

Section 1

Introduction and background





Table of contents

A.	Introduction to water resources planning	1
	What is a Water Resources Management Plan?	1
B.	Our water supply area	3
C.	Levels of service provided to our customers	4
D.	Planning framework	6
	Public inquiry 2010	14
E.	The relationship between the WRMP and other plans	16
F.	Engagement with customers, regulators and stakeholders	17
	Customers	19
	Regulators	21
	Stakeholders	22
G.	Engagement with our Board	22
H.	Quality assurance	23
I.	Public consultation on our draft Plan	23

Figures

Figure 1-1: The step-wise process to develop a WRMP	2
Figure 1-2: Thames Water supply area showing the Water Resource Zones (WRZs)	4
Figure 1-3: Drought resilience assessment for London, taken from the WaterUK study	7
Figure 1-4: Maps of forecast regional deficits by 2040 (accounting for committed supply side options to 2025) under three example future scenarios	8
Figure 1-5: Overview of the customer research and engagement programme	19

Tables

Table 1-1: Our levels of service for water restrictions based on historic twentieth century droughts	5
Table 1-2: WRMP planning priorities	10
Table 1-3: Summary of instructions provided by Defra relevant to WRMP14 and future plans, from the 2010 public inquiry	14
Table 1-4: Engagement framework as presented in the statement of Water Resources Stakeholder Engagement	18

Section 1.

Introduction and background

In this section we cover:

- What is a Water Resources Management Plan (WRMP)
- Our water supply area and the levels of service provided to our customers
- The planning framework
- The relationship between the WRMP and other plans
- Engagement with customers, regulators and stakeholders
- Engagement with our Board and quality assurance
- Public consultation on the draft WRMP

A. Introduction to water resources planning

What is a Water Resources Management Plan?

- 1.1 A secure water supply is essential for public health, the environment and the economy. Water companies have a statutory duty to develop and maintain efficient and economical systems of water service provision which will provide security of supply for customers¹. Every five years water companies are required² to produce a WRMP. Government, and regulators, publish reference documents, namely, the Guiding Principles³ and Water Resource Planning Guideline (WRPG)⁴, which provide a framework for the development of WRMPs.
- 1.2 The WRMP is a strategic plan which sets out how the company plans to maintain the balance between supply and demand for water for a minimum planning period of 25 years, although companies with particularly complex planning problems are encouraged to take a longer term view⁴.
- 1.3 The main components of a WRMP, and the step-wise process to develop a WRMP, are shown in Figure 1-1.

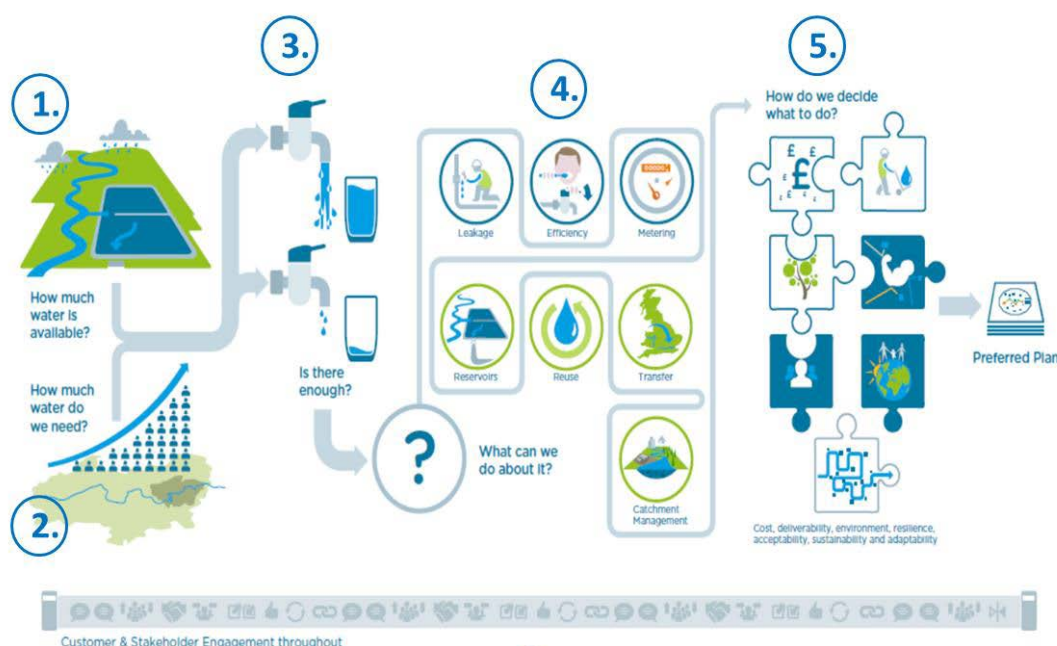
¹ Water Industry Act 1991, Section 37

² Water Industry Act 1991, Sections 37A to 37D (as amended by the Water Act 2003)

³ Defra, Guiding principles for water resources planning for water companies operating wholly or mainly in England, May 2016

⁴ Environment Agency and Natural Resources Wales, Water Resources Planning Guideline: Interim Update April 2017. Note guidance was issued on specific topics after this date.

Figure 1-1: The step-wise process to develop a WRMP



- 1) **How much water is available?** This is a forecast of the amount of water available for public water supply now and how this might change over the planning period.
- 2) **How much water do we need?** This is a forecast of demand for water setting out how much water customers need now and how this might change over the planning period.
- 3) **Is there enough?** This is the baseline supply demand balance. It is an estimate of the water resource position produced by comparing the demand forecast, including an allowance for uncertainty called headroom, and the supply forecast. This identifies if there is a surplus or deficit of water for each year of the planning period.
- 4) **What can we do about it?** Where a deficit is identified, a range of options to manage demand for water and provide additional water supply are assessed.
- 5) **How do we decide what to do?** Taking account of information including cost, environmental impact and customers' preferences we develop a programme of options to ensure a secure supply of water over the planning period.

Customer and stakeholder engagement: Throughout the process we have engaged with our customers and stakeholders to seek their input and challenge to inform the development of the draft WRMP19.

1.4 To ensure we can provide our customers with the best possible value over the long term we have developed our draft WRMP19 over an 80 year planning period and designed it to satisfy three main objectives:

- To provide a secure supply of water for our customers addressing the supply demand deficits that we forecast in our region
- To improve our resilience to a severe drought



- To look beyond the needs and opportunities of our region alone and take into account the growing needs of the wider south east of England. Our draft WRMP19 will allow for transfers to neighbouring companies in the south east of England achieve the most effective and efficient outcome
- 1.5 Our approach is explained in more detail in Section 10: Programme appraisal and scenario testing.

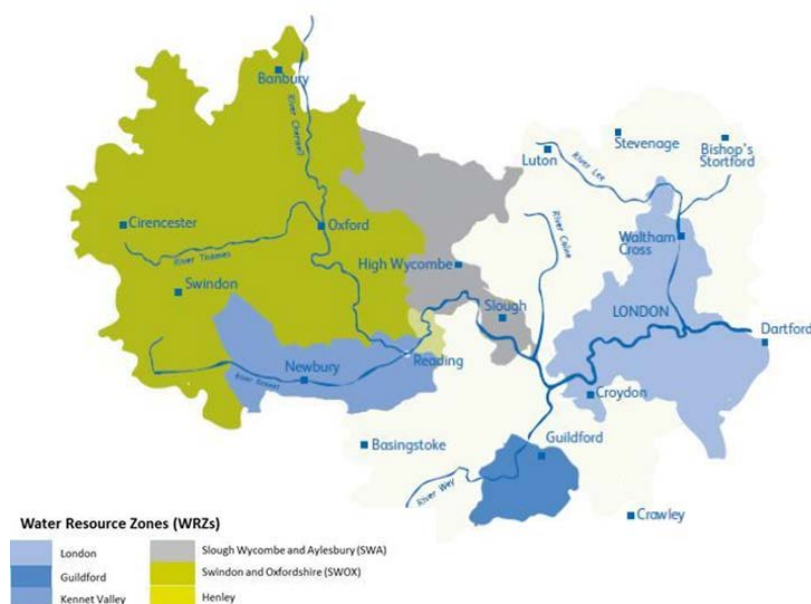
B. Our water supply area

- 1.6 Our water supply area extends from Cirencester in the west to Dartford in the east and from Banbury in the north to Guildford in the south and covers over 13,000 square km. Every day, we supply around 2,600 million litres of water to around 10 million people and 250,000 businesses⁵. Water supplies are derived from a mixture of surface water sources (mostly from large storage reservoirs supplied from the River Thames and River Lee) and groundwater sources. We also have a desalination water treatment works on the River Thames (Tideway) that can supplement water supplies at times of high demand and/or during drought conditions.
- 1.7 For planning purposes our supply area is divided into six water resource zones (WRZs) as presented in Figure 1-2. A WRZ describes an area within which the abstraction and distribution of water to meet demand is largely self-contained and all customers experience the same risk of supply failure and the same level of service. We have defined our WRZs using the Environment Agency's WRZ assessment methods⁶. We undertake the WRMP planning process for each WRZ to ensure we can provide a secure supply of water to our customers in that zone.

⁵ In April 2017 a competitive retail market for water services for business customers was introduced. This means that business customers can choose which retailer they buy their water and wastewater services from. The retailer provides billing, customer service and efficiency advice to the business customer, while Thames Water, as a wholesale water provider, still has an obligation to supply the water and sewerage services and manage the infrastructure.

⁶ Environment Agency, Water Resource Zone Integrity, 2016

Figure 1-2: Thames Water supply area showing the WRZs



- 1.8 London WRZ is the largest of the six zones and covers much of the Greater London area. The water resources for London are largely based on abstraction from the River Thames, which is stored in reservoirs, and the remainder from underground sources (aquifers) via boreholes.
- 1.9 The next largest zone is the Swindon and Oxfordshire (SWOX) WRZ. This zone is supplied mainly from groundwater (60%), supported by river abstraction and a reservoir, sited near Oxford.
- 1.10 The other zones to the west of London are Kennet Valley (includes Reading and Newbury); Henley; Slough, Wycombe and Aylesbury (SWA) and Guildford. These latter four zones are largely reliant on groundwater abstraction although there are abstractions directly from local rivers, notably the River Kennet in Reading and the River Wey near Guildford.
- 1.11 A more detailed map of each WRZ along with a high level description of each zone can be found in Appendix D: Water resource zone integrity.
- 1.12 As a part of the development of our draft WRMP19 we reviewed the WRZs with the Environment Agency and agreed that they were still the most appropriate planning units⁷.

C. Levels of service provided to our customers

- 1.13 In a succession of dry years, measures to reduce demand for water e.g. Temporary Use Bans (TUBs) and Non-essential Use Bans (NEUBs), and measures to allow increased abstraction, outside that permitted by an abstraction licence, may be required. Such measures are known as drought interventions. Drought interventions either have a direct effect on customers (e.g.

⁷ Thames Water and Environment Agency Water resources update meeting, September 2017



- TUBs) or the environment (e.g. drought permits for temporary changes to abstraction licences).
- 1.14 We set targets regarding the average frequency with which such interventions will be implemented. These are known as levels of service. The aim of the WRMP is to ensure that we can meet customer demands for water in a dry year without the need for drought interventions at a frequency that exceeds the stated level of service. Our levels of service are shown in Table 1-1.
- 1.15 We consulted household and non-household customers on levels of service for water use restrictions, specifically seeking their feedback on whether the levels of service should deteriorate, be maintained or improved⁸. The main findings are summarised as:
- Overall customers indicated that they did not want a deterioration in the levels of service. This was particularly strong for the more severe restrictions such as rota cuts and drought permits
 - The current expected frequency of sprinkler bans, hosepipe bans, and NEUBs were not perceived to have significant impacts on customers' day-to-day activities and as such customers indicated that they were broadly satisfied with the current levels of service
 - Customers indicated support for improved levels of service for the more severe restrictions. For rota-cuts (Level 4 restrictions), both household and non-household customers showed some support for an improvement to a 1 in 200 year level of service (from the current 1 in 125 year). Household customers did not support improvement in service beyond 1 in 200 years
- 1.16 In line with customers' preferences for Level 4 restrictions we intend to reduce the risk of these restrictions to a 1:200 year frequency over the next ten years. The lead time to enact this change will ensure it is deliverable and affordable for our customers. This is explained further in Section 10: Programme appraisal and scenario testing.
- 1.17 Further information on the customer research is provided in Appendix T: Our customer priorities and preferences.

Table 1-1: Our levels of service for water restrictions based on historic twentieth century droughts

Restriction level	Frequency of occurrence	Water use restrictions
Level 1	1 year in 5 on average	Intensive media campaign
Level 2	1 year in 10 on average	Sprinkler/unattended hosepipe ban, enhanced media campaign
Level 3	1 year in 20 on average	TUB (formerly hosepipe ban), Drought Direction 2011 (formerly NEUBs) requiring the granting of an Ordinary Drought Order. Note these would be applied in a staged manner in line with our Drought Plan ⁹

⁸ Appendix T: Our customer priorities and preferences

⁹ Thames Water, draft Drought Plan, April 2017 (available on Thames Water's website)



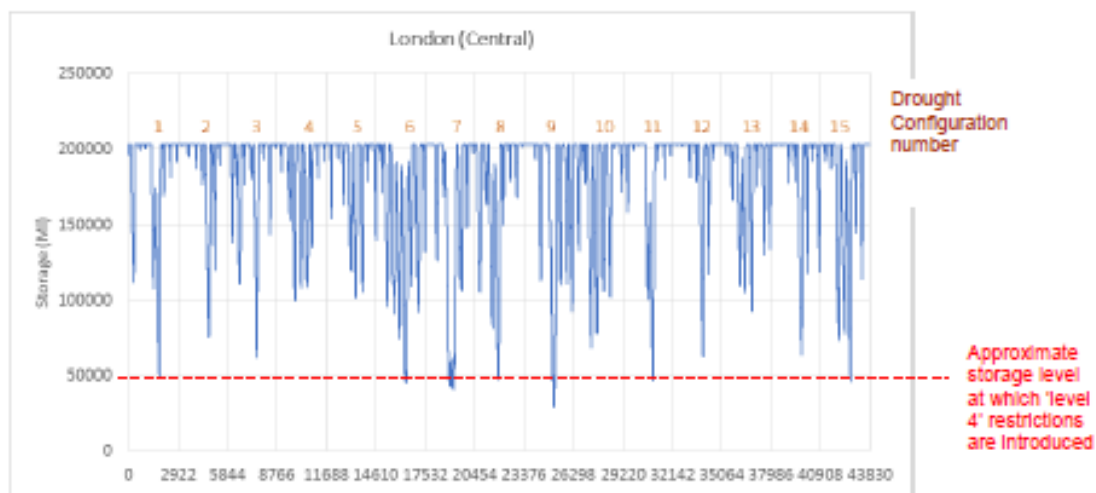
Restriction level	Frequency of occurrence	Water use restrictions
Level 4	Never (In reality this equates to ~ 1 year in 125 years on average)	If extreme measures (such as standpipes and rota cuts) were necessary their implementation would require an Emergency Drought Order

D. Planning framework

- 1.18 In 2015, following concern around the growing risk of drought in England and Wales, the Government asked the water industry to look at the future challenges and solutions in terms of resilience to the risk of drought. Water company's levels of resilience to drought are a matter of public interest and public policy. A study¹⁰ was commissioned by WaterUK, the trade association for the UK Water Industry, together with water companies and regulators. The study considered the possible effects of climate change, population growth, environmental protection measures, and trends in water use to produce a wide range of potential future scenarios, looking 50 years ahead.
- 1.19 The results of the study showed that, the problem is more pronounced than previously thought and if we carry on with "business as usual" droughts are likely to become more frequent and more geographically widespread than previously understood. Drier areas of the country, namely the south and the east of England, face a higher risk of more severe droughts than were experienced in the past. The modelling shows that measures to manage demand and enhance supplies of water are needed to contain the risk of drought.
- 1.20 The analysis assessed the resilience of water supplies to 15 drought scenarios (five historic and 10 modelled). **Error! Reference source not found.** presents the assessment of the resilience of water supplies in London to these drought scenarios. The graph shows that in many of the drought scenarios the levels of water storage fall to a level where the most severe water use restrictions, referred to as Level 4 restrictions, which includes rota cuts or standpipes, would be required. This is shown as the red dotted line in Figure 1-3.

¹⁰ Water UK, Water resources long-term planning framework 2015-2065 , 2016

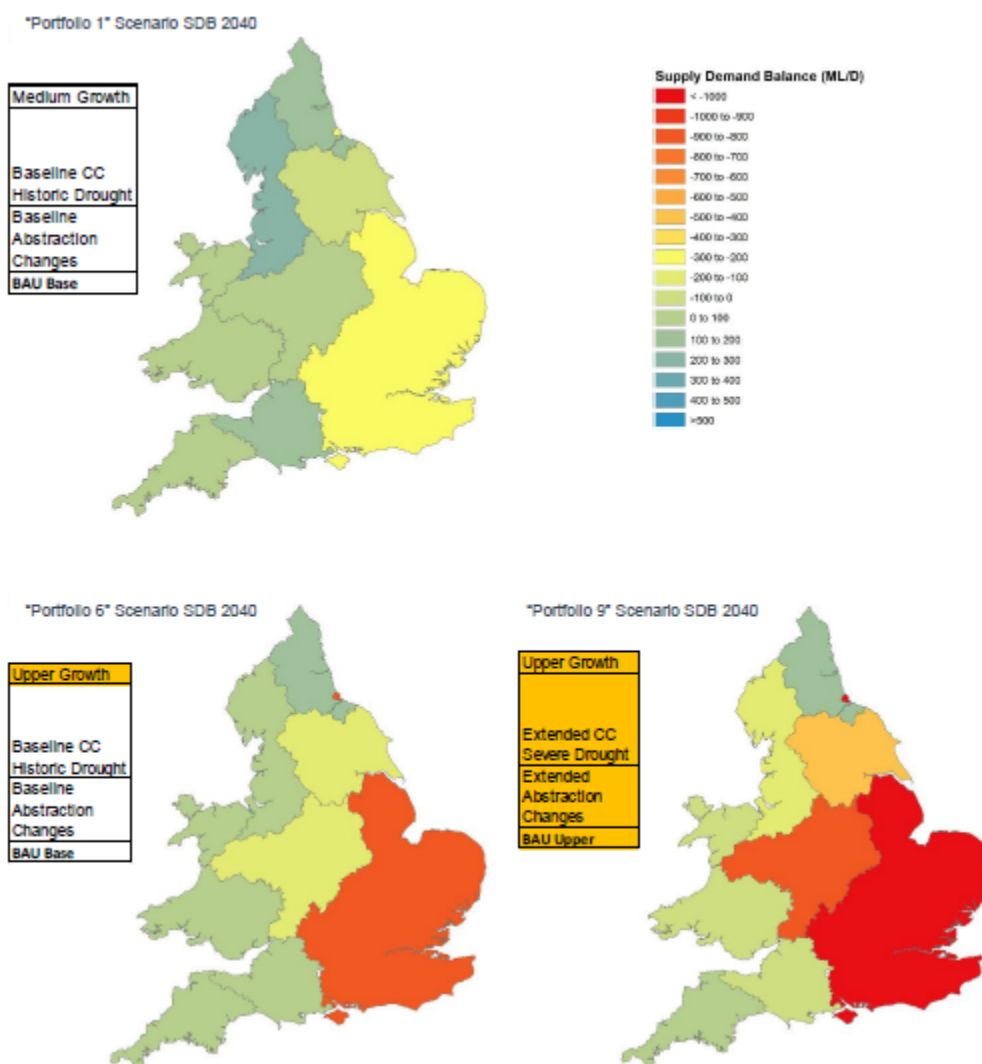
Figure 1-3: Drought resilience assessment for London, taken from the WaterUK study¹¹



1.21 The study also presented a summary of the forecast deficits by region for different scenarios for population growth, climate change, environmental protection requirements, and drought. This is presented in Figure 1-4. This shows that the biggest percentage water resource deficits are forecast across London and the south east.

¹¹ Water UK, Water resources long term planning framework, 2016, Figure 6-5,

Figure 1-4: Maps of forecast regional deficits by 2040 (accounting for committed supply side options to 2025) under three example future scenarios¹²



- 1.22 The findings of the study were provided to Government, for consideration in the development of government policy. We have also taken account of this work, in planning future water resources and developing our draft WRMP19; for example, we plan for the long-term, looking over 80 years for some areas, as the decisions and investments we make today will determine the levels of service we can provide to our customers in the future.
- 1.23 The Guiding Principles and WRPG, produced by Government and its regulatory agencies respectively, provide a framework to guide the preparation of WRMPs. These documents set out good practice, the various technical approaches to follow, and the information that a plan should contain. They also ensure compliance with statutory requirements and government policy objectives. These documents were reviewed and revised for this round of water resource planning and included a number of significant changes to secure the long-term

¹² WaterUK, Water resources long term planning framework, 2016, Figure 6.27



resilience of the water sector. We have referred to the Guiding Principles and WRPG in preparing our draft WRMP19.

- 1.24 Ofwat has also published a number of technical papers and other documents¹³ which reinforce the priorities set out in the Guiding Principles and WRPG. Ofwat has placed specific focus on four key themes: resilience; affordability; innovation; and great customer service and has proposed a suite of performance measures¹⁴ which reflect these key areas. The measures directly relevant to the WRMP are the Security of Supply Index, per capita consumption (PCC) and leakage. In addition there are performance measures covering the environment and resilience to severe droughts. We support these measures which reflect key areas of water resource planning focus, and which help to ensure high levels of customer service into the longer term.
- 1.25 Main priorities presented in these documents, which have shaped our approach, are noted below.
- Understanding and delivering the outcomes that our customers want
 - A planning period that reflects the water resources challenges faced
 - Strategic approach that represents best value to customers over the long term
 - Assessment of the vulnerability of water resources to future pressures such as climate change and the needs of the population and business
 - Flexibility to accommodate reasonably predictable changes
 - Promotion of water efficiency and leakage control and, where appropriate, increase customer metering, thereby reducing overall demand for water
 - Consideration of every option to meet future public water supply needs including those outside company boundaries, plus collaboration with neighbouring water companies and other sectors
 - Evaluation of resource options within a regional supply context
 - Protection and enhancement of the environment
- 1.26 These priorities are set out in Table 1-2 alongside our response to them and reference to the relevant section of this document in which greater detail is provided.

¹³ Ofwat, Delivering more of water matters in PR19, July 2017

¹⁴ Ofwat, Delivering Water 2020, Ofwat consultation document, July 2017



Table 1-2: WRMP planning priorities

Priorities and policy objectives	Our response	Section of the plan
The plan must focus on delivering the outcomes that our customers want	We have undertaken a detailed programme of customer research and engagement to understand the priorities and preferences of our customers. We have worked with our Customer Challenge Group (CCG) to design and implement the programme. The output of this research and engagement has informed the development of our draft WRMP19 and our Business Plan.	10 and Appendix T
Involved customers, interested parties, statutory and non-statutory consultees and taken into account their views	We recognise that there is wide interest in the sustainable management of water resources and over the past three years have engaged with customers, stakeholders and regulators to share the work we have undertaken to inform our draft WRMP19, and provided the opportunity for their input into plan development.	Appendix S
A planning period that reflects the challenges	<p>The statutory minimum planning horizon for water resources is 25 years. In recognition of the longer term pressures, and the time it takes to develop necessary infrastructure, Government has encouraged water companies to adopt a longer planning horizon where this is considered to be appropriate. We support this.</p> <p>We worked with independent consultants, NERA¹⁵, to consider the planning horizon for WRMP19 and completed problem characterisation for each WRZ. The conclusions of this work are:</p> <ul style="list-style-type: none"> • London and SWOX WRZs have significant and complex water resource challenges. SWA WRZ has moderate challenges. The solutions required in these WRZs will be high cost, with long lifespans. As such, we have developed plans over an 80 year time horizon and have used advanced decision support tools for thorough analysis of the planning problem and to develop multiple feasible programmes of investment. • The remaining three WRZs (Kennet Valley, Guildford and Henley) have simpler planning problems. Lower cost options are available and can be implemented relatively quickly. As such, we have developed plans over a 25 year time horizon and used less complex decision support tools. 	10

¹⁵ NERA, How Should the Appropriate Horizon for Integrated Water Resource Planning be Ascertained? September 2016



Priorities and policy objectives	Our response	Section of the plan
Strategic approach that represents best value to customers over the long term	<p>For many years cost has been the primary factor in devising the WRMPs, and a least cost decision support tool, called Economics of Balancing Supply and Demand (EBS), has been used to support the development of plans. However, a least cost plan is not necessarily a resilient or robust plan and there is now support from regulators¹⁶, stakeholders¹⁷ and our customers¹⁸, to develop best value plans which take account of a wider range of factors including the environment, resilience, and customer preferences.</p> <p>We have developed a suite of modelling and decision support tools¹⁹ to aid the formulation of, and decision making on, the best value programme for the draft WRMP19. We have shared the approach and decision support tools with stakeholders to build an understanding of the process and overall stakeholders were supportive of the approach.</p> <p>To improve transparency and confidence in the decision making process we have set up an Expert Panel to work alongside us providing advice and challenge throughout the programme development and helping to inform the preferred programme to be promoted.</p> <p>We have also explored innovative water resource options including considering opportunities in growth areas for non-potable reuse of water in new buildings, planned wastewater re-use which is not widely practiced in the UK, large inter-company water trades and innovative tariffs.</p>	10
Assessment of the vulnerability of water resources to future pressures such as climate change	<p>We have assessed the severity and complexity of the water resource planning problem in each WRZ in accordance with industry guidance²⁰; this is referred to as problem characterisation. The assessment helps us to decide on the appropriate planning horizon, and the approach and decision support tools, to be used to develop the best value programme.</p> <p>Specifically on climate change, historically WRMPs have been prepared to survive a repeat of the worst drought in the 90 year historical record, at the lowest economic cost. Climate change is likely to bring different conditions such as multi-year droughts, and evidence from our own studies, the WaterUK study⁶, and other companies studies show that the historical record is not an appropriate basis on which to plan. We have completed work to develop stochastic forecasting approaches for our area and generated artificial drought sequences which have been used to test the resilience of the existing system and new supply options to droughts worse than in the historical record.</p>	4 and 10

¹⁶ Water Resources Planning Guideline, May 2016

¹⁷ Technical Stakeholder Meetings, March 2016 and November 2016

¹⁸ Customer research, Water resources deliberative research, February 2017

¹⁹ UK Water Industry Research (UKWIR) WRMP 2019 Methods – Decision Making Process: Guidance Report Ref. No. 16/WR/02/10

²⁰ UKWIR, WRMP 2019 Methods – Decision Making Process: Guidance Report Ref. No. 16/WR/02/10



Priorities and policy objectives	Our response	Section of the plan
Flexibility to accommodate reasonably predictable changes to regulation such as abstraction reform	<p>Uncertainty is inherent in all forecasts. We have assessed our draft WRMP19 against a range of plausible future scenarios, and also used an adaptive pathways approach, to ensure our draft WRMP19 can respond flexibly to future risks, and ensure a “no regrets” approach.</p> <p>As part of the statutory process we undertake an annual performance review of our plan and a five-yearly review and can therefore make adjustments to our long-term strategy as needed.</p>	5 and 10
Promotion of water efficiency and leakage control and, where appropriate, increase customer metering, thereby reducing overall demand for water	<p>There is wide support from customers and stakeholders for demand management activity. Regulators have also set out their expectation to see on-going reductions in household PCC. We support measures to manage water resources efficiently and effectively and have promoted a large programme of activity in the current five year period (2015-2020). In developing our draft WRMP19 we have explored a wide range of demand management options which will form the foundation of our future plan.</p>	8 and 10
Consideration of every option to meet future public water supply needs including those outside company boundaries, plus collaboration with neighbouring water companies and other sectors	<p>In developing our draft WRMP19 we have considered a wide range of options to both manage demand and to develop new water resources. We have engaged with stakeholders to identify and develop these options including exploration of options with other water companies and third parties. Since January 2015 we have held regular meetings, Water Resources Forum and technical stakeholder meetings, as well as individual discussions to enable stakeholder input into water resource planning.</p>	7, 8 and Appendix S
Evaluation of resource options within a regional supply context	<p>We have worked closely with the Water Resources in the South East Group (WRSE), and also engaged with Water Resources East (WRE), to ensure we develop our plan within a regional supply context.</p> <p>The work of WaterUK, and the WRSE, has shown the significant water resource challenge facing the south east. Other water companies in the south east have indicated that they will require water from Thames Water of around 130 Ml/d in the mid-late 2040s. These requirements will be confirmed in their WRMPs. We have tested the implications of changes to these requirements in scenario testing.</p>	7 and 10
Protection and enhancement of the environment.	<p>There is wide recognition of the need to balance the needs of society and the economy with the environment. We have assessed environmental and social impacts and benefits at all stages of the development of the WRMP including coarse screening of options, fine screening of feasible options, the assessment of the constrained options, and development of the best value programme. This ensures end-to-end consistency of approach in the appraisal process.</p> <p>Strategic Environmental Assessment (SEA) is the core of the environmental assessment approach</p>	9, 10, Appendices B, C and BB



Priorities and policy objectives	Our response	Section of the plan
	<p>of the WRMP and is supported by the statutory assessment processes relating to the Habitats Directive (Habitats Regulations Assessment (HRA) process) and Water Framework Directive (WFD)). We consulted stakeholders throughout the process, including on the scope of the SEA, methodological approaches and outputs.</p> <p>We have also undertaken work to explore the use of natural capital accounting to aid understanding about how to manage our environment. This concluded that the approach was not sufficiently mature at present to apply to water resource planning. Industry wide work will be completed in the next five years to develop this approach for future plans.</p>	



Public inquiry 2010

1.27 In 2010 a public inquiry was held to examine our proposed WRMP at that time (draft WRMP09). In May 2011 Defra issued instructions²¹ on the amendments needed to be made to the plan (draft WRMP09) taking account of the Planning Inspector's recommendations²². The instructions also identified which of the Inspector's recommendations needed to be addressed as part of WRMP14 and future plans. These instructions have been addressed; those that are relevant to the current draft WRMP19 are summarised in Table 1-3 with an update on progress.

Table 1-3: Summary of instructions provided by Defra relevant to WRMP14 and future plans, from the 2010 public inquiry

Instruction	Progress update
Options appraisal	
Technical analysis to confirm feasibility and uncertainty of Severn-Thames transfer options.	We have undertaken work to examine options to transfer water from the River Severn to the River Thames. This is presented in the Raw Water Transfer Feasibility Option Report and summarised in Section 7: Appraisal of resource options.
Investigations of alternative sites for a 50 million cubic metres (Mm ³) reservoir.	We have undertaken work to investigate and assess a range of reservoir options. This is presented in the Reservoir Feasibility Option Report and summarised in Section 7: Appraisal of resource options.
Investigations into a greater range of effluent reuse schemes and alternatives to reverse osmosis technology.	We have undertaken work to investigate and assess a range of reuse options. This included consideration of potential sites and relevant technology. This is presented in the Reuse Feasibility Option Report and summarised in Section 7: Appraisal of resource options and Appendix L: Water reuse. We have engaged with the former Chief Inspector of the Drinking Water Inspectorate (DWI) as we have undertaken this work.
Update on public perception investigations and wastewater reuse trial at Deephams wastewater treatment works.	We have completed further research with customers to understand their preferences and concerns for a range of options, including wastewater reuse. This is presented in Appendix T: Our customer priorities and preferences. We have also funded an EngD to explore stakeholder's expectations for reducing risk and promoting safety linked to water reuse. This research is summarised in Appendix L: Water reuse.
Further breakdown of costs for all options and to support Water Resources in the South-East (WRSE) modelling work.	We have worked collaboratively with WRSE and provided detailed information on options for WRSE assessment. This work is discussed further in Section 7: Appraisal of resource options.

²¹ <http://archive.defra.gov.uk/environment/quality/water/resources/documents/thames-inquiry-decision-letter.pdf>

²² The Planning Inspectorate (December 2010) Water Resources Management Plan Regulations 2007, Inquiry into the Thames Water Revised Draft Water Resources Management Plan 2010-2035, September 2009



Instruction	Progress update
<p>Consideration of how a greater range of feasible options could be provided.</p>	<p>We have developed and considered a wide range of resource options. We screened options to refine the options under consideration to produce a feasible option list. We have completed more detailed assessment of the feasible options. We have engaged with stakeholders throughout the option appraisal process providing opportunity for input and comment. This work is presented in Section 7: Appraisal of resource options.</p>
<p>Further investigate and review some of the more uncertain contingency options such as aquifer storage and recovery (ASR).</p>	<p>ASR 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. To investigate its potential and enable delivery of an ASR water supply scheme, we have targeted the Lower Greensand aquifer in and around Horton Kirby in the Darent Valley, in the London WRZ. We have drilled a new ASR borehole, two new observation boreholes, and constructed new pipeline connections to recharge the aquifer with potable water. During operational scale cycle testing, which is ongoing, we are recharging the aquifer to increase storage then re-abstracting the stored water, while monitoring groundwater levels and water quality to confirm its viability. This work is leading to delivery of the ASR Darent Valley (Horton Kirby) scheme, where work is in progress and currently remains on track to increase the London WRZ DO by 5 MI/d in 2019/20. As a result of this work, a number of schemes have been included in our list of potential future resource development options.</p>
Programme appraisal	
<p>Apply new methodology to programme appraisal to identify the Company's preferred strategic programme.</p>	<p>We worked across the industry, and with regulators, to develop new guidance to support programme appraisal, and followed this in developing our draft WRMP19. We have developed a suite of modelling and decision support tools to aid the formulation of, and decision making on, the best value programme. This involves consideration of a range of parameters including cost, environmental performance, customer preference, deliverability, inter-generational equity, resilience and adaptability. Best value planning is supported by our customers²³.</p> <p>To improve transparency and confidence in the decision making process we have established an Expert Panel comprising Professor McDonald (University of Leeds), Professor Harou (University of Manchester), Dr Bill Sheate (University of London, Imperial College) and Dr Fenn, to work alongside us providing advice and challenge through the programme development.</p>
<p>Consideration of programme sensitivity to cost certainty.</p>	<p>We have refined our approach to estimating uncertainty in costing through the use of an established process, termed optimism bias. This is presented in Section 7: Appraisal of resource options and Section 10: Programme appraisal and scenario testing.</p>

²³ Britain Thinks, Deliberative research, September 2016



Instruction	Progress update
Consideration of programme sensitivity to different potential sustainability reduction scenarios.	Programme sensitivity to different potential sustainability reduction scenarios has been considered and is presented in Section 10: Programme appraisal and scenario testing.
Consideration of programme sensitivity to actual utilisation of schemes and to Net Present Value calculation over 80 years.	The Guiding Principles set out the need to develop plans over a longer time horizon where the planning problem is significant and complex. We have adopted an 80-year planning period, for some of our WRZs, in developing our draft WRMP19. This time horizon is agreed as suitable given the significance and complexity of the planning problem.
Need to explicitly quantify the probability of the main sources of scheme timing and yield uncertainty and to include in target headroom.	Target headroom includes the main sources of uncertainty associated with schemes. We have followed industry best practice in assessing target headroom.

E. The relationship between the WRMP and other plans

1.28 Our WRMP has links with other plans. The main plans are listed below with an explanation of the relationship between the plans.

River basin management plans (RBMP)

1.29 RBMPs set out how organisations, stakeholders and communities will work together to improve the water environment. This is important context to the development of the WRMP. The SEA references the RBMPs in setting the key policy messages and establishing the environmental baseline. In addition, a specific objective is included in the water topic of the SEA to support achievement of the RBMP objectives. Furthermore, many of the sustainability reductions that we are required to make are to achieve the requirements of the WFD and are set out in the RBMP.

Business plan

1.30 We produce a Business Plan every five years which sets out the services that we plan to provide to our customers. Funding for the Business Plan is secured through Ofwat's Price Review process. The investment required in the first five years of the WRMP is included in the Business Plan. The next Price Review will be in 2019 (PR19).

Drought plan

1.31 The Drought Plan sets out the short-term operational steps implemented as a drought progresses to enhance available supplies, manage customer demand and minimise environmental impacts. We updated our Drought Plan in 2016 in accordance with the Drought



Plan Guideline,²⁴ consulted on it, and are waiting for feedback from Defra. There is a very close link between the Drought Plan and WRMP where we are required to demonstrate how supply will be maintained during severe drought events.

- 1.32 Our 2016 Drought Plan shows that, during the five year planning period, we can meet our planned levels of service for a range of severe drought scenarios, although with less resilience. However the plan does not take account of the forecast increase in population in our supply area and the associated increased demand for water, the future impacts of climate change on water available for supply, or potential future reductions in abstractions in order to provide greater protection for the environment, all of which are forecast to have a significant effect on water supply in the Thames catchment. Furthermore whilst the plan shows that we can maintain supply, it also shows that our current assets will be placed under great strain, impacting the robustness of the water system and potentially having a significant detrimental effect on the environment and ecology; and businesses which rely on water would be subject to more frequent NEUBs and TUBs.
- 1.33 The associated increasing demand and reduced water availability have the potential to significantly affect the underlying supply demand balance and therefore the extent to which the Drought Plan could be relied upon to robustly protect customers from Level 4 water use restrictions in future periods. These aspects are covered in Section 4: Current and future water supply.

Local plans produced by local authorities

- 1.34 In line with the WRRPG we have based our forecasts for population and property growth on Local Plans published by the local council or unitary authority. We contacted the 95 Local Authorities across our area to obtain data to produce population and property forecasts to 2045.

F. Engagement with customers, regulators and stakeholders

- 1.35 We recognise that there is wide interest in the sustainable management of water resources and over the past three years have engaged with customers, regulators and stakeholders, sharing work to inform our draft WRMP19 as it is undertaken and to provide the opportunity for input and feedback.
- 1.36 In November 2014 we published a statement of Water Resources Stakeholder Engagement. This document set out how we planned to engage during the preparation of our draft WRMP19. The engagement framework is provided in Table 1-4. We have updated and re-published the statement on a quarterly basis.
- 1.37 Alongside the statement of Water Resources Stakeholder Engagement we published our water resources work programme and an accompanying report explaining the main areas of work and progress update for each of the workstreams. This was to ensure that stakeholders

²⁴ Environment Agency, Drought Plan Guideline, 2016



understood the work that was being undertaken and the timing of outputs, and provide the opportunity to input and contribute in a timely manner. This approach allowed us to understand issues and concerns and address these, as far as possible, in the development of our draft WRMP19.

Table 1-4: Engagement framework as presented in the statement of Water Resources Stakeholder Engagement

Customers	We engage with customers to understand their views on a range of water resource matters and ensure these are taken into account in developing our plan. This is aligned with engagement activity to inform the Business Plan.
Customers - CCG	The CCG was set up to test the quality of our engagement with customers and how we responded to their priorities in developing our Business Plan 2015-2020 and WRMP14. We are continuing to work with the CCG as we progress work to inform our next Business Plan and WRMP19.
Regulators - Environment Agency	We hold regular meetings with the Environment Agency to discuss water resources matters. The purpose of these meetings is to discuss technical work and to ensure the Environment Agency has the opportunity to raise concerns, contribute to the work, and to agree approaches and technical methods where required. Each quarter we provide a progress report on the water resources work programme to the Thames Water and Environment Agency Directors' meetings. The purpose of the report is to highlight any risks or issues on water resources that require discussion.
Regulators - All	We hold meetings with other regulators (Ofwat, Consumer Council for Water (CCWater), Natural England, Historic England (HE), and Natural Resources Wales (NRW) on specific topics as appropriate to ensure they are updated on technical work and to give them the opportunity to raise concerns and contribute to the work.
Regulators - All	We are involved in a number of research, technical and strategic projects such as the WRSE Group, UKWIR research, Environment Agency technical projects and the industry wide Strategic Water Resources Liaison Group. Regulators and other organisations are involved in the majority of these groups.
Stakeholders	We continue to hold forums on a regular basis to which all interested organisations are invited. The purpose of the forums is to update stakeholders on our work and to give them the opportunity to discuss and challenge our approach and to highlight issues and concerns. The agenda for these forums are aligned with the work programme and also in response to feedback from stakeholders. We regularly review the approach to engagement and seek feedback at the forum to ensure the approach is meeting the needs of stakeholders. Further information is provided in Appendix S: stakeholder engagement.
Stakeholders	We continue to convene technical meetings on specific topics that stakeholders are interested in. These meetings give stakeholders the opportunity for greater discussion and scrutiny on specific technical matters. We also hold individual meetings as needed.
Water companies and commercial organisations	We continue dialogue with water companies and external organisations to identify opportunities for collaboration and partnerships including identification of opportunities for sharing and trading resources to ensure

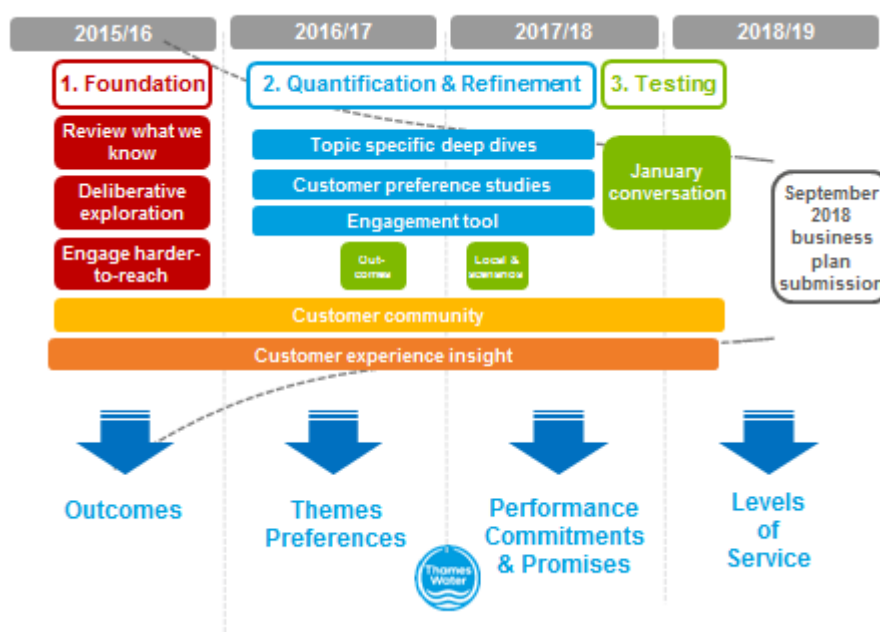
the most effective use of available resources.

1.38 The following sections provide further information on the engagement approach with customers, regulators and stakeholders, and key issues.

Customers

1.39 Our plans and strategies are developed to reflect our customers' preferences. We have undertaken an extensive research and engagement programme to understand customers' views and expectations on all aspects of our business, and the services that we provide, as summarised in Figure 1-5. We have worked with our CCG in the design and delivery of the research and engagement programme, and how the information has been used to shape our long term plans.

Figure 1-5: Overview of the customer research and engagement programme



1.40 On water resources, we have specifically sought feedback from our customers on the following:

- the planning process and how we develop the plan
- the levels of service we provide in terms of the frequency of water use restrictions that we plan for
- the options that can be used to provide a secure supply of water, including the level of leakage that is considered acceptable

1.41 A summary of the views and priorities of our customers on these points is provided below with more detailed information provided in Appendix T: Our customer priorities and preferences.



Feedback on the planning process

- 1.42 Customers want a dependable service which they can rely on. Most customers are unaware of the challenges to our future water resources in terms of population growth, climate change and environmental protection. When prompted, customers understand that there is a need for investment to maintain a reliable water supply, they consider a secure water supply to be fundamental and they want reassurance that we are planning for the future.
- 1.43 The majority of customers support the need for us to plan for the future, considering a planning horizon of at least the next 25 years, building in flexibility to accommodate future changes
- 1.44 Customers indicated that while the bill is important, and must be affordable, a variety of factors need to be taken into account in addition to cost in determining the long term strategy. These factors include the environment, reliability and deliverability.
- 1.45 Customers believed that the costs for future investment should be shared across current and future customers showing a strong sense of responsibility towards future generations.

Feedback on Levels of service - Water use restrictions

- 1.46 Customers indicated a preference to avoid a deterioration in the levels of service.
- 1.47 The current expected frequency of sprinkler bans, hosepipe bans, and NEUBs were not perceived to have significant impacts on customers' day-to-day activities and as such customers indicated that they were broadly satisfied with the current levels of service.
- 1.48 As the severity of the water use restrictions increase, customers' views that the level of service should either be maintained or enhanced are stronger.
- 1.49 Water rationing, referred to as a Level 4 restriction, is the restriction that is of most concern to customers. Household and non-household customers expressed a preference for enhanced service levels for Level 4 restrictions, moving from the current service levels of 1:125 year drought to a 1:200 year drought.

Feedback on options

- 1.50 Customers indicated a strong preference for demand management options (leakage reduction and water efficiency) over supply options (for example new resource development). A key driver for this is avoidance of waste.
- 1.51 Many customers consider that the current levels of leakage are unacceptable. They understand that it is not cost effective to fix some leaks but would like to see us go beyond what we are currently doing.
- 1.52 Tariffs were not as popular as other demand management measures, mainly because customers considered they were unfair to some customers.
- 1.53 There was a range of views on the individual resource options:
 - The preferred option was transferring water at Teddington. This was perceived to have few negative impacts, and was understood to provide a large volume of water and to be simple



- Reservoir and reuse were the next preferred large options
 - Water transfer was identified as one of the least preferred options in all the research studies. One of the main reasons for this is customers thought that the company should be self-sufficient rather than relying on another water company for water supplies
 - The choice of energy sources was identified as a significant driver in making decisions, and customers have a strong preference for options that use renewable energy²⁵
- 1.54 We provide further detail on how we have used the customer research to inform the selection of our preferred plan in Section 10: Programme Appraisal and scenario testing.
- 1.55 Our independent CCG has a mandate to monitor our performance and whether we are meeting our commitments, reporting properly on progress, and are considering customers in our future plans. The CCG writes formally to Ofwat in response to consultation and questions, and also comments on our future plans. We hold regular meetings with the CCG and for the past two years each quarter we have provided a progress update on the development of the draft WRMP. Minutes from all our meetings with the CCG are published on our website. The CCG have also regularly attended our stakeholder meetings to ensure these are operated in a fair and transparent way, to hear from other stakeholders and to contribute to the discussions.

Regulators

- 1.56 We have invited Government and regulators to attend the stakeholder meetings.
- 1.57 We have held regular meetings with the Environment Agency throughout the development of our draft WRMP19. The purpose of these meetings has been to ensure that the Environment Agency is up to speed with the work being undertaken and to provide opportunities for comment, input, challenge and feedback. Overall the discussions have been helpful, although noting that all the comments provided by the Environment Agency to date are without prejudice, as the Environment Agency would not formally sign off or agree methods and approaches in advance of submission of the draft WRMP19.
- 1.58 We held meetings with Ofwat to update them on our progress in developing our draft WRMP19 and to seek their feedback and comment. In addition we have engaged with Ofwat through the development of the framework for PR19, definition of performance measures and technical issues such as direct procurement of strategic infrastructure.
- 1.59 In the preparation of the SEA, HRA and WFD assessment we have worked with statutory regulators Environment Agency, Natural England, HE and NRW) and wider stakeholders. We have completed consultation on the scope and approach of the SEA, the methodology for the HRA and WFD assessments, and the output of the assessment of options.
- 1.60 The primary role of the Drinking Water Inspectorate (DWI) is to ensure the safety and quality of drinking water. We have invited the DWI to join our stakeholder meetings and shared information with them on resource options under consideration. Options we consider will be of particular concern to the DWI are catchment based schemes, and options which involve the

²⁵ Note the use of renewable energy is only reported for options where it is considered to be feasible



reuse of water. We commissioned the former Chief Inspector of the DWI to provide advice and feedback in respect of wastewater reuse. This is presented in Appendix L: Water reuse.

- 1.61 The main role of the CCWater is to ensure consumers are at the heart of the water industry in terms of the nature and quality of the service provided. CCWater has an active voice through our CCG, we regularly meet CCWater on a wide range of business issues, and we also invite CCWater to participate in stakeholder discussions and meetings to ensure we understand their views and concerns. We share with them the work that we do to engage with our customers, both day to day and also to inform future planning.
- 1.62 We have briefed the Welsh Government and NRW during the development of the draft WRMP19, specifically focusing on aspects which could affect Welsh resources and the people of Wales.

Stakeholders

- 1.63 There is wide interest in water resources from a diverse range of stakeholders, from those organisations who have interest in a specific geographical area, watercourse or single option to organisations who have a broad interest in the sustainable management of resources for the long term.
- 1.64 Since January 2015 we have held ten Water Resources Forums and 15 technical water resources stakeholder meetings, to update stakeholders on progress with our draft WRMP19 and to give them the opportunity to discuss and challenge our approach and to highlight issues and concerns. To ensure transparency we have published papers, presentations and minutes from these meetings on our website. These meetings have provided valuable information and input to our draft WRMP19 and have also provided a good forum for stakeholder organisations to not only hear from us, but also to hear others' viewpoints and comments. We have regularly sought feedback from stakeholders to ensure our approach is meeting their needs, which has been broadly positive.
- 1.65 We have also published method statements, technical reports and documents and have provided the opportunity for stakeholders to comment on these. Where comments have been received, we have ensured we have provided feedback and an opportunity for further discussion.
- 1.66 Further information on our engagement with stakeholders is provided in Appendix S: Stakeholder engagement.

G. Engagement with our Board

- 1.67 The Board is accountable to shareholders, customers and other stakeholders for the performance of the company and in promoting its long-term success. As such, the Board is responsible for setting the company's strategy and for leading the development of its quinquennial business plan and the WRMP, including the quality and completeness of these regulatory submissions.

- 1.68 The Board has provided strategic leadership throughout the business planning process by setting the governance and assurance requirements; making key strategic decisions that shape the overall direction of the longer-term strategy; monitoring the progress of preparations; and reviewing and challenging at key stages. The Board assesses the overall quality of the plan based on the findings of the agreed assurance activity. The decisions and recommendations made by the Board are central to the development of the Business Plan and WRMP.
- 1.69 We have engaged with our executive management team and the Board at key stages in the development of the WRMP and the Board approved the draft WRMP in November 2017 prior to submission to the Secretary of State for Food and Rural Affairs.

H. Quality assurance

- 1.70 We have established a three tiered risk management and control framework to support the development of the Business Plan and the WRMP. The framework is designed to clearly define roles and responsibilities, improve communication and coordination, and provide assurance for compliance with legal and regulatory requirements as well as efficiency and effectiveness of operations, safeguarding of assets, and reliability and integrity of reporting. Independent assurance auditors are involved in the process to provide the Board with assurance based on independence and objectivity.
- 1.71 For the WRMP, Method statements have been prepared which set out methodological approaches followed in the preparation of aspects of the draft WRMP19. To provide assurance with regulatory requirements we contracted an external organisation, KPMG, to review the data collection, calculation and controls process and compliance of these with the WRMP Table instructions. KPMG completed their review between August and October 2017. The scope of the review included reviewing the approach and processes, and testing the draft data tables for the Guildford Water Resources Zone (WRZ) as a case study. Feedback was provided to the Environment Agency on issues and errors identified with the data tables following this assurance review. The assurance review has been undertaken for all six WRZs to ensure assurance of data quality and reporting.

I. Public consultation on our draft WRMP19

- 1.72 We will undertake a 12 week public consultation on our draft WRMP19 starting in January 2018. The start date will be subject to Defra's approval.
- 1.73 We will publish the draft WRMP19 on our website www.thameswater.co.uk/haveyoursay and will provide a link to the draft WRMP19 and details of how to participate in the public consultation to stakeholders and customers who have expressed interest in the draft WRMP19. This will include statutory consultees, stakeholder organisations who had participated in our water resources stakeholder forums and stakeholders who participated in the public consultation on our previous plan, WRMP14.
- 1.74 We will make a paper copy of the draft WRMP19 available to view throughout the consultation period, by appointment, at our offices in Reading.



- 1.75 We will engage with stakeholders, communities and customers to raise awareness of the draft WRMP19 and the opportunity to review and provide comment on it. We will do this through promotion in the press, via media channels, community networks and stakeholder events to give as many people and organisations as possible the opportunity to comment on the draft WRMP19.
- 1.76 We will run the public consultation on our website. Consultees can also submit comments on line or written responses by letter or email if they prefer.
- 1.77 At the end of the public consultation, we will set out our consideration and responses to the comments received. This will be in a document called the Statement of Response. We will publish this within 26 weeks of the start of the consultation. This document will:
- present the comments received during the public consultation and the consideration given to the comments
 - set out changes made to the draft WRMP19 as a result of comments and reasons for the changes
 - where changes have not been made as a result of comments, explain why no changes have been made
 - describe any other relevant changes that have occurred during the consultation period and how they have affected parts or the whole of the plan and other plans such as the drought plan or business plan
 - we will engage on our draft Business Plan in conjunction with the public consultation on the draft WRMP and comments raised on water resource matters from the Business Plan will also be considered and addressed in the Statement of Response.