Autumn 2022

# Regional Water Resources Plan – Eastern and Midlands

## Appendix 6 Study Area 6 Technical Report

Tionscadal Éireann
Project Ireland
2040

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

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

# Table of Contents

# 1 Introduction and Background

# 1 Introduction – Study Area 6

This is the Technical Report for Study Area 8 which applies the Options Assessment Methodology, as set out in the Framework Plan and the Regional Water Resource Plan - Eastern and Midlands (RWRP-EM), the final version of which was reviewed by the authors of this Technical Report prior to finalisation of this Technical Report. This document should be reviewed in conjunction with the Framework Plan and the RWPRP – EM, which explain key concepts and terminology used throughout the report

This Study Area includes 28 water resource zones located in Counties Laois, Carlow, Offaly and Kilkenny. This Technical Report includes:

This Technical Report includes:

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

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

## 1.1 Summary of Our Options Assessment Methodology

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

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

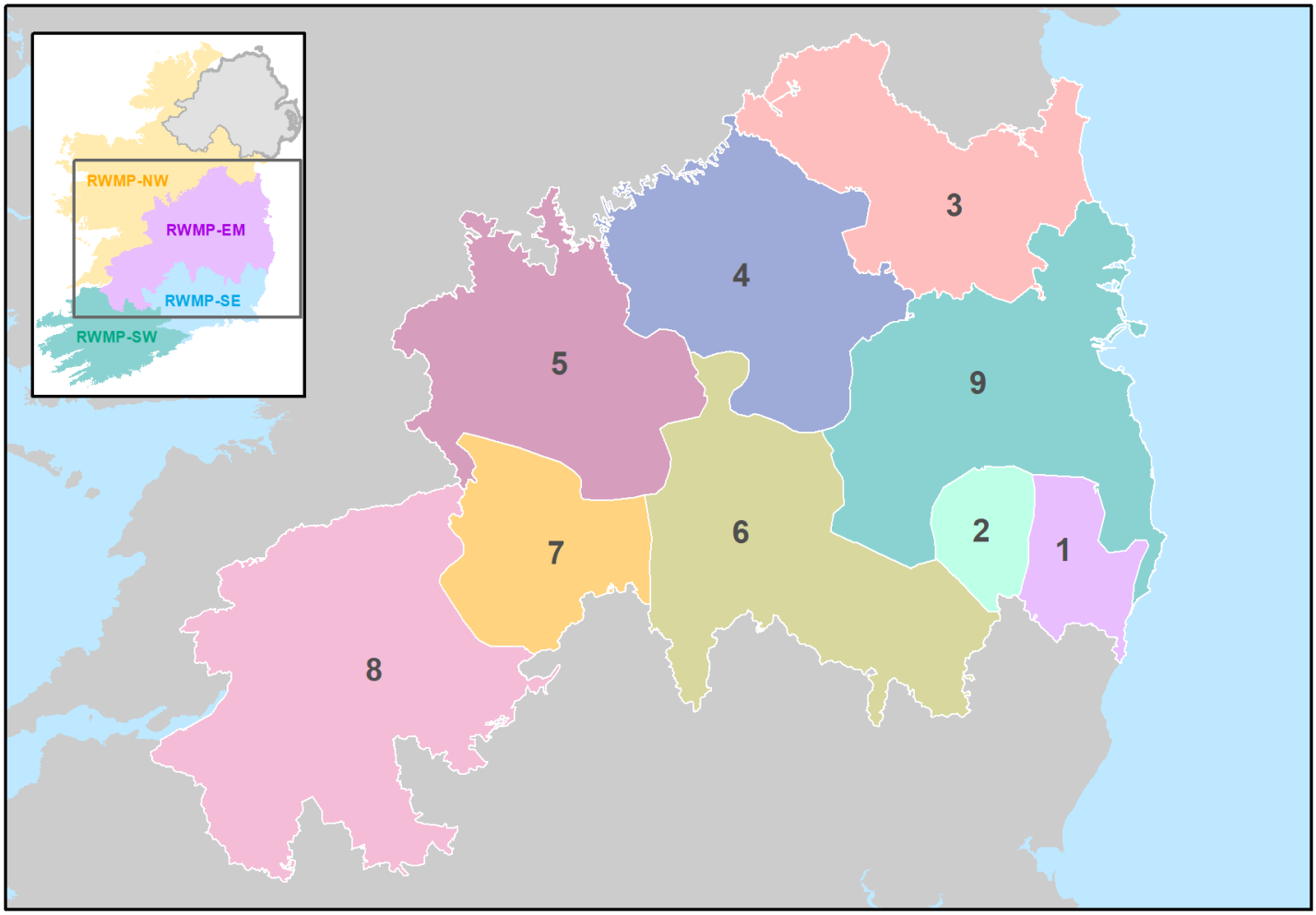



Figure 1.1 Overview of Study Areas within the Eastern and Midlands Region.

This Technical Report is for Study Area 6 (SA6), which consists of 28 individual water resource zones (WRZs). Within this Study Area, the Preferred Approach has been developed following the process shown in Figure 1.2.

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

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

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

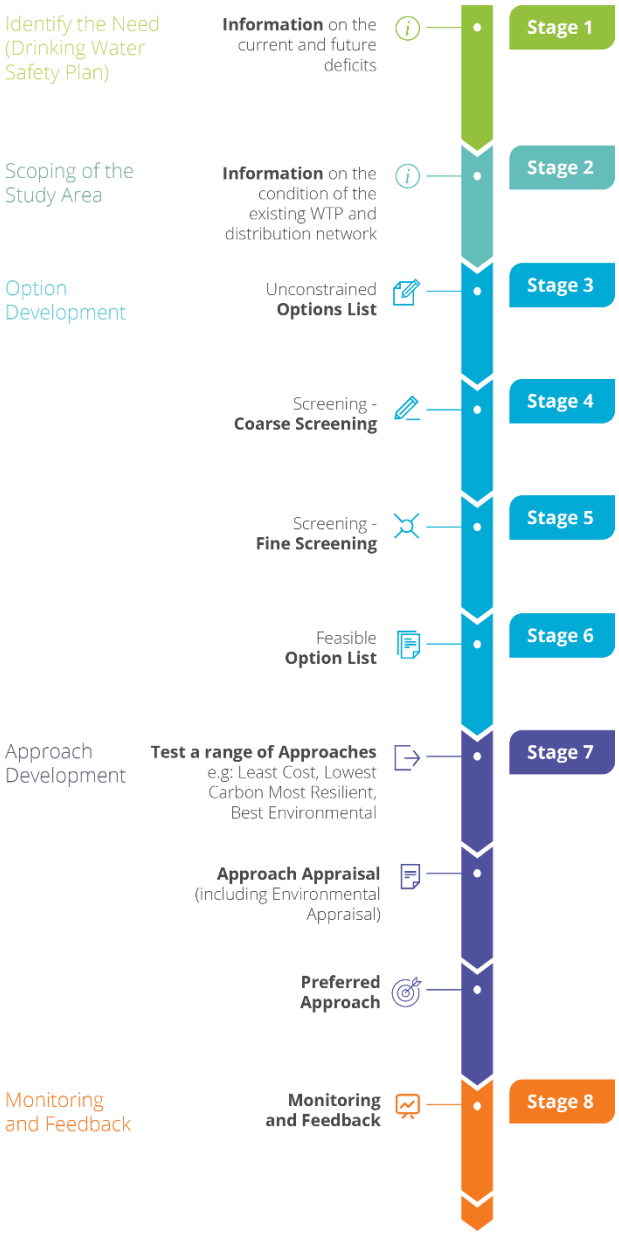



**Figure 1.2 Option Assessment Methodology Process**

## 1.2 Introduction to the Study Area

The population within Study Area 6 is approximately 126,665, people, served across 28 water resource zones via approximately 1,700 kilometres of distribution network. The Study Area is summarised in Figure 1.3 and Table 1.1. The largest demand centres in the Study Area include Carlow Town, Portlaoise, Tullamore, Portarlington and Mountmellick. The sources of water consist of 6 surface water sources and 38 groundwater abstractions. The majority of the Study Area is located within the River Nore and River Barrow catchment basins, which rise in the Slieve Bloom Mountains and drain south. The south east of the Study Area, near Tullow, crosses into the River Slaney catchment.

Together the Nore, Barrow and Slaney drain a large portion of the south eastern part of the country. The majority of the existing SW abstractions are in the south east of the Study Area, near Carlow Town.

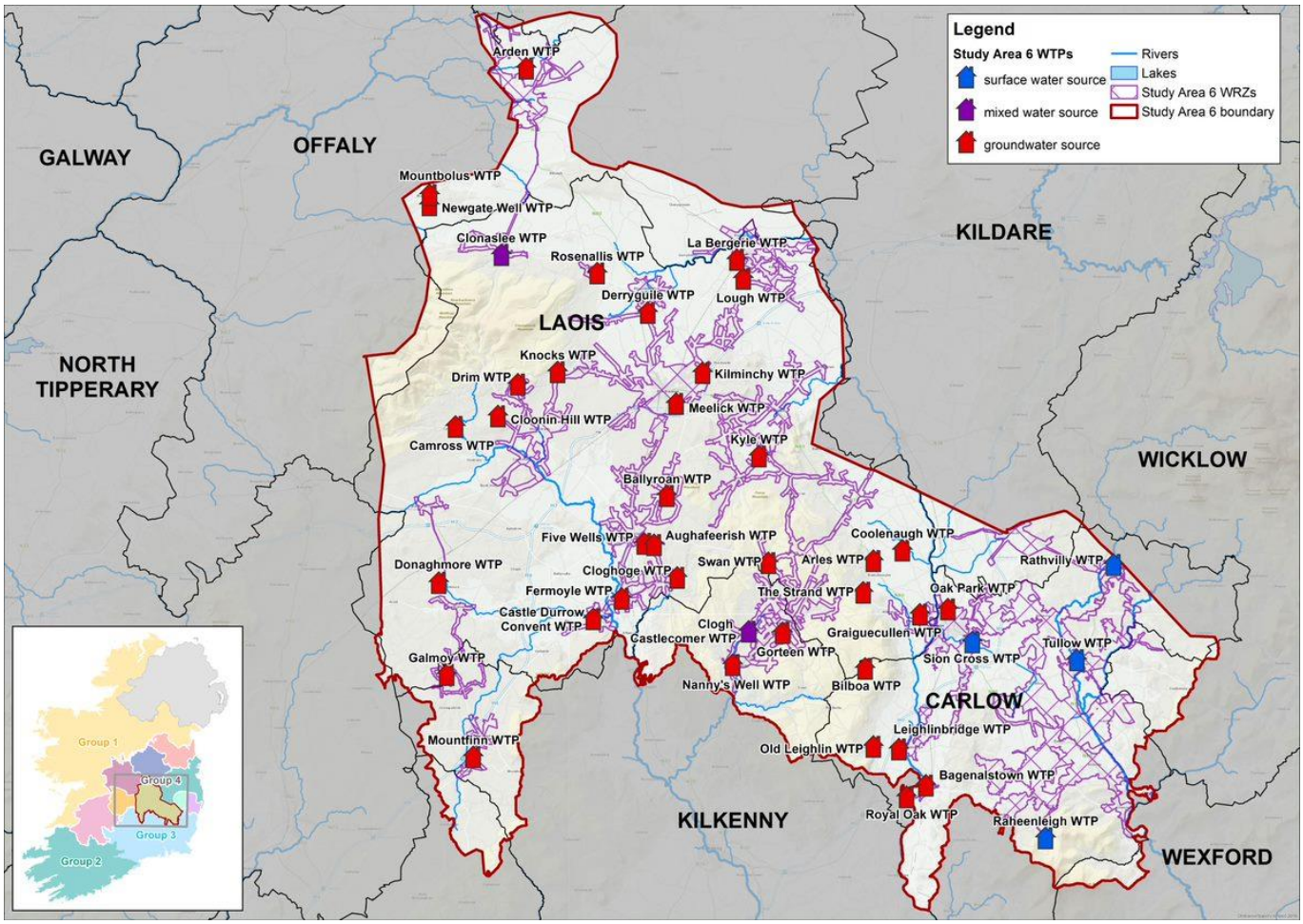



**Figure 1.3 SA6**

There are two abstractions each from River Slaney and River Burren (tributary of the Barrow), with the Slaney abstraction at Rathvilly WTP being the most significant in the region. Additionally, in the south, an abstraction from River Dinin (tributary of the Nore) serves Clogh Castlecomer WRZ, and in the north, a small abstraction from River Clodiagh (tributary of the Brosna/Shannon) supplies Tullamore WRZ. During the drought of 2018, significant reduction in the levels of River Slaney were experienced and low flow interventions were required on the River Burren and Clodiagh Rivers, highlighting the sustainability risk of these sources, now and in the future. Study Area 6 contains several designated areas – Slieve Bloom Mountains SPA and SAC, River Nore SPA, River Barrow and River Nore SAC.

All WRZs in Laois are groundwater supplies. The geology of the Study Area is dominated by widespread limestones lying as lowland topography covered in substantial thicknesses of overlying gravelly soils, with two topographic high points at the Slieve Bloom (Silurian) uplands to the northwest, and the Castlecomer Plateau (Leinster Coalfields) to the southeast at Carlow town.

The limestone rock units in the lowlands form a key regionally important aquifer close to the towns of Tullamore, Portlaoise and Durrow, which feeds each town with significant volumes of groundwater.

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

Table 1.1 Study Area 6 Laois

| Laois | Total Population | 126,670 | Total Network Length (km) | 1,723 | Number of Water Resource Zones | 28 |
|---|---|---|---|---|---|---|
| Counties in Study Area | Carlow, Kilkenny, Laois, Offaly | | | | | |
| Principal Settlements | Carlow,Portlaoise (formerly Maryborough),Portarlington,Tullow,Mountmellick,Castledermot,Abbeyleix,Mountrath,Ballon,Muinebeag (Bagenalstown),Ballyroan,Durrow | | | | | |
| Number of Water Sources | 44 | Surface Water Sources | 6 | Groundwater Sources | 38 | |

| Water Treatment Plant | Source | Population | WTP Capacity ($m^3$/day) | Quality | Quantity | Reliability | Potential Sustainability |
|---|---|---|---|---|---|---|---|
| Reservoir WTP | Groundwater | 152 | 30 | ● | ● | ○ | ● |
| Newgate Well WTP | Groundwater | | 60 | ● | ● | ● | ● |
| Arden WTP | Groundwater | 12,891 | 1,500 | ● | ● | ○ | ● |
| Clonaslee WTP | Groundwater & Clodiagh River | 3,809 | 2,500 | ● | ● | ● | ● |
| Ballyroan WTP | Groundwater | 1,281 | 700 | ● | ● | ○ | ● |
| Aughafeerish WTP | Groundwater | 1,870 | 900 | ● | ● | ○ | ● |
| Castle Durrow Convent WTP | Groundwater | 519 | 310 | ● | ● | ○ | ○ |
| Cloghoghue WTP | Spring | 145 | 90 | ● | ● | ○ | ● |
| Fermoyle (Ballinakill) WTP | Groundwater | 532 | 625 | ● | ● | ○ | ● |
| Five Wells WTPr | Spring | 569 | 500 | ● | ● | ○ | ○ |
| Drim WTP | Groundwater | 347 | 420 | ● | ● | ○ | ● |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Knocks WTP | Groundwater | 1,818 | 600 | ● | ● | ● | ● |
| Cloonin Hill WTP | Groundwater | 1,434 | 620 | ● | ● | ○ | ● |
| Swan WTP | Groundwater | 1,500 | 606 | ● | ● | ● | ● |
| Kyle WTP | Spring | 4,769 | 3,000 | ● | ● | ● | ● |
| Camross WTP | Groundwater | 39 | 6 | ● | ● | ○ | ● |
| Donaghmore WTP | Groundwater | 613 | 340 | ● | ● | ○ | ● |
| Coolenaugh WTP | Groundwater | 28 | 6 | ● | ● | ○ | ● |
| The Strand WTP | Groundwater | 6 | 5 | ● | ● | ○ | ● |
| Arles WTP | Groundwater | 111 | 18 | ● | ● | ○ | ○ |
| Lough WTP | Multiple Groundwater | 3,650 | 1,150 | ● | ● | ● | ○ |
| Le Bergerie WTP | Groundwater | 5,311 | 1,300 | ● | ● | ○ | ○ |
| Derryguille WTP | Groundwater | 5,150 | 1,900 | ● | ● | ○ | ○ |
| Rosenallis WTP | Groundwater | 188 | 45 | ● | ○ | ○ | ○ |
| Meelick WTP | Groundwater | 372 | 1,100 | ● | ● | ○ | ○ |
| Kilminchy WTP | Multiple Groundwater | 23,953 | 8,400 | ● | ● | ● | ○ |
| Derrymoyle WTP | Groundwater | 4,752 | 1,205 | ● | ○ | ○ | ○ |
| Glosha / Galmoy WTP | Groundwater | 1,685 | 803 | ● | ● | ○ | ● |
| Gorteen WTP | Spring | 287 | 200 | ● | ● | ○ | ● |
| Nannys Well WTP | Spring | 224 | 250 | ● | ● | ● | ● |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Clogh Castlecomer WTP | River Dinn & Spring &BH | 3,268 | 900 | ● | ● | ● | ○ |
| Mountfinn WTP | Spring | 1,769 | 500 | ○ | ● | ○ | ○ |
| Raheenleigh WTP | Burren River | 3,797 | 1,800 | ◉ | ○ | ● | ● |
| Royal Oak WTP | Groundwater | 2,956 | 1,600 | ● | ○ | ○ | ○ |
| Bagenalstown WTP | Groundwater | | 1,600 | ● | ○ | ○ | ○ |
| Bilboa WTP | Groundwater | 37 | 12 | ● | ● | ● | ○ |
| Old Leighlin WTP | Groundwater | 83 | 20 | ● | ● | ○ | ○ |
| Leighlinbridge WTP | Groundwater | 1,165 | 750 | ● | ○ | ○ | ○ |
| Tullow WTP | River Slaney | 3,087 | 1,200 | ◉ | ○ | ○ | ○ |
| Oak Park WTP | Groundwater | 20,067 | 2,000 | ● | ○ | ○ | ○ |
| Sion Cross WTP | Burren River | | 3,500 | ◉ | ○ | ○ | ● |
| Rathvilly WTP | River Slaney | 9,966 | 11,500 | ◉ | ○ | ● | ● |

| Score | Irish Water Asset Standard Assessment |
|---|---|
| ○ | Low Risk |
| ◉ | Medium Risk |
| ● | |

| | |
|---|---|
| ● | High Risk |

# 2

# Scoping the Study Area

# 2 Scoping the Study Area

In this chapter we summarise the current and future issues with water supplies in Study Area 6, in terms of water quality, quantity, reliability and sustainability.

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

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

## 2.1 Water Quality

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

The barriers are an internal gauge and the initial desktop assessments of barrier performance for SA6 are summarised in Table 2.1.

Table 2.1 Quality: Barrier Scores

| Quality: Barrier Scores | | | | |
|---|---|---|---|---|
| **Water Treatment Plants** | **Barrier 1: Bacteria & Virus** | **Barrier 2.1: Maintain chlorine Residual in the Network** | **Barrier 3 Protozoa (Crypto) Asset Potential** | **Barrier 6b THM's Leading Indicator** |
| Reservoir WTP | ● | ● | ● | ● |
| Newgate Well WTP | ● | ● | ● | ● |
| Arden WTP | ● | ● | ● | ● |
| Clonaslee WTP | ● | ● | ● | ● |
| Ballyroan WTP | ● | ● | ● | ● |
| Aughafeerish WTP | ● | ● | ● | ● |
| Castle Durrow Convent WTP | ● | ● | ● | ● |

| Quality: Barrier Scores | | | | |
|---|---|---|---|---|
| **Water Treatment Plants** | **Barrier 1: Bacteria & Virus** | **Barrier 2.1: Maintain chlorine Residual in the Network** | **Barrier 3 Protozoa (Crypto) Asset Potential** | **Barrier 6b THM's Leading Indicator** |
| Cloghoghue WTP | | | | |
| Fermoyle (Ballinakill) WTP | | | | |
| Five Wells WTPr | | | | |
| Drim WTP | | | | |
| Knocks WTP | | | | |
| Cloonin Hill WTP | | | | |
| Swan WTP | | | | |
| Kyle WTP | | | | |
| Camross WTP | | | | |
| Donaghmore WTP | | | | |
| Coolenaugh WTP | | | | |
| The Strand WTP | | | | |
| Arles WTP | | | | |
| Lough WTP | | | | |
| Le Bergerie WTP | | | | |
| Derryguille WTP | | | | |
| Rosenallis WTP | | | | |
| Meelick WTP | | | | |
| Kilminchy WTP | | | | |
| Derrymoyle WTP | | | | |
| Glosha / Galmoy WTP | | | | |
| Gorteen WTP | | | | |
| Nannys Well WTP | | | | |

| Quality: Barrier Scores | | | | |
|---|---|---|---|---|
| **Water Treatment Plants** | **Barrier 1: Bacteria & Virus** | **Barrier 2.1: Maintain chlorine Residual in the Network** | **Barrier 3 Protozoa (Crypto) Asset Potential** | **Barrier 6b THM's Leading Indicator** |
| Clogh Castlecomer WTP | ● | ● | ● | ● |
| Mountfinn WTP | ● | ● | ● | ● |
| Raheenleigh WTP | ● | ● | ● | ● |
| Royal Oak WTP | ● | ● | ● | ● |
| Bagenalstown WTP | ● | ● | ● | ● |
| Bilboa WTP | ● | ● | ● | ● |
| Old Leighlin WTP | ● | ● | ● | ● |
| Leighlinbridge WTP | ● | ● | ● | ● |
| Tullow WTP | ● | ● | ● | ● |
| Oak Park WTP | ● | ● | ● | ● |
| Sion Cross WTP | ● | ● | ● | ● |
| Rathvilly WTP | ● | ● | ● | ● |

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

The colour coding within the outline assessment indicates the severity of the potential risk of barrier failure. It should be noted that the table is not an indicator of non-compliance with the European Union (Drinking Water) Regulations 2014 as amended (Drinking Water Regulations), but an internal Irish Water assessment of the asset capability standard compared with the asset standard set out in Section 5.7 of the Framework Plan.

Based on the barrier assessment, 40 of the WTPs in the Study Area are considered to be at high risk of failing to achieve the required standards in relation to Bacteria and Virus (Barrier 1) and effectiveness of our Protozoa removal processes (Barrier 3). However, in some cases our desktop assessments can over-estimate risk, particularly when there is little available data on the catchment characteristics of our raw water sources. As our "*Source to Tap*" Drinking Water Safety Plan (DWSP) assessments, which are a requirement under the Recast Drinking Water Directive (2020), are developed for each water supply, the barrier scores for all of our supplies will be updated and become more reliable.

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

Currently, there is one WRZ within Study Area 6, on the EPA Remedial Action, namely Carlow North Regional. Irish Water is currently progressing immediate corrective action in relation to a number of supplies within SA6 in advance of the NWRP. A national programme to improve disinfection standards (Barrier 1) at water treatment facilities across Ireland was initiated by Irish Water in 2016. The projects summarised in the Table 2.2 are currently in progress.

**Table 2.2 Critical Water Quality Requirements SA6**

| Critical Water Quality Requirements | Progress |
|---|---|
| 1. **Aughafeerish WTP:** WTP Upgrade to improve Cryptosporidium barrier. Design works are nearing completion and procurement and fabrication of plant off-site is ongoing. The works commenced on-site in July 2021 and are now complete. | Complete |
| 2. **Rathvilly WTP:** WTP Upgrade is progressing to ensure removal from RAL. Proposed date of completion is March 2024. | In Progress |
| 3. **Durrow:** WTP Upgrade works commenced at Fermoyle in 2020. | Complete |
| 4. **Portarlington WS:** This €2.7 million investment will see the development of a new water treatment plant at the existing La Bergerie Wellfield site, improving drinking water quality and allowing for growth in the area. | Complete |
| 5. **Sion Cross WTP:** WTP upgrade required as the supply from the River Burren is vulnerable to pollution | Assessment Complete |
| 6. **Mountbolus:** Works commenced in 2019 to develop a more productive and sustainable groundwater abstraction | In Progress |
| 7. **Reservoir Cleaning Programme:** A major reservoir cleaning programme has been undertaken at 7 sites, which has reduced network water quality issues. | Complete |

| Critical Water Quality Requirements | Progress |
|---|---|
| 8. **Disinfection Programme:** In 2016, Irish Water completed a national review of all water treatment plants where disinfection upgrades were required. This review was followed by a programme of works to complete any required upgrades. In SA6, the following sites have been upgraded and commissioned:<br><br>• **Kilkenny:**<br>  ◦ Loon WTP & Love Lane WTP (Castlecomer),<br>  ◦ Mountfinn WTP,<br>  ◦ Gorteen WTP<br>• **Carlow:**<br>  ◦ Royal Oak WTP & The Parade WTP (Baganelstown),<br>  ◦ Rathvilly WTP (Carlow North RWSS)<br>  ◦ Leighlinbridge WTP,<br>  ◦ Old Leighlin WTP,<br>  ◦ Tullow WTP,<br>  ◦ Sion Cross WTP,<br>  ◦ Oak Park WTP,<br>  ◦ Raheenleigh WTP (Carlow Central RWSS),<br>  ◦ Bilboa WTP,<br>• **Laois:**<br>  ◦ The Strand WTP<br>Any requirements within the remaining supplies will be identified via Drinking Water Safety Plans with solutions developed as part of the NWRP | **Ongoing** |

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

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

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

## 2.2 Water Quantity – Supply Demand Balance

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

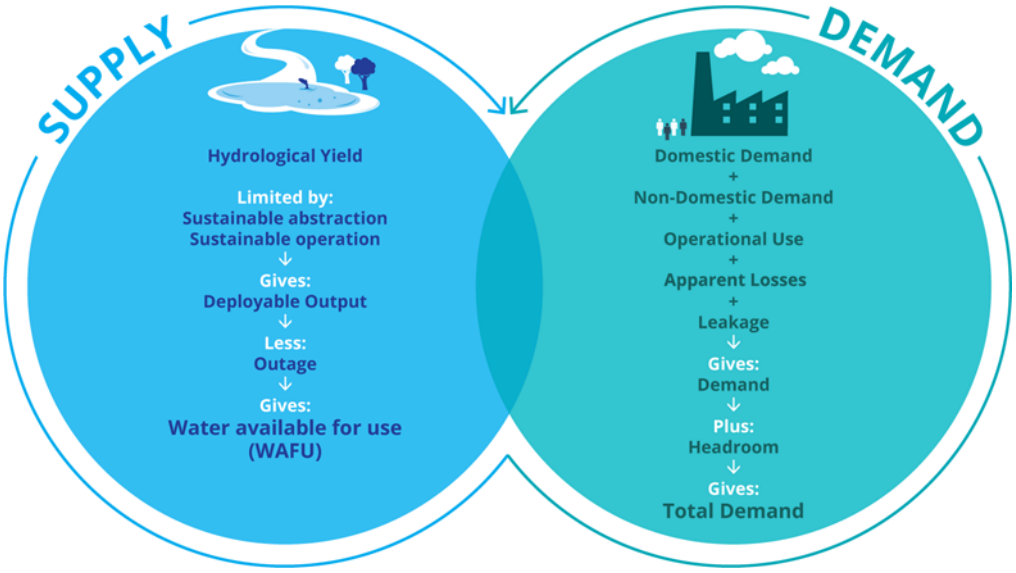



Figure 2.1 Supply Demand Balance

For each of the 28 WRZs in this Study Area, we assessed the baseline SDB and developed 25-year forecasts of supply and demand, in accordance with Figure 2.1.

The SDB assessments were carried out for each of the weather event planning scenarios (Normal Year Annual Average, Dry Year Annual Average, Dry Year Critical Period, Winter Critical Period) which described in Chapter 2 of the Framework Plan. The SDB deficits in SA6 manifest in the following ways:

1. **Inappropriate standards and levels of risk for a strategic water supply:** As water supply is essential for public health, Irish Water must ensure appropriate standards of supply and be able to cope with drought conditions, peak events, and maintenance of assets. This requires adequate reserve capacity in our supplies to provide a 1 in 50 Level of service. At present, not all supplies within this Study Area meet the required levels of reserve capacity. However, due to the lack of historical monitoring, particularly in relation to groundwater supplies, some of the deficits may be data driven.
2. **Day to day operations:** At present, 25 out of 28 of the water resource zones in the study area suggest a supply demand balance deficit (based on a “do nothing” approach) under present & future scenarios. While sufficient during normal weather conditions, several would fail in drought. During the drought in summer 2018, all of our groundwater supplies were monitored due to falling levels in the groundwater bodies, and a number of the supplies in SA6 were affected. These include Nanny’s Well supplying Clogh-Castlecomer, Kilminchy boreholes supplying Portlaoise, Lough borehole supplying Portarlington, Knocks borehole supplying Mountrath, and Newgate well supplying Mountbolus. All of these groundwater sites were noted as having a significant reduction in water levels/availability during this period. A significant reduction in flow was recorded on the River Slaney supplying Rathvilly (Carlow) and low flow interventions were required on the River Burren, River Dinin, and Clodiagh River supplying Carlow Central, Clogh-Castlecomer and Clonaslee respectively, to ensure continuity of supplies.

A summary of the SDB deficit across all 28 Water Resource Zones is summarised in Table 2.2. The water resources zones are detailed in Appendix L of the Framework Plan - Supply Demand Balance Summaries.

Table 2.3 WRZ SDB Dry Year Critical Period Deficits

| Water Resource Zone Name | Water Resource Zone code | Population | Estimated Maximum Deficit $m^3$/day | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 2019 | 2025 | 2030 | 2035 | 2040 | 2044 |
| Mountbolus PWS | 2500SC0013 | 152 | -35 | -36 | -37 | -38 | -39 | -40 |
| Tullamore | 2500SC0002 | 16,700 | -5,999 | -5,904 | -6,103 | -6,289 | -6,473 | -6,620 |
| Ballyroan | 1600SC0021 | 1,281 | -323 | -345 | -362 | -373 | -384 | -393 |
| Abbeyleix North | 1600SC0020 | 1,870 | -423 | -453 | -478 | -496 | -514 | -528 |
| Durrow | 1600SC0019 | 1,309 | -1,126 | -1,147 | -1,162 | -1,177 | -1,192 | -1,204 |
| Ballinakill | 1600SC0018 | 676 | -1,288 | -1,316 | -1,326 | -1,333 | -1,339 | -1,344 |
| Abbeyliex South | 1600SC0017 | 569 | -223 | -235 | -244 | -250 | -255 | -259 |
| Mountrath | 1600SC0016 | 3,600 | -860 | -907 | -944 | -973 | -1,002 | -1,025 |
| Swan PWS | 1600SC0015 | 1,500 | -210 | -224 | -235 | -246 | -258 | -267 |
| South East Regional PWS | 1600SC0014 | 4,769 | -2,380 | -2,451 | -2,500 | -2,537 | -2,573 | -2,602 |
| Camross PWS | 1600SC0011 | 39 | -6 | -6 | -6 | -7 | -7 | -7 |

| Water Resource Zone Name | Water Resource Zone code | Population | Estimated Maximum Deficit $m^3$/day | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 2019 | 2025 | 2030 | 2035 | 2040 | 2044 |
| Borris In Ossory | 1600SC0010 | 613 | -232 | -239 | -245 | -251 | -257 | -261 |
| Coolanaugh PWS | 1600SC0008 | 28 | -5 | -5 | -6 | -6 | -6 | -6 |
| The Strand | 1600SC0007 | 6 | -3 | -3 | -3 | -3 | -3 | -3 |
| Arles | 1600SC0006 | 111 | -7 | -8 | -8 | -9 | -10 | -10 |
| Portarlington | 1600SC0005 | 10,636 | -2,432 | -2,307 | -2,377 | -2,447 | -2,517 | -2,573 |
| Mountmellick | 1600SC0004 | 5,150 | -559 | -597 | -631 | -666 | -701 | -729 |
| Rosenallis | 1600SC0003 | 188 | No Deficit | No Deficit | No Deficit | No Deficit | -1 | -2 |
| Portlaoise | 1600SC0001 | 24,325 | -3,212 | -3,213 | -3,468 | -3,723 | -3,977 | -4,180 |
| Galmoy Rathdowney PWS | 1500SC0018 | 1,685 | -1,060 | -1,085 | -1,099 | -1,114 | -1,128 | -1,139 |
| Clogh-Castlecomer | 1500SC0009 | 3,780 | -838 | -817 | -844 | -870 | -895 | -915 |
| Urlingford-Johnstown PWS | 1500SC0006 | 1,769 | -216 | -225 | -236 | -248 | -259 | -268 |
| Carlow Central Regional | 0100SC0011 | 3,797 | -521 | -588 | -644 | -678 | -710 | -736 |
| Bagenalstown | 0100SC0008 | 2,956 | No Deficit | No Deficit | No Deficit | No Deficit | No Deficit | No Deficit |

| Water Resource Zone Name | Water Resource Zone code | Population | Estimated Maximum Deficit $m^3$/day | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 2019 | 2025 | 2030 | 2035 | 2040 | 2044 |
| Bilboa | 0100SC0004 | 37 | -4 | -4 | -4 | -4 | -5 | -5 |
| Old Leighlin | 0100SC0003 | 83 | -8 | -8 | -9 | -9 | -9 | -10 |
| Leighlinbridge | 0100SC0002 | 1,165 | No Deficit | No Deficit | No Deficit | No Deficit | No Deficit | No Deficit |
| Carlow North | 0100SC0001 | 37,872 | -8,590 | -8,949 | -9,468 | -9,874 | -10,274 | -10,594 |

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

The target 1 in 50 level of service in the region were applied in each case, along with the corresponding requirements for reserves, indicating that our supplies are operating with a cumulative SDB deficit of approximately 30,560 $m^3$/day. As a result, while we can continue to supply water, the water supplies in this area may come under pressure, particularly in drought conditions. In addition, there may be ongoing reliability issues.

This situation will further deteriorate over time due to climate change driven reductions in water resources, together with increased demand due to population growth. If we do nothing, the supply demand balance deficit will increase to approximately 35,720 $m^3$/day by 2044.

Our ongoing activities to improve the Supply Demand Balance in SA6 are prioritised as:

- Ongoing leakage management including active leakage control, pressure management and find and fix activities to meet target levels of Leakage.

Water Conservation measures, including information campaigns and initiatives, and Water Conservation Orders during drought periods

## 2.3 Water Supply Reliability

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

There are a number of problematic distribution and trunk mains throughout SA6. Irish Water & the Local Authority Water Services sections will continue to monitor the performance of all water mains in the network to ensure that the most problematic mains are replaced as required.

A significant amount of watermain rehabilitation has been carried out, to date, across Study Area 6. This provides for a more reliable water supply, reducing instances of bursts and water outages. The works also improve water quality by replacing old cast iron and lead watermains, whilst reducing leakage and improving overall operation and maintenance of our supply system.

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

Table 2.4 SA6 Critical Infrastructure Projects and Need Identification

| Critical Requirement | Progress |
|---|---|
| 1. **National Leakage Reduction Programme:** Investment of €500 million in the public water network is planned up to the end of 2021. This involves fixing or replacing old, damaged pipes and reducing high levels of leakage to provide a more reliable water supply. Watermain replacement works have been carried out across Study Area 6, including Mountrath, Mountbolus, Mountmellick, Portlaoise and Carlow. | In Progress |
| 2. **Tullamore – Arden Vale and Marian Place Watermain Rehabilitation:** This project saw €1.7 million invested to rehabilitate 9.5 kilometres of aging and defective water mains in Arden Vale and Marian Place in Tullamore. | Complete |
| 3. **Tullamore Town North & Tullamore Town South - Water Mains Rehabilitation:** This project saw an investment of €4.1 million to rehabilitate 7.5 kilometres of aging and defective water mains in the north and south of Tullamore town. | Complete |
| 4. **Portlaoise PWS -** Works commenced in 2020 to increase the raw water supply to Kilminchy WTP. This will help to mitigate the risk of interruptions to supply in the town during drought periods | In Progress |
| 5. **Clogh-Castlecomer WS -** There are significant reductions in supply in Clogh-Castlecomer WS during dry weather periods leading to restrictions and tankering. The boreholes at Loon WTP are duty only (no standby). There are issues with existing infiltration gallery, while the manganese removal facilities at the treatment plant are in poor condition leading to elevated manganese levels in the network. Any issue with these single BHs or the WTP would impact the supply a population of approximately 3,800. | Assessment Complete |
| 6. **Tullamore North PWS -** There are no standby boreholes in the Tullamore North WRZ. Any issue with at this WTP would impact the supply a population of 12,900 The existing 9" AC main (constructed in the 1960s) between Tullamore and Clonaslee had several bursts and interruption to supply. | Assessment Complete |

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

## 2.4 Water Supply Sustainability

The water supplies within the region were developed over time to address the needs of the local populations and to support growth and development.

As outlined at Section 3.7.2 of the Framework Plan, the Government is currently developing new legislation dealing with water abstractions. As this legislation is still being developed, we do not have full visibility of the future regulatory regime. We have therefore not progressed through a theoretical licencing process on a site by site basis and cannot reliably include an estimation of sustainable abstraction within the SDB calculations. Instead, we use the hydrological yield, water treatment capacity

and bulk transfer limitations in our calculation of DO. This assessment procedure is set out at Appendix C of the Framework Plan, and in line with a precautionary approach.

To understand the potential impact of the Abstraction Legislation on the SA6 supplies, we have assessed the potential impacts to our 6 no. surface water abstractions.

Table 2.5 presents the findings of this assessment in order to indicate the potential reductions to abstraction that may be required at our existing surface water supplies. These reductions are based on estimates of the level of reductions that a potential future regulatory regime may require, taking a conservative and precautionary approach. The table presents our current abstraction levels[1], our source hydrological yield[2], and our estimated sustainable abstraction[3] amount which the source may be limited to in the future.

Based on this initial assessment, the volumes of water abstracted from the River Burren (Raheenleigh) and River Clodiagh sources may not meet sustainability guidelines during dry weather flows. However, under the proposed regulatory regime, this will be adjudicated by the EPA who will have the benefit of further detailed project level information.

For the Carlow North WRZ river abstractions at Rathvilly WTP (Slaney) and Sion Cross WTP (Burren), it is considered that the new Abstraction Legislation is unlikely to reduce this potential sustainable abstraction limit below our available yield (baseline) estimates. For these two sources, our baseline has been calculated using a water resources model applying the operational rules of the current abstraction licence to test Deployable Output (DO) available. The simulation model found that the DO was significantly constrained when enforcing the Hands off Flow (HoF) requirements of the existing licence, so we do not envisage further reduction.

**Table 2.5 Comparison of Current Abstraction, Hydrological Yield and Potential Future Abstraction**

| Description | River Slaney (Rathvilly) | River Slaney (Tullow) | River Burren (Raheenleigh) | River Burren (Sion Cross) | River Dinin (Castlecomer) | River Clodiagh (Clonaslee) |
|---|---|---|---|---|---|---|
| Current abstraction ($m^3/d$) | 10,542 | 1,100 | 1,650 | 3,208 | 825 | 2,292 |
| Hydrological yield ($m^3/d$) | 4,500 | 25,900 | 1,170 | 1,400 | 1,850 | 570 |
| Potential Future abstraction limit ($m^3/d$) | 4,500 | 3,641 | 275 | 1,400 | 890 | 175 |

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

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

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

| Description | River Slaney (Rathvilly) | River Slaney (Tullow) | River Burren (Raheenleigh) | River Burren (Sion Cross) | River Dinin (Castlecomer) | River Clodiagh (Clonaslee) |
|---|---|---|---|---|---|---|
| Potential Change in SDB[4] ($m^3/d$) | none | none | -733 | none | none | -323 |

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

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

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

As noted in Section 3.2.2 of the framework plan producing robust desktop assessments of water availability from our existing groundwater abstractions is very difficult. Ideally, yield estimates would be based on a three-dimensional assessment of the geology within the vicinity of the supply, supplemented with long term records on pumping and drawdown of water levels over many years. Irish Water does not have this type of information available for most of our groundwater supplies and while we will aim to complete site-specific studies of groundwater availability, this may take many years.

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

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

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

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

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

## 2.5 Water Resource Zone Needs Summary

Study Area 6–has issues in relation to quality, quantity, reliability and sustainability which must be addressed as part of the preferred approach to future water resources planning, summarised in Table 2.7.

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

| | |
|---|---|
| **Quality** | Upgrades required at all WTPs, aligned with the Barrier approach |
| **Quantity** | Net leakage reduction 823 $m^3$/d in the region<br>Additional Leakage Targets of 8,311 $m^3$/d to achieve SELL and reduce leakage levels to 21% of demand in WRZs with demand in excess of 1,500m3/<br>Interim additional supplies of 30.56 Ml/d within 10 years<br>Total of 35.72 Ml/d additional supplies beyond the 10 year horizon |
| **Reliability (In addition to progressing projects)** | Continued network upgrades and improvements in the bulk and distribution networks |
| **Sustainability** | Based on this initial assessment, the volumes of water abstracted from the River Burren (Raheenleigh) and River Clodiagh sources may not meet sustainability guidelines during dry weather flows. However, under the proposed regulatory regime, this will be adjudicated by the EPA.<br>Over the coming years, Irish Water will work with the environmental regulator EPA and the Geological Survey of Ireland, to develop desktop and site investigation systems to better understand the sustainability of our groundwater sources. |

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

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

# 3 Solution Types Considered in Study Area 6

# 3 Solution Types Considered in Study Area 6

In this chapter, we summarise the type of solutions we have considered to address identified need in Study Area 6.

We consider measures across the following three pillars: **Lose Less**, **Use Less** and **Supply Smarter** in forming our list of unconstrained options, which are assessed for short, medium and long-term solutions. For SA6, the following unconstrained options have been reviewed.

## 3.1 Leakage Reduction


The Leakage reduction measures across the public water supply considered for SA6 are based on what we assess to be both achievable and sustainable and include:

- Ongoing leakage management, including active leakage control, pressure management and Find and Fix activities, to offset Natural Rate of Leakage Rise (NRR); and
- Net leakage reductions targets listed in Table 3.1 have been applied to SDB deficit to move towards achieving the national Sustainable Economic Level of Leakage (SELL) target prioritised based on
  - Supply demand deficit;
  - Existing abstractions with sustainability issues; and
  - Drought impacts.
- Additional leakage Targets to achieve SELL and reduce leakage levels to 21% of demand in WRZs with demand in excess of 1,500m$^3$/d, see Table 3.1.

Table 3.1 SELL Targets for WRZ in SA6

| WRZ | Net Leakage Reduction applied to SDB (m$^3$) | Additional leakage Targets to achieve SELL and reduce leakage levels to 21% of demand in WRZs with demand in excess of 1,500m3/d (m$^3$) | Total Leakage Targets (m$^3$) |
|---|---|---|---|
| Carlow North | 198 | 2,979 | 3,177 |
| Clogh-Castlecomer | 36 | | 36 |
| Portlaoise | 214 | 750 | 964 |
| Portarlington | 143 | 773 | 916 |
| Tullamore | 232 | | 232 |
| Galmoy Rathdowney PWS | | 483 | 483 |
| Borris In Ossory | | 67 | 67 |
| South East Regional PWS | | 1,461 | 1,461 |
| Mountrath | | 265 | 265 |

| WRZ | Net Leakage Reduction applied to SDB ($m^3$) | Additional leakage Targets to achieve SELL and reduce leakage levels to 21% of demand in WRZs with demand in excess of 1,500m3/d ($m^3$) | Total Leakage Targets ($m^3$) |
|---|---|---|---|
| Abbeyliex South | | 76 | 76 |
| Ballinakill | | 783 | 783 |
| Durrow | | 242 | 242 |
| Abbeyleix North | | 20 | 20 |
| Ballyroan | | 95 | 95 |
| Bilboa | | 1 | 1 |
| Mountmellick | | 313 | 313 |
| The Strand | | 3 | 3 |

## 3.2 Water Conservation


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

## 3.3 Supply Smarter


The supply options considered as part of the options assessment are unconstrained by distance from the Study Area 6 and include:

- 93 stand-alone groundwater options across the Study Area
- 36 stand-alone surface water options across the Study Area
- Upgrades to our existing treatment plants
- Network connectivity and transfers from other Study Areas
- Rationalisation[5] and interconnection of WRZs within the Study Area

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

# 4 Option Development SA6

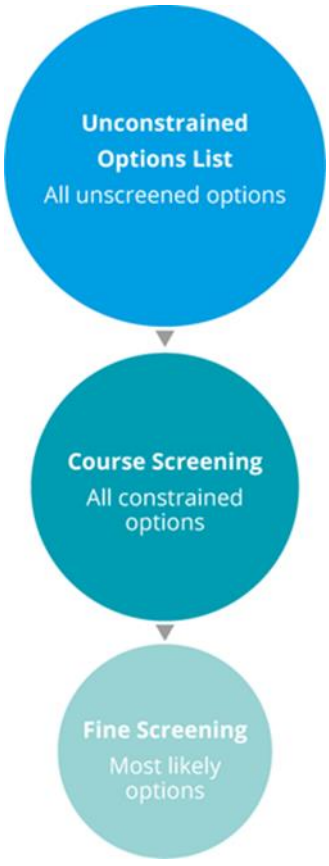
# 4 Option Development for Study Area 6

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

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

The options assessment screening process involves the following:

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




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

## 4.1 Developing a List of Unconstrained Options

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

Table 4.1 Desktop Assessments for Unconstrained Options

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

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

For SA6, 254 Unconstrained Options were identified to address need. These unconstrained options were not limited by cost, distance from the area or feasibility. These options are summarised in Table 4.2 and shown spatially in Figure 4.1.

Table 4.1 SA6 Unconstrained Options

| No. of Options | Option Type |
|---|---|
| 93 | Groundwater |
| 37 | Surface water |
| 2 | Transfer from scheme in surplus |
| 21 | Transfer from Group Water Scheme |
| 12 | Interconnection (GW) |
| 1 | Interconnection (SW) |
| 19 | Cross Study Area Supply |
| 51 | Rationalise to another supply |
| 6 | Conjunctive use |
| 3 | Upgrade Water Treatment Plant |
| 8 | Riverbank filtration |
| 1 | Tankering |

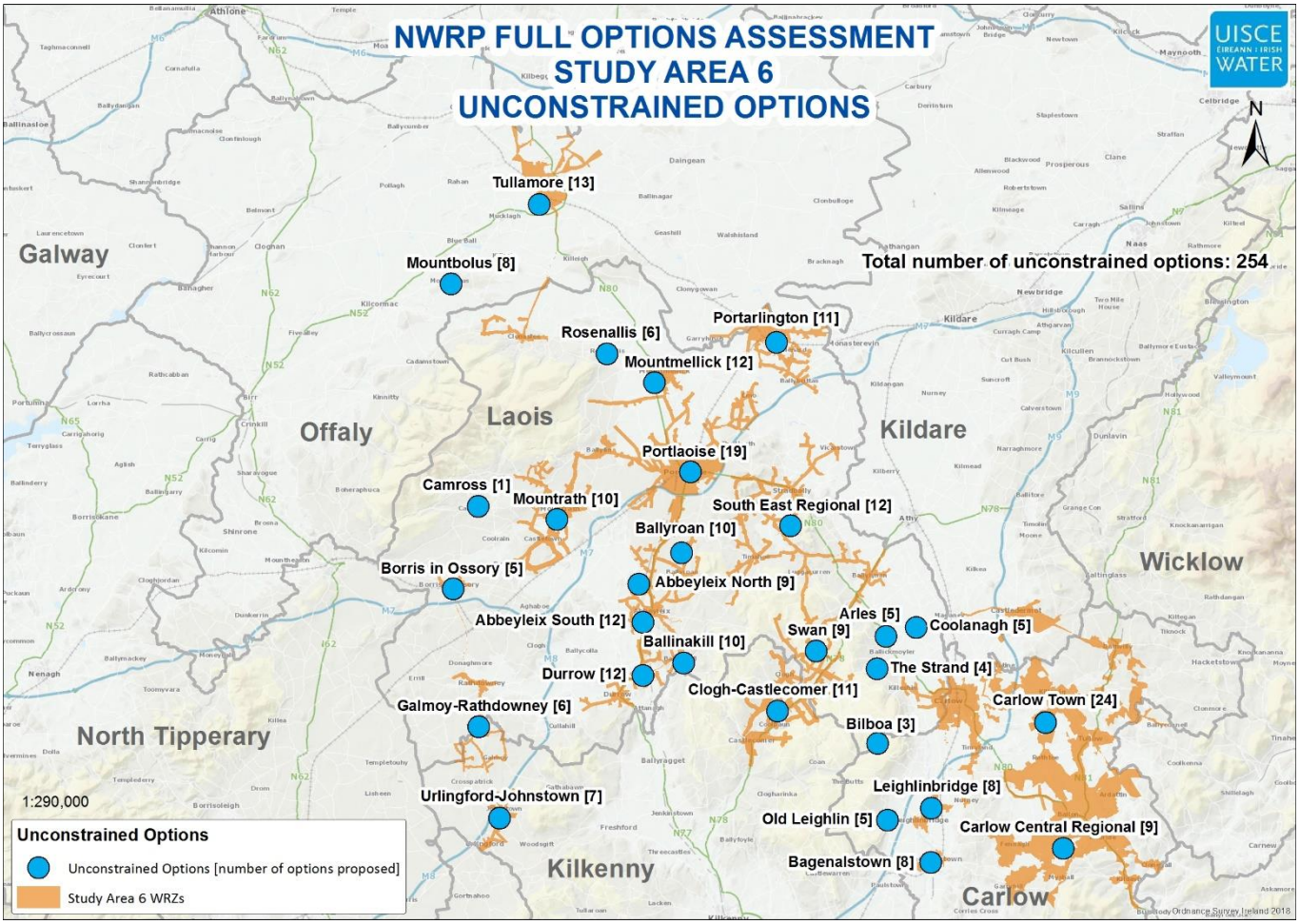



Figure 4.1 SA6 Unconstrained Options

The 254 options were filtered through our screening process to eliminate those with potentially unviable environmental impacts or feasibility issues.

## 4.2 Coarse Screening

The 254 identified Unconstrained Options were assessed through Coarse Screening against the criteria of:

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

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

144 Unconstrained Options were rejected at this stage as they were found to be unviable in relation to one or more assessment criteria. Details of these options and the justification for their rejection are outlined in the rejection summary, Annex B of this report. The rejection summary records the criteria against which the rejected options were assessed as having a ‘red’ score for the purposes of the coarse screening exercise (as explained in more detail in Chapter 8 of the framework plan), and accordingly

were not brought forward at the coarse screening phase. The box below provides an example of a rejection justification for an option considered for Carlow Town WRZ.

**Example Rejected Option**

Option SA6-01

Increase SW abstraction from River Burren to supply deficit.

Rejection Reason

The calculated allowable abstraction is insufficient to meet the DYCP demand. Abstracting the volume of water required to make this a feasible option is considered likely to result in the waterbody not achieving good WFD status. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria.

The remaining 110 options were progressed to further assessment through the Fine Screening process. The rejected options are summarised in Annex A of this technical report. Annex A records the criteria against which the rejected options were assessed as having a “red” score for the purposes of the coarse screening exercise (as explained in more detail in Chapter 8 of the Framework Plan), and accordingly were not brought forward at the coarse screening stage. The remaining options are summarised in Table 4.3.

Table 4.3 SA6 Remaining Options after Coarse Screening

| No. of Options | Option Type |
|---|---|
| 59 | Groundwater |
| 5 | Surface water |
| 2 | Transfer from scheme in surplus |
| 2 | Transfer from Group Water Scheme |
| 3 | Interconnection (GW) |
| 1 | Interconnection (SW) |
| 14 | Cross Study Area Supply |
| 15 | Rationalise to another supply |
| 3 | Conjunctive use |
| 2 | Upgrade Water Treatment Plant |
| 4 | Riverbank filtration |
| 0 | Tankering |

## 4.3 Fine Screening

The 110 remaining options were subject to a more detailed multi-criteria assessment (MCA) at the Fine Screening Stage using desktop assessments of performance against 33 specified questions relating to Sustainability (Environmental and Social Impacts), Resilience, Deliverability and Progressibility. The assessment for each option was based on an objective assessment with uniform scoring criteria, based on best publicly available datasets.

At Fine Screening stage, no further options were rejected, with the remaining 110 options considered to be feasible and brought forward to desktop outline design and costing. These are summarised in Table 4.4 and shown spatially in Figure 4.2.

Table 4.4 SA6 Remaining Options after Fine Screening (Feasible Options)

| No. of Options | Option Type |
|---|---|
| 59 | Groundwater |
| 5 | Surface water |
| 2 | Transfer from scheme in surplus |
| 2 | Transfer from Group Water Scheme |
| 3 | Interconnection (GW) |
| 1 | Interconnection (SW) |
| 14 | Cross Study Area Supply |
| 15 | Rationalise to another supply |
| 3 | Conjunctive use |
| 2 | Upgrade Water Treatment Plant |
| 4 | Riverbank filtration |
| 0 | Tankering |

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

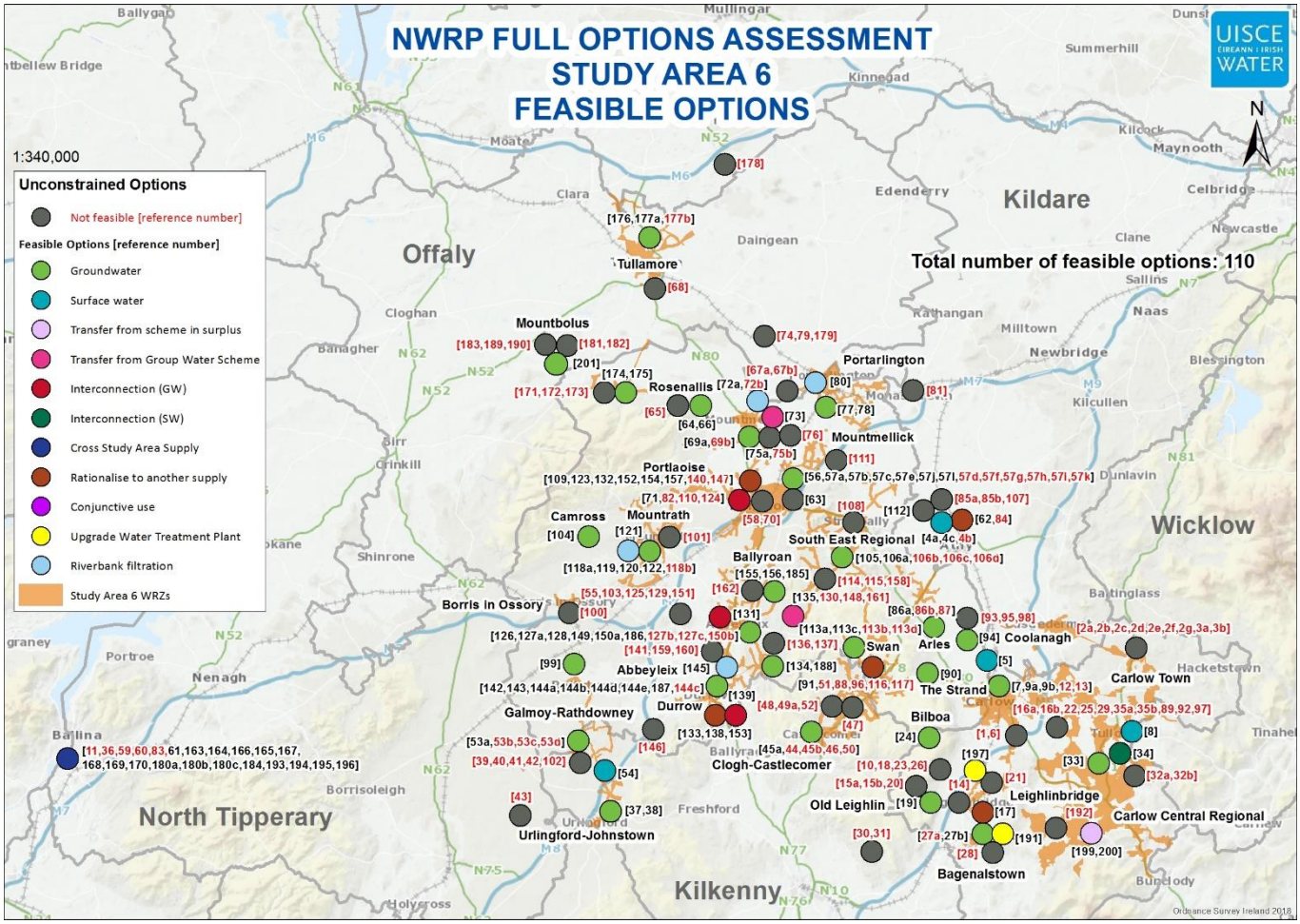



Figure 4.2 Feasible Options

## 4.4 Options Assessment Summary

The supply demand balance deficit in the region ranges between approximately 30,560 $m^3/d$ in 2019 during dry conditions, to a maximum of approximately 35,720$m^3/d$ in 2044 during dry conditions. During the options assessment stage, a total of 254 unconstrained options were assessed. Of these 144 options were screened out for the reasons summarised in Table 4.5 and recorded in Annex B.

Table 4.5 Rejected Options Summary

| No. of Options | Reason for Rejection |
|---|---|
| 97 | Deliverability & Flexibility |
| 31 | Resilience, Sustainabililty & Deliverability & Flexibility |
| 16 | Other reasons such as repeat options or Operational Options which did not provide additional supply. |

The remaining 110 feasible options are categorised into options that resolve the need for one WRZ only “WRZ options” and options that resolved the need for more than one WRZ “ Study Area options”. Table 4.6 provides an overview of the number of WRZ options and Study Area options for the WRZs in Study Area 6. From this table it can be noted that there are 60 WRZ Options and 50 options which can be merged to form 16 Study Area Options.

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

**Table 4.6 SA6 Feasible Options Summary**

| Water Resource Zone Name | Option Type | |
|---|---|---|
| | WRZ Option | Study Area Option |
| Abbeyleix North | 1 | 5 |
| Abbeyliex South | 3 | 5 |
| Arles 2 PWS | 1 | 0 |
| Bagenalstown | 1 | 2 |
| Ballinakill | 2 | 4 |
| Ballyroan | 2 | 3 |
| Bilboa | 1 | 0 |
| Borris in Ossory PWS | 1 | 0 |
| Camross PWS | 1 | 0 |
| Carlow Central Regional | 1 | 2 |
| Carlow Town | 7 | 1 |
| Clogh-Castlecomer WS | 1 | 1 |
| Coolanaugh PWS | 1 | 0 |
| Durrow | 4 | 5 |
| Galmoy Rathdowney PWS | 2 | 0 |
| Leighlinbridge | 1 | 1 |
| Mountbolus PWS | 1 | 1 |
| Mountmellick | 3 | 3 |
| Mountrath | 5 | 2 |
| Old Leighlin | 1 | 0 |
| Portarlington | 3 | 1 |
| Portlaoise | 3 | 7 |
| Rosenallis | 2 | 0 |
| South East Regional PWS | 3 | 2 |
| Swan PWS | 1 | 2 |
| The Strand | 1 | 1 |
| Tullamore | 5 | 2 |
| Urlingford-Johnstown PWS | 2 | 0 |

# 5 Approach Development

# 5 Approach Development

This chapter describes how we tested different combinations of the Feasible Options to develop a Preferred Approach to meet the needs we identified for the WRZ in Study Area 6.

## 5.1 Approach Development

### 5.1.1 Introduction to Approach Development

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

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

Table 5.1 The Six Approaches

| Approaches Tested | Description | Policy Driver |
|---|---|---|
| Least Cost | Lowest Net Present Value (NPV) cost in terms of Capital, Operational, Environmental and Social and Carbon Costs. | Public Spending Code |
| Best Appropriate Assessment (AA) | Lowest score against the European Sites (Biodiversity) sub-criteria question: Score = 0 equates to no likely significant effects (LSEs). If, in our opinion, these 0 scoring options meet the deficit/ plan objectives, they are automatically picked as the Preferred Approach. Score = -1 or -2 equates to LSEs that can be addressed with general/standard mitigation measures. Score = -3 equates to LSEs that may be harder to mitigate or require significant project level assessment. | Habitats Directive |
| Quickest Delivery | Based on an estimate of the time taken to bring an option into operation (including typical feasibility, consent, construction and commissioning durations) as identified at Fine Screening This is particularly relevant where an option might be required to address an urgent Public Health issue. | Statutory Obligations under the Water Supply Act and Drinking Water Regulations |

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

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

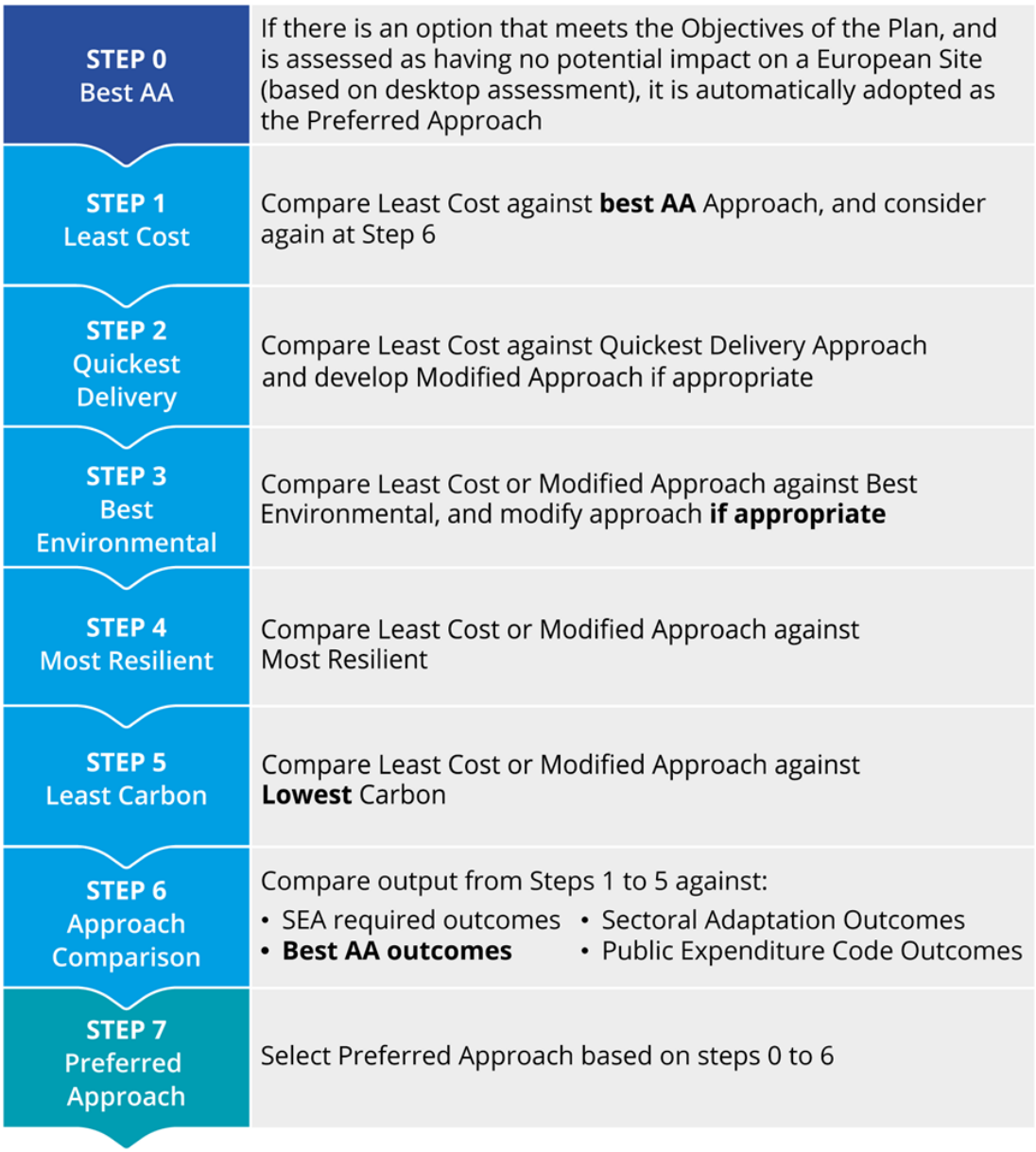



**Figure 5.1 Figure of the 7 step assessment process**

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

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

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

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

Further details on these three stages is provided in Chapter 7 of the RWRP -EM. Section 5.2 provides an overview of the application of this process to SA 6.

## 5.2 Preferred Approach Development Process for Study Area 6

### 5.2.1 Stage 1 – WRZ Level Approach

As outlined in Section 4.4 of this technical report there are 110 feasible options. 60 of these options are WRZ Options while 50 options are merged to form 16 Study Area Options. Table 5.2 outlines the 27 WRZ options for SA6, providing option reference numbers and detailing the WRZs they provide a solution to. These solutions are presented as "Options" for the purposes of this plan; however, will be subject to their own regulatory, timing and budgetary constraints.

Table 5.2 SA6 Feasible Options

| Water Resource Zone Name | Feasible Options SA6 | |
|---|---|---|
| | Option Code | Option Description |
| Carlow Town | SA6-004a | Upgrade Srowland WTP (GDA WRZ) and supply deficit to Carlow Town. |
| Carlow Town | SA6-005 | New SW abstraction from River Barrow and new WTP at Carlow Town |
| Carlow Town | SA6-007 | Increase GW abstraction to supply deficit (Oak Park/ Graigcullen) |
| Carlow Town | SA6-008 | New SW abstraction from River Derreen |
| Carlow Town | SA6-009a | New GW abstraction/wellfield |
| Carlow Town | SA6-009b | Abandon Sion Cross and supply from new GW abstraction/wellfield |
| Old Leighlin | SA6-019 | Increase GW abstraction to supply deficit - yield assessments required |
| Bilboa | SA6-024 | New GW abstraction to supply full demand |
| Carlow Central Regional | SA6-033 | New GW abstraction to supply deficit, to the Barrow gravels just south of Carlow Town |

| Water Resource Zone Name | Feasible Options SA6 | |
|---|---|---|
| | Option Code | Option Description |
| Urlingford-Johnstown WS | SA6-037 | Increase GW abstraction to supply deficit |
| Urlingford-Johnstown WS | SA6-038 | New GW abstraction to supply deficit and improve water quality |
| Clogh-Castlecomer WS | SA6-045a | New GW abstraction/wellfield to supply deficit |
| Galmoy-Rathdowney PWS | SA6-053a | Increase GW abstraction to supply deficit |
| Galmoy-Rathdowney PWS | SA6-054 | New SW abstraction from River Goul |
| Portlaoise PWS | SA6-056 | Increase GW abstraction to supply deficit |
| Portlaoise PWS | SA6-057a | New GW abstraction/wellfield development |
| Portlaoise PWS | SA6-062 | Supply deficit for Portlaoise from GDA WRZ (Barrow/Poulaphouca Blend supply) Srowland WTP. Based on new source NSS supplying GDA. |
| Rosenallis PWS | SA6-064 | Increase GW abstraction to supply deficit |
| Rosenallis PWS | SA6-066 | New GW abstraction to supply deficit in the vicinity of Rosenallis Reservoir - Clonaslee groundwater body |
| Mountmellick 1 PWS | SA6-069a | Increase GW abstraction to supply deficit |
| Mountmellick 1 PWS | SA6-072a | Riverbank filtration from River Barrow |
| Mountmellick 1 PWS | SA6-073 | Supply deficit from the neighboring GWS - The Rock |
| Portarlington 1 PWS | SA6-077 | Increase GW abstraction to supply deficit |
| Portarlington 1 PWS | SA6-078 | New GW abstraction/wellfield at Doolough to supply deficit and new WTP. |
| Portarlington 1 PWS | SA6-080 | Riverbank filtration from River Barrow |
| Arles 2 PWS | SA6-086a | Increase GW abstraction to supply deficit - yield assessments required |
| The Strand PWS | SA6-090 | Increase GW abstraction to supply deficit |

| Water Resource Zone Name | Feasible Options SA6 | |
|---|---|---|
| | Option Code | Option Description |
| Coolanagh PWS | SA6-094 | Increase GW abstraction to supply deficit |
| Borris in Ossory PWS | SA6-099 | Increase GW abstraction to supply deficit |
| Camross PWS | SA6-104 | Increase GW abstraction to supply deficit |
| South East Regional PWS | SA6-105 | Increase GW abstraction to supply deficit |
| South East Regional PWS | SA6-106a | New GW abstraction to supply deficit; replace existing spring source with new BHs (Timahoe gravels groundwater body) |
| South East Regional PWS | SA6-112 | Conjunctive use of Srowland WTP (increase WTP capacity) during winter and local GW during summer |
| Swan PWS | SA6-113a | Increase GW abstraction to supply deficit |
| Mountrath | SA6-118a | Increase GW abstraction at Cloonin Hill WTP to supply deficit |
| Mountrath | SA6-119 | Increase GW abstraction at Drim WTP to supply deficit |
| Mountrath | SA6-120 | Increase GW abstraction at Knocks WTP to supply deficit |
| Mountrath | SA6-121 | Riverbank filtration from River Nore |
| Mountrath | SA6-122 | Rationalise Cloonin Hill, Drim and Knocks into 1 WTP to add resilience. Require source protection. |
| Abbeyliex South | SA6-126 | Increase GW abstraction to supply deficit |
| Abbeyliex South | SA6-127a | New GW abstraction to supply deficit and abandon existing spring |
| Abbeyliex South | SA6-128 | New GW abstraction, maintain spring |
| Ballinakill | SA6-134 | Increase GW abstraction to supply deficit |
| Ballinakill | SA6-135 | Supply from neighboring GWS - Ballypickas |
| Durrow | SA6-142 | Increase GW abstraction at Castle Durrow Convent WTP to supply deficit |
| Durrow | SA6-143 | New GW abstraction (BH) at Castle Durrow Convent WTP to supply deficit, abandon existing spring source |

| Water Resource Zone Name | Feasible Options SA6 | |
|---|---|---|
| | Option Code | Option Description |
| Durrow | SA6-144a | Increase GW abstraction at Fermoyle WTP to supply deficit |
| Durrow | SA6-145 | Riverbank filtration from River Nore (nitrates at this point) |
| Abbeyleix North | SA6-149 | Increase GW abstraction to supply deficit |
| Ballyroan | SA6-155 | Increase GW abstraction to supply deficit and decommission existing spring source - Cross of Newtown BH |
| Ballyroan | SA6-156 | Increase GW abstraction to supply deficit - Ballyroan Spring |
| Tullamore | SA6-174 | Increase GW abstraction from Clonaslee BHs and Sillogue spring (Clonaslee groundwater body - productive fissured bedrock) and upgrade WTP to partly supply deficit |
| Tullamore | SA6-175 | New GW abstraction/wellfield from Clonaslee groundwater body (productive fissured bedrock) to partly supply deficit. Also potential to combine with Rosenallis Gravels (10km2) for enhanced productivity or use wells from both aquifers for max potential |
| Tullamore | SA6-176 | Increase GW abstraction from Ardan BHs (Tullamore groundwater body - karstic bedrock) and upgrade WTP to partly supply deficit |
| Tullamore | SA6-177a | New GW abstraction/wellfield from Tullamore groundwater body (karstic bedrock) to supply deficit |
| Tullamore | SA6-180a | Supply Tullamore from NSS |
| Bagenalstown | SA6-191 | WTP Upgrade |
| Carlow Town | SA6-193 | Connect to NSS via Srowland |
| Mountbolus | SA6-201 | New GW abstraction for Mountbolus and WTP Upgrade |

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

**Table 5.3 SA7 Alignment of WRZ Option/s with Approach Categories**

| Water Resource Zone Name | Feasible Options SA6 | | | Approach | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | No. Local Option | Option Code | Option Description | Least Cost | Quickest Delivery | Best AA | Best Environmental | Lowest Carbon | Most Resilient |
| Abbeyleix North | 1 | SA6-149 | Increase GW abstraction to supply deficit | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Abbeyliex South | 3 | SA6-126 | Increase GW abstraction to supply deficit | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | SA6-127a | New GW abstraction to supply deficit and abandon existing spring | - | - | - | - | - | - |
| | | SA6-128 | New GW abstraction, maintain spring | - | - | - | - | - | - |
| Arles 2 PWS | 1 | SA6-86a | Increase GW abstraction to supply deficit - yield assessments required | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Bagenalstown | 1 | SA6-191 | WTP Upgrade | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Ballinakill | 2 | SA6-134 | Increase GW abstraction to supply deficit | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | SA6-135 | Supply from neighboring GWS - Ballypickas | - | - | - | - | - | - |
| Ballyroan | 2 | SA6-155 | Increase GW abstraction to supply deficit and decommission existing spring source - Cross of Newtown BH | - | ✓ | ✓ | ✓ | - | ✓ |
| | | SA6-156 | Increase GW abstraction to supply deficit - Ballyroan Spring | ✓ | - | - | - | - | - |
| Bilboa | 1 | SA6-24 | Increase GW abstraction to supply deficit | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Borris in Ossory PWS | 1 | SA6-99 | Increase GW abstraction to supply deficit | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Camross PWS | 1 | SA6-104 | Increase GW abstraction to supply deficit | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Carlow Central Regional | 1 | SA6-33 | New GW abstraction to supply deficit | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Carlow North | 7 | SA6-04a | Upgrade Srowland WTP (GDA WRZ) and supply deficit to Carlow town | - | - | - | - | - | - |
| | | SA6-05 | New SW abstraction from River Barrow at Carlow Town | - | - | - | - | - | - |
| | | SA6-07 | Increase GW abstraction to supply deficit (Oak Park/ Graigcullen) | - | - | - | ✓ | - | ✓ |

| Water Resource Zone Name | Feasible Options SA6 | | | Approach | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | No. Local Option | Option Code | Option Description | Least Cost | Quickest Delivery | Best AA | Best Environmental | Lowest Carbon | Most Resilient |
| | | SA6-08 | New SW abstraction from River Derreen | - | - | - | - | - | - |
| | | SA6-09a | New GW abstraction/wellfield | - | ✓ | - | - | - | - |
| | | SA6-09b | Abandon Sion Cross and supply from new GW abstraction/wellfield | - | - | ✓ | - | ✓ | - |
| | | SA6-193 | Connect to NSS via Srowland | ✓ | - | - | - | - | - |
| Clogh-Castlecomer WS | 1 | SA6-45a | New GW abstraction/wellfield to supply deficit | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Coolanaugh PWS | 1 | SA6-94 | Increase GW abstraction to supply deficit | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Durrow | 4 | SA6-142 | Increase GW abstraction at Castle Durrow Convent WTP to supply deficit | - | - | - | - | - | - |
| | | SA6-143 | New GW abstraction (BH) at Castle Durrow Convent WTP to supply deficit, abandon existing spring source | ✓ | - | - | - | ✓ | - |
| | | SA6-144a | Increase GW abstraction at Fermoyle WTP to supply deficit | - | ✓ | ✓ | ✓ | - | ✓ |
| | | SA6-145 | Riverbank filtration from River Nore (nitrates at this point) | - | - | - | - | - | - |
| Galmoy Rathdowney PWS | 2 | SA6-53a | Increase GW abstraction to supply deficit | ✓ | ✓ | ✓ | ✓ | - | ✓ |
| | | SA6-54 | New SW abstraction from River Goul | - | - | - | - | ✓ | - |
| Leighlinbridge | 1 | SA6-197 | WTP upgrade only | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Mountbolus PWS | 1 | SA6-201 | New GW abstraction for Mountbolus and WTP Upgrade | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Mountmellick | 3 | SA6-69a | Increase GW abstraction to supply deficit | ✓ | - | - | ✓ | - | ✓ |
| | | SA6-72a | Riverbank filtration from River Barrow | - | - | - | - | - | - |
| | | SA6-73 | Supply deficit from the neighboring GWS - The Rock | - | ✓ | ✓ | - | ✓ | - |
| Mountrath | 5 | SA6-118a | Increase GW abstraction at Cloonin Hill WTP to supply deficit | - | - | - | - | - | - |
| | | SA6-119 | Increase GW abstraction at Drim WTP to supply deficit | - | - | - | - | - | - |
| | | SA6-120 | Increase GW abstraction at Knocks WTP to supply deficit | - | ✓ | ✓ | ✓ | - | - |

| Water Resource Zone Name | Feasible Options SA6 | | | Approach | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | No. Local Option | Option Code | Option Description | Least Cost | Quickest Delivery | Best AA | Best Environmental | Lowest Carbon | Most Resilient |
| | | SA6-121 | Riverbank filtration from River Nore | - | - | - | - | - | ✓ |
| | | SA6-122 | Rationalise Cloonin Hill, Drim and Knocks into 1 WTP to add resilience. Require source protection. | ✓ | - | - | - | ✓ | - |
| Old Leighlin | 1 | SA6-19 | Increase GW abstraction to supply deficit - yield assessments required | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Portarlington | 3 | SA6-77 | Increase GW abstraction to supply deficit | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | SA6-78 | New GW abstraction/wellfield at Doolough to supply deficit and new WTP. | - | - | - | - | - | - |
| | | SA6-80 | Riverbank filtration from River Barrow | - | - | - | - | - | - |
| Portlaoise | 3 | SA6-56 | Increase GW abstraction to supply deficit | - | ✓ | ✓ | - | - | ✓ |
| | | SA6-57a | New GW abstraction/wellfield development | ✓ | - | - | - | - | - |
| | | SA6-62 | Supply DYCP deficit in Portlaoise from GDA WRZ (Srowland WTP) | - | - | - | ✓ | ✓ | - |
| Rosenallis | 2 | SA6-64 | Increase GW abstraction to supply deficit | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | SA6-66 | New GW abstraction to supply deficit in the vicinity of Rosenallis Reservoir - Clonaslee groundwater body | - | - | - | - | - | - |
| South East Regional PWS | 3 | SA6-105 | Increase GW abstraction to supply deficit | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| | | SA6-106a | New GW abstraction to supply deficit; replace existing spring source with new BHs (Timahoe gravels groundwater body) | - | - | - | - | - | - |
| | | SA6-112 | Conjunctive use of Srowland WTP (increase WTP capacity) during winter and local GW during summer | - | - | - | - | - | - |
| Swan PWS | 1 | SA6-113a | Increase GW abstraction to supply deficit | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| The Strand | 1 | SA6-90 | Increase GW abstraction to supply deficit | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Tullamore | 5 | SA6-174 | Increase GW abstraction from Clonaslee BHs (Clonaslee groundwater body - productive fissured bedrock) and upgrade WTP to partly supply deficit | - | - | - | - | ✓ | - |

| Water Resource Zone Name | Feasible Options SA6 | | | Approach | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | No. Local Option | Option Code | Option Description | Least Cost | Quickest Delivery | Best AA | Best Environmental | Lowest Carbon | Most Resilient |
| | | SA6-175 | New GW abstraction/wellfield from Clonaslee groundwater body (productive fissured bedrock) to partly supply deficit | - | - | - | - | - | - |
| | | SA6-176 | Increase GW abstraction from Ardan BHs (Tullamore groundwater body - karstic bedrock) and upgrade WTP to partly supply deficit | - | ✓ | ✓ | ✓ | - | - |
| | | SA6-177a | New GW abstraction/wellfield from Tullamore groundwater body (karstic bedrock) to partly supply deficit | - | - | - | - | - | - |
| | | SA6-180a | Supply Tullamore from NSS - connection point TBC | ✓ | - | - | - | - | ✓ |
| Urlingford-Johnstown PWS | 2 | SA6-37 | Increase GW abstraction to supply deficit | - | - | - | - | - | ✓ |
| | | SA6-38 | New GW abstraction to supply deficit and improve water quality | ✓ | ✓ | ✓ | ✓ | ✓ | - |

The 7 Step Process outlined in Figure 5.2 was then applied to each WRZ in SA6, in order to develop a WRZ level approach. A summary of the outcome of this assessment at WRZ level (i.e. WRZ options only) is shown in Table 5.4.

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

- Three local level options score a Zero AA at plan level in relation to potential impact on a designated European Site.
- In 19 of the 28 Water Resource Zones, the Preferred Approach consists of the same Plan Level options as the Best AA and Best Environmental Approaches.
- The preferred approach at WRZ level for the Ballinakill WRZ has a -3 Biodiversity score against the European Site (Biodiversity) question. A -3 Score against biodiversity indicates a potential high risk (without mitigation measures) under the biodiversity criterion for a European Site.

Preferred Approaches at WRZ level are outlined in Table 5.4.

Table 5.4 SA6 WRZ Level Approach

| Water Resource Zone Name | Feasible Options SA6 | | Approach | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Option Code | Option Description | Zero AA | Least Cost | Quickest Delivery | Best AA | Best Environmental | Lowest Carbon | Most Resilient | Preferred Approach |
| Carlow Town | SA6-193 | Connect to NSS via Srowland | - | ✓ | - | - | - | - | - | ✓ |
| Old Leighlin | SA6-019 | Increase GW abstraction to supply deficit - yield assessments required | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Bilboa | SA6-024 | New GW abstraction to supply full demand | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Carlow Central Regional | SA6-033 | New GW abstraction to supply deficit, to the Barrow gravels just south of Carlow Town | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Urlingford-Johnstown WS | SA6-038 | New GW abstraction to supply deficit and improve water quality | - | ✓ | ✓ | ✓ | ✓ | ✓ | - | ✓ |
| Clogh-Castlecomer WS | SA6-045a | New GW abstraction/wellfield to supply deficit | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Galmoy-Rathdowney PWS | SA6-053a | Increase GW abstraction to supply deficit | - | ✓ | ✓ | ✓ | ✓ | - | ✓ | ✓ |
| Portlaoise PWS | SA6-057a | New GW abstraction/wellfield development | - | ✓ | - | - | - | - | - | ✓ |
| Rosenallis PWS | SA6-064 | Increase GW abstraction to supply deficit | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Mountmellick 1 PWS | SA6-069a | Increase GW abstraction to supply deficit | - | ✓ | - | - | ✓ | - | ✓ | ✓ |
| Portarlington 1 PWS | SA6-077 | Increase GW abstraction to supply deficit | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Arles 2 PWS | SA6-086a | Increase GW abstraction to supply deficit - yield assessments required | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| The Strand PWS | SA6-090 | Increase GW abstraction to supply deficit | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

| Water Resource Zone Name | Feasible Options SA6 | | Approach | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Option Code | Option Description | Zero AA | Least Cost | Quickest Delivery | Best AA | Best Environmental | Lowest Carbon | Most Resilient | Preferred Approach |
| Coolanagh PWS | SA6-094 | Increase GW abstraction to supply deficit | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Borris in Ossory PWS | SA6-099 | Increase GW abstraction to supply deficit | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Camross PWS | SA6-104 | Increase GW abstraction to supply deficit | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| South East Regional PWS | SA6-105 | Increase GW abstraction to supply deficit | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Swan PWS | SA6-113a | Increase GW abstraction to supply deficit | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Mountrath | SA6-122 | Rationalise Cloonin Hill, Drim and Knocks into 1 WTP to add resilience. Require source protection. | - | ✓ | - | - | - | ✓ | - | ✓ |
| Abbeyliex South | SA6-126 | Increase GW abstraction to supply deficit | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Ballinakill | SA6-134 | Increase GW abstraction to supply deficit | - | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ |
| Durrow | SA6-143 | New GW abstraction (BH) at Castle Durrow Convent WTP to supply deficit, abandon existing spring source | - | ✓ | - | - | - | - | - | ✓ |
| Abbeyleix North | SA6-149 | Increase GW abstraction to supply deficit | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Ballyroan | SA6-156 | Increase GW abstraction to supply deficit - Ballyroan Spring | - | ✓ | - | - | - | ✓ | - | ✓ |
| Tullamore | SA6-180a | Supply Tullamore from NSS | - | ✓ | - | - | - | - | ✓ | ✓ |
| Bagenalstown | SA6-191 | WTP Upgrade | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Leighlinbridge | SA6-197 | WTP upgrade only | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

| Water Resource Zone Name | Feasible Options SA6 | | Approach | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Option Code | Option Description | Zero AA | Least Cost | Quickest Delivery | Best AA | Best Environmental | Lowest Carbon | Most Resilient | Preferred Approach |
| Mountbolus | SA6-201 | New GW abstraction for Mountbolus and WTP Upgrade | - | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

### 5.2.2 Stage 2 - Creation of the Study Area Combinations

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

For each Study Area, one of the SA Combinations will always be the WRZ Level Approach. The WRZ Level Approach is the combination of all of the individual the Preferred Approach at WRZ level for the entire Study Area. Table 5.5 below provides a summary of the 16 Study Area options.

**Table 5.5 SA6 Grouped options**

| Option Code | Feasible Options SA6 | | |
|---|---|---|---|
| | Water Resource Zone | Water Resource Zone Code | Option Description |
| Group 12 | The Strand PWS | 1600SC0007 | Rationalise The Strand to Swan WRZ<br>Increase GW abstraction to supply deficit |
| | Swan PWS | 1600SC0015 | |
| Group 17 | Portlaoise PWS | 1600SC0001 | New GW abstraction/wellfield development<br>Rationalise Mountrath to Portlaoise |
| | Mountrath | 1600SC0016 | |
| Group 18 | Portlaoise PWS | 1600SC0001 | New GW abstraction/wellfield development<br>Rationalise Abbeyleix South to Portlaoise WRZ; network upgrade required<br>Rationalise Abbeyleix North to Portlaoise WRZ<br>Rationalise Ballyroan to Portlaoise WRP |
| | Abbeyleix South | 1600SC0017 | |
| | Abbeyleix North | 1600SC0020 | |
| | Ballyroan | 1600SC0021 | |
| Group 19 | Abbeyleix South | 1600SC0017 | Rationalise Abbeyleix South to Durrow WRZ<br>Increase GW abstraction at Fermoyle WTP to supply deficit<br>Rationalise Abbeyliex North to Durrow WRZ |
| | Durrow | 1600SC0019 | |
| | Abbeyleix North | 1600SC0020 | |
| Group 23 | Portlaoise PWS | 1600SC0001 | New GW abstraction/wellfield development<br>Rationalise South East Regional PWS to Portlaoise WRZ |
| | South East Regional PWS | 1600SC0014 | |

| Option Code | Feasible Options SA6 | | |
|---|---|---|---|
| | Water Resource Zone | Water Resource Zone Code | Option Description |
| Group 36 | Ballinakill | 1600SC0018 | Rationalise Ballinakill to Durrow WRZ<br>Increase GW abstraction at Fermoyle WTP to supply deficit |
| | Durrow | 1600SC0019 | |
| Group 38 | Leighlinbridge | 0100SC0002 | Rationalise Leighlinbridge to Bagenalstown (New GW in Bagenalstown)<br>Increase GW abstraction to supply deficit - yield assessments required |
| | Bagenalstown | 0100SC0008 | |
| Group 42 | Portlaoise PWS | 1600SC0001 | Connection<br>Supply Tullamore from NSS |
| | Mountmellick 1PWS | 1600SC0004 | |
| | South East Regional PWS | 1600SC0014 | |
| | Swan PWS | 1600SC0015 | |
| | Mountrath | 1600SC0016 | |
| | Abbeyleix South | 1600SC0017 | |
| | Ballinakill | 1600SC0018 | |
| | Durrow | 1600SC0019 | |
| | Abbeyleix North | 1600SC0020 | |
| | Tullamore | 2500SC0002 | |
| Group 46 | Portlaoise PWS | 1600SC0001 | New GW abstraction/wellfield development<br>Improve interconnection of Mountmellick and Portlaoise for improved resilience |
| | Mountmellick 1PWS | 1600SC0004 | |
| Group 50 | Abbeyleix South | 1600SC0017 | Upgrade existing interconnection of Abbeyliex South and Abbeyliex North WRZs<br>New GW abstraction to supply deficit and abandon existing spring |
| | Abbeyleix North | 1600SC0020 | |
| Group 51 | Portlaoise PWS | 1600SC0001 | Connection to Portlaoise<br>New GW abstraction/wellfield development<br>Rationalise Abbeyliex North to Portlaoise WRZ (new source required) |
| | Abbeyleix South | 1600SC0017 | |

| Option Code | Feasible Options SA6 | | |
|---|---|---|---|
| | Water Resource Zone | Water Resource Zone Code | Option Description |
| | Ballinakill | 1600SC0018 | |
| | Durrow | 1600SC0019 | |
| | Abbeyleix North | 1600SC0020 | |
| | Ballyroan | 1600SC0021 | |
| Group 52 | Tullamore | 2500SC0002 | Supply Tullamore from NSS |
| | Mountbolus PWS | 2500SC0013 | New connection point from NSS connecting to Mountbolus |
| Group 53 | Ballinakill | 1600SC0018 | Interconnect Ballinakill with Durrow WRZ for increased resilience |
| | Durrow | 1600SC0019 | Increase GW abstraction at Fermoyle WTP to supply deficit |
| Group 54 | Portlaoise PWS | 1600SC0001 | Conjunctive use of River Barrow (new SW abstraction or riverbank filtration) during winter and local GW during summer |
| | Mountmellick 1PWS | 1600SC0004 | |
| Group 55 | Bagenalstown<br>Carlow Central Regional | 0100SC0008<br>0100SC0011 | Supply surplus from Bagenalstown<br>to Carlow Central Regional |

17 SA Combinations are formed from the SA level option. The 17 SA Combinations and the WRZ Level Approach are then ranked against each of the Six Approach Types using the EBSD model to generate Least Carbon, Least Cost, Best Environmental, Best AA, Most Resilient and Quickest Delivery Approaches. The WRZ approach and the SA combinations are summarised in Table 5.6 in terms of the types of options within each combination and then how the combinations are ranked based on the MCA scores against each approach category.

Table 5.6 SA6 Combinations Options Summary

| Key | WRZ Approach Option | ○ | SA Grouped Option | □ |
|---|---|---|---|---|

| WRZ | WRZ approach options | SA combination 1 (SA grouped option 12) | SA combination 2 (SA grouped option 17) | SA combination 3 (SA grouped option 18) | SA combination 4 (SA grouped option 19) | SA combination 5 (SA grouped option 23) | SA combination 6 (SA grouped option 36) | SA combination 7 (SA grouped option 38) | SA combination 8 (SA grouped option 40) | SA combination 9 (SA grouped option 42) | SA combination 10 (SA grouped option 46) | SA combination 11 (SA grouped option 50) | SA combination 12 (SA grouped option 51) | SA combination 13 (SA grouped option 52) | SA combination 14 (SA grouped option 53) | SA combination 15 (SA grouped option 54) | SA combination 16 (SA grouped option 55) | SA combination 17 (SA grouped option 52 & 53) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Carlow Town | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | □ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Leighlinbridge | ○ | ○ | ○ | ○ | ○ | ○ | ○ | □ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Old Leighlin | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Bilboa | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Bagenalstown | ○ | ○ | ○ | ○ | ○ | ○ | ○ | □ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | □ | ○ |
| Carlow Central Regional | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | □ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | □ | ○ |
| Urlingford-Johnstown WS | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Clogh-Castlecomer WS | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Galmoy-Rathdowney PWS | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Portlaoise PWS | ○ | ○ | □ | □ | ○ | □ | ○ | ○ | ○ | □ | □ | ○ | □ | ○ | ○ | □ | ○ | ○ |

| WRZ | WRZ approach options | SA combination 1 (SA grouped option 12) | SA combination 2 (SA grouped option 17) | SA combination 3 (SA grouped option 18) | SA combination 4 (SA grouped option 19) | SA combination 5 (SA grouped option 23) | SA combination 6 (SA grouped option 36) | SA combination 7 (SA grouped option 38) | SA combination 8 (SA grouped option 40) | SA combination 9 (SA grouped option 42) | SA combination 10 (SA grouped option 46) | SA combination 11 (SA grouped option 50) | SA combination 12 (SA grouped option 51) | SA combination 13 (SA grouped option 52) | SA combination 14 (SA grouped option 53) | SA combination 15 (SA grouped option 54) | SA combination 16 (SA grouped option 55) | SA combination 17 (SA grouped option 52 & 53) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rosenallis PWS | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Mountmellick 1 PWS | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | □ | □ | ○ | ○ | ○ | ○ | □ | ○ | ○ |
| Portarlington 1 PWS | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Arles 2 PWS | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| The Strand PWS | ○ | □ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Coolanagh PWS | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Borris in Ossory PWS | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Camross PWS | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| South East Regional PWS | ○ | ○ | ○ | ○ | ○ | □ | ○ | ○ | ○ | □ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Swan PWS | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | □ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Mountrath | ○ | ○ | □ | ○ | ○ | ○ | ○ | ○ | ○ | □ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Abbeyliex South | ○ | ○ | ○ | ○ | □ | ○ | ○ | ○ | ○ | □ | ○ | □ | □ | ○ | ○ | ○ | ○ | ○ |
| Ballinakill | ○ | ○ | ○ | ○ | ○ | ○ | □ | ○ | ○ | □ | ○ | ○ | □ | ○ | □ | ○ | ○ | □ |
| Durrow | ○ | ○ | ○ | ○ | □ | ○ | □ | ○ | ○ | □ | ○ | ○ | □ | ○ | □ | ○ | ○ | □ |

| WRZ | WRZ approach options | SA combination 1 (SA grouped option 12) | SA combination 2 (SA grouped option 17) | SA combination 3 (SA grouped option 18) | SA combination 4 (SA grouped option 19) | SA combination 5 (SA grouped option 23) | SA combination 6 (SA grouped option 36) | SA combination 7 (SA grouped option 38) | SA combination 8 (SA grouped option 40) | SA combination 9 (SA grouped option 42) | SA combination 10 (SA grouped option 46) | SA combination 11 (SA grouped option 50) | SA combination 12 (SA grouped option 51) | SA combination 13 (SA grouped option 52) | SA combination 14 (SA grouped option 53) | SA combination 15 (SA grouped option 54) | SA combination 16 (SA grouped option 55) | SA combination 17 (SA grouped option 52 & 53) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Abbeyleix North | ○ | ○ | ○ | □ | □ | ○ | ○ | ○ | ○ | □ | ○ | □ | □ | ○ | ○ | ○ | ○ | ○ |
| Ballyroan | ○ | ○ | ○ | □ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | □ | ○ | ○ | ○ | ○ | ○ |
| Tullamore | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | □ | ○ | ○ | ○ | □ | ○ | ○ | ○ | □ |
| Mountbolus PWS | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | □ | ○ | ○ | ○ | □ |

### 5.2.3 Stage 3 – Preferred Approach at Study Area Level

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

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

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

For SA6, eleven SA combinations had a very similar ranking under the Least Cost category.

- WRZ Level Approach
- Grouped Option 12 (Combination 1)
- Grouped Option 18 (Combination 3)
- Grouped Option 19 (Combination 4)
- Grouped Option 36 (Combination 6)
- Grouped Option 46 (Combination 10)
- Grouped Option 50 (Combination 11)
- Grouped Option 52 (Combination 13)
- Grouped Option 53 (Combination 14)
- Grouped Option 55 (Combination 16)
- Grouped Option 52 & 53 (Combination 17)

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

When we compare these eleven combinations against each other to identify which should go forward as the Least Cost approach, Grouped Option 36 (Combination 6), Grouped Option 53 (Combination 14) and Grouped Option 52 & 53 (Combination 17) are the only SA combinations with no -3 biodiversity scores, so were brought forward for further consideration. These SA Combinations had comparable scores across all other approach categorises categories, however, as Grouped Option 52 & 53 (Combination 17) performed the best of the three under the Least Cost and Environmental criteria it was considered as the Least Cost approach.

Table 5.7 SA6 Summary of SA Combination of Performance against Approach Type

| Ranked order (best to worst) | Best | | | | | | | | | | | | | | Worst |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| WRZ | WRZ approach options | SA combination 1 (SA grouped option 12) | SA combination 2 (SA grouped option 17) | SA combination 3 (SA grouped option 18) | SA combination 4 (SA grouped option 19) | SA combination 5 (SA grouped option 23) | SA combination 6 (SA grouped option 36) | SA combination 7 (SA grouped option 38) | SA combination 8 (SA grouped option 40) | SA combination 9 (SA grouped option 42) | SA combination 10 (SA grouped option 46) | SA combination 11 (SA grouped option 50) | SA combination 12 (SA grouped option 51) | SA combination 13 (SA grouped option 52) | SA combination 14 (SA grouped option 53) | SA combination 15 (SA grouped option 54) | SA combination 16 (SA grouped option 55) | SA combination 17 (SA group option 52 & 53) Preferred Approach |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Least Cost | | | | | | | | | | | | | Worst | | | | | Best |
| Quickest Delivery | Best | | | | | | | | | | | | | | | | | |
| Best AA *no. of -3 scores against biodiversity | 1 No. -3 scores | 1 No. -3 scores | 1 No. -3 scores | 1 No. -3 scores | 1 No. -3 scores | 1 No. -3 scores | 0 No. -3 scores | 2 No. -3 scores | 1 No. -3 scores | 0 No. -3 scores | 1 No. -3 scores | 1 No. -3 scores | 0 No. -3 scores | 1 No. -3 scores | 0 No. -3 scores | 1 No. -3 scores | 2 No. -3 scores | 0 No. -3 scores |
| Lowest Carbon | | | | | | | | | | Worst | | | | Best | | | | |
| Most Resilient | | | | | | | | | | | | Best | Worst | | | | | |
| Best Environmental | | | | | | | | Worst | | Best | | | | | | Worst | | |

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

Table 5.8 Best Combinations

| Approach Categories | Best Performing Combination |
|---|---|
| Least Cost (LCo)* | Group 52 & 53 |
| Best Environmental (BE) | Group 42 |
| Quickest Delivery (QD) | WRZ Approach |
| Most Resilient (MR) | Group 50 |
| Lowest Carbon (LC) | Group 52 |
| Best AA (BA) | Group 42 |

The MCA assessment included the following assessment criteria:

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

The NPV Costs are based on four criteria:

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

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

In terms of NPV Cost, the WRZ Approach, Group 50, Group 52 and Group 52 & 53 have the lowest NPV Costs all within 5% of each other, as shown in Figure 5.2.

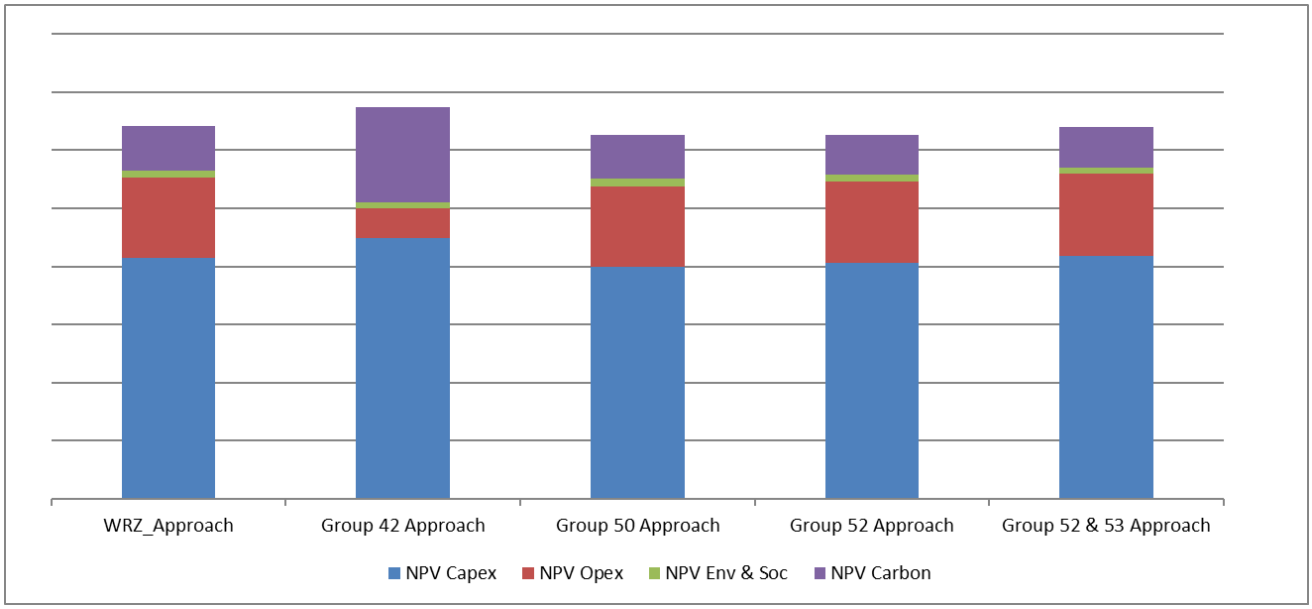



**Figure 5.2 NPV Costs for WRZ and SA approaches**

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

- Step 1 – We compared the Least Cost Approach against the Best AA approach. The Least Cost approach contained no options with a -3 biodiversity score and is comparable to the Best AA approach therefore the Least Cost Approach was retained at this stage.
- Step 2 – We compared the Quickest Delivery Approach against the Least Cost Approach. The Quickest Delivery approach does not deliver significantly better scores against the carbon and resilience criteria compared to the Least Cost and performs poorly against the environmental criteria. The Least Cost approach was therefore retained at this stage.
- Step 3 - We compared the Least Cost against the Best Environmental Approach. The Best Environmental Approach performs poorly against the quickest delivery, carbon and resilience criteria with Carbon cost twice that of the Least Cost. The Least Cost Approach was therefore retained at this stage.
- Step 4 – We compared the Least Cost against the Most Resilient Approach. The Most Resilient Approach has comparable scores against the environmental and carbon and resilience criteria compared to the Least Cost, however this combination contains one option with a -3 biodiversity score. The Least Cost approach was therefore retained at this stage.
- Step 5 - We compared the Least Cost Approach against the Least Carbon Approach. The Least Carbon Approach has comparable scores against the resilience and quickest delivery compared to the Least Cost Approach and preforms poorly against the environmental criteria. The Least Cost approach was therefore retained at this stage.
- Step 6 – A final assessment of the Least Cost was completed against the Least Carbon, Best AA, Best Environmental and Most Resilient Approaches. The Least Cost Approach is comparable in terms of infrastructure development to the Best AA, Most Resilient and Least Carbon Approach. While the Best Environmental Approach has a lower environmental score, associated with the fact the approach involves rationalising a number of supplies, the Carbon

costs are significant compared to all other Approaches. The Least Cost approach was therefore retained at this stage.

- Step 7 – The Least Cost Approach was therefore selected as the Preferred Approach for the Water Resource and Study Area Levels.

## 5.3 Study Area Preferred Approach Summary

The Preferred Approach (SA Combination Group 53) comprised the options listed in listed in Table 5.9.

Table 5.9 Preferred Approach for SA6

| WRZ ID | WRZ Name | Option Description |
|---|---|---|
| 0100SC0001 | Carlow North | SA6-193<br>Includes Carlow Town. Connect to the Greater Dublin Areas WRZ |
| 0100SC0002 | Leighlinbridge | SA6-197:<br>WTP upgrade only |
| 0100SC0003: | Old Leighlin | SA6-019:<br>Increase GW abstraction to supply deficit - yield assessments required |
| 0100SC0004 | Bilboa | SA6-024:<br>New GW abstraction to supply full demand |
| 0100SC0008 | Bagenalstown | SA6-191:<br>WTP Upgrade |
| 0100SC0011 | Carlow Central Regional | SA6-033:<br>New GW abstraction to supply deficit, to the Barrow gravels just south of Carlow Town" |
| 1500SC0006 | Urlingford-Johnstown WS | SA6-038:<br>New GW abstraction to supply deficit and improve water quality |
| 1500SC0009 | Clogh-Castlecomer WS | SA6-045a:<br>New GW abstraction/wellfield to supply deficit |
| 1500SC0018 | Galmoy-Rathdowney PWS | SA6-053a:<br>Increase GW abstraction to supply deficit |
| 1600SC0001 | Portlaoise PWS | SA6-057a:<br>New GW abstraction/wellfield development |
| 1600SC0003 | Rosenallis PWS | SA6-064:<br>Increase GW abstraction to supply deficit |
| 1600SC0004 | Mountmellick 1 PWS | SA6-069a: |

| WRZ ID | WRZ Name | Option Description |
|---|---|---|
| | | Increase GW abstraction to supply deficit |
| 1600SC0005 | Portarlington 1 PWS | SA6-077:<br>Increase GW abstraction to supply deficit |
| 1600SC0006 | Arles 2 PWS | SA6-086a:<br>Increase GW abstraction to supply deficit - yield assessments required |
| 1600SC0007 | The Strand PWS | SA6-090:<br>Increase GW abstraction to supply deficit |
| 1600SC0008 | Coolanagh PWS | SA6-094:<br>Increase GW abstraction to supply deficit |
| 1600SC0010 | Borris in Ossory PWS | SA6-099:<br>Increase GW abstraction to supply deficit |
| 1600SC0011 | Camross PWS | SA6-104:<br>Increase GW abstraction to supply deficit |
| 1600SC0014 | South East Regional PWS | SA6-105:<br>Increase GW abstraction to supply deficit |
| 1600SC0015 | Swan PWS | SA6-113a:<br>Increase GW abstraction to supply deficit |
| 1600SC0016 | Mountrath | SA6-122:<br>Rationalise Cloonin Hill, Drim and Knocks into 1 WTP to add resilience. Require source protection. |
| 1600SC0017 | Abbeyliex South | SA6-126:<br>Increase GW abstraction to supply deficit |
| 1600SC0018 | Ballinakill | SA6-553:<br>Increase GW abstraction at Fermoyle WTP to supply deficit<br>Interconnect Ballinakill with Durrow WRZ for increased resilience |
| 1600SC0019 | Durrow | |
| 1600SC0020 | Abbeyleix North | SA6-149:<br>Increase GW abstraction to supply deficit |
| 1600SC0021 | Ballyroan | SA6-156:<br>Increase GW abstraction to supply deficit - Ballyroan Spring |

| WRZ ID | WRZ Name | Option Description |
|---|---|---|
| 2500SC0002 | Tullamore | SA6-552:<br>Supply Tullamore and Mountbolus from the NSS |
| 2500SC0013 | Mountbolus PWS | |

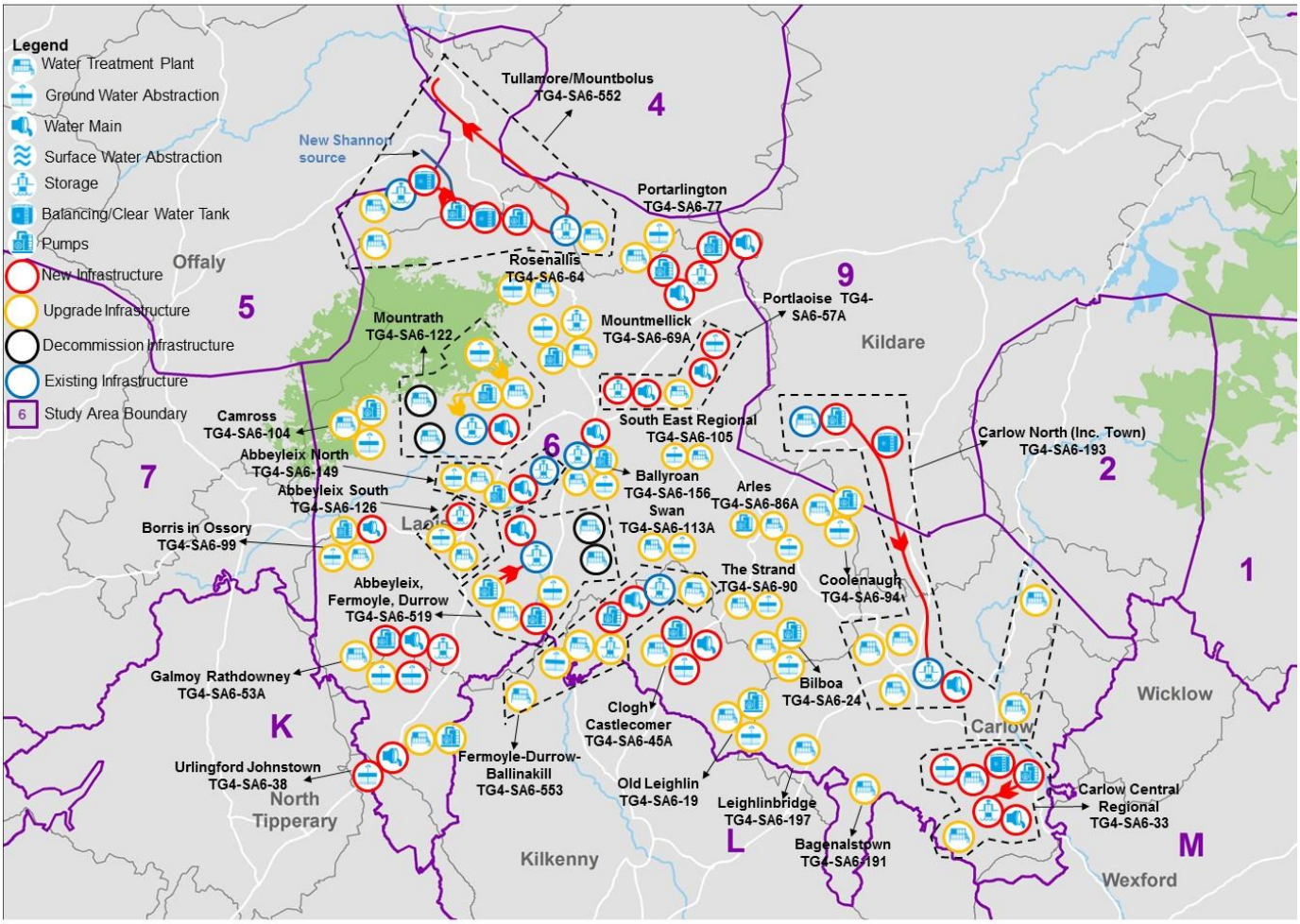



Figure 5.3 SA6 Preferred Approach

The Preferred Approach (SA approach Group 52 & 53) is shown schematically in Figure 5.3.

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

The Preferred Approach for SA6 also includes for demand side (**Lose Less** and **Use Less**) measures, including.

- Ongoing leakage management including active leakage control, pressure management and find and fix activities to offset Natural Rate of Leakage Rise (NRR)
- 823 m³ of nett leakage reduction across 9 WRZs (applied to SDB deficit)
- Continuation of IW household and business water conservation campaigns, initiatives and education programmes
- The option to implement legally enforceable Water Conservation Orders in drought periods in order to protect the environment and our public water supplies

Before we adopt this approach at Plan level for SA6, we must give consideration to the following:

- **Interim Solutions**: Based on scale of investment required across the entire country it is likely that it may take 5-10 investment cycles before we address all issues with the existing water supplies. Therefore, small localised options may be required on an interim basis to secure priority need in existing supplies until the SA Preferred Approach can be delivered;
- **Sensitivity Analysis**: When planning for water supplies over a medium to long term horizon, we must give consideration to adaptability of our plan to change across a range of future scenarios (for example, what if population growth rates are lower than expected or what if we are unable to secure a licence in the medium term to abstract the quantity water currently allowed for at a given location); and
- **Alternative options for WRZs dependent on another SA option:** The Preferred Approach for Carlow Town, Tullamore and Mountbolus is to obtain supply from the GDA WRZ and the New Shannon Source, respectively. These options are unlikely to progress unless the Preferred Approach for the GDA WRZ SA9 proceeds, therefore an alternative option is required for consideration as an alternative at Regional level and in the event the Preferred Approach for SA9 cannot advance. The alternative options considered are outlined in Table 5.10 below.

Table 5.10 Alternative Options for WRZs dependent on another SA option

| WRZ Name | Alternate Option |
|---|---|
| Carlow Town | SA6-009a<br><br>Maintain existing WTP and abstractions.<br>Abstractions from the River Slaney and the River Burren to be reduced.<br>Increase output at Oak Park WTP with the provision of New GW abstraction. (+10,594 m3/day) |
| Tullamore | TG4-SA6-177a<br><br>New GW abstraction and increase output at the existing Arden WTP. (+6,620 m3/day) |
| Mountbolus | TG4-SA6-201<br><br>New GW abstraction and increase output at the existing WTP. (+40 m3/day) |

# 6 Preferred Plan Constraints – Interim Solutions

# 6 Interim Solutions

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

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

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

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

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

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

Table 6.1 SA6 Interim Options

| WTP Name | Interim Option |
|---|---|
| Rathvilly WTP | Upgrade WTP to IW Standards |
| Sion Cross WTP | Upgrade WTP to IW Standards |
| Oak Park WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Tullow WTP | Upgrade WTP to IW Standards |
| Leighlinbridge WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Old Leighlin WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Bilboa WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Bagenalstown WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Royal Oak WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Raheenleigh WTP | Upgrade WTP to IW Standards |
| Mountfinn WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Clogh Castlecomer WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Nannys Well WTP | Upgrade WTP to IW Standards |
| Gorteen WTP | Fit out existing Borehole, and upgrade WTP to IW Standards |
| Glosha / Galmoy WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Derrymoyle WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Kilminchy WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Meelick WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Rosenallis WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |

| WTP Name | Interim Option |
|---|---|
| Derryguille WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Le Bergerie WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Lough WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Arles WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| The Strand WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Coolenaugh WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Donaghmore WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Camross WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Kyle WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Swan WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Cloonin Hill WTP | Refurb existing Borehole, and upgrade WTP to IW Standards – Potential site for a containerised solution |
| Knocks WTP | Refurb existing Borehole, and upgrade WTP to IW Standards – Potential site for a containerised solution |
| Drim WTP | Refurb existing Borehole, and upgrade WTP to IW Standards – Potential site for a containerised solution |
| Five Wells WTPr | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Fermoyle (Ballinakill) WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Cloghoghue WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Castle Durrow Convent WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |

| WTP Name | Interim Option |
|---|---|
| Aughafeerish WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Ballyroan WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Newgate Well WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Reservoir WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Clonaslee WTP | Upgrade WTP to IW Standards – Potential site for a containerised solution |
| Arden WTP | Refurb existing Borehole, and upgrade WTP to IW Standards – Potential site for a containerised solution |
| Reservoir WTP | Upgrade WTP to IW Standards |
| Clonaslee WTP | Upgrade WTP to IW Standards |
| Arden WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Reservoir WTP | Upgrade WTP to IW Standards |
| Clonaslee WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |
| Arden WTP | Refurb existing Borehole, and upgrade WTP to IW Standards |

# 7

# Preferred Approach – Sensitivity Analysis

# 7 Preferred Approach – Sensitivity Analysis

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

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

A summary of the adaptability criteria and analysis we have undertaken for SA6 is shown in Table 7.1 .

Table 7.1 Sensitivity Analysis for SA6

| Uncertainty | Likelihood | Increase/Decrease in Deficit | Impact on Preferred Approach |
|---|---|---|---|
| **Sustainability** | Moderate/High (as our current abstractions are large compared to the water bodies from which they abstract) | +1.056 Ml/d | **The impact of sustainability reductions would reduce the volumes that can be abstracted from our existing sources therefore increasing the supply demand balance deficit**.<br><br>Our outline sustainability assessments would mean a potential increase in deficit for SA 6 based on reductions in the sustainable abstraction amounts from both the River Burren (Carlow Central Regional) and River Clodiagh (Tullamore) sources.<br><br>However, the proposed options for Tullamore and Carlow Central are to connect to NSS and develop new groundwater, respectively, in these regions, reducing the stress on these sources. The majority of options considered in SA6 are groundwater supplies. Groundwater Sustainability is more difficult to assess at desktop |

| Uncertainty | Likelihood | Increase/Decrease in Deficit | Impact on Preferred Approach |
|---|---|---|---|
| | | | level, and will require project level assessments. |
| | | | Based on this scenario, the Preferred Approach remains the optimal solution. |
| **Climate Change** | High (international climate change targets have not been met) | +1,800 m3/d | **Higher climate change scenarios would impact our existing supplies and result in decreased water availability at certain times of year.** Although the likelihood of this scenario is high based on climate change adaptation to date, potential impacts may be mitigated against by optimizing our operations on a more environmentally sustainable basis across the range of supplies. |
| | | | Based on this scenario, the Preferred Approach remains the optimal solution. |
| **Demand Growth** | Low/Moderate (growth has been based on policy) | -200 $m^3$/d | **The impact of lower than expected growth would reduce the supply demand balance deficit and the overall need requirement.** The supply demand balance deficit is spread across 28 individual water resource zones and is driven by quality as well as quantity issues. In this rural area, growth is relatively low. However there are large growth centres such as Carlow Town and Portlaoise. |
| | | | Based on this scenario, the Preferred Approach remains the optimal solution. |
| **Leakage Targets** | Low (Irish Water is focused on sustainability and aggressive leakage reduction) | 823 $m^3$/d | **The impact of lower than expected leakage savings would increase the supply demand balance deficit and the overall need requirement.** As Irish Water is committed to achieving leakage reductions, the likely scenario would be an extension in the period of time taken to achieve leakage targets as opposed to accepting lower targets. |

| Uncertainty | Likelihood | Increase/Decrease in Deficit | Impact on Preferred Approach |
|---|---|---|---|
| | | | Based on this scenario, the Preferred Approach remains the optimal solution. |
| | Moderate/High (Irish Water is focused on sustainability and aggressive leakage reduction) | 8,311 $m^3/d$ | **The impact of achieving SELL and 21% leakage targets in our larger WRZs would reduce the supply demand balance deficit and the overall need requirement.** The need drivers in SA6 are across all 28 water resource zones and are driven by quality as well as availability issues. Therefore, the Preferred Approach is required, even accounting for increased leakage savings. |
| | | | Based on this scenario, the Preferred Approach remains as the optimal solution. |

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

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

- Interim Approach – As the purpose of the Interim Approach is to allow for priority Quality and Quantity issues, the solutions will have a limited design life (usually less than 10 years). They allow time to assess the Preferred Approach and improve adaptability within our Plan

- Preferred Approach – The supplies in SA6 vary in size with a large number of small WRZs <1Ml/d as well as large growth areas such as Carlow Town, Portlaoise and Tullamore. The majority of preferred options look to expand existing groundwater supplies which will require further investigation at project level. However, preferred approaches for Carlow Town. Mountbolus and Tullamore propose new connections to the GDA and the New Shannon Source respectively, which provides scope for future connections to other WRZs. Our Preferred Approach is therefore adaptable.

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

# 8

# Summary of Study Area 6

# 8 Summary of Study Area 6

The Preferred Approach for SA6 (summarised in **Error! Reference source not found.** 5.8 and Figure 5.5 of Section 5.4) consists of local WRZ supplies for 24 of the 28 WRZs in the Study Area, primarily driven by the small scale of the supplies and difficulties in transporting small volumes of water over long distances.

The preferred approach for Carlow Town, Mountbolus and Tullamore includes a connection to the GDA WRZ and the New Shannon Source respectively . The Preferred Approach for the remaining Water Resource Zones involves WRZ options and smaller transfers between 2 WRZs.

Delivery of the Preferred Approach will secure all of the supplies in the area in terms of Quality, Quantity, Sustainability and Resilience. The Preferred Approach for SA6 also includes for demand side (**Lose Less** and **Use Less**) measures, including.

- Ongoing leakage management including active leakage control, pressure management and find and fix activities to offset Natural Rate of Leakage Rise (NRR)
- 823 $m^3$ of net leakage reduction (applied to SDB deficit)
- Continuation of IW household and business water conservation campaigns, initiatives and education programmes
- The option to implement legally enforceable Water Conservation Orders in drought periods in order to protect the environment and our public water supplies

As part of our Preferred Approach we have also identified a range of interim solutions for SA6, as summarised in Table 6.1 in Section 6. The measures will only be progressed in the event of critical need and/or public health impact and to allow time for delivery of the required Preferred Approach solutions in the Study Area.

# Annex A

## Study Area 6 Water Treatment Plants

| WTP Asset Name | Local Plant Names |
|---|---|
| Rathvilly WTP | Rathvilly WTP |
| Sion Cross WTP | Sion Cross WTP |
| Oak Park WTP | Oak Park WTP |
| Raheenleigh WTP | Raheenleigh WTP |
| Bagenalstown WTP | Bagenalstown WTP |
| Royal Oak WTP | Royal Oak WTP |
| Tullow WTP | Tullow WTP |
| Leighlinbridge WTP | Leighlinbridge WTP |
| Old Leighlin WTP | Old Leighlin WTP |
| Bilboa WTP | Bilboa WTP |
| Clogh Castlecomer WTP | Clogh Castlecomer WTP |
| Glosha / Galmoy WTP | Galmoy WTP |
| Mountfinn WTP | Mountfinn WTP |
| Nannys Well WTP | Castlecomer (Old) WTP |
| Gorteen WTP | Gorteen WTP |
| Kilminchy WTP | Kilminchy WTP |
| Kyle WTP | Kyle WTP |
| Derryguille WTP | Derryguile WTP |
| Le Bergerie WTP | La Bergerie WTP |
| Derrymoyle WTP | Derrymoyle WTP |
| Lough WTP | Lough WTP |
| Meelick WTP | Meelick WTP |
| Aughafeerish WTP | Aughafeerish WTP |
| Ballyroan WTP | Ballyroan WTP |
| Fermoyle (Ballinakill) WTP | Fermoyle WTP |
| Cloonin Hill WTP | Cloonin Hill WTP |
| Swan WTP | Swan WTP |
| Knocks WTP | Knocks WTP |
| Five Wells WTPr | Five Wells WTP & Reservoir |
| Drim WTP | Drim WTP |
| Donaghmore WTP | Donaghmore WTP |
| Castle Durrow Convent WTP | Castle Durrow Convent WTP |
| Cloghoghue WTP | Cloghoge WTP |
| Rosenallis WTP | Rosenallis WTP |

| WTP Asset Name | Local Plant Names |
|---|---|
| Arles WTP | Arles WTP |
| Coolenaugh WTP | Coolenaugh WTP |
| Camross WTP | Camross WTP |
| The Strand WTP | The Strand WTP |
| Clonaslee WTP | Clonaslee WTP |
| Arden WTP | Ardan Boreholes WTP |
| Newgate Well WTP | Newgate Well WTP |
| Reservoir WTP | Mountbolus WTP |

# Annex B

# Study Area 6 Rejection Register Summary

Study Area 6 – Coarse Screening Rejection

| Option Reference | Option Description | Rejection Reasoning | Resilience | Deliverability & Flexibility | Sustainability (Environmental and Social Impacts) |
|---|---|---|---|---|---|
| TG4-SA6-01 | Increase SW abstraction from River Burren to supply deficit to Carlow Town | The plan has identified that this option does not have available yield to meet the DYCP demand. The option is therefore unviable and was not taken through to the fine screening stage. | ● | ● | ● |
| TG4-SA6-02a | Increase SW abstraction from River Slaney - Carlow North Regional abstraction - to supply deficit to Carlow Town | The plan has identified that this option does not have available yield to meet the DYCP demand. The option is therefore unviable and was not taken through to the fine screening stage. | ● | ● | ● |
| TG4-SA6-02b | Increase SW abstraction from River Slaney - Carlow North Regional abstraction - to supply deficit to Carlow Town | The plan has identified that this option does not have available yield to meet the DYCP demand. The option is therefore unviable and was not taken through to the fine screening stage. | ● | ● | ● |
| TG4-SA6-02c | Increase SW abstraction from River Slaney - Carlow North Regional abstraction - to supply deficit to Carlow Town | The plan has identified that this option does not have available yield to meet the DYCP demand. The option is therefore unviable and was not taken through to the fine screening stage. | ● | ● | ● |
| TG4-SA6-02d | Increase SW abstraction from River Slaney - Carlow North Regional abstraction - to supply deficit to Carlow Town | The plan has identified that this option does not have available yield to meet the DYCP demand. The option is therefore unviable and was not taken through to the fine screening stage. | ● | ● | ● |
| TG4-SA6-02e | Increase SW abstraction from River Slaney - Carlow North Regional | The plan has identified that this option does not have available yield to meet the DYCP demand. The option is therefore unviable and was not taken through to the fine screening stage. | ● | ● | ● |

| Option Reference | Option Description | Rejection Reasoning | Resilience | Deliverability & Flexibility | Sustainability (Environmental and Social Impacts) |
|---|---|---|---|---|---|
| | abstraction - to supply deficit to Carlow Town | | | | |
| TG4-SA6-02f | Increase SW abstraction from River Slaney - Carlow North Regional abstraction - to supply deficit to Carlow Town | The plan has identified that this option does not have available yield to meet the DYCP demand. The option is therefore unviable and was not taken through to the fine screening stage | ● | ● | ● |
| TG4-SA6-02g | Increase SW abstraction from River Slaney - Carlow North Regional abstraction - to supply deficit to Carlow Town | The plan has identified that this option does not have available yield to meet the DYCP demand. The option is therefore unviable and was not taken through to the fine screening stage | ● | ● | ● |
| TG4-SA6-03a | Increase SW abstraction from River Slaney - Tullow abstraction - to supply deficit to Carlow Town | The plan has identified that this option does not have available yield to meet the DYCP demand. The option is therefore unviable and was not taken through to the fine screening stage | ● | ● | ● |
| TG4-SA6-03b | Increase SW abstraction from River Slaney - Tullow abstraction - to supply deficit to Carlow Town | The plan has identified that this option does not have available yield to meet the DYCP demand. The option is therefore unviable and was not taken through to the fine screening stage. | ● | ● | ● |
| TG4-SA6-04b | Upgrade Srowland WTP (GDA WRZ) and supply deficit to Carlow town | This option requires transferring water via a significant length of pipeline over 23Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was considered not feasible at coarse screening stage due to age of water and possible sedimentation issues and not taken forward to fine screening. | | ● | |

| Option Reference | Option Description | Rejection Reasoning | Resilience | Deliverability & Flexibility | Sustainability (Environmental and Social Impacts) |
|---|---|---|---|---|---|
| TG4-SA6-06 | Upgrade Johnstown reservoir to improve storage in Carlow Town | Infrastructure involved in this option is to be included in detailed design for every feasible option, and for this reason it was screened out at coarse screening as it does not resolve the deficit for this WRZ on its own. | **Infrastructure involved in this option is to be included in detailed design and as a result, was not considered at the coarse screening stage** | | |
| TG4-SA6-10 | Supply deficit at Carlow Town from neighbouring GWS - Ballinabranna | This option requires pump tests to determine yield due to the need for a significant amount of supply. It also involves transferring water via a significant length of pipeline over 6Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was considered not feasible at coarse screening stage and not taken forward to fine screening. | • | • | • |
| TG4-SA6-11 | Supply Carlow Town from New Shannon Source via Portlaoise/Portarlington connection | This was considered as part of a grouped option to supply 4 WRZs from a New Shannon Source. The overall plan required a significant length of the pipeline over 80km, of which about 14 Km is required for a relatively small supply. Therefore, it was considered not feasible at coarse screening stage and not taken forward to fine screening. | | • | |
| TG4-SA6-12 | Upgrade Sion Cross WTP | The plan identified that the calculated sustainable abstraction at this source is not sufficient enough to meet demand.The option is therefore unviable and cannot be considered at the coarse screening stage and would not be advanced to the fine screening stage. | • | • | • |
| TG4-SA6-13 | Abandon Sion Cross WTP and augment Carlow Town WRZ with new GW | This option is the same as option TG4-SA6-09b and as a result would not be considered at coarse screening stage. TG4-SA6-09b is advanced to the fine screening stage. | **This option is a repeat and is assessed as part of a different feasible option** | | |
| TG4-SA6-14 | Increase GW abstraction to supply deficit at Leighlinbridge | When the unconstrained options list was originally drawn up this WRZ was identified as having a deficit; however, due to an updated SDB, which takes into account recent projects and leakage reduction there is no longer an identified deficit in this WRZ. Therefore, no new supply option is required. | **Leghlinbridge WRZ is no longer in deficit** | | |

| Option Reference | Option Description | Rejection Reasoning | Resilience | Deliverability & Flexibility | Sustainability (Environmental and Social Impacts) |
|---|---|---|---|---|---|
| TG4-SA6-15a | New SW abstraction from River Barrow for Leighlinbridge | This option would require a high cost developing new SW abstraction for a very small deficit. The option is therefore unviable and cannot be considered at the coarse screening stage and would not be advanced to the fine screening stage. | | ● | |
| TG4-SA6-15b | New SW abstraction from River Barrow for Leighlinbridge | This option requires transferring water via a significant length of pipeline over 3Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was considered not feasible at coarse screening stage due to age of water and sedimentation and not taken forward to fine screening. | | ● | |
| TG4-SA6-16a | Rationalise Leighlinbridge to Carlow town | The plan has identified that this option does not have available yield to meet the DYCP demand. The option is therefore unviable and was not taken through to the fine screening stage. | ● | ● | ● |
| TG4-SA6-16b | Rationalise Leighlinbridge to Carlow town | The plan has identified that this option does not have available yield to meet the DYCP demand. The option is therefore unviable and was not taken through to the fine screening stage. | ● | ● | ● |
| TG4-SA6-18 | Supply deficit at Leighlinbridge from neighbouring GWS - Ballinabranna | This option requires transferring water via a significant length of pipeline over 4Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore it was considered not feasible at coarse screening stage and not taken forward to fine screening. | | ● | |
| TG4-SA6-20 | New SW abstraction point from Old leighlin stream for Old Leighlin WRZ | This option would require a high cost developing new SW abstraction for a very small deficit. The option is therefore unviable and cannot be considered at the coarse screening stage and would not be advanced to the fine screening stage. | | ● | |
| TG4-SA6-21 | Rationalise Old Leighlin to Leighlinbridge | This option requires transferring water via a significant length of pipeline over 3Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore it was considered not feasible at coarse screening stage and not taken forward to fine screening. | | ● | |

| Option Reference | Option Description | Rejection Reasoning | Resilience | Deliverability & Flexibility | Sustainability (Environmental and Social Impacts) |
|---|---|---|---|---|---|
| TG4-SA6-22 | Rationalise Old Leighlin to Carlow town via Leighlinbridge | The plan has identified that this option does not have available yield to meet the DYCP demand. The option is therefore unviable and was not taken through to the fine screening stage. | • | • | • |
| TG4-SA6-23 | Supply deficit at Old Leighlin from Ballinabranna GWS | This option requires transferring water via a significant length of pipeline over 3Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore it was considered not feasible at coarse screening stage and not taken forward to fine screening. | | • | |
| TG4-SA6-25 | Rationalise Bilboa to Carlow Town WRZ | The plan has identified that this option does not have available yield to meet the DYCP demand. The option is therefore unviable and was not taken through to the fine screening stage. | • | • | • |
| TG4-SA6-26 | Supply deficit at Bilboa from Ballinabranna GWS | This option requires transferring water via a significant length of pipeline over 3Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore it was considered not feasible at coarse screening stage and not taken forward to fine screening. | | • | |
| TG4-SA6-27a | Increase GW abstraction at Bagnelstown to supply deficit | When unconstrained options list were originally drawn up this WRZ was identified as having a deficit; however, due to an updated SDB, which takes into account data improvements, there is no longer an identified deficit in this WRZ. Therefore, no new supply option is required. | **Bagenalstown WRZ is not in deficit** | | |
| TG4-SA6-28 | New SW abstraction from River Barrow for Bagenalstown | When unconstrained options list were originally drawn up this WRZ was identified as having a deficit; however, due to an updated SDB, which takes into account data improvements, there is no longer an identified deficit in this WRZ. Therefore, no new supply option is required. | **Bagenalstown WRZ is not in deficit** | | |
| TG4-SA6-29 | Rationalise Bagenalstown to Carlow Central Regional | When unconstrained options list were originally drawn up this WRZ was identified as having a deficit; however, due to an updated SDB, which takes into account data improvements, there is no longer an identified deficit in this WRZ. Therefore, no new supply option is required. | **Bagenalstown WRZ is not in deficit** | | |
| TG4-SA6-30 | Rationalise Bagenalstown to Gowran-Goresbridge-Paulstown (SA L) | When unconstrained options list were originally drawn up this WRZ was identified as having a deficit; however, due to an updated SDB, which takes into account data improvements, there is no longer an identified deficit in this WRZ. Therefore, no new supply option is required. | **Bagenalstown WRZ is not in deficit** | | |

| Option Reference | Option Description | Rejection Reasoning | Resilience | Deliverability & Flexibility | Sustainability (Environmental and Social Impacts) |
|---|---|---|---|---|---|
| TG4-SA6-31 | Interconnect Bagenalstown with Gowran-Goresbridge-Paulstown for increased resilience and supply deficit | When unconstrained options list were originally drawn up this WRZ was identified as having a deficit; however, due to an updated SDB, which takes into account data improvements, there is no longer an identified deficit in this WRZ. Therefore, no new supply option is required. | **Bagenalstown WRZ is not in deficit** | | |
| TG4-SA6-32a | New SW abstraction from River Slaney for Carlow Central Regional | This option would require a high cost developing new SW abstraction for a very small deficit. The option is therefore unviable and cannot be considered at the coarse screening stage and would not be advanced to the fine screening stage. | | ● | |
| TG4-SA6-32b | New SW abstraction from River Slaney for Carlow Central Regional | This option would require a high cost developing new SW abstraction for a very small deficit. The option is therefore unviable and cannot be considered at the coarse screening stage and would not be advanced to the fine screening stage. | | ● | |
| TG4-SA6-35a | Rationalise Carlow Central Regional to Carlow Town | The plan has identified that this option does not have available yield to meet the DYCP demand. The option is therefore unviable and was not taken through to the fine screening stage. | ● | ● | ● |
| TG4-SA6-35b | Rationalise Carlow Central Regional to Carlow Town (new source required for Carlow Town) | This option requires transferring water via a significant length of pipeline over 23Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was considered not feasible at coarse screening stage due to age of water and sedimentation and not taken forward to fine screening. | | ● | |
| TG4-SA6-36 | Supply Carlow Central Regional from New Shannon Source via Portlaoise/Portarlington connection and Carlow Town | This was considered as part of a grouped option to supply 4 WRZs from a New Shannon Source. The overall plan required a significant length of the pipeline over 80km, of which about 14 Km is required for a relatively small supply. Therefore, it was considered not feasible at coarse screening stage and not taken forward to fine screening. | | ● | |
| TG4-SA6-39 | Rationalise Urlingford-Johnstown to Galmoy-Rathdowney WRZ | This option is considered to be part of a grouped option. It requires transferring water via a significant length of pipeline over 8Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality | | ● | |

| Option Reference | Option Description | Rejection Reasoning | Resilience | Deliverability & Flexibility | Sustainability (Environmental and Social Impacts) |
|---|---|---|---|---|---|
| | | of the water. Therefore, it was considered not feasible at coarse screening stage and not taken forward to fine screening. | | | |
| TG4-SA6-40 | Interconnect Urlingford-Johnstown with Galmoy-Rathdowney WRZ for increased resilience and supply deficit | This option requires transferring water via a significant length of pipeline over 6Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was considered not feasible at coarse screening stage and not taken forward to fine screening. | | • | |
| TG4-SA6-41 | New SW abstraction from River Goul for Urlingford-Johnstown | This option requires a new SW abstraction, WTP and transfer of water via a significant length of pipeline over 1Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. The option is a high cost option for a very small supply. Therefore, it was considered not feasible at coarse screening stage and not taken forward to fine screening. | | • | |
| TG4-SA6-42 | Rationalise Urlingford-Johnstown to Fethard (Tipperary) WRZ | At the time of screening, a deficit was determined in Fethard (part of the SWRP) but determination of a preferred solution was required before assessing the feasibility of a rationalisation of Urlingford (EMR). This can be assessed at a later date, once the South West regional plan is finalised, to determine if a better outcome can be achieved. | **This option is to be assessed as part of a national plan** | | |
| TG4-SA6-43 | Supply deficit at Urlingford-Johnstown WS from neighbouring GWS - Baunmore, Moyne (Tipperary), Balief, Clomantagh and Graine | This option requires transferring water via a significant length of pipeline over 3Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was considered not feasible at coarse screening stage and not taken forward to fine screening. | | • | |
| TG4-SA6-44 | Increase GW abstraction at Clogh- | This option requires a new GW source of which pump tests will be required to determine available yield. This process is of a high cost for a relatively small | | • | |

| Option Reference | Option Description | Rejection Reasoning | Resilience | Deliverability & Flexibility | Sustainability (Environmental and Social Impacts) |
|---|---|---|---|---|---|
| | Castlecomer WS to supply deficit | supply and as a result is not considered feasible at coarse screening stage and is not taken forward to fine screening stage. | | | |
| TG4-SA6-45b | New GW abstraction/wellfield at Clogh-Castlecomer WS to supply deficit | This option is considered as part of a grouped option to rationalise Swan Public Water Supply to Clogh-Catlecomer WS. It involves the transfer of water over 5Km of pipeline for a relatively small supply. Transferring small amounts of water over long distances can affect the quality of water. Therefore, it is considered not feasible at coarse screening stage and would not be taken forward to fine screening stage. | | • | |
| TG4-SA6-46 | New GW abstraction/wellfield to supply deficit at Crettyard | This option is the same as option TG4-SA6-45b and as a result would not be considered at coarse screening stage and will not be taken forward to fine screening stage. TG4-SA6-45b is advanced to fine screening stage. | **This option is a repeat and is assessed as part of a different feasible option** | | |
| TG4-SA6-47 | Riverbank filtration from River Dinin for Clogh-Castlecomer | This option involves an abstraction close to the iver Dinin has potential to undermine the conservation objectives of R Nore SAC. Impact on the conservation objectives of the River Nore SAC are likely to impact the River Slaney which is a high status WFD water body. In addition, the option involves an abstraction above the plan identified sustainable abstraction limit. Making this a feasible option is considered likely to result in waterbody not achieving high WFD status and a greater risk of having adverse effects on this European site. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria. | • | • | • |
| TG4-SA6-48 | New SW abstraction from River Dinin to supply deficit for Clogh-Castlecomer | new abstraction from the River Dinin has potential to impact with conservation objectives of R Nore SAC. In addition, the option involves an abstraction above the plan identified sustainable abstraction limit. Making this a feasible option is considered likely to result in waterbody not achieving high WFD status and a greater risk of having adverse effects on this European site. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria. | • | • | • |

| Option Reference | Option Description | Rejection Reasoning | Resilience | Deliverability & Flexibility | Sustainability (Environmental and Social Impacts) |
|---|---|---|---|---|---|
| TG4-SA6-49a | New SW abstraction from River Clogh for Clogh-Castlecomer | This option requires a new SW source and a new WTP. This process is of a high cost for a relatively small supply and as a result is not considered feasible at coarse screening stage and is not taken forward to fine screening stage. | | ● | |
| TG4-SA6-50 | Increase GW abstraction at Gorteen to supplement Castlecomer | This option requires a new GW source of which pump tests will be required to determine available yield. This process is of a high cost for a relatively small supply and as a result is not considered feasible at coarse screening stage and is not taken forward to fine screening stage. | | ● | |
| TG4-SA6-51 | Interconnect Clogh-Castlecomer with The Swan for increased resilience with new GW | This option is considered as part of a grouped option that interconnects Swan Public Water Supply and Clogh-Castlecomer WS. It requires transferring water via a significant length of pipeline over 5Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore it was considered not feasible at coarse screening stage and not taken forward to fine screening. | | ● | |
| TG4-SA6-52 | New SW abstraction from Muckalee Impoundment and new WTP | This option requires transferring water via a significant length of pipeline over 9Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was considered not feasible at coarse screening stage and not taken forward to fine screening. | | ● | |
| TG4-SA6-53b | Increase GW abstraction to supply deficit at Galmoy-Rathdowney PWS | This option is considered as part of a grouped option that involves the rationalisation of Borris in Ossory PWS to Galmoy-Rathdowney PWS. It requires transferring water via a significant length of pipeline over 6Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was considered not feasible at coarse screening stage and not taken forward to fine screening. | | ● | |
| TG4-SA6-53c | Increase GW abstraction to supply deficit at Galmoy-Rathdowney PWS | This option is considered to be part of a grouped option. It requires transferring water via a significant length of pipeline over 8Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was considered not feasible at coarse screening stage and not taken forward to fine screening. | | ● | |

| Option Reference | Option Description | Rejection Reasoning | Resilience | Deliverability & Flexibility | Sustainability (Environmental and Social Impacts) |
|---|---|---|---|---|---|
| TG4-SA6-53d | Increase GW abstraction to supply deficit at Galmoy-Rathdowney PWS | This option requires transferring water via a significant length of pipeline over 6Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore it was considered not feasible at coarse screening stage and not taken forward to fine screening. | | ● | |
| TG4-SA6-55 | Supply deficit at Galmoy-Rathdowney PWS from neighbouring GWSs - Errill (Laois), Donaghmore (Laois), Ballacolla (Laois) | This option requires transferring water via a significant length of pipeline over 5Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore it was considered not feasible at coarse screening stage and not taken forward to fine screening. | | ● | |
| TG4-SA6-57d | New GW abstraction/wellfield development to supply deficit at Portlaoise PWS. | This option involves the rationalisation on 5 WRZs to Portlaoise WRZ and requires the transfer of water via a pipeline over 15Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of water. It was therefore considered not feasible at coarse screening stage and not taken forward to fine screening stage. Individual assessment of the WRZs should be considered. | | ● | |
| TG4-SA6-57f | New GW abstraction/wellfield development to supply deficit at Portlaoise PWS. | This option requires transferring water via a significant length of pipeline over 7Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore it was considered not feasible at coarse screening stage and not taken forward to fine screening. | | ● | |
| TG4-SA6-57g | New GW abstraction/wellfield development to supply deficit at Portlaoise PWS. | This option is to be assessed as part of Group 18 and as a result will not be assessed at the coarse screening stage and not taken forward to fine screening stage. Group 18 is advanced to fine screening stage. | **This option is a repeat and is assessed as part of a different feasible option** | | |
| TG4-SA6-57h | New GW abstraction/wellfield development to supply deficit at Portlaoise PWS. | This option is to be assessed as part of Group 18 and as a result will not be assessed at the coarse screening stage and not taken forward to fine screening stage. Group 18 is advanced to fine screening stage. | **This option is a repeat and is assessed as part of a different feasible option** | | |

| Option Reference | Option Description | Rejection Reasoning | Resilience | Deliverability & Flexibility | Sustainability (Environmental and Social Impacts) |
|---|---|---|---|---|---|
| TG4-SA6-57i | New GW abstraction/wellfield development to supply deficit at Portlaoise PWS. | This option is only feasible when assessed as a part of a Group connection and as a result the individual/ local option will not be assessed at the coarse screening stage and not taken forward to fine screening stage. | | • | |
| TG4-SA6-57k | New GW abstraction/wellfield development to supply deficit at Portlaoise PWS. | This option requires transferring water via a significant length of pipeline over 8Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore it was considered not feasible at coarse screening stage and not taken forward to fine screening. | | • | |
| TG4-SA6-58 | New SW abstraction from River Triogue for Portlaoise | The plan has identified that the sustainable action from the source in this option would only meet less than 20% of the deficit in the WRZ. The option was considered unviable and as a result was not taken forward to fine screening stage. | • | • | • |
| TG4-SA6-59 | Supply Portlaoise from New Shannon Source Pipeline | This option requires transferring water via a significant length of pipeline over 30Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore it was considered not feasible at coarse screening stage due to age of water and sedimentation and not taken forward to fine screening. Option should be assessed as part of a grouped option. | | • | |
| TG4-SA6-60 | Supply Portlaoise from New Shannon Source | This was considered as part of a grouped option to supply 4 WRZs from a New Shannon Source. The overall plan required a significant length of the pipeline over 80km, of which about 14 Km is required for a relatively small supply. Therefore it was was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | • | |
| TG4-SA6-65 | New GW abstraction to supply deficit in Rosenallis - Rosenallis gravels GWB | This option requires transferring water via a significant length of pipeline over 0.4Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | • | |

| Option Reference | Option Description | Rejection Reasoning | Resilience | Deliverability & Flexibility | Sustainability (Environmental and Social Impacts) |
|---|---|---|---|---|---|
| TG4-SA6-67a | Rationalise Rosenallis to Mountmellick WRZ | This option is part of a group option to rationalise Rosenallis to Mountmellick WRZ and requires transferring water via a significant length of pipeline over 3Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was rejected at coarse screening stage and would not be taken forward to fine screening stage.Individual assessment of the WRZs should be considered | | ● | |
| TG4-SA6-67b | Rationalise Rosenallis to Mountmellick WRZ | This option is part of a group option to rationalise Rosenallis to Mountmellick WRZ and requires transferring water via a significant length of pipeline over 3Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was rejected at coarse screening stage and would not be taken forward to fine screening stage.Individual assessment of the WRZs should be considered | | ● | |
| TG4-SA6-68 | Rationalise Rosenallis to Tullamore North WRZ | This option requires transferring water via a significant length of pipeline over 4Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | ● | |
| TG4-SA6-69b | Increase GW abstraction to supply deficit at Mountmellick 1 PWS | This option requires transferring water via a significant length of pipeline over 3Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | ● | |
| TG4-SA6-70 | Rationalise Mountmellick to Portlaoise | This option requires transferring water via a significant length of pipeline over 7Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was rejected at coarse screening stage and would not be taken forward to fine screening stage.. | | ● | |
| TG4-SA6-72b | Riverbank filtration from River Barrow for Mountmellick | This option requires transferring water via a significant length of pipeline over 3Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | ● | |

| Option Reference | Option Description | Rejection Reasoning | Resilience | Deliverability & Flexibility | Sustainability (Environmental and Social Impacts) |
|---|---|---|---|---|---|
| TG4-SA6-74 | Supply deficit at Mountmellick 1 PWS from Killeigh/Cloneygowen GWS (Offaly) | This option requires transferring water via a significant length of pipeline over 8Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. As better alternatives were identified, it was therefore was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | • | |
| TG4-SA6-75b | Conjunctive use of River Barrow (new SW abstraction or riverbank filtration) during winter and local GW during summer for Mountmellick | This option requires transferring water via a significant length of pipeline over 8Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | • | |
| TG4-SA6-76 | New river abstraction from the Owenass River (CFRAM study - flood alleviation scheme underway) for Mountmellick | This option is a high cost option requiring a new WTP that would not meet the WRZ deficit. It was therefore considered to be unviable and as a result was rejected at coarse screening stage and would not be taken forward to fine screening stage. | • | • | • |
| TG4-SA6-79 | Supply deficit at Portarlington from Killeigh/Cloneygowen GWS (Offaly) | This option requires a significant yield and pump tests required to confirm yield. It also involves transferring water via a significant length of pipeline over 10Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore it was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | • | |
| TG4-SA6-81 | Rationalise Portarlington to GDA - supply deficit from Monasterevin wellfield | This option requires transferring water via a significant length of pipeline over 10Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore it was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | • | |

| Option Reference | Option Description | Rejection Reasoning | Resilience | Deliverability & Flexibility | Sustainability (Environmental and Social Impacts) |
|---|---|---|---|---|---|
| TG4-SA6-82 | Interconnect Portarlington with Portlaoise for increased resilience | This option requires transferring water via a significant length of pipeline over 13Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore it was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | ● | |
| TG4-SA6-83 | Supply Portarlington from New Shannon Source Pipeline | This was considered as part of a grouped option to supply 4 WRZs from a New Shannon Source. The overall plan required a significant length of the pipeline over 80km, of which about 14 Km is required for a relatively small supply. Therefore it was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | ● | |
| TG4-SA6-84 | Rationalise Portarlington to GDA WRZ - Srowland WTP | This option requires transferring water via a significant length of pipeline over 17Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore it was rejected at coarse screening stage and would not be taken forward to fine screening stage.. | | ● | |
| TG4-SA6-85a | Conjunctive use of Srowland WTP (increase WTP capacity) during winter and local GW during summer for Portarlington | This option requires transferring water via a significant length of pipeline over 17Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | ● | |
| TG4-SA6-85b | Conjunctive use of River Barrow (increase WTP capacity) during winter and local GW during summer for Portarlington | This option requires transferring water via a significant length of pipeline over 16Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was rejected at coarse screening stage and would not be taken forward to fine screening stage.. | | ● | |
| TG4-SA6-86b | Increase GW abstraction to supply deficit at Arles | This option requires transferring water via a significant length of pipeline over 6Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it v | | ● | |

| Option Reference | Option Description | Rejection Reasoning | Resilience | Deliverability & Flexibility | Sustainability (Environmental and Social Impacts) |
|---|---|---|---|---|---|
| TG4-SA6-87 | Look at options for The Strand, Coolanagh and Arles as 1 scheme. | This option has been split out and considered as part of other grouped options. Therefore it was rejected at coarse screening stage and would not be taken forward to fine screening stage. | **This option is a repeat and is assessed as part of a different feasible option** | | |
| TG4-SA6-88 | Rationalise Arles to Swan WRZ | This option is part of a grouped option to rationalise Arles to Swan WRZ and requires transferring water via a significant length of pipeline over 5Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore it was was rejected at coarse screening stage and would not be taken forward to fine screening stage.Individual assessment of WRZs is considered. | | ● | |
| TG4-SA6-89 | Rationalise Arles to Carlow Town WRZ | The plan has identified that this option does not have available yield at Rathvilly to meet the DYCP demand. The option is therefore unviable and was not taken through to the fine screening stage. | ● | ● | ● |
| TG4-SA6-92 | Rationalise The Strand to Carlow Town WRZ | The plan has identified that this option does not have available yield at Rathvilly to meet the DYCP demand. The option is therefore unviable and was not taken through to the fine screening stage. | ● | ● | ● |
| TG4-SA6-93 | Connect The Strand PWS to Arles | This option requires transferring water via a significant length of pipeline over 6Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | ● | |
| TG4-SA6-95 | New SW abstraction from River Douglas for Coolanagh | This option is a high cost option to develop a new SW abstraction for a relatively small supply. It was considered unviable and as a result not feasible at coarse screening stage and would not be taken forward to fine screening stage. | | ● | |
| TG4-SA6-96 | Rationalise Coolanagh to Swan WRZ | This option requires transferring water via a significant length of pipeline over 7Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was considered not feasible at coarse screening stage and not taken forward to fine screening. | | ● | |
| TG4-SA6-97 | Rationalise Coolanagh to Carlow Town WRZ | The plan has identified that this option does not have available yield at Rathvilly to meet the DYCP demand. The option is therefore unviable and was not taken through to the fine screening stage. | | ● | |

| Option Reference | Option Description | Rejection Reasoning | Resilience | Deliverability & Flexibility | Sustainability (Environmental and Social Impacts) |
|---|---|---|---|---|---|
| TG4-SA6-98 | Connect Coolanagh PWS to Arles | This option requires transferring water via a significant length of pipeline over 6Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | • | |
| TG4-SA6-100 | Riverbank filtration from River Nore for Borris in Ossory | This option requires a new abstraction, WTP and transfer of water via a significant length of pipeline over 3Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. It is also deemed a high cost option and therefore it was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | • | |
| TG4-SA6-101 | Rationalise Borris in Ossory to Mountrath WRZ | This option requires transferring water via a significant length of pipeline over 7Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | • | |
| TG4-SA6-102 | Rationalise Borris in Ossory to Galmoy-Rathdowney WRZ (Kilkenny) | This option is considered as part of a grouped option that involves the rationalisation of Borris in Ossory PWS to Galmoy-Rathdowney PWS. It requires transferring water via a significant length of pipeline over 6Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | • | |
| TG4-SA6-103 | Supply deficit at Borris in Ossory from neighbouring GWS - Ballacolla GWS | This option requires transferring water via a significant length of pipeline over 6Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | • | |
| TG4-SA6-106b | New GW abstraction to supply deficit in South East Regional; replace existing spring source with new BHs (Timahoe gravels groundwater body) | This option requires transferring water via a significant length of pipeline over 11Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it v was rejected at coarse screening stage and would not be taken forward to fine screening stage.. | | • | |

| Option Reference | Option Description | Rejection Reasoning | Resilience | Deliverability & Flexibility | Sustainability (Environmental and Social Impacts) |
|---|---|---|---|---|---|
| TG4-SA6-106c | New GW abstraction to supply deficit in South East Regional; replace existing spring source with new BHs (Timahoe gravels groundwater body) | This option requires transferring water via a significant length of pipeline over 9Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | • | |
| TG4-SA6-106d | New GW abstraction to supply deficit in South East Regional; replace existing spring source with new BHs (Timahoe gravels groundwater body) | This option requires transferring water via a significant length of pipeline over 7Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | • | |
| TG4-SA6-107 | Rationalise South East Regional PWS to GDA WRZ - Srowland WTP | This option requires transferring water via a significant length of pipeline over 11Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | • | |
| TG4-SA6-108 | New SW abstraction from River Strandbally for South East Regional | The plan has identified that this option is likely to be above sustainable abstraction limits. Making this a feasible option is considered likely to result in the waterbody not achieving high WFD status and also to result in a greater risk of having adverse effects on this European site. Therefore, this option did not meet the requirements of the Environmental, Resilience or Deliverability criteria. | • | • | • |
| TG4-SA6-110 | Interconnect South East Regional PWS with Portlaoise WRZ for increased resilience | This option requires transferring water via a significant length of pipeline over 5Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was rejected at coarse screening stage and would not be taken forward to fine screening stage.. Option is assessed as part of a new source option. | | • | |

| Option Reference | Option Description | Rejection Reasoning | Resilience | Deliverability & Flexibility | Sustainability (Environmental and Social Impacts) |
|---|---|---|---|---|---|
| TG4-SA6-111 | Supply deficit at South East Regional from neighbouring GW - The Heath GWS | This option requires transferring water via a significant length of pipeline over 6Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | ● | |
| TG4-SA6-113b | Increase GW abstraction to supply deficit Swan PWS | This option is part of a grouped option to rationalise Arles to Swan WRZ and requires transferring water via a significant length of pipeline over 5Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it v was rejected at coarse screening stage and would not be taken forward to fine screening stage. Individual assessment of WRZs is considered. | | ● | |
| TG4-SA6-113d | Increase GW abstraction to supply deficit at Swan PWS | This option requires transferring water via a significant length of pipeline over 7Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | ● | |
| TG4-SA6-114 | Rationalise Swan WRZ to South East Regional PWS | This option requires transferring water via a significant length of pipeline over 11Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | ● | |
| TG4-SA6-115 | Improve existing interconnection of Swan and South East Regional PWS for increased resilience | This option requires transferring water via a significant length of pipeline over 7Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, was rejected at coarse screening stage and would not be taken forward to fine screening stage.. | | ● | |
| TG4-SA6-116 | Rationalise Swan WRZ to Clogh-Castlecomer WRZ (Kilkenny) | This option is considered as part of a grouped option to rationalise Swan PWS to Clogh-Catlecomer WS. It involves the transfer of water over 5Km of pipeline for a relatively small supply. Transferring small amounts of water over long distances can affect the quality of water. Therefore, it was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | ● | |

| Option Reference | Option Description | Rejection Reasoning | Resilience | Deliverability & Flexibility | Sustainability (Environmental and Social Impacts) |
|---|---|---|---|---|---|
| TG4-SA6-117 | Interconnect Swan with Clogh-Castlecomer WRZ (Kilkenny) for increased resilience | This option is considered as part of a grouped option that interconnects Swan PWS and Clogh-Castlecomer WS. It requires transferring water via a significant length of pipeline over 5Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | ● | |
| TG4-SA6-118b | Increase GW abstraction at Cloonin Hill WTP to supply deficit | This option requires transferring water via a significant length of pipeline over 7Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | ● | |
| TG4-SA6-124 | Improve interconnection of Mountrath and Portlaoise WRZs for increased resilience | This option requires transferring water via a significant length of pipeline over 8Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, v was rejected at coarse screening stage and would not be taken forward to fine screening stage.. | | ● | |
| TG4-SA6-125 | Supply deficit at Mountrath from neighbouring GWS - Ballacolla GWS | This option requires transferring water via a significant length of pipeline over 5Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | ● | |
| TG4-SA6-127b | New GW abstraction to supply deficit at Abbeyliex South and abandon existing spring | This option requires transferring water via a significant length of pipeline over 6Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, was rejected at coarse screening stage and would not be taken forward to fine screening stage.. | | ● | |
| TG4-SA6-127c | New GW abstraction to supply deficit at Abbeyliex South and abandon existing spring | This option requires transferring water via a significant length of pipeline over 3Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, was rejected at coarse screening stage and would not be taken forward to fine screening stage.. | | ● | |
| TG4-SA6-129 | Supply deficit at Abbeyliex South from | This option requires transferring water via a significant length of pipeline over 6Km for a relatively small supply. Transferring small quantities of water over | | ● | |

| Option Reference | Option Description | Rejection Reasoning | Resilience | Deliverability & Flexibility | Sustainability (Environmental and Social Impacts) |
|---|---|---|---|---|---|
| | neighbouring GWS - Ballacolla GWS | long distances can affect the quality of the water. Therefore, v was rejected at coarse screening stage and would not be taken forward to fine screening stage.. | | | |
| TG4-SA6-130 | Supply deficit at Abbeyliex South from neighbouring GWS - Ballacolla GWS | This option requires transferring water via a significant length of pipeline over 2Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, was rejected at coarse screening stage and would not be taken forward to fine screening stage.. | | • | |
| TG4-SA6-136 | New SW abstraction from River Owveg and new WTP for Ballinakill | This option involves a new source which would be too costly for a very small demand. It was deemed unviable and therefore was rejected at coarse screening stage and would not be taken forward to fine screening stage.. Other alternatives have been considered for this option | | • | |
| TG4-SA6-137 | New riverbank filtration abstraction at River Owveg for Ballinakill | This option involves a new source which would be too costly for a very small demand. It was deemed unviable and therefore was rejected at coarse screening stage and would not be taken forward to fine screening stage.Other alternatives have been considered for this option | | • | |
| TG4-SA6-140 | Rationalise Ballinakill to Portlaoise WRZ | Option is only feasible when assessed as part of a grouped option. As a result, this individual option was considered not feasible at coarse screening stage and not taken forward to fine screening stage. | | • | |
| TG4-SA6-141 | Rationalise Ballinakill to Abbeyliex South WRZ (new source required) | This option requires transferring water via a significant length of pipeline over 3Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, was rejected at coarse screening stage and would not be taken forward to fine screening stage.. | | • | |
| TG4-SA6-144c | Increase GW abstraction at Fermoyle WTP to supply deficit | This is a duplicate option and has been assessed in another option | **This option is a repeat and is assessed as part of a different feasible option** | | |
| TG4-SA6-146 | Supply deficit at Durrow from neighbouring GWS - Cullahill GWS | The source is not productive, and unlikely that is can provide the required supply to resolve the full deficit. The option is therefore deemed unviable and as a result is not feasible at coarse screening stage and would not be taken forward to fine screening stage. | • | • | • |

| Option Reference | Option Description | Rejection Reasoning | Resilience | Deliverability & Flexibility | Sustainability (Environmental and Social Impacts) |
|---|---|---|---|---|---|
| TG4-SA6-147 | Rationalise Durrow to Portlaoise WRZ | This option involves the rationalisation on 5 WRZs to Portlaoise WRZ and requires the transfer of water via a pipeline over 15Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of water. It was rejected at coarse screening stage and would not be taken forward to fine screening stage.. Individual assessment of the WRZs should be considered. | | ● | |
| TG4-SA6-148 | Supply deficit at Abbeyleix North from neighbouring GWS - Ballypickas GWS | There is already a connection that currently supplies into the GWS, providing resilience between the 2 schemes, and therefore this option was not considered necessary. As a result this option will not be taken forward to fine screening stage. | | ● | |
| TG4-SA6-150b | New GW abstraction to supply deficit at Abbeyleix North and abandon existing spring | This option requires transferring water via a significant length of pipeline over 6Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was considered not feasible at coarse screening stage and not taken forward to fine screening. | | ● | |
| TG4-SA6-151 | Supply deficit at Abbeyleix North from neighbouring GWS - Ballacolla GWS | This option requires a pump test to confirm yield availability and the transfer of water via a significant length of pipeline over 6Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | ● | |
| TG4-SA6-158 | Rationalise Ballyroan to South East Regional WRZ | This option requires transferring water via a significant length of pipeline over 9Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | ● | |
| TG4-SA6-159 | Rationalise Ballyroan to Abbeyleix North WRP | This option requires transferring water via a significant length of pipeline over 6Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | ● | |
| TG4-SA6-160 | Rationalise Ballyroan to Abbeyleix South WRP | This option requires transferring water via a significant length of pipeline over 6Km for a relatively small supply. Transferring small quantities of water over | | ● | |

| Option Reference | Option Description | Rejection Reasoning | Resilience | Deliverability & Flexibility | Sustainability (Environmental and Social Impacts) |
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| | | long distances can affect the quality of the water. Therefore, was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | | |
| TG4-SA6-161 | Supply deficit at Ballyroan from neighbouring GWS - Ballypickas GWS | This option requires transferring water via a significant length of pipeline over 4Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | • | |
| TG4-SA6-162 | New SW abstraction from River Ballyroan to supply deficit for Ballyroan WRZ | This option requires transferring water via a significant length of pipeline over 6Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, was rejected at coarse screening stage and would not be taken forward to fine screening stage. | | • | |
| TG4-SA6-171 | Increase SW abstraction from Gorragh River to partly supply deficit in Tullamore | The desktop assessments undertaken in this plan identify that the sustainable abstraction for this source can only supply approximately less than 1% of the deficit. The option was therefore deemed unviable and as a result was rejected at coarse screening stage and would not be taken forward to fine screening stage. | • | • | • |
| TG4-SA6-172 | Increase SW abstraction from Clodiagh River to partly supply deficit in Tullamore | The desktop assessments undertaken in this plan identify that the sustainable abstraction for this source can only supply approximately less than 1% of the deficit. The option was therefore deemed unviable and as a result was rejected at coarse screening stage and would not be taken forward to fine screening stage. | • | • | • |
| TG4-SA6-173 | New SW abstraction from Tullamore U.D.C. to partly supply deficit in Tullamore | The desktop assessments undertaken in this plan identify that the sustainable Bstraction for this source can only supply a small portion of the deficit. The option was therefore deemed unviable and as a result was rejected at coarse screening stage and would not be taken forward to fine screening stage. | • | • | • |
| TG4-SA6-177b | New GW abstraction/wellfield from Tullamore groundwater body | This option requires transferring water via a significant length of pipeline over 4Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, this option was rejected at coarse screening stage and not taken forward to fine screening. | | • | |

| Option Reference | Option Description | Rejection Reasoning | Resilience | Deliverability & Flexibility | Sustainability (Environmental and Social Impacts) |
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| | (karstic bedrock) to partly supply deficit | | | | |
| TG4-SA6-178 | Interconnect Tullamore and Mullingar WRZs for increased resilience | This option requires the interconnection of Tullamore and Mullingar to increase resilience in the supply network. However, the assessments undertaken identified that Mullingar does not have the capacity to satisfy the supply demand balance deficit required. . It was therefore deemed unviable and as a result was rejected at coarse screening stage and was not taken forward to fine screening stage. | | • | |
| TG4-SA6-179 | Supply part of the deficit at Tullamore from neighbouring Kelleigh/Cloneygowen GWS | This option requires transferring water via a significant length of pipeline over 15Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was considered not feasible at coarse screening stage and not taken forward to fine screening. | | • | |
| TG4-SA6-181 | Increase GW abstraction at Newgate Well and upgrade Newgate Well WTP (poorly productive bedrock) | The existing source is not productive, and unlikely that it can provide the required supply to resolve the full deficit, particularly during critical periods. The option is therefore deemed unviable and as a result is not feasible at coarse screening stage and would not be taken forward to fine screening stage. | • | • | • |
| TG4-SA6-182 | Increase GW abstraction at Village Well and upgrade Mountbolus WTP (poorly productive aquifer) | The existing source is not productive, and unlikely that it can provide the required supply to resolve the full deficit, particularly during critical periods. The option is therefore deemed unviable and as a result is not feasible at coarse screening stage and would not be taken forward to fine screening stage. | • | • | • |
| TG4-SA6-183 | Rationalise Mountbolus to Rahan WRZ (approx. 6km to Holmshill WTP) | This option requires transferring water via a significant length of pipeline over 6Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, this option was rejected at coarse screening stage and not taken forward to fine screening. | | • | |

| Option Reference | Option Description | Rejection Reasoning | Resilience | Deliverability & Flexibility | Sustainability (Environmental and Social Impacts) |
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| | to supply deficit and increase resilience | | | | |
| TG4-SA6-189 | Tanker water when required for Mountbolus | Tankering is not a robust, resilient, long term solution for any WRZ within the region and for this reason, is not taken forward to fine screening | **This option is a tactical option and is unlikely to meet the full deficit. This will likely be implemented along with a new supply option** | | |
| TG4-SA6-190 | Supply deficit at Mountbolus from nearby Ballyboy GWS (approx. distance 4km, new watermains and network upgrades required) | This option requires transferring water via a significant length of pipeline over 4Km for a relatively small supply. Transferring small quantities of water over long distances can affect the quality of the water. Therefore, it was considered not feasible at coarse screening stage and not taken forward to fine screening. | | • | |
| TG4-SA6-192 | New SW abstraction from River Burren to meet deficit for Carlow Central Regional, requiring new abstraction intake works and new WTP for 1 MLD supply, plus approx. new 3.5 km pipe to Ballon SR. | Option involves abstracting above 10% of Q95 which is not within the design guidelines. It was therefore deemed not viable and as a result this option was rejected at coarse screening stage and was not taken forward to fine screening stage. | • | • | • |
| TG4-SA6-198 | WTP Upgrade | When the unconstrained options list were originally drawn up this WRZ was not identified as having a deficit; however, due to an updated SDB, which takes into account data improvements, there is now an identified deficit in this WRZ. Therefore, a new supply option is required. | **Mountbolus WRZ is now in deficit** | | |