



7

**Preferred
Approach –
Study Area**

7.1 Introduction

The purpose of this section of the RWRP-SE is to examine all potential Feasible Options that could be used to address the identified Need (both in terms of Quantity and Quality) across the 111 Water Resource Zones (WRZs) in the South East Region. The Approach Development Process, which is set out in Section 8.3.7 of the Framework Plan, seeks to identify the Preferred Approach for addressing Need at three (3) spatial Levels: individual WRZs, Study Area (SA) Level, and Regional Level (Figure 7.1). This process involves comparison of the Feasible Options at each level using defined criteria.

The Approach Development Process is undertaken sequentially for each WRZ and Study Area, before looking at approaches to address Need at a wider Regional Level. This Section will outline how the process is applied at WRZ and Study Area Level and Section 8 outlines the development of the Preferred Approach at Regional Level.

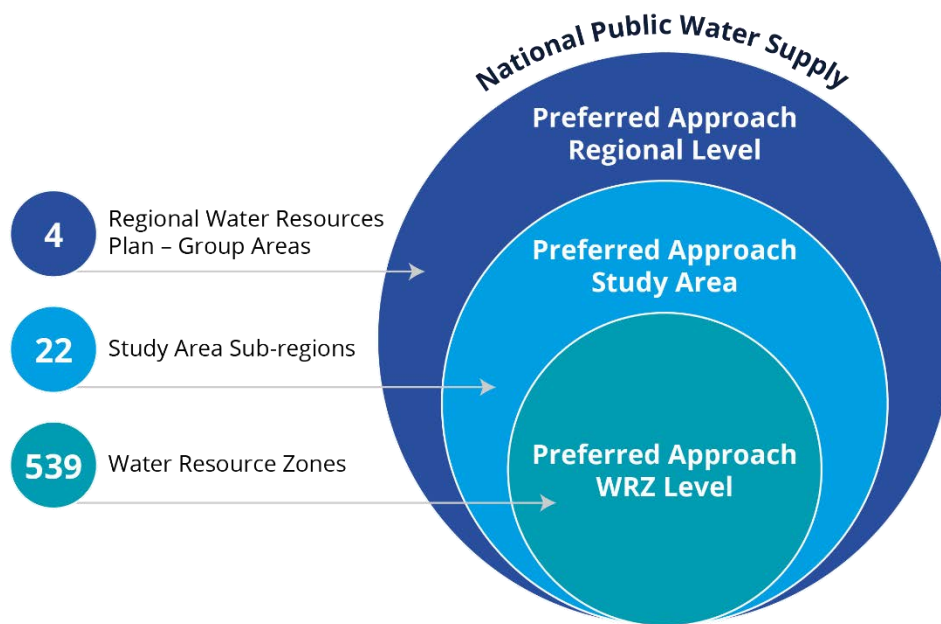


Figure 7.1 Spatial Level Assessment

The process we follow, which is based on a hierarchical view of the South East Region, allows us not only to resolve Need across the individual supplies, but also allows us to understand the potential for the strategic possibilities for collective water supply needs across the South East Region. This complete view means that each WRZ is no longer looked at in isolation (which was historically the case). It also enables the establishment of a wider plan that allows for the integration of WRZs, in circumstances where such integration is identified as the best outcome. This approach aligns with other jurisdictions that have fewer WRZs and will help deliver a more sustainable and cost-effective water supply service.

This section,

- Outlines the Approach Development Process we have implemented to determine the Study Area Preferred Approach (Section 7.2).
- Describes the Study Area Preferred Approach we have developed to address long term Need within the South East Region and compares this with the WRZ Level Approach (Section 7.3 and 7.4).
- Summarises the Preferred Approach for each Study Area (Section 7.5).
- Presents the 'Interim Solutions' we have identified to address the short-term Needs within the South East Region (Section 7.6).
- Details the outcomes of the Sensitivity Analysis of each of the Preferred Approaches to changes in climate change, abstraction limits, leakage targets and growth projections (Section 7.7).

7.2 Approach Development Process

7.2.1 Approach Categories

The Framework Plan establishes an Approach Development Process (Section 8.3.7) to compare various Options to address the Need within each WRZ and Study Area, and across the South East Region as a whole. This process is designed to identify the Option that meets estimated Deficits while providing the best overall outcomes when considered against a range of criteria based on policy objectives.

Specifically, the Approach Development Process assesses the Feasible Options under six (6) defined "Approach Categories". These categories are Least Cost, Best AA (Best Appropriate Assessment), Best Environmental, Most Resilient, Lowest Carbon and Quickest Delivery. These Approach Categories were selected to align the National Water Resources Plan (NWRP) with relevant Government Policy. The six (6) categories, along with the associated policy drivers, are summarised in Table 7.1 and explained in more detail below. We use these Approach Categories as a starting point to determine the best performing Option to meet the Deficit, relative to each Approach Category. For example, a "Least Carbon" approach would be the Option that would meet the Deficit and involve the least embodied and operational carbon load over the lifetime of the Option.

Table 7.1 Range of Approaches to Test Feasible Options

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 (Best AA)	<p>Lowest score against the European Sites (Biodiversity) sub-criteria question:</p> <p>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.</p> <p>Score = -1 or -2 equates to LSEs that can be addressed with general/standard mitigation measures.</p> <p>Score = -3 equates to LSEs that may be harder to mitigate or require significant Project Level assessment.</p>	Habitats Directive
Quickest Delivery	<p>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</p> <p>This is particularly relevant where an Option might be required to address an urgent Public Health issue.</p>	Statutory Obligations under the Water Supply Act and Drinking Water Regulations
Best SEA Environmental	This is the Option or combination of Options with the highest total score across the 19 No. Strategic Environmental Assessment (SEA) Multi-Criteria Assessment (MCA) sub-criteria questions.	SEA Directive and Water Framework Directive
Most Resilient	This is the Option or combination of Options with the highest total score against the four (4) resilience criteria. These include outages, financial uncertainty, regulatory changes, and climate change.	National Adaptation Plan and Climate Action Plan

Approaches Tested	Description	Policy Driver
Lowest Carbon	This is the Option or combination of Options with the lowest embodied and operational carbon cost	Climate Action Plan

Least Cost Approach

The Least Cost Approach is determined using an Uisce Éireann Net Present Value (NPV) assessment tool which establishes the Option with the lowest comparative NPV cost encompassing: Environmental and Social Costs, Carbon Costs, Capital Costs and Operational Costs. The NPV assessment tool utilises a strict set of requirements and is limited in the flexibility it offers. Therefore, where a number of Options provide similar NPV costs, so as to ensure that no such Options are excluded at this early stage by reference only to "least cost", 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 also recognises the desk-based nature of the NPV assessment, and the fact that these figures will change at project stage. To then determine the individual "least cost" Option in each case, Uisce Éireann has applied wider factors, including SEA and Habitats objectives, as part of its exercise of professional judgement (as explained in Section 8.3.7.4 in the Framework Plan). Further details of this approach are provided in Section 7.2.2. below. This approach also ensures that our plan level assessments align with the requirements of the Public Spending Code and the National Adaptation Framework¹.

Best Appropriate Assessment (Best AA) Approach

The Best AA approach gives maximum consideration to the Options with no potential for impacts on European Designated sites (no Likely Significant Effects or LSEs) or Options with LSEs that can be addressed with general/standard mitigation measures at the project level. This can equally be described as giving maximum consideration to the Option with the least impact on European Sites. This prioritises the avoidance of impacts on European Sites in the Option Assessment Process.

Options with high LSEs, which could lead to adverse effects on a European Site, will have already been removed at Coarse Screening stage.

Quickest Delivery Approach

The Quickest Delivery Approach is based on the estimated time for an Option to be brought into operation (including typical feasibility, consent, construction and commissioning durations) as identified at Fine Screening. This approach allows us to potentially optimise the Preferred Approach by minimising the time taken for an Option to become operational. This could be appropriate in a WRZ with a critical water quality issue that might impact on public health as this approach would identify the Option that could potentially be delivered in the shortest possible timeframe. As the NWRP does not confer funding or statutory consent for any project, and the identified Needs across the South East Region must be considered, we would be unlikely to modify an approach based on Quickest Delivery, unless there is a critical driver.

Best Environmental Approach

The Best SEA Environmental Approach is the Option performing best overall across the 19 SEA objective-based Multi Criteria Assessment (MCA) environmental criteria, assessed as part of the Fine Screening assessment (described in Section 8.3.5 of the Framework Plan). Positive and negative scores

are summed separately. The purpose of this approach is to ensure that the SEA objectives to minimise potential impacts are considered through the Option Assessment and Approach Selection process. For each Option, we assess the MCA scoring in detail across all SEA assessment criteria, using the sum negative scores to indicate the potential for significant adverse effects and the sum positive to indicate the potential for beneficial effects. We also review the scoring against individual criteria to identify where assessment reflects important differences between Options, focusing on potential operational or long-term effects. This ensures that we can review the relative merits of each Option. When the combination with the lowest environmental score also scores any -3 score under the Best AA criteria, we review the other combinations to determine if there are any combinations with no -3-biodiversity score. The Best Environmental Option is the Combination with the best performing environmental score that has the least number of -3 scores against the best AA criteria.

Table 8.6 of the Framework Plan lists the criteria, sub-criteria and questions that are applied when completing the MCA assessment.

Most Resilient Approach

The Most Resilient Approach is the Option with the highest scores against four (4) resilience MCA screening criteria. These include outages, financial uncertainty, regulatory changes, and climate change. This approach is aligned to the NWRP objective to ensure a safe and secure water supply in the short, medium and long term.

Lowest Carbon Approach

The Lowest Carbon Approach is the Option with the lowest embodied and operational carbon costs. This approach is aligned with Uisce Éireann's carbon reduction policies and the National Adaptation Framework (NAF)¹ in relation to climate change.

7.2.2 Approach Ranking and Appraisal

The EBSD (Economics of Balancing Supply and Demand) method is applied to rank the Options in order of lowest to highest NPV cost and with regard to their applicable MCA scores for the six (6) Approach Categories. The EBSD method determines an optimum combination of Options to address the future Need, balancing across the range of NWRP and SEA objectives outlined above. Further detail on the EBSD method is outlined in Section 8.3.7 of the Framework Plan.

In some instances, Options may achieve similar, although not identical scores within an Approach Category. In these circumstances, to ensure that Options which perform better overall are not excluded from the Approach Development Process, Uisce Éireann takes a wider look at the combination to consider which of these comparable Options to categorise as the "Best" approach within each category. In particular, Uisce Éireann 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 exercise of professional judgement from the multi-disciplinary teams identified in Section 8.3.7.4 of the Framework Plan as being necessary.

We then compare the Option identified as the best performing within each of the six (6) Approach Categories (Least Cost, Best AA, Lowest Carbon etc.) against each other to come up with a Preferred Approach that meets the objectives of the Framework Plan and aligns with all relevant Government Policy. This comparison process is outlined in Figure 7.2. In this figure, the 'Modified Approach' refers to the Approach that is taken forward at Step 2 to Step 5. For example, at Step 2, if the Quickest Delivery Approach is determined to outperform the Least Cost Approach overall (when comparing the MCA scores of each Approach across the six categories), the Quickest Delivery Approach becomes the

'Modified Approach'. At Step 3, it is then the Quickest Delivery Approach (as the 'Modified Approach') that is compared against the Best Environmental Approach.

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: <ul style="list-style-type: none"> • 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 7.2 Seven (7)-Step Approach Development Process

This Approach Development Process is conducted via a combination of interactive workshops supported by a process of ongoing engagement and dialogue between the technical experts, including Engineers, Hydrologists and Hydrogeologists, Ecologists and Environmental Scientists working directly on the development of the Preferred Approach.

It should be noted that the identification of a Preferred Approach at a plan level does not confer any consent to develop a project, nor does it preclude other Options being considered subsequently at the project level. Assessments at this stage are desk-based and plan level assessments. No statutory consent or funding consent is conferred by inclusion of any Option in the NWRP. Any projects that are progressed following identification as a Preferred Approach in the Regional Plans, 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.

As explained in Section 6, the Option to resolve a Deficit can include a transfer of water from outside the WRZ or Study Area. The feasible source area will depend on the size of the demand centre. It is usually not feasible to develop Options that require small volumes of water to be transferred over a distance of five (5) kilometres or more, due to potential water quality issues associated with such transfers. The Approach Development Process contains three (3) tiers. We first start with WRZ Level and then apply the process sequentially to each Study Area and then the Region as follows:

Stage 1 – We assess the WRZ individually to develop an initial Preferred Approach, - WRZ Level 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. 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 across the six (6) Approach Categories. This is known as the Preferred Approach at SA Level.

We set out the process for identifying the Preferred Approach for WRZ and Study Area Level below, and Section 8 outlines how this is done at Regional Level.

7.2.3 Stage 1 – WRZ Level Approach

7.2.3.1 Test a Range of Approach Types - WRZ Level

The purpose of the NWRP is to examine all potential Options that could be used to resolve the Need within the WRZ (Unconstrained Options) and then to eliminate those that are not feasible or that have identifiable environmental issues at a desktop level (Option assessment and screening). This is set out in Section 6.

The remaining Feasible Options are categorised as Options that resolve the Need for one WRZ only (“WRZ Option”), and Options that resolve the Need for more than one WRZ (“Study Area Option”).

To illustrate, Table 7.2 provides an overview of the number of feasible WRZ Options and Study Area Options for the 75 WRZs in Study Area K (SAK) in County Tipperary and Waterford.

Table 7.2 Study Area K – Option Types

Water Resource Zone	Option Type	
	WRZ Option	Study Area Option
Adramore/Kilrossanty	3	3
Aheeney	1	5
Anglesboro Water Supply	1	0
Ardfinnan Reginal	3	13
Ardmore	1	1
Ardmore Grange	2	2
Ballinvir	1	5
Balluguiry	2	2
Ballyknock	2	4
Ballylanders Water Supply	3	6
Ballymacarbry	2	0
Ballynoe/Melleray	1	0
Ballyogarty	2	6
Ballysaggart	1	4
Ballyshunnock	2	6
Boolavoonteen/Kilcooney/Touraneena	2	0
Burncourt Ballylooby	4	4
Callan PWS	3	3
Carrick-On-Suir	2	7
Carrigeen	1	2
Carrimore	2	3
Carrignagower	1	5
Carrowgarriff	1	0
Clonmel & Environs	6	15
Coalbrook / Commons	1	3
Crehanagh	2	5
Deelish/Ballinacourty/Kilnafrehan	1	0

Water Resource Zone	Option Type	
	WRZ Option	Study Area Option
Dundrum Regional	7	5
Dungarvan	3	5
Dunhill	2	10
Dunhill Ballinageeragh	2	10
East Waterford Water Supply Scheme	5	19
Faha	2	2
Fethard & Mullenbawn Regional Public Water Supply	3	5
Fews	2	6
Galbally Water Supply	4	4
Galtee Regional	7	6
Garravoone	1	5
Garryahlish	1	1
Glenagad	1	4
Glengar	1	3
Graigenageeha	1	4
Herbertstown	4	8
Horse & Jockey PWS	1	5
Inchinleamy	1	0
Kilbrien	1	0
Kilcash	1	7
Kil/Ballylaneen	1	5
Kilmacthomas	2	8
Kilmanahan	1	5
Kilteely	2	9
Knocklong / Hospital	3	10
Lacken	3	8
Liskealty	1	1

Water Resource Zone	Option Type	
	WRZ Option	Study Area Option
Lismore / Cappoquin / Ballyduff (LCB)	1	15
Littleton PWS	1	5
Lyrenaleara	1	0
Modeligo	1	0
Monatarrif	1	4
Moores Well	3	8
Piltown-Fiddown	1	2
Portlaw	2	6
Poulnagunoge (Waterford)	1	4
Rathgormack	1	4
Russelstown	1	5
Scrahan	1	6
Smoore	1	4
South Kilkenny	4	8
Stradbally	1	5
Templemore / Templetuohy	5	7
Templetney/Brackford Bridge PWS	4	15
Thurles / Borrisoleigh	2	10
Tipperary Town Supply	2	2
Tullohea	1	8
Two Mile Borris	2	4

Uisce Éireann's next step is to assess the Feasible WRZ Options for each WRZ and identify the best performing Option within each of the six (6) Approach Categories for the relevant WRZ. This is achieved by following the Seven (7)-Step Approach Development Process (Figure 7.2).

The Approach Development Process at WRZ Level is illustrated using the South Kilkenny & Environs WRZ in SAK. As can be seen from Table 7.2 above, there are four (4) feasible WRZ Options for South Kilkenny & Environs WRZ. We rank the four (4) WRZ Options against the six (6) Approach Categories using the EBSD tool. As set out in Table 7.3, Option SAK-060 performed poorly against all approach categories whilst option SAK-057 and SAK-282 were identified as the Best in only one approach category. Option SAK-648 was the Least Cost, Quickest Delivery, Best AA and Lowest Carbon option. It

was also comparable to SAK-057 in terms of resilience. This option was therefore identified as the Preferred Approach for South Kilkenny & Environs WRZ.

As previously mentioned, in some instances, Options may achieve similar, although not identical, scores within an Approach Category. As described in Section 7.2.2, where Options or combinations of Options achieve similar, although not identical scores under the six (6) approach types, Uisce Éireann takes a wider look at the comparable combinations/Options to consider which to categorise as the “Best” approach within each category. Therefore, prior to the Seven (7)-Step process, the Options that achieve similar scores for an approach category are compared to determine which approach should go forward as the ‘Best’ in that approach category.

Table 7.3 SAK, South Kilkenny WRZ - WRZ Options

WRZ Name	Feasible Options – South Kilkenny & Environs WRZ			Approach					
	No. of WRZ Options	Option Code	Option Description	Least Cost	Quickest Delivery	Best AA	Best SEA (Environmental)	Lowest Carbon	Most Resilient
South Kilkenny & Environs	4	SAK-057	Increase GW abstraction from existing BH's and upgrade Mullinabro WTP to supply deficit	-	-	-	-	-	✓
		SAK-060	New GW abstraction (productive fissured bedrock) and new WTP to supply deficit	-	-	-	-	-	-
		SAK-282	New wellfield and new WTP to supply deficit	-	-	-	✓	-	-
		SAK-648	Bring back Silverspring WTP to production and supply deficit	✓	✓	✓	-	✓	✓

7.2.3.2 Approach Appraisal - WRZ Level Approach

Once Uisce Éireann has identified the Option with the best outcomes within each of the Approach Categories, these Options are brought through to the Approach Development Process. As noted previously, this process allows us to compare the best ranked approaches within each category at WRZ Level relative to each other, to select the Option that provides the best overall solution for that WRZ. This process is demonstrated in Figure 7.3 for the South Kilkenny & Environs WRZ in SAK.

STEP 0 Best AA	There are no options assessed as having no potential impact on a European Site (based on a desktop assessment). Proceed to the 7-step process.
STEP 1 Least Cost	We compared the Least Cost Approach against the Best AA Approach. The Least Cost Approach is also the Best AA Approach. Option SAK-057, SAK-282 and SAK-648 all have a -1 biodiversity score whilst option SAK-060 has a -2 biodiversity score. The Least Cost Approach was therefore retained at this stage.
STEP 2 Quickest Delivery	We compared the Quickest Delivery Approach against the Least Cost Approach. The Quickest Delivery Approach was the Least Cost Approach. Therefore the Least Cost Approach was retained at this stage.
STEP 3 Best Environmental	We compared the Least Cost against the Best Environmental Approach. The Best Environmental Approach was not significantly better than the Least Cost Approach and was less resilient, had higher carbon and NPV costs and a longer delivery time. Therefore the Least Cost Approach was retained at this stage.
STEP 4 Most Resilient	We compared the Least Cost Approach against the Most Resilient Approach. The Least Cost Approach was the Most Resilient Approach. The Least Cost Approach was therefore retained at this stage.
STEP 5 Least Carbon	We compared the Least Cost Approach against the Lowest Carbon Approach. The Least Cost Approach was the Lowest Carbon Approach. The Least Cost Approach was therefore retained at this stage.
STEP 6 Approach Comparison	A final assessment of the Least Cost Approach was completed against the Best Environmental Approach. The Least Cost Approach is also the Quickest Delivery, Best AA, Lowest Carbon and Most Resilient Approach. It is comparable to other options in relation to the Best AA assessment. The Least Cost Approach was therefore retained at this stage.
STEP 7 Preferred Approach	The Least Cost Approach was selected as the Preferred Approach for the Water Resource Zone.

Figure 7.3 WRZ Level Preferred Approach Development – SAK, South Kilkenny & Environs WRZ

We follow this same process for the WRZs within each Study Area to establish the Preferred Approach for each WRZ across the three (3) Study Areas of the South East Region. The individual WRZ Preferred Approaches are combined and referred to as the **WRZ Level Approach**. This Stage 1 process is outlined in Figure 7.4.

• Stage 1: •

WRZ Level Preferred Approach Development



Figure 7.4 Preferred Approach Development – Stage 1

The outcome of the Stage 1 process for SAK is summarised in Table 7.4. This shows the combination of the WRZ Preferred Approaches in the Study Area and their alignment with the six (6) Approach Categories, as determined by the application of the Seven (7)-Step process. Each of the 75 WRZs has a local Option available.

All study areas in the South East Region have a local WRZ option however nationally there may be no local WRZ Option available for some WRZs. For example, there are four (4) WRZs in Study Area A in the North West Region which do not have a feasible local Option. Such a scenario highlights the benefit of identifying Options at a broader Study Area Level (Section 7.2.4).

Even where a local Option is available for each WRZ, some of these Options may have the potential to meet the deficit of more than one WRZ. Combining WRZs into SA Option can be a good alternative to the local WRZ Option, as SA Options are likely to deliver cost efficiencies by supplying multiple WRZs. They also may provide wider environmental and social benefits through the rationalisation of infrastructure and abstraction points.

Table 7.4 SAK WRZ Level Approach –Assessment Outcome

Water Resource Zone Name	Feasible Options SAB		Zero AA	Approach						Preferred Approach
	Option Code	Option Description		Least Cost	Quickest Delivery	Best AA	Best SEA	Lowest Carbon	Most Resilient	
Adramone / Kilrossanty	SAK-450	Increase GW abstraction from Kilrossanty BH and upgrade Kilrossanty WTP to supply deficit.	-	✓	✓	✓	✓	✓	✓	✓
Ahenny	SAK-233	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit. Land acquisition required due to lack of space at the WTP site.	-	✓	✓	✓	✓	✓	✓	✓
Anglesboro Water Supply	SAK-055	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit.	✓	✓	✓	✓	✓	✓	✓	✓
Ardfinnan Regional	SAK-156	New SW abstraction from River Tar and upgrade Goatenbridge WTP to supply deficit.	-	-	✓	-	-	✓	-	✓
Ardmore	SAK-392	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit.	✓	✓	✓	✓	✓	✓	✓	✓
Ardmore Grange	SAK-625	Increase GW abstraction and upgrade WTP to supply deficit.	✓	✓	✓	✓	✓	✓	✓	✓
Ballinvir	SAK-248	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit.	-	✓	✓	✓	✓	✓	✓	✓
Ballyguiry	SAK-472	Increase GW abstraction from Ballyguiry BH and upgrade Ballyguiry WTP to supply deficit.	-	✓	✓	✓	✓	✓	-	✓
Ballyknock	SAK-580	Increase GW abstraction from Ballyknock BH and upgrade Ballyknock WTP to supply deficit.	-	✓	✓	✓	-	✓	✓	✓
Ballylanders Water Supply	SAK-046	Increase GW abstraction at Ballylanders BH and upgrade Ballylanders Pump Station WTP to supply deficit.	-	✓	✓	-	-	-	✓	✓
Ballymacarbry	SAK-441	New GW abstraction (karstic) and new WTP to supply deficit.	-	✓	-	✓	✓	-	-	✓
Ballynoe / Melleray	SAK-386	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit.	-	✓	✓	✓	✓	✓	✓	✓

Water Resource Zone Name	Feasible Options SAB		Zero AA	Approach						Preferred Approach
	Option Code	Option Description		Least Cost	Quickest Delivery	Best AA	Best SEA	Lowest Carbon	Most Resilient	
Ballyogarty	SAK-393	Increase GW abstraction from existing BH and upgrade Ballyogarty WTP to supply deficit.	-	✓	✓	✓	-	✓	✓	✓
Ballysaggart	SAK-420	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit.	-	✓	✓	✓	✓	✓	✓	✓
Ballyshunnock	SAK-481	Increase GW abstraction from BH and Ballyshunnock WTP to supply deficit.	✓	✓	✓	✓	✓	✓	✓	✓
Boolavoonteen / Kilcooney / Touraneena	SAK-444	Increase GW abstraction from Touraneena BH and upgrade Touraneena WTP to supply deficit.	-	✓	✓	✓	✓	✓	✓	✓
Burncourt Ballylooby	SAK-211	Increase GW abstraction from no.2 BHs and upgrade Ballylooby Springs WTP to supply deficit.	-	✓	-	-	✓	✓	✓	✓
Callan PWS	SAK-077	Increase GW abstraction from existing spring and BH and upgrade Callan WTP to supply deficit.	-	✓	-	-	-	✓	-	✓
Carrick-On-Suir	SAK-202	New GW abstraction and new Linguan WTP to supply deficit.	-	✓	✓	-	✓	✓	-	✓
Carrigeen	SAK-548	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit.	✓	✓	✓	✓	✓	✓	✓	✓
Carrigmore	SAK-123	Increase GW abstraction at Carrigmore BH and upgrade Carrigmore BH to supply deficit.	✓	✓	✓	✓	✓	✓	-	✓
Carrignagower	SAK-622	New GW abstraction and new WTP to supply deficit.	-	✓	✓	✓	✓	✓	✓	✓
Carrowgarriff	SAK-416	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit.	✓	✓	✓	✓	✓	✓	✓	✓
Clonmel & Environs	SAK-140	New abstraction from the River Suir and new WTP at Barne (site identified)	-	✓	✓	✓	-	-	✓	✓

Water Resource Zone Name	Feasible Options SAB		Zero AA	Approach						Preferred Approach
	Option Code	Option Description		Least Cost	Quickest Delivery	Best AA	Best SEA	Lowest Carbon	Most Resilient	
Coalbrook / Commons	SAK-247	New GW abstraction and new WTP to supply deficit.	-	✓	✓	✓	✓	✓	✓	✓
Crehanagh	SAK-585	Increase GW abstraction from Crehanagh BH and upgrade Crehanagh WTP to supply deficit.	-	✓	✓	✓	✓	✓	✓	✓
Deelish/Ballinacourty /Kilnafrehan	SAK-387	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit.	-	✓	✓	✓	✓	✓	✓	✓
Dundrum Regional	SAK-165	New SW abstraction from River Suir and new WTP to supply deficit.	-	✓	✓	✓	✓	✓	✓	✓
Dungarvan	SAK-461	Increase GW abstraction from no. 6 BH and upgrade Ballinamuck WTP to supply deficit.	-	✓	✓	✓	✓	-	✓	✓
Dunhill - Cois Coille	SAK-488	Increase GW abstraction from BH and upgrade Dunhill Cois Coille WTP to supply deficit.	-	✓	✓	✓	✓	✓	✓	✓
Dunhill Ballinageeragh	SAK-532	Increase GW abstraction from Dunhill BH and upgrade Dunhill Ballynageeragh WTP to supply deficit.	-	✓	✓	✓	-	✓	✓	✓
East Waterford Water Supply Scheme	SAK-260	New SW abstraction from River Suir upstream of Carrick-on-Suir. Pump raw water to Adamstown WTP and treat at Adamstown WTP to supply deficit.	-	✓	-	-	-	-	-	✓
Faha	SAK-499	Increase GW abstraction from Faha BH and upgrade Faha WTP to supply deficit.	-	✓	✓	✓	✓	✓	✓	✓
Fethard & Mullenbawn Regional Public Water Supply	SAK-225	Upgrade Fethard WTP for water quality improvements. WRZ is not in deficit.	-	✓	✓	-	✓	✓	-	✓

Water Resource Zone Name	Feasible Options SAB		Zero AA	Approach						Preferred Approach
	Option Code	Option Description		Least Cost	Quickest Delivery	Best AA	Best SEA	Lowest Carbon	Most Resilient	
Fethard & Mullenbawn Regional Public Water Supply	SAK-219	Upgrade existing Dualla WTP for water quality improvements. The WRZ is not in deficit.	✓	-	✓	✓	-	-	-	✓
Fews	SAK-557	Increase GW abstraction from Fews BH and upgrade Fews WTP to supply deficit.	-	✓	✓	✓	✓	✓	✓	✓
Galbally Water Supply	SAK-038	Increase GW abstraction at Galbally BH and upgrade Galbally WTP to supply deficit.	-	✓	✓	✓	-	✓	-	✓
Galtee Regional	SAK-120	New SW abstraction from Aherlow river and upgrade Rossadrehid WTP to supply deficit.	-	✓	✓	-	-	-	-	✓
Garravoone	SAK-595	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit.	-	✓	✓	✓	✓	✓	✓	✓
Garryahylsh	SAK-525	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit.	-	✓	✓	✓	✓	✓	✓	✓
Glenagad	SAK-568	Upgrade WTP for water quality improvements.	-	✓	✓	✓	✓	✓	✓	✓
Glengar	SAK-298	New GW abstraction and new WTP to supply deficit.	-	✓	✓	✓	✓	✓	✓	✓
Graiguenageeha	SAK-505	Increase GW abstraction from BH and upgrade Graiguenageeha WTP to supply deficit.	-	✓	✓	✓	✓	✓	✓	✓
Herbertstown	SAK-011	Increase GW abstraction at Herberstown Pump Station BH and upgrade Herbertstown WTP to supply deficit.	✓	✓	✓	✓	✓	✓	-	✓

Water Resource Zone Name	Feasible Options SAB		Zero AA	Approach						Preferred Approach
	Option Code	Option Description		Least Cost	Quickest Delivery	Best AA	Best SEA	Lowest Carbon	Most Resilient	
Horse & Jockey PWS	SAK-089	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit.	-	✓	✓	✓	✓	✓	✓	✓
Inchinleamy	SAK-476	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit.	-	✓	✓	✓	✓	✓	✓	✓
Kilbrien	SAK-509	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit.	✓	✓	✓	✓	✓	✓	✓	✓
Kilcash	SAK-250	New GW abstraction in karstic region and new WTP to supply deficit.	-	✓	✓	✓	✓	✓	✓	✓
Kill/Ballylaneen	SAK-601	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit.	-	✓	✓	✓	✓	✓	✓	✓
Kilmacthomas	SAK-428	Increase GW abstraction from Kilmacthomas School (spring) and upgrade Kilmacthomas WTP to supply deficit.	-	✓	✓	✓	✓	-	✓	✓
Kilmanahan	SAK-574	Upgrade WTP for water quality improvements.	-	✓	✓	✓	✓	✓	✓	✓
Kilteely	SAK-001	Increase GW abstraction at Kilteely BH and upgrade existing Kilteely WTP to supply deficit.	✓	✓	✓	✓	✓	✓	-	✓
Knocklong/ Hospital	SAK-029	Increase GW abstraction at Knocklong BH and upgrade Knocklong BH WTP to supply deficit.	✓	✓	✓	✓	-	-	✓	✓
Lacken	SAK-514	Increase GW abstraction from BH and upgrade Lacken WTP to supply deficit.	-	✓	✓	✓	✓	✓	✓	✓

Water Resource Zone Name	Feasible Options SAB		Zero AA	Approach						Preferred Approach
	Option Code	Option Description		Least Cost	Quickest Delivery	Best AA	Best SEA	Lowest Carbon	Most Resilient	
Liskealty	SAK-478	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit.	-	✓	✓	✓	✓	✓	✓	✓
Lismore / Cappoquin / Ballyduff (LCB)	SAK-987	Increase GW abstraction from existing BH and upgrade LCB Lismore Deerpark WTP to partly supply deficit. New GW (commission 2018 TW) abstraction and upgrade Lismore Deerpark WTP to partly supply deficit.	-	✓	✓	✓	✓	✓	-	✓
Littleton PWS	SAK-113	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit.	-	✓	✓	✓	✓	✓	✓	✓
Lyrenaleara	SAK-569	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit.	-	✓	✓	✓	✓	✓	✓	✓
Modeligo	SAK-477	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit.	-	✓	✓	✓	✓	✓	✓	✓
Monatarrif	SAK-570	Increase existing GW abstraction and upgrade Monatarrif WTP to supply deficit.	-	✓	✓	✓	✓	✓	✓	✓
Moore's Well	SAK-402	Increase GW abstraction from existing BH and upgrade Moore's Well WTP to supply deficit.	-	✓	✓	-	✓	✓	-	✓
Piltown-Fiddown	SAK-073	New GW and upgrade Jamestown WTP to supply deficit (progressing as project to address RAL).	-	✓	✓	✓	✓	✓	✓	✓
Portlaw	SAK-560	Increase GW abstraction from Portlaw BH and Portlaw spring and upgrade Portlaw WTP to partly supply deficit.	-	-	✓	✓	✓	✓	-	✓
Portlaw	SAK-618	New GW abstraction and new WTP to partly supply deficit.	-	✓	-	✓	-	-	✓	✓

Water Resource Zone Name	Feasible Options SAB		Zero AA	Approach						Preferred Approach
	Option Code	Option Description		Least Cost	Quickest Delivery	Best AA	Best SEA	Lowest Carbon	Most Resilient	
Poulnagunoge (Waterford)	SAK-575	Increase GW abstraction from Poulavanogue BH and upgrade Poulavanogue WTP to supply deficit.	-	✓	✓	✓	✓	✓	✓	✓
Rathgormack	SAK-468	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit.	-	✓	✓	✓	✓	✓	✓	✓
Russelstown	SAK-498	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit.	-	✓	✓	✓	✓	✓	✓	✓
Scrahan	SAK-388	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit.	-	✓	✓	✓	✓	✓	✓	✓
Smoores	SAK-526	Increase GW abstraction from Smoor Beg BH and upgrade Smoorbeg WTP to supply deficit.	-	✓	✓	✓	✓	✓	✓	✓
South Kilkenny	SAK-648	Bring back Silverspring WTP to production and supply deficit.	-	✓	✓	✓	-	✓	✓	✓
Stradbally	SAK-411	Upgrade existing WTP for water quality improvements. The WRZ is not in deficit.	-	✓	✓	✓	✓	✓	✓	✓
Templemore/Templetuohy	SAK-106	Rationalise Templetuohy to Templemore [rationalise to College Hill WTP]. Rationalisation within WRZ.	-	✓	-	-	✓	-	-	✓
Templetney/Brackford Bridge PWS	SAK-183	Increase GW abstraction from existing no.3 BHs and upgrade Templetney WTP to supply deficit.	-	-	✓	✓	✓	✓	-	✓
Thurles / Borrisoleigh	SAK-092	Upgrade existing WTPs for water quality improvements. The WRZ is not in deficit.	-	✓	✓	✓	✓	✓	✓	✓

Water Resource Zone Name	Feasible Options SAB		Zero AA	Approach						Preferred Approach
	Option Code	Option Description		Least Cost	Quickest Delivery	Best AA	Best SEA	Lowest Carbon	Most Resilient	
Tipperary Town Supply	SAK-180	New GW abstraction and new WTP to supply deficit.	-	✓	✓	✓	✓	-	✓	✓
Tullohea	SAK-237	New GW abstraction at Ninemilehouse and new WTP to supply deficit.	-	✓	✓	✓	✓	✓	✓	✓
Two Mile Borris	SAK-085	Increase GW abstraction from Two Mile Borris BH and upgrade Two Mile Borris WTP to supply deficit.	-	✓	✓	✓	✓	✓	✓	✓

7.2.4 Stage 2 – Study Area Combinations

As outlined in Section 6, there are three (3) types of Options considered within the NWRP:

- WRZ Option – Options that address Need in one WRZ only
- SA Option – Options that can address needs across multiple WRZs, generally within a Study Area
- Regional Option – Options that can address the needs in multiple WRZs across multiple Study Areas.

Accordingly, once the WRZ Level Preferred Approach for each of the individual WRZs has been identified, we determine whether there are alternative SA Options that can address need in more than one WRZ and replace the WRZ Options. Uisce Éireann then develops various combinations of Study Area Options and WRZ Options that can address the Deficit for the entire Study Area. These are called "SA Combinations". This Stage 2 process is summarised in Figure 7.5.

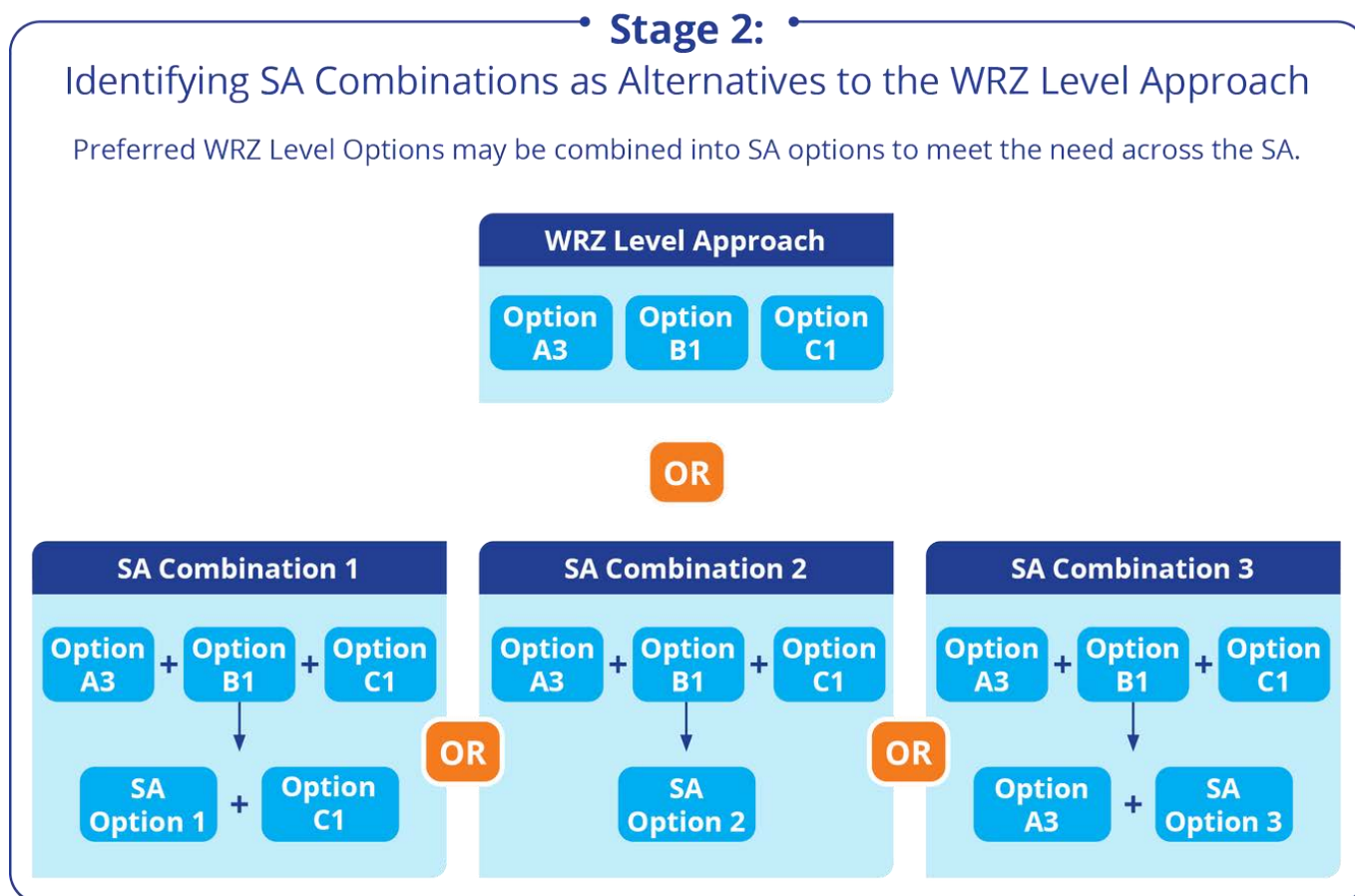


Figure 7.5 Preferred Approach Development – Stage 2

The WRZ Level Approach will form one of these combinations for assessment at the Study Area Level, if it can meet the full Deficit of the Study Area. Where this is not the case (that is, where feasible WRZ Options are not identified for all WRZs in the Study Area) the WRZ Level Approach is not included in the Seven (7) - Step Option Development Process.

In our example of SAK, twelve (12) SA Combinations were developed and taken through the Seven (7)- Step process to identify the 'Best' performing combination of Options across the six (6) Approach Categories. The combinations for SAK are summarised in Table 7.5.

Table 7.5 SAK SA Level Approach - Assessment Outcome

Key		WRZ Level Approach Option	○	SA Grouped Option	□							
WRZ	WRZ Approach Options	SA Combination 1 (SA Grouped Option 6, 7, 10, 20, 34, 47, 58, 66, 73, 77, 78, 119, 125, 141)	SA Combination 2 (SA Grouped Option 1, 9, 18, 40, 46, 153, 183, 190, 191 and 192)	SA Combination 3 (SA Grouped Option 37, 53, 121, 149, 173, 175, 183, 185)	SA Combination 4 (SA Grouped Option 23, 34, 51, 66, 78, 119, 185b)	SA Combination 5 (SA Grouped Option 12, 20, 28, 33, 57, 59, 63, 69, 74, 77, 119, 127, 129, 133, 135, 140, 141, 187, 193)	SA Combination 6 (SA Grouped Option 135, 169, 170, 176, 184, 187, 190, 191, 192)	SA Combination 7 (SA Grouped Option 38, 69, 149, 173, 180, 185)	SA Combination 8 (SA Grouped Option 3, 12, 34, 37, 40, 50, 61, 75, 78, 129, 142, 15)	SA Combination 9 (SA Grouped Option 149)	SA Combination 10 (SA Grouped Option 183)	SA Combination 11 (SA Grouped Option 175)
Adramone / Kilrossanty	○	○	○	○	○	○	□	○	○	□	○	○
Ahenny	○	○	□	□	○	○	○	○	□	○	□	○
Anglesboro Water Supply	○	○	○	○	○	○	○	○	○	○	○	○
Ardfinnan Regional	○	□	□	□	○	○	□	□	□	○	□	○
Ardmore	○	○	○	○	○	□	○	○	○	○	○	○
Ardmore Grange	○	○	□	○	○	□	□	○	○	○	○	○
Ballinvir	○	○	○	□	○	○	○	○	○	○	□	○
Ballyguiry	○	□	□	○	□	□	□	○	○	○	○	○
Ballyknock	○	○	○	□	○	○	○	□	□	○	○	○
Ballylanders Water Supply	○	□	○	□	□	□	○	□	□	○	○	○
Ballymacarbry	○	○	○	○	○	○	○	○	○	○	○	○
Ballynoe / Melleray	○	○	○	○	○	○	○	○	○	○	○	○

WRZ	WRZ Approach Options	SA Combination 1 (SA Grouped Option 6, 7, 10, 20, 34, 47, 58, 66, 73, 77, 78, 119, 125, 141)	SA Combination 2 (SA Grouped Option 1, 9, 18, 40, 46, 153, 183, 190, 191 and 192)	SA Combination 3 (SA Grouped Option 37, 53, 121, 149, 173, 175, 183, 185)	SA Combination 4 (SA Grouped Option 23, 34, 51, 66, 78, 119, 185b)	SA Combination 5 (SA Grouped Option 12, 20, 28, 33, 57, 59, 63, 69, 74, 77, 119, 127, 129, 133, 135, 140, 141, 187, 193)	SA Combination 6 (SA Grouped Option 135, 169, 170, 176, 184, 187, 190, 191, 192)	SA Combination 7 (SA Grouped Option 38, 69, 149, 173, 180, 185)	SA Combination 8 (SA Grouped Option 3, 12, 34, 37, 40, 50, 61, 75, 78, 129, 142, 15)	SA Combination 9 (SA Grouped Option 149)	SA Combination 10 (SA Grouped Option 183)	SA Combination 11 (SA Grouped Option 175)
Ballygarty	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>
Ballysaggart	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ballyshunnock	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Boolavoonteen / Kilcooney / Touraneena	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Burncourt Ballylooby	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Callan WS 1001	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Carrick-On-Suir	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Carrigeen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Carrimore	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Carrignagower	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Carrowgarriff	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clonmel	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>
Coalbrook / Commons	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Crehanagh	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

WRZ	WRZ Approach Options	SA Combination 1 (SA Grouped Option 6, 7, 10, 20, 34, 47, 58, 66, 73, 77, 78, 119, 125, 141)	SA Combination 2 (SA Grouped Option 1, 9, 18, 40, 46, 153, 183, 190, 191 and 192)	SA Combination 3 (SA Grouped Option 37, 53, 121, 149, 173, 175, 183, 185)	SA Combination 4 (SA Grouped Option 23, 34, 51, 66, 78, 119, 185b)	SA Combination 5 (SA Grouped Option 12, 20, 28, 33, 57, 59, 63, 69, 74, 77, 119, 127, 129, 133, 135, 140, 141, 187, 193)	SA Combination 6 (SA Grouped Option 135, 169, 170, 176, 184, 187, 190, 191, 192)	SA Combination 7 (SA Grouped Option 38, 69, 149, 173, 180, 185)	SA Combination 8 (SA Grouped Option 3, 12, 34, 37, 40, 50, 61, 75, 78, 129, 142, 15)	SA Combination 9 (SA Grouped Option 149)	SA Combination 10 (SA Grouped Option 183)	SA Combination 11 (SA Grouped Option 175)
Deelish /Ballinacourty	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dundrum Regional	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>
Dungarvan	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dunhill - Cois Coille	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>
Dunhill Ballinageeragh	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>
East Waterford Water Supply Scheme	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>
Faha	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>
Fethard & Mullenbawn Regional Public Water Supply	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fews	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>
Galbally Water Supply	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Galtee Regional	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Garravoone	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Garryahylsh	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Glenagad	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>

WRZ	WRZ Approach Options	SA Combination 1 (SA Grouped Option 6, 7, 10, 20, 34, 47, 58, 66, 73, 77, 78, 119, 125, 141)	SA Combination 2 (SA Grouped Option 1, 9, 18, 40, 46, 153, 183, 190, 191 and 192)	SA Combination 3 (SA Grouped Option 37, 53, 121, 149, 173, 175, 183, 185)	SA Combination 4 (SA Grouped Option 23, 34, 51, 66, 78, 119, 185b)	SA Combination 5 (SA Grouped Option 12, 20, 28, 33, 57, 59, 63, 69, 74, 77, 119, 127, 129, 133, 135, 140, 141, 187, 193)	SA Combination 6 (SA Grouped Option 135, 169, 170, 176, 184, 187, 190, 191, 192)	SA Combination 7 (SA Grouped Option 38, 69, 149, 173, 180, 185)	SA Combination 8 (SA Grouped Option 3, 12, 34, 37, 40, 50, 61, 75, 78, 129, 142, 15)	SA Combination 9 (SA Grouped Option 149)	SA Combination 10 (SA Grouped Option 183)	SA Combination 11 (SA Grouped Option 175)
Glengar	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>
Graigenageeha	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Herbertstown	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Horse and Jockey	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>
Inchinleamy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kilbrien	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Kilcash	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>
Kill/Ballylaneen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>
Kilmacthomas	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>
Kilmanahan	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>
Kilteely	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knocklong/ Hospital	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lacken	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Liskealty	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

WRZ	WRZ Approach Options	SA Combination 1 (SA Grouped Option 6, 7, 10, 20, 34, 47, 58, 66, 73, 77, 78, 119, 125, 141)	SA Combination 2 (SA Grouped Option 1, 9, 18, 40, 46, 153, 183, 190, 191 and 192)	SA Combination 3 (SA Grouped Option 37, 53, 121, 149, 173, 175, 183, 185)	SA Combination 4 (SA Grouped Option 23, 34, 51, 66, 78, 119, 185b)	SA Combination 5 (SA Grouped Option 12, 20, 28, 33, 57, 59, 63, 69, 74, 77, 119, 127, 129, 133, 135, 140, 141, 187, 193)	SA Combination 6 (SA Grouped Option 135, 169, 170, 176, 184, 187, 190, 191, 192)	SA Combination 7 (SA Grouped Option 38, 69, 149, 173, 180, 185)	SA Combination 8 (SA Grouped Option 3, 12, 34, 37, 40, 50, 61, 75, 78, 129, 142, 15)	SA Combination 9 (SA Grouped Option 149)	SA Combination 10 (SA Grouped Option 183)	SA Combination 11 (SA Grouped Option 175)
Lismore / Cappoquin / Ballyduff (LCB)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Littleton	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>
Lyreanearla	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Modeligo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Monatarriff	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Moores Well	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Piltown-Fiddown	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Portlaw	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Poulavanogue (Waterford)	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>
Rathgormack	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Russelstown	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>
Scrahan	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>
Smoore	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
South Kilkenny Environs	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

WRZ	WRZ Approach Options	SA Combination 1 (SA Grouped Option 6, 7, 10, 20, 34, 47, 58, 66, 73, 77, 78, 119, 125, 141)	SA Combination 2 (SA Grouped Option 1, 9, 18, 40, 46, 153, 183, 190, 191 and 192)	SA Combination 3 (SA Grouped Option 37, 53, 121, 149, 173, 175, 183, 185)	SA Combination 4 (SA Grouped Option 23, 34, 51, 66, 78, 119, 185b)	SA Combination 5 (SA Grouped Option 12, 20, 28, 33, 57, 59, 63, 69, 74, 77, 119, 127, 129, 133, 135, 140, 141, 187, 193)	SA Combination 6 (SA Grouped Option 135, 169, 170, 176, 184, 187, 190, 191, 192)	SA Combination 7 (SA Grouped Option 38, 69, 149, 173, 180, 185)	SA Combination 8 (SA Grouped Option 3, 12, 34, 37, 40, 50, 61, 75, 78, 129, 142, 15)	SA Combination 9 (SA Grouped Option 149)	SA Combination 10 (SA Grouped Option 183)	SA Combination 11 (SA Grouped Option 175)
Stradbally	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Templemore/ Templetuohy	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Templetney/ Brackford Bridge PWS	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>
Thurles	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>
Tipperary Town Supply	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tullohea	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>
Two Mile Borris	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/>

Table 7.5 demonstrates the variety of SA Combinations for SAK. For example, SA Combination 7 contains six (6) Group Options - 38, 69, 149, 173, 180 and 185:

- Group 149 resolves the need in ten (10) WRZs - East Waterford Supply Scheme, Ballyogarty, Stradbally, Kilmacthomas, Dunhill Cois Coille, Smoore, Dunhill Ballinageeragh, Fewes, Kill/Ballylaneen and Scrahan.
- Group 180 resolves the need in eight (8) WRZs - Templetny/Brackford, Bridge PWS, Clonmel & Environs, Ardfinnan Regional, Russelstown, Kilmanahan, Glenagad and Poulavanogue (Waterford).
- Group 185c resolves the need in seven (7) WRZs - Carrigmore, Kiltely, Herberstown, Knocklong/Hospital, Ballylanders Water Supply, Galbally Water Supply and Limerick City.
- Group 173 resolves the need in six (6) WRZs - Ballysaggart, Monatarriff, Carrignagower, Lismore/Cappoquiin/Ballyduff (LCB), Lacken and Morreswell.
- Group 38 resolves the need in five (5) WRZs - Rathgormack, Ballyknock, Crehanagh, Garravoone and Carrick-On-Suir.
- Group 69 resolves the need in two (2) WRZs - Galtee Regional and Dundrum Regional.

The Need for the remaining WRZs in SA Combination 7 is resolved by the Preferred Approach at WRZ Level.

Even when we consider all permutations of Study Area Options to create the SA Combinations, there are some water supplies that will always require a WRZ Level Option. For example, in SAK Garryahylish, Inchinleamy, Kilbrien, Lyreanearla and Modeligo are always supplied by a WRZ Level Option. These WRZs are typically very small, isolated supplies serving a limited number of people. Due to the age of our water network and water quality issues associated with transferring small volumes of water over long distances, a local supply is a more suitable solution for these WRZs. In these cases, the emphasis of the NWRP is to ensure that the best possible resilient local sources are identified.

In Table 7.6 we show the number of SA Combinations identified for each Study Area in the South East Region.

Table 7.6 Number of SA Combinations for each Study Area

Number of SA Combinations		
SAK	SAL	SAM
12	26	41

7.2.5 Stage 3 – Study Area Level Preferred Approach

7.2.5.1 Test a Range of Approach Types – Study Area Level

As part of Stage 3, we compare the WRZ Level Approach (which is a combination of all the WRZ Level Options identified at WRZ level) and the SA Combinations developed in Stage 2. Where the WRZ Level Approach cannot meet the full need of the Study Area, it is excluded at this stage of comparison.

The purpose of this exercise is to ensure that the Preferred Approach selected at Study Area Level for each Study Area is the combination of Options that provide the best overall outcome when considered against the six (6) Approach Categories. To assist us in this exercise, we use the EBSD tool to rank the Study Area Combinations against the six (6) Approach Categories.

Table 7.7 shows an example of the output from the EBSD process for SAK. The presentation of the data in this way allows us to understand the relative benefits of each combination of Options.

Table 7.7 Stage 3 – EBSD Output for SAK (SA Combinations Assessment)

Ranked order (best to worst)	Best												Worst
WRZ	WRZ Approach Options	SA Combination 1 (SA Grouped Option 6, 7, 10, 20, 34, 47, 58, 66, 73, 77, 78, 119, 125, 141)	SA Combination 2 (SA Grouped Option 1, 9, 18, 40, 46, 153, 183, 190, 191 and 192)	SA Combination 3 (SA Grouped Option 37, 53, 149, 173, 175, 183, 185, 195)	SA Combination 4 (SA Grouped Option 23, 34, 51, 66, 78, 119, 185b)	SA Combination 5 (SA Grouped Option 12, 20, 28, 33, 57, 59, 63, 69, 74, 77, 119, 127, 129, 133, 135, 140, 141, 187, 193)	SA Combination 6 (SA Grouped Option 135, 169, 170, 176, 184, 187, 190, 191, 192, 193)	SA Combination 7 (SA Grouped Option 38, 69, 149, 173, 180, 185)	SA Combination 8 (SA Grouped Option 3, 12, 34, 37, 40, 50, 61, 75, 78, 129, 142, 153, 171, 187, 192)	SA Combination 9 (SA Grouped Option 149)	SA Combination 10 (SA Grouped Option 183)	SA Combination 11 (SA Grouped Option 175)	
Least Cost				Best		Worst							
Quickest Delivery		Best		Worst									
Best AA biodiversity	9 -3 AA impacts	7 -3 AA impacts	9 -3 AA impacts	9 -3 AA impacts	7 -3 AA impacts	11 -3 AA impacts	7 -3 AA impacts	9 -3 AA impacts	7 -3 AA impacts	9 -3 AA impacts	8 -3 AA impacts	8 -3 AA impacts	
Lowest Carbon					Best					Worst			
Most Resilient								Best				Worst	
Best Environmental	Worst			Best									

The SA combinations outlined in Table 7.7 are assessed to determine the ‘Best’ performing combination in each Approach Category. These are summarised in Table 7.8.

Table 7.8 Best SA Combinations for SAK

Approach Categories	Best Performing Combination
Least Cost (LCo)	SA Combination 3 (SA Grouped Option 37, 53, 149, 173, 175, 183, 185 & 195)
Best Environmental (BE)	SA Combination 3 (SA Grouped Option 37, 53, 149, 173, 175, 183, 185 & 195)
Quickest Delivery (QD)	SA Combination 1 (SA Grouped Option 6, 7, 10, 20, 34, 47, 58, 66, 73, 77, 78, 119, 125 & 141)
Most Resilient (MR)	SA Combination 7 (SA Grouped Option 38, 69, 149, 173, 180, 185)
Lowest Carbon (LC)	SA Combination 4 (SA Grouped Option 23, 34, 51, 66, 78, 119, 185b)
Best AA (BA)	SA Combination 8 (SA Grouped Option 3, 12, 34, 37, 40, 50, 61, 75, 78, 129, 142, 153, 171, 187, 192)

7.2.5.2 Approach Appraisal – Study Area Level

We then compare the best performing Option or combinations of Options (listed in Table 7.8) within each of the six (6) Approach Categories using the Seven (7)-Step Process to establish the Preferred Approach at Study Area Level. As at WRZ Level, this process allows us to compare the best ranked approaches within each Approach Category at Study Area Level relative to each other, to select the combination of Options that provides the best overall solution for that Study Area. This process is conducted via a workshop, and the decision-making and outcomes are recorded for each supply.

As an illustration, we set out in Figure 7.6 how we applied this process to Study Area K.

STEP 0 Best AA	<p>There is no SA Combination in SAK assessed as having no potential impact on a European Site (based on a desktop assessment). Proceed with the 7-Step process.</p>
STEP 1 Least Cost	<p>We compared the Least Cost Option (Combination 3) against the Best AA Approach (SA Combination 1). The Best AA Approach increases the total NPV cost by 18%, therefore the Least Cost Approach was retained at this stage.</p>
STEP 2 Quickest Delivery	<p>We compared the Quickest Delivery Approach (Combination 1) against the Least Cost Approach (Combination 3). The Quickest Delivery Approach is also the Best AA Approach. The Quickest Delivery Approach increases the total NPV cost by 18%, therefore the Least Cost approach was retained at this stage.</p>
STEP 3 Best Environmental	<p>We compared the Least Cost Approach (Combination 3) against the Best Environmental Approach (Combination 3). The Best Environmental Approach is the same as the Least Cost Approach. The Least Cost Approach was therefore retained at this stage.</p>
STEP 4 Most Resilient	<p>We compared the Least Cost Approach (Combination 3) against the Most Resilient Approach (Combination 7). The Most Resilient Approach increases the total NPV cost by 20%, therefore the Least Cost approach was retained at this stage.</p>
STEP 5 Least Carbon	<p>We compared the Least Cost Approach (Combination 3) against the Least Carbon Approach (Combination 4). The Lowest Carbon Approach increases the total NPV cost by 12%, therefore the Least Cost approach was retained at this stage.</p>
STEP 6 Approach Comparison	<p>A final assessment of the Least Cost Approach was completed against the Least Carbon, Best AA, Best Environmental, Quickest Delivery and Most Resilient Approaches. While the Least Cost does not have the lowest score for all six criteria, it does not significantly increase the scores of the other criteria and is the preferred approach in terms of cost. The Least Cost Approach was therefore retained at this stage .</p>
STEP 7 Preferred Approach	<p>The Least Cost Approach was therefore selected as the Preferred Approach for the Water Resource and Study Area Levels.</p>

Figure 7.6 SA Level Preferred Approach Development – SAK

7.2.5.3 Selection of Preferred Approach – SA Level Approach

Table 7.9 summarises the comparison of the best performing SA combinations for SAK.

When we compare the five (5) best performing approaches against each other (representing the Stage 3 analysis for the selection of the Preferred Approach), their relative performance against categories they were not identified as ‘best’ in, may be different compared to their relative performance within the wider ranking against all the combinations, as presented in Table 7.7. Furthermore, in Table 7.7 the colour scale used to indicate the relative ranking of all combinations requires more gradations of colour to account for the large number of option combinations that can be assessed. Table 7.9 only contains five (5) different combinations and therefore the colours denoting relative performance between the ‘Best Performing SA Combinations’ for a particular Approach Type are different to the colour representing relative performance within the wider ranking. For example, for Combination 3, the Most Resilient Score is ranked last against the five (5) Best Performing SA Combinations; whereas it is ranked 7th amongst the 12 combinations in Table 7.7.

Table 7.9 suggests that SA Combination 1, 4 and 8 are the Best AA because they have the same number of -3 biodiversity scores (i.e., they each have six (6) -3 biodiversity scores). However, SA Combination 8 was selected as the Best AA approach overall, after comparing the number of -2 and -1 biodiversity scores.

Table 7.9 Summary of the MCA Scoring for the Best Performing SA Combinations – SAK

Category Criteria	SA Combination 1 (QD)	SA Combination 3 (LCo, BE)	SA Combination 4 (LC)	SA Combination 7 (MR)	SA Combination 8 (BA)
Least Cost Score	Worst	Best			
Quickest Delivery Score	Best	Worst			
Best AA Score	Seven -3 Biodiversity Scores	Nine -3 Biodiversity Scores	Seven -3 Biodiversity Scores	Nine -3 Biodiversity Scores	Seven -3 Biodiversity Scores
Lowest Carbon Score			Best	Worst	
Most Resilient Score				Best	Worst
Best Environmental Score		Best	Worst		

Key				
Ranked order (best to worst)				
Worst				Best

The outcome when we follow the Seven (7)-Step Process is that SA combination 3 is the Preferred Approach for SAK. SA Combination 3 has been selected through the 7-step process as the best performing approach overall across the different categories (Table 7.7). This combination of Feasible Options is the best long term water supply solution. In particular, the combination of Options performs well against the environmental criteria and cost.

The general Preferred Approach development process at Study Area Level (Stage 3) is summarised in Figure 7.7.

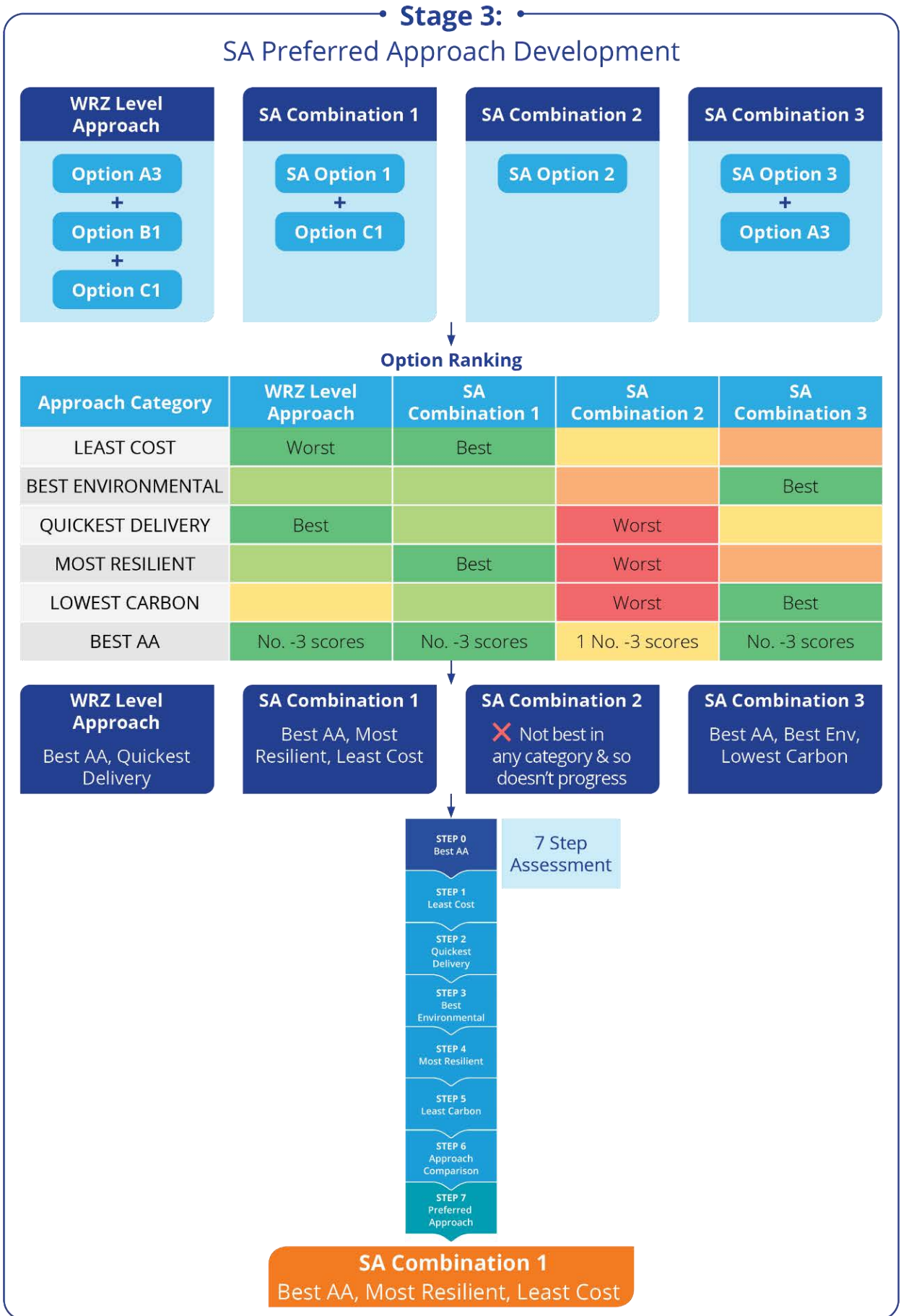


Figure 7.7 SA Preferred Approach Development – Stage 3

7.3 WRZ Level Approach and SA Preferred Approach

In this section, we compare the benefits of developing interconnected systems (under the SA Preferred Approach), with the option of continuing to supply existing WRZs independently (under the WRZ Level Approach).

One of the benefits of developing the Preferred Approach at Study Area Level is the ability to create an interconnected network and rationalise our infrastructure to provide a more resilient supply to our customers. In the following sections, we compare the combination of Options that make up the SA Preferred Approach with the WRZ Options that combine to form the WRZ Level Approach. The comparison considers the difference in the infrastructure components and total estimated cost provided by the Option. Additionally, the overall benefit of the SA Preferred Approach is described with reference to the NWRP objectives represented by the six (6) Approach Categories.

7.3.1 SA Preferred Approach Description

The Preferred Approach at Study Area Level comprises 15 SA Grouped Options across all three study areas that collectively supply 65 WRZs across the South East Region (Table 7.10). This creates an interconnected network and allows us to rationalise our infrastructure providing a more resilient supply to our customers. There is also the benefit of eventually moving away from some of our potentially unsustainable abstractions by reducing our abstraction points. Reviewing our supplies at a Study Area Level allows us to understand the regional sustainability of our abstractions.

Table 7.10 SA Preferred Approach

Study Area	Number of WRZs	SA Preferred Approach		Number of WRZs benefitting from a SA Grouped Option
		WRZ Option	SA Grouped Option	
SAK	75	27	8	49
SAL	10	3	3	7
SAM	26	18	4	9
Region Total	111	48	15	65

Table 7.11 and Table 7.12 compare the SA Preferred Approach with the WRZ Level Approach. The Option summary in Table 7.11 describes whether the supply Deficit will be met through new and/or increased groundwater (GW) and surface water (SW) abstractions, rationalisations (connection of water treatment plants (WTPs) and/or WRZs, which are usually accompanied by decommissioned abstractions and WTPs), or transfers from sources within or outside of the Study Area. The number of Options that only comprise a water quality upgrade to an existing WTP is also presented for those WRZs that are not in Deficit and therefore do not require a new or upgraded supply or transfer from another supply system.

Table 7.11 Comparison of Option Types

Study Area	WRZ Level Approach	SA Preferred Approach
<p style="text-align: center;">SAK</p> <p style="text-align: center;">Waterford and South Tipperary</p>	<p>75 WRZ Options*:</p> <ul style="list-style-type: none"> - 42 Options with increased/new GW abstractions. - 4 Options with new SW abstractions - 28 Options with a WTP upgrade (WQ only) – WRZs are not in deficit. - 1 Option involving ‘within’ WRZ supply rationalisation, decommissioning 1 WTP and abstraction. <p>* Portlaw WRZ has 2 WRZ Options abstracting from 2 sources.</p>	<p>27 WRZ Options*:</p> <ul style="list-style-type: none"> - 12 Options with increased/new GW abstractions. - 1 Option with a new SW abstraction. - 1 Option involving ‘within WRZ supply rationalisation and an increased GW abstraction. - 12 Options involving a WTP upgrade (WQ only) - WRZs are not in deficit. <p>8 SA Grouped Options:</p> <ul style="list-style-type: none"> - 1 Option with a new SW abstraction, interconnecting 3 WRZs and rationalising 8 WRZs. - 1 Option with a new SW abstraction rationalising 9 WRZs to one source WRZ. - 2 Options with increased/new GW, rationalising 4 and 5 WRZs each. - 1 Option supplying spare capacity to neighbouring WRZs, interconnecting 1 WRZ and rationalising 4 WRZs. - 1 Option involving a cross study area supply from the Limerick Supply system in the Eastern and Midlands Region, rationalising 6 WRZs. - 2 Options with new/increased GW abstractions, interconnecting 2 WRZs and rationalising 2 WRZs to 1 source WRZ.

Study Area	WRZ Level Approach	SA Preferred Approach
SAL Kilkenny	<p>10 WRZ Options:</p> <ul style="list-style-type: none"> – 7 Options with increased/new GW abstractions. – 3 Options, upgrading or replacing existing WTPs to improve water quality – WRZs not in deficit. 	<p>3 WRZ Options:</p> <ul style="list-style-type: none"> – 1 Option, increasing the existing GW abstraction. – 2 Options with new GW abstractions and new WTPs <p>3 SA Grouped Options:</p> <ul style="list-style-type: none"> – 1 Option improving water quality by upgrading an existing WTP and decommissioning an underperforming WTP. The WRZ is not in deficit. – 2 Options with new GW abstractions.
SAM Wexford and Wicklow	<p>26 WRZ Options*:</p> <ul style="list-style-type: none"> – 17 Options with increased/new GW abstractions. – 1 Option with an increased SW abstraction. – 1 Option interconnecting the WRZ to a neighbouring Group Water Scheme (GWS) to supply the deficit. – 1 Option involving ‘within WRZ supply rationalisation to a new WTP – WRZ not in deficit. – 6 Options with a WTP upgrade (WQ only) – WRZs are not in deficit. <p>* Sow Regional WRZ has 2 WRZ Options abstracting from 2 sources.</p>	<p>18 WRZ Options*:</p> <ul style="list-style-type: none"> – 12 Options with increased/new GW abstractions. – 1 Option involving ‘within WRZ supply rationalisation to a new WTP – WRZ not in deficit. – 5 Options with a WTP upgrade (WQ only) – WRZs are not in deficit. <p>4 SA Grouped Options:</p> <ul style="list-style-type: none"> – 1 Option increasing the existing SW abstraction and rationalising 4 WRZs to 1 source WRZ. – 1 Option developing a new GW abstraction and rationalising 1 WRZ. – 2 Options rationalising WRZs to Study Area 1 (Mid-Wicklow) in the Eastern and Midlands Region: Coolgreany WRZ to the Arklow WRZ and Ballingate WRZ to the Tinahely WRZ.

Table 7.12 details the infrastructure components associated with the Options identified for each Study Area. Overall, the SA Preferred Approach across the three (3) Study Areas of the South East Region requires 7 fewer new WTPs, 55 fewer WTP upgrades, and 37 fewer new or increased abstraction sources, compared to the WRZ Level Preferred Approach. The SA Grouped Options making up the SA Preferred Approach will also eventually result in the decommissioning of 55 more WTPs and the abandonment of 59 more abstractions, presenting the potential to deliver improved environmental outcomes, than if the abstractions were to remain local. The higher interconnectivity created by the SA Preferred Approach requires approximately 277 km more pipeline compared with the WRZ Level Approach and 9 additional water storages.

Full details of the SA Preferred Approach development are included in Technical Appendices 1-3.

Table 7.12 Infrastructure Component Summary

SA	Approach Type	Infrastructure Component						
		New Pipeline (km)	New WTPs	Upgrade WTPs *	New/Upgraded Abstracts	Decomm. WTPs	Decomm. Abstracts	No. of Water Storage
SAK	SA Preferred Approach	300	6	53	22	46	48	42
	WRZ Level Approach	97	10	98	50	1	1	33
SAL	SA Preferred Approach	56	3	5	5	8	9	5
	WRZ Level Approach	21	5	8	7	5	4	8
SAM	SA Preferred Approach	99	4	22	15	9	9	14
	WRZ Level Approach	60	5	29	22	2	2	11
Total	SA Preferred Approach	455	13	80	42	63	66	61
	WRZ Level Approach	178	20	135	79	8	7	52
Difference between SA and WRZ Level Approach		+277	-7	-55	-37	+55	+59	+9

* Includes WTP upgrades for both Water Quality only (for those WRZs that are not in Deficit) and WTPs with capacity upgrades.

7.3.2 Assessment against the Six Approach Categories

Table 7.13 shows the Multi Criteria Assessment (MCA) ranking of the Preferred Approach at Study Area Level and the WRZ Level Approach for SAK, SAL and SAM. The ranking (colour coding) presented in Table 7.13 is relative to all SA Combinations identified for the Study Area.

A comparative description for each Study Area is presented in Table 7.14. Further justification for the selection of the SA Preferred Approach is set out in detail in the supporting Study Area Technical Reports (Appendix 1 - 3). The SEA South East Regional Environmental Report details the environmental assessment outcomes.

Study Area	Comparative Assessment
	<p>impact as it requires fewer abstractions and WTPs. Benefits to the water environment are also achieved through the abandonment of 48 abstractions. Six (6) of these are surface water abstractions, of which four may not meet sustainability guidelines during dry weather flows. Cessation of abstractions from these sources are likely to improve water quality and benefit water dependent biodiversity, including aquatic ecology.</p>
<p>SAL Kilkenny</p>	<p>The PA is the Least Cost and Lowest Carbon Approach.</p> <p>The PA for SAL comprises 3 SA Options and 3 WRZ Options compared with 10 WRZ Options for the WRZ Level Approach. Both approaches can meet the deficit across all WRZs in the study area.</p> <p>The PA decommissions 9 abstraction sources compared with 4 decommissioned abstractions under the WRZ Level Approach. The PA has the advantage of requiring 2 less new or increased abstractions. Therefore, the PA has a lower impact on biodiversity and the water environment.</p> <p>The interconnected Options of the PA will require an estimated 35 km more pipeline than the WRZ Options and will reduce the number of WRZs from 10 to 6. The PA will require 3 fewer water storages.</p> <p>The PA has been selected as the Lowest Carbon and Least Cost Approach and ranks second highest against the Best Environmental Approach due to the reduced infrastructure requirements.</p> <p>The NPV cost is estimated to be 10% less than the WRZ Level Approach. This cost benefit is the result of lower capital expenditure due to fewer new/increased WTPs; as well as lower operational costs associated with the number of WTPs to be decommissioned.</p> <p>The PA has two high-risk Options that could impact on European, which will require further assessment at project level to confirm mitigation opportunities.</p> <p>The better environmental score for the PA is associated with the lower materials and waste impacts due to the rationalisation of assets. The PA is also likely to have a lower landscape impact as it requires fewer water storages and abstractions. Benefits to the water environment are achieved through the abandonment of 9 abstractions (2 of which are surface water abstractions that may not meet sustainability guidelines during dry weather flows). Cessation of abstractions from this surface water sources has potential to improve water quality and benefit water dependent biodiversity including aquatic ecology.</p> <p>The PA has a relatively long delivery timescale when compared with the other SA Combinations; however, the low score in this category is outweighed by the significant gains in overall environmental improvement, ranking highest for carbon.</p> <p>The SA Grouped Options of the PA merge WRZs through interconnections and rationalisation. This improves the resilience score of the PA compared with the independent local solutions that make up the WRZ Level Approach.</p>
<p>SAM Wexford and Wicklow</p>	<p>The PA is the Least Cost Approach.</p> <p>Development in many of the WRZs of Study Area M is currently constrained by capacity limitations in the existing supply system. The Preferred Approach for SAM has therefore been selected as the solution that is best able to address this short-term need across the study area.</p> <p>The PA for SAM includes 18 WRZ Options and 4 SA Options compared with 26 WRZ Options for the WRZ Level Approach. Both approaches can meet the deficit across all WRZs in the study area.</p> <p>The PA decommissions 7 additional abstractions and 7 additional WTPs compared to the WRZ level approach. It also has the advantage of requiring 7 fewer new or increased abstractions and</p>

Study Area	Comparative Assessment
	<p>1 less new WTP. The interconnection of WRZs requires 39 km of additional pipeline compared to the WRZ Level Approach.</p> <p>The PA has been selected as the Least Cost Approach; however, there is only a small difference compared with the WRZ Level Approach (1%). This is because the overall infrastructure requirements are similar - while the preferred approach has a longer length of pipeline and more water storages, it has 1 less new WTP and will have fewer operational WTPs.</p> <p>The PA has only 1 high-risk Option that could impact on European sites (which is the same as the WRZ Level Approach). This will require further assessment at project level to confirm mitigation opportunities.</p> <p>The PA provides benefits to the water environment through the abandonment of 9 abstractions, particularly as 1 of these abstractions may not meet sustainability guidelines during dry weather flows. Cessation of abstraction from this surface water source has potential to improve water quality and benefit water dependent biodiversity, including aquatic ecology.</p> <p>The PA scores higher against the environmental score as it as a reduced impact on landscape due to fewer operational WTPs, and it abandons 9 abstractions, one of which may not meet sustainability guidelines during dry weather flows.</p> <p>The Least Cost approach is the preferred approach which allows Uisce Éireann to meet the pressing shorter term needs in the study area by utilising new groundwater sources in the local area. Therefore, the Least Cost approach does not have the significant lead time associated with the Best AA, Lowest Carbon, Most Resilient and Best Environmental approach.</p>

Appropriate Assessment (AA)

Study Area Combinations for all three study areas have -3 scores, indicating there are options with the potential for Likely Significant Effects (LSEs) on European Sites that cannot be ruled out without further detailed site level assessments. These options have been assessed as -3 either because the mitigation may be complex or there is uncertainty around potential impacts. However, with the mitigation proposed in the NIS, these have been assessed as being expected to have no adverse effects on site integrity (AESIs) at plan level.

The Preferred Approach for SAK has nine -3 biodiversity scores associated with the following options:

- Increase in abstraction from the existing spring and borehole to supply the Callan Public Water Supply (Option SAK-077) has the potential to impact Groundwater Dependent Terrestrial Ecosystems (GWDTEs) within the River Barrow and River Nore Special Area of Conservation (SAC). The works may also impact on Qualifying Interest (QI) species and habitats in this SAC, and on kingfisher in the River Nore SPA during construction;
- The new surface water abstraction from the Aherlow River (Option SAK-120) has the potential to impact the Lower River Suir SAC and the potential for pollution impacts during construction due to hydrological links and works within of near the SAC;
- Increased groundwater abstraction that is adjacent to the River Tar (Option SAK-211), which forms part of the Lower River Suir SAC, as well as other associated works, have the potential to impact the SAC during construction and operation, and may cause disturbance to birds within the Blackwater Callows SPA during construction;
- The new and increased groundwater abstractions in Portlaw (Options SAK-560 & SAK-618 combined) have the potential to impact the Lower River Suir SAC during operation, and the associated works may also impact this SAC during construction. The works may cause disturbance impacts to birds within the Tramore Back Strand SPA during construction;

- Increased abstraction at Mullinbawn springs (Option SAK-853), which is adjacent to the Clashawley River has the potential to impact the Lower River Suir SAC during operation, and other works within this option may also impact this SAC and the River Barrow and River Nore SAC during construction;
- The new surface water abstraction from the River Suir, upstream of Carrick-on-Suir, and the proposed pipeline (Option SAK-949) has the potential to impact the Lower River Suir SAC during both construction and operation, and the River Barrow and River Nore SAC may be impacted by pollution during construction due to hydrological links. Birds within Mid-Waterford Coast SPA, Tramore Back Strand SPA and Dungarvan Harbour SPA may be impacted during construction;
- The new and increased groundwater abstractions for Lismore/Cappoquin/Ballyduff WRZ (Group Option SAK-973) have the potential to impact the Blackwater River (Cork/Waterford) SAC during operation, and the associated works may also impact this SAC during construction. The works may cause disturbance impacts to the birds within the Blackwater Callows SPA, Dungarvan Harbour SPA, and Blackwater Estuary SPA during construction;
- The new surface water abstraction from the River Suir and proposed pipeline (Option SAK-983) has the potential to impact the Lower River Suir SAC during both construction and operation, and may cause disturbance to birds within the Blackwater Callows SPA during construction;
- The increased abstraction from the Shannon (Option SAK-985c) has the potential to exacerbate existing hydrological pressures from the hydropower station on the Lower River Shannon SAC during operation and may also impact on this SAC and the Lower River Suir SAC during construction. There may be construction impacts on the River Shannon and River Fergus Estuaries SPA.

The Preferred Approach for SAL has two -3 biodiversity scores:

- The new groundwater abstraction for Bennetsbridge (Option SAL-078) has the potential to impact the River Barrow and River Nore SAC, which contains several groundwater dependent Qualifying Interests (QIs), during operation. Some of the works are within or adjacent to this SAC leading to the potential for impacts during construction. The works may also impact on kingfisher in the River Nore SPA during construction;
- The new groundwater abstraction for Graiguenamanagh and Thomastown/Inistioge (Group Option SAL-521) has the potential to impact the River Barrow and River Nore SAC during operation, and other works associated with this option may cause impacts during construction. The works may also impact on kingfisher in the River Nore SPA during construction.

The Preferred Approach for SAM has one -3 biodiversity score associated with the new groundwater abstraction to supply Bunclody (Option SAM-036) as the Slaney River Valley SAC is in the Zone of Contribution (ZOC) and some of the construction works are within or adjacent to this SAC. The works may also cause disturbance to birds in the Wexford Harbour and Slobs SPA during construction.

There are Options with -1 and -2 scores across all three (3) Study Areas and as such there is the potential for Likely Significant Effects (LSEs). The potential for LSEs however is generally construction related impacts and it is considered that these LSEs will not result in Adverse Effects on Site Integrity (AESI) if mitigation is in place. A number of options (twelve options) across the three (3) Study Areas have 0 scores as they are not predicted to have impacts on any European Sites

SEA Objectives

The Preferred Approach for SAK is assessed as the Best Environmental approach. The environmental benefits include reduced long-term impact that is achieved through the decommissioning of water treatment plants and existing abstractions. The approach involves the lowest number of new WTPs, WTP upgrades, and new or upgraded abstractions and is therefore likely to have a high beneficial impact against landscape during operation as it also decommissions more WTPs compared with other

approaches. There are further benefits offers with fewer options that have high abstraction rate, which have the potential to be unsustainable in the long-term.

SAL is assessed as the Least Cost and Lowest Carbon approach. Although the Preferred Approach for SAL does not achieve the highest environmental score, its score is similar to the Best Environmental Approach. The Preferred Approach involves the lowest number of WTPs upgrades and has the highest number of decommissioned WTPs and abstractions. For this reason, it is likely to have some beneficial operational impacts against landscape and visual environmental categories. The SAL Preferred Approach scores lower than the Best Environmental approach as there is more construction required in urban areas and there is also greater potential for adverse impacts against biodiversity as it requires construction with the River Barrow SAC and River Nore SPA.

The Preferred Approach for SAM is assessed as the Least Cost approach and was considered the best performing approach overall. It achieves a lower score than the best environmental approach as it requires four more new WTPs and does not decommission as many existing WTPs. Consequently, there will be eleven more WTPs in operation. It also requires more upgraded and increased local groundwater abstractions. The Preferred Approach is selected in preference to the Best Environmental approach, inter alia, as it does not require the significant lead-time that is associated with the Best AA, Lowest Carbon, Most Resilient and Best Environmental approach. Surface water availability is also limited in the south-east of Ireland; therefore, the Least Cost approach is the preferred approach as it allows Uisce Éireann to meet the pressing shorter-term needs in the study area through utilising new groundwater sources in the local area. Groundwater investigations will be carried out to determine available yield in the area. If it is found that the groundwater sources cannot provide the required yield then the study area approach that was selected as the best Best AA, Lowest Carbon, Most Resilient and Best Environmental approach will be brought forward to supplement the groundwater supplies developed under the Preferred Approach. Further detail of this alternative approach is presented in Section 7.3.4.

Collectively, the Preferred Approach for the three study areas includes the eventual decommissioning of 63 WTPs and 66 abandoned abstractions, of which 11 of these are surface water sources. Seven (7) of the abandoned surface water abstractions are abstractions that may not meet sustainability guidelines under dry weather flows (as assessed by Uisce Éireann using the UKTAG guidelines)². Cessation of abstractions from these surface water sources has potential to benefit ecology and support Water Framework Directive (WFD) objectives.

We have also determined that 31 of the 43 surface water abstractions will be maintained under the Preferred Approach. Twenty-eight (28) of these may not meet sustainability guidelines during dry weather flows. While the plan level assessment has identified that these abstractions may not meet sustainability guidelines further project level assessments will need to be carried out in the context of applications for planning permission and/or abstraction licences under the new legislative regime. The Preferred Approach, however, does improve or avoid further deterioration at these sources by reducing existing abstractions or developing additional sources to support growth. Reduced abstractions have the potential to benefit aquatic ecology and contribute to the meeting of WFD objectives for these sources. Many of our existing abstractions will require a licence under the new abstraction legislation. Detailed environmental assessments will be submitted with these licence applications which will be assessed and adjudicated by the EPA. The SEA and AA set a framework for identifying mitigation and monitoring so that these can be part of the decision-making and inform Option design and development. This is further discussed in Section 9.

Least Carbon

Although the Preferred Approach for SAK may not yield the lowest carbon score, it presents as the best environmental combination of options, due to the benefits of decommissioning water treatment plants and mitigating unsustainable abstractions.

The Preferred Approach for SAL is the Lowest Carbon Approach. Compared with other SA combinations, it less new infrastructure such as WTPs and storages. This approach also involves decommissioning existing WTPs, resulting in reduced operational carbon requirements.

For SAM, the SA approach that include an interconnection to the Great Dublin Area resulted in the lowest carbon score. However, due to the extensive lead time required to make this option operational, it will not be available to address the immediate water supply deficit in the region. The Preferred Approach presents as the best alternative option to meet the short-term needs of the area.

There is noted to be scope for improving performance against SEA climate change carbon criteria significantly through energy efficient design and investigation of low carbon opportunities as identified as part of the process for developing future projects in the Environmental Action Plan in section 9. Also, further work on future operational modes will allow Uisce Éireann to optimise the interconnected supplies, to provide resilience and environmental benefit whilst balancing energy and carbon impacts.

7.3.3 Cost Comparison

Table 7.15 compares the cost difference for the SA Preferred Approach and the WRZ Level Approach for each Study Area. The Preferred Approach, which considers interconnected supply options, offers the Least Cost option across all three study areas (Figure 7.8). Comparing its estimated NPV to that of independent discrete water supply systems operated under the WRZ Level Approach, the Preferred Approach offers an 11 percent lower cost option.

The Preferred Approach for SAK and SAL incurs significantly lower costs compared to the WRZ Level Approach. This is in the most part attributed to lower operational expenses due to fewer treatment plants catering to identical demands.

For SAM, 22 SA combinations had a very similar ranking under the Least Cost category, within 5% of each other. The WRZ Level Approach was included amongst the 22 SA combinations. As set out in Section 7.2.1, where an Option or combination of Options provide similar NPV costs, to ensure that no Option is discounted by reference to only “Least Cost”, we compared the 22 SA combinations by applying the 7-step process. This approach recognises the desktop nature of the NPV plan level assessment.

When we compared the 22 SA Combinations against each other to identify which should go forward as the Least Cost approach, the SA Preferred Approach scored better in the Most Resilient and Best Environmental category and was comparable in score to the other combinations for the Lowest Carbon, Best AA and Quickest Delivery Criteria. The Preferred Approach was therefore selected as the Least Cost Approach.

Table 7.15 Cost Comparison

Cost Difference (%)			
SA Preferred Approach cf. WRZ Level Approach			
SAK	SAL	SAM	Region
-14% ↓	-10% ↓	-1% ↓	-11% ↓

↓ = Reduced cost
 ↑ = Increased cost

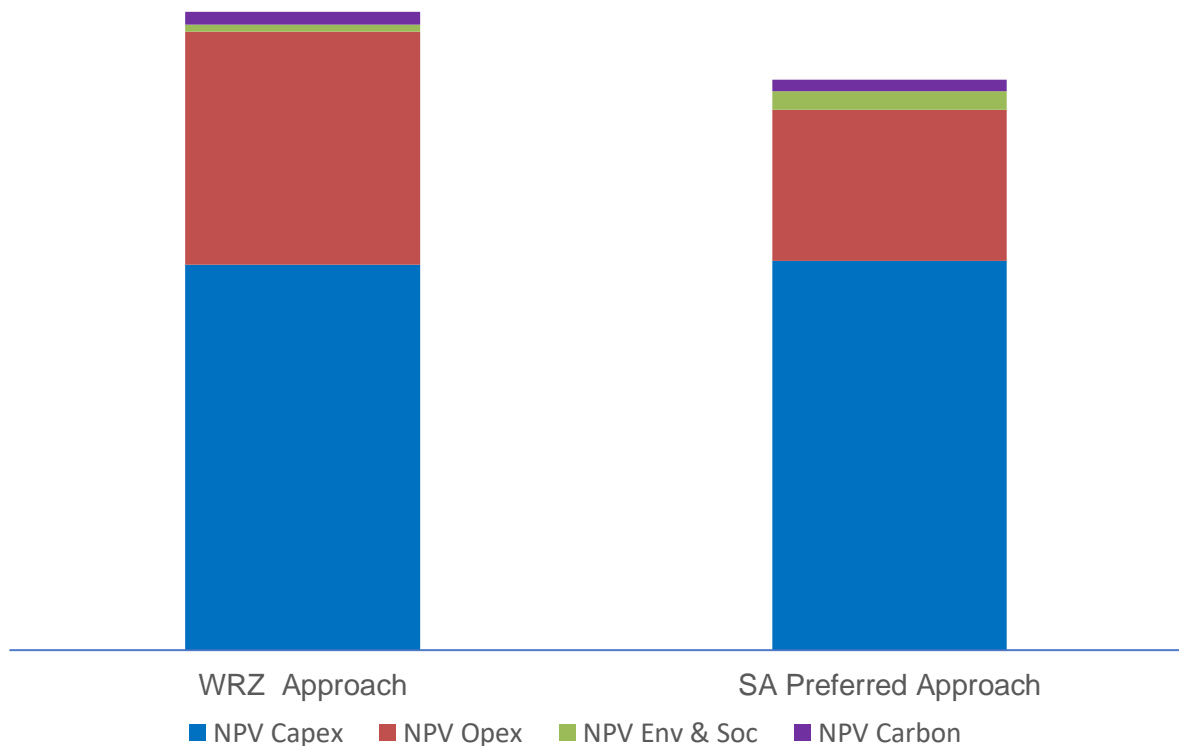


Figure 7.8 Regional NPV Costs for WRZ Level Approach and Study Area Preferred Approach

7.3.4 Alternative Study Area Approach for SAM

Development in many of the WRZs of Study Area M is currently constrained by capacity limitations in our existing supply system. Eleven (11) of the 26 WRZs in the study area have limited capacity. These are Enniscorthy, Bunclody, Sow Regional, Ferns Regional, New Ross, South Regional, Clonroche, Monageer, Woodview Drive, Bree and Carrigbyrne. . The SAM Preferred Approach has been selected as the solution that is best able to address this pressing need across the study area. The solution proposes to address almost 90% of the 2044 Deficit in the study area with increased or new groundwater abstractions that will serve 14 WRZs. An increased surface water abstraction from the River Slaney will address the critical need in the Enniscorthy Town WRZ and will also supply growth in Marshalstown, Glynn, Ballyhogue and Bree.

The available yield of the groundwater sources is based on a plan level assessment that relies on limited available information. Although the hydrogeological map of the study area (Figure 8.3) shows there are extensive swathes of productive fissured bedrock (Rf) stretching from Gorey in the north-east to Stradbally on the coast of Waterford, detailed project level investigations will be necessary to confirm the available yield.

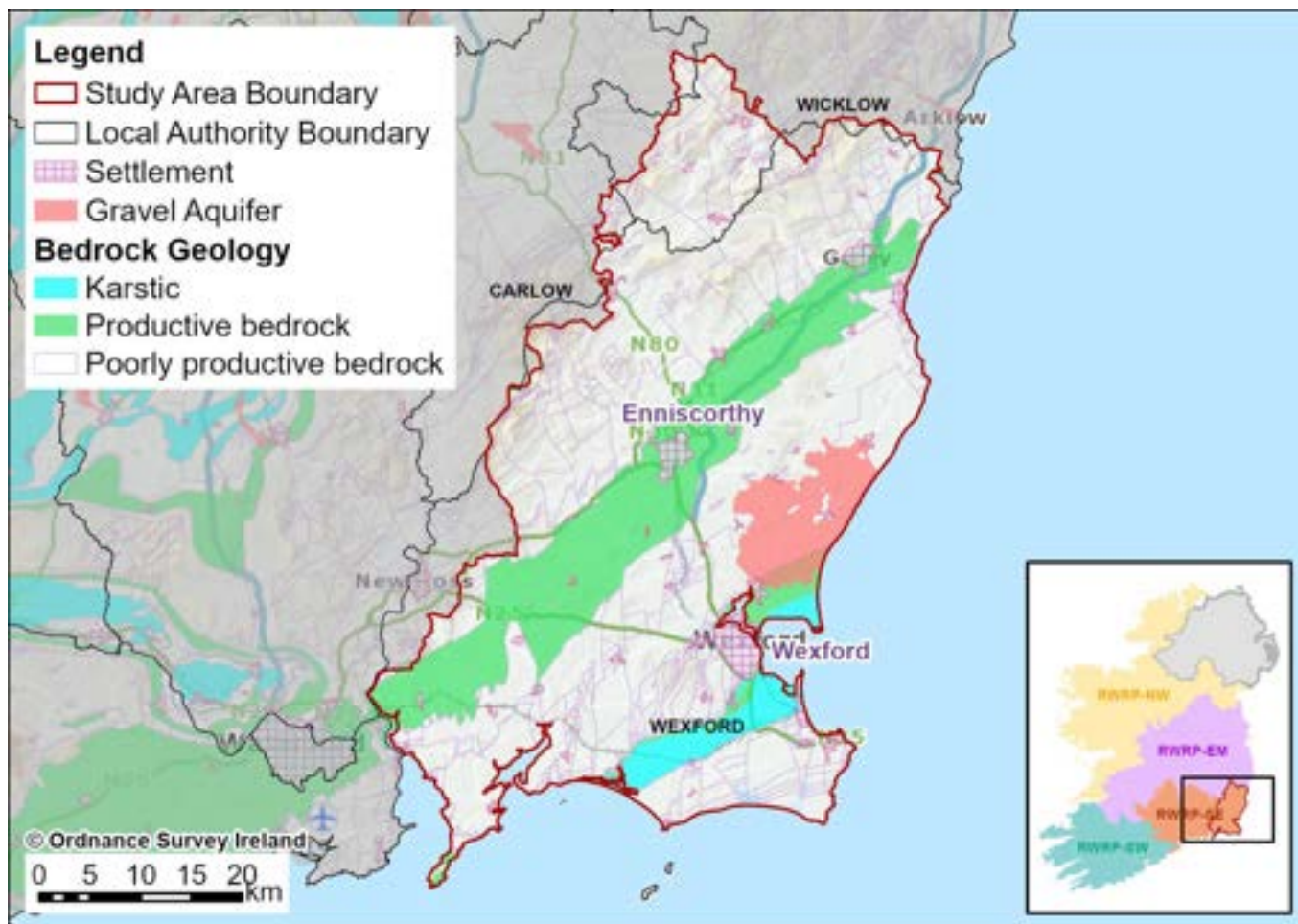


Figure 7.9 SAM Hydrogeology

If project level assessments indicate a lower-than-expected yield from groundwater sources, a higher volume supply source may be required to supplement the groundwater sources of the preferred approach and meet medium to longer term growth across the study area. The feasible option identified as the next best solution to address the study area Needs involves interconnecting 13 WRZs to the Greater Dublin Area in the Eastern and Midlands Region, via the Rathvilly WTP. This option will require new pumps, storages and approximately 140 km of new watermain. The option performed best against four of the best value assessment categories – Best AA (biodiversity), Best Environmental, Lowest Carbon and Most Resilient. This was associated with the benefits from the interconnection which decommissions seven (7) additional WTPs, abandons ten (10) additional abstractions and requires three (3) fewer new WTPs than the Preferred Approach.

Table 7.16 compares the options that would be different between the SAM Preferred Approach and the Alternative SAM Approach for each WRZ. Table 7.17 compares the infrastructure components for all the options within the two approaches.

Table 7.16 Comparison of SAM Study Area Approach

	Connect to GDA		No change
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WRZ Name	Preferred Approach (Within SA groundwater supplies)	Alternative Approach (Cross-regional supply source)
Coolgreany	SAM-501 Rationalise to Arklow WRZ in the Eastern and Midlands Region. Increase GW abstraction.	
Gorey	SAM-198 Rationalise within WRZ. Upgrade 2 WTPs for water quality (WQ) improvements.	
Camolin	SAM-017 Upgrade existing WTP for WQ improvements.	
Ferns WS	SAM-029 New GW abstraction and New WTP	
Bunclody	SAM-036 New GW and upgrade WTP	SAM-581 Rationalise and supply from GDA via Rathvilly
Kilteely	SAM-044 Increase GW abstraction and upgrade WTP	
Ballindaggin	SAM-050 Increase GW abstraction and upgrade WTP	
Monagear	SAM-061 Increase GW and upgrade WTP	SAM-581 Rationalise and supply from GDA via Rathvilly
Davidstown	SAM-073 Upgrade existing WTP for WQ improvement	SAM-581 Rationalise and supply from GDA via Rathvilly
Clonroche	SAM-100 New GW and upgrade WTP	
Woodview Drive Adamstown	SAM-105 Increase GW and upgrade WTP	
Raheen	SAM-108 Upgrade existing WTP for WQ improvement	
Sow Regional	SAM-127 & SAM-207 New GW and new WTP	SAM-581 Rationalise and supply from GDA via Rathvilly
Ballynavortha Public Supply	SAM-141 Upgrade existing WTP for WQ improvement	
Coolboy Coolafancy Public Supply	SAM-144 Upgrade existing WTP for WQ improvement	
Raheengraney Public Supply	SAM-146 Upgrade existing WTP for WQ improvement	
Fardystown	SAM-148 New GW and upgrade WTP	SAM-581 Interconnect to GDA via Rathvilly WTP
Wexford Town	SAM-149 New GW and new WTP	SAM-581 Interconnect to GDA via Rathvilly WTP
Ballingate Public Supply	SAM-547 Rationalise Ballingate to Tinahely in the Eastern and Midlands Region	
Carrickbyrne	SAM-575 Rationalise to South Regional	SAM-581 Rationalise and supply from GDA via Rathvilly
South Regional	SAM-575 New GW and new WTP	SAM-581 Interconnect to GDA via Rathvilly WTP

WRZ Name	Preferred Approach (Within SA groundwater supplies)	Alternative Approach (Cross-regional supply source)
Marshalstown	SAM-576 Rationalise to Enniscorthy Town	SAM-581 Rationalise and supply from GDA via Rathvilly
Enniscorthy Town	SAM-576 Increase SW abstraction from River Slaney and upgrade WTP	SAM-581 Interconnect to GDA via Rathvilly
Bree	SAM-576 Rationalise to Enniscorthy Town	SAM-581 Rationalise and supply from GDA via Rathvilly
Ballyhogue	SAM-576 Rationalise to Enniscorthy Town	SAM-581 Rationalise and supply from GDA via Rathvilly
Glynn WS	SAM-576 Rationalise to Enniscorthy Town	SAM-581 Rationalise and supply from GDA via Rathvilly

Table 7.17 SAM Study Area Approach Component Summary

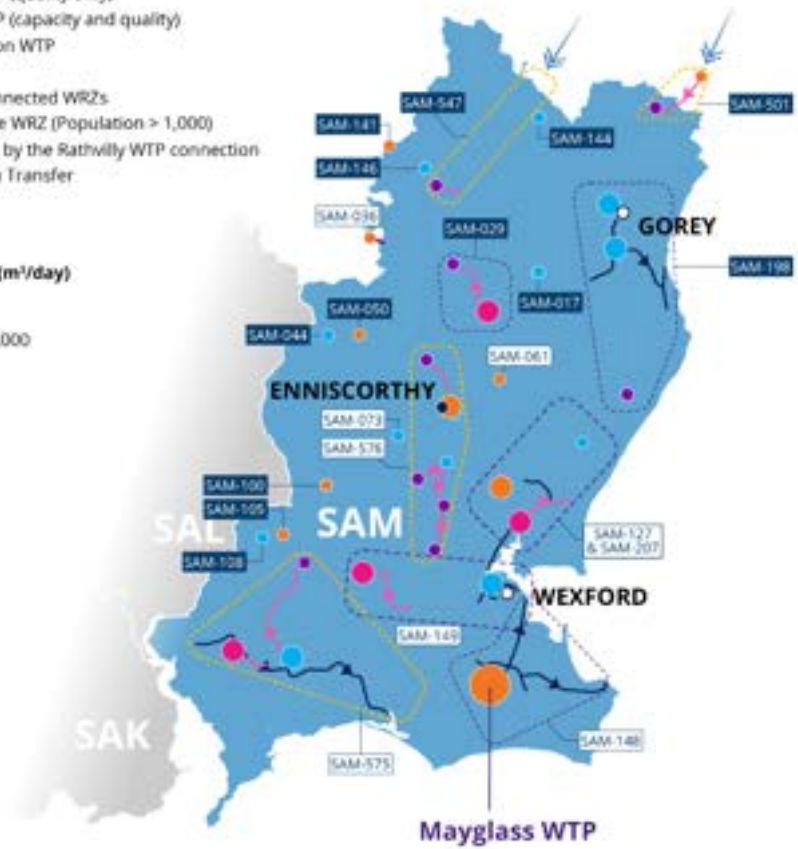
Infrastructure Summary	Preferred Approach (Within GW supply sources)	Alternative Approach (Cross-regional supply source)
New pipeline network (km)	99	157
New WTPs	4	1
Upgrade WTPs	22	15
New / upgraded abstractions	14	6
WTPs decommissioned	9	16
Abstractions abandoned	9	19
Raw Water Storage	0	0
Treated Water Storage	14	19

The Preferred Approach and the Alternative Approach are presented for comparison in Figure 7.10. The figure on the left shows the Study Area Preferred Approach. The options that would be different if the Alternative Approach was taken forward as the Preferred Approach are highlighted in white. The figure on the right shows the Alternative Approach. The WRZs that would benefit from the transfer of water from the GDA via Rathvilly are shaded pink. The blue highlighted options form part of both the Preferred Approach and Alternative Approach.

If project level assessments determine that the Rathvilly option will be required in addition to the new groundwater sources, the Preferred Approach and the Rathvilly option will be adapted to consider the future integration of the GDA source and avoid stranded assets when the GDA is brought online. For example, where a new WTP is proposed under the Preferred Approach that is not required for the Rathvilly Option, a temporary treatment option may be considered instead.

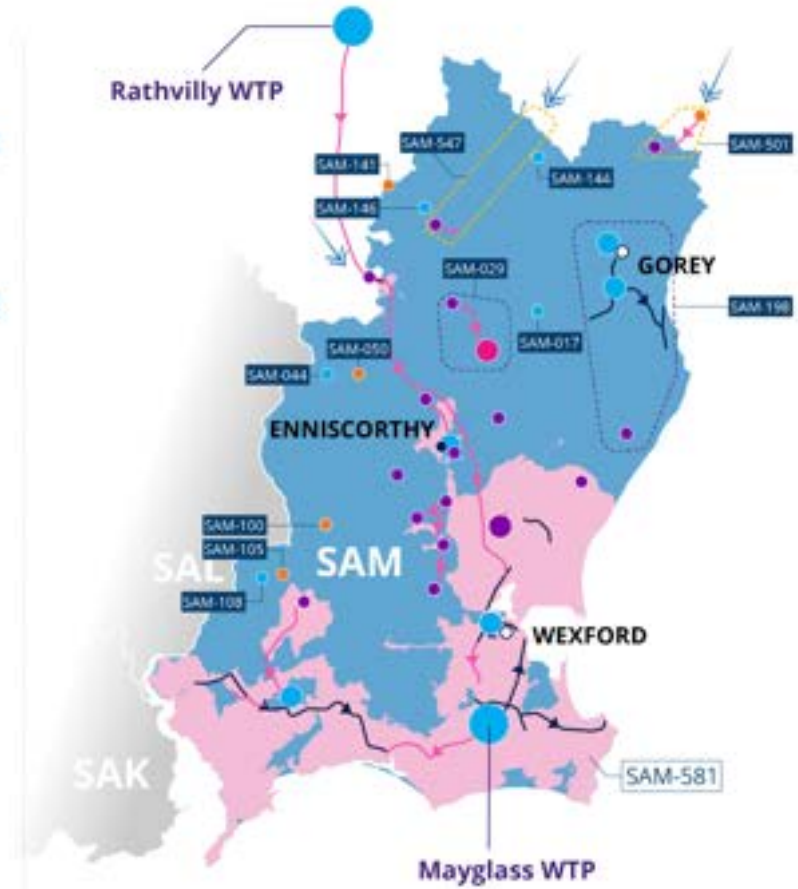
- City
 - Key Town
 - Existing Trunk Mains*
 - New Mains*
- Preferred Approach**
- Upgrade WTP (quality only)
 - Upgrade WTP (capacity and quality)
 - Decommission WTP
 - New WTP
 - New Interconnected WRZs
 - ⋮ Existing Large WRZ (Population > 1,000)
 - ◻ WRZs served by the Rathvilly WTP connection
 - ➔ Cross Region Transfer
- WTP Capacity (m³/day)**
- <1,000
 - 1,001 to 10,000
 - >10,000

Study Area Preferred Approach



*All infrastructure locations and alignments are indicative and not to scale

Study Area Alternative Approach - Connection to GDA via Rathvilly WTP



*All infrastructure locations and alignments are indicative and not to scale

Figure 7.10 SAM Preferred and Alternative Approach

7.4 SA Preferred Approach

7.4.1 Water Supply Sources

The SA Preferred Approach for the three (3) Study Areas address the supply Deficit across all WRZs in the South East Region through:

- 28 Independent local WRZ sources - local surface water and groundwater sources;
- 12 Within Study Area (SA) interconnected supplies – benefitting 57 WRZs supplied from a new, ungraded or existing source within the Study Area;
- 3 Cross Regional interconnected supplies – benefitting 8 WRZs supplied from a new, upgraded or existing source outside the Region; and

For 18 WRZs that are not in deficit and therefore do not require a new or upgraded resource supply, the Preferred Approach includes a WTP water quality processing upgrade (WQ upgrade only). Table 7.18 lists the number of WRZs supplied by each source type, and the WRZs where a WTP upgrade (WQ only) is required.

Under the Preferred Approach 27 local groundwater supplies and one (1) local surface water supply contribute to meeting an estimated 27% and 9%, respectively, of the 2044 Deficit across the South East Region in a dry year. The supplies are mostly expansions of existing sources with some new abstractions.

The interconnection of supply systems reduces the number of WRZs in the region from 111 to 58. Sixty-three (63%) of the Deficit across the three (3) Study Areas is met by interconnecting and rationalising supplies. Across the South East Region, the SA Preferred Approach, once delivered, will eventually decommission 63 WTPs and abandon 66 abstractions. As mentioned previously, the reduction in the number of WTPs achieved through supply rationalisation is likely to have benefits of reduced landscape impact, and over the longer term will reduce operational costs. Furthermore, the abandonment of abstractions will deliver environmental benefits to the surface water and groundwater bodies. Resilience and Flexibility are also improved through larger, interconnected supplies.

Table 7.18 Preferred Approach Source Types

	Number of WRZs			
	SAK	SAL	SAM	Total
Local source (GW)	13	3	11	27
Local source (SW)	1	0	0	1
Within SA interconnection	43	7	7	57
Cross Region interconnection	6	0	2	8
WTP upgrade (WQ only)	12	0	6	18

The three (3) cross region interconnections supply 1% of the regional Deficit and benefit eight (8) WRZs interconnecting to supply systems in the Eastern and Midlands Region. These include:

- Rationalising six (6) WRZs in SAK to the Limerick Supply System in Study Area 8 (Limerick Clare). The water supply for Limerick comes from the River Shannon and is treated at Clareville WTP. The full demand for each connected WRZ will be met via the new interconnection.

- Rationalising Coolgreany Water Supply in SAM to the Arklow supply system in Study Area 1 (Mid Wicklow). The groundwater abstraction serving the Arklow supply system will be increased to meet the full demand of the Coolgreany WRZ.
- Rationalising Ballingate Public Supply in SAM to the Tinahely supply system in Study Area 1 (Mid Wicklow). The Tinahely supply can meet the full demand of the Ballingate WRZ without further upgrade.

The relative contribution of the types of sources that will address the 2044 supply Deficit is represented in Figure 7.11. Local groundwater sources supply almost 70% of deficit for both SAM and SAL, whereas interconnected supplies and associated increased or new surface water supplies meet almost 80% of the deficit across SAK.

The Option Development Process at the Study Area Level has not identified any large Regional Options that can connect and supply multiple WRZs across the three Study Areas of the South East Region. This is further discussed in Section 8, where we consider the Regional Preferred Approach.

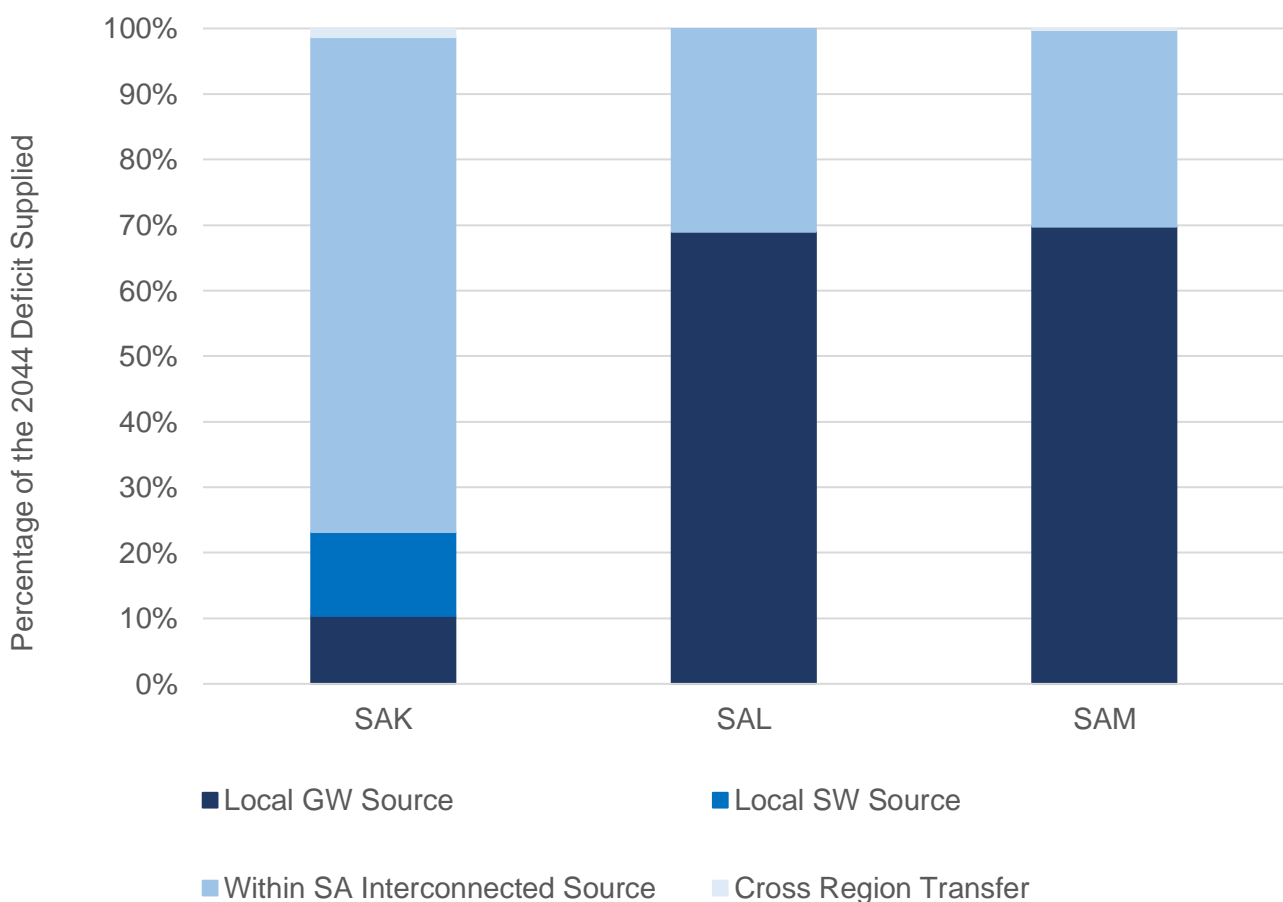


Figure 7.11 Preferred Approach Source Type - Percentage (%) of 2044 Deficit Supplied in a Dry Year

7.4.2 Existing Infrastructure

The existing WTPs and major interconnecting pipelines across the region are displayed in Figure 7.12. There are six (6) WTPs (out of 143 WTPs in the region) with a 22-hour design capacity of greater than 10,000 m³/day (Table 7.19). The largest WTP is the East Waterford (Adamstown) WTP. This serves Waterford City and surrounds, which comprises a population of approximately 70,000 representing almost 20% of the regional population.

Table 7.19 Water Treatment Plant Capacities greater than 10,000 m³/day

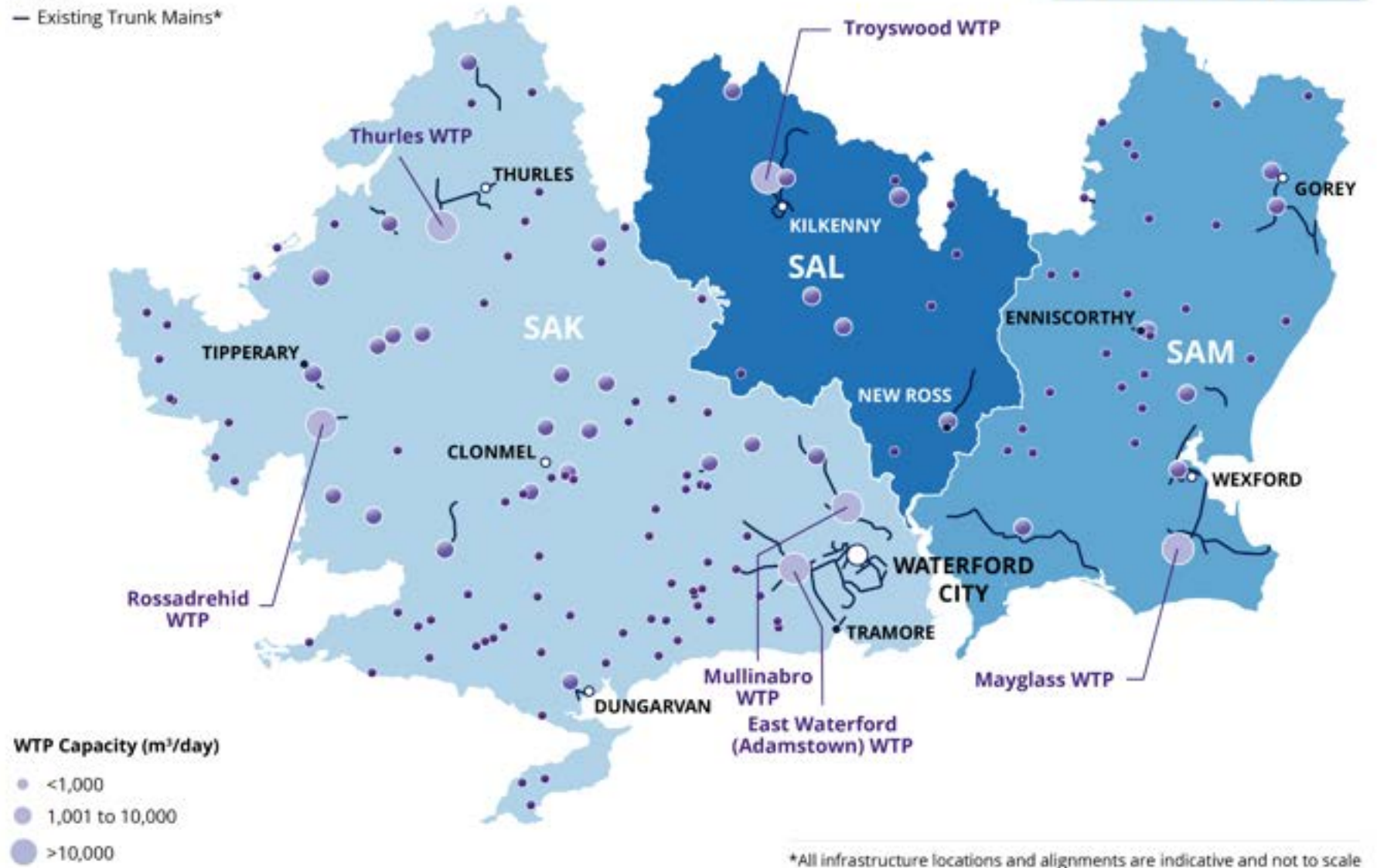
Water Treatment Plant	WRZ Name	Capacity* (m ³ /day)
East Waterford (Adamstown) WTP	East Waterford Water Supply Scheme (SAK)	53,170
Troyswood WTP	Kilkenny City (SAL)	21,460
Mullinabro WTP	South Kilkenny Environs (SAK)	13,750
Rossadrehid WTP	Galtee Regional (SAK)	11,920
Mayglass WTP	Fardystown (SAM)	11,000
Thurles WTP	Thurles (SAK)	10,510

* 22 hr WTP Design Capacity

The SA Preferred Approach increases the security of supply through upgraded abstractions and treatment capacity. Safe supplies are achieved through improved treatment processing, and resilience is increased by interconnecting systems where this is feasible. These improvements are presented in Section 7.4.3 for WRZ Options and Section 7.4.4 for Grouped Study Area Options.

- City
- Key Town
- Town
- Existing Trunk Mains*

Grouped SA Sources
 Local WRZ Sources
 Existing infrastructure



*All infrastructure locations and alignments are indicative and not to scale

Figure 7.12 Existing Infrastructure

7.4.3 WRZ Options

Options that involve upgraded or new local WRZ sources are presented in Figure 7.13. The WRZ Options that will serve populations greater than one thousand are shown labelled in the figure and listed in Table 7.20.

Table 7.20 Water Treatment Plant Capacities greater than 10,000 m³/day

Option Number	WRZ Name	DYCP Demand 2044 (m ³ /d)	DYCP Deficit/Surplus 2044 (m ³ /d)	Population (2044)
SAK-073	Piltown-Fiddown	1,570	-1,190	3,820
SAK-077	Callan WS 1001	1,500	-510	3,140
SAK-120	Galtee Regional	12,820	-7,460	13,460
SAK-180	Tipperary Town Supply	3,590	-1,410	5,460
SAK-211	Burncourt Ballylooby	3,850	-1,330	2,060
SAK-560 & SAK-618	Portlaw	690	-410	1,860
SAK-648	South Kilkenny Environs	10,190	-400	8,040
SAL-073	New Ross	4,440	-1,140	9,270
SAL-078	Bennettsbridge & Kilmaganny	4,240	-1,470	6,430
SAM-029	Ferns WS	870	-270	1,960
SAM-127 & SAM-207	Sow Regional	4,970	-1,620	14,450
SAM-148	Fardystown	13,830	-3,380	18,890
SAM-149	Wexford Town	11,210	-6,400	31,920
SAM-198	Gorey	11,450	410	9,200

The WRZ options serving the largest populations in each study area are:

- SAK-120, Galtee WRZ – A new surface water abstraction from Aherlow River and an upgrade to the capacity of Rossadrehid WTP
- SAL-073, New Ross WRZ – A new groundwater abstraction located south of New Ross WRZ and a new WTP
- SAM-149, Wexford Town – A new groundwater wellfield at Adamstown and a new WTP.

Details of the smaller systems are provided in the Technical Appendices 1-3

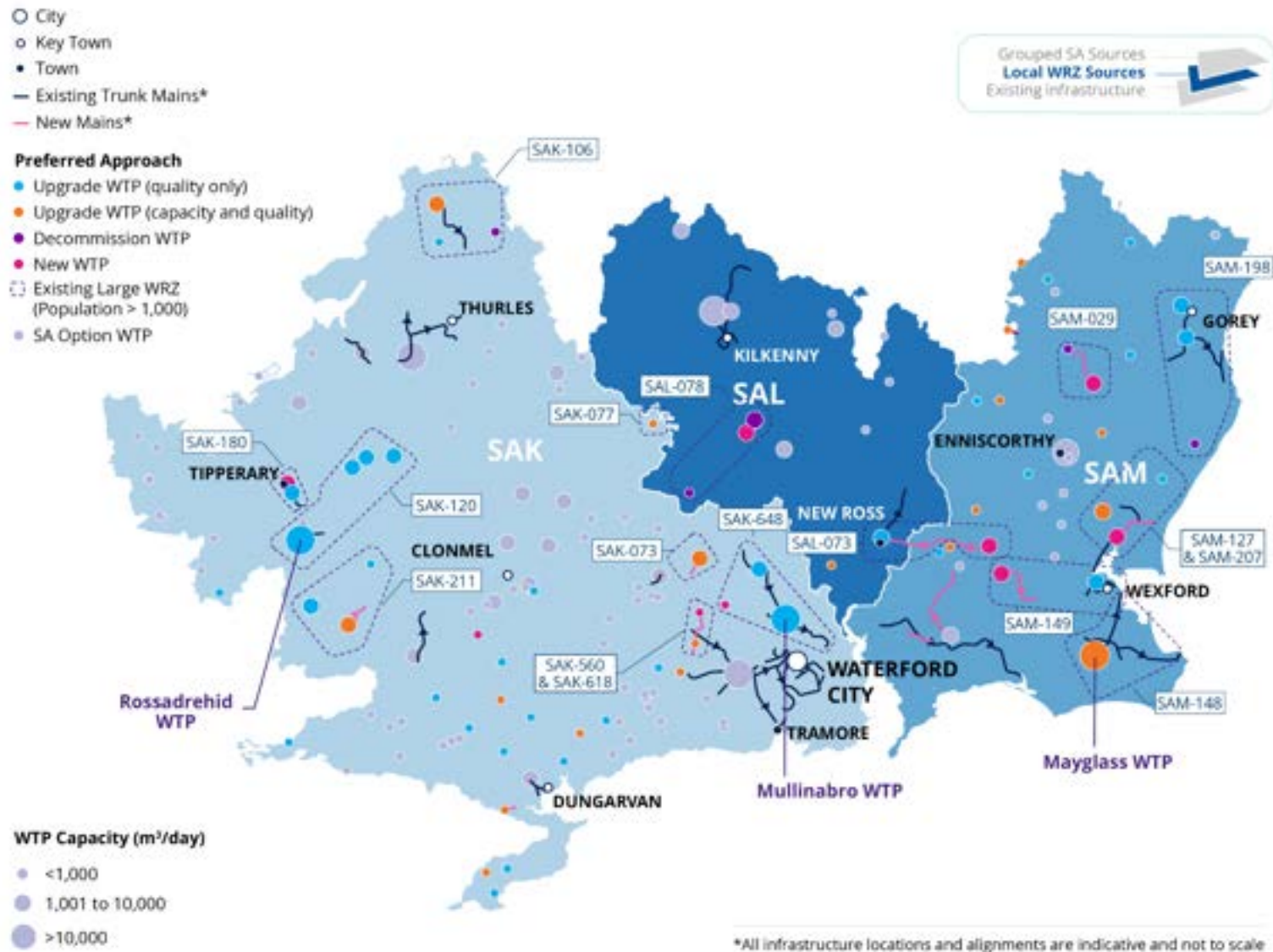


Figure 7.13 Preferred Approach - Local WRZ Sources

7.4.4 Study Area Grouped Options

The SA Grouped Options that will interconnect two or more WRZs, are displayed in Figure 7.14.

The two Grouped Options that will merge the largest number of WRZs are:

- Option SAK-949 proposes a new surface water abstraction from the River Suir, upstream of Carrick-on-Suir and will rationalise nine (9) WRZs to the East Waterford Supply system decommissioning ten (10) WTPs and associated abstractions.
- Option SAK-983 proposes a new surface water abstraction from the River Suir and new WTP at Barne. Ardfinnan Regional and Templetny/Brackford Bridge WRZs will be interconnected with Clonmel WRZ. Four (4) adjacent WRZs will be rationalised to Templetny/Brackford Bridge WRZ and a further four (4) WRZs will be rationalised to Clonmel. The rationalisation and interconnection of supplies will result in the decommissioning of 10 WTPS and associated abstractions.

These Options combined will meet 42% of the regional deficit in 2044 and serve a population of almost 97,000 representing about 30% of the 2044 regional population.

Table 7.21 lists the interconnected systems, including a list of the benefitting WRZs.

Table 7.21 Study Area Preferred Approach – SA Grouped Sources

Option number	Source WRZ	Benefitting WRZs	No. of WRZs	Trunk Main (km)	No. of Decomm. WTPs	DYCP Demand 2044 (m3/d)	DYCP Net Deficit 2044 (m3/d)	Population (2044)
SAK-837	Carrick-on-Suir	Ballyknock Carrick-on-Suir Crehanagh Garravoone Rathgormack	5	10	5	3,300	-1,420	3,030
SAK-853	Fethard and Mullenbawn Regional Public Water Supply (PWS)	Colabrook / Commons Fethard and Mullenbawn PWS	2	14	0	9,960	-430	2,300
SAK-949	East Waterford Supply Scheme	Ballyogarty Dunhill Ballinageeragh Dunhill – Cois Coille East Waterford Supply Scheme Faha Fews Kill/Ballylaneen Kilmacthomas Scrahan Smooore	10	69	10	43,890	-19,550	94,570
SAK-973	Lismore/Cappoquin/Ballyduff	Ballysaggaart Carrignagower Lacken Lismore/Cappoquin/Ballyduff Monatarriff Moores Well	6	28	5	2,910	-1,060	360
SAK-975	Thurles	Dundrum Regional Glengar Horse and Jockey Littleton Thurles Two Miles Borris	6	31	4	16,550	-760	11,530

Option number	Source WRZ	Benefitting WRZs	No. of WRZs	Trunk Main (km)	No. of Decomm. WTPs	DYCP Demand 2044 (m3/d)	DYCP Net Deficit 2044 (m3/d)	Population (2044)
SAK-983	Clonmel	Ahenny Ardfinnan Regional Ballinver Clonmel Glenagad Kilcash Kilmanahan Poulavanogue (Waterford) Russeltown Templetney/Brackford Bridge PWS Tullohea	11	54	10	24,140	-14,650	23,090
SAK-985c	Limerick City (Eastern and Midlands Region)	Ballylanders Water Supply Carrigmore Galbally Water Supply Herbetstown Kiltely Knocklong/Hospital	6	58	9	3,160	-780	4,410
SAK-995	Dungarvan	Ddungarvan Graiguenageeha Stradbally	3	15	2	8,950	-1,740	15,890
SAL-511	Kilkenny	Ballyragget PWS Kilkenny City	2	10	2	15,190	8,080*	15,890
SAL-521	Thomastown/Inistioge	Graiguenamanagh PWS Thomastown/Inistioge	2	13	1	3,460	1,000	3,560
SAL-526	Gowan-Goresbridge-Paulstown	Ballinkillen Borris Gowan-Goresbridge-Paulstown	3	15	3	1,440	40	3,320
SAM-501	Arklow (Eastern and Midlands Region)	Coolgreany	1	8	1	680	40	1,220
SAM-547	Tinahely (Eastern and Midlands Region)	Ballingate	1	3	1	5	2	10

Option number	Source WRZ	Benefitting WRZs	No. of WRZs	Trunk Main (km)	No. of Decomm. WTPs	DYCP Demand 2044 (m3/d)	DYCP Net Deficit 2044 (m3/d)	Population (2044)
SAM-575	South Regional	Carrigbyrne South Regional	2	18	1	8,280	2,860	13,550
SAM-576	Enniscorthy Town	Ballyhogue Bree Enniscorthy Town Glynn Water Supply Marchalstown	5	23	4	6,990	2,610	15,880

*Both merged water resource zones are in surplus. The interconnection of the two supply systems increases resilience and improves operational efficiency by decommission two WTPs.

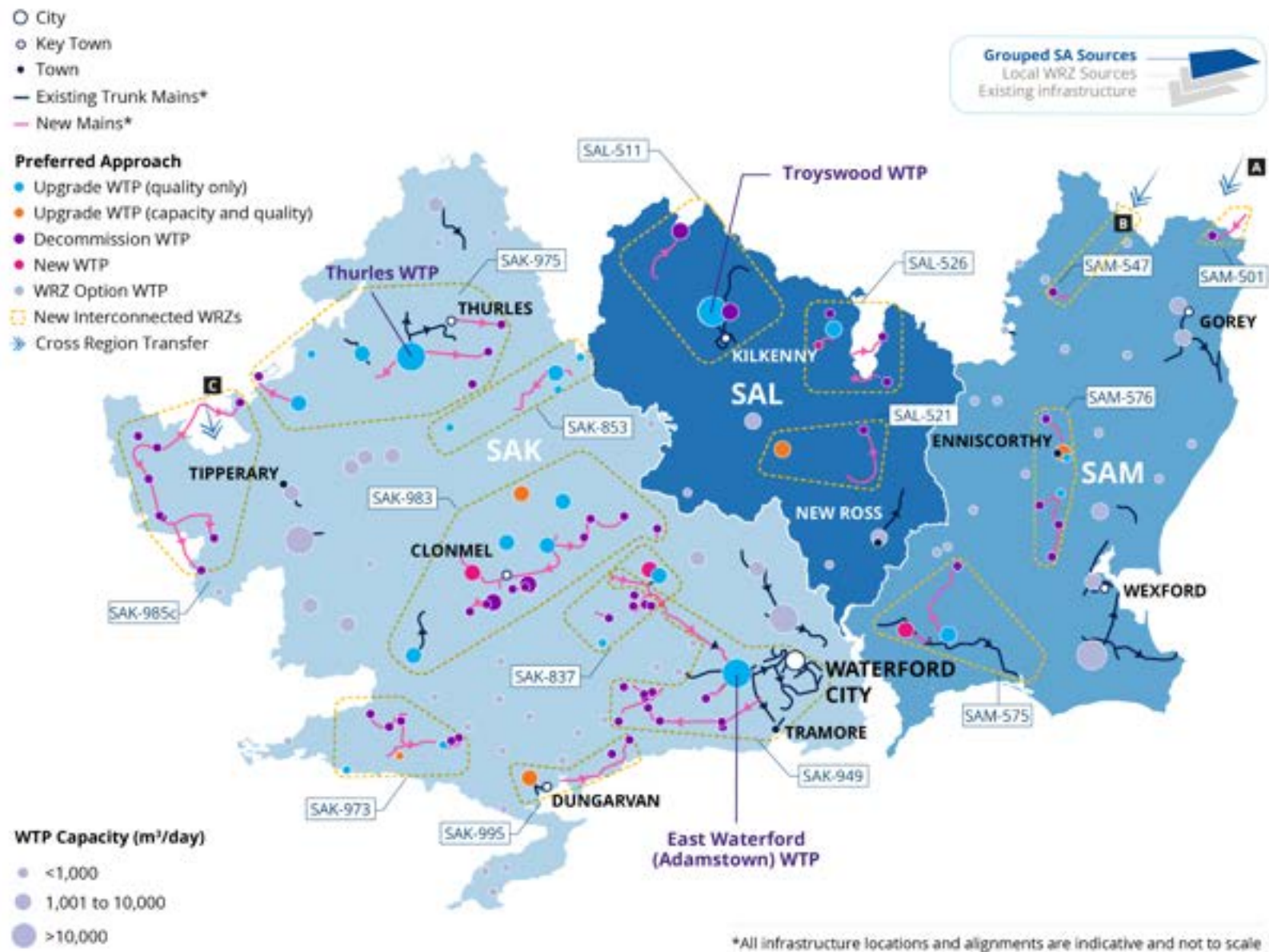


Figure 7.14 Preferred Approach - SA Grouped Sources

7.4.5 Addressing Leakage

Leakage reduction measures are a key component of the Preferred Approach to addressing Need across the South East Region. As outlined in Section 5.2, the measures aim to nationally reduce leakage by 400 million litres per day (ML/d) by 2034. This will be achieved through the following contributions:

- 39.5 % within the Eastern and Midlands Region (representing 158 ML/d)
- 23.5% within the South West Region (representing 94 ML/day)
- 25.5% within the North West Region (representing 102 ML/day)
- 11.5% within the South East Region (representing 46 ML/day)

Leakage outside of the Greater Dublin Area WRZ (which is in the Eastern and Midlands Region) across all four regions of the NWRP, is prioritised on an annual basis as part of the National Leakage Reduction programme. This allows Uisce Éireann's leakage reduction programmes to be flexible and targeted, to meet specific emerging needs. For this reason, leakage targets are not automatically applied to the Supply Demand Balance (SDB) calculations.

As set out in Section 4.3.3 of the Framework Plan and Section 5.2.2 of this RWRP-SE, leakage targets for 2019 were applied to the SDB for priority supplies based on:

- supply demand deficit,
- existing abstractions with sustainability issues,
- and drought impacts.

For supplies within the South East region, specific leakage targets of 0.91 ML/d were included in the SDB for 2019. Leakage targets for future years will be allocated to supplies to meet specific emerging needs and to meet the targets for the region.

Planned leakage targets (built into the SDB) across WRZs in the South East Region include the following reductions:

- SAK – 0.35 ML/d through net leakage reduction in Fethard & Mullenbawn Regional Public Water Supply, Galtee Regional and Tipperary Town Supply.
- SAL – 0.32 ML/d through net leakage reduction in Kilkenny City.
- SAM – 0.24 ML/d through net leakage reduction in Fardystown, Enniscorthy and Gorey.

(Note: 1,000 m³ per day is equivalent to 1 ML/day).

This does not mean that only 0.91 ML/d will be applied for the region between 2019 and 2034 but rather, we have committed to a target for 2019 in the SDB for specific supplies and we have provided flexibility to prioritise supplies for future leakage reduction.

Our current leakage targets are to reduce leakage in supply systems with demand greater than 1,500 m³/day (1.5 ML/d), to 21% of total demand by 2034. For the South East Region, this equates to a total leakage reduction of 46 ML/d, which will reduce leakage to 24% of demand on average across the region.

Our leakage targets will be reviewed annually and will be subject to further modification. At project level, when we proceed to develop the Preferred Approach, we will review the SDB and subtract the target leakage reductions from the Deficit at this stage. This ensures that the Preferred Approaches are not oversized, or that the needs are not over emphasized.

The achievement of these additional leakage targets may mean that the supply volume delivered by the Preferred Approach would not be required in full. This will provide the opportunity to adapt the Preferred Approach, for example through changes in the delivery timeframe or modular designs. In the circumstance that higher than projected growth occurs, the additional leakage reductions would go towards balancing the additional demand generated through higher growth.

To ensure the Preferred Approach that we develop remains appropriate in the scenario of reduced leakage and static demand, we have carried out a sensitivity analysis of our Preferred Approach (Section

7.7). This has allowed us to understand the impact of leakage reductions on the proposed Preferred Approach and whether the Preferred Approach would still be valid under a reduced leakage scenario. This process allows us to balance the delivery of the Preferred Approach between the Lose Less pillar (Section 5.2) and Supply Smarter pillar (Section 5.4).

7.4.6 Addressing Water Quality

Uisce Éireann's Interim Barrier Assessment (described in our Framework Plan and summarised in Section 3.3.2 of this RWRP-SE) identifies Water Quality driven Need to inform the Preferred Approach development. The assessment determined that **115 of the 143 WTPs** in the Region have a high risk of not meeting one (1) or more of four (4) Uisce Éireann's Water Quality Barriers. However, these are internal Uisce Éireann assessments and 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 (DWD)³ and our national transposing legislation) are developed for each water supply, the barrier scores for all our supplies will be updated and become more reliable.

A '**Barrier**' consists of any actions, processes, procedures, standards or assets (WTPs, water mains, pumping stations etc) put in place across the entire system, from catchment to tap, to achieve water of sufficient quality and quantity. The four Barriers include: 1) Protection against bacteria and virus; 2) Maintain chlorine residuals in the network; 3) Protozoa removal processes; and 4) Prevention of the formation of trihalomethanes (THMS).

It should be noted that the assessment is not an indicator of non-compliance with the European Union (Drinking Water) Regulations 2023⁴, but an assessment of the asset capability standard compared with the asset standard as set out in Section 5.7 of the Framework Plan. The assessment provides an indication of the need to invest in areas of our asset base (human and structural) through resource planning, to ensure that we can address potential risks or emerging risks to our supplies.

The Preferred Approach for all study areas includes upgrades to water quality treatment efficiency for all WTPs that are not associated with an in-flight project (a project that is in progress). In-flight projects for the South East Region are described in Section 4. The WTP upgrades are designed to address the risks identified in Section 3.3.2 through improvements in filtration, coagulation and ultraviolet (UV) treatment. They do not include improvement measures that are related to actions required on WTPs that are subject to an Environmental Protection Agency (EPA) direction or are listed on the EPA Remedial Action List (as outlined in Table 3.15 of this RWRP-SE).

7.4.7 Environmental Sustainability

In December 2022 the Water Environment (Abstractions and Associated Impoundments) Act (the "Abstractions Act")⁵ was published; however, it has not yet commenced. The Abstractions Act will align abstraction licensing with the requirements of the Water Framework Directive (WFD) (2000/60/EC), both for the specific abstraction and in combination with other activities. The Environmental Protection Agency (EPA) will determine the licences.

Whilst the regulations and guidelines for the new abstraction regime are being developed, we are assessing existing abstractions to identify surface water sites that may exceed future abstraction thresholds. We have taken a precautionary approach based on our current understanding of how proposed abstraction legislation might be applied. This assessment suggests that certain schemes may

be subject to reductions in abstraction under the new legislation; however, this will ultimately be determined by the EPA based on the project level information before them. This independent assessment of surface water abstractions is based on UKTAG standards to determine (i) the potential impact on our SDB and (ii) to identify possible alternative solutions to improve the sustainability of our abstractions. This assessment procedure is set out in Appendix C of the Framework Plan and is in line with a precautionary approach.

A sensitivity analysis (presented in Section 7.6) is conducted for each WRZ, to allow us to stress test the sensitivity of the Preferred Approach against potential sustainability driven reductions to existing abstractions (again, taking a conservative and precautionary approach as to the level of reductions that may be required). This will ensure that our decision making is robust, and the Preferred Approaches are adaptable and compatible with the future legislative framework for abstractions, in so far as this can be anticipated at this stage.

7.4.7.1 Surface Water Abstractions

Our assessment has identified 43 existing surface water sites where potential abstraction reductions may be required in the future under the future legislative framework for abstractions (which will ensure Ireland can meet its obligations under the WFD). Our assessment is based on conservative estimates of what a future regime may require). The 43 sites are shown in Figure 7.15 by symbols outlined in red. The WFD ecological status of the surface water waterbody is represented by the colour coded site identifier. The site names are listed in Table 7.22 against the corresponding site number that is displayed in Figure 7.15.

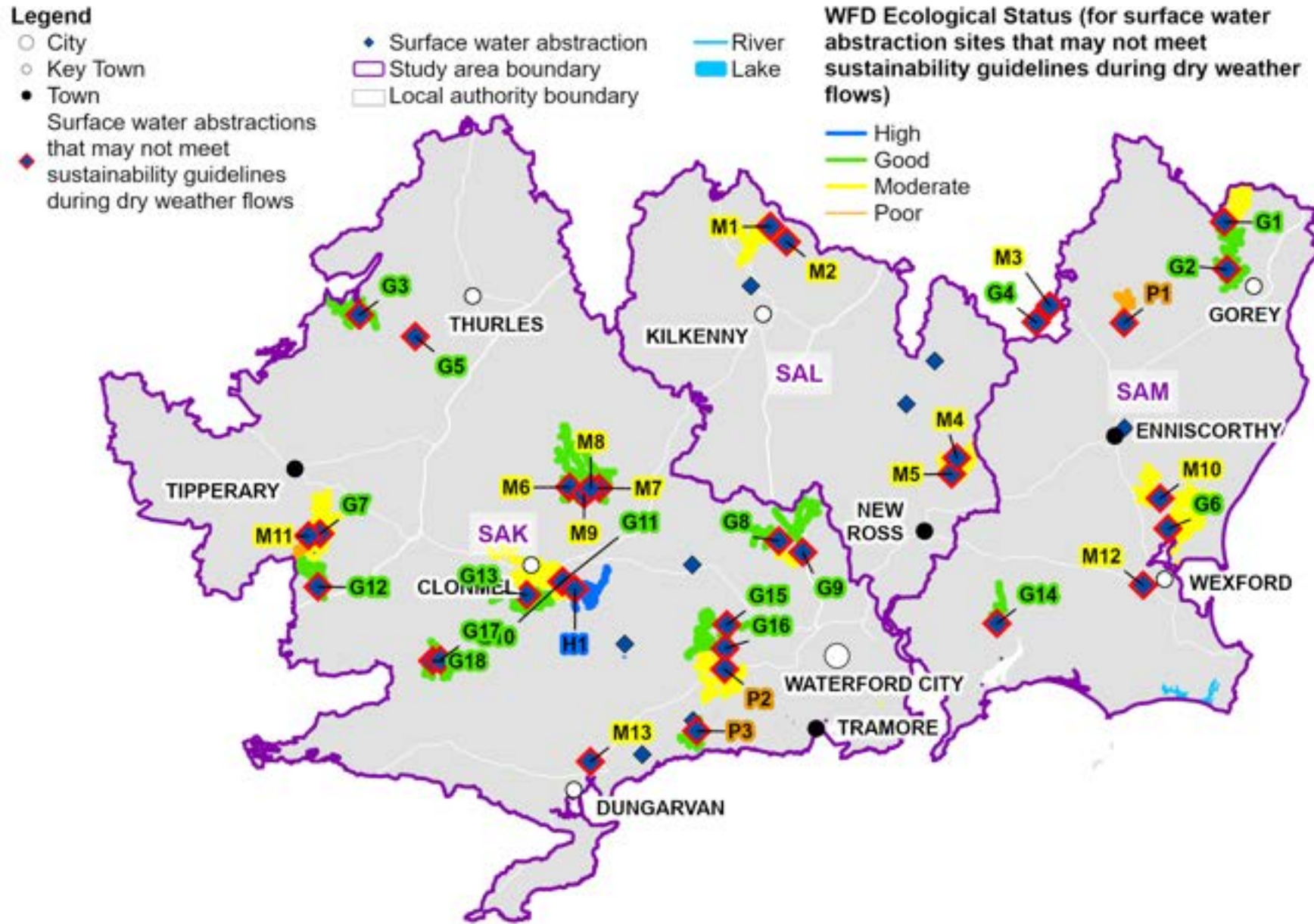


Figure 7.15 Existing Surface Water Abstractions

When developing our Preferred Approach, we considered solutions to improve the sustainability at the sites that were assessed to be potentially impacted by the new legislation.

Thirty-five (35) of the 43 surface water abstractions that have been identified as potentially exceeding sustainable abstraction thresholds are intended to be decommissioned as part of the Preferred Approach. These sites are shown in Figure 7.16, which presents the changes to surface water abstractions under the Preferred Approach development, including new abstractions and existing abstractions which will be maintained, upgraded or abandoned. The decommissioning of potentially unsustainable abstractions has the potential to improve the environmental outcomes at these sites and reduce the uncertainty posed by the future legislation.

The remaining 28 surface water abstractions that may not meet sustainability guidelines during dry weather flows, will be maintained under the Preferred Approach due to a lack of viable alternatives. The Preferred Approach, however, does improve or avoid further deterioration at these sources by reducing existing abstractions or developing additional sources to support growth.

The actual reductions that may be needed in future will depend on the specific requirements of the future legislation. Uisce Éireann will update the NWRP as appropriate to account for these requirements, once known, using the monitoring and feedback process set out in Section 9 of this Plan.

Table 7.22 Preferred Approach – Abstractions Potentially Exceeding Sustainable Abstraction Thresholds

Preferred Approach Outcome	Abstraction Sites	
	Decommission	Maintain
SAK Waterford and South Tipperary	H1 – Boola River Intake (Clonmel & Environs)	G3 – Multeen River Intake (Dundrum Regional)
	G10 – Poulavanogue Abstraction 1 (Clonmel & Environs)	G5 – River Clodiagh (Thurles/Borrisoleigh)
	G11 – Poulavanogue Abstraction 2 (Clonmel & Environs)	G7 – Muskry Stream Intake (Galtee Regional)
	G13 – Glenary Abstraction 2 (Clonmel & Environs)	G8 – Clonassy / Pollanasa River (South Kilkenny)
		G9 – River Blackwater, Mullinavat (South Kilkenny)
		G12 – Glengarra River (Burncourt Ballylooby)
		G15 – Clodagh River (East Waterford Water Supply Scheme)
		G16 – Portlaw Springs (Portlaw)
		G17 – Ahernes Glen Abstraction (Ardfinnan Regional)
		G18 – Glenbreda Stream Abstraction (Ardfinnan Regional)
		M6 – Anner River (Fethard & Mullenbawn Regional Public Water Supply)
		M7 – Gurtnapisha (Fethard & Mullenbawn Regional Public Water Supply)

Preferred Approach Outcome	Abstraction Sites	
	Decommission	Maintain
		<p>M8 – Cloran stream (Fethard & Mullenbawn Regional Public Water Supply)</p> <p>M9 – Walshbog (Fethard & Mullenbawn Regional Public Water Supply)</p> <p>M11 – College Stream Intake (Galtee Regional)</p> <p>M13 – Deelish Reservoir (Deelish/Ballinacourty/Kilnafrehan)</p> <p>P2 – Ballyshonock Impoundment (East Waterford Water Supply System)</p> <p>P3 – Mahon River Intake (East Waterford Water Supply Scheme)</p>
SAL Kilkenny	<p>M1 – River Dinan (Kilkenny City)</p> <p>M2 – River Douglas (Kilkenny City)</p>	<p>M4 – Dranagh (New Ross)</p> <p>M5 – River Pollmounty (New Ross)</p>
SAM Wexford and Wicklow	<p>P1 – River Currlane (Ferns Regional)</p>	<p>G1 – Bann River (Pallis Bridge) (Gorey)</p> <p>G2 – Bann River (Kilmichael pumping station) (Gorey)</p> <p>G6 – River Sow (Wexford Town)</p> <p>G14 – Owenduff (South regional)</p> <p>G4 – Craan Intake (Bunclody)</p> <p>M10 – River Sow (Sow Regional)</p> <p>M12 – Coolree Intake (Wexford Town)</p> <p>M3 – Barkers Creek (Bunclody)</p>

Legend

- City
- Key Town
- Town
- Study area boundary
- Local authority boundary
- Lake
- River

Surface water abstractions that may not meet sustainability guidelines during dry weather flows

Surface water abstractions

- ◆ Decommission
- ◆ Maintain
- ◆ New
- ◆ Upgrade

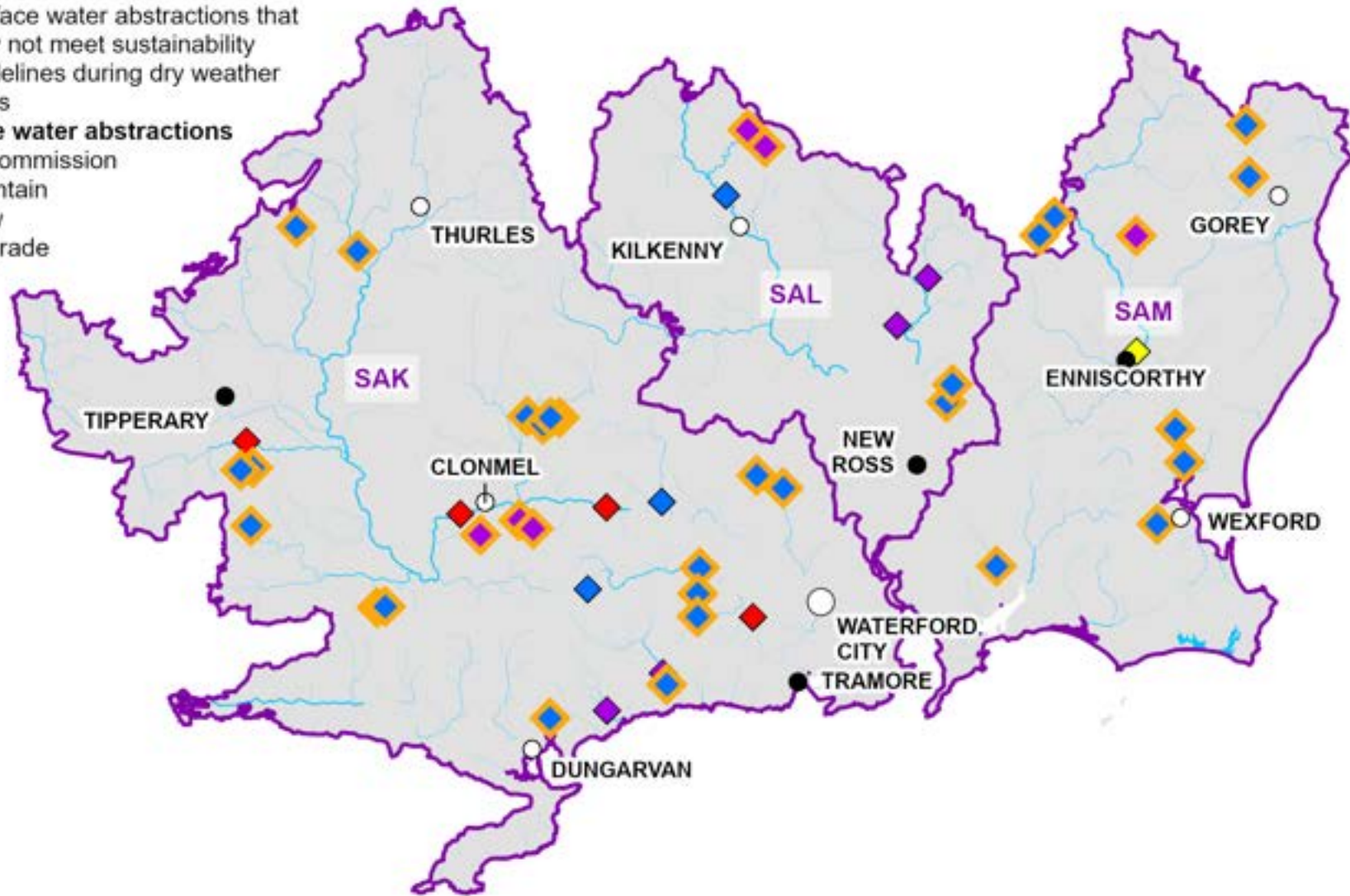


Figure 7.16 Preferred Approach – Surface Water Abstractions

7.4.7.2 Groundwater Abstractions

As explained in Section 3.2.2 of the Framework Plan, groundwater abstractions will need to conform to the proposed new abstraction licencing regime as well. Due to the limited long-term records on pumping and drawdown of water levels for many of our groundwater supplies, it is difficult to present robust desktop assessments of water availability for our existing groundwater abstractions. Until site-specific studies of groundwater availability are completed, Uisce Éireann have developed an initial assessment for existing abstractions based on best available information. Appendix C and Appendix G of the Framework Plan describes our approach to groundwater supply assessments and the regulatory and licencing constraints, respectively. Over the coming years, Uisce Éireann will work with the environmental regulator (the EPA) and the Geological Survey of Ireland (GSI), 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.

Figure 7.17 presents our 120 groundwater sources with the SA Preferred Approach in place. If the SA Preferred Approach is delivered as proposed, abstractions from 55 groundwater sources will be decommissioned, there will be increased abstractions from 20 sources and 16 new groundwater sources will be developed.

Legend

- City
- Key Town
- Town

Groundwater abstractions

- ◆ Decommission
- ◆ Maintain
- ◆ New
- ◆ Upgrade

- ▭ Study area boundary
- ▭ Local authority boundary

- Lake
- River

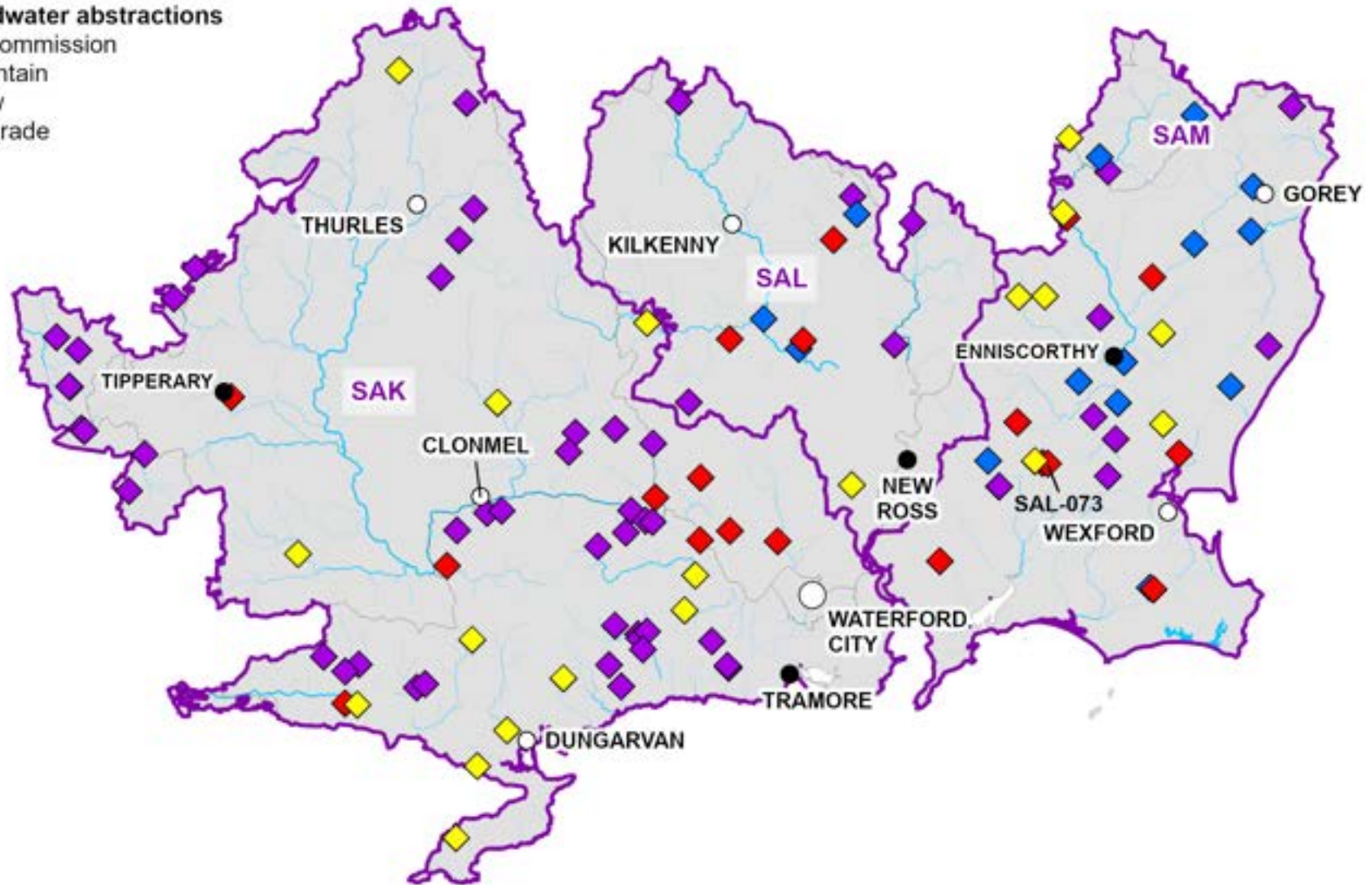


Figure 7.17 Preferred Approach - Groundwater Abstractions

7.5 SA Preferred Approach Summaries

The following sections provide a summary of the Preferred Approaches for each Study Area. Further details are contained in the Study Area Technical Reports in Appendices 1-3.