



Water resources review

April 2017 - March 2018

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1. Summary of water resources in 2017/18



Supply and Demand

- Regional demand in 2017/18 was higher than in the previous year, and higher than our forecasts for 2017/18. The increase was partly due to bursts occurring during some significant 'freeze-thaw' events in early 2018, affecting both our own mains network and customer supply pipes. This has led to increases in both the leakage and consumption components of our supply-demand balance.
- Despite the recent 'freeze-thaw' events, we have outperformed our regional leakage target of 463 MI/d again this year.
- We have achieved regional water efficiency savings totalling over 3 MI/d, including further estimated savings in West Cumbria through our enhanced water efficiency programme.
- We have installed free meters at 36,615 households; this is below our forecasts, but an increase of 4,168 households or 13% from the previous year.
- We have maintained the supply-demand surplus in all of our resource zones.



West Cumbria

- We completed the South Egremont borehole project in summer 2017, and the scheme is now fully operational. Water has been supplied from the boreholes throughout most of 2017/18, in line with a new agreed mode of operation from summer 2017 onwards. The new way of operating provides a more acceptable water blend, ensures a resilient supply of water and provides environmental benefit by enabling reduced abstraction from Ennerdale Water.
- We have reduced leakage in West Cumbria Resource Zone by 0.8 MI/d, a 5% reduction from the previous year.
- Construction of the Thirlmere transfer scheme commenced in March 2017, and good progress has been made despite challenging weather conditions.
- Planning approval for changes to the pipeline route following Storm Desmond was granted in November 2017.
- Positive working relationships and innovation have provided an opportunity to construct assets quickly. This has allowed project milestones to be achieved either on or ahead of schedule, and we are currently on track to outperform against our project targets. This will ultimately allow us to revoke our abstraction licences at Ennerdale Water and other sites in West Cumbria by the target date of March 2022.



Environment

- We completed modifications at our Swindale Beck intake on 31 March 2017, 18 months ahead of schedule, enabling us to deliver environmental benefits through reduced abstraction during 2017/18.
- As part of a programme of sustainability changes to comply with environmental directives, we have implemented an increased compensation flow to the river downstream of Holdenwood Reservoir.
- We have continued to deliver the package of compensatory measures in West Cumbria, working with environmental regulators, stakeholders and experts in order to deliver the best solution for the protection of the River Ehen.



Planning for the future

- Following consultation on our updated draft Drought Plan, we have published our Final Drought Plan 2018, and this is now available on our website.
- We published our draft Water Resources Management Plan 2019, focusing on the strategic plan for the period 2020 – 2045, in March 2018 following an extensive pre-consultation exercise with customers, regulators and stakeholders. Following a further 12-week consultation period, we intend to publish our revised draft plan in summer 2018, and this will subsequently become the final plan for 2020 – 2045 pending approval by the Secretary of State.

2. Introduction



In this Water Resources Review we report on our water resources position for the year 1 April 2017 – 31 March 2018 (2017/18). In compliance with the Water Industry Act 1991, the primary aim of this report is to provide an annual update to our current Water Resources Management Plan published in 2015. We do this by assessing actual events and performance against the forecasts in our plan. This review describes progress made on implementing the plan and provides commentary on the key issues, following the Environment Agency guidelines¹. It also includes an annual update of our drought planning progress, and other activities and plans that may influence water resources.

We are sending this annual Water Resources Review to the Secretary of State, to the Environment Agency and to Ofwat. We are also publishing it on our website for interested customers and/or stakeholders.

¹ Water resource management plan annual review and annual data return, Environment Agency and Natural Resources Wales, May 2018

2.1 Background to the Water Resources Management Plan

Our current Water Resources Management Plan was published in March 2015 and became effective from 1 April 2015, superseding the 2009 Water Resources Management Plan as the formally adopted plan. The 2015 Water Resources Management Plan covers the period 2015/16 to 2039/40, and in developing the plan we reviewed customer and stakeholder priorities and changes in our supply system, accounted for future effects of climate change and set out our proposed plan to secure the future for water resources in the North West. The Final Water Resources Management Plan 2015 is available at <https://www.unitedutilities.com/corporate/about-us/our-future-plans/water-resources/>.

In this review, actual performance and events are compared to the 2015 Water Resources Management Plan forecasts for the third year of the plan covering the period 1 April 2017 – 31 March 2018 (2017/18), and we present key progress and upcoming activities to continue to deliver the plan.

2.2 Links to our other plans

Our Water Resources Management Plan is one of a number of plans that influence the provision of secure water resources for customers and the environment. As described above, this report also provides an update on, or reference to our:

- Statutory Drought Plan – see Section 10 for an update. Our Final Drought Plan 2018 is available at: www.unitedutilities.com/drought-plan;
- PR14 Business Plan – see Section 3.1. A publicly available summary can be found at: <https://www.unitedutilities.com/corporate/about-us/our-future-plans/Our-business-plan/>; and
- 2019 Water Resources Management Plan development – we update the Water Resources Management Plan every 5 years to reflect the latest guidelines, methods and latest evidence. Our draft Water Resources Management Plan was published in March 2018 and is available at: <https://www.unitedutilities.com/corporate/about-us/our-future-plans/water-resources/developing-our-water-resources-management-plan/>. Following consultation on this draft document, we are progressing with the development of our final plan, and provide a short update in Section 11.1.

2.3 Structure of the document

Table 1 below shows the coverage of each section of this report:

Table 1 Report Structure

Section	Coverage
2 – Introduction	This section is an introduction to the 2017/18 Water Resources Review and provides the context for our published plans.
3 – General	Within this section we comment on our performance for 2017/18 against the Customer Promises, Outcomes and Measures of Success. We also give an overview of our activities in 2017/18 towards delivering the 2015 Water Resources Management Plan, discuss the weather we experienced, and the overall supply-demand balance position.
4 – Supply	This includes details of our supply position in 2017/18, including Water Available for Use, outage, and sustainability changes.
5 – Demand	This section outlines the demands we experienced in 2017/18, comparing them to the 'dry year' forecast that we included in our 2015 plan. We discuss our 2017/18 performance for leakage, water efficiency, and customer metering.
6 – Headroom	Within this section we discuss the target headroom component of the supply-demand balance.
7 – Options and other measures	This includes an update on our delivery of the Thirlmere transfer scheme, and the activities to reduce abstraction in West Cumbria until its implementation. We also provide updates on the West Cumbria compensatory measures package and Thirlmere transfer contingency plan.
8 – Supply-demand balance	In this section we summarise all of the material presented in earlier sections that is used to determine the supply-demand balance. We show the 2017/18 supply-demand balance position for each resource zone and compare it to our forecast position.
9 – West Cumbria summary	West Cumbria is a focal point in our 2015 plan; this section gathers all of the information from other sections of the report to provide a view on our activities and progress within the resource zone.
10 – Making sure we are prepared for drought	This section includes an update on our activities in developing our new Final Drought Plan 2018.
11 – Forward look	Within this section we provide a forward look to the coming activities in 2018/19, and also provide an update on the development of our 2019 Water Resources Management Plan.
12 – Conclusions	This section summarises the key information presented in this review and highlights priorities for the forthcoming year and beyond.
Appendix A	We present the key outturn data for 2017/18 compared to the dry year forecasts for 2017/18, which we have amended to reflect the weather experienced in the year.

3. General



3.1 Our Customer Promises, Outcomes and Measures of Success

We developed Customer Promises and Outcomes as part of our PR14 Business Plan. Each Outcome is underpinned by one or more Measures of Success, which allow customers and stakeholders to judge our performance in delivering against our targets. The Measures of Success that align to our 2015 Water Resources Management Plan are shown below.

Further details of our Customer Promises and Outcomes can be found on our website, please visit: <https://www.unitedutilities.com/corporate/about-us/our-future-plans/Our-business-plan/>.

Our performance for 2017/18 and annual targets between 2017 and 2020 are shown in Table 2, and an introduction to each is below:

Total leakage at or below target:

- This measures leakage levels across the North West compared to our target, which is to maintain leakage at or below an annual target of 462.7 Ml/d.
- Incentivised with financial penalties and rewards.
- More information on our leakage performance for 2017/18 is in Section 5.3.

Security of supply index:

- The Security of Supply Index (SOSI) measures our success in meeting the region's demand for water, and is expressed as an index score out of 100. A score of 100 means we have an adequate supply-demand balance.
- Incentivised with financial penalties only.
- More information on our SOSI performance for 2017/18 is in Section 8.

Thirlmere transfer into West Cumbria:

- This measures our progress in the delivery of this major scheme to protect the environment in West Cumbria and ensure the security of future supplies. Progress is measured as a percentage, so that a value of 100 will indicate that the project has been completed and is in use, supplying water from Thirlmere to customers in West Cumbria.
- Incentivised with financial penalties and rewards.
- Our progress with the Thirlmere transfer scheme during 2017/18 is described in Section 7.1.

Contribution to rivers improved:

- This measures the delivery of environmental projects and changes to our abstraction regime to make it more sustainable. It is primarily achieved by delivering a range of projects agreed with the Environment Agency under the National Environment Programme.
- We are also incentivised under this performance commitment to make operational changes to our abstraction, where possible, at four environmentally sensitive sites in the North West.
- Incentivised with financial penalties and rewards.
- More information on our sustainability changes is in Section 4.4, and detail on our Abstraction Incentive Mechanism (AIM) performance for 2017/18 is in Section 4.7.

Number of free water meters installed:

- This measures the number of free water meters we have installed for customers. The target is based upon the numbers originally forecast within our plans.
- As customers who stand to benefit most from a free meter continue to have them installed, the market of potential customers becomes smaller. The figures have been calculated based on the historic decrease in take-up already observed.
- More information on our free meter installation performance for 2017/18 is in Section 5.5.

Per household consumption of water:

- This measures the average consumption per household in litres per property per day (l/prop/d). It allows us to track customer consumption against forecast levels, and over time can provide an indication of the effectiveness of our promotion of water efficiency across the region.
- More information on per household consumption in 2017/18 is in Section 5.2.1.

Table 2 Our Promises, Outcomes and Measures of Success relating to water resources

Promise	Outcome	Measure	Units of Measure	Performance 2015/16	Performance 2016/17	Target 2017/18	Performance 2017/18	Target 2018/19	Target 2019/20
Provide you with great water 	You have a reliable supply of water now and in the future 	Total leakage at or below target	MI/d Variance from 462.7 MI/d (NB. positive values represent leakage below target)	+10.8	+23.4	0.0	+9.1	0.0	0.0
		Security of supply index (SOSI)	Index out of (100.000)	100.000	100.000	100.000	100.000	100.000	100.000
		Thirlmere transfer into West Cumbria	% of project complete based on earned value tied to milestones	2	5	21	24.68	53	82
We promise to protect and enhance the environment 	The natural environment is protected and improved in the way we deliver our services 	Contribution to rivers improved	km river length	36.8	36.8	6.6	34.8	6.6	159.5
We promise to give you value for money 	Bills for you and future customers are fair 	Number of free water meters installed	Number per year	27,197	32,447	57,393	36,615	47,421	46,054
		Per household consumption of water ²	litres/property/day	303	305	285-316	310	282-313	280-311

² A range is provided for per household consumption because it depends on the weather conditions experienced in the year. The upper end of the range is consistent with our dry year planning assumption in the 2015 Water Resources Management Plan.

3.2 Weather in 2017/18

Over the full year rainfall was near to average across our region and temperatures were above average. The summer period (April to September 2017) was wetter and temperatures higher than the long-term average (although not quite as warm as during 1995/96). In particular, temperatures during the period April to June 2017 were significantly higher than the long-term average.

The winter period (October 2017 to March 2018) was drier than the long-term average with the average temperature higher than both the long-term average and 1995/96. However, our region was affected by a spell of severe winter weather in the UK from late February to early March, with exceptionally low temperatures and significant accumulations of snow occurring across much of the country. During this period, Met Office cold weather warnings affecting our company area of supply were issued on 11 days (including 10 consecutive days). The temperature in our region remained below freezing for three consecutive days and daytime temperatures recorded during this period were the lowest since the start of records in 1960. The lowest minimum temperature recorded during this period was -6.7 °C on 28 February 2018. This significant cold weather event was followed by a rapid thaw over the subsequent few days. The potential impact of this 'freeze-thaw' event on supply and demand is discussed in Sections 4 and 5 of this report.

Table 3 below gives a comparison of temperature and rainfall against the long-term averages and 1995/96. Detail of how the weather we experienced has impacted demands across the region is included in Section 5.2.

Table 3 Comparison of rainfall and temperatures in 2017/18 with long-term averages and 1995/96 values

	April to September	October to March	Full year (April to March)
Regional rainfall (mm)			
2017/18	677	871	1,547
Long-term average	654	906	1,560
1995/96	320	571	891
Average maximum daily temperatures (°C)			
2017/18	18.4	9.2	13.8
Long-term average	16.0	8.5	12.3
1995/96	19.0	8.4	13.7

3.3 Supply and demand in 2017/18

We have maintained a surplus in all our water resource zones for 2017/18, with a Security of Supply Index score of 100. More detail on the individual supply-demand balance components contributing to this score is included in Sections 4 and 5 of this report.

3.4 Progress with our 2015 Water Resources Management Plan

In 2017/18 we have made good progress in delivering our 2015 Water Resources Management Plan. As well as outperforming our regional leakage target and achieving further water efficiency savings, we have also progressed with the Thirlmere transfer scheme. Our 2015 Plan concluded that the Thirlmere transfer scheme should be progressed to address the future supply-demand deficit in West Cumbria. Further progress during 2017/18 has included:

- Construction started in March 2017;
- Planning approval for changes to the pipeline route, following damage from Storm Desmond meaning that a section of the original route adjacent to the River Greta is no longer constructable, was granted in November 2017;
- Substantial progress has been made on construction of our new Williamsgate Water Treatment Works, and connections to existing assets at Thirlmere have been completed 24 months ahead of schedule;
- We have met our target of 23.12% of new water mains in the ground in the first year of construction;
- Completion of a fifth phase of public consultation activities on the scheme; and
- We launched our community legacy fund in January 2018, awarding £97,000 at the first grants panel to support projects in the local area.

Further detail on the Thirlmere transfer scheme progress is included in Section 7.1.

This year we have continued to progress interim measures and compensatory measures to protect Ennerdale Water in West Cumbria. We completed the South Egremont borehole project in summer 2017 and the scheme is now fully operational. Water has been supplied from the boreholes throughout most of 2017/18, in line with a new agreed mode of operation since summer 2017, delivering environmental benefit in terms of reduced abstraction from Ennerdale Water whilst providing an acceptable blend of water to customers. Further detail on the mode of operation of this scheme is given in sections 4.1.2 and 7.2.

Further detail on the interim measures, compensatory measures and Thirlmere transfer scheme is included in Section 7.

Following the publication of our 2015 plan Defra indicated that we should continue to work with the Environment Agency during the delivery of this plan and preparations for the next planning round. We have held regular meetings with the Environment Agency and provided updates on our activities during the reporting period. We are also engaging with the Environment Agency on at least a bi-monthly basis to support development of the 2019 Water Resources Management Plan (see Section 11.1 for more information). Our draft plan was published in March 2018, and following a 12-week consultation period we intend to publish a revised draft in summer 2018, which will become our 2019 Final Water Resources Management Plan subject to approval from the Secretary of State.

We have continued to engage with communities in West Cumbria, having undertaken further stakeholder consultation on both the Thirlmere transfer scheme (also referred to as the West Cumbria Water Supplies Project) and our updated Drought Plan. Our bespoke Cumbria website (www.unitedutilities.com/cumbria) continues to support our engagement with customers.

We have already outlined our progress in Table 2 for free meter installations. During the year we have seen an increase in the number of customers requesting a meter compared to 2016/17, however we are still below target overall. This is discussed further along with actions to improve performance in Section 5.5.

3.5 Water resource zones

A water resource zone is the largest area across which water resources can be balanced, and within which customers therefore experience the same risk of supply failure from a resource shortfall. Currently we have four:

- *Integrated Resource Zone;*
- *Carlisle Resource Zone;*
- *North Eden Resource Zone; and*
- *West Cumbria Resource Zone.*

The resource zones were assessed for the 2015 Water Resources Management Plan through the Water Resource Zone Integrity Review. There have been no changes in resource zone boundaries since 2004.

We are currently preparing for our 2019 Water Resources Management Plan. Our water resource zone assumptions for the 2019 plan include the completion of the Thirlmere transfer scheme by March 2022. Following this the West Cumbria Resource Zone will cease to exist and this area will be absorbed into the existing Integrated Resource Zone. The new, combined zone will be named the Strategic Resource Zone. However, for the purpose of this annual review, there have been no changes to water resource zone boundaries for 2017/18.

3.6 Levels of service

There has been no change to our minimum stated levels of service, which remain as:

- temporary use bans (often referred to as hosepipe bans, although their remit is broader than this) and drought permits/orders to augment supply no more than once in 20 years;
- drought orders to ban non-essential water use no more than once in 35 years; and
- no standpipes or rota cuts during a repeat of the worst drought on record.

Maintaining this level of service was supported by customer research, with additional research undertaken for the PR14 Business Plan as part of our 2015 Water Resources Management Plan. Our level of service for this planning period (covered by our 2015 plan) remains the same as in the 2009 plan.

We have undertaken further customer research to inform the levels of service that we will adopt in our 2019 Water Resources Management Plan; further details of our proposals are given in Section 11.1.

4. Supply



4.1 Assessing water available for use

The Water Resources Management Plan is a strategic plan covering a planning period of 25 years. In the 2015 plan we forecasted the Water Available for Use³ (a term used to represent our available supplies in a dry year) across the planning period. The supply-demand tables are presented on a year by year basis, but there may be shorter-term variances in the plan components against original forecasts and assumptions. For example, delivery of aspects of the capital programme, the implementation of sustainability reductions, or licence changes, may vary to reflect changing circumstances and/or priorities. Further to this, Water Available for Use may change from that reported in the 2015 Water Resources Management Plan assumptions if new information comes to light. Such aspects are reviewed regularly and we report any changes in the annual Water Resources Review. An explanation of these changes for 2017/18 follows below.

As a strategic plan, in developing the 2015 Water Resources Management Plan we used long-term asset capability assumptions in line with the strategic nature of the plan, and accounted for our anticipated

³ Deployable output is a source yield assessment that results from consideration of a particular set of constraints and rules, for example abstraction licence limits and asset capabilities. From deployable output a number of deductions are made, including outage, raw water and process losses, and net exports. This is the calculation used to derive Water Available for Use.

capital maintenance activities. We reflected the expected position following delivery of capital interventions during the 2015-2020 planning period and beyond⁴ to determine how much water we are able to supply.

The pace and delivery of capital interventions can be subject to change, and we expect it to vary with normal business prioritisation of the capital programme. In some cases it is also possible for new asset considerations to arise, which can be increases or decreases to asset capability. Changes are not necessarily associated with asset deterioration, but also the resolution of existing issues (not covered by outage).

To ensure that we fully reflect the situation for the reporting year, and to ensure that an appropriate supply-demand surplus is maintained for the benefit of customers and stakeholders, we closely monitor and review Water Available for Use in line with changing circumstances. This adjustment does not account for any short-term reductions in asset capability that are associated with, and captured as part of, outage management (see Section 4.3).

For 2017/18, we have applied adjustments in Water Available for Use to reflect variances against the original supply forecasts, which are explained further in Sections 4.1.1 to 4.1.4. The supply-demand surplus is maintained (as detailed in Section 8) and these adjustments (Table 4) are not considered to be a material change from the 2015 Water Resources Management Plan assumptions. The values in Table 4 also reflect small decreases in Water Available for Use since 2016/17 due to the forecast year on year impacts of climate change. Further detail on sustainability changes affecting our Water Available for Use is given in Section 4.4.

Table 4 Summary of current Water Available for Use appraisal and adjustments from our forecast values

Water resource zone	Forecast Water Available For Use for 2017/18 (Ml/d)	Current Water Available For Use appraised for 2017/18 regulatory reporting (Ml/d)	Adjustment (Asset Assumptions) (Ml/d)
Integrated	1950.4	1895.4	-55.0
West Cumbria	59.1	56.0	-3.1
Carlisle	33.9	35.5	+1.6
North Eden	8.7	8.7	0.0

4.1.1 Integrated Resource Zone

Due to the complexity and interconnectivity of the Integrated Resource Zone, any changes identified to asset capability are implemented into the latest Aquator water resources model (appropriate to this part of the planning horizon) to appraise changes in Water Available for Use. This allows us to assess the net impact on Water Available for Use based on the latest position, based on a review of asset capacity assumptions. Aquator modelling of the current position in the Integrated Resource Zone has resulted in a 55 Ml/d reduction in Water Available for Use relative to forecasts, primarily driven by a number of capital

⁴ This included activities originally planned to be completed by 2015, which had subsequently been deferred.

projects that are either underway or temporarily deferred, and so have not yet reached completion. In addition, for some assets there is a shift of capability away from the 2015 Water Resources Management Plan assumptions. The adjustment reflects the net impacts of any model revisions and the changes to capability as outlined above. The modelled adjustment also includes a permanent increase in the statutory compensation flow from Holdenwood Reservoir from 0.58 Ml/d to 3.46 Ml/d, required for environmental reasons under the Water Framework Directive, which was included as a pro-rata adjustment in 2016/17 as outlined in last year's annual water resources review.

4.1.2 West Cumbria Resource Zone

The South Egremont borehole project was completed in summer 2017 with a design capacity of 11 Ml/d. Water has been supplied from the boreholes throughout most of 2017/18, delivering an environmental benefit to the resource zone by enabling reduced abstraction from Ennerdale Water. However, due to issues relating to the hardness of blended water from the boreholes with the supply from Ennerdale Water, an alternative mode of operation has been adopted with no more than 4 Ml/d normally being supplied from the boreholes. At times when Ennerdale Water is below drought trigger 2 the output from the boreholes will be increased to the full scheme capacity of 11 Ml/d. This new way of operating provides a more acceptable water blend, ensures a resilient supply of water and provides the required environmental protection through reduced abstraction.

The revised mode of operation retains most of the expected Water Available for Use benefit of the scheme, however in line with the Final Drought Plan 2018 we have also included operational changes in the use of Crummock Water that offset this benefit to a broadly neutral position. This means that a net reduction of 3.1 Ml/d overall, confirmed by water resource modelling of the current position, has been included in the forecast Water Available for Use for 2017/18 in the West Cumbria Resource Zone.

The South Egremont boreholes project is one of several interim measures to reduce abstraction from Ennerdale Water in the 2015 Water Resources Management Plan, further detail on which can be found in Section 7.2.

4.1.3 Carlisle Resource Zone

There is a small increase to Water Available for Use in the Carlisle Resource Zone for the 2017/18 period, compared to our 2015 Water Resources Management Plan forecast value for the year. This figure includes the benefit of previous Water Available for Use changes declared in the 2016/17 Annual Water Resources Review and as also reflected in the Final Drought Plan 2018.

4.1.4 North Eden Resource Zone

There are no changes to Water Available for Use in the North Eden Resource Zone away from the 2015 Water Resources Management Plan forecast assumptions.

4.2 Bulk supplies

There are no changes to our existing bulk supply arrangements relative to the allowance we made in our 2015 Water Resources Management Plan. This reflects imports and exports of water, and non-potable exports.

4.3 Outage

Outages occur for a variety of reasons such as pollution events, poor raw water quality, asset failure necessitating emergency repairs, and routine maintenance. Outages may be planned (i.e. scheduled maintenance) or unplanned. Where planned, operationally a risk assessment is undertaken for each outage

request to consider hydrology, headroom, resilience and contingency. The programming of planned outages is often subject to timing constraints relating to seasonal demand and/or completion of dependent outages. The production planning outage process is designed to minimise the risk to water resources and the supply-demand balance whilst at the same time enabling essential repair and maintenance work to be undertaken.

The outage allowance determined for Water Resources Management Plan submissions takes into account any outage events which would affect the ability to supply during a 'dry year'. Actual outages during 2017/18 have occurred at a range of source work types. Only those that would affect supplies during a drought are included in the outage reported.

The level of outage experienced this year is 80.8 MI/d across our region, and this is summarised in Table 5 by resource zone. This is higher than the outage allowance in our 2015 Water Resources Management Plan, noting that the allowance is risk-based and thus may be anticipated on occasion to be exceeded. Unforeseen and unavoidable asset failures, and extensions to capital project work completion dates, have contributed to the total outage slightly exceeding the target (by about 4.5%). However, outage events experienced have been carefully managed to minimise the overall short term loss of deployable output during 2017/18.

Table 5 Outturn outage data for 2017/18 compared with the outage allowances for 2017/18 included in our 2015 Water Resources Management Plan

	Carlisle	Integrated Zone	North Eden	West Cumbria	Regional
Outage Experienced (MI/d)	0.0	80.8	0.0	0.0	80.8
Outage allowance (MI/d)*	2.0	74.3	0.1	0.9	77.3
Difference (MI/d)	-2.0	+6.5	-0.1	-0.9	+3.5

*2017/18 dry year outage allowance from the 2015 Water Resources Management Plan

A breakdown by category of the outage events experienced during 2017/18, compared to 2016/17, is shown in Table 6.

Table 6 Regional outage events experienced in 2016/17 and 2017/18 by category

Reason for Outage	Outage MI/d in 2016/17	Outage MI/d in 2017/18
Impounding Reservoirs	11.7	8.8
Asset failure	13.5	40.1
Maintenance	45.1	27.5
Pipeline	0.1	0.0
Raw water quality	2.5	4.4
Total	72.9	80.8

Notes:

Asset failures are reactive and include loss of capacity due to faulty equipment such as borehole pumps and process control instrumentation.

Maintenance includes inspections, cleaning and refurbishment activities. Unplanned maintenance is associated with addressing issues that become apparent during other activities (e.g. inspections) that are a risk to asset failure.

Pipeline outages are generally for repairs of leaks and bursts on raw water or potable mains that have an impact on water resources dry year availability.

Raw Water Quality outages are due to short-term or seasonal deterioration of raw water quality.

Key outage events during 2017/18 were as follows:

- Outages experienced at Oswestry WTW made the greatest contribution (55.5%) to the outage total. Treatment capacity was reduced by 40 MI/d throughout the year due to the overrunning of capital project activities, which were due for completion in early 2016, however this is accounted for in the short term supply adjustments outlined in Section 4.1.1 and will be restored to the Water Available for Use for the Integrated Resource Zone once the capital work is complete. Another two events, asset failure type outages of 3 weeks and 2.5 months duration, further reduced the WTW capacity by 68 and 60 MI/d respectively.
- Several outages were also experienced at Huntington WTW, accounting for 8.3% of the outage total. These were for a variety of reasons, including raw water quality, asset failure and maintenance, and ranged from a 10 MI/d to 160 MI/d reduction in capacity with durations of 4 to 81 days.

In addition, a severe cold weather incident occurred during late February/early March 2018, resulting in a widespread 'freeze-thaw' event during which a number of water treatment works sites experienced freezing assets and bursts. This led to a number of asset failure type outage events, which have contributed to the overall outage experienced in 2017/18, although due to the resilience of our network and careful management of risks, supplies were maintained during these events.

4.4 Sustainability changes

As a result of the Review of Consents process for Habitats Directive sites, undertaken by the Environment Agency and Natural Resources Wales (with Natural England as a statutory consultee), we have had many changes to our abstraction and impoundment licences over recent years to ensure our abstractions do not cause environmental damage. These changes are fully incorporated in the reported Water Available for Use (where appropriate). In some cases we have received new licences, however, interventions to implement these are still underway, as shown in Table 7 below. The Environment Agency is fully engaged on these delivery timescales.

To safeguard sensitive aquatic species and habitats we have a number of additional sustainability reductions scheduled in future years as defined and accounted for in our 2015 Water Resources Management Plan (Table 7). These are mainly associated with the requirements of the Water Framework Directive. As sustainability changes are implemented, we will reflect them in our Water Available for Use assessment in subsequent reporting years.

Table 7 Sustainability changes included in the 2015 Water Resources Management Plan

Site	Driver	Sustainability solution	Expected completion date
Integrated Resource Zone			
Haweswater intakes	Habitats Directive	Increased prescribed flow and lower abstraction limits at Swindale Beck	Implemented from 1 April 2018
River Calder, Barnacre	Water Framework Directive	New prescribed flow to be provided to downstream river before abstraction can occur	1 October 2018 New abstraction licence issued 27 June 2014
Tarnbrook Wyre river intakes, Lancaster	Water Framework Directive	New prescribed flows at the three main intakes	31 March 2020
Afon Cownwy and Marchnant, Lake Vyrnwy	Water Framework Directive	New prescribed flows at the two river intakes and abstraction limited to 75% of available flow above this	31 March 2020
Holden Wood reservoir	Water Framework Directive	Increase to compensation flow provided to downstream river	Implemented. New impoundment licence issued by the Environment Agency on 25 October 2017
Poaka Beck reservoir	Water Framework Directive	New compensation flow provided to downstream river	31 March 2020
Readycon Dean reservoir	Water Framework Directive	New compensation flow provided to downstream river	31 March 2020
Horse Coppice reservoir	Water Framework Directive	New compensation flow provided to downstream river	31 March 2020
Carlisle Resource Zone - No sustainability reductions planned			
North Eden Resource Zone – No sustainability reductions planned			
West Cumbria Resource Zone			
Ennerdale Water	Habitats Directive	Revocation of abstraction licence	16 December 2022
Crummock Water	Habitats Directive	Revocation of abstraction licence	16 December 2022
Quarry Hill system: Overwater	Site of Special Scientific Interest (SSSI)	Hands-off lake level in Overwater	1 April 2022 New abstraction licence issued 27 June 2014
Quarry Hill system: Overwater	Habitats Directive	Revocation of abstraction licence	16 December 2022
Quarry Hill system: Chapel House reservoir	Habitats Directive	Revocation of abstraction licence	16 December 2022

4.5 Structural abstraction asset modifications

In 2016/17 we completed a project to undertake significant structural modifications at our Swindale Beck river intake on the Haweswater system, under a Habitats Directive driver. This included a new fish pass, eel pass, intake screen and control system to allow us to meet the new abstraction licence conditions. The result is that we are abstracting less water at this location, allowing more water to flow down the river, especially during periods of fish migration, and also allowing a more variable flow regime, so that the abstraction has less impact on the environment. The Environment Agency delivery date for the scheme was 30 September 2018, however we achieved early delivery on 31 March 2017, ensuring that environmental benefits were realised earlier than planned. This scheme won the Project of the Year in the Natural Environment category and was highly commended in the Partnership of the Year category at the ENDS Environmental Impact awards.

Figure 1 Swindale Beck Intake



4.6 Climate change

In our 2015 Water Resources Management Plan we fully assessed the effects of climate change on water source yields, water demand and target headroom. We worked with the Environment Agency and National Resources Wales to utilise the UK Climate Impacts Programme climate projections (“UKCP09”) in the 2015 plan using a best-practice approach.

The impact of climate change on supply availability for 2017/18 is small given that the impacts of climate change are lowest at the start of the planning horizon. Climate change impacts remain the same in 2017/18 as forecast in the 2015 Water Resources Management Plan.

4.7 Abstraction incentive mechanism

Ofwat’s abstraction incentive mechanism (AIM) is a way of encouraging water companies to manage their abstraction in a more sustainable way.

AIM sites are in environmentally sensitive areas and abstraction at times of low river flow has the potential to cause harm. AIM measures the amount of abstraction that occurs at times of low river flows and compares this to an average baseline period (covering the period between 2007 and 2013), indicating whether current abstraction is higher or lower than the recent past. For each site, we estimate the equivalent length of downstream river that the abstraction reduction contributes to improving.

AIM was initiated by Ofwat as a reputational assessment from 1 April 2016. However, we already have it incorporated in our “kilometres of river improved” environmental Measure of Success (see Table 2 for information), which supports our Promise “to protect and enhance the environment”. We have a financial incentive for this Measure of Success, which means that we can be rewarded or penalised depending on whether abstraction is lower or higher than it was historically. At the time of producing our Measure of Success, the Ofwat definition did not exist, and therefore we developed our own approach based on “AIM principles”.

We are committed to reporting our AIM performance in this annual review. We report two sets of AIM performance:

- Using our previously developed AIM assessment included in our “kilometres of river improved” Measure of Success (see Table 2 and Table 8); and
- Using the Ofwat AIM guidelines (February 2016) (see Table 9).

There are four AIM sites included in our Measure of Success:

- Old Water (River Gelt, Cumbria);
- Ennerdale Water (Cumbria);
- River Calder (Lancashire); and
- Aughtertree Springs (Cumbria).

During 2017/18 the river flows at three of the AIM sites (Old Water, River Calder and Aughtertree Springs) did not reach the AIM low flow threshold at any time. This is consistent with the weather experienced in the year (see Section 3.2); rainfall was only slightly below the long-term average for the year, whilst summer rainfall (April to September inclusive) was above average. This benefits the environment as river flows have not dropped to low levels. As a result there has been no abstraction at times of low river flow at these AIM sites.

At Ennerdale the AIM river flow threshold was reached on 9 days (6 to 14 May 2017 inclusive); on these days we managed to abstract less water than during the baseline period, resulting in good AIM performance.

The significance of AIM really comes to the fore during dry periods, and we plan to adapt our future abstraction as much as we can during times of lower river flow, whilst still maintaining security of supply.

Table 8 AIM performance - “kilometres of river improved” Measure of Success

Abstraction site	Low flow threshold (ML/d)	Historic average abstraction below threshold (2007-2013) (ML/yr)	2017/18 abstraction below threshold (ML/yr)	Contribution to river improved (km)
Old Water (Carlisle Resource Zone)	8.80	41.92	0.00	0.35
Ennerdale Water (West Cumbria Resource Zone)	80.00	2,200.90	210.90	18.94
River Calder (Integrated Resource Zone)	33.10	34.25	0.00	10.30
Aughertree Springs (West Cumbria Resource Zone)	25.90	0.36	0.00	5.24
TOTAL				34.83

Table 9 AIM performance – Ofwat measure

Abstraction site	Low flow threshold (ML/d)	Historic average abstraction at or below threshold (2007-2013) (ML/d)	2017/18 abstraction at or below threshold (ML/d)	AIM performance (ML)	Normalised AIM performance (no units)	Cumulative AIM performance (ML)	Cumulative Normalised AIM performance (no units)
Old Water (Carlisle Resource Zone)	8.8	3.27	0.0	0.0	0.0	0.0	0.0
Ennerdale Water (West Cumbria Resource Zone)	80.0	26.03	23.43	-23.3	-0.1	-23.3	-0.1
River Calder (Integrated Resource Zone)	33.1	7.09	0.0	0.0	0.0	0.0	0.0
Aughertree Springs (West Cumbria Resource Zone)	25.9	1.09	0.0	0.0	0.0	0.0	0.0
TOTAL				-23.3	-0.1	-23.3	-0.1

4.8 Distribution, production and resource developments

In the West Cumbria Resource Zone we completed the delivery of the South Egremont borehole scheme in summer 2017; water has been supplied from the boreholes throughout most of 2017/18, enabling abstraction from Ennerdale Water to be reduced. As outlined previously, a revised mode of operation has been adopted in which supply from the boreholes is limited to 4 Ml/d in normal operation, but increased to the full scheme capacity of 11 Ml/d when Ennerdale Water is below drought trigger 2. The benefit to Water Available for Use has been offset by other developments in the resource zone, relating to operational changes in the use of Crummock Water in line with the Final Drought Plan 2018, resulting in a net reduction of 3.1 Ml/d to Water Available for Use in the resource zone compared to the original forecasts, as outlined in section 4.1.2.

5. Demand



This section explores the demand experienced in the year, the influences of weather and the other influencing factors on demand, to allow comparison to Water Resources Management Plan forecasts where appropriate. It also summarises our demand management activity in 2017/18.

5.1 2015 Water Resources Management Plan demand forecast

The Water Resources Management Plan focusses on ensuring an adequate supply-demand balance in a 'dry year' and we therefore produced 'dry year' demand forecasts for the 2015 plan. Weather is one of many factors influencing demand, and we have used Met Office models to understand the influence of weather effects on observed demands. For this year's annual Water Resources Review, we continue to use the forecasts declared in the 2015/16 review (the "aWRMP16 forecasts") relating to updated Met Office weather-demand models, and compare the observed demands during 2017/18 to the updated forecasts for that year based on these revisions. A comparison of the aWRMP16 forecasts with the previous 2015 Water Resources Management Plan forecasts is included in Appendix A.

5.2 Demand in 2017/18

Distribution input is the average volume of water put into the water supply network. Regional distribution input during 2017/18 was higher than our forecasts for the year and the equivalent 'dry year' distribution input for 2017/18 is also higher than the updated 'dry year' forecast for the year (see Table 10). Distribution input for the reporting period is influenced by the weather experienced throughout the year, which is discussed later in this section.

During the summer period in 2017/18 rainfall and temperature were above the long term average whilst sunshine duration was around the long term average. Temperatures were almost as warm as in 1995/96, and during the period April to June were significantly higher than the long-term average.

During the winter period, rainfall was slightly below the long term average and temperature above average (see section 3.2). However, as outlined in section 3.2, our region was also affected by a spell of very severe winter weather in February/March 2018, in which the temperature remained below freezing for three consecutive days, followed by a very rapid thaw. This 3-day event, together with a number of other 'freeze-thaw' events during the winter, has contributed to the increase in demand compared to 2016/17 through the impact on leakage of increased numbers of burst pipes, both in our mains network and in our customers' supply pipes. The winter of 2016/17 had only one notable freeze-thaw event, compared to three notable events in 2017/18 (between December 2017 and March 2018) including the particularly severe event referred to above.

Figure 2 shows how this year compares to historic years in terms of dry year influence. A lower ranking would correlate with a smaller proportion of weather dependent usage, and a higher uplift would be required to bring the demand in line with a dry year. A warmer than average summer followed by a number of severe 'freeze-thaw' events during the winter have contributed to the significant increase in distribution input compared to 2016/17.

The outturn data in Appendix A (Table A1) shows a like for like comparison of 2017/18 actual demand and the aWRMP16 'dry year' forecast, adjusted to reflect the weather experienced during the year. The adjustment is only applied to those consumption-based components which are influenced by the weather, and this enables comparison of the outturn data with the forecasts on a like-for-like basis.

Table 10 Comparison of distribution input values to 'dry year' and 'critical period' forecast values

	Carlisle	Integrated	North Eden	West Cumbria	Region Total
Key to table	2017/18 actual data uplifted to represent an equivalent dry year				
	2017/18 forecast data (aWRMP16 revision)				
	<i>Difference</i>				
Dry year distribution input	28	1,713	6	49	1,796
	26	1,656	5	47	1,735
	+2	+57	+1	+2	+61
Critical period distribution input	30	1,713	6	52	1,801
	28	1,656	5	50	1,739
	+2	+57	+1	+2	+62

Note: numbers may not sum due to rounding

Figure 2 Demand for water in 2017/18 due to weather with Met Office analysis showing the dry influences of summer in 2017⁵ (red) relative to historic data

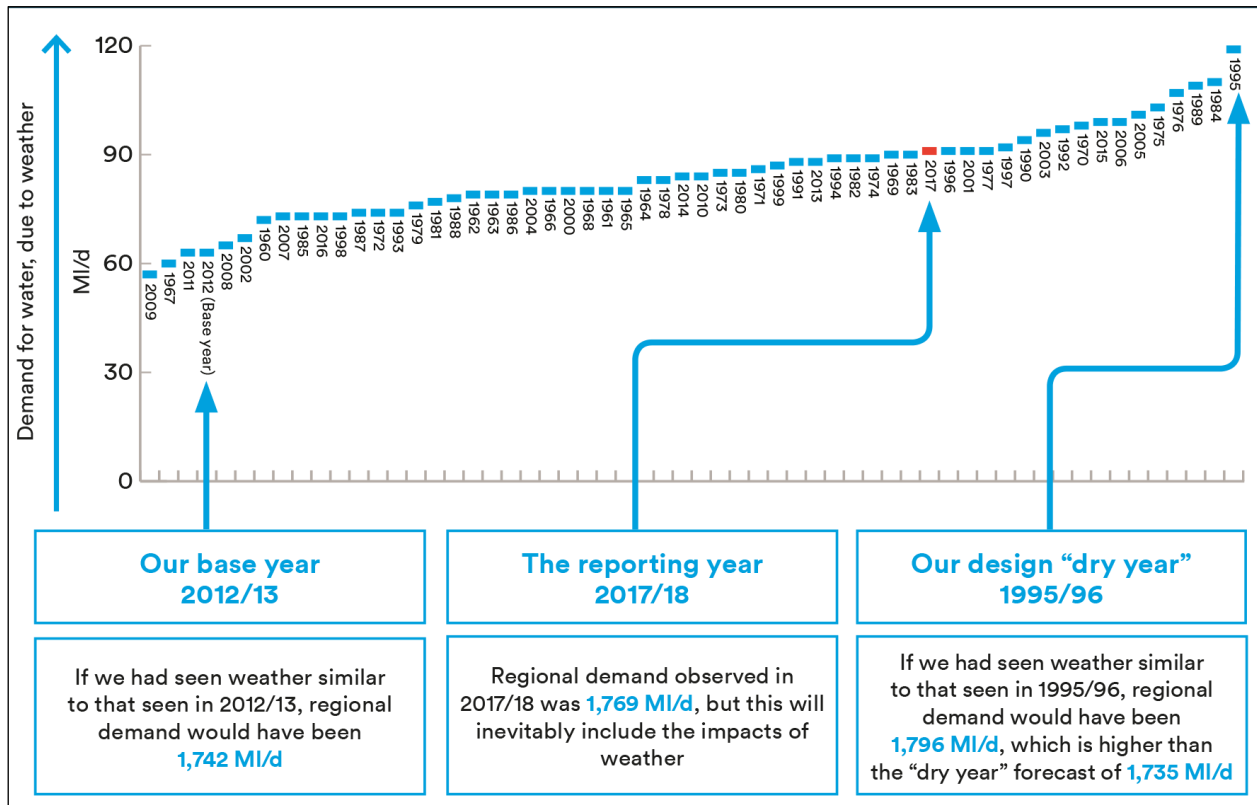
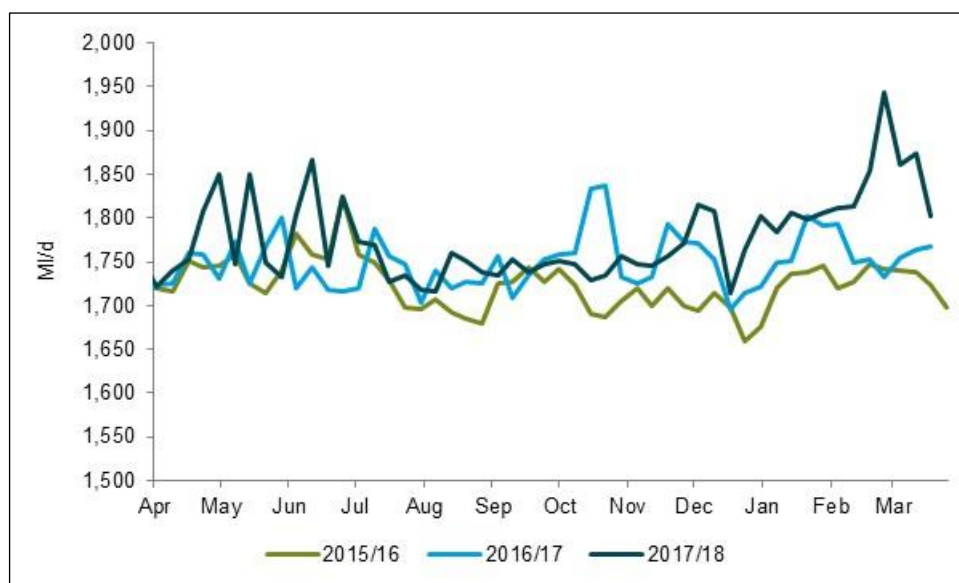


Figure 3 below shows the weekly regional distribution input for the last three years. Average distribution input for 2017/18 has been higher than the previous years. The demand throughout the year has been generally higher than the previous two years, particularly during the winter period of January to March 2018, which is partly attributable to the impact on leakage of several 'freeze-thaw' events as outlined earlier.

⁵ Summer 2017 refers to the summer months, April to September 2017, for the year 1 April 2017 to 31 March 2018.

Figure 3 Weekly regional distribution input for the last 3 years



During 2017/18 we have seen changes in different demand components that, overall, comprise an increase in regional distribution input from the previous reporting year. The increase is partly influenced by the weather as outlined previously. A decrease in non-household consumption has been outweighed by increases in consumption by households and water taken unbilled which, in combination with increases in leakage partly due to winter ‘freeze-thaw’ events, net as a 38 MI/d increase in distribution input from the 2016/17 period. We are currently undertaking further studies into the components of distribution input, which may help to identify whether demand in 2017/18 was unusually high due to the weather impacts or whether the increase reflects a new upward trend in demand.

Demand values need to be compared on a like for like basis. The 2017/18 demand uplifted for a dry year is 1,796 MI/d, compared to our dry year forecast of 1,735 MI/d. This shows that on a comparable basis we are within 61 MI/d of the dry year forecast (approximately 3.5% higher than the aWRMP16 forecast). This is within the margin of uncertainty allowed for within our target headroom component; uncertainty is inherent within future forecasts of demand and we are currently investigating alternative models for predicting household consumption based on a multi linear regression approach.

Leakage showed a lower variance from the forecast at 9.1 MI/d below target compared to 23.4 MI/d for 2016/17, an increase of 14.3 MI/d, and this was due to having a greater number of freeze-thaw events in 2017/18. Our continued efforts to target leakage performance within 2017/18 have kept regional leakage below the target despite significant increases due to ‘freeze-thaw’ events during the winter period of 2017/18, as referred to previously. Our leakage performance is discussed in more detail in section 5.3 below.

Similar to the previous year 2016/17, non-household consumption showed an increase against the forecast of 22 MI/d. This variance may be related to improving economic circumstances. The Office of National Statistics showed that in 2015 the North West’s economy was the UK’s fastest growing region for gross value added (GVA). This trend is predicted to continue albeit at a reduced rate with the latest forecasts from Ernst and Young predicting annual growth in GVA of 1.5% between 2018 and 2020.

There is some uncertainty related to non-household water efficiency, as market separation is still in its relative infancy, and there is not yet a clear understanding of the impact retailers will have in promoting

and delivery of water efficiency activities to non-households. We will continue to engage with retailers in terms of water efficiency activities related to non-household customers.

5.2.1 Per capita consumption

Per capita consumption (PCC) is a highly used metric to monitor consumption, and in recent years the North West has had one of the lowest rates in the country. In 2017/18 our regional average household per capita consumption was 142 litres/person/day which shows a small increase (2%) since the previous year. This increase is above the 2015 Water Resources Management Plan forecasts for normal and dry years (Figure 4). Per capita consumption is sensitive to occupancy rate in each zone; occupancy rates are measured through periodic surveys which may become out of date over time. Periodic updates or corrections are made to the occupancy data which will impact on the per capita consumption calculation. The increase in per capita consumption in 2016/17 and 2017/18 was the result of using revised occupancy rates (survey was carried out in 2016⁶). Table 11 below also shows the average per capita consumption for each resource zone for this reporting year compared to 2016/17.

As a company we consider per household consumption to be a better comparator than per capita consumption. This is due to the relative uncertainty around occupancy and population estimates that are used to calculate per capita consumption. For this reason, we chose per household consumption as one of the Measures of Success (see Section 3.1). Per household consumption for 2017/18 was 310 l/prop/d, which is a slight increase on the previous year. However, taking into account the influence of weather experienced during the year, it is within 5% of the annual forecast and within the expected bounds of variance of our Measure of Success target for per household consumption. Both per capita consumption and per household consumption may be influenced by increased customer-side leakage due to the severe 'freeze-thaw' events experienced during the year as outlined previously.

Ofwat produced guidance in March 2018 for the consistent reporting of per capita consumption (as well as leakage) across the industry. We have incorporated a number of data improvements and methodology changes and are working towards compliance with the new guidance.

⁶ This was carried out as part of the 2019 Water Resources Management Plan development

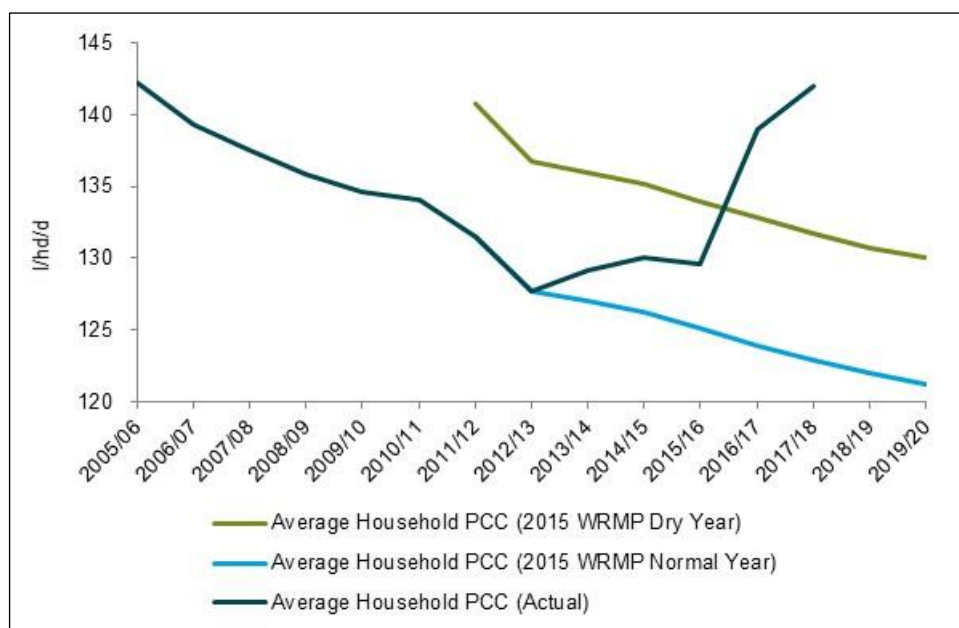
Figure 4 Average household per capita consumption since 2005/06⁷

Table 11 Average household per capita consumption from 2016/17 to 2017/18

Resource zone	2016/17 (l/hd/d)	2017/18 (l/hd/d)	Change (l/hd/d)
Carlisle	139	141	+2
Integrated	139	142	+3
North Eden	139	137	-2
West Cumbria	144	148	+4
Region	139	142	+3

As shown in Table 11, West Cumbria PCC is higher than the other resource zones, and the gap in the 2017/18 period has increased slightly compared to 2016/17. This is associated with a low metering penetration in West Cumbria, as indicated in the outturn data. For commentary on our water efficiency and metering activities in the resource zone please refer to sections 5.4.1 and 5.5.

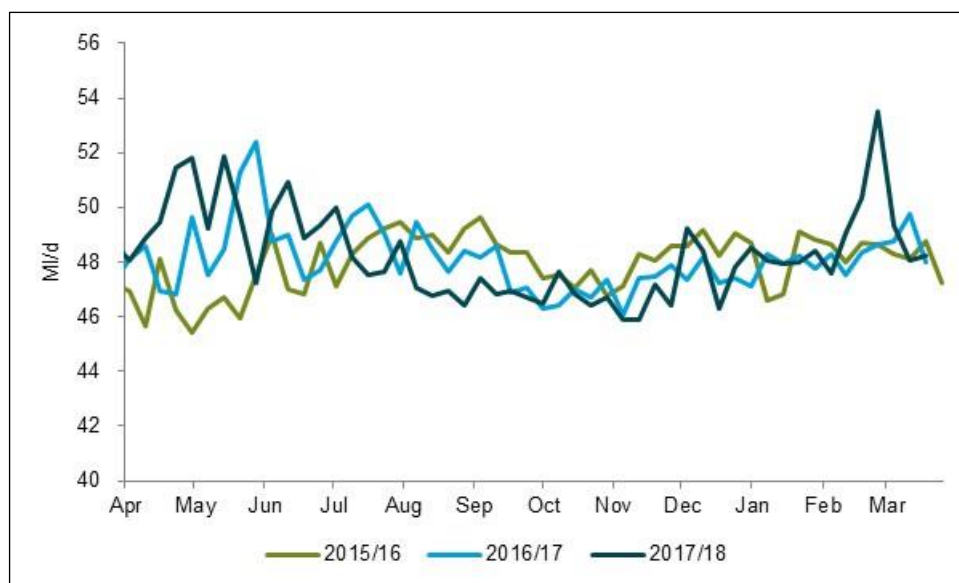
5.2.2 Changes in demand in West Cumbria

There has been no significant change in distribution input in West Cumbria compared to 2016/17 (Figure 5), despite an improvement in the leakage performance compared to the previous year (see section 5.3). We take our responsibility to reduce demand in West Cumbria very seriously given the environmental sensitivity of Ennerdale Water in particular. Therefore plans are in place to recover our performance in this

⁷ A slight decrease in the trend appears from 2014/15 to 2015/16 due to rounding

zone throughout 2018/19 to reduce demand below current levels (these commenced in the 2015/16 period, but inherently it takes time for these to take effect), as described in the sections that follow.

Figure 5 Weekly West Cumbria Resource Zone distribution input for the last 3 years



5.3 Leakage

Having achieved our lowest ever level of leakage of 439 MI/d in 2016/17 we started the financial year in a favourable position. Throughout the year we have continued to carry out an extensive range of leakage control activities in all water resource zones and as a result, we have again outperformed the Ofwat published target of 463 MI/d for 2017/18.

Table 12 below shows leakage in the four water resource zones.

There has been a slight decrease in leakage in North Eden compared to the previous year. Historically, leakage in North Eden has been slightly over the forecast levels. The resource zone is very small, with few properties and a water balance across such an area is difficult to reconcile.

Leakage in West Cumbria has been reduced by 0.8 MI/d from the 2016/17 position (a 5% reduction), but remains above the total leakage forecast for this zone. We continue to target West Cumbria to recover our performance in this zone including further analysis into the worst performing DMAs and investigating connectivity and operability on top of our extensive leakage activities in the area.

There has been a slight increase in leakage for Carlisle from the 2016/17 position, and total leakage for this zone remains above the forecast level. We are continuing with the extensive pressure management programme and leakage detection to recover performance in this zone throughout 2018/19.

Table 12 Zonal leakage levels 2016/17 to 2017/18 and comparison with 2015 forecast (Ml/d)

Resource zone	Carlisle	Integrated	North Eden	West Cumbria	Region Total
Actual total leakage 2016/17	5.3	414.9	3.1	16.1	439.2
Actual total leakage 2017/18	5.4	430.0	3.0	15.3	453.5
Change from 2016/17	+0.1	+15.1	-0.1	-0.8	+14.3
2017/18 forecast from our 2015 Plan	4.8	441.9	2.0	14.0	462.6
Variance from forecast	+0.6	-11.9	+1.0	+1.3	-9.1

NOTE: Numbers may not sum due to rounding

Regionally there was an increase in leakage compared to the previous year (in which we achieved our lowest ever leakage level). This reflects a more severe winter than in the previous year, with a number of 'freeze-thaw' events occurring during early 2018. However, due to our extensive leakage reduction programme the leakage value remains below the target (by over 9 Ml/d).

Tackling leakage is a priority for us and we are always looking for innovative techniques to help us to do this more effectively. In rural areas, we use satellite technology to geo-locate potential areas of leakage in our network down to a range of about 80 metres. We then send in our sniffer dog, Snipe (the UK's first leakage sniffer dog), to accurately pinpoint the exact location of the leak by recognising the tiniest traces of chlorine. Trials have been so successful that we are now expanding the approach across our region. The approach is supplemented by our Event Recognition in Water Network technology (ERWAN) which helps to predict where issues will occur and resolve these issues proactively before customers experience a problem.

We continue to provide a private supply pipe repair/replacement service for household customers. We also offer unlimited free repairs or one free replacement supply pipe in a 12-month period, subject to conditions.

We are working towards compliance with Ofwat's guidance for water companies to report leakage consistently across the industry from 2020. A number of projects are underway and most of these will be completed by 2020.

5.3.1 Leakage in West Cumbria

We have been working hard to find and fix leaks and achieved further leakage reductions this year across our region. In West Cumbria we have deployed additional resources to carry out a deep dive analysis on the worst performing DMAs (district meter areas), investigate connectivity and operability. A detailed review and implementation of enhanced pressure management has assisted with the overall reduction in demand. We continue to operate with an enhanced level of detection and repair resources. In West Cumbria we are operating with 10 leakage technicians, 2 permanent network maintenance teams covering the Lakes, Carlisle and North Eden focussing on optimising pressure across the network to reduce burst frequency and leakage.

This is on top of our “business as usual” leakage activities and we will continue with these activities throughout 2018/19. We will also continue with our pressure optimisation programme; currently average zone night pressure is the lowest it has been. Our efforts resulted in a 5% leakage reduction in comparison to the previous year, bringing leakage down by 0.8 Ml/d whilst still remaining 1.3 Ml/d above target for this zone. However, leakage per kilometre of water main is now 19% lower than the regional average.

Leakage can be split into district meter areas and the trunk mains upstream of them. District meter areas (DMAs) are the part of the water network where most of the leakage occurs, typically the pipes under roads near where we live and work.

We have an ongoing programme of demand management, including DMA leakage reduction, in West Cumbria. Actions include:

- testing of new PMV controllers;
- improved logging and monitoring of all DMAs with respect to pressure management;
- increased active leakage control by using additional resources to enhance daytime activity. We also continue to survey regularly for leaks in unmetered areas;
- increased active leakage control at night and permanent night detection resources;
- ongoing focus on supply pipe leakage to ensure that repair times are optimised (either through using our contractors to repair or working with the customer to repair via their insurance company);
- an ongoing upstream losses campaign including distribution input meter validation and service reservoir investigations as part of trunk main leakage and losses detection process;
- extensive pressure reduction programme;
- successful use of acoustic technology on trunk mains to locate leaks;
- upstream leakage reduction targeting high leakage tiles;
- drop tests to identify and target leaks at our service reservoirs where appropriate;
- meter verification and a review of the pressure management programme to identify potential for further pressure reduction; and
- data validation including operability investigations, void properties status, industrial users and allowances for concessionary supplies.

We will continue our extensive efforts throughout the 2015-2020 planning period to bring leakage back on track for the 2018/19 period and beyond.

5.4 Water efficiency and impact on consumption

Water efficiency plays an important role in balancing supply and demand. We achieved a saving of 2.90 Ml/d for 2017/18, and achieved additional savings of 0.34 Ml/d from enhanced activities in our West Cumbria Resource Zone.

Table 13 summarises the benefits of our water efficiency and metering activity for the year. These actions contribute to the overall change in consumption by customers.

Table 13 Summary of United Utilities water efficiency programme 2017/18

Water Efficiency Activity	Number	Estimated water saving (Ml/d)
Cistern devices distributed to customers	25,914	0.24
Water efficiency customer self-audits	128,327	1.04
Water butts distributed to customers	168	0.00
Water Efficiency Education Programme, pupils visited	9,847	0.47
Other promotional events	4,566	0.03
Crystal packs / water sticks distributed to customers #	1,984	0.00
Retrofit devices distributed to customers	78,336	1.11
Base Service Water Efficiency Programme – Total (including a carry over of 0.05 Ml/d from 2015/16)		2.90
Free meter options	36,615	1.24
West Cumbria Sustainable Level of Water Efficiency Programme	14,933	0.21
West Cumbria education programme	3,499	0.14
TOTAL ESTIMATED SAVING		4.49

NOTES: Numbers may not sum due to rounding;

Value is greater than zero, but the savings are small so do not show to two decimal places

During 2017/18, we have demonstrated our commitment to promoting water conservation by the following activities:

- continuing to leave a pack called “A simple guide to your water meter” (including water saving information) with household customers after a meter is installed;
- carrying out over 1,500 audits in customer homes, leading to the installation of over 5,800 water efficient products;
- delivering a water saving education programme to 9,820 Key Stage 2 pupils;
- offering a water usage calculator on our website, used by 73,430 customers in 2017/18, which gave them advice on how to save water across their homes;
- supplying over 32,700 customers with a range of water efficient products including Save-A-Flush’s, Shower Regulators, Tap Inserts, Toothy Timers, Shower Timers, Showerheads and Bathbuoys, to install in their properties;
- in July 2017 we sponsored a garden at Tatton Flower Show, where we won a gold prize for the design, distributed water saving products and advice as well as giving away a water butt as a competition prize;
- continuing to promote water efficiency through our education programme;
- every customer bill received information on saving water (see Figure 6). The inserts were slightly different for metered and non-metered bills but both featured information on free meters and free water saving products as a way for customers to save money on their bill; and

- Throughout the year we have promoted water efficiency via a number of digital campaigns, as well as using traditional press advertising, radio adverts, and bus backs advertising (see Figure 6).

Figure 6 Examples of water efficiency promotions

Measured and unmeasured billing inserts



Digital campaigns



Press advertising



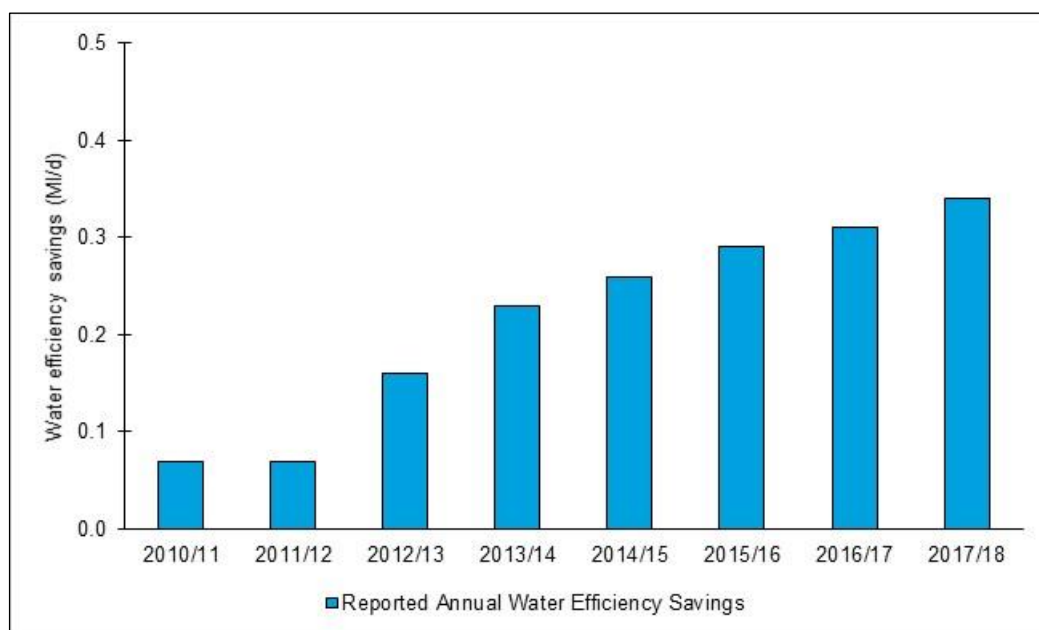
Bus advertising



5.4.1 Water efficiency in West Cumbria

In our 2015 Water Resources Management Plan we committed to maintain the enhanced level of demand management activity delivered from 2010-2015. As part of realising on-going benefits we are continuing to undertake enhanced demand management activity to minimise abstraction in West Cumbria. This year we have seen further savings of 0.34 MI/d in the zone, exceeding the previous year's performance of 0.31 MI/d. These further savings follow on from successful results in earlier years, in which savings were more than double the cumulative target through the 2010-2015 planning period (see Figure 7).

Figure 7 West Cumbria cumulative water efficiency savings



As with previous years we held a series of give-away days at supermarkets and events in West Cumbria, giving away over 14,700 products, which included water efficient showerheads, shower regulators, shower timers, toothy timers, Bath Buoys, tap inserts, Save-A-Flushes and handy information booklets.

Working in partnership with the Lake District National Park we continue to offer a free Water Workshop, which was delivered to over 1,900 key stage 2 pupils in 2017/18. The workshop is extremely interactive, allowing all the children to participate. The programme covers a number of topics from Key Stage 2 Science and Geography.

We had a number of water efficiency adverts in the West Cumbria press from May – June 2017 (see Figure 8).

Figure 8 Examples of water efficiency promotion in West Cumbria



5.5 Customer metering

We continue to meter all new properties, and under our free meter option scheme household customers can opt for a meter. The number of unmeasured non-households is relatively small following a programme to compulsorily meter unmeasured non-households several years ago (where practical to do so). Household customers therefore drive most of the annual growth in metering.

During 2017/18, we installed meters at:

- 22,479 new households;
- 36,615 households, which opted for a free meter; and
- 823 new non-households.

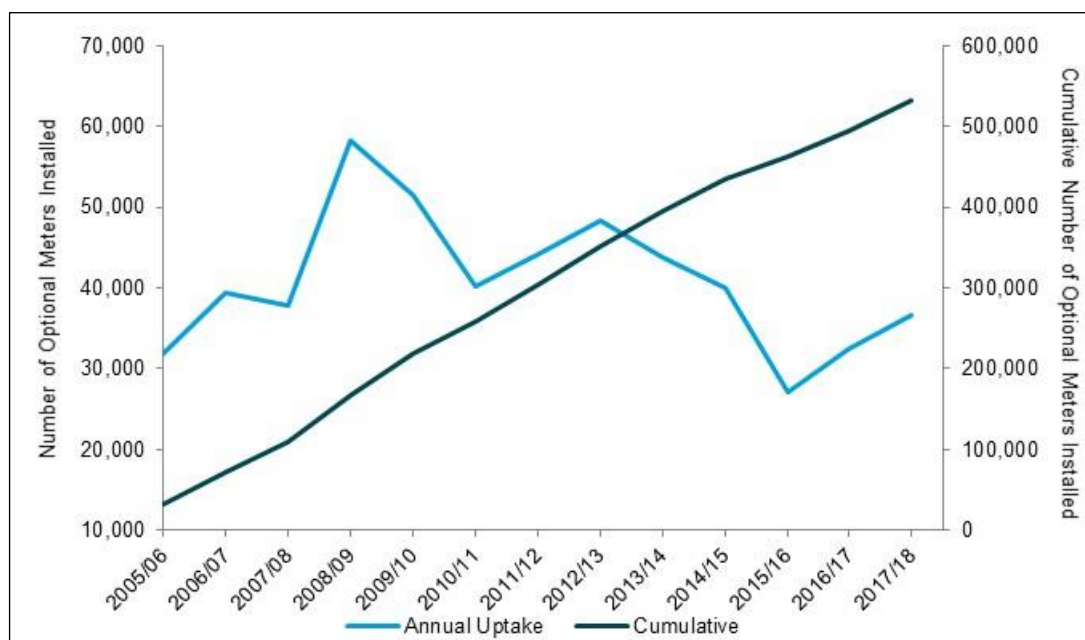
This year, we are reporting an increase in the number of customers requesting a meter from the previous year 2016/17, from 32,447 to 36,615. However this is still below the forecast of 57,393 in our 2015 Water Resources Management Plan and we consider it unlikely that we will reach the levels of uptake originally forecast even though we are taking additional measures to encourage meter uptake as described in this section. Bills have reduced from the previous reporting years, which will have reduced the incentive to switch to some degree, serving as a downward pressure on the reported values. We are currently revising our forecasts as part of the developing the next Water Resources Management Plan, with the revised draft plan due for submission in summer 2018. Our latest modelling indicates that lower forecasts for metering uptake are likely to be adopted within the next plan, against which we will compare performance in future annual reviews once the next plan comes into effect from 2020 onwards.

Our actions as outlined in this section have helped us to increase free meter uptake by over 4,000 if compared with 2016/17, reducing the gap between actual and forecast uptake of the free meter option.

Figure 9 shows the uptake under our free meter option scheme over the last thirteen years. The number of optants each year varies due to a wide range of factors, including water tariffs. This may in part be due to

the wider economy, as already discussed in Section 5.2, with peaks in the free meter option uptake observed during the recession when it is likely that customers who would financially benefit would have been encouraged to reduce household bills. However, the number of free meter installations is generally expected to decline in future within the forecasts; as the metering penetration increases, the number of unmetered customers who still stand to benefit most from a free meter reduces. This is reflected in our “Number of free meters installed” Measure of Success (see Table 2), which shows the expected number of new installations to decrease year on year.

Figure 9 Free meter option uptake since 2005/06



To address the lower than expected meter uptake we have continued to progress a number of actions to improve our performance. Using the findings and understanding from behavioural economics research, we have reviewed our approach to promoting meters to try to tackle this issue and improve the uptake rate of meters.

We continue to offer an extended period of 24 months for all customers to switch back from being metered to unmetered. This gives customers time to decide whether they will benefit from being on a metered tariff. It is widely accepted that customers with a meter use less water than those without one and this makes the option more attractive. Metering is an opportunity for customer engagement which, if sustained, can also be useful for promoting water efficiency. Metered customers are able to review the impact of their behaviour on their bills, and metering also gives us the opportunity to use flexible tariffs based on consumption patterns. “Paying for what you use” is a well-supported principle.

A pilot trial is underway and being run by United Utilities Domestic Retail in which customers that opt for a new free water meter will have a ‘Lowest Bill Guarantee’ for a 24-month period. This ensures that customers will pay the lesser of the existing Rateable Value based charges or our new metered charges. This offer has been designed to reduce the potential ‘loss aversion’ that customers tell us is preventing them from moving to a meter, whilst still offering a potential financial saving to reduce water use, along with the use information that a meter provides.

We have promoted this offer to 5,000 households that are likely to experience lower bills with a meter. By using detailed information on customers’ likely consumption patterns, household occupancy rates and

existing property rateable values we have been able to target promotion of the lowest bill guarantee to those customers most likely to gain from being on a meter.

During the initial phases of the trial period we have observed a measurable increase in customers taking up the offer of a free meter when compared to a control group. Between July and September we saw a 40% uplift in free meter requests from the trial group versus the control group. We have also seen that the small number of participating customers that have received bills to date have almost exclusively seen lower bills when compared to their previous unmeasured charges. It remains too early to assess impacts of the Lowest Bill Guarantee on household consumption, but there is potential to roll this out to a larger proportion of the population in the future.

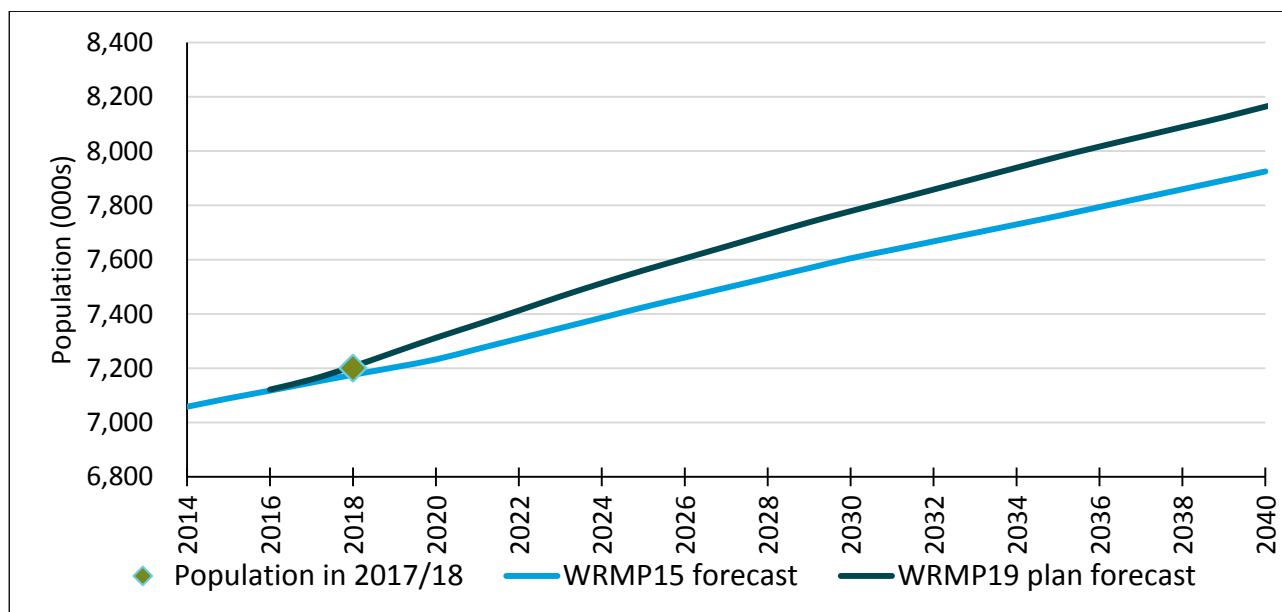
We are also working on a project called Advizzo to offer the provision of water use data to customers and to use different interventions to change behaviour around water use, to help customers reduce water use and save money, that some customers are now able to access through online accounts.

5.6 Population and property forecasts

The April 2018 population projections prepared by our specialist demographic analysts have indicated that in the short term there is little variation from the 2015 Water Resources Management Plan (WRMP15) trend projections. By 2040 there is a 6% difference between the WRMP15 and April 2018 trend-based population projections; given that these are long-range forecasts they are likely to shift over time.

We continue to review the latest population forecast projections on an annual basis. In line with the Water Resources Planning Guideline (Environment Agency, 2017), we have engaged with Local Authority Districts and Unitary Authorities to ensure that we incorporate data from Local Development Plans in our revised forecasts. Using this data we have produced a plan-based property and population forecast for our 2019 Water Resources Management Plan, which is higher than the current trend-based projections. A comparison of the WRMP15 population projections and the latest plan-based projections, as adopted in our draft 2019 Water Resources Management Plan, is shown in Figure 10.

Figure 10 Latest population forecasts (WRMP19 plan-based) against the previous (WRMP15) forecast



6. Headroom



In the annual Water Resources Review for 2015/16 we outlined changes to the dry year demand and target headroom components of the supply-demand balance due to a revised method of calculating the dry year uplift factor based on Met Office models. We continue to use this approach in 2017/18, as for last year, and therefore the target headroom values are consistent with the previous forecasts reported on in the 2015/16 annual Water Resources Review.

7. Options and other measures



Our 2015 Water Resources Management Plan outlines the preferred plan to deliver the Thirlmere transfer scheme, along with a set of interim measures to mitigate the potential impacts of our abstraction from Ennerdale Water until the Thirlmere transfer scheme is delivered. We also committed to complete an annual review of the contingency plan that would come into effect in the unlikely event that the Thirlmere transfer scheme is undeliverable. These three key aspects of our 2015 plan are discussed in turn in the sections below.

7.1 Thirlmere transfer scheme

Our 2015 Water Resources Management Plan concluded that the Thirlmere transfer scheme (sometimes referred to as the West Cumbria Water Supplies Project) should be progressed to address the future supply-demand deficit in West Cumbria.

Following submission of the full planning application ahead of target in January 2016, and a subsequent period of working closely with the planning authorities to address any queries, we gained planning approval in November 2016. Information on the content of the planning application can still be viewed on our bespoke project website; please visit <https://www.unitedutilities.com/cumbria/our-plans/west-cumbria/planning/>.

The project team has made further good progress during 2017/18 and we are on track to meet or outperform the project delivery date of 31 March 2022, as included in our 2015 plan. The key items of work undertaken this year and/or in progress include:

- Construction commenced in March 2017 with excellent progress made despite challenging weather conditions.
- Planning amendments for pipeline changes, in response to the damage from Storm Desmond meaning that a section of the original pipeline route adjacent to the River Greta is no longer constructable, were approved in November 2017 by all three planning authorities: Allerdale Borough Council, the Lake District National Park Authority and Copeland Borough Council.
- Construction has started on the site of our new Williamsgate Water Treatment Works with over 205,000 cubic metres of soil excavated by March 2018, with all material to be retained on site. Substantial progress has also been made on the construction of the new buildings and tanks at the water treatment works (Figure 11).
- The target of 23.12% of new water mains being in the ground during the first year of construction has been achieved (Figure 12).
- Connections to existing assets at Thirlmere Bridge End have been completed 24 months ahead of schedule.
- Completion of a fifth phase of public consultation activities on the scheme.
- In January 2018 a legacy fund was launched by United Utilities to support projects providing social and economic benefits in the local area. Nine projects were supported at the first grants panel in March 2018 and a total of £97,000 awarded to communities in West Cumbria.

Further information on the work we expect to complete to progress the Thirlmere transfer scheme in the coming year is included in Section 11.

Figure 11 Construction of new Williamsgate Water Treatment Works



Figure 12 Construction of Thirlmere transfer water mains



7.2 Interim measures in West Cumbria

In order to protect the sensitive habitat in the River Ehen Special Area of Conservation (SAC), we plan to deliver further measures to reduce the abstraction from Ennerdale Water until the Thirlmere transfer scheme is implemented. As part of realising ongoing benefits we have committed to continue with a number of activities. These include:

- continuation of existing enhanced levels of water efficiency promotion (as described in Section 5.4);
- continuation of existing leakage management activities to keep leakage as low as possible, and investigation of new ways of reducing leakage further (as described in Section 5.3.1); and
- we have plans in place to tanker potable water when it is most needed, i.e. when very dry weather is being observed and the lake level in Ennerdale Water is low. This is defined within our Drought Plan. However, this is not something that has been required to date due to the weather conditions experienced.

Two further projects were included in our 2015 plan to bring further abstraction reduction from Ennerdale Water:

- Summergrove: the scheme of improvements allows the further transfer of demand from Ennerdale Water to Crummock Water by allowing us to operate our network differently. This allows a reduction in abstraction from Ennerdale Water by a further 3 MI/d. This project was completed in March 2016 and has since delivered the benefit of reduced abstraction from Ennerdale Water; and
- South Egremont boreholes: following completion of this scheme in summer 2017, water is available from this source at a capacity of up to 11 MI/d. Due to issues with the hardness of the blended water from the boreholes with the supply from Ennerdale Water, an alternative mode of operation

of the scheme has been adopted with up to 4 Ml/d normally being supplied from the boreholes. At times when the level of Ennerdale Water is below drought trigger 2 the output from the boreholes will be increased to the full scheme capacity of 11 Ml/d. This new way of operating provides a more acceptable water blend in response to customer contacts during the commissioning phase of the borehole scheme. Water has been supplied from the boreholes throughout most of 2017/18 (including during the commissioning phase prior to full completion), enabling us to reduce abstraction from Ennerdale Water, and this will continue in future years until delivery of the Thirlmere transfer scheme. The revised mode of operation has yet to be formalised in a Section 20 agreement (a formal agreement covering the operation of water resources made under Section 20 of the Water Resources Act), but has been agreed in principle and outlined on our website.

7.3 Compensatory measures

During 2014/15 we worked with Natural England and the Environment Agency to commence the delivery of a package of 13 physical ecological and eight research compensatory measures. This was submitted to Defra on 28 February 2014. Implementation of the package of measures commenced in 2014 and will continue to be progressed over the coming years. Defra confirmed in November 2015 that there are Imperative Reasons of Overriding Public Interest (IROPI) to continue abstraction from Ennerdale Water until the Thirlmere transfer scheme is operational in 2022.

The aim of the agreed package of measures is to improve the population of mussels and salmon by enabling more recruitment (survival to successful reproduction), primarily in the River Ehen SAC, and to undertake research and monitoring to understand how this outcome would best be achieved. The compensatory measures will be secured as far as possible within the River Ehen SAC and are therefore planned to both prevent and compensate for potential further damage. Additional measures will provide compensation for salmon in other Cumbrian lakes and rivers, including other Natura 2000 sites. Progress on each measure is reviewed and guided by a project steering group, which comprises representatives from United Utilities, the Environment Agency and Natural England and meets at least twice a year. A formal review of all of the research measures occurs each February, with a review of the wider package in July each year.

Below is a summary of the package of compensatory measures:

Physical measures:

- nine physical ecological measures are largely focused on changing land use and delivering catchment management actions in the area of the River Ehen SAC in order to improve water quality, optimise freshwater mussel and salmon habitat extent and condition and enhance recruitment in both of the interest features; and
- the four offsite physical measures include revocation of abstraction licences and the potential removal of associated infrastructure at Crummock Water and Dash Beck (SAC and SSSI) and at Chapel House Reservoir and Over Water (SSSI) in order to restore natural functioning and improve salmon migration in a number of designated and undesignated Cumbrian lakes and rivers.

Research measures:

- seven research measures have been designed to inform the scope (and in some cases, the need for and feasibility) of the physical measures focused on the River Ehen SAC and elsewhere. The research measures will also enable us, along with the Environment Agency and Natural England, to monitor the

effectiveness of the physical measures and improve the body of knowledge regarding factors which threaten the overall coherence of Natura 2000, particularly relating to the River Ehen SAC; and

- there is one research measure to trial the reintroduction of freshwater mussels and artificial encystment to contribute to the body of knowledge associated with freshwater mussel recovery efforts.

During the year 2017/18, we have made further progress implementing the package of compensatory measures to the scope and the timescale agreed with the Environment Agency and Natural England:

- The River Ehen Project Officer, hosted by the West Cumbria Rivers Trust, has facilitated the delivery of conservation actions in the River Ehen and Ennerdale Water catchments. Walkover surveys were carried out and subsequent action has been delivered through practical measures in the catchment. These measures will further minimise risk to and improve the populations of mussels and salmon in the River Ehen SAC (see Figure 13 and Figure 14).
- We continued to progress algal monitoring surveys of locations around Ennerdale Water to better understand where nutrients could be entering the lake. The results of these surveys have begun to inform locations for the Project Officer to target conservation actions. Additionally phosphorus monitoring has commenced to identify nutrient hotspots around the lake and in the River Ehen. This study has been carried out with Lancaster University (see Figure 15).
- We continued to progress an intensive three-year project to assess and map potential juvenile freshwater mussel habitat in the River Ehen SAC; the final report from this study is due to be delivered in autumn 2018.
- A four year EngD study hosted by Newcastle University is progressing. The student is investigating the implications of a 'return to natural' flow regime to improve understanding of the likely future flow conditions experienced by the designated species and provide context and data for other research and physical measures.
- An additional four year EngD study hosted by Newcastle University has begun. The student is investigating the physical impacts of infrastructure removal at Crummock Water and communicating the impacts of water resource infrastructure removal with stakeholders.
- We have continued to progress feasibility studies for infrastructure removal of the redundant bleaching weir in the River Ehen, and removal of abstraction-related infrastructure and weirs at Crummock Water, Dash Beck, Overwater and Chapel House, all sites where abstraction will cease in 2022 when the Thirlmere transfer scheme becomes operational. These studies are due to be completed in 2018.
- The River Ehen bleaching weir study was completed in April 2018 and concluded that to minimise impact on downstream flood risk, removal of the River Ehen bleaching weir should be considered alongside Ennerdale Weir removal.

Figure 13 Encystment checks carried out annually on the River Ehen by the Project Officer



Figure 14 Example of stone wall leaky dam installed by the Project Officer to reduce runoff from an ochorous ditch in the River Ehen catchment; a number of such interventions have been installed across the catchment



Figure 15 Installation of DGT (diffusive gradients in thin films) devices to monitor phosphorus in the River Ehen



The package of compensatory measures will provide additional knowledge and ecological actions over and above the actions that are normal practice for the management of the SAC. Outside of this package of measures, considerable research, monitoring and physical action is currently being delivered by United Utilities working in partnership with other organisations, focused on restoring the River Ehen SAC to favourable condition.

We are committed to working with Natural England, the Environment Agency, local stakeholders and experts in order to find the best solution for the protection of the River Ehen SAC and public water supplies in the light of emerging evidence.

7.4 Contingency plan

Our 2015 Water Resources Management Plan contains a contingency plan in case the Thirlmere transfer scheme proves undeliverable. The contingency plan is based around the local sources alternative from our last Water Resources Management Plan, and involves new groundwater sources in West Cumbria and acquiring existing licences held by a third party. It may also utilise and retain existing sources, with the exception of Ennerdale Water.

We have recently undertaken our annual review of the contingency plan. Following the granting of planning approval for the Thirlmere transfer scheme in November 2016, and good progress made on the project throughout 2017 and to date, the likelihood of triggering the contingency plan is now very low. Given this position, we do not consider it necessary to continue detailed liaison with the Environment Agency on the availability of additional groundwater resources in the West Cumbria aquifer. Monitoring data will be collected as part of the South Egremont boreholes abstraction licence conditions in order to understand the effects of groundwater abstraction.

We will continue to review the contingency plan at least annually in future to reflect changing circumstances over time, and then report on any changes through the annual Water Resources Management Plan review process.

8. Supply-demand balance



This section brings together all of the changes and our performance for 2017/18 as detailed in the previous sections. Here we summarise what it means for the supply-demand balance across our four resource zones.

For the 2017/18 reporting period we have maintained a surplus in all four water resource zones, as indicated in Table 14. This means that we have achieved a Security of Supply Index (SOSI) score of 100 for 2017/18.

Table 14 Supply-demand balance for the 2017/18 period by resource zone

Component description		Carlisle (critical period)	Integrated (dry year)	North Eden (dry year)	West Cumbria (critical period)
Supply	Water available for use (MI/d) #	33.51	1,901.93	8.65	55.11
Demand	2017/18 Dry year demand (MI/d)	29.85	1,712.50	6.37	51.97
Target Headroom	Target Headroom (MI/d)	2.44	77.61	0.26	2.95
2017/18 Supply-demand balance	This is the supply-demand balance position for 2017/18 (MI/d)	1.22	27.08	3.02	0.19
2017/18 forecast supply-demand balance	This is the supply-demand balance position for 2017/18 from the WRMP 2015 forecast (MI/d)	1.57	138.67	4.06	4.85
Difference	Difference between actual and forecast supply-demand balance in 2017/18 (MI/d)	-0.35	-111.59	-1.04	-4.66

Note: Environment Agency Water Available for Use definition minus process losses and outage allowance (not actual outage)

9. West Cumbria summary



Protecting the sensitive environment in West Cumbria is the focal point of our 2015 Water Resources Management Plan. In our 2015 plan we committed to undertake a host of different activities to protect the environment in both the short and the long-term.

This section summarises our overall performance in West Cumbria, as discussed in the earlier sections of this report. In 2017/18 within the resource zone:

- we have seen the benefits of our water efficiency efforts in the zone, outperforming the water efficiency demand savings to a total of 0.34 Ml/d for the year. This is a further saving of 0.03 Ml/d from our performance in 2016/17;
- total leakage in West Cumbria has reduced by 0.8 Ml/d (5%) since 2016/17, although it is still above the target for the zone. However leakage per kilometre of water main, which has also reduced this year, is 19% lower than the regional average for 2017/18;
- demand in the resource zone has increased slightly from 2016/17 (by less than 0.2%);
- the South Egremont borehole scheme was completed in summer 2017, and water supplied from this source has enabled us to reduce our abstraction from Ennerdale Water during 2017/18;
- progress on the Thirlmere transfer scheme has continued to be ahead of target; and
- we have made further good progress in delivering the package of compensatory measures (see section 7.3).

In the coming year we will continue our ongoing programme of demand management, including increased leakage reduction activities as outlined in section 5.3.1, and continue with construction of the Thirlmere transfer scheme.

10. Making sure we are prepared for drought



10.1 Updating the Drought Plan

We have recently published our Final Drought Plan 2018. This follows extensive public and stakeholder consultation and updated environmental assessments for drought orders and permits and a new source of water in West Cumbria (South Egremont boreholes), which will support reduced abstraction from Ennerdale Water. Our final plan includes additional information on drought scenario testing to demonstrate testing of the Drought Plan under a range of drought scenarios, including extreme drought events more severe than those experienced in the historic record.

Our Final Drought Plan 2018 can be found at www.unitedutilities.com/drought-plan.

10.2 Strategic pumping

In Appendix 8 of the Final Drought Plan we agreed to hold regular meetings with the Environment Agency and the Windermere stakeholders to review strategic pumping. Three meetings have now taken place, with United Utilities presenting our approach to strategic pumping at each. All parties agree that these meetings are beneficial and are to be continued for the coming year.

10.3 Drought permit environmental assessments

We hold pre-prepared environmental assessments of drought permits/orders alongside the main Drought Plan and these are developed with groups of local interested stakeholders. Following recommendations from the Windermere assessment, updated during 2016/17, we initiated further investigations into the feasibility of mitigation measures to complement the main assessment. This study concluded that dredging

is a viable mitigation option so an environmental assessment of dredging has been commissioned. We have also commissioned a review of the abstraction licence at Windermere, which is investigating different hands-off flow scenarios. At the next workshop stakeholders will discuss and score the benefits and impacts of the scenarios in order to narrow down the options carried forward for further analysis.

11. Forward look



In this section we give an overview of some of our key activities in 2018/19 noting however that it is not exhaustive.

The key activities in Table 15 are to:

- help to progress the delivery of our 2015 Water Resources Management Plan;
- bring our performance in line with expectations where this review has identified a requirement to do so;
- ensure security of supplies; and
- reduce our abstraction from Ennerdale Water.

Table 15 Key items of activity in 2018/19

Item	Action
South Egremont boreholes	Following completion of the South Egremont borehole scheme in summer 2017, we will continue to offset supply from Ennerdale Water by abstracting from the boreholes in line with the agreed mode of operation.
Demand management activities	We will maintain our water efficiency savings and focus activities in West Cumbria to improve leakage within the zone. In Carlisle we will complete the pressure management programme to realise further benefits in this zone.
Thirlmere transfer scheme	Following the success of the construction activity in 2017/18, similar progress is expected during 2018/19. Pipe-laying will continue along multiple sections of the pipeline route, major civil engineering works will take place at the new water treatment works and tunnelling activities will continue. In 2018 we will also commence the construction of two new clean water service reservoirs that will store our water ready for distribution to customers. In all construction work we will continue to carefully consider the impact on the environment and on tourism in the area. We will continue our strategy of regular communication with the local community through our project website, visitor centre, meetings and informal liaison as appropriate.
Final Drought Plan 2018	We have now been given permission by Defra to publish our Final Drought Plan 2018 which is available at www.unitedutilities.com/drought-plan .
Thirlmere Transfer contingency plan	Following the granting of planning approval for the Thirlmere transfer scheme, and good progress made on the project throughout 2017 and to date, the likelihood of triggering the Thirlmere Transfer contingency plan is now very low. However, we will continue to review the contingency plan on an annual basis as part of this Water Resources Review.
Customer metering	We will continue with a number of actions to improve our uptake of the free meter option in 2018/19. These actions include: - continuing a pilot trial of a 'Lowest Bill Guarantee' offer, to cap charges for 24 months for customers opting for a free meter, and reviewing the potential to roll this out to larger numbers of customers in future; and - continuing with our extended switch back period of 24 months, to give customers longer to decide whether they will benefit from having a meter.

11.1 Developing our 2019 Water Resources Management Plan

We're already well underway towards development of our 2019 Water Resources Management Plan. Following an extensive pre-consultation exercise during autumn 2016, we developed our draft plan taking into account the valuable feedback which we received from customers, stakeholders and regulators. We published the draft plan in March 2018 and then undertook a 12-week consultation process upon the plan, in order to take on board any further views or comments as we continue to develop our plan⁸.

We intend to publish our revised draft plan in the summer of 2018; subject to approval by the Secretary of State this will then become our Final 2019 Water Resources Management Plan, covering the period 2020 to 2045 and beyond. We will also prepare a Statement of Response to the consultation feedback.

In 2017/18, the following activities have taken place or are in progress as part of developing our 2019 Water Resources Management Plan:

- In July 2017 a second meeting of our Technical Stakeholder Group was held, following the first meeting in March 2017. This group allows us to work more closely with interested stakeholders to gain feedback on the plan outside the formal consultation period, and to better understand stakeholder views and preferences in creating our plan.
- In November 2017 the Board endorsed and subsequently assured that the draft Water Resources Management Plan represents the most cost effective and sustainable long term solution.
- We completed our draft 2019 Water Resources Management Plan and submitted this document to Defra on 1 December 2017.
- Following direction from Defra, on 2 March 2018 we published our draft plan on our website. We invited stakeholders and other interested parties to comment on our plan during a subsequent 12-week consultation period. We have consulted widely on our plan at over 60 meetings, workshops and public events across our region, including around 20 meetings with local authorities, 12 roadshows to consult on our business plan development, 7 drop-in sessions in West Cumbria and 3 specific Water Resources Management Plan consultation events. We are currently reviewing the responses to this consultation and determining appropriate updates to our plan, prior to publication of a revised draft plan in summer 2018.
- In line with Ofwat guidance, we have published market information on our Draft Water Resources Management Plan to enable potential market participants to identify opportunities to supply water resources, or provide demand management or leakage services. The market information is required to support the development and operation of a future bidding market which Ofwat are seeking to develop.

⁸ Further information about the development of our plan, and contact details can be found at:
<https://www.unitedutilities.com/corporate/about-us/our-future-plans/water-resources/developing-our-water-resources-management-plan/>.

Compared to our previous Water Resource Management Plans, our new draft plan is based on even more extensive and earlier stakeholder consultation, more innovative customer research using different techniques, and new sophisticated computer modelling techniques. We have assessed the resilience of our water supply system to more extreme droughts, or droughts which are different from those historically experienced, and a range of other potential hazards, such as flooding, freeze-thaw events and asset failure. We have explored future opportunities for water trading with other water companies.

The key points of our draft 2019 Water Resources Management Plan are summarised below:

- Our dry year supply-demand balance forecasts a surplus over the 25 years of the plan (from 2020 to 2045), taking into account future population and economic growth, and the impacts of climate change.
- Beyond our baseline demand management activities, we are proposing to undertake enhanced leakage reductions of 80 Ml/d over the 25 year planning period, with 50 Ml/d of this reduction taking place in the first ten years from 2020-2030. We have consulted on more stretching leakage reduction targets through consultation on our draft Water Resources Management Plan.
- The proposed leakage reductions will enable us to offer an improved level of service for the frequency of occurrence of drought permits and drought orders from 2025, from an average of 1 in 20 years (or 5% annual chance) to an average of 1 in 40 years (or 2.5% annual chance).
- We have consulted on potential solutions to increase resilience to the most pressing water supply resilience risk identified in our recent assessments, specifically related to our regional aqueduct system associated with Manchester and Pennines resilience.
- We have investigated and consulted on potential opportunities for future water trading to export water from our region to other parts of the UK, whilst ensuring that resilience, water quality and the environment are protected and that any future trade will deliver benefits to our own customers.

We have received over 200 comments in response to our consultation from a variety of organisations and individuals, ranging from informal feedback to formal written comments. Respondents have included water industry regulators such as the Environment Agency and Ofwat, local authorities, stakeholder organisations such as wildlife trusts, Natural England, Friends of the Lake District and Windermere local groups, and a number of interested individuals. We are also continuing to complete customer engagement to inform our final Water Resources Management Plan and Business Plan.

We intend to confirm our final proposals relating to these key strategic choices in our Final Water Resources Management Plan submission, in line with our Business Plan submission.

12. Conclusions



2017/18 is the third year that our 2015 Water Resources Management Plan has been in effect. We've generally made good progress in delivering our plan, in particular outperforming our regional leakage target, achieving further water efficiency savings and making significant progress with the Thirlmere transfer scheme. We have maintained a supply-demand surplus and a Security of Supply Index score of 100 in all of our resource zones.

In the West Cumbria Resource Zone, we completed delivery of the South Egremont boreholes in summer 2017; the boreholes are now fully operational and are supplying water into the resource zone in line with the agreed mode of operation. This has enabled us to offset supply and reduce abstraction from Ennerdale Water during 2017/18. Leakage has decreased by around 5% compared to 2016/17, but remains above target. Uptake of our free meter option has increased from 2016/17, but is still below target. In the longer term we have made good progress with the Thirlmere transfer scheme, commencing construction in March 2017 and meeting project milestones on time or ahead of schedule, despite challenging weather conditions.

During 2018/19 we will continue to progress with the Thirlmere transfer scheme. Activities will include further pipe laying during 2018/19, completion of the foundations of the new water treatment works and the commencement of construction of two new clean water service reservoirs. Currently we are on track to outperform against our targets for the delivery of this scheme. In the meantime, supply from the South Egremont boreholes will enable us to continue to reduce our abstraction from Ennerdale Water in future years until the completion of the project. Building on the momentum of 2017/18, we will continue our extensive efforts throughout the 2015-2020 planning period to bring leakage in West Cumbria back on

track for the 2018/19 period and beyond. We will also continue with enhanced actions to promote free meter options across the region and monitor progress.

Our draft 2019 Water Resources Management Plan was published in March 2018. Following a 12-week consultation period we will prepare a revised draft and a Statement of Response. We intend to publish our revised draft in summer 2018, and subject to approval by the Secretary of State this will then become our Final Plan for the period 2020 – 2045.

We have updated our Drought Plan after triggering a material change to the plan, and following consultation with the Environment Agency and other key stakeholders we have now published our Final Drought Plan 2018 on our website.

Our latest Drought Plan and Water Resources Management Plan can be found at the link below:



**Water Resources Management Plan 2015
Final Drought Plan 2018**

unitedutilities.com/water-resources-plan



Appendix A

Table A1 Key outturn data, compared with 'dry year' forecasts for 2017/18 amended to reflect the weather experienced in the year

	Carlisle Resource Zone	Integrated Resource Zone	North Eden Resource Zone	West Cumbria Resource Zone	Region
Key to table	2017/18 actual data				
	2017/18 forecast data (aWRMP16, *with weather as seen in 2017/18)				
	Difference				
Water available for use (own water sources) (MI/d)	35	1,895	9	56	1,996
	32	1,957	9	58	2,056
	+3	-62	0	-2	-60
Total population (000's)	110	6,929	14	148	7,201
	110	6,903	13	150	7,176
	0	+26	+1	-2	+25
Number of unmeasured households (000's)	30	1,607	3	47	1,687
	27	1,529	3	45	1,605
	+3	+78	0	+2	+82
Number of metered households (000's)	17	1,177	2	17	1,214
	19	1,272	3	18	1,312
	-2	-95	-1	-1	-98
Total household metering penetration (excl. voids)	37%	42%	40%	27%	42%
	41%	45%	46%	29%	45%
	-5%	-3%	-6%	-1%	-3%
Per capita consumption unmeasured households (l/hd/d)*	156	154	155	161	154
	144	142	171	168	143
	+12	+12	-16	-7	+11
Per capita consumption metered households (l/hd/d)*	115	123	112	115	123
	110	104	125	112	104
	+5	+19	-13	+3	+19
Per capita consumption all households (l/hd/d)*	141	142	137	148	142
	132	126	151	153	127
	+9	+16	-14	-5	+15
Per household consumption all households (l/prop/d)*	302	310	296	319	310
	302	297	290	344	298
	+0	+14	+5	-25	+13
Water consumption by households (MI/d)*	14	864	2	20	901
	14	830	2	22	867
	0	+34	0	-2	+34
Water consumption by non-households (MI/d)	7	349	1	9	366
	7	326	1	9	344
	0	+23	0	0	+22
Miscellaneous water use (MI/d)	1	43	1	4	48
	0	24	0	1	26
	+1	+19	+1	+3	+22
Total leakage (MI/d)	5	430	3	15	454
	5	442	2	14	463
	0	-12	+1	+1	-9
Distribution input (MI/d)*	28	1,687	6	48	1,769
	26	1,622	5	46	1,700
	+2	+65	+1	+2	+69
Security of supply	In Balance	In Balance	In Balance	In Balance	In Balance
	In Balance	In Balance	In Balance	In Balance	In Balance
	No Change	No Change	No Change	No Change	No Change

Note: numbers may not sum due to rounding

Table A2 Comparison of the 2015 plan and the aWRMP16 revised demand and target headroom forecasts for the Integrated Resource Zone (as included in the 2015/16 annual Water Resources Review)

Component	Forecast	2015/16	2017/18	2020/21	2025/26	2030/31	2035/36	2039/40
Water Available For Use	WRMP 2015	1,885.1	1,872.2	1,863.4	1,831.2	1,802.7	1,792.5	1,784.3
Dry Year Demand	WRMP 2015	1,687.8	1,675.5	1,662.3	1,641.8	1,635.5	1,630.3	1,620.4
	aWRMP16	1,668.1	1,655.9	1,642.8	1,622.7	1,616.3	1,611.1	1,601.3
	<i>Difference</i>	-19.7	-19.6	-19.5	-19.1	-19.2	-19.2	-19.1
Target Headroom	WRMP 2015	60.7	56.5	53.6	53.2	57.1	63.0	68.0
	aWRMP16	82.5	77.6	73.2	72.1	75.5	82.1	87.1
	<i>Difference</i>	+21.8	+21.1	+19.6	+18.9	+18.4	+19.1	+19.1
Supply-Demand Balance	WRMP 2015	136.5	140.2	147.6	136.2	110.0	99.2	96.0
	aWRMP16	134.6	138.7	147.3	136.4	110.9	99.4	96.0
	<i>Difference</i>	-1.9	-1.5	-0.3	+0.2	+0.9	+0.2	0.0