

Section 2

Water resources programme 2016-2020





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Section 2.

Water resources programme 2015-2020

- In this section we set out our progress on the programme and the activity we will have completed by the end of March 2020, which forms part of the Price Review process undertaken with Ofwat in 2014 (PR14)
- We present how we plan to meet the supply demand gap, accounting for the challenges of growth being higher than forecast and the need to transform leakage working processes to meet the AMP6 target by 2019/20
- We outline the learning from the start of the roll-out of our smart metering programme, our ambition to develop a smart network, and the work we have done with customers on water efficiency to reduce their consumption, which has won national awards
- We present an overview of the supply demand studies undertaken to inform the development of our draft Water Resources Management Plan 2019 (draft WRMP19)
- We describe where we are progressing schemes to mitigate the impact of our abstractions on the environment

A. Summary

- 2.1 By the end of March 2020, we will have delivered our AMP6 water resources programme which forms the first five years of our 25 year Water Resources Management Plan 2014 (WRMP14) programme. The plan includes leakage reduction, metering and water efficiency as well as a resource development programme in the London Water Resource Zone (WRZ) to maintain supply security. All WRZs are forecast to be in a surplus at the end of the period excluding London which is currently forecast to have a small deficit of 2 MI/d as a result of actual population growth being significantly higher than forecast in WRMP14.
- 2.2 We have nearly 400,000 more people in our supply area at the end of 2016/17 than was anticipated in WRMP14. We estimate that this growth will continue and 598,250 more people than predicted will require water by 2019/20. This equates to growth being 6% higher than forecast and approximately 48 MI/d of additional customer demand.
- 2.3 We forecast to deliver our leakage target of 606 MI/d at the end of 2019/20 despite missing it for the first time in 11 years in 2016/17. There have been some challenges associated with embedding a new partnership alliance at the start of AMP6 to transform leakage detection and repair working processes, including improving the impact on that these activities have on customer service. A recovery plan has been put in place to deliver the WRMP14 target for 2019/20.
- 2.4 Our programme of progressive metering is underway in London with over 140,000 smart meters installed at the end of 2016/17. Due to the property make up in London, which



includes a large number of flats, approximately 60% of the installations require an appointment with a customer to install an internal meter. There are challenges associated with engaging busy and transient customers to make these appointments. As a result we have accelerated the delivery of the fixed radio network across the London WRZ to enable more external meter installations and targeted additional customer side leakage repairs from bulk metering common supply pipes to housing developments with large private mains networks. Work is in progress to close the London WRZ forecast 2 MI/d deficit by increasing the current forecast of progressive meter installations in the period.

- 2.5 Resource development for the London WRZ is ahead of target and is forecast to deliver an extra 51 MI/d water into supply. The new schemes include water trades and groundwater development.
- 2.6 We have undertaken an extensive programme of supply demand studies to inform the development of the draft WRMP19. The drivers for draft WRMP19 remain largely unchanged from WRMP14, although there is an additional water industry driver focusing on security of supply resilience and the need to consider more extreme drought events than have occurred in the previously used historical record. WRMP14 highlighted the need for a new large resource scheme (>150 MI/d), or combination of schemes, from the mid-2020s which has resulted in us undertaking a detailed programme of investigations and options appraisal in AMP6. Work is on-going to assess the wider benefits of smart metering. We have reviewed our household meter data and increased the WRMP14 estimate for customer reduction in water use after meter fit from 12% to 17%. This finding aligns with savings reported by other water companies in the south east.
- 2.7 The remainder of this section is structured as follows:
- Introduction
 - AMP6 Demand Management Programme
 - AMP6 Resource Development Programme
 - Update on Supply Demand Studies
 - AMP6 Environment Programme
 - AMP6 Supply Demand Balance

B. Introduction

- 2.8 All WRMPs start from a 'base year'. The base year for this plan is 2016/17. Our activity through to 2020 was included as a part of the Price Review process undertaken with Ofwat in 2014 (PR14). In this section we set out the activity we will have completed by the end of March 2020.
- 2.9 Our performance each year is published on our website and reported to Ofwat in a process known as the Annual Return (AR). Further details are available on the Ofwat website. We also



publish an Annual Review of the current WRMP, as required by the Environment Agency¹. Please refer to these documents for further details on our activity in this period.

C. AMP6 Demand management programme

2.10 Demand management is any activity that reduces the amount of water we need to put into supply. This includes the reduction of losses from our distribution system in transit to customers and how much water our customers use. Typical demand management activities include:

- Leakage reduction – fixing leaks on the distribution network and customer supply pipes
- Metering – metering helps us and customers identify leaks and can reduce demand for water by raising awareness of how much is being used. As such it is an important ‘enabler’ for both leakage reduction and water efficiency
- Water efficiency – activity to enable customers to be efficient in their water usage and reduce wastage. This can be device led (e.g. tap inserts, efficient shower heads, trigger nozzles for hosepipes, etc) and/or advice led, to improve awareness

2.11 To 2020 we will deliver a number of demand management outcomes, which are summarised in Table 2-1.

Table 2-1: Activity within the AMP6 demand management programme

Activity	Unit	2015/16 actual	2016/17 Actual	2017/18 forecast	2018/19 forecast	2019/20 forecast
Reported leakage²	MI/d	642.5	677.2	694.0	651.5	606.3
Leakage target³	MI/d	649.0	630.4	619.5	611.4	606.3
Optant metering	Nr	18,689	19,798	17,000	16,000	15,000
Progressive metering	Nr	42,083	103,422	100,000	54,489	- ⁴
Water efficiency	MI/d	7.05	11.82	7.33	6.05	6.61

Leakage

2.12 Leakage reduction is a key element of our plan to manage the balance between supply and demand. Total leakage has been reduced by 30% since the peak in 2003/04. A key feature of the AMP6 plan is to reduce leakage by a further 10% (59 MI/d) in the period 2015-20.

¹ Environment Agency, Annual Review, June 2017- <https://corporate.thameswater.co.uk/About-us/Our-strategies-and-plans/Water-resources/Our-current-plan-WRMP14>).

²These are based on the ‘ODI methodology’ assumptions and do not include an up-lift for the leakage consistency (shadow reporting) impact.

³Annual Return Table 10 consistent.

⁴ To be reviewed and balanced with the revenue meter replacement programme which is prioritised in 2019/20.



- 2.13 We currently estimate that 72% of leakage is from our water network and 28% is on customer supply pipes.
- 2.14 Leakage is primarily being reduced through:
- Repairing leaks reported to us by our customers
 - Proactively detecting and repairing leaks on our network, hidden underground, targeted through district meter areas
 - Undertaking free repairs of leaks for our customers on their underground pipework
 - Installing more household meters to allow us to better target customer side leakage activity, including the use of smart meters being rolled out as part of the Progressive Metering Programme (PMP)
 - Optimising pressures throughout our water network, ensuring fluctuations and excessive pressures are minimised, providing more constant pressures to our customers whilst reducing bursts
 - Replacing ageing mains, targeting those that leak and burst the most. This not only helps to reduce leakage but also to reduce future disruption and inconvenience to our customers
 - Introducing improvements in how we account for water use, both by our customers and by ourselves in our day to day management of the network
 - Using advanced monitoring on our trunk mains to detect small leaks before they burst and cause large scale disruption
 - Using advanced analytics to undertake flow balances across our network from abstraction to the customers' tap and all the meters in between, identifying and resolving imbalances through improving metering, network understanding, and ultimately targeted leakage reduction with in-pipe acoustic investigations on the large trunk mains
 - Through the coldest parts of the winter, injecting our network with warmer water from our desalination plant and underground reservoirs
 - Trialling new approaches to leak detection including the use of satellites and drones
- 2.15 Although replacing the oldest and leakiest parts of our network is the best way to make long-term sustainable reductions in leakage, detecting and repairing leaks still forms a key part of the leakage strategy to offset leakage recurrence levels that are well in excess of other companies. Currently we detect and repair some 65,000 leaks per annum, with an estimated leakage benefit value in excess of 400 MI/d.
- 2.16 Approximately one quarter of leakage comes from supply-pipe leaks from customers' own pipes. We offer our domestic customers a free leak repair and pipe relay service.
- 2.17 At the start of AMP6 we formed a new partnership alliance (called the Infrastructure Alliance) to encourage better, smarter and more collaborative working. This has proved more complex than expected to implement and embed. These issues, along with the desire to always keep customers in supply throughout the leak repair process whilst working within traffic management restrictions, have hampered our ability to detect and repair leaks quickly and efficiently. In 2016/17 we missed our leakage target by 46.8 MI/d. This was first time we had missed the target in 11 years. Leakage was ahead of target in three WRZs, but was behind



target in London, Slough, Wycombe and Aylesbury (SWA) and also Swindon and Oxfordshire (SWOX). Given the magnitude of the failure to deliver our leakage target in 2016/17, Ofwat has launched an investigation into our performance. An extensive data collection exercise is being progressed under the remit of the Wholesale Water Managing Director.

- 2.18 We have a detailed leakage recovery plan to address the shortfall and deliver the 2019/20 target. As well as investing in additional trunk mains rehabilitation, we have committed additional funding on activities such as further leakage detection and repair, including the use of more advanced technologies, further pressure management and optimisation, and more investment into improving understanding and accounting for water use which is drawing heavily on the increasing numbers of smart meters being installed. This is all supported by improved governance and clearer accountability.
- 2.19 Due to missing the target in 2016/17, with leakage increasing over the current year, and each future year's target being more challenging, this recovery plan does not see us meeting our WRMP14 leakage targets fully until 2019/20. However, this plan will ensure we are back on track for AMP7 and forms a key part of the base plan for draft WRMP19.
- 2.20 In July 2017 Ofwat introduced the requirement to report leakage following the newly defined guidance developed by UKWIR⁵. This reporting is to be in the form of 'shadow reporting' for the remainder of AMP6, 2016/17 to 2019/20, with the requirement that companies' leakage performance commitments will be set on the new reporting methodology for AMP7. We have estimated that our reported leakage levels will increase by 40 MI/d using the new methodology. It should be noted that not all the changes specified in the UKWIR report have been fully incorporated into our provisional estimate as we need to install additional pressure and flow monitoring equipment in the field as well as implement software upgrades. We will be undertaking further work in AMP6 to become compliant with the new requirements by AMP7.
- 2.21 For further information on the leakage reduction options considered in our plan see Section 8: Appraisal of demand options and Appendix M: Leakage.

Metering

- 2.22 Smart meter data supports demand management, water efficiency and leakage improvements. Smart meters provide greater insight into asset performance, improving the speed and effectiveness of decision making and enabling investments to be made more wisely. From a customer's perspective smart meters put them fully in control of their bill. They help meet an increasing customer expectation to access services digitally and will change the relationship from water supplier to trusted advisor on water and energy use.
- 2.23 In 2014 we started our transformation journey to deliver an industry leading smart metering programme. Key milestones of this transformation included:
- Appointing a new meter installation partner
 - Creating a smart metering operations centre to manage the millions of meter reads we would start to receive

⁵ UKWIR, Consistency of Reporting Performance Measures, July 2017, Report Ref No. 17/RG/04/5



- Procuring a new meter, radio network and data capture supplier and starting to build our radio network
- Developing a new customer journey and training our teams to become smart metering experts

2.24 Table 2-2 presents the total number of optant, progressive and bulk meters installed in AMP6 compared to the anticipated outputs over the period.

Table 2-2: Meter installations in AMP6

New meter installations		2015/16	2016/17	2017/18	2018/19	2019/20	AMP6 total
Optant metering	Target	34,089	34,089	34,089	34,089	34,089	170,445
	Actual/forecast	18,689	19,798	17,000	16,000	15,000	86,487
	Difference	-15,400	-14,291	-17,089	-18,089	-19,089	-83,958
Progressive metering	Target	40,000	110,000	109,990	109,990	71,020	441,000
	Actual/forecast	42,083	103,422	100,000	54,489	- ⁶	299,994
	Difference	2,083	-6,578	-9,990	-55,501	-71,020	-141,006
Bulks	Actual/forecast	1,086	1,080	1,123	723	723	4,736

Progressive metering

2.25 In WRMP14 we planned to install 441,000 smart domestic water meters by the end of AMP6 as part of the PMP, in order to contribute towards delivering 33.7 MI/d of demand related savings.

2.26 Under the PMP we have installed 145,505 meters in the first two years of AMP6. This is in line with our revised delivery programme. However, the programme requires significantly more internal installations than originally envisaged, presenting challenges to generate appointments with our customers. It was assumed that the majority of our meters would be fitted externally in the footpath. We have quickly learnt however that this is not the case and in fact, due to the property make up in London, approximately 60% of our meter fits require an appointment with a customer. Trying to engage a busy, transient population living largely in rented accommodation has been challenging. Our biggest issue is customer engagement; customers do not know who their water supplier is, let alone if they have a meter. Renters do not understand their responsibility in terms of getting a meter fitted and a small group of customers actively object to having a meter fitted. We have had to innovate and learn to develop our communications quickly to open up new channels for customers to engage with us. One of our recent improvements has been launching an online appointment booking platform which has helped us digitalise our journey and reach out to a wider demographic.

⁶ To be reviewed and balanced with the revenue meter replacement programme which is prioritised in 2019/20.



- 2.27 As a result of the challenges associated with internal meter installations the programme is expanding into more London Boroughs than originally planned to progress external meter installations. This has required an accelerated roll-out of the fixed radio network across the London WRZ. The forecast number of progressive meter installations in AMP6 has been reduced to account for this issue and the number of targeted bulk meter installations has been increased to make up for the shortfall in demand reduction benefits by identifying and repairing additional customer side leaks. Work is currently in progress to develop and trial a more cost effective internal meter installation journey.
- 2.28 Our smart meters are helping us pinpoint leaks on customers' pipes more accurately than ever before. The data they collect alerts us to continuous flow, which is where the flow does not drop to zero over a sustained period of time, indicating that there could be a leak. So far we have fixed, for free, over 800 leaks found through the smart metering programme.
- 2.29 A number of customers will see an increase in their bill after the meter is installed. To manage this 'bill shock' we allow customers two years to switch over to a metered bill. We have now activated over 100,000 customers' accounts on to their two year bill comparison journey. We are using smart meter data to write to customers after three months, six months, 12 months and 18 months to let them know what their metered bill is likely to be compared to their current bill which is based on the rateable value of their home. The meter reads are also being used by our online customer platform 'my meter online', to populate daily usage graphs allowing customers to log in online regularly and view their water use. Educating our customers on how much water they use, when they use it and how they can reduce it is a hugely important part of our programme. Smart water meter data allows us to engage with customers in many different ways which will be critical in our success of reducing water use. Updated analysis of our historic metering data shows that customer reduction in water use after a meter fit is approximately 17% which is higher than the 12% forecast for WRMP14. The benefits from the new smart metering programme data will be evaluated in the summer of 2018 when the first customers complete their two year journey and convert to a metered bill.
- 2.30 After fitting the meter we offer all our customers water efficiency advice and a personalised Smart Home Visit. During this visit we spend time with the customer understanding their current water use behaviour, what they can do to reduce the amount of water they use and fit free water saving devices. The smart water meter data is really influential in supporting this water efficiency message and it can be used to help customers understand their before and after water use. It also has the potential to be used in future water efficiency programmes, such as gamification, to help push water use savings even further.
- 2.31 We are not only using the smart meter data to detect leaks and reduce customer water use. We're also starting to build our first smart District Metered Areas (DMAs). These are areas within our water network where we know the amount of water we are pumping into it but not necessarily where the water then goes. By installing smart meters our intelligence on where water is going (i.e. is it being used or lost through leakage) will vastly improve. This will help us plan for future investment and ensure we target leakage repair and mains replacement work in the areas with the largest benefit. Smart DMAs will also help us:
- Significantly improve the accuracy of our water balance calculations
 - Make sure we quantify customer side leaks better
 - Improve our understanding of night time consumption



- Predict leaks before they become visible
 - Make better informed investment decisions with regard to the water network
- 2.32 There are also many indirect benefits of our smart water metering programme that we are only just starting to realise. For example, for customers to view their water use online they have to sign up for an online account. By driving sign ups we are helping to reduce the retail cost to serve as customers can make payments online, change billing details and access their bills etc. without having to call us.
- 2.33 We have saved 4.7 MI/d in the first two years of the programme through a combination of locating and fixing leaks on our customers' pipes, fixing internal wastage problems in their properties and customers reducing their usage as a result of having a meter.
- 2.34 The proportion of billed measured households is 38% at the end of 2016/17 compared with 34% at the start of 2015/16.

Bulk metering

- 2.35 The bulk metering programme was developed to better understand demand and leakage on private mains networks. The programme is currently over-achieving on its leakage reduction targets and has saved 7.46 MI/d in the first two years of AMP6 through detection and repair of leaks on supply pipes to large blocks of flats.
- 2.36 The team has been working with specialist consultants to target bulk meter installations where there is a higher chance of customer side leaks being identified to improve the cost efficiency of the programme. The current threshold is blocks of flats in London with over 50 dwellings per building.
- 2.37 There are a limited number of these types of buildings with private mains networks within our supply area, so this benefit cannot be relied upon in the long term. The programme is being extended to buildings with over 35 dwellings to make up for the shortfall in benefits from the progressive metering internal meter installations.
- 2.38 An Information Systems (IS) change project will provide the ability for bulk meters to be connected to the fixed radio network allowing for improved ongoing data capture from the spring of 2017.

Optant metering

- 2.39 It was assumed that, with increased awareness of the benefits of metering through the roll-out of the PMP in London, there would be an uplift in applications from customers wanting to have a meter installed during AMP6 (25% in London and 5% in Thames Valley), compared to AMP5, leading to a total of 170,445 in AMP6 (approx. 34,000 / year).
- 2.40 The current optant meter installation rate is however, significantly below the WRMP14 forecast. During 2016/17 we successfully started the roll out of smart meters on the optant programme to utilise the benefits of the fixed radio network in London.
- 2.41 It is intended to use the historic optant approach to help drive successful internal installations. Customers who have opted for a meter will be more likely to provide us access to enable the installation. It is also proposed that the optant meter installations are rolled up into the PMP in London to ensure a more efficient delivery approach.



2.42 For further detail on metering see Section 8: Appraisal of demand options and Appendix N: Metering.

Water efficiency

2.43 Water efficiency is an essential part of our long-term plans to sustainably manage water. We are delivering the UK's largest ever water efficiency programme of nearly 40 MI/d in AMP6.

2.44 We promote water efficiency to encourage our customers to save water, energy and money in a variety of different ways and we work directly with our household and non-household (business) customers via a number of projects, including third party partnership schemes. These include:

- **Smarter home visits (SHVs):** The UK's largest in-home specific advice and fitting of water saving products for customers. We offer our customers a range of free water-saving products and tailored behaviour change advice to save water, energy and money
- **Wastage fixes:** Wastage fixes of leaking toilets and taps, as identified through our SHV programme, has ramped up this year. A leaking toilet will waste between 200 – 400 litres a day, on average, and we have a programme running alongside our SHVs to do a one off free fix to households with leaky loos
- **Smarter business visits:** We are offering business customers smarter business visits to fit free water saving devices (including urinal controls) and wastage fixes
- **Water saving freebies:** We offer all our water supply customers free water-saving products – including showerheads and timers, tap inserts, and toilet cistern devices
- **Water energy calculator:** We also provide a free to use water and energy calculator via our website (<https://www.thameswater.co.uk/Be-water-smart>). The calculator helps households to quantify how they use water in the home and their potential savings
- **Water efficiency schools programme:** We have engaged students during water efficiency schools visits
- **Water matters:** Schools and community engagement programme based in the River Kennet catchment, in partnership with an environmental group Action for the River Kennet (ARK)
- **Local authorities and housing associations:** We are working with a number of local authorities and housing associations and delivering in home water saving device installation, including a trial with Zap carbon linking it to an existing in-home energy and benefits programme being rolled out with London and Quadrant housing in London
- **Save water south east (SWSE):** This is a two year collaboration between Waterwise, the Environment Agency and six water companies in the south east. We have joint funded this partnership to promote water efficiency and increase awareness of water as a finite resource and create a water saving culture in the south east of England. This year, SWSE has started to build relationships with key stakeholders, run the innovative #Thinkwater campaign and also set up a conference with local authorities and housing associations



- **Oxford water efficiency campaign** – during 2016/17 we ran two campaigns in Oxford to raise awareness of the supply demand deficit issue “*More people, less water to go around*”. This consisted of radio adverts, local media, posters at bus stops, and direct mail to households. The pre and post-campaign market research showed some really positive results to the campaign and helped to raise awareness of the water issues faced. We are using the results to help feed into future campaigns
- 2.45 After two years of the five year programme we have exceeded our target savings based on the Ofwat assumed savings methodology. However, we are aware that measured savings will be lower than the reported figure which includes an element of assumed water savings. To account for the lower savings figures recorded from measured flow rates/volumes we have increased the scale of our core on-ground water efficiency initiatives with the aim of achieving the AMP6 targets using a greater share of programmes that can support a measured savings methodology. Once we have robust water efficiency measured savings from our smart meter data we will change to measured savings and retrospectively adjust for the whole AMP.
- 2.46 Our efforts to improve the quality and increase the quantity of our water efficiency delivery were rewarded in 2016 with four national awards.
- 2.47 Our SHV programme won:
- Water Industry Achievement Award for Water Resource Management Initiative of the Year
 - UK Water Efficiency Award for Built Environment
 - UK Customer Experience Award for Utilities and Team- Customer at the Heart categories
- 2.48 We were also shortlisted in the Sustainability Leaders Awards and the Utility Week Awards for SHVs.
- 2.49 Our Clearwater Court bathroom refurbishment project (Propelair toilets, Cistermiser tap and urinal sensors) and large-scale rollout across our office buildings won the Institution of Civil Engineers – Sustainable Water Management Award.
- 2.50 In addition to promoting water efficiency activity to help customers use water wisely we committed to undertaking a trial of innovative tariffs in AMP6. The objective of the trial was to understand and quantify customers’ responses to alternative tariffs and different communication approaches, as well as helping to understand the logistics, systems, and technology requirements and full costs of implementing tariffs in preparation for their roll-out in the period 2020-2025.
- 2.51 We have undertaken two studies to inform the innovative tariff trial:
- a desk based review of tariffs which have been trialled and adopted internationally⁷
 - an assessment of innovative charging options for Thames Water⁸
- 2.52 We also engaged customers, regulators and stakeholders, including Waterwise and the Greater London Authority (GLA), on our proposed approach. The key findings were to first prioritise measures which would positively engage customers on efficient water use. We have

⁷ RPS Literature Review, October 2017

⁸ Review of Innovative Tariff Options, Nera, April 2015



subsequently started an incentives scheme pilot in Reading targeting 3,000 homes. This is the first ever non-financial water efficiency incentives pilot, linked to smart meter data and a web based site. The scheme has been developed with Greenredeem, a recycling reward specialist. The pilot will test whether we can encourage households to reduce their water use in return for points and rewards vouchers. The objective is to roll-out the scheme on a wider basis to other smart metered homes in AMP6. The learning from the incentive scheme will inform the development of future innovative tariffs which could be adopted in AMP9 when household meter penetration is greater than 65% to ensure fair imposition on our customers.

- 2.53 Average household per capita consumption (PCC) has been reduced by over 20% since 2002/03. Average PCC is forecast to reduce to approximately 142 l/p/d by 2019/20, which will be 7 l/p/d lower than the WRMP14 estimate. In addition to the impact of metering and water efficiency interventions, reported PCC has been impacted by the change in categorisation of large blocks of flats due to the introduction of the non-household commercial market in 2016. Historically a large block of flats, billed as a single entity, was counted as a single non-household property. These flats are now counted as household properties, in line with Ofwat's new eligibility criteria in 2016, and the number of the flats in the building (subsidiary properties) is included within the property count.
- 2.54 For further details see Section 3: Current and future demand for water, Section 8: Appraisal of demand options, Appendix M: Leakage, Appendix N: Metering and Appendix O: Water efficiency.

D. AMP6 Resource development programme

- 2.55 Resource development is any activity that increases the amount of water available for supply.
- 2.56 In AMP6 we are delivering a number of resource development schemes in the London WRZ. The schemes are a combination of groundwater development and water trades. By the end of the period we forecast we will be able to deliver an extra 51 MI/d water into supply during a dry year. Table 2-3 presents progress against targets for the delivery of our water resources development programme for AMP6:
- **Bulk transfer RWE Didcot:** 17 MI/d, resulting from an agreement with RWE npower to utilise water not abstracted following the closure of Didcot Power Station A. The scheme delivered a deployable output (DO) gain of 17 MI/d earlier than planned and was included in the 2013/14 London DO as reported in the AR14 Environment Agency Review
 - **BT Essex and Suffolk Water (ESW) Chingford reduction:** 17 MI/d, resulting from a new water trading agreement to reduce the volume of the existing raw water transfer to Essex and Suffolk Water (Northumbrian Water South), was delivered in 2014/15. This delivered a DO gain of 17 MI/d during periods of drought and low flow. This increase was included in the 2014/15 London DO as reported in the AR15 Environment Agency Review.
- Subsequently, a further 5 MI/d reduction in the export to ESW has been agreed in 2016/17. This has delivered a corresponding benefit of 6 MI/d to the London WRZ DO



- **Groundwater (GW) Tottenham borehole** delivers additional water from an existing private borehole. Delivery of the output was delayed from the original target date of 2015/16 due to access and construction challenges, but has delivered an increase of 6 MI/d to the London WRZ DO in 2016/17. This is a significant increase against the original target DO benefit of 1.4 MI/d programmed in WRMP14
- **GW ELRED** will not now be delivered during AMP6. More detailed investigations have demonstrated that high turbidity in the raw groundwater requires a reduction of the ELRED source DO. As the scope of any solution has changed significantly, the original scheme has been deferred. A new solution is not currently included in our list of options for draft WRMP19, but the reduction in the ELRED source DO is reflected in our draft WRMP19 base position for London WRZ DO. This reduction is compensated by the increased output from the GW Tottenham Borehole scheme
- **Aquifer storage and recovery (ASR) Darent Valley (Horton Kirby)** is an innovative groundwater option whereby water is pumped into, and stored within, an aquifer when water is plentiful and then recovered in times of need. We have drilled a new ASR borehole to the south of Horton Kirby and two new observation boreholes. We have constructed new connections to the ASR boreholes that enable the Lower Greensand aquifer to be recharged with potable water and abstracted. Using these new assets we have carried out operational scale cycle testing, recharging the aquifer to increase storage then re-abstracting the stored water, while monitoring responses in the catchment. During the testing, which is ongoing, we are collecting hydraulic and water quality data to confirm the operational viability of ASR. Work currently remains on track to increase the London WRZ DO by 5 MI/d in 2019/20
- **GW Honor Oak** was programmed to deliver an increase of 1.48 MI/d at the existing Honor Oak water treatment works in 2019/20. During development of the design for the scheme the scope of the solution required to deliver this output has increased significantly. As a result, the cost has increased significantly and, consistent with our draft WRMP19 options screening process, the scheme has been rejected



Table 2-3: AMP6 resource development schedule

London – AMP6 increases in WAFU	WRMP14 MI/d	Forecast MI/d	Actual/Forecast delivery (x)		AMP6 delivery schedule (x- planned, x- delayed)					Actual/Forecast delivery
			2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	
GW Tottenham BH	1.4	6			X	X				Benefit claimed
GW Honor Oak	1.48	0							X	Rejected
GW ELRED	0.95	0			X					Deferred
BT RWE Didcot	17	17	X		X					Benefit claimed
ASR Darent Valley (Horton Kirby)	5	5							X	2019/20
BT ESW Chingford reduction	17	17		X	X					Benefit claimed
Additional ESW reduction		6				X				Benefit claimed
Total AMP6 actual/forecast	42.83	51				12			17	
Cumulative total (target)			17	17	36.35	36.35	36.35	36.35	42.83	
Cumulative total actual/forecast			17	34	34	46	46	46	51	



E. Update on supply demand studies

- 2.57 We have undertaken a range of complex technical supply demand studies in AMP6 to refine our water resources planning for draft WRMP19.
- 2.58 We have held 26 forums and technical meetings with stakeholders to review and explain our approaches to develop our plan against the guidelines provided.

Demand forecast

- 2.59 Two UKWIR projects on forecasting household demand and developing population and property forecasts were completed in 2016⁹. We have used the output from these studies to inform our approach to develop the baseline demand forecasts.
- 2.60 We commissioned Edge Analytics to work with Local Authorities to develop 'plan based' population and housing forecasts for the period 2016 - 2045 and the University of Leeds to develop longer term 'trend based' forecasts from 2045 - 2100.
- 2.61 New Multivariate Linear Regression household consumption forecasting models were developed with Artesia Consulting for each WRZ. These models have replaced the micro-component models used in WRMP14.
- 2.62 Servelec Technologies working with Teccura were commissioned to develop non-household forecast consumption for each WRZ.
- 2.63 For the detail of our demand forecast see Section 3: Current and future demand for water, Appendix E: Population and property projections, Appendix F: Household water demand modelling and Appendix G: Non-household water demand modelling. The results of these studies have illustrated that demand for water is forecast to significantly increase in our region, mainly driven by population growth.

Assessment of available resource

- 2.64 We have an improved water resources management system model, WARMS2, which is the tool we use to assess water resources Deployable Output (DO). The tool has been reviewed by recognised independent industry experts, HR Wallingford, and we have commissioned periodic audits to ensure the model remains fit for purpose, and provide assurance to this effect for external stakeholders.
- 2.65 Sensitivity testing of WRMP14 showed vulnerability of the preferred plan to severe droughts not present in the historic record from 1920. For draft WRMP19 we commissioned Atkins to generate spatially and temporally coherent artificial drought data that models the current climate and can be used to evaluate the sensitivity of our current water resource system and water resource options to different drought types than those in the historical record. The work

⁹ UKWIR (2016) WRMP19 Methods – Household Consumption Forecasting. UKWIR (2016) Population, household property and occupancy forecasting.



was used to assess our resilience to more extreme drought events and to assess the reliable yield of new surface water resource options. For further details see Section 4: Current and future water supply.

- 2.66 We are seeing changes to the raw water quality in our large raw water storage reservoirs supplying London and predict that this will continue with the increasing effects of climate change. Deeper reservoirs have better control measures to manage the raw water quality and therefore are more resilient to the impacts of climate change. Therefore any drawdown of the reservoirs will impact our treatment capability. This, coupled with our increasing concern with our ability to treat water in the lower levels of our reservoirs, is likely to reduce our DO by a notable amount, with algal blooms impacting a normal year and total reservoir water quality in a dry year. We have engaged the services of independent experts to undertake a quantitative assessment of the impact of these changes in raw water quality and quantity on the treatment capability as described in Appendix K: Process losses.
- 2.67 Our 'stock' of raw water storage reservoirs is very different to that of other water companies in the UK in that they generally comprise embankments with thin clay cores supported by sand and gravel shoulders. Two independent studies have been undertaken by Atkins¹⁰ and AECOM¹¹ to review the probability of failure of this type of constructed reservoir. The analysis was to assist in the prediction of an event which would result in the 'loss' of a reservoir, either through failure or the need to drawdown a reservoir for a significant period of time, affecting the storage capacity and consequent resource availability. The results illustrated that due to the age and construction of this type of reservoir, the risk to loss of storage to undertake remedial repairs is 2.5 times higher than the UK average. The impact of any failure resulting in the requirement to draw down any one of the twenty five raw water storage reservoirs will have a significant impact on our DO, placing our customers at risk of a supply shortage during dry periods.

Water resource options

- 2.68 In WRMP14 we set out that a new large resource scheme (>150 Ml/d), or combination of schemes, is highly likely to be required to maintain security of supply in the region from the mid-2020s. In autumn 2014 we started a programme of work to examine resource schemes. The programme comprises multiple phases and we have worked extensively with regulators and stakeholders as we progress the work.
- 2.69 The process to develop our constrained list of resource options is explained in detail in Section 7: Appraisal of resource options, Appendix P: Options list tables, and Appendix Q: Scheme rejection register.

Demand management options

- 2.70 We are implementing a large programme of demand management activity from 2015 - 2020, comprising leakage reduction, metering and the promotion of water efficiency. The

¹⁰ Atkins Reservoir Longevity report, April 2016

¹¹ AECOM Reservoir Longevity report review, February 2017



programme is planned to deliver approximately 107 Ml/d of savings. We are monitoring this programme as it is rolled out to ensure we are taking this learning into account in planning future activity.

- 2.71 In August 2016 we published our approach for developing demand management options for the draft WRMP19¹². We have considered a wide range of demand management options and screened the options to produce a shortlist of feasible options. We have engaged with stakeholders throughout this work. In March 2017 we published an updated screening report¹³, including comments from stakeholders, and set out the final constrained list of feasible options. The options are categorised into five areas:
- Metering
 - Water efficiency
 - Leakage
 - Incentive schemes
 - Non-potable options
- 2.72 We have undertaken a detailed feasibility study¹⁴ on the opportunities for the use of non-potable water to help to manage demand in London, and specifically the Opportunity Areas in London identified by the GLA. Further detail on this study is included in Appendix L: Water Reuse.
- 2.73 In June 2017 we published an updated feasibility paper¹⁵ setting out the costs and benefits of the feasible options and sought feedback from stakeholders on these.
- 2.74 The feasible options have been input into the DMA based Integrated Demand Management model to develop optimised demand management portfolios to input to the programme appraisal decision support tools alongside the resource options.
- 2.75 For more detail see Section 8: Appraisal of demand options, Appendix P: Options list tables, Appendix Q: Scheme rejection register and the reports available on our website <https://corporate.thameswater.co.uk/About-us/Our-strategies-and-plans/Water-resources/Document-library/Past-meetings-minutes-and-presentations>.

Developing our preferred programme

- 2.76 Our WRMP14 method of programme appraisal found only a small pool of potential solutions to the supply-demand problem, using least-cost optimisation as the primary driver for the search and modifying the solutions in terms of other values such as environmental and social costs. Sensitivity testing to different futures was carried out on the preferred plan.
- 2.77 For draft WRMP19 we have enhanced our decision making process based on UKWIR guidance¹⁶ to include for a longer planning horizon where appropriate and worked with Decision Lab Ltd (EBSL) and the University of Manchester (IRAS-MCS) to improve the

¹² Demand management options screening report, August 2016

¹³ Demand Management Options Screening report update, April 2017

¹⁴ Non-potable water reuse feasibility report, June 2017

¹⁵ Demand Management Feasibility paper, June 2017

¹⁶ UKWIR (2016) WRMP19 Methods – Decision Making Process: Guidance Report Ref. No. 16/WR/02/10



functionality of our decision support tools such that they will generate a large number of potential investment programmes which will be optimised in terms of cost, but also with consideration of other parameters (referred to as metrics), including resilience, environmental effects, customer preference, intergenerational equity and deliverability, to ensure a best value programme is taken forwards.

- 2.78 We have also developed a new tool, PolyVis, to show how the different programmes perform against the range of metrics, improving the transparency of the process.
- 2.79 For the detail of this work, see Section 10: Programme appraisal and Appendix W: Programme appraisal.

Water Resources South East

- 2.80 We continue to work with Water Resources in the South East (WRSE), a collaboration of water companies, located predominantly in the South East of England, and regulators. The objective of WRSE is to develop a flexible and robust water resources strategy for the region.
- 2.81 WRSE has completed modelling to investigate the resilience of the region to a range of possible futures. The modelling has highlighted the vulnerable zones in the region, considered opportunities for transfers and greater connectivity to share resources across the region, and identified potential regional infrastructure investment. The output has been reviewed and commented on by WRSE members and it is intended that the output will be used to inform individual water companies' plans.
- 2.82 We requested that companies set out their future requirements from us and we have used this in the development of draft WRMP19.

Market development

- 2.83 Ofwat has identified over recent years that the development of markets may be beneficial in stimulating the efficient use of existing resources to support resource development and in encouraging more innovation and involvement of third parties in demand management. There have been several developments in AMP6 to support the development of markets, which we have actively supported.
- 2.84 Ofwat introduced financial incentives for trades in AMP6, which requires companies to have an approved trading and procurement code. We were one of the early adopters of this approach and our code was approved by Ofwat in May 2016.
- 2.85 Ofwat have also introduced, following development via an industry working group which we actively supported, a requirement for companies to publish market information using a common framework on their website. The first publication of the market information is aligned with the publication of this draft WRMP.
- 2.86 Further innovations to encourage increased use of existing water resources include:
- the development of a bid assessment framework to create more clarity and confidence to third parties that their bids to supply water resources, leakage or

demand management services will be assessed fairly consistent with the principles of transparency, equal treatment/non-discrimination and proportionality

- development of access pricing for the bi-lateral market

2.87 We are supportive of these developments as we seek to make maximum use of the resources available and have been active in evaluating trading opportunities as set out in Section 7: Appraisal of Resource Options.

F. AMP6 environment programme

2.88 This section discusses progress on schemes to reduce the environmental impact of public water supply. Water companies do this through working closely with the Environment Agency to identify where abstraction may be having an adverse environmental impact and putting plans in place to address this impact if it is necessary to do so.

2.89 The mechanism by which this is achieved is through the Water Industry National Environment Programme (WINEP), which is how the Environment Agency identifies and prioritises its requirements for water companies to undertake measures to improve the environment.

2.90 The process by which adverse environmental impact is assessed is as follows:

- Firstly, the Environment Agency identifies sites where there is concern that the impact of abstraction may be adversely affecting the environment
- Secondly, once the sites of concern are identified, an investigation is undertaken to determine the exact impact of the abstraction on the flow in a river or the water level in a wetland. This requires understanding of the hydrology, if the abstraction is from a surface water source, and both the hydrology and the hydrogeology if the abstraction is from a groundwater source. If a significant hydrological impact is identified then the impact on the flow or level in a water body is assessed to determine the impact on the ecology supported by that water body. This process of investigation may be undertaken quite quickly in simple cases where there is clear evidence of a direct impact or may take several years if the impact is complex, and it may require a programme of measurement and monitoring of hydrogeological and hydrological variables as well as ecology
- Thirdly, if an adverse impact on the environment is clearly demonstrated through this process of investigation, or in cases where it is not possible to demonstrate no adverse impact and the site is very sensitive (e.g. a site designated under the European Habitats Directive), then the next stage is to assess all the options to address the impact. This is termed an options appraisal and is undertaken by the water company if the investigation concludes that it is necessary
- Finally, if the options appraisal identifies that a feasible option is available it will be put forward for implementation. The decision as to whether an option is implemented will normally need to take account of the costs and benefits of the option to determine whether it is cost-beneficial. In cases relating to sites designated under the European Habitats Directive, cost benefit assessment is not a requirement although if an option is very expensive or 'disproportionately costly' then a different option or a mitigation option may be considered as an alternative



- 2.91 The WINEP sets out the requirements for investigations, options appraisals and scheme implementations that water companies are required to undertake.
- 2.92 During AMP6 a number of sustainability reductions, investigations and options appraisals have taken place or are currently taking place, in response to concerns raised by the Environment Agency regarding the impact of abstractions on the environment. These are discussed below.
- 2.93 For information on future schemes, see Section 4: Current and future water supply. There is considerable uncertainty on the long-term levels of sustainability reductions particularly in relation to the potential need for licence reductions arising from the requirement for 'no deterioration' under the Water Framework Directive (WFD). We have not included an allowance for these in the baseline forecasts in our plan, but we have included scenario tests on how sustainability reductions, including no deterioration, affect our plan in Section 10: Programme appraisal.

Licence reductions and mitigation schemes

- 2.94 The schemes identified by the Environment Agency as needing specific reductions or mitigation schemes during AMP6 are related to our abstractions at Axford, Ogbourne, Childrey Warren and Pann Mill. Additionally, a mitigation scheme to address the impact of abstraction from the Lower Thames is required to be implemented.

Axford

- 2.95 The sustainability reduction for Axford was identified following an investigation undertaken in AMP3 and options appraisal undertaken in AMP4. The required solution reduces the licence in low flow periods from 13 MI/d to 6 MI/d average and peak. This licence reduction required a network infrastructure solution and incorporates the delivery of the Ogbourne sustainability reduction (discussed below) because the solution is common to both reductions.
- 2.96 The construction of this scheme commenced in AMP5 and was successfully completed to allow the reduction in the Axford licence from 1 April 2017. An allowance for emergency abstraction in the event of infrastructure failure, such as a burst in the main transferring water from Farmoor to Swindon, has been included on the licence.

Ogbourne

- 2.97 The requirement for a sustainability reduction at Ogbourne was identified following an investigation in AMP4 followed by an options appraisal in AMP5 which was completed in 2013. The requirement identified was to reduce the licence at Ogbourne to zero MI/d. The scheme to deliver this licence reduction required similar network modification to the licence reduction for Axford and so the solution for Axford incorporated the requirements for the licence reduction at Ogbourne, with the two reductions delivered to the same timescale. The Ogbourne abstraction licence was revoked from 1 April 2017. As for Axford, an allowance for emergency abstraction in the event of infrastructure failure has been included on the licence.



Pann Mill

- 2.98 A scheme for licence reduction at Pann Mill is required to reduce the risk of over abstraction impacts on the River Wye in High Wycombe. The requirement for a sustainability reduction at Pann Mill was identified following an investigation and options appraisal in AMP5 which was completed in 2015. The licence reduction required is to reduce the average and peak licence from 22.73 MI/d to 9.5 MI/d. This will reduce the DO at Pann Mill from 16.8 MI/d to 9.5 MI/d. This scheme requires no infrastructure modification. However, in order to ensure the SWA WRZ retains sufficient supply/demand surplus to allow the licence reduction to take place the average licence reduction will be accommodated by transfer of the licence volume to Medmenham. This will mean that the average licence limit at Medmenham will be increased from 45 MI/d to 52.3 MI/d. It is expected that this licence transfer will be completed by the end of March 2018.

Lower Thames

- 2.99 The requirement for a mitigation solution to address the impact of abstraction from the Lower Thames was identified following an investigation and options appraisal in AMP5. The investigation identified that the Lower Thames abstractions had an impact on the ecology of the Thames Tideway, however the options appraisal and cost benefit assessment concluded that it was not cost beneficial to reduce the abstraction from the Lower Thames. The options appraisal identified the requirement to investigate further the oxygen levels in the reach of the Thames Tideway in the vicinity of the discharge from Mogden sewage treatment works (STW) and, if necessary, to develop a scheme to increase oxygenation during periods of low flow. Investigations and monitoring have been undertaken to assess the oxygen levels in the Thames Tideway and to identify the best mechanism to deliver the requirement for increased oxygenation if needed. Work undertaken to improve the quality of the discharge from Mogden STW has been undertaken since the completion of the investigation and so there may no longer be the need for a scheme. Water quality modelling of the Thames Tideway will be undertaken to determine whether a scheme is required and if necessary a scheme will be designed and implemented by March 2020.

Site investigations and options appraisals

AMP6 investigations

- 2.100 A number of investigations at abstraction sites with no statutory designation for environmental protection were initiated in AMP6 to identify the potential environmental impact as a result of abstraction. Table 2-4 outlines the investigations. Regular progress updates are provided to the Environment Agency and these investigations are due to be completed in 2018 with the exception of the Darent review which will be extended to allow it to include the conclusions of the Sundridge investigation. The Environment Agency has used the interim findings of these investigations to inform the requirement for sustainability reductions and included this in the WINEP. The requirement for further options appraisals will also be confirmed following the outcome of these investigations.
- 2.101 The AMP6 investigations to date have led to a requirement for potential sustainability reductions for the Lower Lee, Sundridge, Westerham, Bexley and Hawridge and these have

been identified in the WINEP. These investigations have been assessed as sufficiently certain to be included in the WRMP baseline apart from at Bexley for which assessment through a scenario is required. However this requirement identified in the WINEP2 was received too late (30 September 2107) for inclusion of the potential reductions in the draft WRMP19 baseline and so each of the reductions will be assessed through a scenario and this is discussed in more detail in Section 4: Current and future water supply. Our approach has been agreed with the Environment Agency. The confirmation of the requirement for any sustainability reduction will be determined following completion of options appraisals which are likely to be required in each case. The investigations at Sundridge and Hawridge are being undertaken with South East Water and Affinity Water respectively as they also operate sources that have the potential to have an impact on the watercourses being investigated.

Table 2-4: Environmental investigations in AMP6

Investigation	Water body	Completion date	WRZ
Lower Lee	Lower Lee	31/12/2017	London
Sundridge and Westerham	Upper Darent	31/12/2017	London
Bexley	River Cray	31/12/2017	London
Hawridge	River Chess	31/12/2017	SWA
Darent Review	River Darent	31/12/2018 (tbc)	London

Note: The timescale for delivery of the Darent review is under discussion with the Environment Agency and will be completed later than the other investigations because of the need for the outcome of the Sundridge investigation to be included in the review.

AMP6 options appraisals

2.102 The investigations described above to determine the impact of abstraction at several non-statutory sites will determine whether our abstractions may be contributing to environmental impacts and whether options appraisal will be required. Work to date suggests that options appraisal is likely to be required in most cases. In addition an options appraisal is required for Waddon which was investigated in AMP5 and has an impact on the Waddon Ponds. Table 2-5 outlines the options appraisals underway or likely to be required in the current period. Some further work is required beyond March 2018 in some cases.

Table 2-5: Environment options appraisals in AMP6

Options appraisal	Water body	Completion date	WRZ	Status
Lower Lee	Lower Lee	31/12/2018	London	Ongoing
Bexley	River Cray	31/12/2018	London	Investigation Ongoing
Sundridge and Westerham	Darent	31/12/2018	London	Investigation Ongoing
Waddon	Waddon Ponds and River Wandle	31/03/2018	London	Ongoing
Hawridge	River Chess	31/05/2018	SWA	Investigation Ongoing



Eel screens

- 2.103 There is a requirement¹⁷ to install screening at all abstraction intakes where the abstraction has the potential to result in the entrainment of eels and where it is cost beneficial and feasible to do so.
- 2.104 The Regulations require all abstraction intakes to be reviewed to determine the requirement for screening protection and to implement a screening solution by an agreed date. It has been confirmed that the majority of our intakes on the Lower Thames and Lower Lee will require screening with other intakes in the Thames Valley also likely to require screening, but at a greater aperture size. The implementation of these requirements must be carried out in such a way that they do not affect abstraction volumes. Where compliance with the regulations is not possible by 2015 the Environment Agency has issued an exemption to allow implementation of a suitable solution at an agreed date. In the interim period mitigation measures may be required.
- 2.105 We have investigated specific requirements for all our intakes and developed detailed environmental and engineering design specifications to enable the screening programme to be rolled out during AMP6. The installation of these screens will need to be undertaken in light of the Water Framework Directive requirement to improve the status of fish where it is not achieving good status as a result of entrainment at abstraction intakes.
- 2.106 The first screen to be installed was at Walton and was completed in March 2017 and is being used as a pilot to enable experience to be gained through its operation to inform the design of the other screens to be rolled out by the end of AMP6.
- 2.107 The cost of these screens was not included in the WRMP14 but was included in our Business Plan for PR14.

River restoration

- 2.108 We are required to undertake river restoration at a number of sites in AMP6 as a result of obligations identified in the WINEP. This requirement arises as a result of abstractions impacting on watercourses and the need to mitigate this impact. We will undertake river restoration at eight sites where we are either undertaking sustainability reductions or where impact of abstraction on a watercourse has been identified but it is not cost beneficial to implement a sustainability reduction. These river restoration requirements are shown in Table 2-6 and will be completed by March 2020.

Table 2-6: River restoration required in AMP6

Abstraction source leading to river restoration requirement	Water body	Completion date	WRZ	Status
New Gauge	River Lee distributary	31/03/2020	London	Ongoing
North Orpington	River Cray	31/03/2020	London	Ongoing
Waddon	Wandle	31/03/2020	London	Ongoing

¹⁷ Under the Eel (England and Wales) Regulations 2009, which arise from European Commission's Eel Recovery Plan 2007



Abstraction source leading to river restoration requirement	Water body	Completion date	WRZ	Status
Pann Mill	River Wye	31/03/2020	SWA	Ongoing
Farmoor	River Thames	31/03/2020	SWOX	Ongoing
Ogbourne	River Og	31/03/2020	SWOX	Ongoing
Childrey Warren	Letcombe Brook	31/03/2020	SWOX	Ongoing
Pangbourne	Sulham Brook	31/03/2020	Kennet	Ongoing

Heavily modified and artificial water bodies

2.109 We are required to undertake mitigation works at a number of Heavily Modified and Artificial Water Bodies (HMWBs) in AMP6 as a result of obligations identified in the WINEP. HMWBs are sites designated under the WFD for the heavily modified nature of the water body due to measures such as flood defence, navigation or water supply. The requirement is to undertake works where it has been identified as beneficial to enable the water body status to be as close to good potential as possible. The works required are to improve habitat at a number of our reservoirs and aqueducts where it is possible to do so without compromising the water supply function of the water bodies. The assessments so far undertaken have identified the requirement to install floating reedbeds at a number of our reservoirs in the Lee Valley and to implement a protective cordon for roosting birds at one of our Lower Thames reservoirs to prevent disturbance from sailing activity. Assessment is also being undertaken for the potential to address vegetation growth, spread of Invasive Non-Native species, and sedimentation in the New River and Staines aqueduct.

Abstraction incentive mechanism

2.110 Since 2016/17 we have implemented the Abstraction Incentive Mechanism (AIM). AIM's objective is to encourage water companies to reduce the perceived impact of water abstraction at sites that are considered environmentally sensitive and is designed to complement existing management tools e.g. NEP Sustainability Reductions, Hands Off Flows. Implementing AIM should not impact security of supply or DO and there is no capital investment for the scheme. We have implemented AIM at five sites where it was not cost beneficial to undertake licence reductions using the existing management tools.

2.111 The five sites included in AIM are: Pangbourne, Axford, Pann Mill, North Orpington and New Gauge. These sites were selected in consultation with the Environment Agency, Ofwat, local stakeholders and the Customer Challenge Group.

2.112 During the first year of implementation, 2016/17, river flows remained above the AIM constraints and therefore no abstraction reductions were implemented. To date during 2017/18 all of the five sites have been triggered at various points throughout the summer/autumn and our performance will be reported on during summer 2018.



G. Supply demand balance from 2016/17 to 2019/20

- 2.113 The supply demand balance for AMP6 is shown below, taking into account the impact of the demand management programme, the resource development programme and the sustainability reductions resulting from the NEP.
- 2.114 There have been some notable changes in the supply demand positions from that forecast in the WRMP14, principally in London, where leakage levels and overall demand are higher than planned.
- 2.115 Population growth at the end of 2016/17 is higher than forecast in WRMP14, with nearly 400 thousand more people requiring water in our region. Most of this growth is in the London WRZ. Our updated forecast for 2019/20 is that 598,250 more people will be living in our region as compared with WRMP14 (+6%).
- 2.116 The WRMP leakage targets have been achieved for the last 11 years but leakage is 34.6 MI/d above target in 2016/17. Leakage recovery plans have been put in place, with the aim of achieving the WRMP14 leakage target by 2019/20 at the latest which will support reducing some of the deficit.
- 2.117 The supply demand balances presented in Table 2-7 reflect the best information available at the end of 2016/17. London is in deficit by 10 MI/d. All other WRZs are in surplus.
- 2.118 There is currently a risk that the London WRZ will still be in a small deficit in 2019/20 as a result of actual population growth being significantly higher than forecast in WRMP14. Work is in progress to enable more than 300,000 progressive meter installations in the London WRZ in AMP6 which could support reducing the increased demand.
- 2.119 Table 2-7 will be updated as part of the WRMP Annual Review process for 2017/18.

Table 2-7: AMP6 supply demand position

WRZ	Item	Volume				
		2015/16	2016/17	2017/18	2018/19	2019/20
London (DYAA)	Demand	2079	2105	2116	2089	2058
	Headroom	82	90	99	112	123
	Supply	2192	2185	2185	2179	2179
	Balance	32	-10	-30	-21	-2
SWOX (ADPW)	Demand	326	327	330	331	330
	Headroom	10	11	13	16	16
	Supply	359	369	358	358	355
	Balance	22	31	16	11	8
SWA (ADPW)	Demand	167	175	181	175	170
	Headroom	5	4	5	6	7
	Supply	195	196	196	196	196
	Balance	23	16	10	15	19
Kennet Valley	Demand	120	121	124	123	122
	Headroom	4	4	5	6	7



WRZ	Item	Volume				
		2015/16	2016/17	2017/18	2018/19	2019/20
(ADPW)	Supply	151	154	154	153	153
	Balance	26	28	24	24	24
	Demand	62	62	62	63	63
Guildford (ADPW)	Headroom	2	2	2	2	3
	Supply	69	68	68	68	68
	Balance	6	4	3	3	2
Henley (ADPW)	Demand	19	19	19	19	19
	Headroom	1	0	1	1	1
	Supply	26	26	26	26	26
	Balance	6	6	6	5	5