develop Eddie Fullerton Pollan Dam, Glen Lough and Gartan Lough for Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam WRZ and surrounding WRZs. Rationalise Carrigart-Downings & Cranford to new sources developed near Letterkenny.	Group 63

Water Resource Zone	Feasible Options SAA		
	Option Code	Option Description	SA Grouped Option
Culdaff Inishowen West/Carndonagh/ Culdaff Buncrana Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam Carrigart-Downings & Cranford Creeslough Dunfanaghy	SAA-564	Rationalise Culdaff to new sources developed near Letterkenny. Rationalise Inishowen West/Carndonagh/ Culdaff to new sources developed near Letterkenny. Rationalise Buncrana to new sources developed near Letterkenny. Develop Eddie Fullerton Pollan Dam, Glen Lough and Gartan Lough for Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam WRZ and surrounding WRZs. Develop Eddie Fullerton Pollan Dam, Glen Lough and Gartan Lough for Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam WRZ and surrounding WRZs. Develop Eddie Fullerton Pollan Dam, Glen Lough and Gartan Lough for Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam WRZ and surrounding WRZs. Rationalise Carrigart-Downings & Cranford to new sources developed near Letterkenny. Rationalise Creeslough Dunfanaghy to new sources developed near Letterkenny	Group 64
Culdaff Inishowen West/Carndonagh/ Culdaff Buncrana Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam Carrigart-Downings & Cranford Fanad West Fanad East	SAA-565	Rationalise Culdaff to new sources developed near Letterkenny. Rationalise Inishowen West/Carndonagh/ Culdaff to new sources developed near Letterkenny. Rationalise Buncrana to new sources developed near Letterkenny. Develop Eddie Fullerton Pollan Dam, Glen Lough and Gartan Lough for Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam WRZ and surrounding WRZs. Develop Eddie Fullerton Pollan Dam, Glen Lough and Gartan Lough for Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam WRZ and surrounding WRZs. Develop Eddie Fullerton Pollan Dam, Glen Lough and Gartan Lough for Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam WRZ and surrounding WRZs. Rationalise Carrigart-Downings & Cranford to new sources developed near Letterkenny. Rationalise Fanad West to new sources developed near Letterkenny. Rationalise Fanad East to new sources developed near Letterkenny.	Group 65
Culdaff Inishowen West/Carndonagh/ Culdaff Buncrana Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam Carrigart-Downings & Cranford Creeslough Dunfanaghy Fanad West Fanad East	SAA-566	Rationalise Culdaff to new sources developed near Letterkenny and interconnect Inishowen West/Carndonagh/ Culdaff to new sources developed near Letterkenny. Rationalise Buncrana to new sources developed near Letterkenny. Develop Eddie Fullerton Pollan Dam, Glen Lough and Gartan Lough for Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam WRZ and surrounding WRZs. Develop Eddie Fullerton Pollan Dam, Glen Lough and Gartan Lough for Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam WRZ and surrounding WRZs. Develop Eddie Fullerton Pollan Dam, Glen Lough and Gartan Lough for Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam WRZ and surrounding WRZs. Rationalise Carrigart-Downings & Cranford to new sources developed near Letterkenny. Rationalise Creeslough Dunfanaghy to new sources developed near Letterkenny. Rationalise Fanad West to new sources developed near Letterkenny.	Group 66

Water Resource Zone	Feasible Options SAA		
	Option Code	Option Description	SA Grouped Option
		Rationalise Fanad East to new sources developed near Letterkenny	
Lettermacaward Glenties-Ardara Killybegs Owenteskiny	SAA-567	Increase existing SW abstraction from Lough Derkmore impoundment. Involves significant project to raise dam. Split WRZ and supply part of the WRZ from Killybegs and another part from Lettermacaward and decommission existing source. Increase existing SW abstraction from Lough Aderry. Interconnect Owenteskiny and Killybegs to meet deficit from Lough Aderry.	Group 67
Lough Mourne Ballyshannon & Bundoran Frosses-Inver Donegal (River Eske)	SAA-569	New Ballyshannon WTP at Knaddar on River Erne/ESB Dam-Kathleen Falls and supply deficit. Rationalise Lough Mourne, Frosses-Inver and Donegal (River Eske) WRZs to new WTP at Knaddar, Balllyshannon on River Erne/Kathleen Falls (ESB) and supply deficit.	Group 69
Lettermacaward Glenties-Ardara Killybegs Owenteskiny	SAA-570	Rationalise Lettermacaward, Glenties Ardara, Killybegs and Owenteskiny to new River Erne source.	Group 70

The 32 Study Area options result in 13 SA Combinations that could meet the need across all WRZs. The WRZ Level Approach is excluded at this stage of comparison as 4 WRZs do not have a WRZ Level Approach (and accordingly the WRZ level approach does not meet the need across all WRZs). The 13 SA Combinations in terms of the types of options within each combination are summarised in Table 5.6 below.

Table 5.6 SAA Combinations

Key	WRZ Approach Option	○	SA Grouped Option	□

WRZ	WRZ Approach Options	SA Combination 1 (SA Grouped Option 2, 12 and 58)	SA Combination 2 (SA Grouped Option 2, 12, 36 and 58)	SA Combination 3 (SA Grouped Option 2, 12, 37 and 58)	SA Combination 4 (SA Grouped Option 2, 12, 40 and 58)	SA Combination 5 (SA Grouped Option 2, 12, 41 and 58)	SA Combination 6 (SA Grouped Option 2, 12, 42 and 58)	SA Combination 7 (SA Grouped Option 12, 63 and 67)	SA Combination 8 (SA Grouped Option 12, 64 and 67)	SA Combination 9 (SA Grouped Option 65 and 67)	SA Combination 10 (SA Grouped Option 66 and 67)	SA Combination 11 (SA Grouped Option 58 and 66)	SA Combination 12 (SA Grouped Option 42, 66 and 67)	SA Combination 13 (SA Grouped Option 42, 66 and 70)
Alt Raws	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Arranmore Island	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Ballyshannon & Bundoran	○	○	○	○	□	□	□	○	○	○	○	○	□	□
Buncrana	No local solution	□	□	□	□	□	□	□	□	□	□	□	□	□
Carrigart-Downings & Cranford	○	□	□	□	□	□	□	□	□	□	□	□	□	□
Creeslough Dunfanaghy	○	□	□	□	□	□	□	○	□	○	□	□	□	□
Culdaff	○	□	□	□	□	□	□	□	□	□	□	□	□	□
Donegal (River Eske)	○	○	□	□	□	□	□	○	○	○	○	○	□	□

WRZ	WRZ Approach Options	SA Combination 1 (SA Grouped Option 2, 12 and 58)	SA Combination 2 (SA Grouped Option 2, 12, 36 and 58)	SA Combination 3 (SA Grouped Option 2, 12, 37 and 58)	SA Combination 4 (SA Grouped Option 2, 12, 40 and 58)	SA Combination 5 (SA Grouped Option 2, 12, 41 and 58)	SA Combination 6 (SA Grouped Option 2, 12, 42 and 58)	SA Combination 7 (SA Grouped Option 12, 63 and 67)	SA Combination 8 (SA Grouped Option 12, 64 and 67)	SA Combination 9 (SA Grouped Option 65 and 67)	SA Combination 10 (SA Grouped Option 66 and 67)	SA Combination 11 (SA Grouped Option 58 and 66)	SA Combination 12 (SA Grouped Option 42, 66 and 67)	SA Combination 13 (SA Grouped Option 42, 66 and 70)
Fanad East	○	□	□	□	□	□	□	□	□	□	□	□	□	□
Fanad West	No local solution	□	□	□	□	□	□	□	□	□	□	□	□	□
Frosses-Inver	○	○	□	□	○	□	□	○	○	○	○	○	□	□
Glenties-Ardara	○	○	○	○	○	○	○	□	□	□	□	○	□	□
Gortahork-Falcarragh	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Inishowen West/Carndonagh/ Culdaff	No local solution	□	□	□	□	□	□	□	□	□	□	□	□	□
Killybegs	○	□	□	□	□	□	□	□	□	□	□	□	□	□
Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam	○	□	□	□	□	□	□	□	□	□	□	□	□	□
Lettermacaward	○	○	○	○	○	○	○	□	□	□	□	○	□	□

WRZ	WRZ Approach Options	SA Combination 1 (SA Grouped Option 2, 12 and 58)	SA Combination 2 (SA Grouped Option 2, 12, 36 and 58)	SA Combination 3 (SA Grouped Option 2, 12, 37 and 58)	SA Combination 4 (SA Grouped Option 2, 12, 40 and 58)	SA Combination 5 (SA Grouped Option 2, 12, 41 and 58)	SA Combination 6 (SA Grouped Option 2, 12, 42 and 58)	SA Combination 7 (SA Grouped Option 12, 63 and 67)	SA Combination 8 (SA Grouped Option 12, 64 and 67)	SA Combination 9 (SA Grouped Option 65 and 67)	SA Combination 10 (SA Grouped Option 66 and 67)	SA Combination 11 (SA Grouped Option 58 and 66)	SA Combination 12 (SA Grouped Option 42, 66 and 67)	SA Combination 13 (SA Grouped Option 42, 66 and 70)
Lough Mourne	○	○	○	□	○	○	□	○	○	○	○	○	□	□
Meeneragh/ Cronalaghey	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Owenteskiny	No local solution	□	□	□	□	□	□	□	□	□	□	□	□	□
Rosses	○	○	○	○	○	○	○	○	○	○	○	○	○	○

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. As the WRZ Level Preferred Approach did not meet the deficit for the Study Area as a whole, it has not been assessed and assigned a score for the purposes of determining the best performing alternative within each approach category.

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 NW, where options or combinations of options achieve similar, although not exactly identical scores under the six approach types, UÉ takes a wider look at the comparable combinations /options to consider which to categorise as the "Best" approach within each category. In particular, UÉ 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 SAA, five SA combinations had a very similar ranking under the Least Cost category, within 5% of each other.

- Combination 1
- Combination 2
- Combination 3
- Combination 5
- Combination 7

The Least Cost Approach is determined using an Uisce Éireann Net Present Value assessment tool. The NPV tool uses a strict set of requirements and is limited in what flexibility it offers. Therefore, as set out in further detail in Section 7.2.1 of the RWRP NW, where an Option or Combination of Options provide similar NPV costs, and in some circumstances so as to ensure that no option is discounted at this early stage by reference only to "Least Cost" only, Uisce Éireann has considered that all options within a 5% NPV cost margin are in principle eligible to be identified as the "Least Cost" option. This approach recognises the desktop nature of the NPV assessment and the fact that the figures will almost certainly change at project stage.

When we compare these five combinations against each other to identify which should go forward as the Least Cost approach we see that Combination 5 only has one "-3" score, while Combinations 2, 4 and 7 have two "-3" scores. Combination 1 also has one "-3" score, but Combination 5 scores best in terms of overall environmental score and overall scores similar under all other approaches. Combination 5 is therefore brought forward as the Least Cost Approach.

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

Ranked order (best to worst)	Best													Worst

WRZ	WRZ Approach Options (Did not meet need)	SA Combination 1 (SA Grouped Option 2, 12 and 58)	SA Combination 2 (SA Grouped Option 2, 12, 36 and 58)	SA Combination 3 (SA Grouped Option 2, 12, 37 and 58)	SA Combination 4 (SA Grouped Option 2, 12, 40 and 58)	SA Combination 5 (SA Grouped Option 2, 12, 41 and 58)	SA Combination 6 (SA Grouped Option 2, 12, 42 and 58)	SA Combination 7 (SA Grouped Option 12, 63 and 67)	SA Combination 8 (SA Grouped Option 12, 64 and 67)	SA Combination 9 (SA Grouped Option 65 and 67)	SA Combination 10 (SA Grouped Option 66 and 67)	SA Combination 11 (SA Grouped Option 58 and 66)	SA Combination 12 (SA Grouped Option 42, 66 and 67)	SA Combination 13 (SA Grouped Option 42, 66 and 70)
Least Cost						Best								Worst
Quickest Delivery		Best											Worst	
Best AA biodiversity	1 No -3 Scores	1 No -3 Scores	2 No -3 Scores	2 No -3 Scores	2 No -3 Scores	1 No -3 Scores	1 No -3 Scores	2 No -3 Scores	2 No -3 Scores	1 No -3 Scores	1 No -3 Scores	1 No -3 Scores	1 No -3 Scores	2 No -3 Scores
Lowest Carbon				Best							Worst			
Most Resilient				Worst						Best				
Best Environmental		Worst											Best	

The SA combinations including the WRZ approach outlined in Table 5.6**Error! Reference source not found.** are assessed to determine the approach categories as summarised in Table 5.8

Table 5.8 Best Combinations

Approach Categories	Best Performing Combination
Least Cost (LCo)	SA Combination 5
Best Environmental (BE)	SA Combination 12
Quickest Delivery (QD)	SA Combination 1
Most Resilient (MR)	SA Combination 9
Lowest Carbon (LC)	SA Combination 3
Best AA (BA)	SA Combination 12*

**Note: 5 combinations have 1 -3 impact but combination 12 has the least -2 AA impacts*

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, the SA Combination 5 has the lowest NPV Cost, as shown in Figure 5.2, with the lowest total costs (CAPEX and OPEX) over the solutions lifetime.

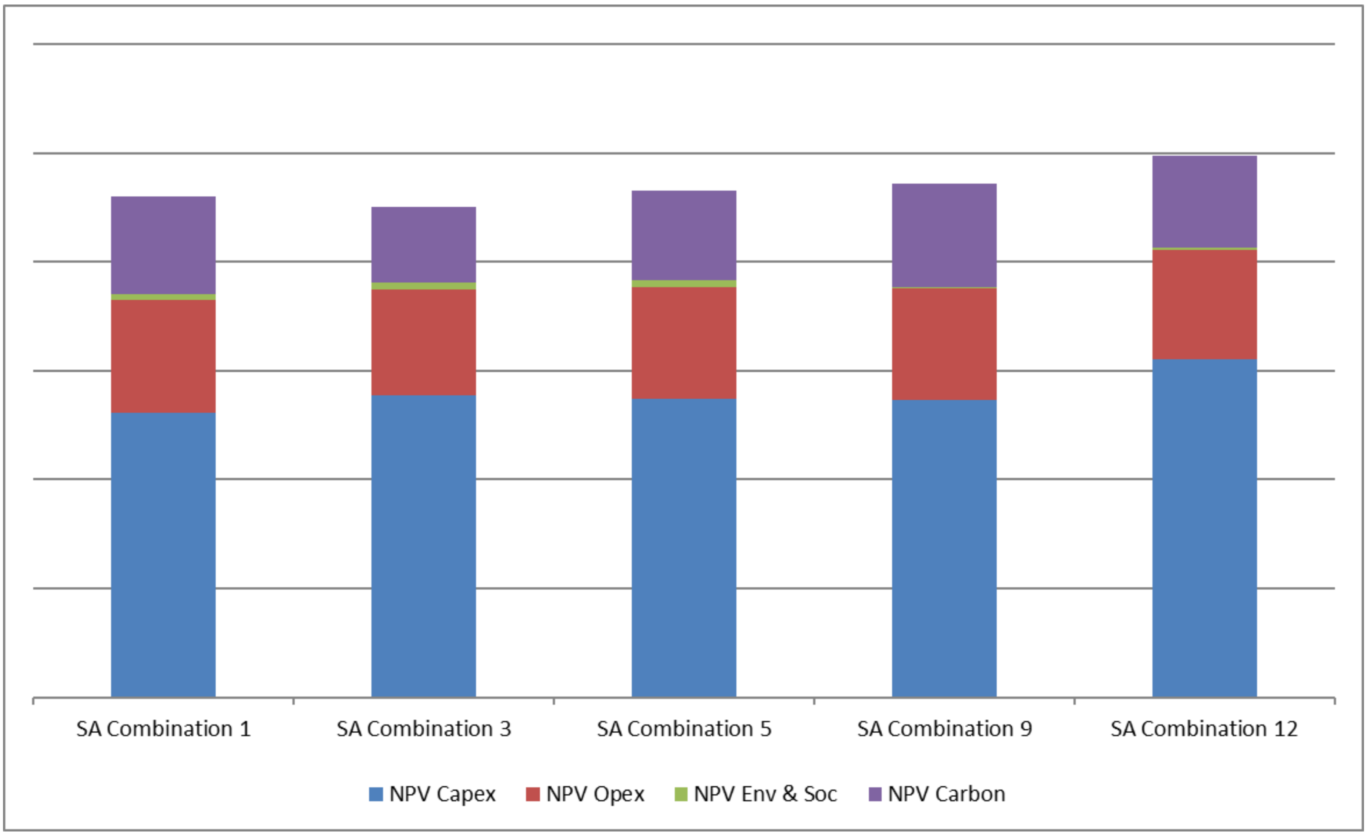

Figure 5.2 SAA NPV Costs for WRZ and SA approaches

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 results in 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 scored similarly to the Best AA Approach against the AA criteria. Both approaches include only one option with a -3 score. As there was minimal difference the Least Cost Approach was retained at this stage.
- Step 2 – We compared the Quickest Delivery Approach against the Least Cost Approach. The Quickest Delivery Approach scores similarly under all criteria, however, it scores worse in terms of overall environmental score. The Least Cost approach was therefore retained at this stage.
- Step 3 - We compared the Least Cost against the Best Environmental Approach. Best Environmental Approach scores significantly better in this category than Least Cost Approach. The difference in costs between the two approaches was not significant and the Best Environmental Approach, when looked at in the workshops offers more resilience, where larger transfers are proposed from a smaller number of new abstractions. The Best Environmental approach was therefore selected as preferred approach, at this stage.
- Step 4 – We compared the Best Environmental Approach against the Most Resilient Approach. The Most Resilient Approach performs poorly against the Best Environmental category and increases carbon costs compared to the Best Environmental Approach. While not achieving the highest score in resilience, overall, the Best Environmental Approach still offers a resilient solution and was therefore retained at this stage.

- Step 5 - We compared the Best Environmental Approach against the Lowest Carbon Approach. The Lowest Carbon Approach has lower carbon costs compared to the Best Environmental Approach, however, carbon costs for both approaches are relatively low when compared to the total NPV costs. The Best Environmental Approach scores much better in terms of the resilience and environmental criteria compared to the Lowest Carbon approach. The Best Environmental approach was therefore retained at this stage.
- Step 6 – A final assessment of the Best Environmental Approach was completed against the Least Cost, Lowest Carbon, Best AA, Quickest Delivery and Most Resilient Approaches. While the Best Environmental approach scored worst in the Quickest Delivery category, the score was not significantly below that of the other options in this category and, as set out of section 8.3.7 of the Framework Plan, we would be unlikely to modify an approach based on the Quickest Delivery criterion, unless there is a critical water quality issue that might impact on public health. Conversely, the Best Environmental approach performed substantially better in terms of environmental outcomes than the Least Cost, Quickest Delivery, Lowest Carbon and Most Resilient Approach. The Best Environmental approach is also the Best AA approach. The Best Environmental approach was therefore retained at this stage.
- Step 7 – The Best Environmental Approach is was therefore selected as the Preferred Approach.

5.3 Study Area Preferred Approach Summary

On the basis of this initial assessment at Plan level, SA Combination 12 represents the Preferred Approach for Study Area A, which consists of the options listed in Table 5.9. The Preferred Approach (SA approach Combination 12) is shown schematically in Figure 5.3

Table 5.9 Preferred Approach for SAA

WRZ Name	Preferred Approach Option Description SA Combination 12
Alt Raws	SAA-217 Rationalise Alt Raws to Lough Mourne WRZ.
Arranmore Island	SAA-141 Increase existing SW abstraction from Lough Shore. Involves rebuilding dam structure to increase operational lake storage volume
Ballyshannon & Bundoran Donegal (River Eske) Frosses-Inver Lough Mourne	Group 542 Interconnect Lough Mourne with new WTP at Knaddar, Balllyshannon on River Erne/Kathleen Falls (ESB) and supply deficit. New Ballyshannon WTP at Knaddar on River Erne/ESB Dam-Kathleen Falls and supply deficit. Interconnect Frosses-Inver WRZ with new Ballyshannon WTP at Knaddar on River Erne/ESB Dam-Kathleen Falls and supply deficit. Interconnect Donegal (River Eske) WRZ with new Ballyshannon WTP at Knaddar on River Erne/ESB Dam-Kathleen Falls and supply deficit.
Buncrana Carrigart-Downings & Cranford Creeslough Dunfanaghy Culdaff Inishowen West/Carndonagh/ Culdaff Fanad East Fanad West Letterkenny & Inishowen East & Eddie Fulerton Pollan Dam	Group 566 Rationalise Culdaff to new sources developed near Letterkenny. Interconnect Inishowen West/Carndonagh/ Culdaff to new sources developed near Letterkenny. Rationalise Buncrana to new sources developed near Letterkenny. Develop Eddie Fulerton Pollan Dam, Glen Lough, and Gartan Lough for Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam WRZ and surrounding WRZs. Develop Eddie Fullerton Pollan Dam, Glen Lough, and Gartan Lough for Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam WRZ and surrounding WRZs. Develop Eddie Fullerton Pollan Dam, Glen Lough, and Gartan Lough for Letterkenny & Inishowen East & Eddie Fullerton Pollan Dam WRZ and surrounding WRZs. Rationalise Carrigart-Downings & Cranford to new sources developed near Letterkenny. Rationalise Creeslough Dunfanaghy to new sources developed near Letterkenny. Rationalise Fanad West and Fanad East to new sources developed near Letterkenny.
Glenties-Ardara Killybegs Lettermacaward Owenteskiny	Group 567 Increase existing SW abstraction from Lough Derkmore impoundment. Involves significant project to raise dam. Split WRZ and supply part of the WRZ from Killybegs and another part from Lettermacaward and decommission existing source. Increase existing SW abstraction from Lough Aderry. Interconnect Owenteskiny and Killybegs to meet deficit from Lough Aderry
Gortahork-Falcarragh	SAA-111a New SW abstraction from Lough Altan and new WTP.
Meeneragh/ Cronalaghey	SAA-218 Rationalise Meeneragh to Lough Mourne WRZ.
Rosses	SAA-118a New SW abstraction from Loch an Luir and new WTP.

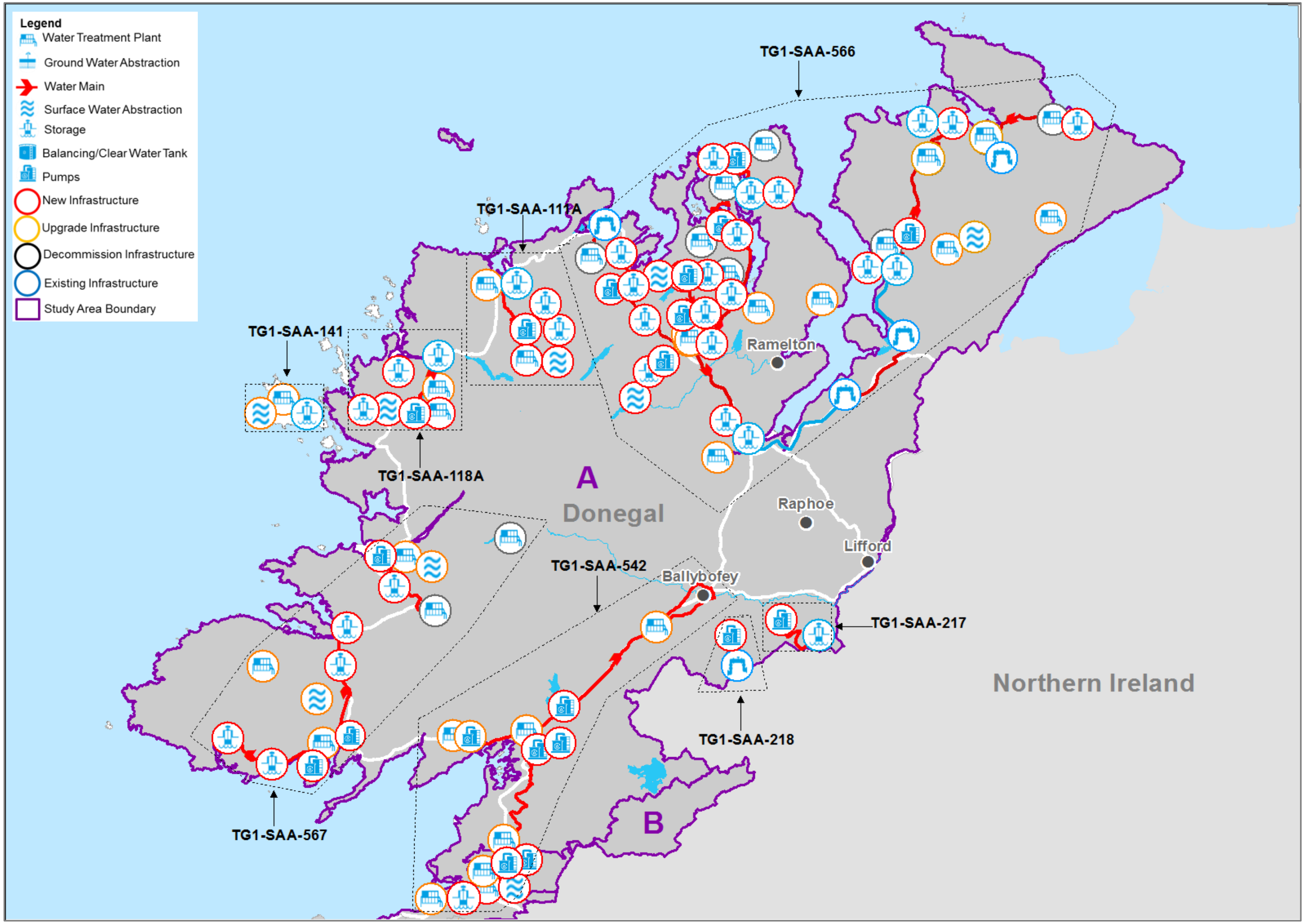

Figure 5.3 SAA Preferred Approach

The Preferred Approach for SAA, 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 Natural Rate of Leakage Rise (NRR).
- Continuation of UÉ household and business water conservation campaigns, initiatives and education programmes.
- 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 SAA, 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; and
- **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 Preferred Plan Constraints – 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, Uisce Éireann 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 UÉ 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 SAA Interim Options

WTP Name	Interim Option
Inishowen West WTP	Upgrade WTP to UÉ Standards
Tiernaleague WTP	Refurb existing Borehole, and upgrade WTP to UÉ Standards
Buncrana WTP	Upgrade WTP to UÉ Standards – Potential site for a containerised solution
Illies WTP	Upgrade WTP to UÉ Standards
Inishowen East (Redcastle) WTP	Upgrade WTP to UÉ Standards
Tullyconnel WTP	Upgrade WTP to UÉ Standards – Potential site for a containerised solution
Fanad East (Lough Shannagh) WTP	Upgrade WTP to UÉ Standards – Potential site for a containerised solution
Carrigart - Downings WTP	Upgrade WTP to UÉ Standards – Potential site for a containerised solution
Cranford WTP	Upgrade WTP to UÉ Standards – Potential site for a containerised solution
Milford WTP	Upgrade WTP to UÉ Standards
Rathmullen WTP	Upgrade WTP to UÉ Standards
Gortahork - Falcarragh WTP	Upgrade WTP to UÉ Standards
Crolly WTP	Upgrade WTP to UÉ Standards
Arranmore Island WTP	Upgrade WTP to UÉ Standards
Lettermacaward WTP	Upgrade WTP to UÉ Standards
Glenties WTP	Upgrade WTP to UÉ Standards – Potential site for a containerised solution
Creeslough (Killdarragh) WTP	Upgrade WTP to UÉ Standards – Potential site for a containerised solution
Lough Mourne (Meencrumlin) WTP	Upgrade WTP to UÉ Standards
Killybegs WTP	Upgrade WTP to UÉ Standards
Killybegs (Old) WTP	Upgrade WTP to UÉ Standards
Frosses - Inver (Drumbeagh) WTP	Upgrade WTP to UÉ Standards
Donegal (River Eske) WTP	Upgrade WTP to UÉ Standards

WTP Name	Interim Option
Ballyshannon (Parkhill) WTP	Refurb existing Borehole and Spring, and upgrade WTP to UÉ Standards
Bundoran (Lough Melvin) WTP	Upgrade WTP to UÉ Standards
Letterkenny (Goldrum) WTP	Upgrade WTP to UÉ Standards
Culdaff WTP	Refurb existing Borehole, and upgrade WTP to UÉ Standards – Potential site for a containerised solution
Ballymacool WTP	Refurb existing Boreholes, and upgrade WTP to UÉ Standards
Owenteskna WTP	Upgrade WTP to UÉ Standards
Ballymagroarty WTP	Upgrade WTP to UÉ 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 reduce leakage below SELL within the timeframe of the plan resulting in lower Needs?

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

Table 7.1 Sensitivity Analysis for SAA

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)	+38,000 m^3/day	**The impact of sustainability reductions would reduce the volumes that can be abstracted from our existing sources therefore increasing the supply demand balance deficit**. There are some surface water sources in SAA that would be impacted from sustainability reductions. However, our preferred approach is designed to relieve pressure on these sources by supplying from new larger more resilient lake sources including Glen Lough, Gartan Lough, Lough Altan and the River Erne/ESB Dam-Kathleen Falls. Groundwater Sustainability is more difficult to assess at desktop level, however, as the abstractions in SAA are small in scale they do not appear to be problematic. Based on this scenario, the Preferred Approach remains the optimal solution.

Uncertainty	Likelihood	Increase/Decrease in Deficit	Impact on Preferred Approach
Climate Change	High (international climate change targets have not been met)	+2,000 m^3/day	**Higher climate change scenarios would impact our existing supplies and result in decreased water availability at certain times of year.** Although the likelihood of this scenario is high based on climate change adaptation to date, potential impacts may be mitigated against by optimizing our operations on a more environmentally sustainable basis across the range of supplies. Also, as part of the Preferred Approach, several of these smaller surface water sources most vulnerable to climate change impacts are to be decommissioned or their supplies supplemented from larger lake sources more resilient to climate change. Regarding the existing groundwater abstractions, there is more difficulty and uncertainty in assessing increased climate change impacts, however it is understood that generally groundwater will be more resilient than surface water sources. Based on this scenario, the Preferred Approach remains the optimal solution.
Demand Growth	Low/Moderate (growth has been based on policy)	-40,455 m^3/day	**The impact of lower than expected growth would reduce the supply demand balance deficit and the overall need requirement.** The supply demand balance deficit is spread across 21 individual water resource zones and is driven by quality as well as quantity issues. In this rural area, growth is relatively low. Based on this scenario, the Preferred Approach remains the optimal solution.
Leakage Targets	Low (Uisce Éireann is focused on sustainability and aggressive leakage reduction)	+634 m^3/day	**The impact of lower than expected leakage savings would increase the supply demand balance deficit and the overall need requirement.** As Uisce Éireann is committed to achieving leakage reductions, the likely scenario would be an extension in the period of time taken to achieve leakage targets as opposed to accepting lower targets. Based on this scenario, the Preferred Approach remains the optimal solution.

Uncertainty	Likelihood	Increase/Decrease in Deficit	Impact on Preferred Approach
	Moderate/High (Uisce Éireann is focused on sustainability and aggressive leakage reduction)	20,605 m^3/day	**Increased leakage savings beyond SELL would reduce the supply demand balance deficit and the overall need requirement.** The need drivers in SAA are across all 21 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. Based on this scenario, the 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 adaptability 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.
- Preferred Approach – The supplies in SAA vary in size with a large number of small WRZs <1Ml/d as well as large growth areas such as Letterkenny. 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 broad range of futures, and therefore represent ‘no regrets’ infrastructure.

8

Summary of Study Area A

8 Summary of Study Area A

The Preferred Approach for SAA (summarised in Table 5.9 and Figure 5.3 in Section 5.3.3) consists of local WRZ supplies solutions for Rosses, Arranmore Island, Gortahork-Falcarragh, Alt Raws and Meeneragh/Cronalaghey WRZs. The Preferred Approach for Inishowen West & Carndonagh, Killybegs, Donegal (River Eske), Culdaff, Owenteskiny, Lough Mourne, Letterkenny/Milford & Inishowen RWSS & Inishowen East, Ballyshannon & Bundoran, Glenties-Ardara, Frosses-Inver, Lettermacaward, Creeslough Dunfanaghy, Carrigart-Downings & Cranford, Buncrana, Fanad West and Fanad East involve transfers from a number of existing surface water abstractions in the study area.

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 SAA 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;
- Nett leakage reduction, amounting to 634 m^3 per day (applied to SDB Deficit) to move towards achieving the National SELL Target by 2034
- Continuation of UÉ 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 SAA, 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 A Water Treatment Plants

WTP Asset Name	Local Plant Names
Inishowen West WTP	Inishowen West WTP
Tiernaleague WTP	Tiernaleague WTP
Buncrana WTP	Buncrana WTP
Illies WTP	Illies WTP
Inishowen East (Redcastle) WTP	Inishowen East (Redcastle) WTP
Tullyconnel WTP	Tullyconnel WTP
Fanad East (Lough Shannagh) WTP	Fanad East (Lough Shannagh) WTP
Carrigart - Downings WTP	Carrigart - Downings WTP
Cranford WTP	Cranford WTP
Milford WTP	Milford WTP
Rathmullan WTP	Rathmullan WTP
Gortahork - Falcarragh WTP	Gortahork - Falcarragh WTP
Crolly WTP	Crolly WTP
Arranmore Island WTP	Arranmore Island WTP
Lettermacaward WTP	Lettermacaward WTP
Glenties WTP	Glenties WTP
Creeslough (Killdarragh) WTP	Creeslough (Killdarragh) WTP
Lough Mourne (Meencrumlin) WTP	Lough Mourne (Meencrumlin) WTP
Killybegs WTP	Killybegs WTP
Killybegs (Old) WTP	Killybegs (Old) WTP
Frosses - Inver (Drumbeagh) WTP	Frosses - Inver (Drumbeagh) WTP
Donegal (River Eske) WTP	Donegal (River Eske) WTP
Ballyshannon (Parkhill) WTP	Ballyshannon (Parkhill) WTP
Bundoran (Lough Melvin) WTP	Bundoran (Lough Melvin) WTP
Letterkenny (Goldrum) WTP	Letterkenny (Goldrum) WTP
Culdaff WTP	Culdaff WTP
Ballymacool WTP	Ballymacool WTP

Annex B – Study Area A Rejection Register Summary

Annex B Study Area A Rejection Register Summary

Study Area A - CS Rejection

Option Reference	Option Description	Rejection Reasoning	Resilience	Deliverability & Flexibility	Sustainability
TG1-SAA-002a	Rationalise Culdaff WRZ to Illies WTP (Letterkenny 25 year plan)	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-003	Rationalise Culdaff WRZ to Inishowen East	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-004	Increase existing SW abstraction from Lough Fad.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-005	New SW source to supply deficit at Inishowen West/Carndonagh/ Culdaff WRZ - source TBC	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-006a	Rationalise Inishowen West WSZ to Illies WTP.	Abstracting the volume of water required is considered unfeasible. 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
TG1-SAA-007	Rationalise Inishowen West WSZ to Lough Mourne WRZ (Letterkenny 25 year plan)	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-008b	Increase GW abstraction from existing BHs to partly supply Inishowen West/Carndonagh/ Culdaff deficit.	Upgrades are to be considered for Inishowen West/Carndonagh/ Culdaff only, not as part of larger regional group as this option is unlikely to be able cover deficit. This option is not taken forward to the fine screening stage as it is assessed as part of a different local feasible option.	Assessed as part of a different feasible option		
TG1-SAA-008c	Increase GW abstraction from existing BHs to partly supply Inishowen West/Carndonagh/ Culdaff deficit.	Upgrades are to be considered for Inishowen West/Carndonagh/ Culdaff only, not as part of larger regional group as this option is unlikely to be able cover deficit. This option is not taken forward to the fine screening stage as it is assessed as part of a different local feasible option.	Assessed as part of a different feasible option		
TG1-SAA-009b	New GW abstraction (Carndonagh Gravels GWB)/wellfield to supply deficit for Inishowen West/Carndonagh/ Culdaff WRZ	Upgrades are to be considered for Inishowen West/Carndonagh/ Culdaff only, not as part of larger regional group as this option is unlikely to be able cover deficit. This option is not taken forward to the fine screening stage as it is assessed as part of a different local feasible option.	Assessed as part of a different feasible option		
TG1-SAA-009c	New GW abstraction/wellfield (Carndonagh Gravels GWB) to supply deficit at Inishowen West/Carndonagh/ Culdaff	Upgrades are to be considered for Inishowen West/Carndonagh/ Culdaff only, not as part of larger regional group as this option is unlikely to be able cover deficit. This option is not taken forward to the fine screening stage as it is assessed as part of a different local feasible option.	Assessed as part of a different feasible option		

Option Reference	Option Description	Rejection Reasoning	Resilience	Deliverability & Flexibility	Sustainability
TG1-SAA-010a	Rationalise Carndonagh WSZ to Illies WTP (Letterkenny 25 year plan)	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-011	Rationalise Carndonagh WSZ to Lough Mourne WRZ (Letterkenny 25 year plan)	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-012	Increase SW abstraction from Lough Doo.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-013a	Interconnect Buncrana and Cardonagh and supply deficit from Carndonagh.	Upgrades are to be considered for Inishowen West/Carndonagh/ Culdaff only, not as part of larger regional group as this option is unlikely to be able cover deficit based on allowable abstraction limits. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-013b	Interconnect Buncrana and Cardonagh and supply deficit from Carndonagh.	Upgrades are to be considered for Inishowen West/Carndonagh/ Culdaff only, not as part of larger regional group as this option is unlikely to be able cover deficit based on allowable abstraction limits. 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
TG1-SAA-014a	Rationalise Buncrana to Cardonagh.	Upgrades are to be considered for Inishowen West/Carndonagh/ Culdaff only, not as part of larger regional group as this option is unlikely to be able cover deficit based on allowable abstraction limits. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-014b	Rationalise Buncrana to Cardonagh.	Upgrades are to be considered for Inishowen West/Carndonagh/ Culdaff only, not as part of larger regional group as this option is unlikely to be able cover deficit based on allowable abstraction limits. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-015a	Rationalise Slavery WTP to Illies WTP.	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-016	Rationalise Slavery WTP to Lough Mourne WRZ (Letterkenny 25 year plan).	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-017a	Increase existing SW abstraction from Crana River and increase capacity of Illies WTP.	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-017c	Increase existing SW abstraction from Crana River and increase capacity of Illies WTP.	Abstracting the volume of water required is considered unfeasible. 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
TG1-SAA-018a	Increase existing SW abstraction from Lough Fad.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-018b	Increase existing SW abstraction from Lough Fad.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-019a	Rationalise Inishowen East to Illies WTP.	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-020	Rationalise Inishowen East to Lough Mourne WRZ (Letterkenny 25 year plan).	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-021b	Increase existing SW abstraction from Lough Mourne. It would require significant increase to impoundment.	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-021c	Increase existing SW abstraction from Lough Mourne. It would require significant increase to impoundment.	This option is a repeated option and is assessed as part of option SAC-217	Assessed as part of a different feasible option		

Option Reference	Option Description	Rejection Reasoning	Resilience	Deliverability & Flexibility	Sustainability
TG1-SAA-021d	Increase existing SW abstraction from Lough Mourne. It would require significant increase to impoundment.	This option is a repeated option and is assessed as part of option SAC-218	Assessed as part of a different feasible option		
TG1-SAA-024	New SW abstraction from Lough Finn and new WTP.	The option also requires a significant length. Transferring small quantities of water over long distances can affect the quality of water. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-025	Import water from NI Water.	There is a high cost associated with this option, based on existing supplies being fed from Northern Ireland. There are better feasible alternatives for supplies managed by Irish Water. Therefore, this option did not meet the requirements of the Deliverability criterion.		•	
TG1-SAA-027	Rationalise Lough Mourne WRZ to Illies WTP supply.	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-028	Continue to import water from NI Water.	There is a high cost associated with this option, based on existing supplies being fed from Northern Ireland. There are better feasible alternatives for supplies managed by Irish Water. Therefore, this option did not meet the requirements of the Deliverability criterion.		•	
TG1-SAA-029	Rationalise Alt Raws to Lough Mourne Supply (via GWS).	This option is a repeated option and is assessed as part of option SAC-217	Assessed as part of a different feasible option		

Option Reference	Option Description	Rejection Reasoning	Resilience	Deliverability & Flexibility	Sustainability
TG1-SAA-030	New GW abstraction (poorly productive bedrock) at Alt Raws	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-031	Continue to import water from NI Water.	There is a high cost associated with this option, based on existing supplies being fed from Northern Ireland. There are better feasible alternatives for supplies managed by Irish Water. Therefore, this option did not meet the requirements of the Deliverability criterion.		●	
TG1-SAA-032	Rationalise Meeneragh to Lough Mourne Supply.	This option is a repeated option and is assessed as part of option SAC-218	Assessed as part of a different feasible option		
TG1-SAA-033	New GW abstraction (poorly productive bedrock) at Meeneragh/ Cronalaghey.	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-034	Increase existing SW abstraction from Lough Naglea.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-037	Rationalise Fanad East to Lough Mourne WRZ (Letterkenny 25 year plan).	Abstracting the volume of water required is considered unfeasible. 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
TG1-SAA-039	Bring back to production Fanad north BH source to partly supply deficit.	More information is required on source, but Local Authority suggest this option is not feasible. This is a highly contaminated source - high in manganese and ammonia. Therefore, this option did not meet the requirements of the Deliverability criterion.		•	
TG1-SAA-040	Rationalise Fanad to Cranford.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-043a	Increase existing SW abstraction from Lough Salt and increase capacity of new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-043b	Increase existing SW abstraction from Lough Salt and increase capacity of new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-043c	Increase existing SW abstraction from Lough Salt and increase capacity of new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•

Option Reference	Option Description	Rejection Reasoning	Resilience	Deliverability & Flexibility	Sustainability
TG1-SAA-043d	Increase existing SW abstraction from Lough Salt and increase capacity of new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-043e	Increase existing SW abstraction from Lough Salt and increase capacity of new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-045a	Increase existing SW abstraction from Lough Greenan and increase capacity of new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-045b	Increase existing SW abstraction from Lough Greenan and increase capacity of new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-045c	Increase existing SW abstraction from Lough Greenan and increase capacity of new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●

Option Reference	Option Description	Rejection Reasoning	Resilience	Deliverability & Flexibility	Sustainability
TG1-SAA-045d	Increase existing SW abstraction from Lough Greenan and increase capacity of new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-045e	Increase existing SW abstraction from Lough Greenan and increase capacity of new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-046	Increase existing SW abstraction from Lough Keel for new Letterkenny WTP and increase capacity of new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-048a	New SW abstraction from Lough Reelan to supplement new Letterkenny WTP and increase capacity of new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-048b	New SW abstraction from Lough Reelan to supplement new Letterkenny WTP and increase capacity of new Letterkenny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•

Option Reference	Option Description	Rejection Reasoning	Resilience	Deliverability & Flexibility	Sustainability
TG1-SAA-050a	New SW abstraction from Lough Fern to supplement new Letterkenny WTP and increase capacity of new Letterkenny WTP.	The overall WFD status of the ground waterbody in this location is classified as poor status and the lake is 'at risk'. There are problems associated with urban wastewater, a nearby landfill site, geomorph issues with shallowness and bank stability issues. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.			
TG1-SAA-050b	New SW abstraction from Lough Fern to supplement new Letterkenny WTP and increase capacity of new Letterkenny WTP.	The overall WFD status of the ground waterbody in this location is classified as poor status and the lake is 'at risk'. There are problems associated with urban wastewater, a nearby landfill site, geomorph issues with shallowness and bank stability issues. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.			
TG1-SAA-051	Increase existing SW abstraction from Lough Columbkille.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.			
TG1-SAA-052	New SW abstraction and new WTP at Lough Fern and abandon Milford WTP.	The overall WFD status of the ground waterbody in this location is classified as poor status and the lake is 'at risk'. There are problems associated with urban wastewater, a nearby landfill site, geomorph issues with shallowness and bank stability issues. 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
TG1-SAA-053	Rationalise Milford to Goldrum Letterkenny WTP	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-054	Rationalise Milford to Cranford.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-055	Increase existing SW abstraction from Gort Lough.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-057	Rationalise Milford to new Letterkenny WTP. New SW abstraction from Lough Reelan to supplement new Letterkeny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•

Option Reference	Option Description	Rejection Reasoning	Resilience	Deliverability & Flexibility	Sustainability
TG1-SAA-059	Rationalise Milford to new Letterkenny WTP. New SW abstraction from Lough Fern to supplement new Letterkeny WTP.	The overall WFD status of the ground waterbody in this location is classified as poor status and the lake is 'at risk'. There are problems associated with urban wastewater, a nearby landfill site, geomorph issues with shallowness and bank stability issues. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-061	Rationalise Rathmullen to Goldrum Letterkenny WTP	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-063	Rationalise Rathmullen to new Letterkenny WTP. New SW abstraction from Lough Reelan to supplement new Letterkeny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-065	Rationalise Rathmullen to new Letterkenny WTP. New SW abstraction from Lough Fern to supplement new Letterkeny WTP.	The overall WFD status of the ground waterbody in this location is classified as poor status and the lake is 'at risk'. There are problems associated with urban wastewater, a nearby landfill site, geomorph issues with shallowness and bank stability issues. 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
TG1-SAA-067c	Increase GW abstraction from existing BHs to partly supply Letterkenny, Inishowen East & Pollan Dam deficit. Recent work has shown potential to get 1-3MLD more from this supply.	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-067d	Increase GW abstraction from existing BHs to partly supply Letterkenny, Inishowen East & Pollan Dam WRZ deficit. Recent work has shown potential to get 1-3MLD more from this supply.	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-069	Rationalise Letterkenny Mixed to Lough Mourne WRZ (Letterkenny 25 year plan).	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-070	Increase existing SW abstraction from Lough Nambraddan.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-071	Increase existing SW abstraction from Lough Nameeltoge.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•

Option Reference	Option Description	Rejection Reasoning	Resilience	Deliverability & Flexibility	Sustainability
TG1-SAA-074	Rationalise Carrigart-Downings to Goldrum Letterkenny WTP	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-076	Rationalise Carrigart-Downings to new Letterkenny WTP. New SW abstraction from Lough Reelan to supplement new Letterkeny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-078	Rationalise Carrigart-Downings to new Letterkenny WTP. New SW abstraction from Lough Fern to supplement new Letterkeny WTP.	The overall WFD status of the ground waterbody in this location is classified as poor status and the lake is 'at risk'. There are problems associated with urban wastewater, a nearby landfill site, geomorph issues with shallowness and bank stability issues. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-079	Rationalise Carrigart-Downings to Ballymacool WTP	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-080	Rationalise Carrigart-Downings to Lough Mourne WRZ (Letterkenny 25 year plan).	Abstracting the volume of water required is considered unfeasible. 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
TG1-SAA-081a	Increase existing SW abstraction from Lough Nacreaght.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-081b	Increase existing SW abstraction from Lough Nacreaght.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-081c	Increase existing SW abstraction from Lough Nacreaght.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-083	Rationalise Cranford to Goldrum Letterkenny WTP	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-085	Rationalise Cranford to new Letterkenny WTP. New SW abstraction from Lough Reelan to supplement new Letterkeny WTP.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•

Option Reference	Option Description	Rejection Reasoning	Resilience	Deliverability & Flexibility	Sustainability
TG1-SAA-087	Rationalise Cranford to new Letterkenny WTP. New SW abstraction from Lough Fern to supplement new Letterkeny WTP.	This option is associated with a large contributing source but the overall WFD status of the ground waterbody in this location is classified as poor status and the lake is 'at risk'. There are problems associated with urban wastewater, a nearby landfill site, geomorph issues with shallowness and bank stability issues. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-088	Rationalise Cranford to Ballymacool WTP	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-089	Rationalise Cranford WSZs to Lough Mourne WRZ (Letterkenny 25 year plan).	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-090	New SW abstraction and WTP from Glen Lough to supply Cranfod	This option is a repeat of option TG1-SAA-072 and as a result, is not taken forward to the fine screening stage as it is assessed as part of a different feasible option.	Assessed as part of a different feasible option		
TG1-SAA-094a	New SW abstraction and WTP on Lough Veagh and supplement Letterkenny/ Milford	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●

Option Reference	Option Description	Rejection Reasoning	Resilience	Deliverability & Flexibility	Sustainability
TG1-SAA-094b	New SW abstraction and WTP on Lough Veagh and supplement Letterkenny & Inishowen RWSS.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-095	Import water from NI Water.	There is a high cost associated with this option, based on existing supplies being fed from Northern Ireland. There are better feasible alternatives for supplies managed by Irish Water. Therefore, this option did not meet the requirements of the Deliverability criterion.		•	
TG1-SAA-096	Increase existing SW abstraction from stream from Muckish Mountain.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-097	Increase existing SW abstraction from Lough Agher.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-098	New SW abstraction from lake (source TBC) and new WTP	This option is a repeat of option TG1-SAA-099 and as a result, is not taken forward to the fine screening stage as it is assessed as part of a different feasible option.	Assessed as part of a different feasible option		

Option Reference	Option Description	Rejection Reasoning	Resilience	Deliverability & Flexibility	Sustainability
TG1-SAA-101	Rationalise Creeslough Dunfanaghy WRZ to Lough Mourne WRZ (Letterkenny 25 year plan).	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-103	Rationalise Creeslough Dunfanaghy WRZ to Letterkenny WRZ - Lough Veagh source	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-107	Rationalise Creeslough Dunfanaghy to Rossess WRZ - new WTP at Dunlewy Lough.	A better alternative to this option is to abstract from larger Lough Nacung directly downstream. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-109	Increase existing SW abstraction from Lough Lagha.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-113	Rationalise Gortahork-Falcarragh to Rossess WRZ - new WTP at Dunlewy Lough.	A better alternative to this option is to abstract from larger Lough Nacung directly downstream. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-115	Rationalise Gortahork-Falcarragh WRZ to Lough Mourne WRZ.	Abstracting the volume of water required is considered unfeasible. 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
TG1-SAA-116a	Increase existing SW abstraction from Lough Keel.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-116b	Increase existing SW abstraction from Lough Keel.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-117	Increase existing SW abstraction from river leaving Lough Keel.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-118b	New SW abstraction from Loch an Luir and new WTP.	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-120a	New WTP on ESB impoundment at Dunlewy Lough.	A better alternative to this option is to abstract from larger Lough Nacung directly downstream. 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
TG1-SAA-120b	New WTP on ESB impoundment at Dunlewy Lough.	A better alternative to this option is to abstract from larger Lough Nacung directly downstream. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-122	Rationalise Rosses WRZ to Lough Mourne WRZ.	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-123	Rationalise Roysses to Killyhbegs and decommission existing source.	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-124	Interconnect Rosses with Glenties-Ardara WRZ (rationalise Lettermacaward WRZ to Glenties-Ardara WRZ) and supply deficit from new WTP at Lough Finn.	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-125	New SW abstraction from Lough Altan and the WTP. Supplement Rosses WRZ.	This option is removed from regional group and assessed as part of a different feasible group.	Option assessed as part of a different feasible group		
TG1-SAA-129	Interconnect Lettermacaward WRZ and Glenties WRZ and supply deficit from Glenties.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•

Option Reference	Option Description	Rejection Reasoning	Resilience	Deliverability & Flexibility	Sustainability
TG1-SAA-130	Rationalise Lettermacaward WRZ to Lough Mourne WRZ.	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-132	Rationalise Lettermacaward to Killybegs and decommission existing source.	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-133	Rationalise Lettermacaward to Glenties-Ardara WRZ (new WTP at Lough Finn) and decommission existing source.	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-134a	Increase existing impoundment at Lough Anna and increase existing SW abstraction.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-134b	Increase existing impoundment at Lough Anna and increase existing SW abstraction.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-135b	New SW abstraction from Lough Finn and new WTP. Supply Glenties-Ardara and Lettermacaward WRZs. Supply deficit to Rosses WRZ.	Abstracting the volume of water required is considered unfeasible. 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
TG1-SAA-137	Rationalise Glenties-Ardara WRZ to Lough Mourne WRZ.	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-140	Rationalise Glenties-Ardara to Killybegs and decommission existing source.	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-142	Target UFW and demand management on Arranmore Island	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		
TG1-SAA-144	Tanker water when required on Arranmore Island	Tankering is not a robust, resilient, long term solution for any WRZ within the region and for this reason, is not taken forward to fine screening	Tankering is not a robust, resilient, long term solution for any WRZ		
TG1-SAA-146	Rationalise Arranmore Island to mainland - Rosses WRZ (Lough Keel)	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-147	Rationalise Arranmore Island to mainland - Rosses WRZ (Lough Anure)	Abstracting the volume of water required is considered unfeasible. 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
TG1-SAA-148	Rationalise Arranmore Island to mainland - Rosses WRZ (Dunlewy Lough)	A better alternative to this option is to abstract from larger Lough Nacung directly downstream. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-150	Increase existing SW abstraction from Lough Nalughraman.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-152a	Increase existing SW abstraction from Lough Aderry.	When unconstrained options list was originally drawn up this WRZ was identified as having a deficit; however, due to an updated SDB, there is no longer an identified deficit in this WRZ. Therefore, no new supply option is required.	WRZ is no longer in deficit		
TG1-SAA-154	Increase existing SW abstraction from Lough Aderry. Rationalise Lettermacaward, Rosses and Glenties-Ardara WRZs (decommission existing sources) to Killybegs and create a single WRZ.	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-155	Increase existing SW abstraction from Lough Aroshin.	When unconstrained options list was originally drawn up this WRZ was identified as having a deficit; however, due to an updated SDB, there is no longer an identified deficit in this WRZ. Therefore, no new supply option is required.	WRZ is no longer in deficit		

Option Reference	Option Description	Rejection Reasoning	Resilience	Deliverability & Flexibility	Sustainability
TG1-SAA-156	Increase existing SW abstraction from St. Peters Lough.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-157	Increase existing SW abstraction from Glencoagh Lough.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-163	Interconnect Frosses-Inver and Donegal (River Eske source) supply deficit from Donegal (River Eske) WRZ.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-164	Interconnect Frosses-Inver and Donegal (River Eske & Lough Eske source) supply deficit from Donegal (River Eske) WRZ.	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-167a	Increase existing SW abstraction from River Eske.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•

Option Reference	Option Description	Rejection Reasoning	Resilience	Deliverability & Flexibility	Sustainability
TG1-SAA-167b	Increase existing SW abstraction from River Eske.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-167c	Increase existing SW abstraction from River Eske.	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-167d	Increase existing SW abstraction from River Eske.	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-167e	Increase existing SW abstraction from River Eske.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-167f	Increase existing SW abstraction from River Eske.	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-168a	New SW abstraction from Lough Eske and new WTP. To supplement existing river abstraction. Operate two sources conjunctively, applying compensation flow release requirements from lake to river.	Abstracting the volume of water required is considered unfeasible. 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
TG1-SAA-168b	New SW abstraction from Lough Eske and new WTP. To supplement existing river abstraction. Operate two sources conjunctively, applying compensation flow release requirements from lake to river.	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-168c	New SW abstraction from Lough Eske and new WTP. To supplement existing river abstraction. Operate two sources conjunctively, applying compensation flow release requirements from lake to river.	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-173	Increase existing SW abstraction from Lough Gorman.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-174	New SW abstraction from lake (source TBC) and new WTP in Ballyshannon & Bundoran WRZ	There are no other suitable new lake sources associated with this option. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-179	Rationalise Ballyshannon/ Ballymagroarty to Donegal (River Eske) WRZ.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●

Option Reference	Option Description	Rejection Reasoning	Resilience	Deliverability & Flexibility	Sustainability
TG1-SAA-180	Rationalise Ballyshannon/ Ballymagroarty to Donegal (River Eske& Lough Eske source) WRZ.	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-184	Rationalise Fanad West WSZs to Lough Mourne WRZ (Letterkenny 25 year plan).	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria	●	●	●
TG1-SAA-017e	Increase existing SW abstraction from Crana River and increase capacity of Illies WTP.	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria	●	●	●
TG1-SAA-210	Increase existing SW abstraction from Lough Unshin	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-216	New SW abstraction from Lough Altan and new WTP	Abstracting the volume of water required is considered unfeasible. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria	●	●	●
TG1-SAA-108	Rationalise Creeslough Dunfanaghy to Rossess WRZ - new WTP at Lough Nacung.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●

Option Reference	Option Description	Rejection Reasoning	Resilience	Deliverability & Flexibility	Sustainability
TG1-SAA-112	New SW abstraction from Lough Nacung.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving WFD objectives. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-114	Rationalise Gortahork-Falcarragh to Rossess WRZ - new WTP at Lough Nacung.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-119a	New WTP on ESB impoundment at Lough Nacung.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-119b	New WTP on ESB impoundment at Lough Nacung.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	•	•	•
TG1-SAA-119c	New WTP on ESB impoundment at Lough Nacung.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status. 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
TG1-SAA-149	Rationalise Arranmore Island to mainland - Rosses WRZ (Lough Nacung).	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-211	New WTP on ESB impoundment at Lough Nacung.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-212	Interconnect Lettermacaward WRZ to Rosses WRZ - new WTP at Lough Nacung	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-213	Interconnect Glenties-Ardara WRZ to Rosses WRZ - new WTP at Lough Nacung	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-219	New WTP on ESB impoundment at Lough Nacung.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status. 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
TG1-SAA-275	Rationalise Gortahork-Falcarragh to Rossess WRZ - new WTP at Lough Nacung.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●
TG1-SAA-276	New WTP on ESB impoundment at Lough Nacung.	Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving high WFD status. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.	●	●	●