SEVERN TRENT WATER

Revised draft Water Resources Management Plan 2013

Our proposals for the next 25 years

Revised Draft Water Resources Management Plan 2013

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1 Executive Summary

This draft Water Resources Management Plan (WRMP) builds on the strategy set out in our previous WRMP published in 2010. The plan explains our proposals for making sure we have enough water available, in the right place and at the right time to supply our customers in an affordable and sustainable way over the next 25 years.

Over recent years, we have made significant investment in our assets and have improved our operations to deliver a better and more secure water supply system. We have reduced leakage to its lowest ever level and have exceeded our water efficiency targets, meaning that we and our customers are more water efficient than ever before. As a result, we currently have sufficient water resources to meet all of our customers' needs. We were proud to be able to maintain supplies to our customers throughout the recent drought of 2011/12 without the need to impose restrictions on water use.

However, over the next 25 years we face a number of challenges which we must address in order to maintain reliable water supplies to customers. They include:

- replacing approximately 85 million litres per day of licensed water abstraction that is no longer environmentally sustainable;
- meeting the demand for water from the additional 1.6 million people expected to be living in the region;
- coping with potential lower river flows during dry periods as a result of climate change; and
- ensuring that we invest at an appropriate rate to address asset deterioration as our network ages.

The views of our customers and key stakeholders have informed our strategy to meet these future challenges. Our strategy also meets the policy and planning expectations set out in the Environment Agency's *Water Resources Planning Guidelines 2012*.

We published our draft WRMP in May 2013 and invited stakeholders to comment on our proposed strategy. We have listened to their views and as a result have revised the following aspects of our long term strategy:

- We have updated the timing and impacts of the Habitats Directive changes to Elan Valley reservoirs.
- We have set ourselves a more challenging leakage reduction target for AMP6, which is double that proposed in the draft plan.
- We will work to increase the uptake of household meters by 22,000 more than previously proposed.
- We have removed the need for the longer term new water resource schemes that were proposed in the draft plan.

We have also updated the text in our draft WRMP document to better explain the thinking behind our strategy. We make clearer:

- How customers' views have shaped our chosen plan.
- How environmental considerations have shaped our chosen plan.
- Our catchment management and partnership working approach.

We have now published this revised draft WRMP to make clear how and where stakeholders' views have shaped our strategy. We have highlighted within this document where the text has changed from the consultation version published in May. We have also published alongside this revised draft WRMP a full list of the comments received during the public consultation period along with our responses.

Overview of our proposed strategy

Our strategy is to reduce the overall demand for water and to make the best use of our existing water resources through a more flexible and sustainable supply system. To achieve this, we will:

- Reduce waste by driving leakage down;
- Reduce the demand for water, by working in partnership with our customers to help them become more water efficient;
- Improve our ability to deploy existing resources flexibly and efficiently;
- Use water trading to make more efficient use of our resources and improve resilience;
- Develop new sources of water when required, with a focus on expanding our existing sources first.
- Use proactive catchment management measures to protect our sustainable sources of drinking water supply from pollution risks.

This strategy will allow us to reduce our impact on the water environment, continue to meet future demands for water and be better able to cope with long term uncertainties. Our proposals also give us the flexibility to adapt over the next 25 years as our understanding of future planning uncertainties improves.

In the short to medium term, our strategy is driven by the need to address environmentally unsustainable levels of water abstraction. We will do this by reducing the amount of water we take from the environment, by providing local environmental improvements and by providing alternative sources of water supply where necessary.

In the longer term, our strategy deals with the significant uncertainties around the potential impacts of climate change on water resources. We will continue with our long term drive to reduce the amount of water we abstract, and we will increase the flexibility and capacity of our Strategic Grid to cope with future supply uncertainties.

The headline activities that will help us achieve our strategy over the next 25 years are that we will:

- Continue to drive leakage down to record low levels, with a reduction of around 6% by 2020. This is a doubling of the leakage reduction that was included in our draft WRMP, and is in response to the challenge from our stakeholders that our leakage reduction plans should be more ambitious. Our plan will mean we exceed Government's aspirations of at least a 3% reduction in leakage by 2020.

- Help our customers reduce their demand for water by accelerating our current water efficiency activities.

- Continue with household metering at a pace led by our customers through the uptake of the free meter option. We expect to install around 672,000 free household meters over the next 25 years, which is 22,000 more than were included in our draft WRMP. We will achieve this by increasing our customers' education and awareness of the potential benefits of having a metered supply

- Give up around 85Ml/d of water abstraction licences suspected to be causing environmental harm.

- Provide alternative supplies to customers where the current sources of supply are considered likely to be environmentally unsustainable.

- Increase the deployable output of our Strategic Grid by improving the flexible operation of the system, creating new strategic links and providing new sources of water supply.

- Make new strategic links to our neighbouring water supply companies and beyond, making better use of existing resources and improving supply resilience.

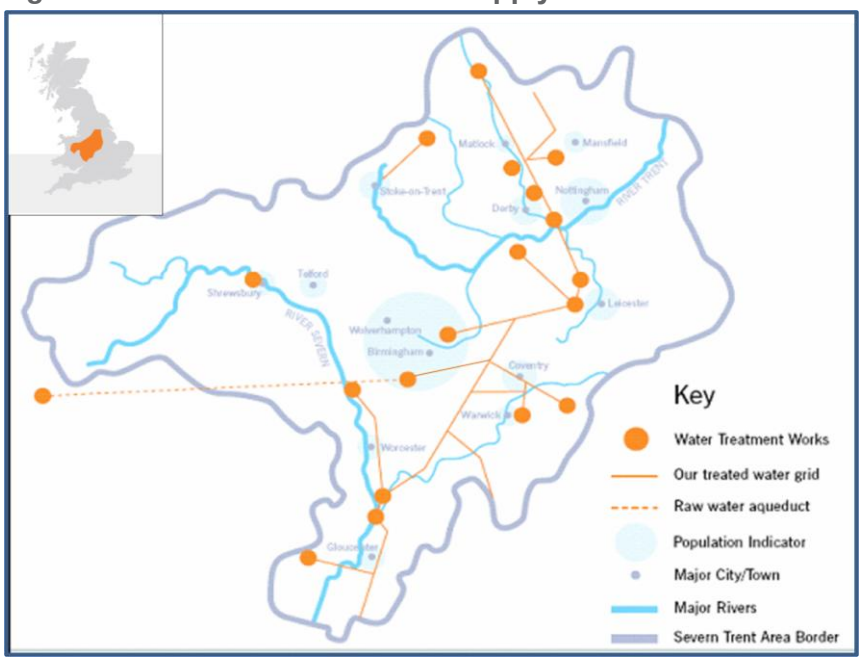
The proposals in our draft WRMP are integrated with our wider capital maintenance and water quality investment plans to ensure reliable and sustainable output from our existing sources.

The main body of our draft WRMP explains our proposals in more detail, along with the methods, assumptions and datasets that we have used to inform our strategy. Within our plan you will find our projections of population and future water demand, along with our estimates of future water resource availability. The draft WRMP quantifies the scale of the long term water supply challenge that we face in our region, and explains the risks and uncertainties that we have taken into account.

2 About Severn Trent Water

We provide clean water – the water our customers drink – to 7.7 million people, and sewerage services – the wastewater we take away – to 8.7 million people in an area covering 21,000 square kilometres in the Midlands and mid-Wales. We are one of the largest water companies in England and Wales, and are listed on the London Stock Exchange in the FTSE100.

Figure 2.1: Severn Trent Water's supply network.



2.1 The main facts about what we do

- We clean 1.8 billion litres – the equivalent of 720 Olympic swimming pools – of drinking water every day.
- We do this at 126 water treatment works.
- We deliver it through our 47,000 kilometre network of water mains – approximately three times the distance between Birmingham and Sydney.
- Our customers are among the most water-efficient in the country, using an average of 126 litres a day for each person.
- We take away 2.4 billion litres of wastewater every day.
- We do this through our 91,000 kilometre network of sewers and drains – approximately five times the distance between Birmingham and Sydney.
- We clean the water at 1,026 sewage treatment works, before putting it back into nearby rivers.

Since privatisation in 1989, we have invested £10 billion to make improvements to our network of pipes and treatment works. As well as 'keeping the taps running', the benefits we have delivered include:

- new, higher water-quality standards (we have some of the highest-quality drinking water in the world);
- a reduction in the number of serious sewage pollution incidents (in 1994 there were 238 incidents in which raw sewage entered rivers; in 2010, there were four of these incidents);
- cleaner rivers than at any time since the Industrial Revolution; and
- the number of properties at risk of receiving low water pressure reduced from over 23,000 in 1991 to just under 250 in 2011.

But we still face significant challenges and have more to do. For example, despite the investments we have made, 15% of our water mains and 20% of our sewers are more than 100 years old.

We are trusted to provide a vital service, but we are also directly responsible for the jobs of 5,100 people and many more through our contract partners and supply chains. Our operations affect the environment and we must ensure we do not cause damage by taking too much water out or not properly treating wastewater before it is put back into rivers and watercourses. We also affect the local communities, and numerous sporting and leisure clubs that use our facilities. We take the full range of our responsibilities seriously.

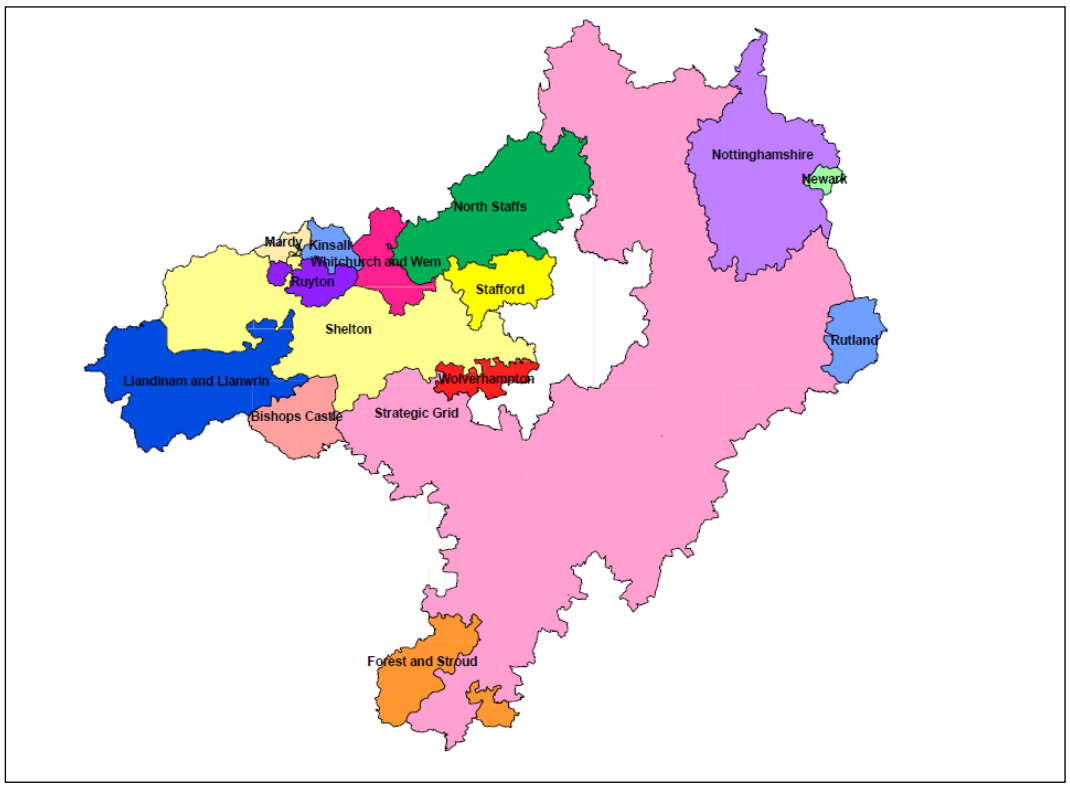
We work with our customers and stakeholders on a daily basis to ensure we can successfully deliver the vital services expected of us. We work with customers to conserve water and to reduce sewer blockages caused by fats and oils being poured down sinks and drains. We are increasingly working with farmers and landowners to reduce pollution entering into our region's rivers as we recognise that further improvements are only possible if we all contribute. We are also working with local authorities, the Environment Agency, Natural England, customer representatives including the Consumer Council for Water, other local groups and regulators.

For further information on our business, please visit www.stwater.co.uk.

2.2 Our water resource zones

For the purposes of water resources planning, we divide the company supply area up into 15 water resources zones. These zones vary widely in scale, from the Strategic Grid zone which supplies the majority of our customers, to the small zones of Mardy and Bishops Castle which supply much smaller populated areas.

Figure 2.2: Severn Trent Water's water resource zones



Our zones have very different water resources concerns, with some requiring significant investment in the long term to ensure secure supplies, while others will need minimal investment other than to maintain the current assets and infrastructure. These future pressures are explained in Appendices A to D of this document. Chapter 4 explains out our long term plans to ensure sufficient supplies are available in each of these zones.

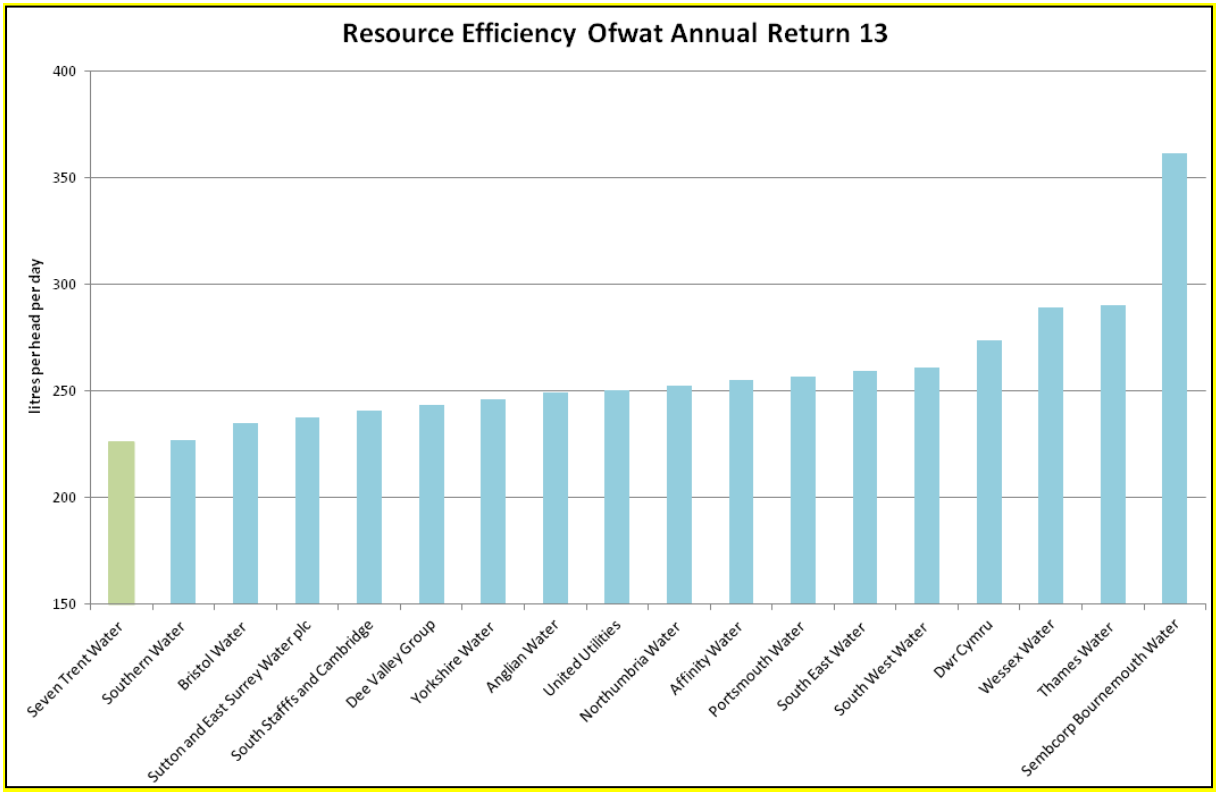
2.3 Our efficient use of water resources

We are the industry's most water resource efficient company (see figure 2.3). We have achieved this by reducing leakage and a very effective water efficiency and education programme.

We measure water resource efficiency by taking the total amount of water that we put into the system (distribution input), subtracting commercial consumption and dividing by the number of domestic customers. This is the amount of water that we take out of the environment per customer.

This measure includes both leakage and consumption. It gives a much better holistic picture than either leakage or consumption alone, due to the many uncertainties involved in the calculations and the allocation between them.

Figure 2.3: Comparison of 2012-13 water resource efficiency



We have delivered the industry's most ambitious leakage reduction programme in AMP5 and we remain on track to deliver our target to reduce leakage by 44Ml/d (9%) over AMP5.

3 Changes to our draft Water Resources Management Plan

Our draft WRMP was published in May 2013 and stakeholders were invited to comment on our proposed long term strategy. The closing date for comments was 2 August 2013.

In total we received written responses from 18 different organisations, who gave us very valuable feedback. We were pleased that no-one raised any objections to the supply and demand management measures proposed in our draft plan.

Appendix F to this revised draft WRMP provides the full list of issues and comments received from each of the respondents, along with our Statement of Response to them. These comments, along with the wider PR14 stakeholder engagement, have helped us to better understand our customers' and stakeholders' concerns. As a result we have made some changes to our draft WRMP. The main areas of change are summarised below:

- We have updated the timing and impacts of the Habitats Directive changes to Elan Valley reservoirs.
- We have set ourselves a more challenging leakage reduction target for AMP6, which is double that proposed in the draft plan.
- We will work to increase the uptake of household meters by 22,000 more than previously proposed.
- We have removed the need for the longer term new water resource schemes that were proposed in the draft plan.
- We better explain how customers' views have shaped our chosen plan.
- We better explain how environmental considerations have shaped our chosen plan.
- We explain our catchment management and partnership working approach.

As well as taking account of the comments received from stakeholders, we have also updated some of our key planning assumptions and made use of the best available data and evidence. Where these planning assumptions have led to a change from our draft WRMP, we have also highlighted these within this revised draft version. The key planning assumptions where we have used more up to date information than in the draft WRMP are:

- The likely outlook for commercial customers' demand for water;
- Our plans to reduce the likelihood of future unplanned water treatment works outage events.

Throughout this revised draft WRMP we have highlighted the text that has changed from the previously published version. Also, appendix G to this revised draft WRMP describes the more

detailed updates to planning assumptions, and provides the text that will be used in the relevant technical appendices when the final WRMP is published.

Despite all of these updates, there are no additional new supply schemes to those that were set out in our draft WRMP. In fact, our new plan to double our AMP6 leakage reduction targets, along with the updates to the projections of commercial demand, mean that many of the new supply schemes that had been proposed for the period beyond 2025 are now no longer required. Instead, our long term strategy will be to manage the supply / demand balance by continuing to drive down leakage and helping our customers become more water efficient. Details of our revised strategy can be found in chapter 4.

4 Our long term water resources strategy

In this chapter we set out our proposed strategy for maintaining the right balance between the supply and demand for water in our region. Our strategy seeks to achieve the best value and most sustainable way of balancing supply and demand for water. We have taken into account the risks, costs and benefits of all the options available to us, including the costs of environmental impacts. We have also actively engaged with our stakeholders and customers, and their views have helped to shape our proposals. We have listened to the views expressed on our published draft WRMP, and we have revised our WRMP accordingly.

The sections that follow give an overview of our long term strategy, explain the key elements for each water resource zone, and give more details on the specific water supply, leakage and demand management proposals. Where there are any changes from what was in the consultation version of the draft WRMP we have highlighted the text to make this clear.

The appendices to this document set out in more detail the long term water resources challenges we face in our region. They present our assessment of the likely growth in demand, the future pressures on our water supplies and the scale of risks and uncertainties around these issues. We also demonstrate the range of feasible and sustainable options available to us over the next 25 years.

4.1 Overview of our long term strategy

Our strategy is to reduce the demand for water and to make the best use of our existing water resources through a more flexible and sustainable supply system. We will:

- Reduce waste by driving leakage down;
- Reduce the demand for water by working in partnership with our customers to help them become more water efficient;
- Improve the ability to deploy our existing resources flexibly and efficiently;
- Use water trading to make more efficient use of our resources and improve resilience;
- Develop new sources of water when required, with a focus on expanding our existing, sources first.
- Use proactive catchment management measures to protect our sustainable sources of drinking water supply from pollution risks.

This strategy will allow us to reduce our impact on the water environment, continue to meet future demands for water and be better able to cope with long term uncertainties. Our proposals also give us the flexibility to adapt our response over the next 25 years, as our understanding of future planning uncertainties improves.

In the short to medium term, our proposed strategy is driven by the need to address environmentally unsustainable levels of water abstraction. We will do this by reducing the amount of water we take from the environment, by providing local environmental improvements and by providing alternative sources of water supply where necessary.

In the longer term, our strategy deals with the significant uncertainties around the potential impacts of climate change on water resources. We will continue with our long term drive to reduce the amount of water we abstract, and we will increase the flexibility and capacity of our Strategic Grid to cope with future supply uncertainties.

Our plans for the next 25 years include:

- Continuing to reduce leakage, with an expected leakage target of around 407Ml/d by 2040. This would represent a leakage fall of around 89Ml/d from 2010 levels, a reduction of around 18%. Our AMP6 leakage reduction will be double the amount that was included in our draft WRMP, and is in response to the challenge from stakeholders that our leakage reduction plans should be more ambitious. Our plan will mean we exceed Government's aspirations of at least a 3% reduction in leakage by 2020.

- Helping our customers reduce their demand for water by continuing and accelerating our current water efficiency activities, with expected savings of around 40Ml/d by 2040.

- Continuing with household metering at a pace led by our customers through the uptake of the free meter option. We expect to install around 672,000 free household meters over the next 25 years, which is an increase of 22,000 over the numbers included in our draft WRMP. We will achieve this by increasing our customers' education and awareness of the potential benefits of having a metered supply.

- Reducing abstractions from those sources where it is certain or likely that our activities are causing environmental damage or are contributing to failure of Water Framework Directive objectives. This means giving up around 85Ml/d of our currently held water abstraction licences.

- Providing alternative supplies to customers in and around Telford and Bromsgrove, where the current sources of supply are considered likely to be environmentally unsustainable.

- Providing new sources of water supply by increasing the capacity of our existing reservoir at Draycote and our boreholes near Worcester.

- Make new strategic links to our neighbouring water supply companies and beyond, making better use of existing resources and improving supply resilience.

The proposals in our draft WRMP are integrated with our wider capital maintenance and water quality investment plans to ensure reliable and sustainable output from our existing sources. Catchment management plays a critical role in supporting our supply/demand plan by protecting our sustainable sources of drinking water supply from pollution risks.

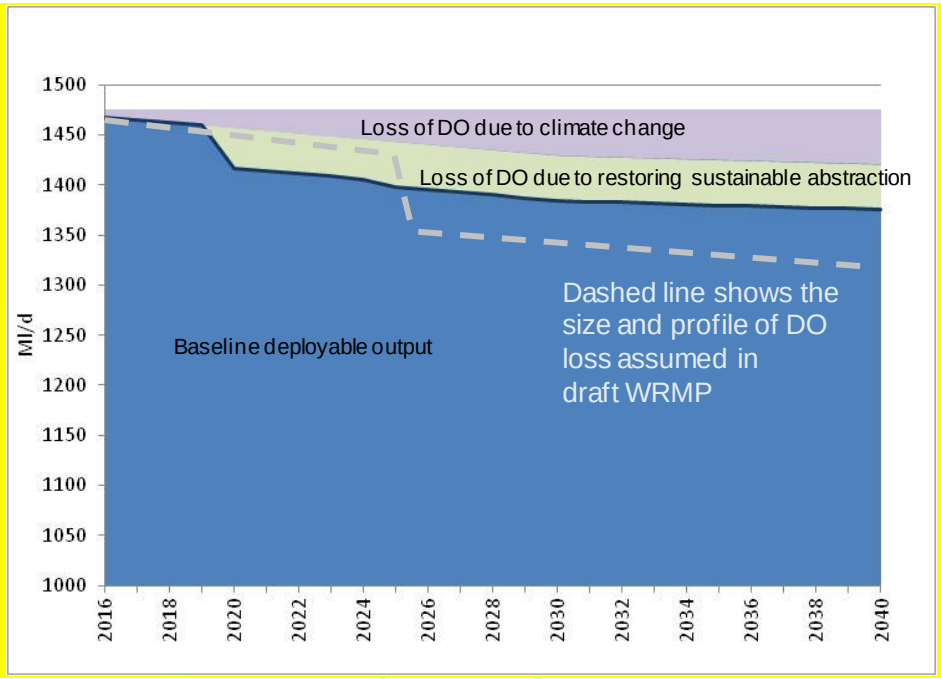
4.2 Our proposals by water resource zone

Without new investment, our Strategic Grid and Nottinghamshire zones face some significant supply shortfalls in the long term as a result of the need to reduce abstraction from unsustainable sources and the potential impacts of climate change. These two zones will require new sources of water supply.

The future deployable output losses we face are largely the result of changes to the operation of the River Wye and Elan Valley reservoirs, as required to meet the objectives of the Habitats Directive. In our draft WRMP we identified that these changes to the reservoir operation could result in a loss of up to up 75Ml/d of deployable output in the Strategic Grid zone. At that stage our plan was to accommodate these changes during AMP7.

Since we published the draft WRMP, we have continued to work with Natural Resources Wales (NRW) to identify ways to minimise the impacts of these changes to the River Wye and Elan Valley operation. Through this work we have reduced the impacts of these changes to around 40Ml/d loss of deployable output. At the same time, NRW have confirmed their preference that these abstraction licence changes be implemented before the end of AMP6. As a result, our final investment plan assumes that the loss of deployable output will be seen sooner than in the draft plan, but the overall impacts will be less. Figure 4.1 shows the overall loss of deployable output in the Strategic Grid zone, and shows how this compares with the scale of loss previously assumed in the draft WRMP.

Figure 4.1: Projected loss of deployable output in the Strategic Grid zone

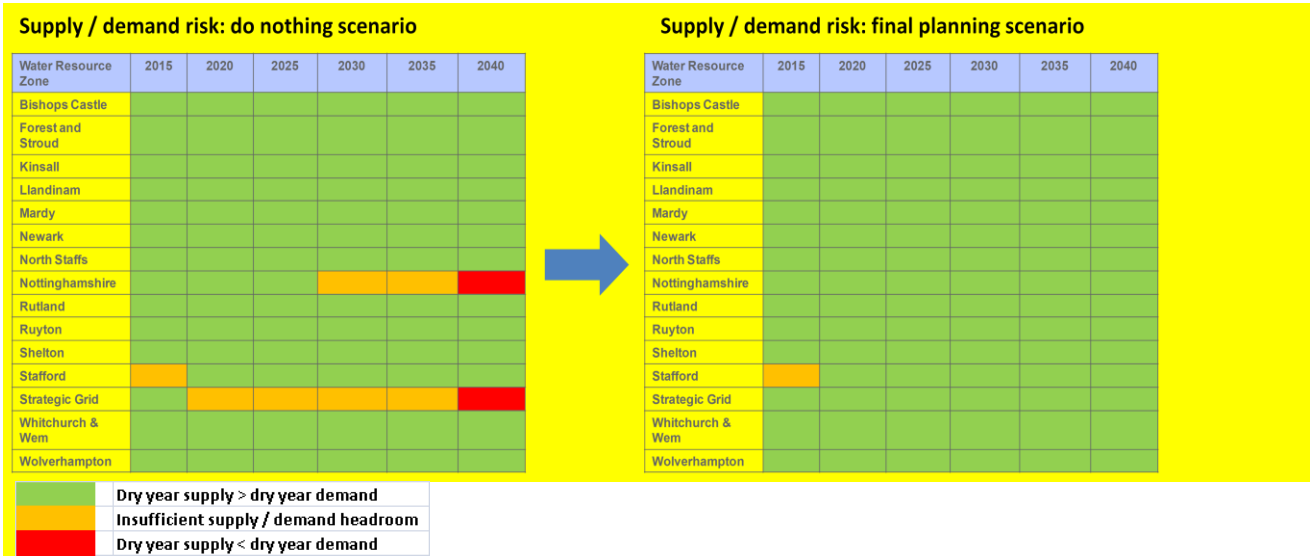


Our other thirteen water resource zones are less impacted by the need to reduce unsustainable abstractions, and our modelling shows they are more resilient to the impacts of future climate change risks. As a result our long term plans in these zones are to optimise the operation of our existing sources, and to manage demand through water efficiency and leakage control measures.

This strategy is dependant on the delivery of our wider water quality and capital maintenance investment programmes that will ensure our existing sources of supply are reliably available.

Figure 4.2 illustrates the supply / demand balance outlook faced by each of our water resource zones if we do not take action, and shows how our strategy will remove these supply / demand risks. In Appendix C we demonstrate the supply / demand balance outlook faced by each of our water resource zones if we do not take action.

Figure 4.2: Long term supply / demand balance risks by water resource zone



The following sections of this chapter set out the measures that we propose to put in place for each of our water resource zones to meet these challenges and ensure continued reliable and sustainable water supplies.

A more detailed explanation of our future targets for the sustainable economic level of leakage then follows in section 4.3 while our overall water efficiency strategy is set out in section 4.4. Sections 4.5 to 4.7 explain those aspects of our wider PR14 investment plans that help enable us to deliver our water resources strategy.

4.2.1 Our supply / demand proposals for the Strategic Grid Zone

The Strategic Grid zone is likely to require significant future investment because of the need to reduce environmentally unsustainable abstractions and to meet the longer term challenge of future climate change impacts.

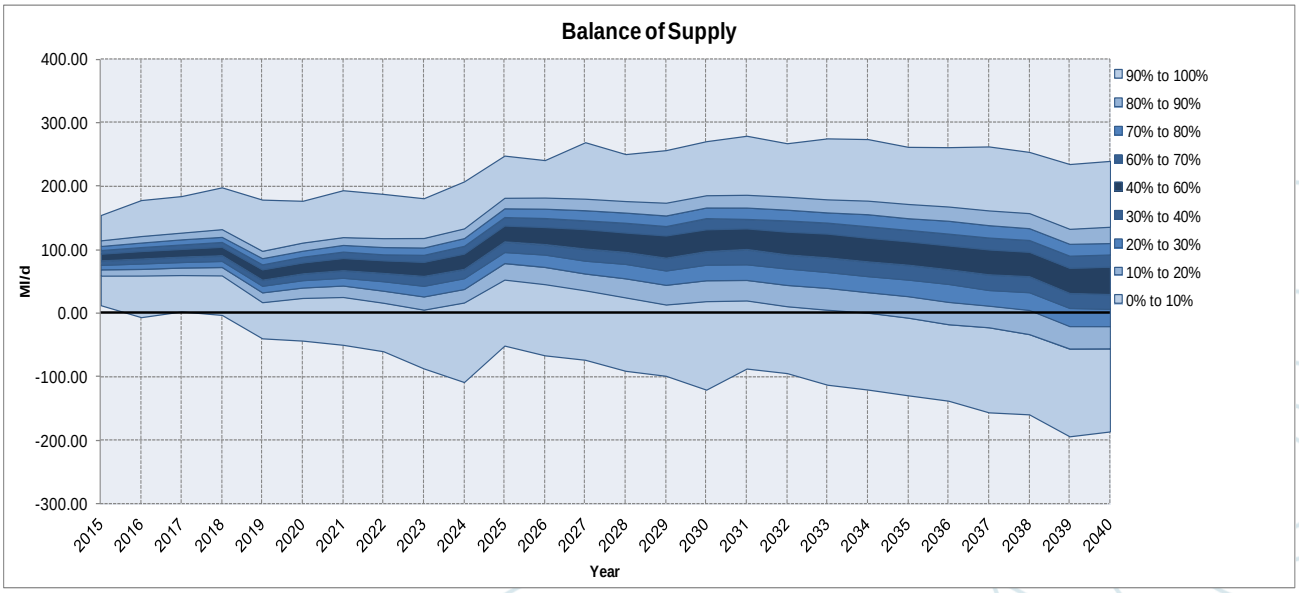
In the short term, the single biggest challenge to our ability to maintain supplies is the impact of the Natural Resource Wales' Review of Consents on the River Wye, as required under the Habitats Directive. In the draft WRMP, we assessed that the required changes along the River Wye and at Elan Valley reservoirs would result in a loss of deployable output to our Strategic Grid of up to 75Ml/d. There are also further abstraction licence reductions needed across the zone due to environmental concerns which will amount to a further 5Ml/d loss of deployable output.

Because the impact of making these abstraction licence changes would have been so large, our original plan was to implement them over a ten year period.

Since the draft WRMP was published, we have continued to work with Natural Resources Wales, the Environment Agency and the other members of the Usk and Wye Abstractors Group to confirm the full scale of this impact on our deployable output. We have sensitivity tested a range of alternative operating scenarios to explore how our plan can be delivered in a way that best meets the environmental objectives, without putting our customers' security of water supplies at risk. As a result, we are confident that by changing the operating rule curves at Elan Valley reservoirs, we can reduce the loss of Strategic Grid zone deployable output to around 40Ml/d. Furthermore, because of our more ambitious AMP6 leakage reduction plans and the changes to expected commercial demand, we can accommodate this loss of deployable output before 2020.

Our strategy for the Strategic Grid is to increase our focus on reducing leakage and demand for water, while providing an increase in sustainable deployable output and a more flexible supply system. Figure 4.3 illustrates how the measures we are proposing will maintain the supply / demand balance for this zone and shows the likelihood of our available supplies being sufficient to meet expected demand. The graph demonstrates that the supply and demand investment measures we are proposing will give us high confidence that we can meet customers' demand for water over the next 25 years. Appendix C gives a full explanation of how this probabilistic assessment has been carried out.

Figure 4.3: Strategic Grid zone supply / demand balance



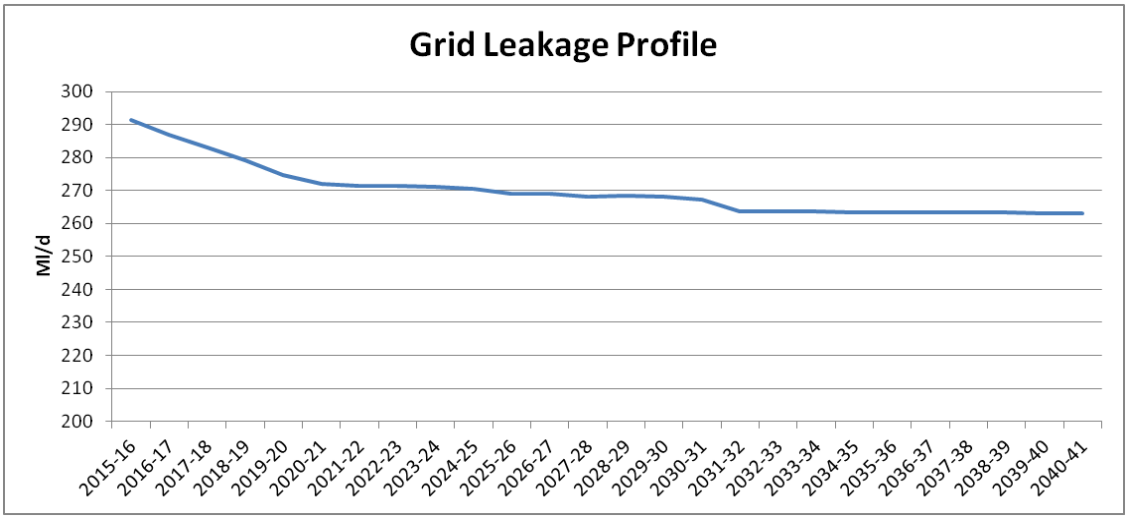
The key elements of our long term strategy for this zone are summarised in table 4.1, and described in more detail below.

Table 4.1: Summary of Strategic Grid strategy

Delivery period	Scheme description	Assumed benefit
AMP6	Reduce leakage by 19Ml/d.	19Ml/d
	Reduce demand by 5Ml/d through additional water efficiency activity.	5Ml/d
2015-2020	Increase Uckington output in the Shelton zone to facilitate Upper Worfe flow augmentation which will be re-abstracted into the Strategic Grid zone from the River Severn.	Maintain service levels
AMP7	Reduce leakage by 3Ml/d.	3Ml/d
	Trimpley-Worcestershire groundwater conjunctive use.	15Ml/d
	Whitacre aquifer storage and recovery, Phase 2.	10Ml/d
2020-2025	Draycote reservoir 6% expansion.	7.5Ml/d
	Bromsgrove groundwater licence transfer.	17Ml/d
	Upper and Lower Worfe flow augmentation	30Ml/d
AMP8 **2025-2030**	Reduce leakage by 1.9Ml/d.	1.9Ml/d
AMP9 **2030-2035**	Reduce leakage by 3.7Ml/d.	3.7Ml/d
AMP10 **2035-2040**	Reduce leakage by 0.3Ml/d.	0.3Ml/d

The long term sustainable economic level of leakage for this zone is illustrated in figure 4.4.

Figure 4.4: Strategic Grid WRZ projected future leakage profile



Details of the new supply and distribution schemes for this zone are given below. Additional information on the environmental and social impacts of these schemes can be found in the Strategic Environmental Assessment that accompanies our draft WRMP.

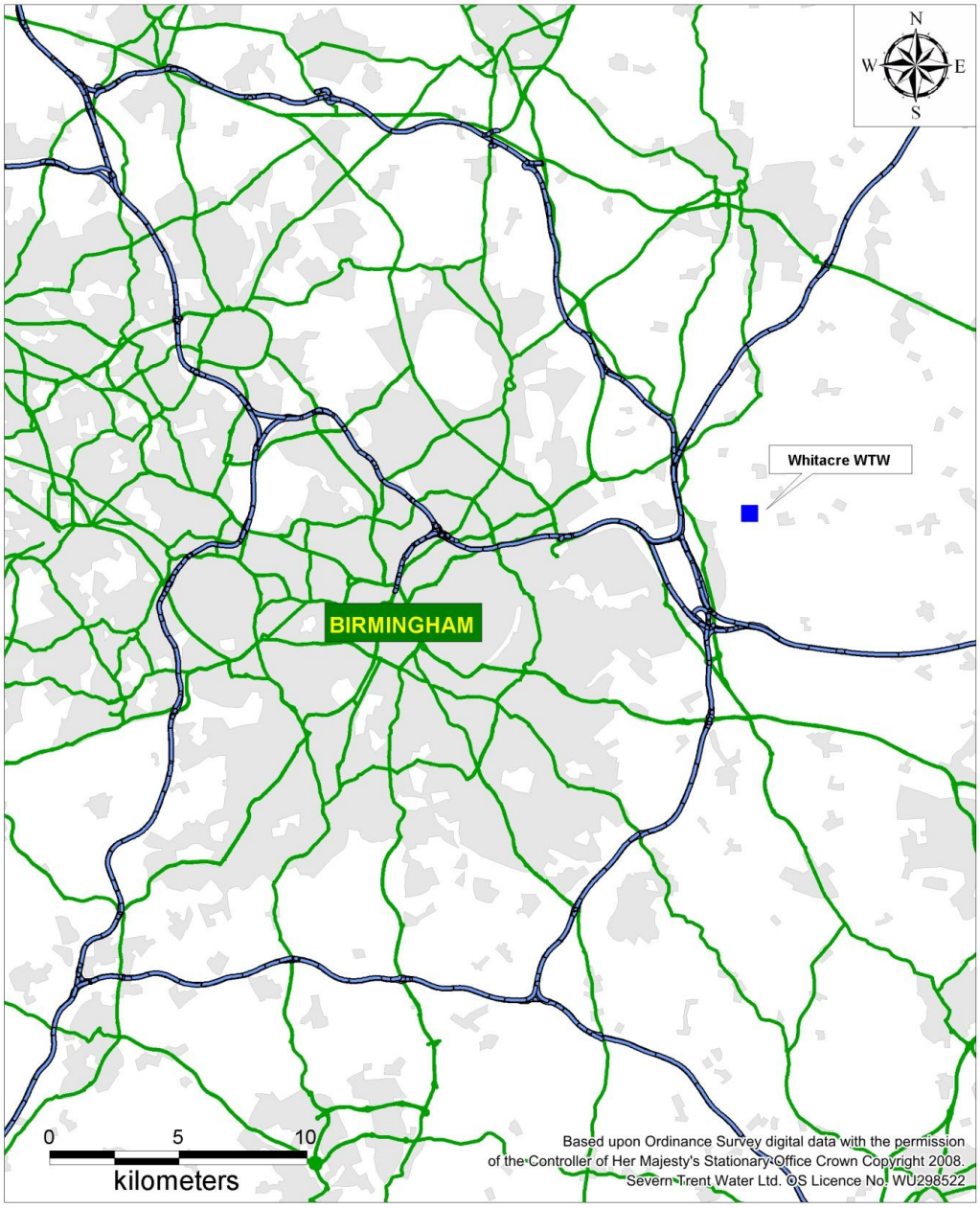
Whitacre Aquifer Storage and Recovery, Phase 2

Aquifer Storage and Recovery (ASR) involves injection of treated water into a sealed aquifer, for re-abstraction when required, e.g. during droughts. Our WRMP09 included a 10-year project to undertake feasibility investigations during AMP5 at two sites in Birmingham in order to provide a dual resilience/resource benefit for Birmingham by 2020. A single preferred site has now been selected for ASR development: this is at Whitacre treatment works, near Birmingham. We are progressing the on-going detailed feasibility investigation in AMP5, including borehole drilling and testing.

The second phase of the scheme will be delivered at the end of AMP6, in order to provide a 10Ml/d deployable output benefit in early AMP7. It is assumed that this will require drilling and testing of a second borehole and installation of permanent pumps, pipework and water treatment capacity in order to deploy into supply in the Strategic Grid WRZ.

The new boreholes will need to be licensed for abstraction, with agreed control rules to prevent environmental impacts and/or derogation of third-party abstraction rights.

Figure 4.5: Whitacre aquifer storage and recovery



Upper Worfe Flow Augmentation

The River Worfe is a tributary of the River Severn in eastern Shropshire. The river and some of its tributaries are impacted by low flows, principally caused by over-abstraction of the underlying aquifer for public supply.

The scheme is intended to be part of a package of activities in the catchment that will contribute to restoring the river to good ecological status. The scheme would involve both: a reduction in long-term abstraction rates that will substantially improve the year-round natural baseflow discharge into the river; and providing additional river flow support during very dry summers.

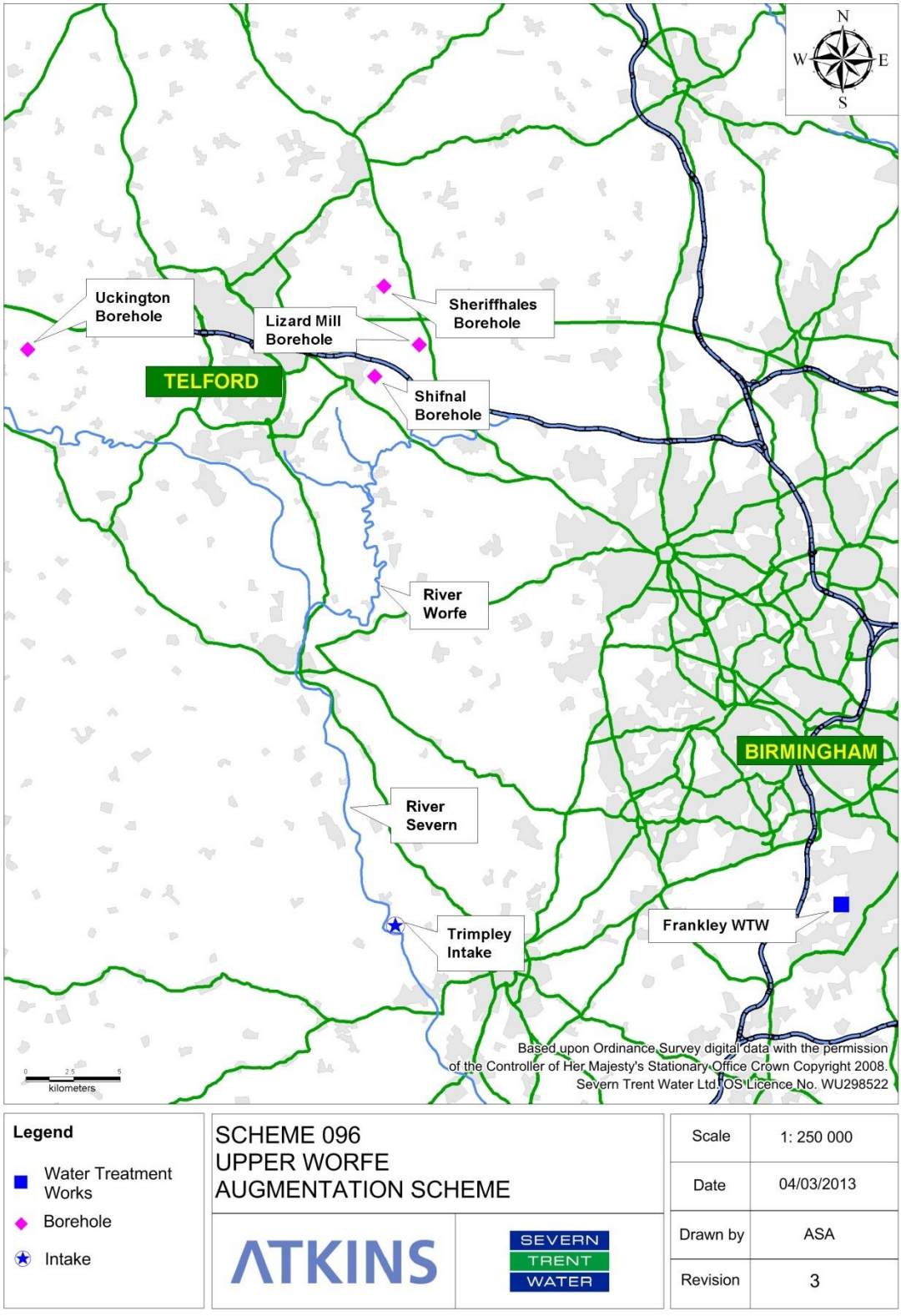
The final size/scope of the scheme to be implemented is dependent on the outcome of our on-going AMP5 Restoring Sustainable Abstraction investigations in the Worfe catchment. At present, it is envisaged that the scheme would involve capital works at three of our existing potable water sites (Lizard Mill, Sherrifhales and Shifnal) to enable them to operate as river augmentation boreholes.

The scheme would operate during dry years by augmenting flows in the upper part of the River Worfe with 25Ml/d of borehole water. The water would then be re-abstracted downstream at the Trimpley intake on the River Severn near Bewdley on a put-and-take arrangement allowing for some river losses in transit. It is envisaged that the additional abstraction at Trimpley would primarily be used to supply additional raw water to Frankley water treatment works in Birmingham.

The scheme will require licence variations at the borehole sites to add river augmentation end-use and at Trimpley to enable the augmentation water to be re-abstracted from the River Severn, in addition to the current Trimpley licence quantities.

The delivery programme of the scheme is dependent on us being able to deliver an alternative supply scheme to customers in Telford during AMP6 in order to offset the loss of public water supply capacity from the sources being converted to low flow support. Our proposed alternative source of supply is the expansion of output from our Uckington source near Telford, up to full licensed quantity (10Ml/d average, 12Ml/d peak) together with pipeline upgrades to transfer additional water from the west part of the Shelton zone to the east. This would require variation of the Uckington abstraction licence.

Figure 4.6: The Upper Worfe flow augmentation scheme

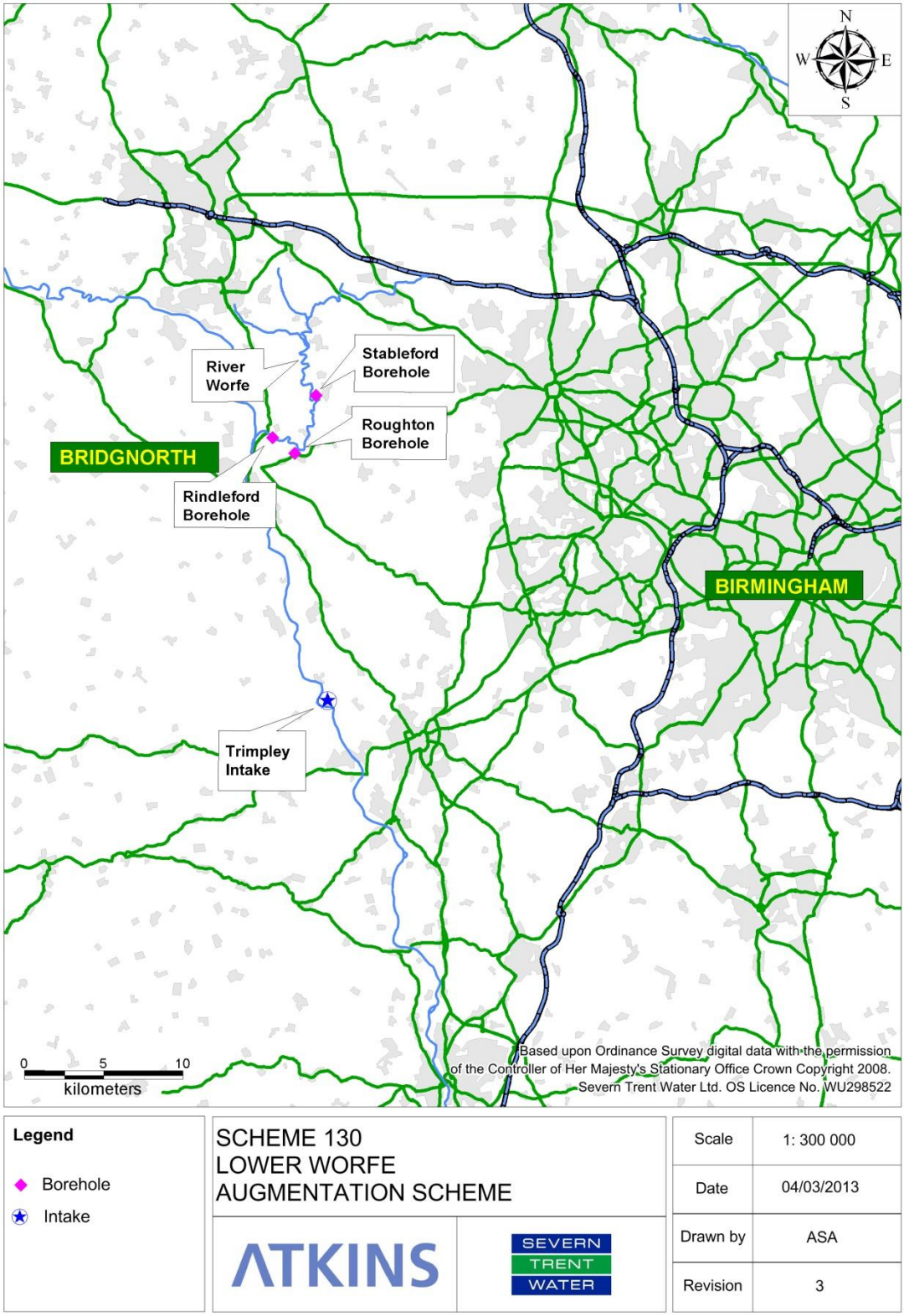


Lower Worfe Flow Augmentation

We own three borehole sites (Stableford, Rindleford and Roughton) in the Lower Worfe catchment, to the east of Bridgnorth. These have not been used for several years due to unsuitable treatment processes on the site. The scheme will involve converting them into river augmentation boreholes to supply 15Ml/d of additional water to the adjacent reach of the River Worfe during dry summers. This water will then be re-abstracted downstream on the Severn at Trimpley intake. This would enable Trimpley to feed more raw water into Frankley treatment works in Birmingham and provide a deployable output benefit to the Strategic Grid zone, as well as enhancement of dry weather flows in the intervening river reach.

Licence variations will be required at the borehole sites to add river augmentation end-use. Trimpley intake licence will also need to be varied to enable re-abstraction on a put-and-take arrangement in addition to the current Trimpley licensed quantities, with an allowance for losses in transit.

Figure 4.7: The Lower Worfe flow augmentation scheme



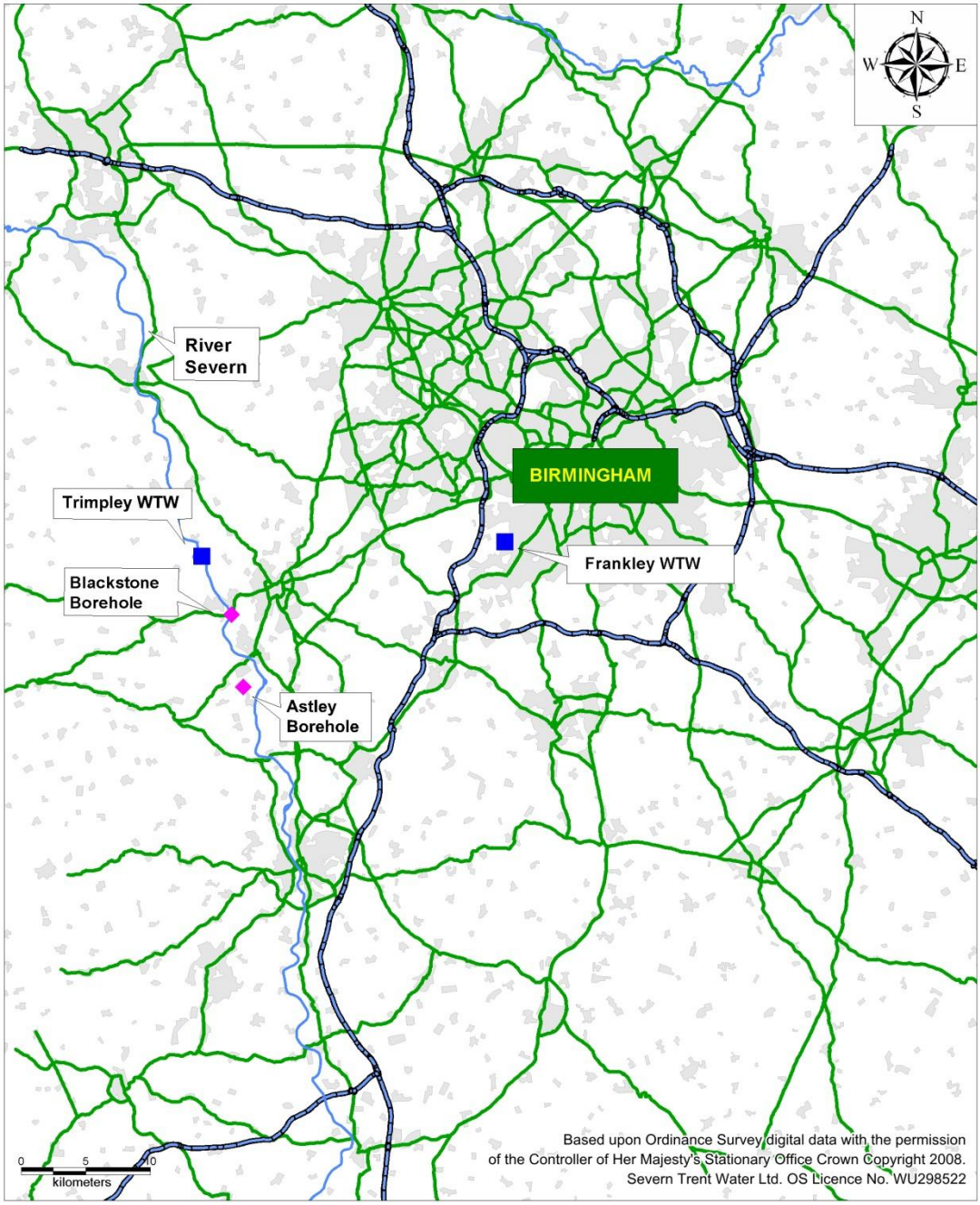
Trimpley & Worcestershire Groundwater Conjunctive Use.

This scheme involves increasing the peak capacity of two existing borehole sites in North Worcestershire. This will enable them to be run at higher outputs during dry-year summer/autumn periods when the River Severn is in Regulation and the Trimpley river- intake abstraction peak rate is constrained. Trimpley treatment works will then need to run at a higher output during wet periods to maintain the borehole sites' licence compliance and deliver the full Deployable Output gain.

The notional scheme involves construction of a new borehole at both sites and local pipework and minor treatment works upgrades to achieve an extra 15Ml/d treated water peak output.

A licence variation to increase the Astley peak and reduce the average will be required, and potentially the Trimpley licence may also need to be varied to allow an additional high-flow licence quantity.

Figure 4.8: Trimpley / Worcestershire conjunctive use scheme



Draycote Reservoir minor water level raise

This scheme involves making minor modifications to the Draycote Reservoir spillway that will allow us to fill the reservoir to a slightly higher level by approximately 60cm. This will provide an additional 6% raw water storage capacity that can be used to increase output from the local water treatment works at Campion Hills in Leamington and Draycote itself through dry year summer periods.

The scheme may require a licence variation of the Draycote Reservoir abstraction licence to deliver the deployable output benefit.

Figure 4.9: Draycote reservoir minor water level raising scheme

Bromsgrove Groundwater Licence Transfer

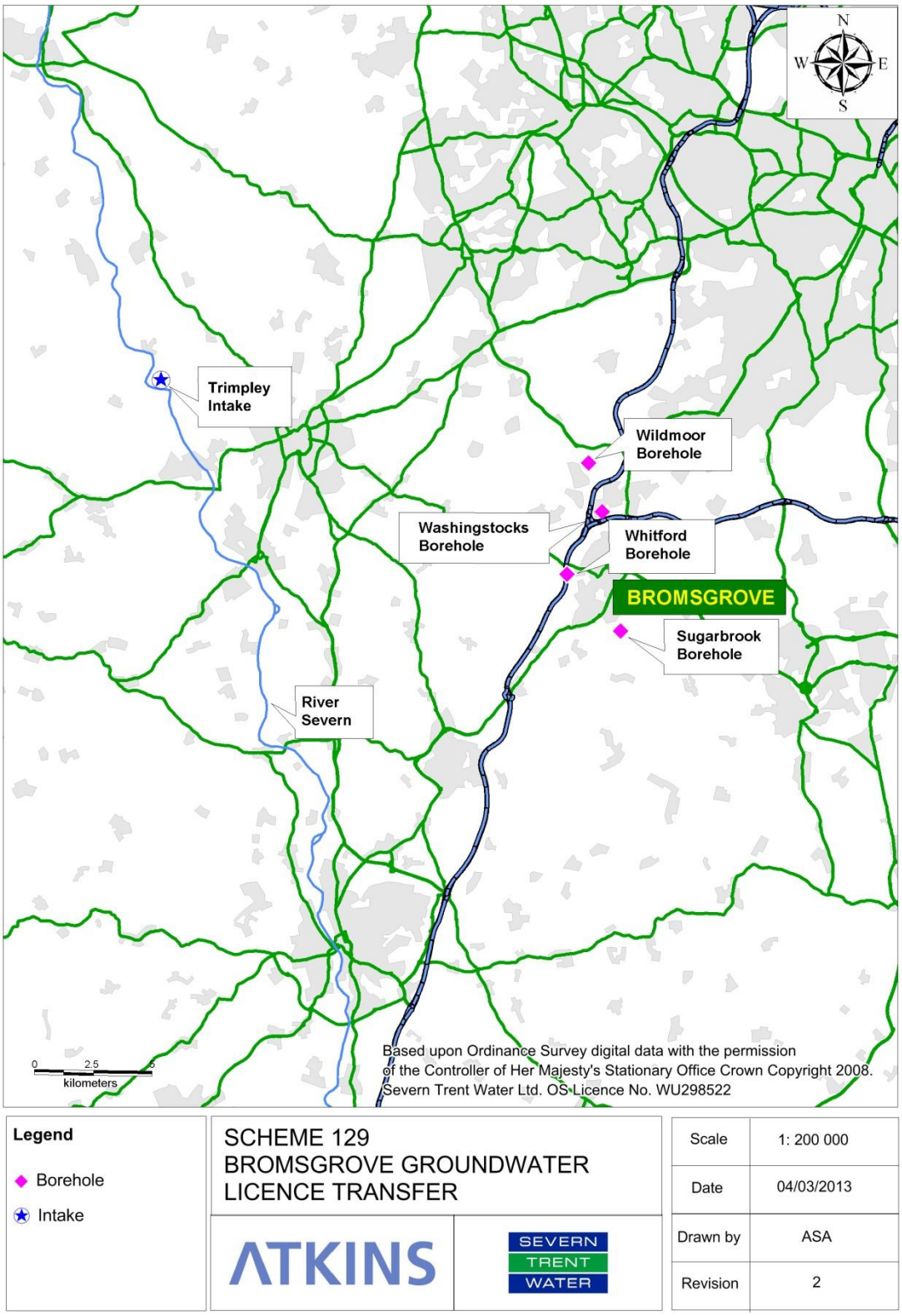
This scheme is intended to change our abstraction regime in the Bromsgrove area to a more environmentally sustainable one, with the objective of improving the flow in the Battlefield Brook.

The scheme will involve transferring 17Ml/d of peak abstraction quantity from three groundwater sources at the top of the catchment (Wildmoor, Washingstocks and Whitford) to an expanded Sugarbrook borehole site, together with new pipeline links to facilitate conjunctive use between the Bromsgrove Aquifer and surface water sources on the Strategic Grid.

The scheme will require licensing of new boreholes at Sugarbrook and modification to the existing Wildmoor, Washingstocks, Whitford and Bromsgrove Group licences. An additional high-flow licence on the Severn at Trimpley intake may also be required to deliver the benefit of the scheme.

The notional solution has been informed by the on-going restoring sustainable abstraction investigation in this area. The scope of the final scheme may need to be refined once the flow improvement targets and the ultimate environmental objectives have been agreed with the Environment Agency.

Figure 4.10: The Bromsgrove groundwater licence transfer scheme



Changes to the draft WRMP

The draft WRMP published in May 2013 included a number of other new supply schemes that we thought were needed to maintain the long term supply / demand balance in the Strategic Grid. However, the changes to our leakage reduction plans along with the improved supply / demand outlook for this zone mean that these schemes are no longer required as part of our revised draft WRMP. Each of these schemes remains on our list of feasible new water resource options that could be developed in future, and we will continue to assess their merit through the ongoing water resources management plan process.

The schemes that were previously part of the May 2013 draft WRMP but that have now been excluded are:

Mythe to Bromsberrow Link

We have been investigating whether abstraction from our Bromsberrow groundwater source south of Malvern is causing environmental harm during low-flow periods on the neighbouring Glynch Brook. At the time of writing the draft WRMP the Environment Agency indicated that a reduction of 3Ml/d abstraction from the source was likely to be necessary to achieve environmental flow targets.

If that licence reduction at Bromsberrow was required, then in order to maintain reliable supplies to customers in the Malvern area, an alternative source of supply would be required. Our proposed solution was to transfer additional water from the main part of the Strategic Grid using a new treated water pipeline linking our Mythe treatment works to Bromsberrow..

However, since the draft WRMP was published, our environmental impact assessment in the catchment has concluded that reducing the Bromsberrow abstraction would not achieve the desired increase in flows in the Glynch Brook. We have therefore proposed an alternative environmental improvement scheme to provide additional flow support to the Glynch Brook during low flow periods. This solution will achieve the desired environmental improvements while allowing us to retain the existing Bromsberrow abstraction licence. As a result, we are no longer proposing the Mythe to Bromsberrow link main.

Convert Short Heath groundwater source to Supply

Short Heath is a borehole site in North Birmingham that is currently set-up to provide river augmentation support for downstream abstraction on the River Trent during very low river flow periods. The proposed scheme was intended to deliver a deployable output gain by installing a new 10Ml/d peak capacity treatment works that would enable the site to deploy directly into the Strategic Grid.

The site's licence would need to be varied to allow for potable use and average and annual quantities may need to be increased to deliver the full deployable output gain. Any new licence would need to take account of the sustainable long-term rate of abstraction from the aquifer and include any conditions necessary to prevent significant impacts on Sutton Park SSSI and local watercourses.

Belper Meadows re-commissioning

We have a disused 4Ml/d borehole north of Derby. This site has been disused since the mid-1990s due to unsuitable treatment processes. The notional scheme was to refurbish the site's pumps, upgrade the on-site treatment works and lay a new pipeline to deploy into the Strategic Grid. This scheme is no longer required in our revised draft WRMP.

Little Eaton conjunctive use

Little Eaton treatment works sits within our Strategic Grid water resource zone and abstracts from the River Derwent. The notional scheme was to expand the Little Eaton Works capacity by 30Ml/d to support the Grid zone via existing pipeline assets. The scheme would be used conjunctively with Carsington Reservoir, which would be filled in the winter from the River Derwent and water then released back to the river to support the downstream Little Eaton intake during the summer. This scheme is no longer required in our revised draft WRMP.

Norton artificial recharge, phase 1

In the early 1980's we constructed a trial artificial recharge scheme near Stourbridge. It was designed to take filtered water from Trimpley river intake during wet periods, inject it into the aquifer and then re-abstract the same volume during dry weather periods. The scheme was built for research and development purposes, but never fully commissioned or put into service. We still hold a licence for re-abstraction of 10Ml/d of injected water from any of the boreholes at the site.

The scheme concept was to undertake the necessary commissioning works to enable artificial recharge at the site. The source of recharge for the proposed scheme was assumed to be treated water from Frankley treatment works, which receives its raw water mainly from the Elan Valley Reservoirs, but also with smaller quantities from the River Severn at Trimpley. It is likely that re-abstracted water will be deployed into the Strategic Grid, thereby reducing demand on the Elan Reservoirs or Frankley treatment works respectively during drought periods. If successful, a second phase of the scheme could be considered in future WRMPs.

The scheme assumed no change to the existing abstraction licence arrangements at Elan Valley and Trimpley, although it is possible that an additional winter abstraction licence could be required at Trimpley to deliver the full deployable output gain for this scheme.

This scheme is no longer required in our revised draft WRMP.

Hatton conjunctive use

We have a spring source near our Hatton treatment works. The spring source has been out of supply for a number of years due to unsuitable treatment processes at the Hatton site.

The notional scheme was to recommission the Haseley Springs (typical output 2Ml/d) to feed into the Hatton treatment works, employing catchment management and controlled blending to achieve quality targets.

Kenilworth groundwater scheme

We own two disused borehole sites in Kenilworth, both of which have been out of use for several years due to unsuitable treatment processes.

The notional scheme was to refurbish and upgrade the treatment works on one site to provide an average output of 3Ml/d. A licence variation may be required to combine the licence quantity to just one of the sites.

Bellington-Frankley conjunctive use

The concept behind this scheme was to increase the peak capacity of the Bellington groundwater source (near Kidderminster), in order to feed up to 2Ml/d into to the Stourbridge area during dry summers. This source would operate conjunctively with Frankley treatment works.

The scheme would require an additional winter licence quantity at Trimpley to deliver the full deployable output benefit. The scheme is no longer required in our revised draft WRMP.

Stanton & Milton groundwater to supply at Melbourne

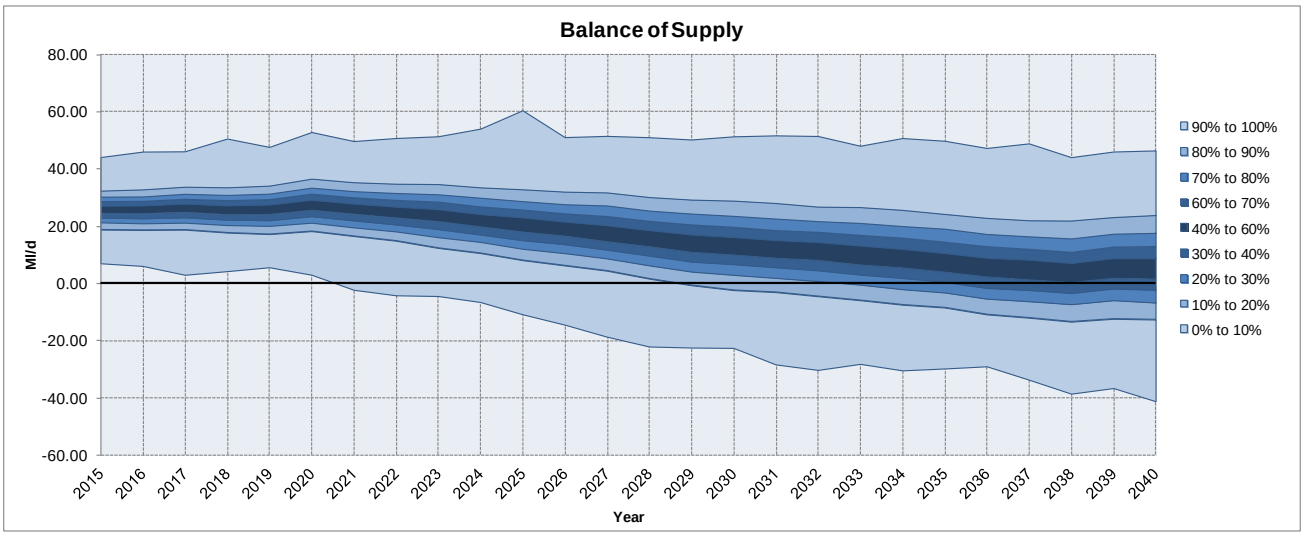
We own two disused boreholes south of Derby. They are licensed for 2.5Ml/d and 4Ml/d peak respectively, but have not been used for several years due to unsuitable treatment processes. This option would re-commission the two borehole sites and install new raw water pipelines to enable them to feed to the nearby Melbourne works for treatment.

4.2.2 Our supply / demand strategy for the Nottinghamshire Zone

Water supplies in the Nottinghamshire zone come from a combination of local groundwater sources and links to the Strategic Grid zone. Because of the future pressures on groundwater supplies to reduce to more sustainable abstraction levels along with the impacts of climate change, the Nottinghamshire zone will require new sources of supply in the long term.

Our strategy for the Nottinghamshire zone is based around reducing leakage and demand for water, and providing more support from with the Strategic Grid zone. Figure 4.11 illustrates how our proposals will maintain the forecast supply / demand balance for this zone.

Figure 4.11: Nottinghamshire zone supply / demand balance



The main new supply scheme for this zone is to provide a major treated water link to the Strategic Grid zone which will allow for a more flexible supply system better able to cope with drought conditions.

The key elements of our plan for this zone are as follows:

Table 4.2: Summary of Nottinghamshire zone strategy

AMP period	AMP period	AMP period
AMP6 **2015-2020**	Reduce leakage by 3.0Ml/d. Reduce demand by 2Ml/d through additional water efficiency activity.	3.0Ml/d 2Ml/d
AMP7 **2020-2025**	Reduce leakage by 0.5Ml/d.	0.5Ml/d
AMP8 **2025-2030**	Reduce leakage by 0.5Ml/d.	0.5Ml/d
AMP9 **2030-2035**	Reduce leakage by 0.6Ml/d.	0.6Ml/d
AMP10 **2035-2040**	Reduce leakage by 1.1Ml/d. Scheme 131 Ogston to Mansfield Pipeline Enhancement	1.1Ml/d 5Ml/d

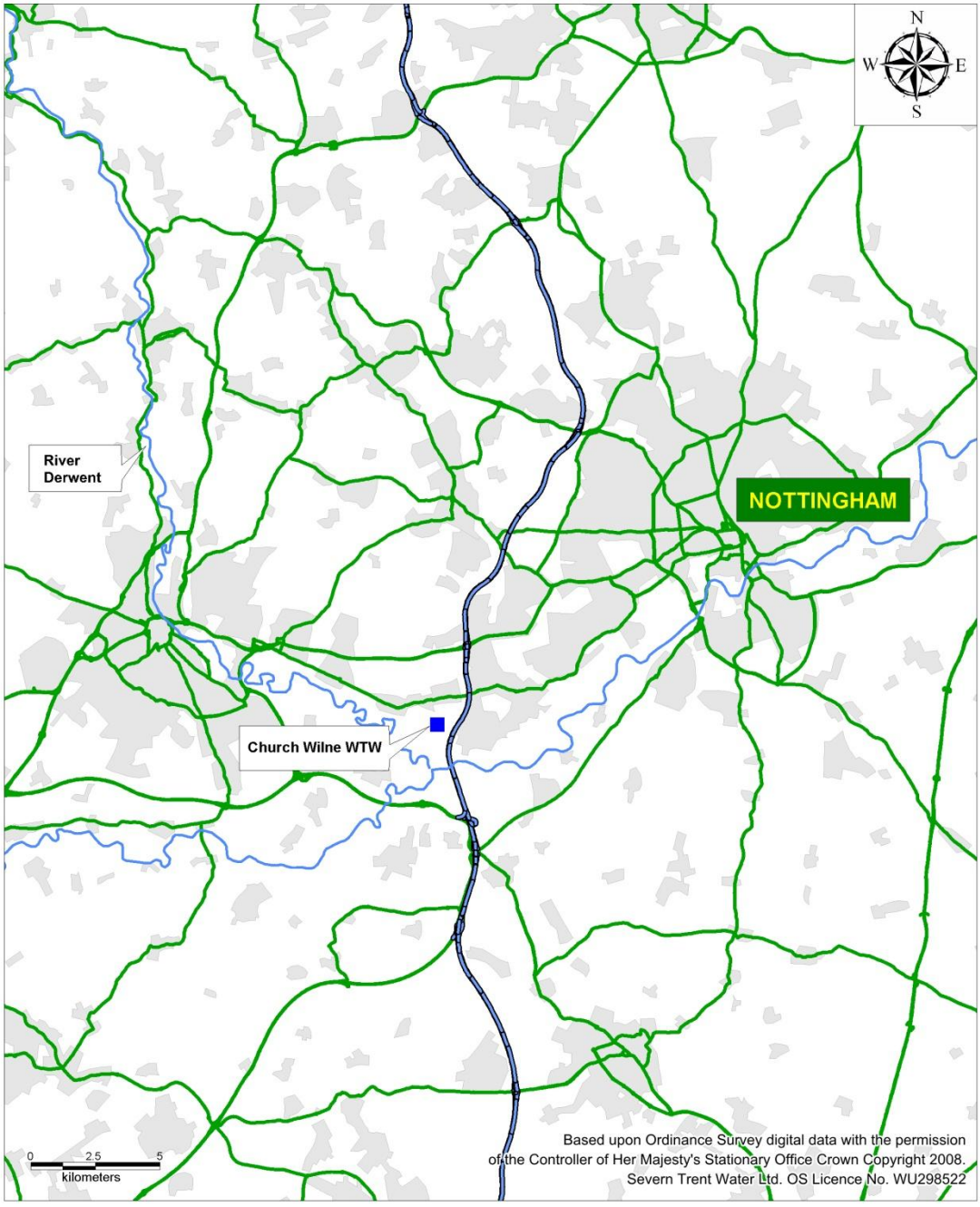
Derwent Valley Aqueduct to Nottingham pipeline enhancement

Nottingham supply zone is fed from two groups of sources: the north and east is predominantly fed by borehole water while the south is normally fed from Strategic Grid surface water treatment works which abstract from the River Derwent. We currently have the capacity to feed additional water into Nottingham from the Strategic Grid zone, but this cannot be used routinely, as it will result in significant diurnal changes in water quality and taste.

The concept behind this scheme is to install a new treated water pipeline to enable more of Nottinghamshire WRZ demand to be re-zoned onto surface water supplies from the Grid. This would deliver a supply-demand benefit to the Notts WRZ, but would increase demand on the Strategic Grid: this inter-zonal transfer is accounted for in the plans for maintaining the Grid zone supply-demand balance, as outlined in section 4.2.1.

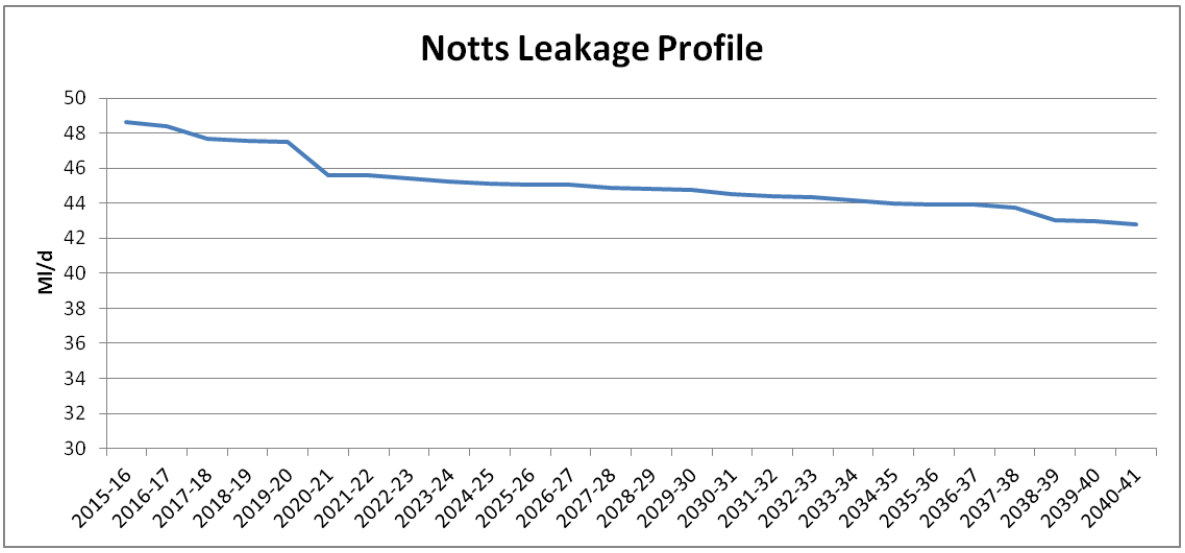
The original draft WRMP envisaged that this new link would need to provide around 15Ml/d of new supplies to the Nottinghamshire zone. The improved supply / demand outlook in our revised draft WRMP means that this need is likely to be less, at around 5Ml/d.

Figure 4.12: Derwent Valley Aqueduct to Nottingham pipeline enhancement scheme



The long term sustainable economic level of leakage profile for this zone is shown in figure 4.13 below.

Figure 4.13: Nottinghamshire WRZ future leakage profile



4.2.3 Our supply / demand strategy for the remaining Zones

Appendix C4 sets out the baseline supply / demand projections for each of our water resource zones. As demonstrated in that chapter, under the baseline scenario only the Strategic Grid and Nottinghamshire zones face any significant supply / demand shortfall in the forecast period.

In our remaining water resource zones, while we face pressures to reduce abstraction from unsustainable sources and climate change impacts, these are not expected to trigger the need for investment in new sources of supply. Instead, our plans for these zones are to manage the supply / demand balance by optimising the operation of our existing sources of supply, by ongoing leakage control and water efficiency measures. These proposals are integrated with our wider capital maintenance and water quality investment plans to maintain reliable and sustainable output from the existing sources in these zones.

The remainder of this section sets out the leakage reduction targets for these zones, and illustrates the resulting supply / demand balance. The leakage target profiles for these zones are the product of our least cost investment modelling, as described in Appendix D. When we come to implement our plan, we will review the delivery profiles of these leakage targets and may look to smooth them over the AMP periods to allow a more efficient delivery.

For each of these zones, the graphs below demonstrate that our long term plans give us high confidence of having sufficient water resources available to meet our customers' needs.

Figure 4.14: Bishops Castle zone supply / demand balance

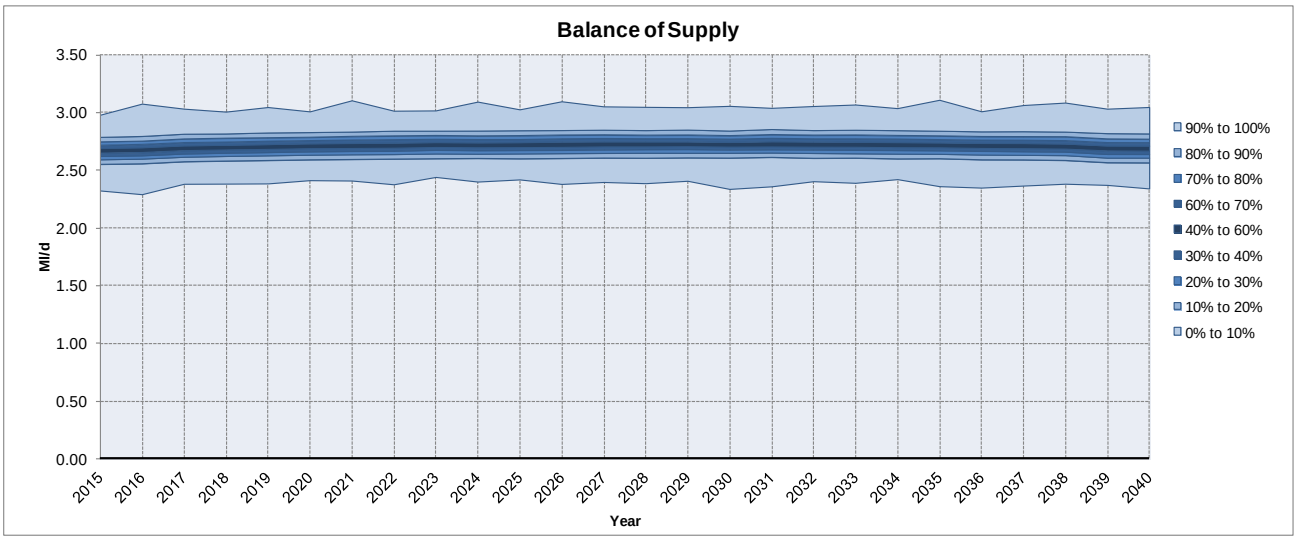


Figure 4.15: Bishops Castle WRZ future leakage profile

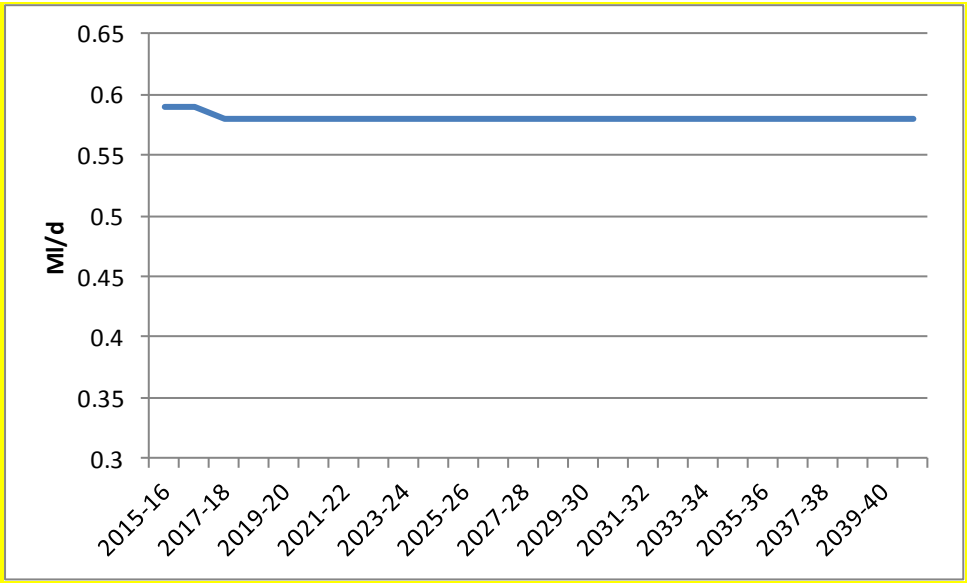


Figure 4.16: Forest and Stroud zone supply / demand balance

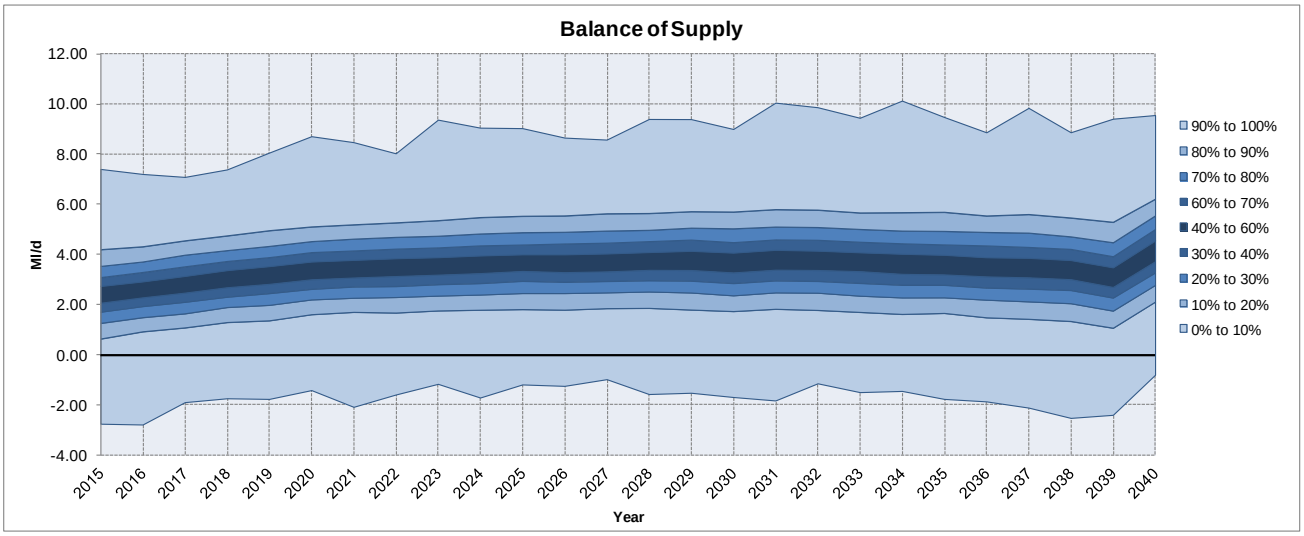


Figure 4.17: Forest and Stroud WRZ future leakage profile

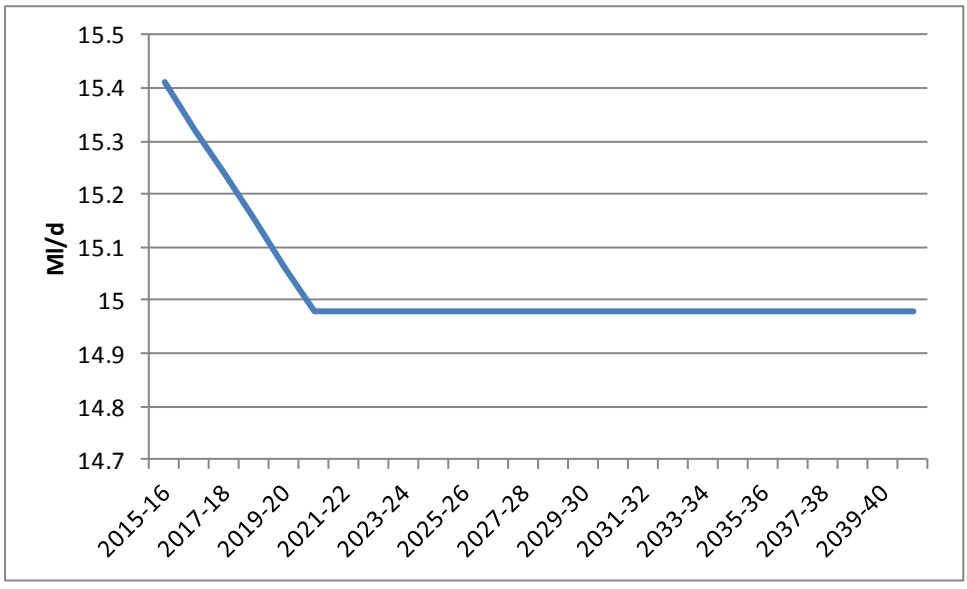


Figure 4.18: Kinsall zone supply / demand balance

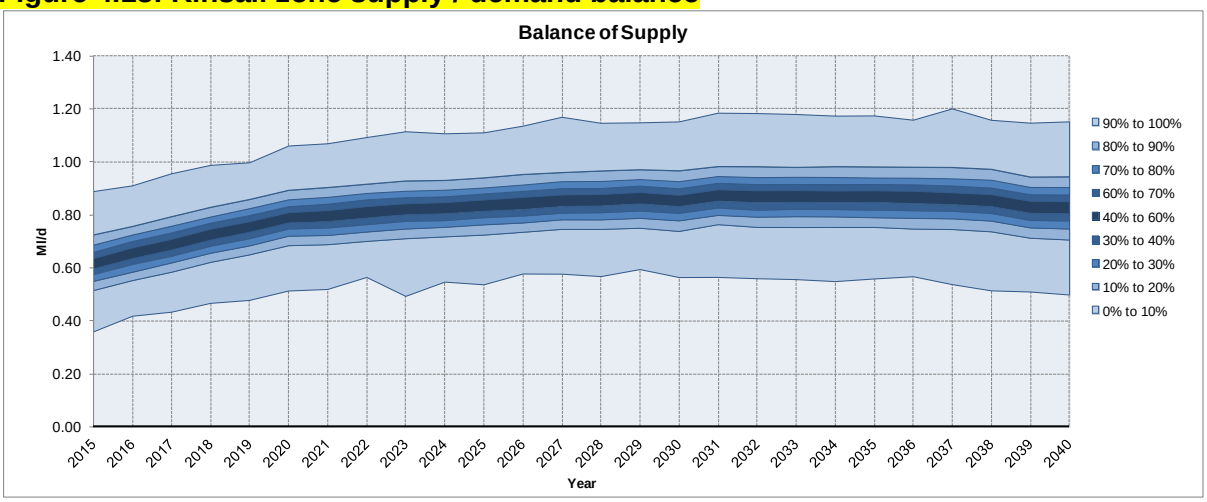


Figure 4.19: Kinsall WRZ future leakage profile

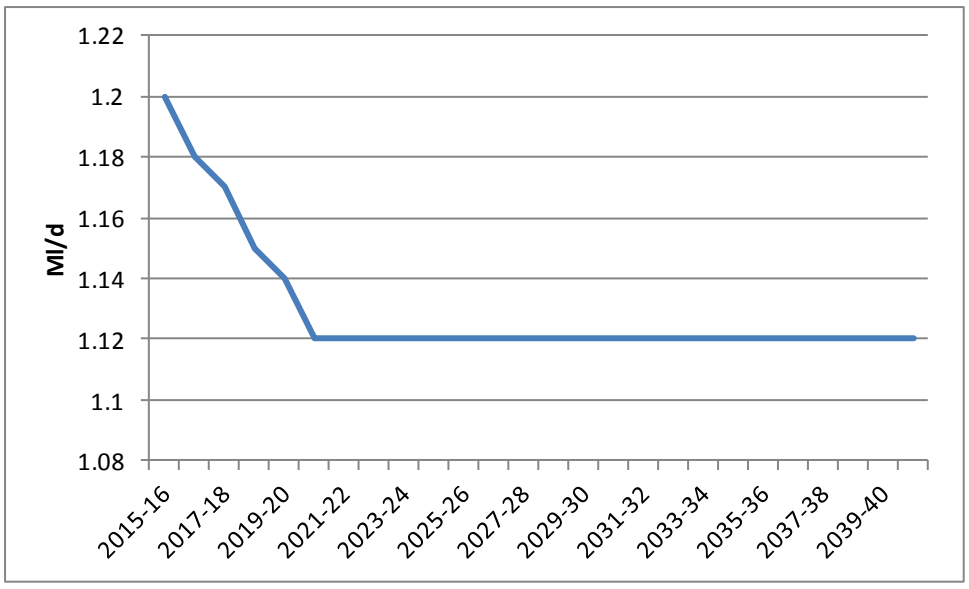


Figure 4.20: Llandinam and Llanwrin zone supply / demand balance

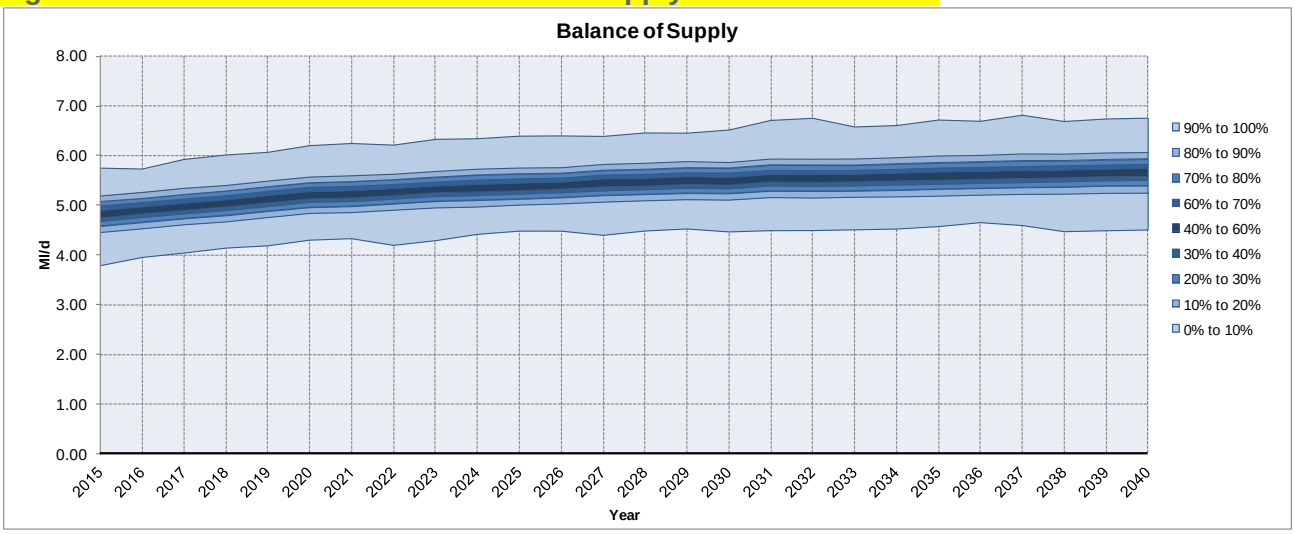


Figure 4.21: Llandinam and Llanwrin WRZ future leakage profile

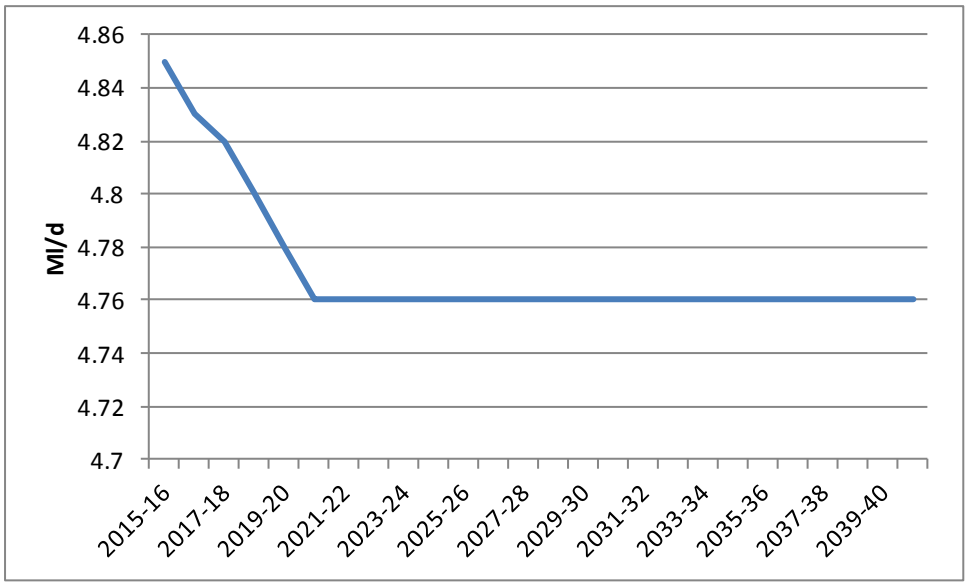


Figure 4.22: Mardy zone supply / demand balance

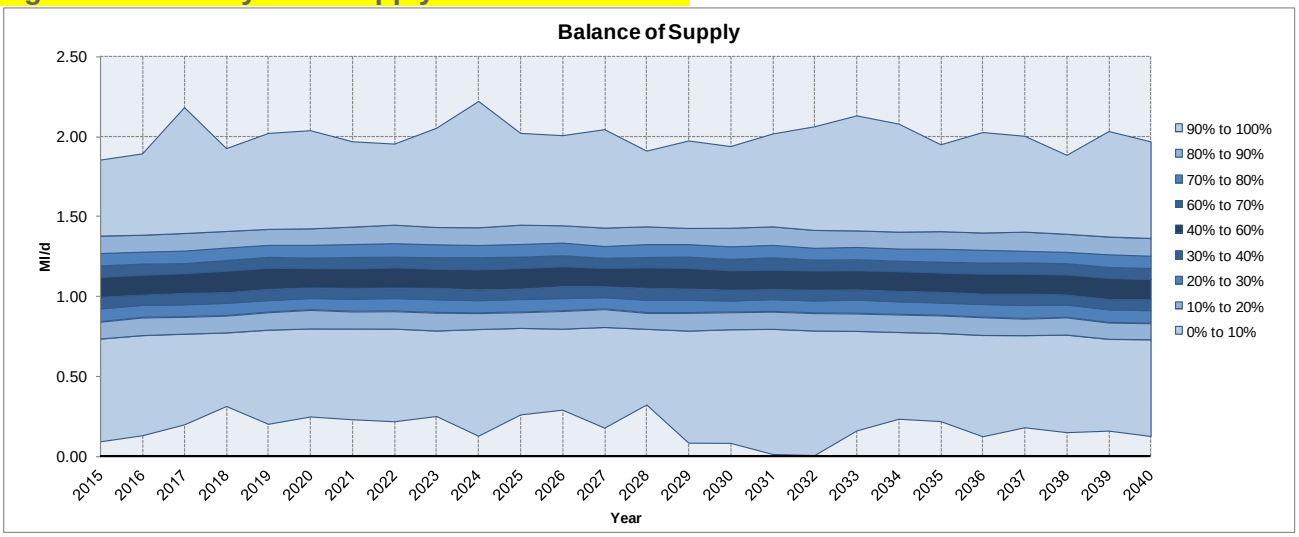


Figure 4.23: Mardy WRZ future leakage profile

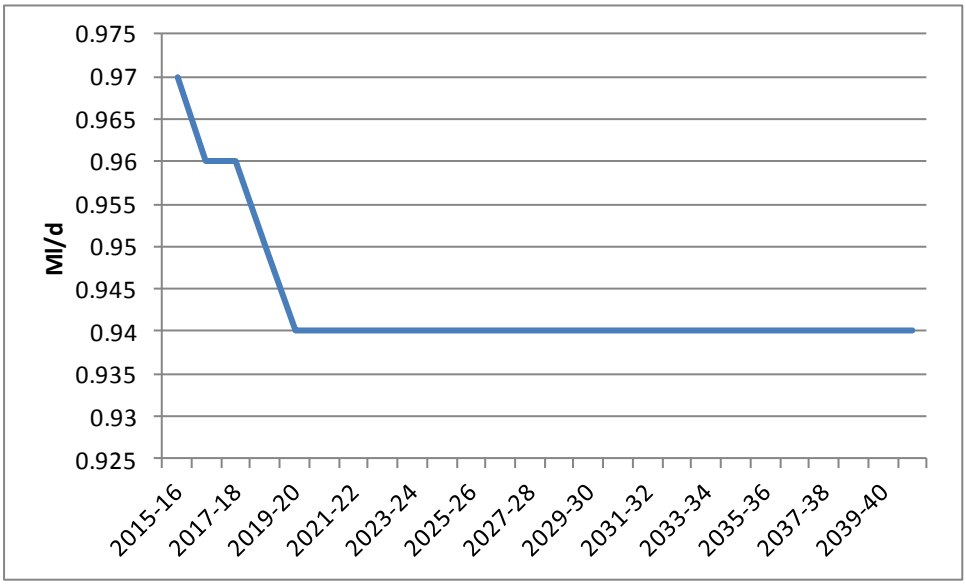


Figure 4.24: Newark zone supply / demand balance

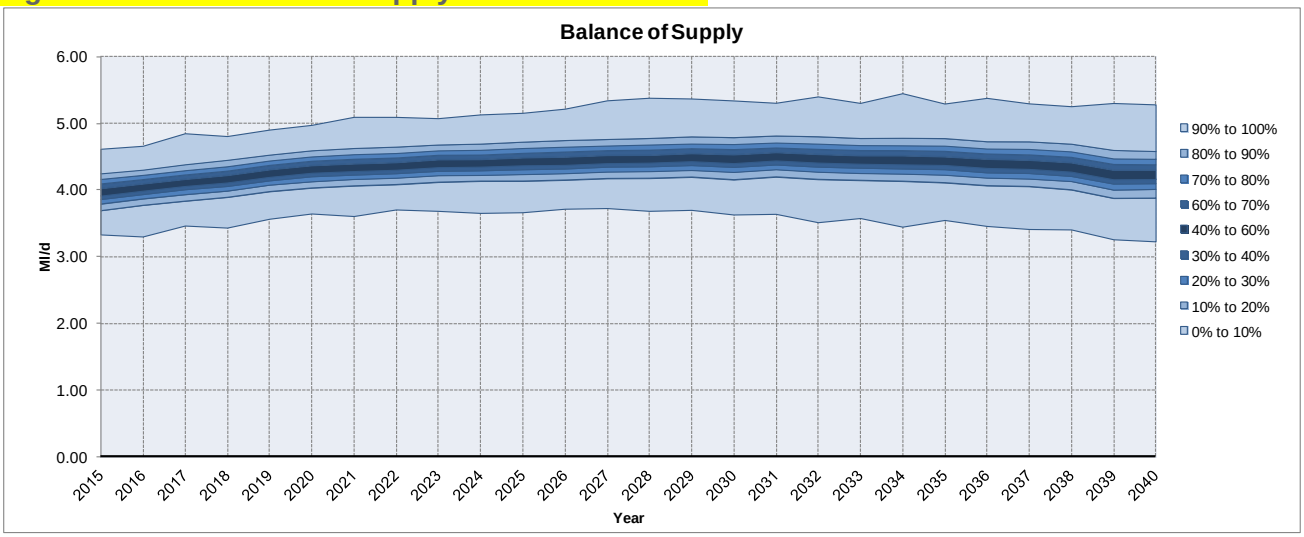


Figure 4.25: Newark WRZ future leakage profile

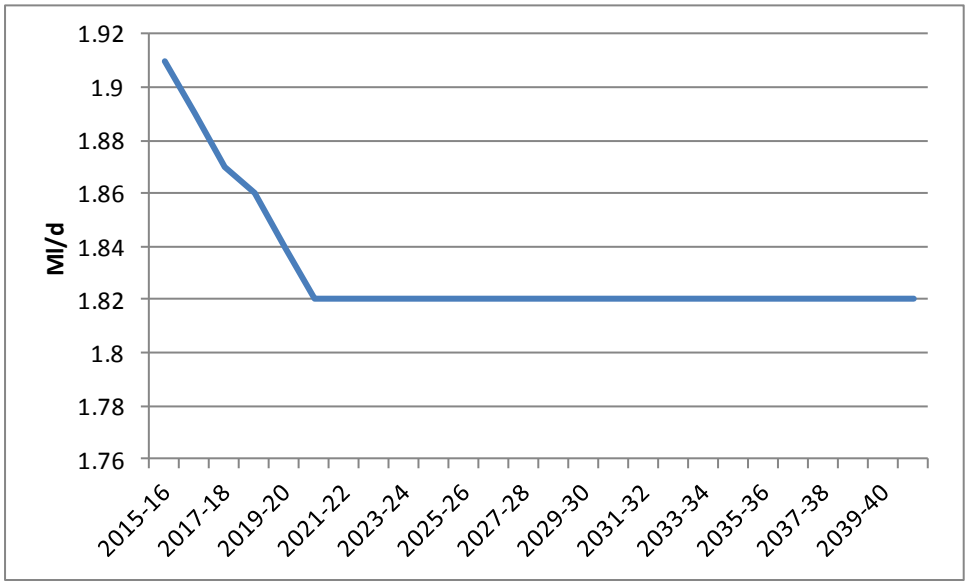


Figure 4.26: North Staffs zone supply / demand balance

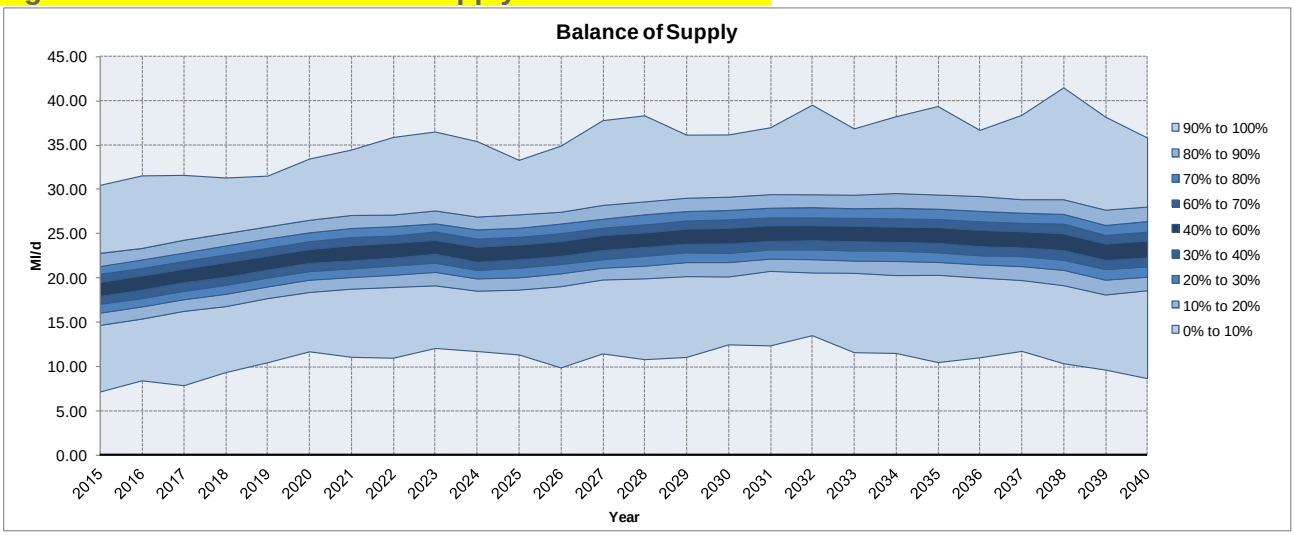


Figure 4.27: North Staffs WRZ future leakage profile

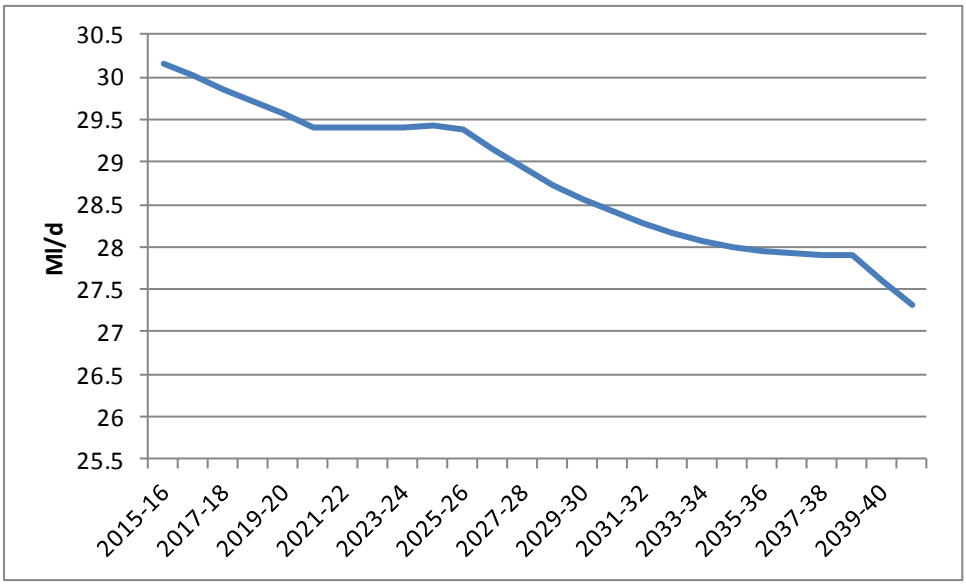


Figure 4.28: Ruyton zone supply / demand balance

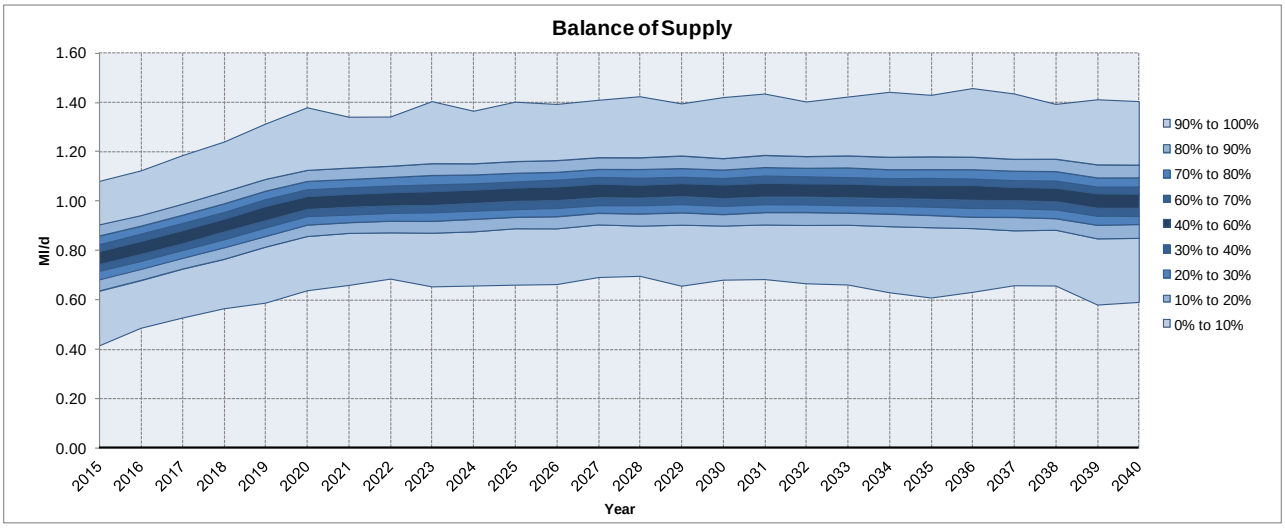


Figure 4.29: Ruyton WRZ future leakage profile

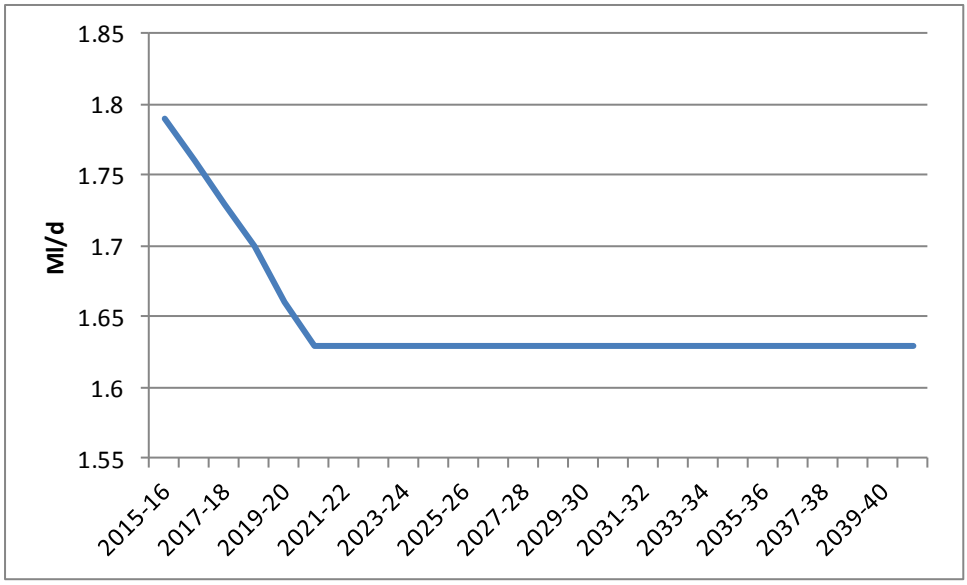


Figure 4.30: Rutland zone supply / demand balance

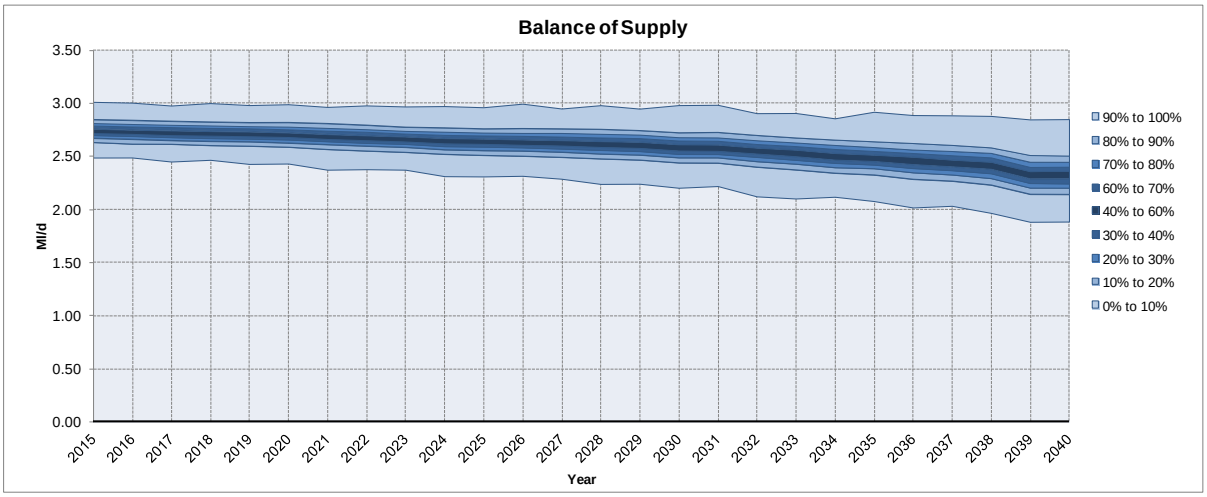


Figure 4.31: Rutland WRZ future leakage profile

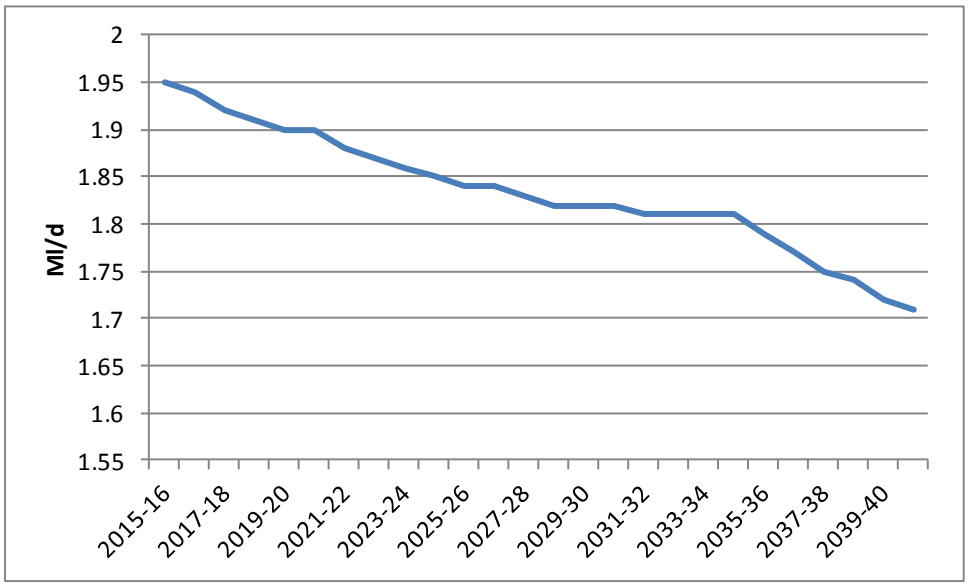


Figure 4.32: Shelton zone supply / demand balance

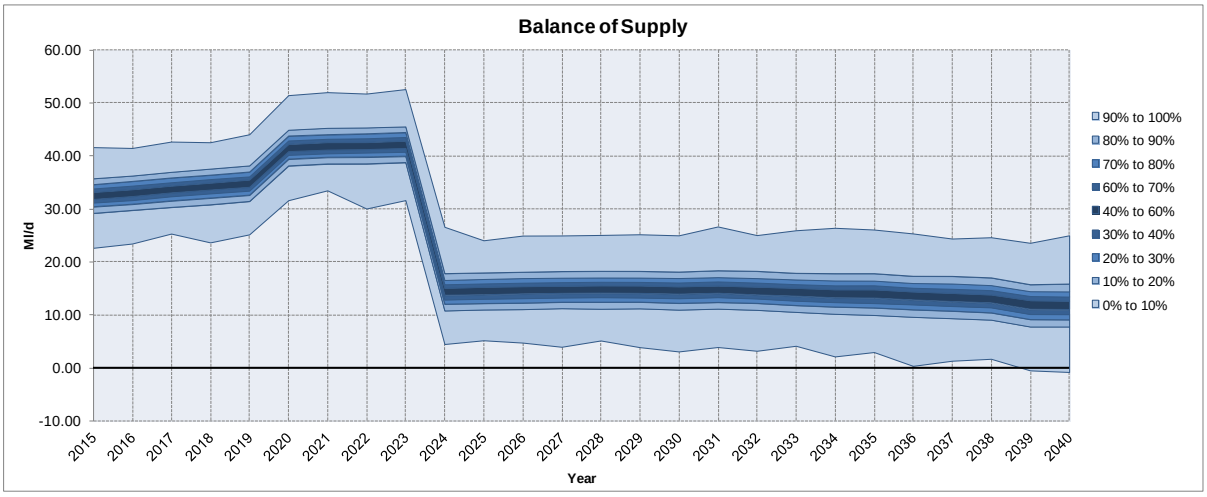
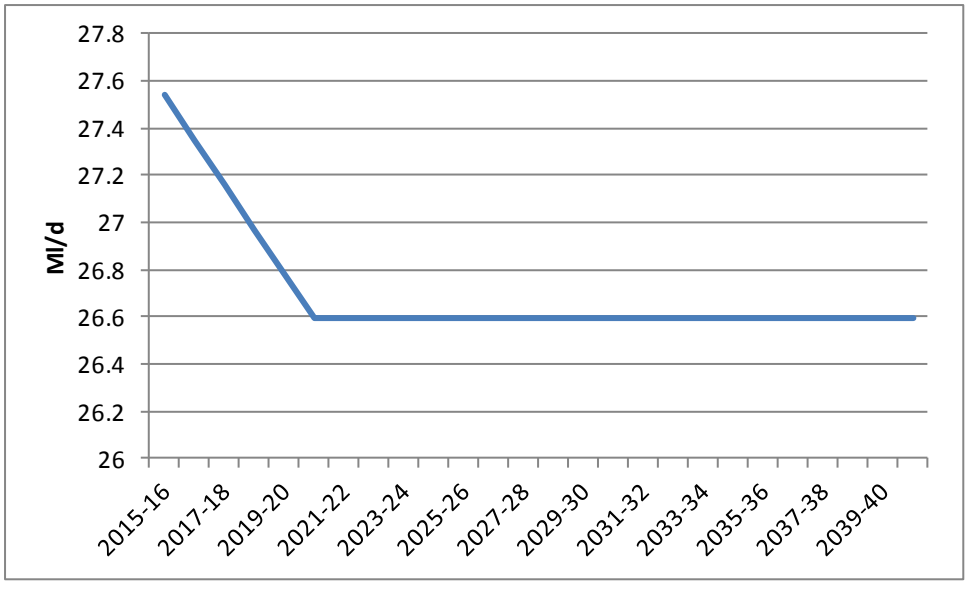


Figure 4.33: Shelton WRZ future leakage profile



As explained in section 4.1 and section 4.5, we have a need to reduce abstraction in the River Worfe catchment, and we will be converting existing public water supply boreholes to provide low flow river support. Our strategy for the Strategic Grid zone involves recapturing these compensation discharges further downstream at our Trimpley abstraction on the River Severn.

Before we can give up the existing public water supply groundwater sources and convert them to sources of low river flow support, we will need to provide an alternative source of supply to customers in Telford. Our proposed alternative source of supply is the expansion of output from our Uckington source near Telford, up to full licensed quantity (10Ml/d average, 12Ml/d peak) together with pipeline upgrades to transfer additional water from the west part of the Shelton zone to the east. This would require variation of the Uckington abstraction licence.

Figure 4.34: Stafford zone supply / demand leakage profile

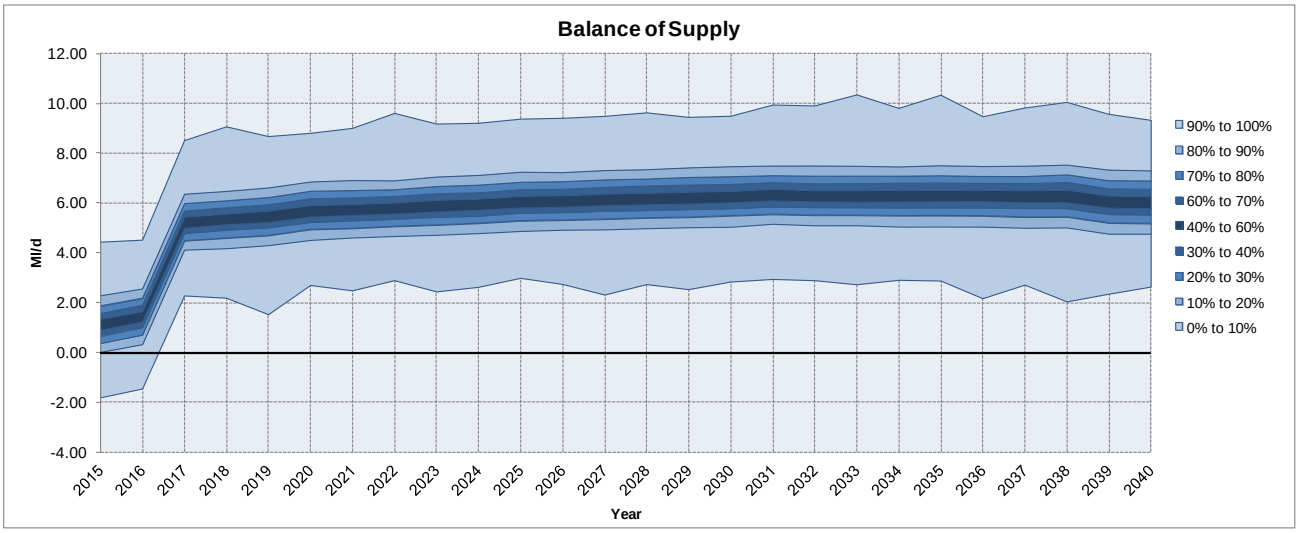
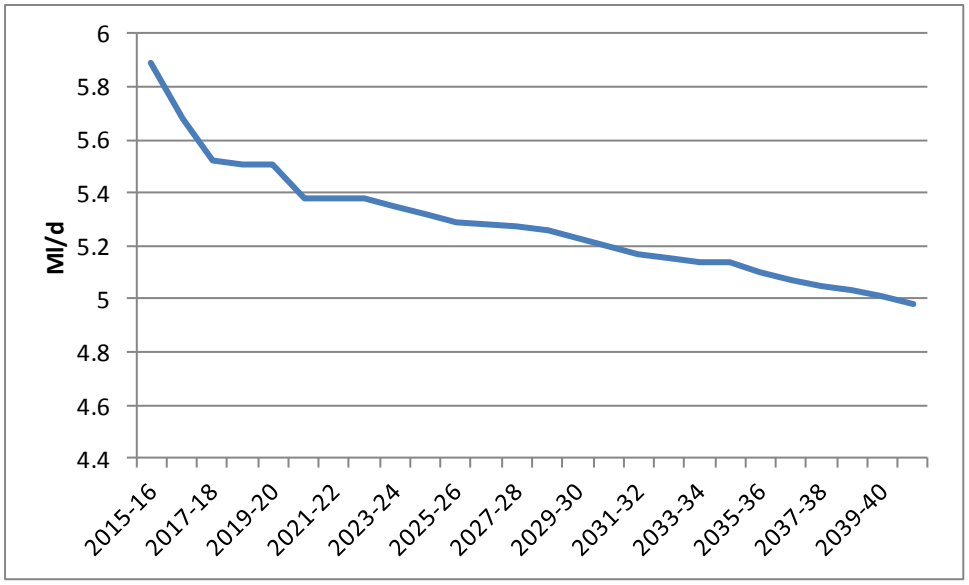


Figure 4.35: Stafford WRZ future leakage profile



As part of our wider PR14 investment plans in the Stafford zone, we will be renewing the trunk distribution main between our Weston Jones borehole and Hob Hill water treatment works. To maximise the benefit of this project, we will also improve the pumping and treatment facilities at the Weston Jones and Hob Hill sites respectively. This will give us greater operational flexibility by increasing peak resource, treatment and distribution capacity, whilst meeting our infrastructure maintenance needs.

This scheme will provide up to 3.7Ml/d increased peak groundwater capacity from Weston Jones in the west of the WRZ to meet occasional high peak demands in the zone. The increased peak output will remain within the existing abstraction licence limits, and will not require any licence changes.

This scheme is not intended to increase the long term average abstraction at Weston Jones. The scheme has been informed by peak demands observed between 2006 and present, and determined

on the basis that the increased peak output provided by the scheme will generally only be utilised for a few weeks in exceptional years.

Figure 4.36: Whitchurch and Wem zone supply / demand profile

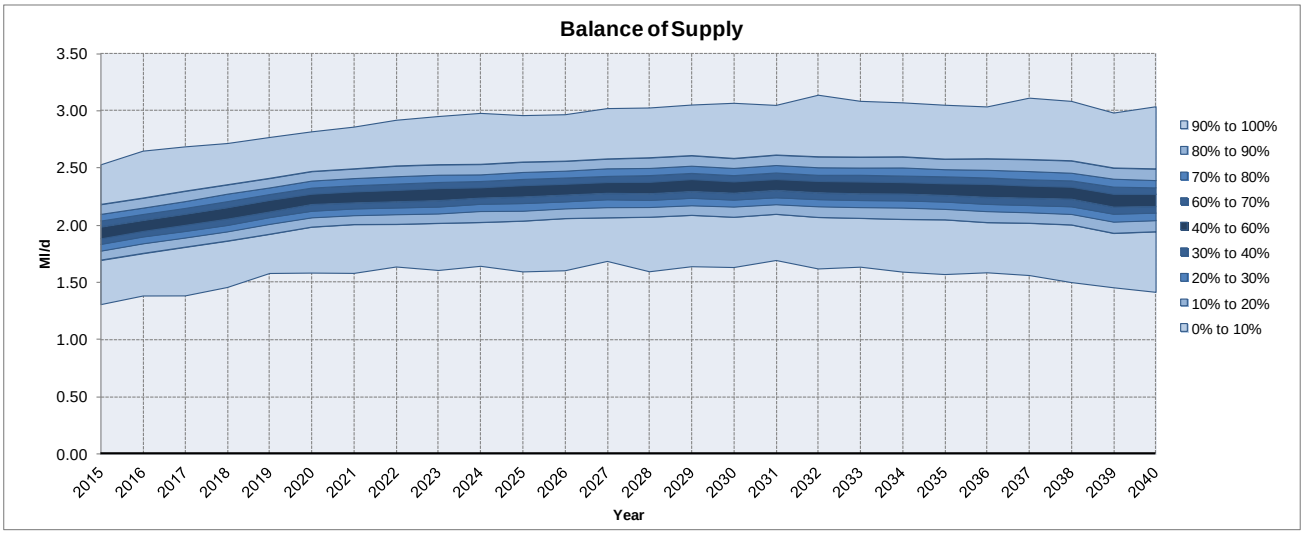


Figure 4.37: Whitchurch and Wem WRZ future leakage profile

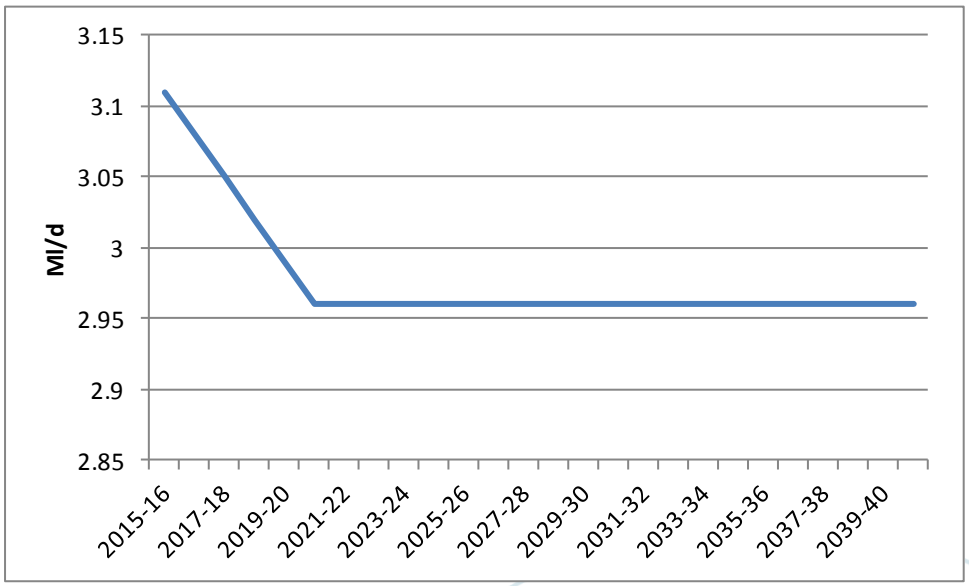


Figure 4.38: Wolverhampton zone supply / demand profile

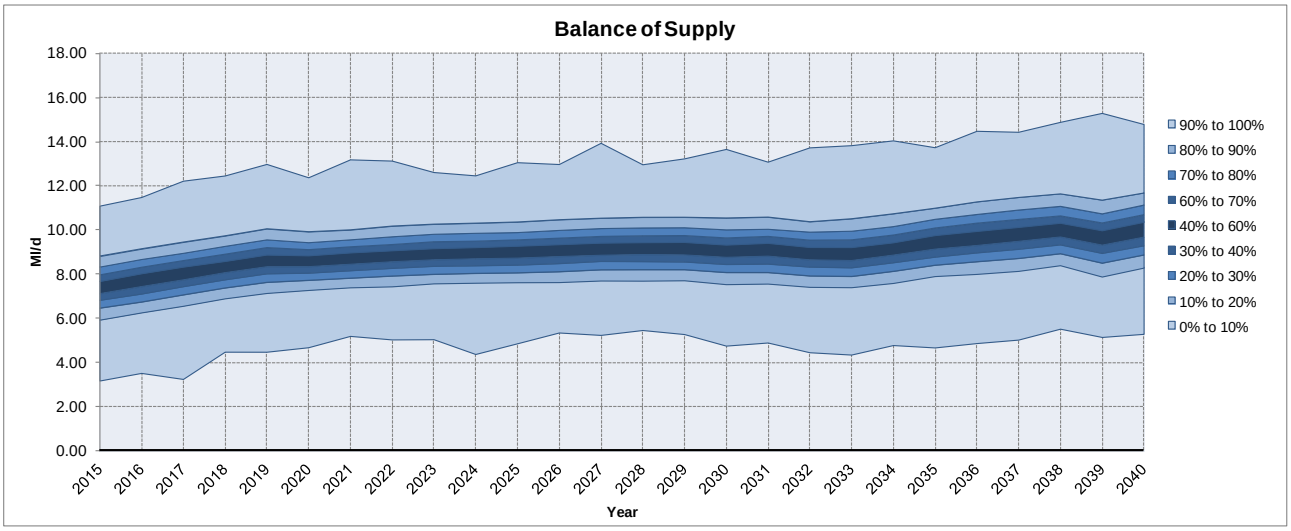
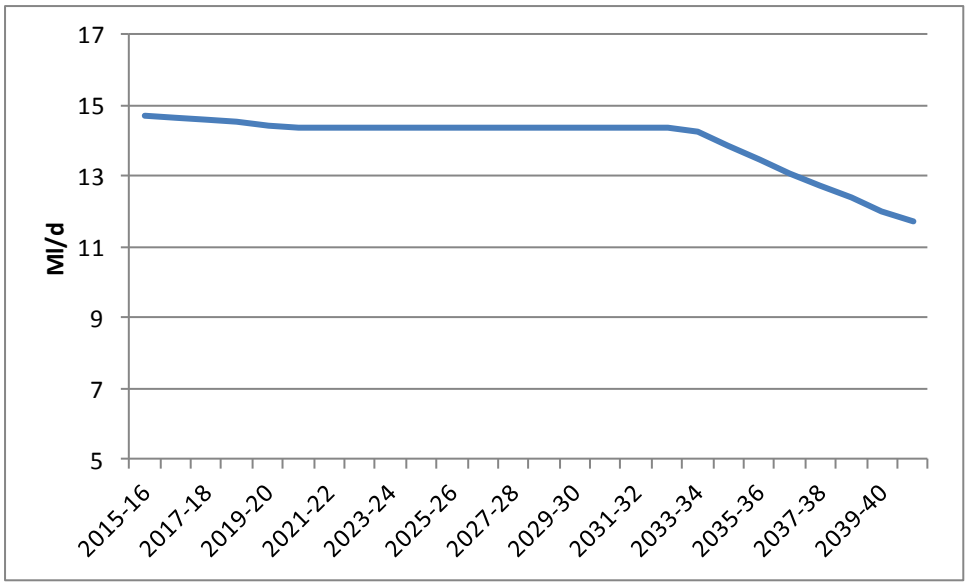


Figure 4.39: Wolverhampton WRZ future leakage profile



4.3 The sustainable economic level of leakage

Our strategy demonstrates our commitment to ongoing leakage reduction and builds on the sustained leakage improvements we have already achieved during AMP5. Between 2010 and 2015 we will have reduced leakage by around 43Ml/d, a saving of around 9% and the largest reduction of any of the water companies in England and Wales.

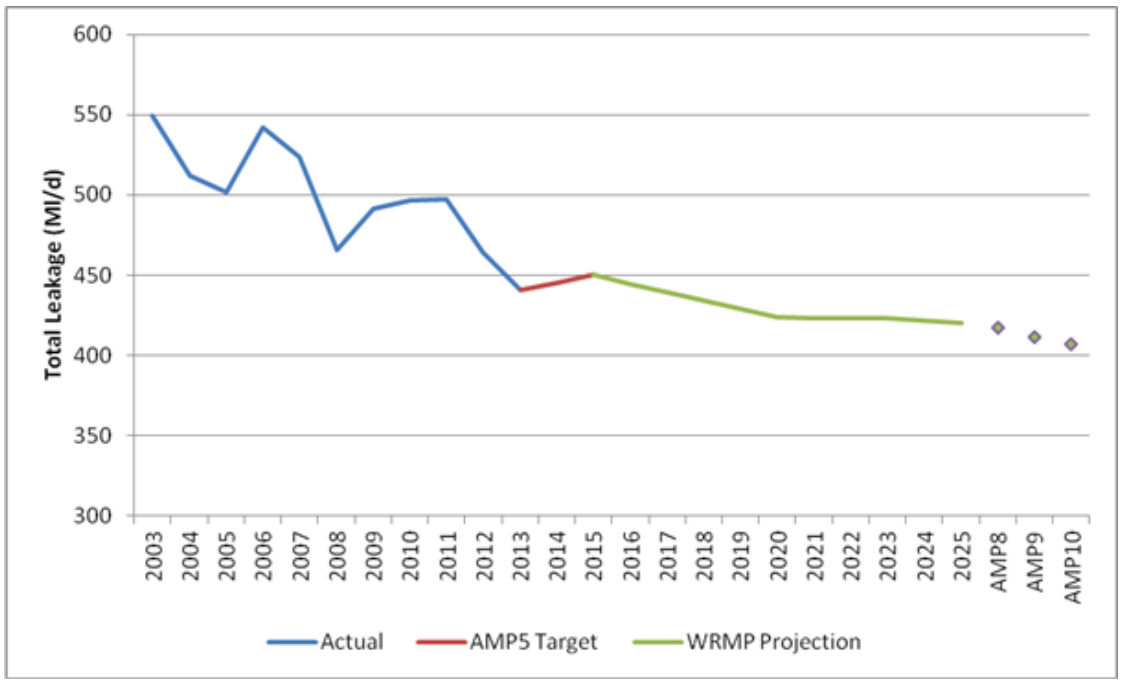
Within our draft WRMP we have considered leakage options alongside water efficiency, metering, pressure management, asset renewal and supply side options to derive the overall least cost mix of investment schemes. The sustainable economic level of leakage activity and mains renewal is at the heart of our supply / demand balance investment plan. Our approach complies with the recent consultation by the Environment Agency and Ofwat on sustainable economic level of leakage methods.

The long term supply pressures in our water resource zones mean that ongoing and significant leakage reductions will be required over the 25 year planning period. In our draft WRMP, our least cost analysis set a new sustainable economic level of leakage target of 439 Ml/d by 2020, a reduction of 14M/d (3%).

The response from customers and other stakeholders to both our draft WRMP and our wider PR14 plan was that we should be more ambitious in our leakage reduction targets. In response to the challenge from our stakeholders, we have set a more challenging leakage reduction target for AMP6. Our new AMP6 leakage reduction target is 25Ml/d (6%), and we have made a commitment to repair all leaks on our network within 24 hours where it safe to do so and will not disrupt customers' supplies.

By 2040, the sustainable economic level of leakage target will be around 407Ml/d, representing a reduction of 89Ml/d (18%) from 2010 levels. Figure 4.40 illustrates how our ongoing commitment to driving down leakage builds on our AMP5 success.

Figure 4.40: Our ongoing leakage reduction targets



The sustainable economic level of leakage targets for each of our water resource zones are shown in table 4.3

Table 4.3: Proposed SELL targets by water resource zone

	AMP5	AMP6					AMP7	AMP8	AMP9	AMP10
WRZ	2015	2016	2017	2018	2019	2020	2025	2030	2035	2040
Bishops Castle	1	1	1	1	1	1	1	1	1	1
Forest and Stroud	15	15	15	15	15	15	15	15	15	15
Kinsall	1	1	1	1	1	1	1	1	1	1
Llandinam and Llanwrin	5	5	5	5	5	5	5	5	5	5
Mardy	1	1	1	1	1	1	1	1	1	1
Newark	2	2	2	2	2	2	2	2	2	2
North Staffs	30	30	30	30	30	29	29	28	28	27
Nottinghamshire	49	48	48	48	47	46	45	45	44	43
Rutland	2	2	2	2	2	2	2	2	2	2
Ruyton	2	2	2	2	2	2	2	2	2	2
Shelton	28	27	27	27	27	27	27	27	27	27
Stafford	6	6	6	6	6	5	5	5	5	5
Strategic Grid	291	287	283	279	275	272	269	267	263	263
Whitchurch and Wem	3	3	3	3	3	3	3	3	3	3
Wolverhampton	15	15	15	15	14	14	14	14	13	12
Company	**450**	**444**	**439**	**434**	**429**	**424**	**420**	**417**	**411**	**407**

Appendix D5 explains how our water infrastructure and supply / demand optimisation (WiSDM) model derives the least cost investment plan from a range of options to maintain the long term supply / demand balance. Our approach uses a single model to derive the least cost plan to achieve supply / demand and infrastructure maintenance needs. The model cuts across the traditional water industry business planning approach of considering capital maintenance, opex, supply / demand and enhanced service level investment separately.

As a result of this investment modelling approach, the leakage reduction strategy in our draft WRMP is closely aligned with our wider infrastructure maintenance plans. We are confident that our approach has produced a fully integrated, least whole-life cost investment plan that will deliver the required serviceability, leakage and supply / demand outcomes.

4.3.1 Active leakage control policy

The bulk of our future leakage savings will be achieved through a continuation of our active find and fix policy. Whilst we will continue to react to leakage breakout across our network, more emphasis will be put on a "programmed" approach to managing leakage. More DMAs will go through a rigorous campaign process to include greater focus on desk top leakage assessment, correct techniques selection, data cleansing and leak detection surveys.

The key elements of our future active leakage control policy are:

- Further pressure management and more sophisticated control of existing assets to maximise leakage savings.
- Improved leak detection targeting which will include a cost of water methodology as well as the current volume based approach.
- We will repair all leaks on our network within 24 hours, where it is safe to do so and will not disrupt customers' supplies.
- Separating demand from leakage which will play an increasingly important part in our activities going forward.
- Our Bursts on Private policy will remain unchanged from AMP5. We will continue to offer a free repair to our customers (up to the limit of two repairs in two years.) We will renew service pipes up to a length of 12 metres from the boundary.
- Regular trunk main inspection to detect leaks and ensure valve operability
- Improved estimation of trunk mains and service reservoirs. We will progressively move to a programme of periodic water balance assessment of Accountability zones.
- We will continue to actively check for leakage from reservoirs as part of our ongoing reservoir maintenance programme.

4.3.2 Mains renewal

Our overall mains renewal investment programme is driven by the need to maintain serviceability along with the long term benefits of preventing future leakage increases due to network deterioration.

Our water infrastructure and supply demand model produces the least cost plan to meet all serviceability and supply demand constraints and drivers. The model outputs produce mains renewal expenditure forecasts that deliver benefits in two key areas;

- **Maintenance:** Expenditure needed to maintain the fabric of our trunk main and distribution systems, maintain serviceability, and off-set the leakage impacts of normal network deterioration to keep the levels of leakage stable.

- **Supply Demand:** Expenditure needed to generate a reduction in leakage in order to address a deficit in our supply demand balance. Mains renewal is one of a number of leakage control measures available to reduce leakage.

We have refined our mains renewal selection process to pick the optimal set of pipes to meet all of our serviceability and supply / demand constraints in the short and long term.

Figure 4.41 shows the investment required in mains renewal to meet the range of serviceability drivers in AMP6.

- S8 – Mains bursts stable
- S9 – Mains bursts and interruptions stable
- S10 – Mains bursts, interruptions and leakage stable
- S6 – Mains bursts, interruptions, leakage stable and supply demand challenge

Figure 4.41: AMP6 drivers of mains renewal expenditure

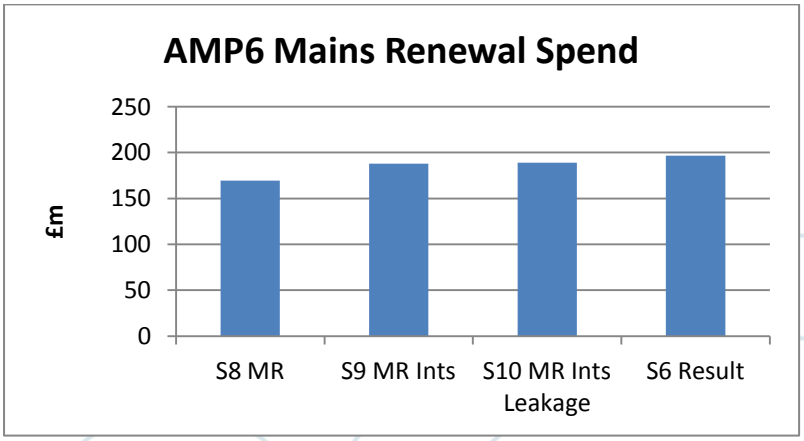
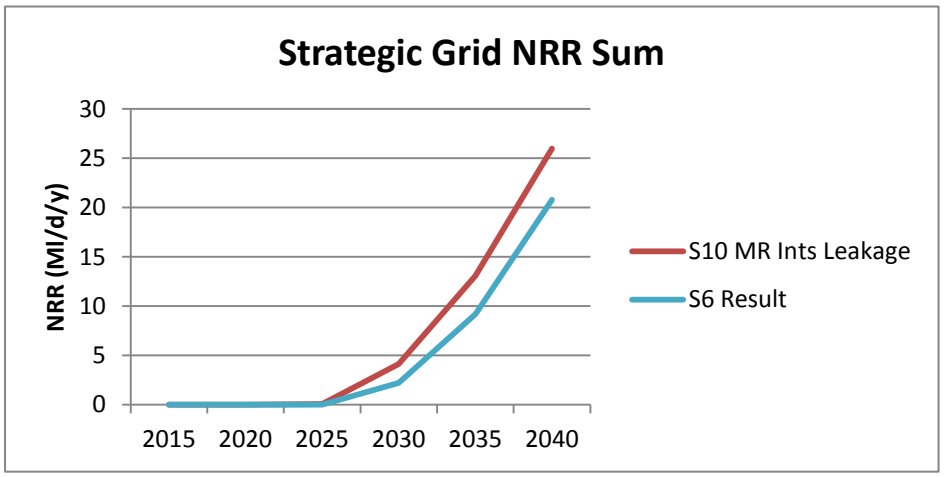


Figure 4.41 shows that additional mains renewal investment is required in AMP6 to meet the long term supply demand challenge (S6)compared to that needed just to maintain current leakage levels (S10). This mains renewal is targeting those mains which contribute most to the deterioration of leakage levels. The effect of the investment can be seen in figure 4.42..

Figure 4.42: Projected leakage impacts of normal network deterioration in the Strategic Grid



However, we have not included this additional mains renewal in our AMP6 plan. We believe that in the short term we can deliver leakage targets without the need for this investment, and deferring it into AMP7 will help keep customers' bills down without increasing risk. However, in the medium term, levels of mains renewal will need to rise.

4.3.3 Leakage management activities

As well as driving efficiency improvements in our active detection activities in AMP6, we are proposing to increase the level of investment in leakage management. Part of this is driven by increasing asset failure rates and is necessary to stop leakage rising from current levels. Our AMP6 leakage targets will be achieved through active leakage detection, new pressure management opportunities, fixing leaks quicker, improving the effectiveness of our detection activities.

Activity	Leakage reduction (Ml/d)	Cumulative Leakage reduction	
		(Ml/d)	%
Pressure Management	5	5	1%
Active Leakage Control	13	18	4%
DMA improvement	2	20	4%
Quicker repair response	4	24	5%
Increased trunk main effort	2	26	6%

4.4 Our water efficiency strategy

In line with our customer expectations, statutory water efficiency duty, Government and regulator expectations, we are committed to continuing our promotion of water efficiency.

As a minimum we will continue to offer advice and support to all of our customers to influence behaviour, and will continue to provide water saving devices to help consumers to reduce their water consumption. Our draft WRMP also includes proposals to increase our water efficiency activities above current levels as part of the best value solution to balancing supply and demand.

The key elements of our water efficiency plans are to:

- Provide information to consumers on how to save water. This includes maintaining our provision of direct engagement with schools and adult groups via our education team, as well as billing information on our website.
- Provide a range of water saving products which are free to all customers on request.
- Provide discounted higher value water saving products (e.g. water butts, showerheads)
- Improve and increase our links with third parties to form partnerships – internal and external, taking advantage of scheduled visits to promote water efficiency and to retrofit water efficient devices. This includes affinity partnerships, social housing, Green Deal, Energy Company Obligation.

  We propose that in AMP 6 we will place more focus on working with partner organisations to deliver water efficiency messages to a wider audience, combining this with messages about energy saving and debt management etc where appropriate, and to ensure water saving products are installed and installed correctly.

Our proposed water efficiency programme for AMP6 is:

- Baseline activity: 18Ml/d savings
- Additional activities: 7Ml/d savings

4.4.1 Baseline water efficiency activities

In Appendix B we explain our approach to forecasting the demand for water, and we set out the ongoing water efficiency savings we have incorporated into our baseline forecasts. The key activities that will deliver these ongoing savings are as follows:

- **Education**

  We will continue to offer advice and support to our customers with the aim of influencing behaviours and reducing water consumption. We will:

  - Work closely with schools and universities and community groups.

- Provide information with bills, on our website, at our sites, and as part of any relevant wider water industry, government or regulator initiatives. We will also carry out targeted promotion as required.
- In partnership with other organisations including social housing, and forming other partnerships, for example with Green Deal providers. This will cover water efficiency advice, but we will also combine with energy saving, debt advice etc as appropriate.

- **Free products**

  We will continue to provide water saving products to our customers. This will include the products we currently distribute, but we will introduce new products that are proven to be effective at reducing water consumption.

- **Partnerships**

  We will continue to seek opportunities to partner with other relevant schemes which provide access to a broader customer base. We will enrol in partnerships where there is a mutual benefit to participating organisations. Working with third party stakeholders, such as the Environment Agency, also appears to be benefit partnership work.

  We will only engage in partnerships where there are mutual benefits for both organisations.

- **SME**

  Other water savings will be delivered through smaller ad hoc opportunities which arise. For example, requests from smaller non household customers for support and advice in reducing water consumption. This will cover domestic type use. Products and service provision for larger business users will be covered under our business customer strategy set out in the Additional Water Efficiency section below.

- **Discounted products**

  We will continue to provide higher value products, for example, water butts and showerheads, to our customers at discounted prices.

  The water efficiency savings we expect these baseline activities to achieve in AMP6 and longer term are set out in tables 4.4 and 4.5 below.

Table 4.4: Proposed baseline water efficiency programme - AMP 6

	Annual product (Ml/d)	Annual education (Ml/d)	Total Ml/d
2015-16	2.64	1.00	3.64
2016-17	2.64	1.00	3.64
2017-18	2.63	1.00	3.63
2019-20	2.62	1.00	3.62
2020-21	2.62	1.00	3.62

The long term savings delivered by our water efficiency activities are likely to decay over time. This is for a number of reasons which include:

- The replacement of existing fitting (e.g. toilets) with more water efficient ones as part of the natural cycle of replacement;
- Product life of retrofit items;
- Customers removing retrofit items.

In estimating the likely decay of water savings we have used a combination of:

- Waterwise Evidence Base half life scenarios which conclude that the half-life of savings is 8.4 years;
- Market Transformation Programme information on the replacement of fittings;
- Our own experience.

Within our demand forecasts we have assumed:

- The decline in water savings from product installation is 10% per annum (10% of previous year's saving);
- The decline in water savings from education is 5% per annum (5% of previous year's saving).

Table 4.5: Long-term baseline water efficiency programme

	Cumulative Net Demand reductions (Ml/d)
AMP 6	15.29
AMP 7	24.82
AMP8	30.69
AMP 9	34.19
AMP 10	36.41

4.4.2 Additional Water Efficiency Activities

In addition to our baseline water efficiency programme, our draft WRMP includes proposals to increase our activities with business customers to achieve further consumption savings. We project that in AMP6 additional savings of around 7Ml/d can be achieved. The key aspects of this additional business customer activity are as follows:

As part of our best value supply / demand strategy, these additional water efficiency activities will be targeted at the Strategic Grid and Nottinghamshire resource zones.

- **Free services**

  To provide the general advice to business customers we will use a similar structure to that used for domestic customers. This will include free advice on:

  - Best practice around the principles of:
    - Understanding use (water balance), measure, plan, reduce, monitor, review.
    - Provide basic advice and simple improvement measures.
    - Direct to free resources.
  - Downloadable self audit guides.
  - Billing and tariff explanation/options.
  - Case studies and benchmarking.

  Included within the free activity we will also undertake audits of certain types of properties. The audits would be focused on "domestic style" usage e.g. toilets, urinals, showers, hand basins. These audits would not include aspects such as process use, leakage identification or re-use schemes.

Our free offer would be limited to completing a simple water audit and report to include recommendations of behaviour / activity changes and free devices, together with an indication of potential water savings. The report will also be used to signpost further opportunities via a referrals process.

For business customers provision of free devices would need to include an agreement regarding installation and feedback. This has worked effectively on trial sites, however as the process expands and more audits are completed contractual arrangements may/will need to be in place.

Based upon the products provided, these additional free services would deliver approximately 0.4-0.6 Ml/d of water savings annually.

- **Paid services**

  Our larger commercial, corporate and public sector customers offer significant opportunities to deliver reductions in water consumption. Drawing on our experience of working with schools, universities and hotels there is scope to provide a water efficiency advice, retrofit and replacement on a scale which goes beyond our statutory water efficiency duty. These would need to be paid services.

  Targeting of specific sectors such as schools, hotels, government buildings, universities would be used, with support also provided for some of the largest SME's. There is the potential for

more sophisticated targeting if we adopt technologies that can identify high consumption customers (based on customer classification). Use of metered data from data loggers for business customers would also be possible.

Paid audits would be undertaken by a third party following a compliant referral process. This may be following an initial free audit, via the Commercial Management team, or from a direct referral. In addition to the services offered during a free audit it is anticipated this service would including leakage identification, detailed process improvement, re-use and recycling and recommendations for investment options.

Investment / remedial works undertaken following the audits, including retrofit programmes, process improvements, would then be a paid service that would operate either on a direct relationship with the third party or a pay as you save model with STW providing the up front capital.

A pay as you save approach will require an up front capital fund which customers would repay via water bill savings. If the calculated payback period is 12 months or less, we would expect the customer to pay for any intervention on completion.

This is a non-profit option for Severn Trent Water, though third parties would need to operate on a cost plus basis to ensure compliance. We require an allowance in price limits for our costs to operate administer the programme including targeting and referral of customers, which would operate along side the free business customers offering.

All service provision, liability and contract agreements would be between the customer and the service provider, there may be additional legal/contractual arrangements if the payback is via a pay as you save arrangement with STW.

We expect to target the bulk of the commercial activity at larger users and public sector properties. We anticipate water efficiency for smaller non-household customers will be addressed within our free activity and our base programme to meet our statutory water efficiency duty.

We anticipate that the bulk of this activity will take place around the time when full competition for non household customers is introduced, and will therefore peak in AMP6.

From 2020 - 21, the activity will become part of our ongoing baseline programme.

In addition to saving water for non household properties, we would be able to use the opportunity afforded by this option to promote water efficiency to staff, site visitors and children. This is particularly relevant to school pupils whose long-term habits we already seek to influence through our extensive and successful education programme. We would deliver this secondary activity as part of our statutory water efficiency duty.

4.5 Restoring sustainable abstraction

Some of our existing water abstractions may be having a detrimental effect on the environment, particularly during dry weather periods when river flows are low. Our long term plan includes investment and activities to address those impacts, and to deliver the Environment Agency's PR14 National Environment Programme (NEP) for water. Our customer research indicates that customers support addressing these issues, and therefore we agree that these should be included in the programme. These activities include:

- Reducing abstractions and providing new strategic sources of supply;
- Implementing low flow alleviation local solutions;
- Accommodating abstraction licence changes required under the Habitats Directive;
- AMP6 environmental impact investigations, trials and options appraisal;

Throughout AMP5 we have been investigating the impacts of those abstractions identified by the EA as possibly causing harm to the environment. Through our investigation work we have gathered site specific evidence of the extent of damage being caused, and whether our activities are the main cause, or just part of the problem.

Where our abstractions have been identified as confirmed or likely to be the cause of the problem, the EA has named these sites in the PR14 NEP and requires us to find and implement solutions. These solutions might include revoking or reducing our abstraction licences at the affected sites and possibly finding an alternative source of supply. These sustainability reductions to licences may be required to protect international or national designated conservation sites (Habitats Directive, Sites of Special Scientific Interest or Biodiversity 2020 sites), to protect locally important sites or to deliver Water Framework Directive (WFD) objectives.

In preparing our AMP6 plan, we have worked with the EA to find workable solutions to the confirmed and likely sites, ranging from local environmental mitigation measures to alternative sources of supply. In our supply / demand strategy, the reductions to our baseline deployable output projections include the impacts of any reduced or revoked abstraction licences at sites where we are likely to be required to change our abstractions.

In August 2013 the EA provided the final list of 'confirmed' and 'likely' sustainability changes plus other 'non-licence change solutions' required to mitigate local environmental concerns in AMP6. The licence changes amount to a loss of 85.4Ml/d of licensed abstraction.

Appendix A1 provides the full list of confirmed and likely changes that the EA has provided and explains how these have been incorporated into our deployable output projections.

The supply / demand measures set out above in section 4.2 and 4.3 will allow us to make these abstraction licence changes without impacting on customers' security of supply. In addition to the measures to provide new alternative sources of supply, we will also be providing local mitigation measures at many of the sites on the confirmed and likely list. A summary of the sites affected, and our proposed mitigation measures is given in figure 4.43 and table 4.6 below.

Figure 4.43: Locations of confirmed and likely sustainability changes

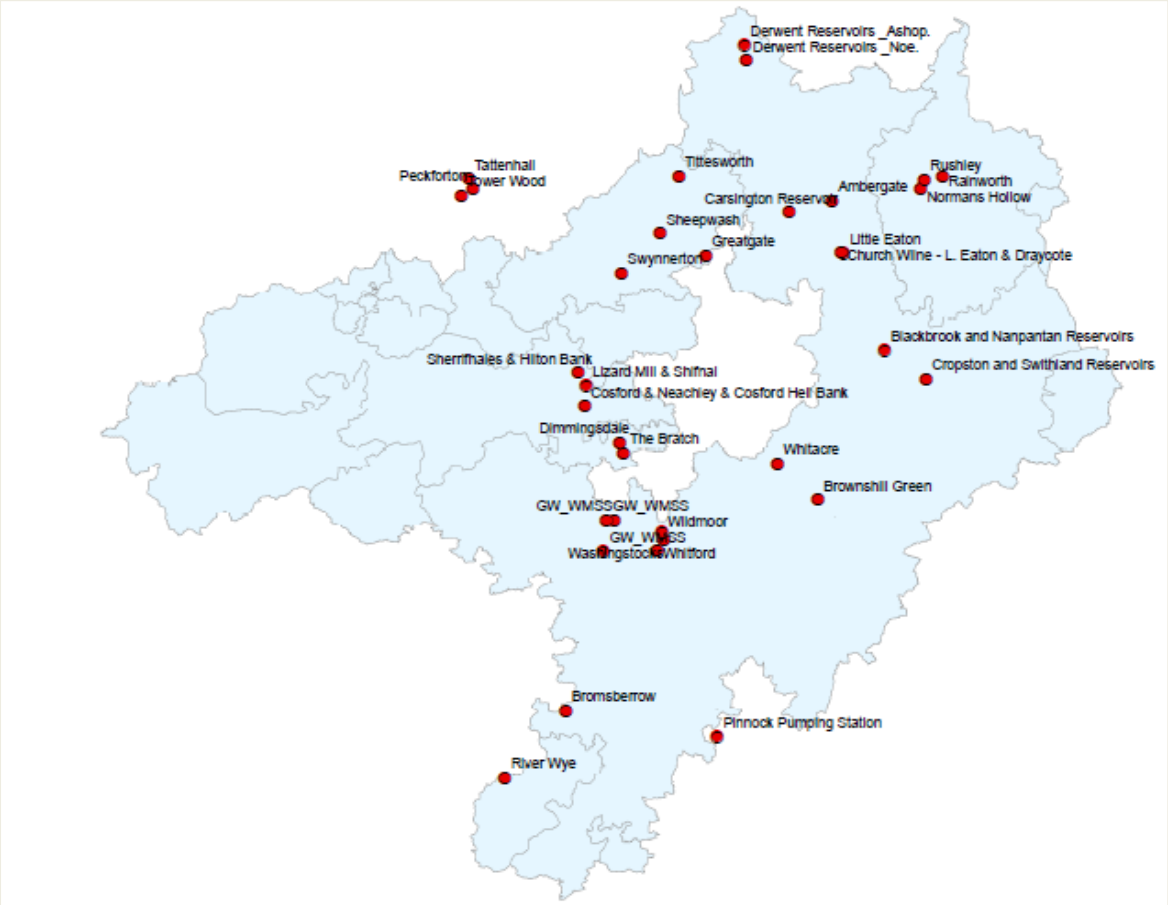


Table 4.6: Proposed mitigation measures at the confirmed and likely sites

STW Site	Site	Mitigation Scheme
Peckforton, Tower Wood, Tattenhall, Audley	Aldford Brook	Environmental Monitoring Programme
Wyelands (Mitcheldean)	River Wye	Environmental Monitoring Programme
Sheepwash, Cresswell, Wallmires (Other Creswell Group sources are Fulford, Meir, Mossgate)	River Blithe	Abandon Sheepwash and transfer supplies back to Cresswell
Whitacre	River Blythe	Construction of Fish Pass on the pUmped intake
Swynnerton	Swynnerton Pools	Licence reduction and montioring
Blackbrook Reservoir	Blackbrook Reservoir	New Compensation Regime required (desgin, testing & installation)
Cropston and Swithland Reservoirs	Cropston/Swithl and Reservoirs	New Compensation Regime required (desgin, testing & installation)
Ambergate, Little Eaton and Draycott	River Derwent	Environmental Monitoring Programme
Bromsberrow, Lintridge, Ketford, British Camp Springs	Glynch Brook	New Compensation discharge at the top of the Catchment
Wildmoor, Washingstocks, Whitford	Battlefield Brook	Licence revocation at Wildmoor and Licence Reduction at Washingstocks and Whitford. Local solution of hydromorphology improvements to the Brook
Ashop Diversion, Derwent Valley Reservoirs	River Ashop	Change to compensation arrangements
Noe Diversion, Derwent Valley Reservoirs	River Noe	Change to compensation arrangements
Brownshill Green	River Sherbourne	Licence revocation for Public Water Supply and conversion to a compensation source.
Dimmingsdale, Bratch	Merryhill Brook	Canal transfer plus new Borehole to support canal
Rainworth, Normans Hollow, Rushley	Rainworth Water	Revocation of all licences
Sheriffhales, Shifnal, Lizard Mill, Neachley, Cosford, (Beckbury, Grindleforge, Hilton, Copley)	Upper Worfe	Revocation PWS licences at Sheriffhales, Hilton Bank, Lizard Mill and Shifnal. Local in channel hydromorphological solution and environmental monitoring programme
Pinnock	Pinnock Springs	Installation of new washout and controls on upper springs
Bellington	Hurcott and Podmore SSSI	Environmental Monitoring Programme (WLMP)
Green Street	Puxton and Stourvale SSSI	Installation of Rock Weir and monitoring programme
Astley	Hartlebury Common SSSI	New Augementation borehole
Whitacre	River Blythe	Construction of Fish Pass on the gravity intake

STW Site	Site	Mitigation Scheme
Whitacre	River Bourne	Modify by pass channel to allow fish passage
Barnby Moor	Ranskill Brook	Licence Reduction - emergency use only.
Roundhills STW (Hagley pumpback)	Blakedown Brook	Maintain Hagley pumpback and environmental monitoring programme
Hatton, Mill Meece, Whitmore	Meece Brook	Environmental Monitoring Programme
Far Baulker, Epperstone, Fishpool, Salterford, Papplewick, Halam	Dover Beck	Revocation of licences at Fishpool and Salterford, and Environmental Monitoring Programme
Carsington Reservoir	Carsington Reservoir	New Compensation Regime required (desgin, testing & installation)
Tittesworth	Tittesworth Reservoir	New Compensation Regime required (desgin, testing & installation)

In addition to these confirmed and likely sustainability changes to our abstraction licences, we are also affected by the changes required by Natural Resources Wales to Dwr Cymru Welsh Water's (DCWW) abstraction licence at the Elan Valley Reservoirs in the upper River Wye catchment. As required under the Habitats Directive, Natural Resources Wales have undertaken a review of consents (ROC) on the River Wye. This has concluded that a number of licence changes are required to reduce the impact of abstractions on the river. These changes include DCWW's licence at Elan Valley Reservoir, which will affect the discharges from the reservoir for river compensation and regulation.

DCWW provide us with a major bulk supply of water from Elan Valley Reservoirs to our Strategic Grid zone. Our Aquator modelling indicates that it is the changes to the Elan Valley Reservoir operation that will have the single biggest impact on deployable output in that zone. Our current assessment is that around 40Ml/d of deployable output will be lost in the Strategic Grid zone due to the changes to the reservoir operation. These losses impact on our AMP6 supply capability, and our plans to accommodate these impacts are described in the section 4.2 above.

4.6 Catchment management strategy

Our catchment management strategy complements our long term water supply, treatment, and capital maintenance strategies. The strategy is outcome based and will allow us to be flexible and innovative in delivering the right catchment solutions. Our catchment strategy will also help us achieved a number of our external obligations and stakeholder expectations. These include:

- The Water Framework Directive (WFD) which provides statutory protection for water supply intakes via Article 7
- Catchment risk assessments undertaken as part of the Drinking Water Inspectorate (DWI) led Drinking Water Safety Plan (DWSP) approach;
- OFWATs desire for water companies and Water UK to show leadership on the issue of catchment management as set out in their 2012 *Water Today, Water Tomorrow* focus report entitled '*From Catchment to Customer'*.

Our strategy is to, *where possible, reduce the number of drinking water failures and minimise or delay future water treatment expenditure on raw water quality deterioration by implementing Catchment Management techniques*. This will be achieved through collaboration with Environment Agency (EA), Drinking Water Inspectorate (DWI) and OFWAT along with other key stakeholders and catchment partnerships. It will also deliver our obligations under the WFD, further enhance catchment risk assessments that support our DWSPs and seek to minimise CO_2 emissions.

We have demonstrated through our cost benefit assessment that catchment schemes will deliver better water quality and lower treatment costs. Our PR14 consultation and research to date has shown that our customers and stakeholders strongly support greater catchment management and partnership working to protect our raw water sources and to avoid the need for expensive treatment.

Overall, we will have 18 catchment schemes in AMP6 aimed at tackling pesticides, nitrate, colour and bacteriological risks over the next 5 to 25 years, to safeguard drinking water sources and to avoid the need for expensive treatment. The types of schemes we will be implementing in these catchments are summarised below:

- **Nutrient Management**: Nutrient management advice is key to all our catchment schemes and forms the basis of each scheme. This is because nutrient management options are often cost beneficial to farmers and therefore help to build trust between the farmer and ourselves. The scheme will include the use of fertiliser and manure management planning as well as farm infrastructure improvements.

  One of the main tools we will be using is our Nutrient Budget Calculator. This is a simple web based tool which compares the amount of nutrients coming onto a farm in feed, fertiliser etc against those leaving the farm in produce such as grain, milk and meat. The difference between the two is potentially lost to the environment. Results are compared to national and catchment averages for each farm type to show how a particular farm performs in comparison to other farms. The potential monetary value of this surplus is shown to

demonstrate the cost benefit of reducing the farm surplus. Advice is given on how to reduce the surplus and nutrient management on the farm.

Advice and awareness raising will involve the production of nutrient management plans, promotion of cover crops and the integration of fertiliser and manure nutrient supply. For pasture, land advice and recommendations will be provided for field stocking rates, avoiding spreading of inorganic fertilisers at high risk times, use of clover, fertiliser recommendation system and integration of fertiliser and manure nutrient supply. Advice and awareness raising will take place through farmer one-to-one visits, farmer events including water treatment works tours, farm walk, newsletters, training, spreader calibration and farmer behaviour surveys. We will also undertake manure, slurry and soil sampling to improve farm nutrient management.

- **Metaldehyde (Product Substitution):** AMP5 investigations have demonstrated that as part of an enhanced catchment management approach we should promote product substitution for metaldehyde. Therefore we will be incentivising the difference in cost between a metaldehyde based product and an alternative ferric phosphate based product. This would be supported by a programme of farmer engagement and in catchment sampling. This would be complemented by nutrient management engagement which is particularly cost beneficial to farmers.

  We are trialling two different delivery approaches during autumn 2013. The outcomes of these will be used to inform our long term approach. However we are likely to need support from other organisations locally, regionally and nationally to deliver the scheme on the scale needed in our region.

- **Pesticides**: Pesticide schemes would focus on increasing cultural controls and offering grants for farm infrastructure improvements such as biobeds and biofilters, in addition to advice and demonstrations, and enhanced monitoring.

  Pesticide schemes will be supported by the development a weather app and/or a web based tool which will provide improved local weather forecasts to farmers. This will enable them to better time pesticide applications and reduce the amount of pesticide which is lost when applications are shortly followed by rainfall. We will also being working with farmers and agronomists in each catchment to capture ‘real time’ information on planned and pesticide applications. It is envisaged, that where possible, this will help us to mange our intakes more effectively to avoid peak concentrations.

  The pesticide and metaldehyde schemes will be run in conjunction with each other, and synergies exploited where both issues are present. In some groundwater catchments product substitution will be considered (Chlortoluron) or changes to crop rotation (Bentazone) explored.

- **Intake management**: It is likely that changing our own water abstraction intake operations can complement catchment solutions. Intake management acknowledges that pesticide loss is episodic; depending on the area and timing of application as well as soil conditions and

weather. There is therefore potential to enhance catchment management by modifying operational practice. The key factors that determine how effective it will be are; the ability to monitor concentrations in real time, the availability of storage and flexibility within abstraction licences, the duration and frequency of pesticide peak concentrations and the impact on water resources deployable output.

Intake management opportunities are limited by the availability of online monitoring, licence conditions and the availability of bank side storage. An initial trial is planned at Draycote during autumn 2013 to investigate this further. This will be complemented by the capture of 'real time' information on pesticide applications from farmers and agronomists in the catchment. Resource concerns will however reduce intake flexibility where concentrations remain high for long periods of time.

- **Cryptosporidium Risk Reduction:** Catchment management for cryptosporidium will complement treatment options planned in future, forming a twin track approach. Within high risk groundwater catchments catchment management will centre on farmer advice and increased farmer awareness of water quality issues in Source Protection Zones (SPZ1 and 2). The advice will focus on promoting good agriculture practice and providing support for agri-environment scheme options that will reduce crypto risk to the site. Where deemed appropriate we will support minor farm infrastructure improvements within SPZ1 (e.g. livestock fencing or covering manure heaps).

  In instances where the Code of Good Agricultural Practices (COGAP) does not sufficiently reduce or fully mitigate crypto risk we will work on a voluntary basis with the farmer to implement an Enhanced COGAP Catchment Management Scheme. Under this scheme we will help with farm infrastructure improvements on the farm yard or within SPZ1 and SPZ2 which will:

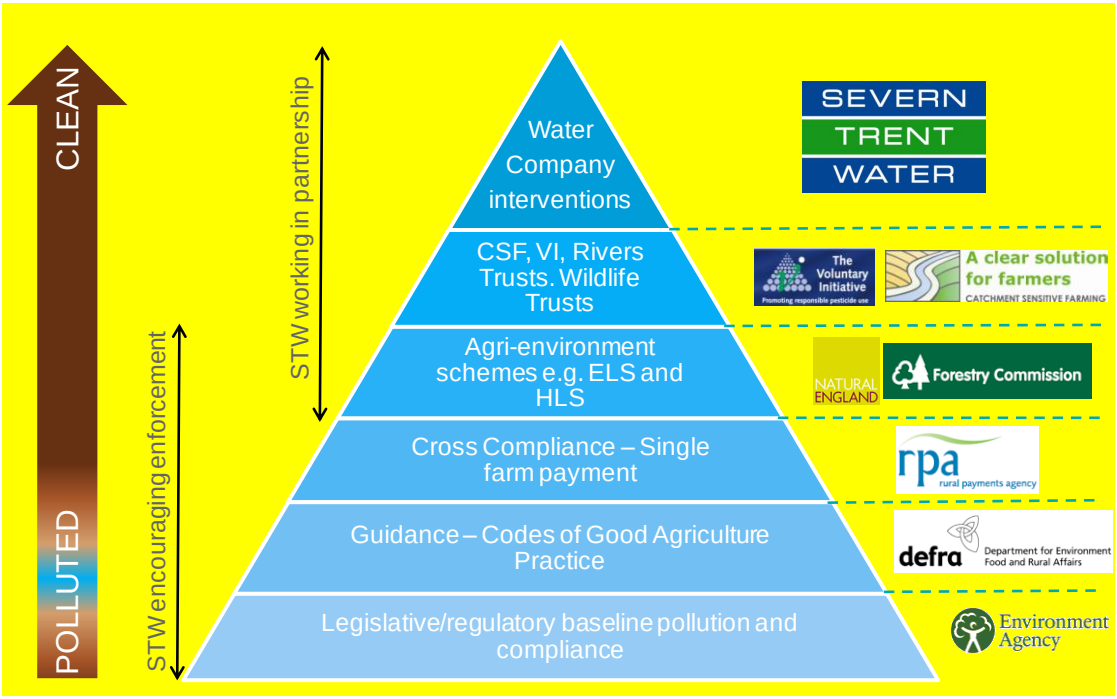
  - Improve manure/slurry management, application and storage
  - Reduce soil compaction and poaching
  - Reduce uncontained losses from hard standing

- **Colour Management**: Colour management will be focused on our Bamford catchment (Upper Derwent Valley). Catchment characterisation has enabled a sub-catchment specific programme of measures to reduce dissolved organic content and particulate organic carbon losses, hence colour, turbidity and suspended solids, from upland moorlands in the Bamford catchment.

Stakeholder engagement is essential for the implementation of our catchment management strategy and we see the Catchment Based Approach (CaBA) partnerships as key in aiding the delivery of our strategy. However, our current catchment management work has shown that in some catchments stakeholder engagement, good agricultural practice and advice alone will not bring about sufficient water quality improvements. In these catchments or high risk areas, enhanced and targeted catchment measures are needed to meet drinking water standards (DWS) or target water quality concentrations. It is in these areas where we see water company intervention as being key

to managing catchment risk and thus where we see our catchment schemes fitting. Figure 4.44 illustrates our role within the overall multi-stakeholder catchment management approach.

Figure 4.44: Tiered approach to catchment management initiatives and stakeholder engagement



We have established the following high level principals for engagement which will underpin our activities and communication in this area:

- We will use scientific evidence and/or expert opinion to support the need for any cost beneficial changes in catchment management;
- We will work with stakeholders (including farmers and landowners) to bring about catchment management improvements voluntarily;
- We will seek to facilitate management changes in the source catchment areas by bringing together interested parties and/or external funding streams into the catchment area to improve resource protection;
- Where asked to go above and beyond good agricultural practice we may part fund improvements or offer incentives to farmers to encourage changes in practices e.g. product substitution;
- We expect farmers to meet good agricultural practice through existing legislation, regulation and guidance. Where farmers do not adhere to the Code of Good Agricultural Practice (COGAP) though voluntary means we will look to the EA to enforce good practice;

- We will actively seek to have catchment areas designated as Water Safeguard Zones to promote voluntary activity;

- We will only resort to regulatory tools such as Water Protection Zones as a last option;

- We will seek to influence regional and national research needs, policy and delivery mechanisms where we identify gaps through our catchment engagement and R&D work.

4.7 Other PR14 investment activities that will benefit our supply / demand position

4.7.1 Increasing our network's resilience

The future is uncertain, but we do know that we may need to cope with more variable and more frequent weather extremes whether that be very hot, dry, cold or wet. We could also be affected indirectly if there is an increasing likelihood of losses of other utilities that we rely on, such as power, and other types of external events that may affect us such as landslips near our critical pipes.

Being adaptable to a range of uncertainties is consistent with our climate change adaptation approach (from our published climate change risk assessment) and with the Government's recommended approach to climate change adaptation.

During AMP5 we've been systematically investing to reduce the risks to customers' supplies posed by single points of failure and from external hazards such as flooding. We've also learnt from our experiences in the Gloucestershire floods of 2007 and have used this to develop both our operational responses and long term investment plans. Our PR14 stakeholder engagement shows that we are still carrying more risk to supply continuity than customers wish to accept, and in some cases, more than they understand.

To reduce the risks to future security of supplies, our wider PR14 plan includes major investment to improve long term strategic resilience. Our investment to increase our resilience spans across multiple AMP periods and can be adapted and built upon as future uncertainties become clearer. The key elements of our strategic resilience investment plan are:

- We intend to make our abstraction and treatment facilities, pipes and reservoirs, in both rural and urban communities, resilient enough to withstand a range of potential extreme weather events. Greater flexibility will also ensure resilience against other challenges, such as fires, floods or contamination.

- We've prioritised our investments in the highest risk areas. Our approach looks for solutions that address resilience and other challenges too, so our investment delivers maximum value to our customers.

- We've designed our programme to save our customers money in the long term, by extending the life of strategic assets like the Elan Valley Aqueduct (EVA) and the Derwent Valley Aqueduct (DVA) .

    - The DVA provides raw and treated water to our Strategic Grid in the East Midlands. Our investment plans include strengthening sections of the aqueduct, to help us move water more flexibly around our region.

- The Elan Valley Aqueduct (EVA) carries nearly 20% of our raw water and is over a hundred years old. It plays a key part in delivering strategic resilience to our network. In order to ensure a resilient service to the customers that rely on the EVA we plan to develop an alternative source of supply. This will allow us to provide an uninterrupted service in the event of an EVA failure and the ability to shut-down the EVA for periods of planned maintenance. The cost of providing this will be significant, and we have decided to spread this over ten years which will provide the resilience our customers expect and help to keep our customers' bills affordable.

4.7.2 Borehole maintenance

Boreholes account for around one third of our water resource, with approximately 320 in supply, located across 150 sites. They are long life assets and best practice guidance (UKWIR) recommends a generic asset life of 80 years for boreholes located in the Permo-Triassic Sandstone aquifer, which is the case for the majority of our boreholes. 10-15% of our boreholes are located in other aquifer types that have shorter asset lives of between 60 and 70 years.

The average age of our boreholes is currently 56 years, and as they approach the end of their design life, they are likely to experience significantly more failures that result in permanent outages, such as collapses. This view is supported by our analysis of historical outages for our boreholes. The deterioration of these important assets will put customers at greater risk of supply interruptions and could erode the deployable output that underpins the long term strategy in our WRMP.

To address the risks posed by our aging borehole asset base, our PR14 investment plan includes a programme of borehole maintenance, rehabilitation and redrilling. The sites included in the borehole maintenance plan have been prioritised based on:

- Strategic criticality to maintaining supplies;
- Water quality performance;
- Their contribution to current and projected WRMP deployable output;
- Dependencies and links to other AMP6 supply investment needs, such as the conjunctive use supply / demand investment schemes in the draft WRMP; and
- Their contribution to the Restoring Sustainable Abstraction solutions;

Consequently we have optimised our proposed investment solutions to enable us to deliver multiple concurrent benefits and efficiencies in delivery.

The overarching benefit of our borehole maintenance programme is that we are securing the long term future of our existing supplies, by ensuring that our assets are capable of producing sufficient volumes and quality water for consumption. Delivery of our plan will not only add resilience to our supplies, but also provide enhanced operational flexibility. Our draft WRMP relies on us maintaining our borehole assets and ensuring that their deployable output continues to be available in the future.

4.7.3 Drinking water quality

Our customers have told us that safe drinking water is one of their highest priorities and they also want it to taste and look good. We also have to comply with Drinking Water Inspectorate standards for the supply of potable water. Our PR14 investment plans include ongoing investment in our water treatment and supply system to ensure that we provide water that is good to drink.

Our raw water comes from large catchments and the quality of that water is highly dependant on the activities of others within those catchments. We need to be able to cope with a wide range of raw water conditions and quality which are significantly affected by both regular and extreme weather variations. We also need to reduce the number of events where taste, odour or discoloration can vary and potentially impact on customers.

During AMP5 we implemented a robust drinking water safety plan (DWSP) approach which has helped us to identify and manage water quality risks. Using this approach, we have identified existing high risks as well as a number that will become high risk during AMP6 if we do not intervene. Therefore our investment plan for 2015-20 will include additional or refurbished treatment processes to address these high risks.

We have also adopted a catchment management approach where we will work in partnership with landowners to reduce diffuse pollution and avoid the need for additional capital investment. Our catchment management approach is described above in section 4.6.

We also have a plan for pro-active trunk mains cleaning to prevent widescale mobilisation of deposits in the event of bursts in high risk areas which would otherwise generate high levels of customer disruption. Our proposed pro-active approach to cleaning our trunk main network is significantly lower cost than retrospectively reacting in the event of a major burst and a widespread incident. We have identified the highest risk locations and have identified a modest pro-active cleaning programme .

Overall, we have an active and innovative programme targeted at improving performance and efficiency in water quality management across the full range of catchment, treatment, distribution and customer areas. The deployable output assumptions made in our draft WRMP are dependent on the success of the ongoing water quality investment plans.

5 Achieving an affordable and sustainable outcome

To ensure that our strategy delivers a sustainable and affordable investment plan, our water resources investment planning process has identified and evaluated the widest range of options available to us. The schemes that make up our strategy for water resources, leakage reduction, water efficiency and investment for ensuring security of supply have been derived by applying the principles of the UKWIR/EA report Economics of Balancing Supply and Demand (EBSD), along with the principles of chapter 6 of the EA's Water Resources Planning Guideline. Our approach follows elements of the "intermediate" and "advanced" application of the EBSD methodology. We have also followed the UKWIR methodology for the integration of Strategic Environmental Assessment (SEA) and Habitats Regulations Assessment (HRA) into the water resources planning process in accordance with the EA's Water Resources Planning Guideline.

The process we have followed can be summarised in the following way:

- Step 1: Identify the unconstrained list of options: We considered a wide range of potential options for maintaining the supply / demand balance and achieving the NEP requirements. The types of options considered are outlined below
    - Existing assets with underused capacity/flexibility due to constraints posed by treatment capacity, pipework constraints etc
    - Existing assets where additional deployable output can be gained with relatively limited capital works
    - Pipeline or river transfers from zones/assets likely to have surplus to those with deficit
    - Transfer of abstraction from environmentally-unsustainable locations to locations where they would be sustainable, e.g. by moving abstraction down-catchment
    - Water quality improvements that have or are likely to happen at Severn Trent's waste water treatment works river discharges that could augment river flows.
    - Links from neighbouring water company assets

  Having identified the long, unconstrained list of potential options, we then took these through a screening process to identify those that should be excluded from the final plan. We shared these screening criteria with the Environment Agency at an early stage and we made some minor adjustments to the process on the basis of their feedback. As a precursor to the scoping for the SEA and HRA processes, these screening criteria included consideration of statutory environmental constraints, such as incursion on nationally and internationally designated sites, and any potential adverse effects on ensuring "no deterioration" of waterbody status under the Water Framework Directive.

- Step 2: Define the feasible options: After the screening process, the remaining options were taken forward for a more detailed appraisal of capital and operating costs, likely environmental impacts, carbon impacts and indicative benefits. We shared these feasible options with Midlands EA for comment at an early stage, and we captured any risks and

concerns at that stage, and in some cases altered option configurations to mitigate environmental impacts. Scoping for both SEA and HRA were also carried out with statutory and non-statutory consultees at an early stage in this process and feedback incorporated into the assessment methodologies. We also developed a methodology for WFD assessment which we shared with the EA at both a regional and national level.

The subsequent SEA Environmental Report and HRA Report describe detailed environmental assessments of the feasible list options. The HRA process includes screening of each option to determine whether it might have likely significant effects on European designated sites. In practice, the outcomes of environmental assessments enabled refinement of the feasible list throughout the plan's development.

- Step 3: Cost / benefit assessment: Using the costs and benefits of the feasible options, we derived a least-cost plan using our PR14 investment optimisation approach. The costs and benefits associated with each of the schemes were used to determine the overall net least whole-life cost package of schemes able to deliver the required security of supply over the long run to 2040 and beyond. These solutions were also taken through the Strategic Environmental Assessment (SEA) process. The costs and benefits included environmental and social impacts (including carbon costs) that could be monetised according to the methodology approved by the Environment Agency.

- Step 4: SEA outputs developed at Step 2 (and informed by the HRA and WFD assessments) were used to identify; firstly whether any of the schemes in the least cost plan should be removed from the preferred plan due to individual or cumulative environmental impacts; and secondly, what the scale of the alternative programme should be, noting the potential delivery risks around the preferred plan.

- Step 5: Align the preferred WFD solution with the needs of the wider PR14 investment plan: By aligning the WFD solutions with the wider investment plan, we ensured that there is no risk of abortive AMP6 expenditure at sites where it is likely that we will reduce or cease abstraction during AMP6 / 7. We also were able to understand where capital maintenance or water quality schemes at neighbouring sites should be prioritised if it would enable the WFD solution to be implemented (eg the borehole maintenance needs at Sugarbrook groundwater site need to be completed before the wider groundwater body abstraction reductions can be implemented).

As well as deriving a least whole life cost investment plan, environmental effects have been considered throughout the plan's development. The process commenced from the outset of the plan development with screening of the unconstrained list of options against a range of criteria including statutory environmental constraints, according to advice provided in the EBSD Guidelines. The feasible list was then continually refined throughout the process of draft WRMP development to reject schemes which would cause significant environmental impacts as informed by discussions with the Environment Agency and consultation with Natural England/Countryside Council for Wales and English Heritage, and by the SEA and HRA processes, undertaken according to best practice industry (UKWIR) Guidance. This resulted in a feasible list of just over thirty schemes, derived from a starting unconstrained list of 130 schemes.

Examples of how environmental considerations have shaped the preferred plan throughout the WRMP process include:

- The potential for dam raising at Tittesworth Reservoir being screened out at an early stage because expansion of the reservoir would have encroached on Ancient Woodland.

- During the programme appraisal process, Scheme 68 Stourbridge BH Conjunctive Use was removed from the Feasible List on account of environmental impacts identified from the SEA, as documented in Section 7.1 of the SEA Environmental Report that accompanied the dWRMP. The revised programme for the Strategic Grid WRZ included Scheme 130 Lower Worfe Augmentation Scheme in 2020-2025 instead of Scheme 68, but otherwise remained similar to the Least Cost programme.

- The WFD assessment included in the Environmental Report identified that for Schemes 96 (Upper Worfe Groundwater Augmentation), Scheme 27 (Hatton Conjunctive Use) and Scheme 35 (Kenilworth BH Scheme), there are uncertainties around potential effects on WFD waterbody status, and that further investigations would be required to clarify these uncertainties. As a result, we have already begun a more detailed WFD impact assessment into the effects of the Upper Worfe Groundwater Augmentation scheme.

- Since publication of the draft WRMP, as a result of stakeholder feedback and customer research we are setting ourselves a more ambitious AMP6 leakage reduction target, which is double the reduction target proposed in the draft plan. We have also made a commitment to repair leaks within 24 hours where it is safe to do so and will not disrupt customers' supplies. These changes to leakage targets mean that many of the longer term new water resource schemes proposed in the draft WRMP will no longer be required. Our response to stakeholder feedback on our leakage plans will provide long -term benefits in terms of the WRMP's wider sustainability by reducing the need for additional water abstraction.

Separate SEA and HRA reports accompany this draft WRMP and are available on request.

6 Understanding our stakeholders' views

In April 2012 we wrote to our statutory consultees to inform them that we were commencing the review of our previous WRMP. This marked the beginning of our pre-consultation stakeholder engagement activities.

Below we explain how we engaged with our stakeholders and customers through the pre-consultation period as we developed our strategy. We also explain the key insight we gained from this early engagement and how it has helped to shape our proposals.

Throughout the pre-consultation period we sought to:

- Understand customers' views about different supply and demand management options, particularly leakage and metering.
- Understand stakeholders' preferences for how we should manage the supply/demand balance in the future.
- Discuss our Strategic Environmental Assessment and Habitats Regulations Assessment scoping studies with stakeholders
- Discuss with neighbouring companies and other interested parties the opportunities for water trading.
- Work with our statutory consultees to explain our proposed approach, and understand their expectations for this draft plan.

We gathered stakeholders' views in a variety of ways during this period, including:

- written consultation (Making the right choices, Strategic Environmental Assessment (SEA) scoping report, population projection consultation, pre-consultation, water resources consultation, newsletter),
- a stakeholder workshop,
- customer research including willingness to pay,
- discussion and scrutiny by our multi-stakeholder Water Forum,
- online information, and
- face to face meetings.

The timeline for these activities is shown in table 6.1.

Table 6.1: Summary of stakeholder engagement

Engagement Group	Engagement	Date
Stakeholders	Water Forum updates	Ongoing
	Dedicated website pages on ST Plc	Ongoing
	Written consultation, 'Making the right choices'	March 2012
	Water resources workshop	June 2012
	Population projection – Local Authority consultation	September 2012
	Resource sharing consultation	October 2012
	Newsletter	November 2012
Statutory	Water trading with neighbouring water companies	Ongoing
	Meetings with Environment Agency and Welsh Environment Agency	Ongoing
	SEA scoping report	July/ August 2012
	Pre-consultation letter to statutory consultees and CCWater	August 2012
Customers	Bill messaging to promote on-line polls	February 2013
	Dedicated questions in customer tracker	Ongoing
	Willingness to pay research (c. 1500 customers)	August 2012

6.1 'Making the right choices' consultation

We aligned our draft WRMP pre-consultation with the consultation we are carrying out to inform our broader AMP6 business plan for the period 2015-20. Our written consultation '*Making the right choices*' explains the future challenges we face that effect our business such as climate change, population growth and future legislation.

One of the key areas we asked for views on in '*Making the right choices'* was how we make sure we have enough water to supply our customers. Some of the options we asked for comment on included reducing leakage, reducing demand for water, metering, increasing supply, water trading and connectivity and catchment management.

Thirty-two individuals representing 28 separate organisations attended the water services focused workshop held on 12 June 2012. The workshop provided an overview of the WRMP process, how we develop a WRMP and current and future water resource priorities and pressures. Electronic voting was used to understand attendee's views on issues such as frequency of hosepipe bans, metering penetration, demand management versus new resource development and investment in catchment management.

6.2 Supporting written consultation

In addition to '*Making the right choices'* we have consulted with stakeholders in line with the guidance set out in the Environment Agency's Guidelines for preparing WRMP's. The written consultations we have undertaken during 2012 include:

- strategic environmental assessment (SEA) scoping report – consultation to determine the scope of the SEA.
- Draft Habitats Regulations Assessment screening report – written consultation to seek the early views of our statutory stakeholders.
- Population and property projections – written consultation with local authorities to determine growth projections for our region.
- pre-consultation with statutory consultees setting out anticipated changes in our new WRMP plan.
- water resources trading consultation – consultation setting out our initial view of deficit/surplus water resources. Accessible via the Severn Trent Plc website.
- newsletter to 160 stakeholders including a progress update and details of relevant consultations.

6.3 Customer research

We have considered the views of customers from a range of sources including:

- willingness to pay research (undertaken as part of our business planning for 2015-20);
- research into customer attitudes to environmental improvements;
- our historic catalogue of research spanning 20 years;
- our quarterly domestic customer tracker;
- research carried after publication of the draft WRMP to establish customer priorities for balancing supply and demand;
- research on the overall acceptability of our plan, including proposals for balancing supply and demand;
- the views of CCWater and relevant research carried out by other parties.

Our August 2012 willingness to pay survey incorporated twelve attributes which were considered highest priority in terms of their significance to customers and the potential for choice in our plan. This included hosepipe bans, resilience and river water flow. Over 1600 domestic customers and over 500 business customers took part in the survey.

We also incorporated additional questions into our quarterly customer satisfaction tracker during 2012 on attitudes to supply demand, leakage and metering.

We have used historic research where relevant to water resources planning, such as customer attitudes expressed in our customer satisfaction tracker, as well as research from other stakeholders, such as CCWater's research into customer attitudes to hose pipe bans.

6.4 Face to Face meetings

We have undertaken numerous face to face meetings throughout 2012 to discuss aspects of our WRMP with our regulators, non-governmental organisations and other water providers including:

- Environment Agency - Midlands
- Environment Agency – Wales
- Consumer Council for Water

- Royal Society for the Protection of Birds
- National Trust
- Wildlife Trusts
- Council for the Protection of Rural England
- Friends of the Earth
- Rivers Trust
- Neighbouring water companies

6.5 Engagement with our Water Forum

As part of our pre-consultation we have regularly discussed our emerging draft WRMP with our Water Forum. This multi-stakeholder group (comprising the Environment Agency, DWI, Natural England, East Midlands Councils, West Midlands Councils, CCWater, Coventry Citizens Advice Bureau, Confederation of British Industry, National Farmers Union, and Scottish and Southern Energy) has been created to inform our broader business planning for 2015-20.

The Water Forum has a remit to scrutinise both how well we engage with our customers, and how well our final business plan reflects the outcome of that engagement. Our approach to water resources is an important element of our business plan.

Two of our Water Forum members, Cllr Tom McDonald (West Midlands Councils) and Sarah Faulkner (National Farmers Union) have scrutinised the key elements of our draft WRMP in more detail on behalf of the Water Forum.

Our Water Forum also has a Customer Engagement Working Group, which considers our approach to engagement in detail and the insight we have drawn from it. As part of this process it has scrutinised the evidence we have collected in relation to water resources.

6.6 Results of customer research

Willingness to Pay survey

Our Willingness to Pay survey involved customers being asked to choose between alternative packages of bills and service levels (choice experiments). This included twelve different aspects of service performance, with those most relevant to supply-demand planning being hosepipe ban frequency and low flow rivers. Other aspects of water supply and demand were addressed through separate research.

The results of the Willingness to Pay survey were that, on average:

- Households were willing to pay £3.06 to reduce rivers affected by low flow resulting from water abstraction from 7% to 5%.
- Households were indifferent on hosepipe ban frequency. Since this contradicted the results from PR09 research, we included this issue in further in-depth research (see below) before considering whether to implement a change in service level.

In terms of company-wide willingness to pay, this indicated that customers were willing to pay £5.6m to address low flow problems in 1% of rivers in the region. This level of Willingness to Pay exceeds

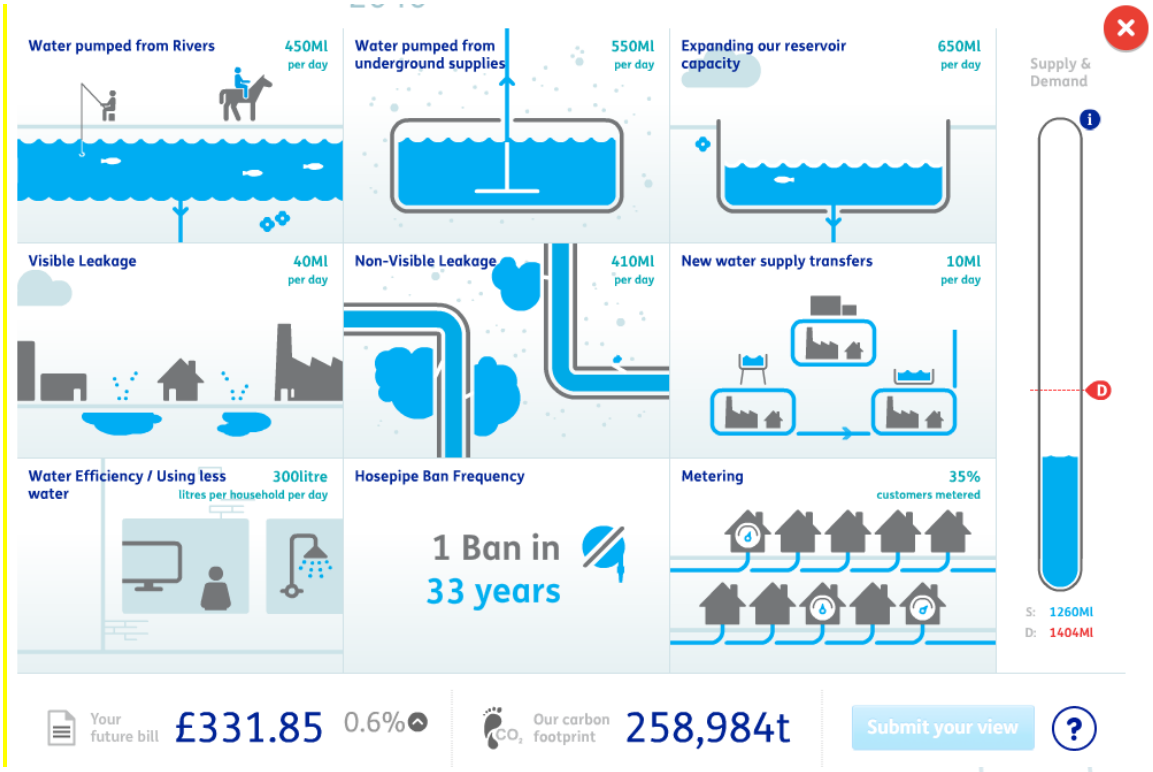
the costs of the proposed schemes to address low flow problems for the programme to 2020, and therefore our customers support the inclusion of these in our plan.

Environmental and River Quality research

Further research on customer views confirmed that river quality is a high priority for our customers, and issues about which customers were concerned included attributes which we could influence, such as low flow.

Supply-demand trade-offs

This research involved presenting to customers the options for balancing supply and demand in the future, with 596 customers interviewed online using an interactive web-based simulation model with a variety of supply and demand variables. This is shown in the figure below. Customers could change each variable and see the resulting impact on supply-demand balance and on bills.



The key conclusions from this research were:

- Customer choices were similar to the balance which we had included in our draft WRMP but customers wanted a plan with more emphasis on leakage reduction, metering and water efficiency than would be included in a least-cost plan.
- Given the impact of changing hosepipe ban frequency on the supply-demand position, the average frequency selected was very similar to current policy – 38 years compared with the current 33 years.
- Among supply options, water transfers and reservoir capacity were chosen ahead of taking more water from rivers or underground supplies.

Acceptability research

In our consultation "Your water. Your choices" we set out proposals that bills would remain unchanged in real terms from 2015 to 2020. A £25 bill impact per customer for improved services would be offset by financing and efficiency savings. The document set out a number of service choices with bill impacts, and we carried out customer research based on our proposal and the choices in the consultation. Customer views were sought using a comprehensive programme of acceptability testing, including a combination of quantitative and qualitative research elements.

Customers broadly supported the balance of improvements set out in our plan. Customers supported some increased investment on improving river water quality. 88% of customers regarded the plan as acceptable.

6.7 What we have learned and implications for the Water Resources Management Plan

The key insights we drew from our stakeholders during the pre-consultation period were that we should:

- Use the best value (as opposed to least cost) approach.
- Look to make the best use of existing resources before exploring new options for supply.
- ensure we are doing our part to reduce waste by continuing to focus on resource efficiency, optimising the amount of water we put into supply and reducing leakage before we ask our customers to be more water efficient.
- Increase metering, but not in isolation of the affordability consequences.
- Continue to support our customers to use water more efficiently through greater education

These themes have influenced the choices and decisions we have made throughout our draft WRMP.

The customer research carried out since our draft WRMP was first published indicated that:

- Overall our plan had a high level of acceptability.
- Customers support more emphasis on leakage reduction and water efficiency measures than would be included in a least-cost plan.
- Customers would not support a change from the current level of hosepipe ban frequency.
- Customers support plans to reduce abstraction where it is environmentally damaging.

In response to these findings, changes we have made in our final plan include:

- Our AMP6 leakage reduction will be double the amount that was included in our draft WRMP, reflecting the challenge from stakeholders, and the results of customer research, that our leakage reduction plans should be more ambitious.
- We have included a target in our measures of success in our business plan for PR19 to fix all reported leaks within 24 hours, where it is safe to do so and will not disrupt customers'. supplies.

- We have increased the projected take-up of meters, to be achieved by increasing our customers' education and awareness of the potential benefits of having a metered supply.

7 Our statement of response to comments received on the draft WRMP

On 10 May 2013 we started a period of consultation on our draft Water Resources Management Plan. The consultation period ended on 2 August 2013. We received representations from the following organisations:

- Derbyshire County Council
- Canal & River Trust (CART)
- The Consumer Council for Water (CCWater)
- The Environment Agency (EA)
- English Heritage
- Group Against Reservoir Development (GARD)
- Haygrove Ltd
- Lichfield District Council
- Natural England (NE)
- Natural Resources Wales (NRW)/ Cyfoeth Naturiol Cymru
- Nottingham City Council
- Ofwat
- Powys County Council
- South Staffs Water
- The Trent Rivers Trust
- Wildfowl & Wetlands Trust (WWT)
- Wildlife Trust Wales
- Worcestershire County Council (WCC)

Appendix F of this revised draft WRMP includes our full statement of response (SoR). It shows how we have addressed all of the comments and suggestions that we have received. The SoR shows all of the comments made by each organisation and what we have done as a result.

Where our response has required changes to our draft WRMP, we have updated the plan and highlighted the areas of change.