





**Scottish  
Water**  
Always serving Scotland

## Water Resource Plan 2015 (Summary Report)

Ensuring customers have clear, fresh, safe drinking water to 2040 and beyond



<b>Water Resources Team</b>	<b>Water Resource Plan 2015 Summary Report</b>	
Water Service Strategy	Version 0.2	

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## Overview

Our Water Resource Plan sets out our strategy to secure the reliable supply of drinking water to protect public health, facilitate growth and support the Hydro Nation agenda, while abstracting and using water in a sustainable way to provide a value for money service to customers without detrimental impact to the water environment.

In line with our customer's priorities as endorsed by the Customer Forum, we show how we intend to balance available supplies and demand, identifying areas that require improvement to ensure we can deliver a continuous supply of water to customers.

### Statutory duties

Scottish Water has statutory duties both to provide adequate wholesome water supplies and to secure efficient and sustainable water use. We must be responsible and control the amount of water we abstract from the environment to protect the future sustainability of water resources and the freshwater environment. We must also ensure we have the ability, at all times over our 25 year planning horizon to supply customers during periods of peak demands and dry weather events. Over the past 10 years we have significantly improved the security of supplies to customer.

### Draft ministers objectives

The ministers objectives for 2015-21 set out that Scottish Water shall in respect of:

#### **SECURITY OF SUPPLY**

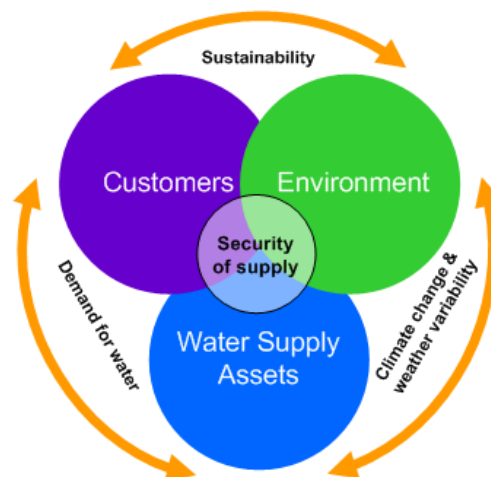
*(a) Provide the necessary improvements to provide a level of service in water resource zones, such that these zones are adequately protected against the risk of water shortages;*

*(b) Maintain a sufficient supply of water in all water supply zones that reflects the most cost effective operating regime, and takes account of the opportunities for demand management including leakage control and water efficiency measures; and*


*(c) Develop an understanding of the overall resilience of water supply systems across Scotland under extreme events and commence implementation of improvements, as approved by the Scottish Ministers.*

### Water resource planning considerations

The sustainability of the water we abstract must be considered as a balance between environmental impact on the water body, mitigation of other environmental impacts (carbon footprint etc.), economic affordability to our customers, meeting the demand for water during periods of dry weather and adaptability to climate change estimates.



**Figure 1: Water resource planning considerations**

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Given the recent short term variability of weather patterns and further potential long term effects of climate change we need to consider whether we will have enough water to comply with emerging environmental legislation and the permissible abstraction limits set by our Environmental Regulator.

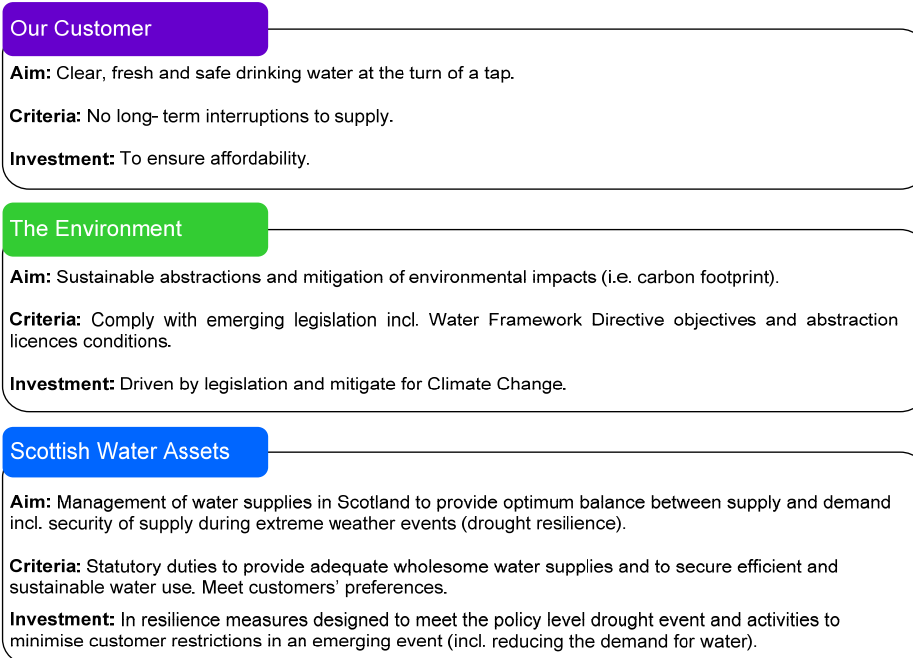
Assets we deliver today will operate for decades. We have built sustainability criteria, such as carbon, into investment planning to help us make sustainable choices for future generations. Our challenge over the next 25 years is to continue our progress towards being increasingly sustainable in the way we deliver water services.

### Water resource planning strategy

Our water resource strategy is therefore to:


- ensure all our customers are receiving a 1:40 policy minimum level of service by 2027
- have a reliable supply demand balance for the 25 years planning horizon
- have no long term supply interruptions at customers' taps, and to achieve this ensure appropriate resilience measures are in place including a higher level of service for some zones
- prevent erosion of level of service where it is higher than the target minimum 1:40, where this may have a detrimental impact on resilience of supply
- continue demand management with the implementation of our Water Efficiency Plan and managing leakage at the economic level

This will be delivered by a balance between our customers, the environment and Scottish Water assets and all three have different needs, as summarised in figure 2:



**Figure 2: Water resource planning needs**



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## Water resource planning process

### Assessing the supply demand balance

Water resource planning requires year by year forecasts of the demand for water from customers (average and peak day use), and the available volumes of water for supply. Supply is limited by:

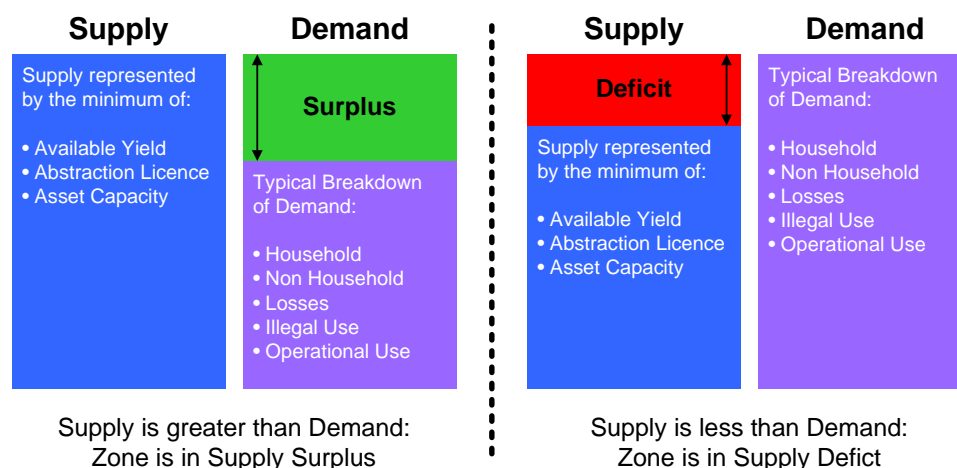
- the raw water volume (yield) from water sources
- the permissible abstraction limits (abstraction licence)
- our physical asset base (water treatment works (WTW) capacity and raw water transfer infrastructure)

Using best practice tools, these forecasts are then compared to assess if there is a potential supply surplus (enough water) or deficit (not enough water). Forecasting both demand and availability are highly complex and sensitive activities, however the key components considered can be seen in the diagram in figure 3, and more detailed technical information can be seen in our full Water Resource Plan.


For customers forecast to be in supply deficit, we can choose to address the deficit in a number of ways including;

- managing leakage at the economic level (including offsetting alternative supply-side investment)
- improving the way in which water is distributed to customers and between zones
- improving the way water is treated
- increasing the supplies of water available
- helping customers to reduce their demand for water

We expect to utilise all of these in our water resource planning. Also, for zones predicted to be in surplus it allows us to consider how and where this water can be used to support other zones or economic growth.



**Figure 3: Concepts of supply demand balance**

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### Level of service

The volume of available water our sources can supply varies based on how much rainfall there is during the year. Generally the higher the rainfall, the larger the volume of water available, however for reservoirs the amount we can store is also a factor. We assess whether normal supplies can be maintained with no restrictions based on the driest year we would expect over a 40 year period (1:40). If supplies can be maintained under such conditions, it implies that there is at most a 2.5% chance of such an event occurring **in any year**. This is the minimum level of drought resilience, termed **yield** level of service, we currently plan for to meet customer expectations.

Our planned **customer** service levels, as measured by the reliability of supplies at customers taps, also has to take into account our response to drought conditions.

While extreme natural events such as prolonged dry weather cannot be controlled by Scottish Water, we can take steps, in order of preference, through our drought planning measures to sustain supplies. These activities will typically include:

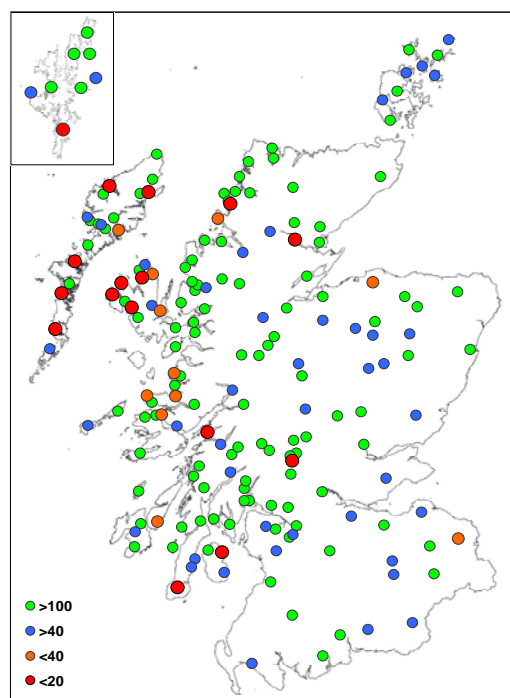
- targeted increased leakage activities (beyond economic cost levels)
- tankering water in vehicles
- encouraging customers to use water wisely
- obtaining permission to use temporary alternative sources for water supply
- allowing a temporary reduction in environmental standards by reducing the compensation flow.

All of which will minimise potential restrictions to customers supplies.


### Variability of available water

The availability of water is variable across Scotland under normal operating circumstances as shown in figure 4. This suggests that without operational responses and/or detriment to the environment, interruptions to customers' supplies could occur more frequently than predicted. Some supply zones, especially the small ones, are sensitive to small changes in the data used in the supply demand balance; therefore it is important that Scottish Water has confidence in the quality of these datasets.

When assessing the supply demand balance or developing drought contingency measures we have to take account of the large variations in the capability and flexibility of the 190 water supply zones we operate.



**Figure 4: Yield level of service at 2014/15 by supply zone**

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We have around 140 small remote rural communities with limited or no interconnectivity between population centres, minimal storage, and limited mitigation options. Individually, these supplies can be maintained in an extreme event through measures such as tankering or the use of temporary alternative water sources. However if the dry weather covers a large part of the region as it did in 2012 in the Western Isles, these can become far more difficult to manage.

In the central belt we have better connectivity, however there are systems supplying large population centres that are considered to be more vulnerable to drought risk, such as Tayside and Ayrshire, because there are currently few alternative supply options. We also have limited capacity to move water west to east, where our largest sources are located to where the majority of people reside.

The amount of raw water available or yield level of service is one measure of resistance to a prolonged period of dry weather. In some systems therefore it may be appropriate to increase the yield level of service. In developing our Resilience Strategy alongside the Water Resource Plan, we will consider other methods of protecting service including: improved reliability from strategic trunk main links, resistance from failure of strategic mains by duplication and alternative strategies including tankering.


#### **Vulnerability to climate change**

Climate change is expected to increase the variability of rainfall patterns across Scotland which will impact on the availability of water. We have recently completed a vulnerability assessment of water availability based on climate change scenarios at 2040.

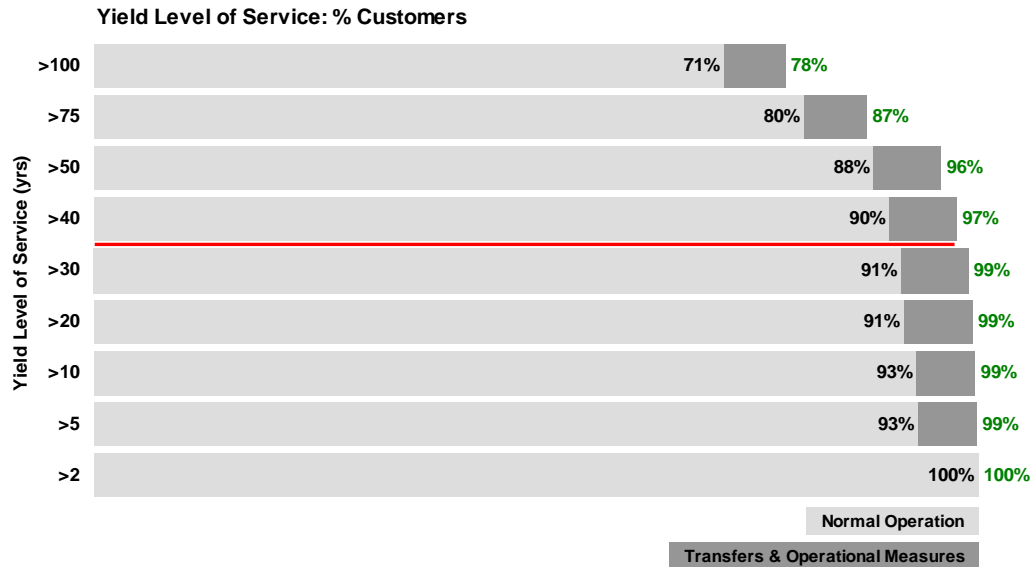
This assessment used 11 equally probable climate change scenarios applying the latest Met Office climate change projections within our existing water resource planning tools. The outcome suggested a range from little impact to up to 45% of customers being affected to different degrees.

The results of the forecast 2015 position against the **worst case climate change scenario in 2040** are shown in figure 5. The diagram shows the current percentage of customers with a given level of service, ranging from 1:2 years (50% chance of water restrictions in any one year) to 1:100 (1% chance). This takes account of known transfers and operational measures we can implement to maintain services to customers.

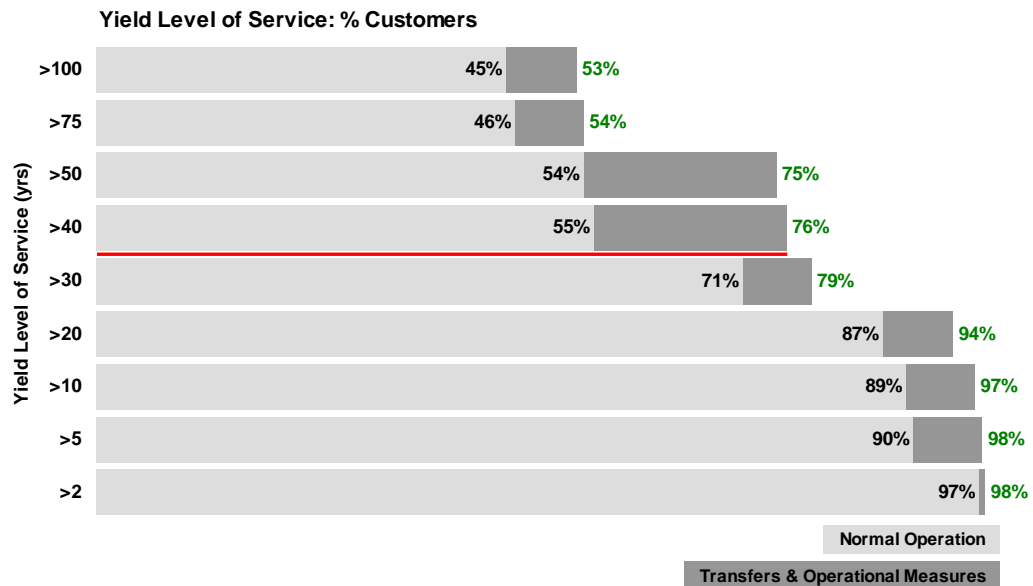
At 2040, there is the risk of less water available and therefore a lower level of service for the majority of customers which could result in more frequent water shortages for some customers.

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*At 2015*




*At 2040 with climate change scenario*



**Figure 5: Comparison of 2015 and 2040 service levels for availability of water under worst case climate change scenario**

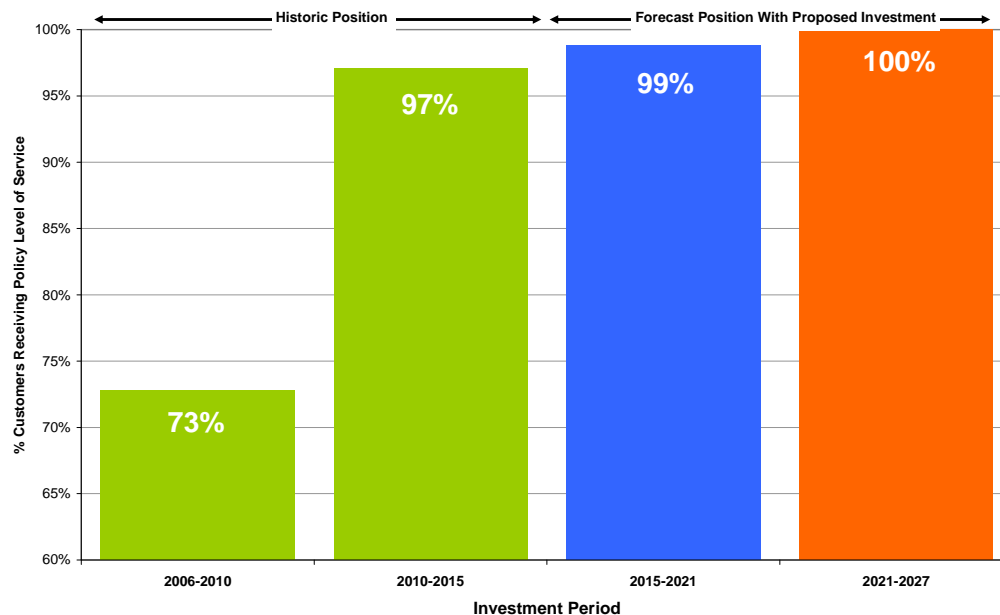
Given the wide range of potential climate change scenarios and significant uncertainty, our view is that at present a business case for investment can not be made. Rather, this work has identified our most vulnerable zones which require a detailed assessment. In addition, it has shown the importance of gathering more information to improve our understanding of the potential impacts and identify the appropriate timing and form of adaptation measures.



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## Scottish Water’s plan

In 2015, following the delivery of historic water resource investment, we forecast that the majority (97%) of our customers will be receiving our target 1:40 level of service, and in many instances exceeding this (figure 5). We propose to continue to improve the position to achieve 99% by the end of 2021 and 100% by 2027 so that all our customers are in supply surplus (figure 6).



**Figure 6: Percentage of customers receiving planned level of service  
Historic position to 2015**


Historically we have invested in water resources and significantly improved our supply demand balance position. In the last investment period (2010-2015) we improved and provided our target level of service to over 830,000 (16%) of our customers in 14 supply zones. This was achieved through a combination of reducing leakage to the economic level, improving water efficiency at our WTW and the provision of new assets including raised impoundments, raw water abstractions, improved network connectivity and increased abstraction licences.

An additional number of our customers benefited from an improved level of service through water quality investment and Scotland-wide leakage reduction activities.

Maintaining our current level of service will continue to be a challenge, particularly in smaller and more remote zones that are potentially more vulnerable to changing demand patterns.

Leakage:

Leakage, and the sustainable management of leakage, continues to be a priority for us. Leakage has been reduced by nearly 50% since 2006. We aim to address environmental concerns and our customers’ and regulators’ interests by fixing leaks quickly and preventing treated water from being wasted.

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We will continue to refresh our economic level of leakage assessments as and when key parameters (such as energy prices and improving technology and innovation in leakage find and fix procedures) indicate a likely material variation in the economics.

Water Efficiency:

We are implementing our Water Efficiency Plan, as approved by the Scottish Government in 2011, which includes a wide portfolio of techniques to drive down water use. Activities undertaken to date include:

- Customer education programmes (including engaging with our own staff) and annual campaigns.
- Working with developers and social landlords to utilise water efficient products and adopt water efficiency measures in new and refurbished housing.
- We have successfully worked with building standards to ensure that water efficiency measures are now included in Building Standards Regulations as mandatory.
- Actively pursued opportunities with business customers and formed industry partnerships (including Building Research Establishment, Energy Saving Trust and academia).
- Investigated and considered the efficient use of water at our own assets through improved treatment process and recycling whilst always considering the impact on final water quality at our customers' tap.

Results from the activities were not available in time to inform this Plan. However, during 2015-21 we will be completing and reporting on these to better understand how our customers respond to water efficiency education and measures. The information gained will be used to inform the direction of the water efficiency agenda in Scotland and provide a strong basis for any future campaigns.

### **Proposed improvements 2015-2021**


Our forecast for 2020/21 shows that 3% of customers in 53 supply zones have service levels below our planned minimum. We propose to improve the service levels these customers receive by:

Reducing demand:

- Continue to manage leakage at economic levels, and consider further reductions where it is technically achievable and the most cost effective method of improving the supply demand balance.
- Continue to implement our Water Efficiency Plan and promotion of water efficiency measures, particularly in the supply zones at highest risk of restrictions. In these areas we will look to provide free water saving packs. As a result we hope to reduce the amount of water we use as part of our everyday routines.

Increasing the availability of water:

- Implementing water availability improvement schemes in 11 supply zones (table 1 below) serving c.46,500 customers, where we are certain of the supply demand deficit and have identified the most appropriate solution.

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- In three supply zones with small deficits serving c.19,500 customers, we propose to monitor the systems in the short term to better understand the demand patterns and the availability of water.
- In 39 supply zones, serving c.38,000 customers there remain uncertainties around the data used to forecast the supply demand balance. As such we propose to undertake data improvement works to improve reliability and support decision making.

In addition to the proposals to improve service levels, we will also:


- Develop the appropriate level of drought plans to cover the remaining 27% customers bringing coverage up to 100% by 2021 to ensure we are prepared for a drought event as it emerges.
- Ensure the outcome of Water Framework Directive studies is included in future updates of the supply demand balance, and any overlaps with future deficits are taken into account.
- Develop long term strategic options for whole regions to inform our resilience strategies, and how we may deal with the worst case scenarios from our climate change risk assessments, this will include:
  - identifying potential strategic WTW to supply whole regions in extreme circumstances and ensure we consider any opportunity to rationalise the number of WTW and therefore water sources;
  - when considering asset rationalisation opportunities or other investment, prevent erosion of level of service where it is higher than the target minimum 1:40, and ensure there is no detrimental impact on resilience of supply.
  - developing our tankering strategy to overcome short term supply shortfalls;
  - assessing the appropriate level of service for each zone as part of the overall resilience strategy, and what actions need to be taken to achieve this.

### **Water resource improvement schemes**

We propose to invest in improving the level of service to customers in 11 supply zones where there is a deficit and we have experienced supply problems in the past, or where there are limited options to maintain supplies during a drought event. In all of these systems we are confident in the data used to develop the supply demand balance and that there is a real service risk to be addressed.

All the possible options for resolving the deficit have been considered including tankering, however due to the remote location or the amount of water required, investment in fixed assets has been chosen to meet the target level of service.


Individual sustainable system leakage targets form part of the forecast used to identify and confirm deficits. Further leakage reduction beyond these agreed targets is unlikely and/ or economically not viable and would not fully resolve the deficits in question as the additional water required to remove the zone from supply deficit is greater than current total leakage. However, Scottish Water will continue to seek out opportunities for further leakage reduction and will work with customers to promote water efficiency reinforcing our commitment to using water wisely and responsibly.

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To support our resilience strategy, we have considered a 1:100 year level of service for the 11 water resource schemes promoted in the investment period 2015-21. This is due to their remote location and the limited options for alternative supplies and mitigation options available.

This is not a guarantee that customers' supply will never be interrupted but it is a safeguard against a specified drought event. We will assess whether this is adequate, in the light of customer preference information, and review Scottish Water's overall policy in addressing investment needs in the longer term.


The chosen options for the water resource schemes are set out in table 1.

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Regional area	Supply system	Customers supplied	Solution descriptions
North West Coast	Lochinver	573	Augment the available water supply by securing abstraction from a nearby loch.
Fort William	Mallaig	1,401	Increase water availability from the existing source by lowering the abstraction point.
Skye & Lochalsh	Waternish	320	Augment the available water supply by securing abstraction from a nearby loch.
Shetland	Sandy Loch	13,073	Augment the available water supply by securing abstraction from a nearby river source to top up the existing Sandy Loch Reservoir.
Western Isles	West Lewis	2,981	Increase water availability from the existing source by raising the height of the existing dam to provide additional storage.
Western Isles	Stornoway	9,604	Increase water availability from the existing source by raising the height of the existing dam to provide additional storage.
Western Isles	Benbecula	1,505	Augment the available water supply by installing pipe work in the existing loch to allow all available water to be accessed (loch splits into two at lower water levels).
Western Isles	South Uist	1,532	Replace the existing source with a new loch source to provide improved water availability.
Argyll & Bute	Tullich	12,506	Increase the availability of water by amending the current compensation release arrangements from Loch Nell making more water available for supply.
Orkney	North Hoy	38	Decommission the source and WTW and supply from South Hoy WTW which has better water availability.
Skye & Lochalsh	Kyle of Lochalsh	2,945	A review of the way that water is supplied to customers in this area to ensure that there is a sustainable long term supply of water.
Total		46,478	

**Table 1: Planned improvements to water supply zones**




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## Conclusion

- Our Water Resource Plan highlights the majority of our customers enjoy a secure water supply and are receiving at least our current target 1:40 level of service.
- We aim that all our customers will receive our policy level of service by the end of the next business planning cycle (2021-2027). In meeting this target, all our supply zones need to be in supply surplus and it is necessary to address the level of uncertainty associated with estimation of the supply demand balance calculation.
- The significant improvements delivered in recent years due to demand management activity and water resource investment are confirmed and the remaining supply zones where we need to invest have been identified.
- Our investment needs are based on recent extreme events and lessons learnt on the ground and our ability to supply water to our customers during periods of dry weather. Following the targeted investment in 11 water resource schemes, by 2021 we intend to reduce the number of customers having a supply demand shortfall by around 46,500.
- The remaining 57,500 customers (1% of our customer base) are in the 39 supply areas that will be included in a study or data improvement strategy or in the 3 zones that have small supply deficits. If these customers are not already in surplus by 2021 as a result of improved data from studies we will be in a better position to determine the most appropriate long term cost effective solution to reducing the deficit in a sustainable manner. Mitigation measures will be put in place to ensure a continuous wholesome supply of drinking water for these customers.
- In parallel, we will develop our national strategies including; resilience, tankering, and regional as well as drought plans. We will continue to model the impacts of climate change on our resource yields.
- We aspire to have no long term supply interruptions at customers' taps. In support of this we will assess all our supply systems in terms of their overall resilience and ensure there is no erosion of existing levels of service, where this would have a negative impact.
- We will continue to look at appropriate cost-effective leakage management and implement the Water Efficiency Plan.

The Water Resource Plan supports the long term strategy of Scottish Water in the following ways:

- *Provide continuous high quality water* – to ensure that all of our customers receive our target 1:40 year level of service by 2027. Develop water quantity strategies, tankering strategies, and drought plans as part of the overall water resource planning process.

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- *Protect and enhance the environment* – working with SEPA to ensure we have the appropriate abstraction licences and comply with Water Framework Directive requirements.
- *Support Scotland’s economy and communities* – investing in opportunities to support economic growth and promoting water efficiency through the delivery of our Water Efficiency Plan.
- *Investing in future water services* – investing in water resources to secure supplies to improve water services in line with our customers’ expectations of which addressing long term interruptions to supplies is a priority.