Water Resources Forum, 21 March 2018

Note of meeting

1. Welcome and Introductions

Richard Aylard, External Affairs & Sustainability Director, welcomed everyone to the meeting, introduced the Thames Water (TW) team present and outlined the topics that would be covered during the meeting. Key points made during Richard's introduction were:

- It is now the formal consultation period for the draft Water Resources Management Plan (WRMP19), which closes on 29 April 2018.
- This meeting will enable stakeholders to ask questions of the Thames Water team and have maximum opportunity to contribute to the development of the Plan.
- After lunch there will be small breakout groups – stakeholders were asked to let Lesley Tait know their preference for what they would like to discuss.

2. Overview of the draft Plan

Chris Lambert, Technical lead on WRMP19, gave an overview of the draft Plan and encouraged stakeholders to respond to the consultation. TW launched its Plan on 5 February 2018 and started the public consultation on 9 February 2018. It closes on 29 April. TW is very keen to hear stakeholders' views via the online survey or in writing. Responses should be sent to Defra at water.resources@defra.gsi.gov.uk and copied to consultations@thameswater.co.uk

Some key points from Chris's presentation were:

- The Water Resources Planning Guideline sets the regulatory framework for the development of WRMPs. The WRMP sets out how TW will balance demand with available resources and – with a complex water system such as the Thames area – TW has developed its plan to cover an 80 year period.
- The water resources position in the South East is challenging due to a growing population, loss of future resources driven by climate change and the reduction of abstraction licences to protect the environment.
- As well as producing its own Plan TW works closely with other water companies through the Water Resources in the South East group (WRSE). TW has not produced its plan in isolation but has looked at a wider plan for the South East.
- It also looks at water quality, infrastructure and the implications of moving water from the source to customers.
- An overview of the water resources planning process outlining what each Section of WRMP19 contains: Section 1 provides an introduction to the planning framework, Section 2

covers current performance . Section 3 covers growth in demand and Section 4 sets out existing resources. Section 5 focuses on impacts of climate change and loss of existing resources due to Water Framework Directives (WFD). Section 6 brings all the information together at individual Water Resource Zone (WRZ) level. TW has six WRZs. London has the biggest challenge, but there are also imbalances forecast in the Swindon & Oxfordshire (SWOX) zone, Slough Wycombe & Aylesbury (SWA) zone and in the longer term the Kennet Valley zone. Sections 7 and 8 look at options available for reducing demand and developing new resources. Section 9 covers the environmental appraisal of each option and Section 10 runs through the programme appraisal process. Section 11 sets out TW's preferred plan.

- **Forecasting demand.** In the TW water supply area there are approximately 10 million people. About 2,600 mega litres per day (Ml/d) goes into supply, of which about 2,000 Ml/d is in London. Forecasting takes the local authority plan information for the first 25 years (a population increase of about 2 million). In the longer term a trend based forecast is used (indicating a population up to 15 million). The biggest growth is forecast for the London and SWOX zones.

- **Supply.** There is a reduction in available resources driven primarily by climate change. In London, 80 per cent of the water put into supply is from surface water sources, the availability of which is forecast to be affected by climate change. Overall rainfall is forecast to remain roughly the same, with wetter winters, drier summers and more extreme weather events. Less summer rainfall leaves less available for abstraction so in London TW is forecasting a reduction of about 200 Ml/d in addition to losses resulting from reductions to its existing licences. Overall, looking longer-term to 2100 the forecast is about 860 Ml/d deficit between water available and demand.

- TW has consulted with customers to understand their requirements. The strong message is to reduce leakage. At the moment it is in the region of 25 per cent. So the focus is on reducing leakage but also bringing down customer demand through a progressive household smart metering programme. Metering also helps show where water is being used in order to target water efficiency activity. Customers also said they would like TW's help in saving water.

- **Additional water resources**. In developing the plan TW considered a range of water resource options including bringing water in from the Midlands and Wales, further groundwater resource development in the catchment (though there are limited opportunities), increasing surface water storage with a new reservoir in Oxfordshire, options to make use of treated effluent currently discharged and building further desalination plants in the Thames estuary. However there is an overall constraint on how much water can be taken from the Tideway without affecting the ecology.

- **Programme appraisal.** A key factor is cost and the impact on customer bills however cost is not the only factor considered. TW has done research with 18,000 customers to understand their views on the options and built their preferences into the appraisal process. The positive and negative impacts on the environment and the level of confidence that the plan will deliver the amount of water forecast are also considered, and then how resilient the

programme is to future change. Finally intergenerational fairness is considered. Customers strongly indicated that, as they benefited from past investment by the Victorians, they should contribute towards investment for the future.

- **The preferred plan.** For the first five years TW has proposed an intensive demand management programme: a leakage reduction of 15 per cent, continuing the household metering programme of 400,000 smart meters, water efficiency activities, developing groundwater sources and water trading. TW's first large resource option is a surface water abstraction above Teddington Weir. This would be operational from the 2030s onwards. To facilitate this further abstraction, some of the treated effluent discharged from Mogden Sewage Treatment Works (STW) would be treated to a higher standard and put into the river above Teddington Weir. In the 2040s the plan shows a reservoir in Oxfordshire to provide water for both TW's customers and for the wider south east to help with other companies' growing deficits. In the 2060s there is an option to bring water into TW's area via canal transfer. Further ahead still, there are options for treating effluent from Beckton STW using reverse osmosis and putting the treated water into the Lee Valley reservoir chain.

GARD: If comments are sent to consultations@thameswater.co.uk will they also get to Defra? **TW:** Anything that comes to Thames Water will definitely get to Defra. Please send responses to both Defra and TW.

GARD: Defra's contact details are not very clear. **TW:** Defra's contact email is water.resources@defra.gsi.gov.uk

TRT: Does the Environment Agency (EA) have any particular environmental issues with the Teddington abstraction? **TW:** This will be covered later on, but we are working very closely with the EA to address their potential concerns.

KVF: The Abingdon reservoir was in the draft WRMP plan ten years ago; last year the Minister for Water said water companies should come forward with storage options. Why has it gone back to 2040 when it was so important ten years ago? **TW:** Because we are doing a lot more on demand management. Also the requirement for water is driven by other companies in the South East. So the timing has moved due to other drivers. **KVF:** There are 2 million extra people not having any water. **TW:** We are fairly comfortable that we have got enough different options to address growth over 25 years. The Teddington option will provide over 200 Ml/d based on the current design, then the substantial demand management policy and water trading with other companies. It is all about timing. **KVF:** Not without breaching your environmental requirements? **TW:** We will talk about environmental requirements. The EA have specified for us a number of licences that will potentially be reduced and that is built into our plan. When you look at the plan we undertook a number of scenarios where we looked at what the licence reductions would do to the timing of our options.

AMF: We should have some detail as this is hugely significant and many people will not think your proposals have much credibility. **TW:** We will come back to this point.

CPRE: The issue about the sensitivity analysis of these proposals. You put in a plan, but what happens if population or housing predictions change? Is that covered in resilience or in scenarios? **TW:** It is covered in the scenarios. We have an adaptability metric and we test the robustness of the

forecast investment programme against a variety of differences in population forecasts and climate change. **CPRE:** Would that also apply to leakage? **TW:** Yes it does.

3. Forecasting growth

Alex Nickson – Water Resources and Growth Lead. Key points of Alex's presentation:

- TW is required to follow the WRPG which stipulate that forecasts for population and housing growth must be based on local authority plans. It also follows UK Water Industry Research Ltd (UKWIR) guidance. For the period 2020-2045, demographers Edge Analytics collated data from local plans from the 95 local authorities in the TW area. For those local plans that did not stretch to 2045, Office for National Statistics (ONS) trend-based forecasts were used. For 2045 to 2100 the University of Leeds demography department was appointed to produce trend-based population forecasts.

- After TW produced its projections there were new forecasts, for example from ONS, and local authorities continued to publish their local plans. The previous draft WRMP used data from May 2017, and the revised projections use figures from August 2017 – this did not produce any material change. TW did see a big change in the 2045 to 2100 forecasts where it has moved away from the Leeds forecasts to the ONS National Populations Projections produced at the end of 2017. This produces a population figure of around 2 million fewer than in the draft plan and a significant drop in the number of homes. TW is therefore revising the household demand forecasts.

GARD: I am pleased to see the household forecast. Before you had a point of inflection at 2045 where the two models met. Now you've gone to a point of inflection the other way where you have gone from local authority plans to new figures with another point of inflection. If you look at the ONS figures for 2045 they are still markedly lower than you have at the moment. I understand you have to use the local area plans, but where those do not exist you should use ONS figures. So you still need to break that point of inflection at 2045 down and, if you join your graph to where it should be, the figure is even lower. **TW:** I am not sure I agree that we have to use ONS forecast; we have to use the best available data. **GARD:** It says you should use alternative methods such as household projection, local government and/or ONS figures – and the ONS figures are still quite a lot lower. **TW:** We have drawn from a range of sources. The GLA plans do go out to 2045, whereas local authority plans tend to go to the late 2030s. The GLA represents a significant portion of our population. We think this is a reasonable forecast for demand but would be delighted to discuss it with you.

CPRE: Have you been using Strategic Housing Land Availability Assessments (SHLAAs)? **TW:** We have been using published local authority plans where they have been adopted. Where they have not been adopted we have used SHLAA or Strategic Housing Market Assessment (SHMA). **CPRE:** Are you using five-year housing plans and housing trajectories because that gets closer to the realism of what actually gets delivered and takes into account infrastructure issues? **TW:** We have been using the data that is in the plans. We are also conscious that government has published a revised methodology. We are using the plans that we have to, but are also conscious there is likely to be an upgrade to the numbers. While some say they are too high and

others too low, we have gone with what we have been instructed to. **CPRE:** Back to my earlier point about sensitivity analysis and what is likely to be delivered. How is it projected to make it a bit closer to that? **TW:** I suggest that government is throwing all its policy might into moving the housing delivery upwards and by the time this plan kicks in we will be three years into that policy enablement. It is very difficult to forecast what will be the impact of that. We are required not to constrain growth, as it says in the guidelines. **CPRE:** If you end up with huge investment and not getting a return, that is going to affect the financial viability of your plans. **TW:** Ofwat will be scrutinising that very closely. It is an important point, but it does not quite work that way; we will cover that this afternoon.

4. Forecasting future resources

Chris Lambert then presented on the situation with regards to the future resource situation.

- In the draft plan there is a section where TW looked at, through scenario testing, the EA's Water Industry National Environment Programme (WINEP2) where the EA have identified sources that they considered as potentially environmentally damaging and where potentially abstraction needs to be reduced. A significant reduction in London was focused on the Lee Valley where they indicated a reduction from existing abstractions of ~125 Ml/d, plus 9 Ml/d elsewhere.

- TW undertook investigations of the River Lee looking at potential impacts of abstractions on the ecology. The investigations are now at an advanced stage and the EA has confirmed the licensed sources that they expect TW to reduce: a reduction of 9 Ml/d in Bexley, and a further 9 Ml/d in the Slough, Wycombe and Aylesbury WRZ.

- When TW produces its baseline forecasts in the revised draft plan, the water available will be after these reductions. That does not mean potential issues in other catchments have gone away, but a better way to tackle them is through river restoration schemes and other alternative solutions. The EA will formally publish the outcome of their WINEP2 programme at the end of March2018. The report will be available then.

AMF: What does river restoration mean in practice? **TW:** River restoration is where for example the river has been channelised you are putting it back to its natural state. We are undertaking some of those river restorations elsewhere in the catchment and it is not a new approach. We have a number of abstraction points in the Lee Valley catchment and it is a matter of balancing them.

AMF: There is a viewpoint that it is little to do with restoration. Ultimately you are making these rivers smaller because there is less water in them, and rivers need to maintain velocity. The only way you can do that with a lower flow is by making them narrower. It is nothing to do with restoring rivers to the natural state – it is simply cosmetic surgery or Botox for chalk streams. **TW:** The Lee report is in draft and we will make available at the end of March.

- **Impacts of climate change.** The forecast impact is significant particularly in the London WRZ. The EA's approach is to forecast the impacts of climate change out to the 2080s. In London the effect is a loss of about 200 Ml/d and there is detailed analysis in Section 5 of the plan. It

appears that, between the 2050s and 2080s, the linear impacts of climate change are going to be fairly steady. HR Wallingford has therefore been commissioned to do a further piece of work which will build into the revised draft plan to be published later this year.

- Another piece of work on climate change is the Marius project led by Professor Jim Hall of Oxford University, looking at the impacts and uncertainties of drought in the future and how it should influence planning. A suite of individual investigations within the project included looking at future changes in drought which suggested that the droughts that occur within the Severn and the Thames catchments are likely to become more coincident than currently. This has a significant potential impact for TW when looking at the transfer of water from the west into the TW catchment. TW has now commissioned CEH to do some more detailed work.

GARD: I would be interested to know what Severn Trent has to say. Do they agree with that assessment and have they done that work as well? **ST:** I have not seen this piece of work however the majority of the water we are offering to TW is drought resilient as it is mainly treated final effluent. **TW:** The key point we are making is that Severn Trent's transfer comprises an unsupported and a supported element. This would have an impact on the unsupported element of the transfer.

- Another piece of work is on the resilience to drought of the Abingdon reservoir. GARD raised concerns about the Atkins assessment on resilience. In response we commissioned Atkins to undertake further work to address concerns. At a technical stakeholder meeting in January Atkins went through the methodology and a number of changes were agreed by stakeholders. That work is currently under way; TW will share the results as they become available and build them into the revised draft plan later in the year.

H&MWT: In the investigations, there did not seem to be any consideration within that of the resource management plan for the abstraction from the Newgate system. Also what potential impact and what resources will TW have to meet demand targets? There seems to be a lot of reliance on customers changing attitudes or rolling out of metering. What are the potential impacts on resources if those targets are missed? **TW:** We have an adaptability metric which looks at how robust the plan is against different future scenarios.

KVF: As you are aware from previous events, angling and wildlife groups have expressed concern at the prospect of highly turbid water from the bottom of the Severn catchment being discharged to the upper reaches of the Thames catchment. We have just heard from the Severn Trent representative that we have to look forward to treated effluent along with turbid water. What are the environmental implications for the integrity of the upper catchment in particular? **TW:** We have done a lot of work to look at water quality implications and hydrological aspects in terms of volume and how it might change the river. That work was led by HR Wallingford. The transfer needs to come lower down in the River Thames at Culham below Oxford, to address impacts of hydrological change. The treatment process itself at the Severn end will include water treatment works to reduce sediment to prevent it being brought into the Thames catchment. We have also commissioned CEH to do further work on the algal loadings of the water. One of the issues identified is that if water with high algal loadings is put into the Thames it would have an impact. The work is not complete yet but will be built in to our assessment.

AMF: The proposed 125 Ml/d reduction in the Lee which is now not going ahead, can you tell us where that was and why it is not going ahead? **TW:** It was from our existing abstractions into the Lee Valley Reservoir. There are abstractions into the King George reservoir and the William Girling below it. The reason it is not going ahead is because the cost benefit case does not stack up. To remove that volume of water from the Lower Lee would necessitate developing additional resources which are highly costly compared with any benefit.

EA: Can you confirm that you will be taking into account the WINEP2 reductions? **TW:** Those are the two reductions I mentioned – 9 Ml/d now in London and then another 9 Ml/d within Slough, Wycombe and Aylesbury.

5. Leakage reduction plan

Tony Owen – Tony introduced the topic of leakage by outlining the three different types of leakage: visible (2 per cent), hidden (70 per cent) and customer side (28 per cent). To stay in the same place with leakage, TW repairs 60,000 leaks per year, saving 300-400 Ml/d of water. If TW stopped working to reduce leakage the levels would double within a year. Key points with reference to leakage reduction in the draft WRMP:

- In the current period 2015-2020 TW is looking to reduce leakage by 9 per cent (59 Ml/d). In the draft WRMP there was a further 9 per cent (55 Ml/d) by 2025. Since then there has been feedback from government, stakeholders and customers that they expect TW to do more in the first five-year period to 2025 so TW has increased its proposal to the position of 15 per cent, which is roughly 100 Ml/d, with a longer term commitment to halve leakage.

- In order to achieve the 2025 target TW will continue to progress smart metering – and bulk metering of flats – which helps to find leaks on customer pipes and identify wastage in homes. Data insight from district meter areas (DMAs) also helps with targeting leakage. TW will continue with mains replacement to achieve >650km of mains replacement. 'Find and fix' repairs will continue with a target of <60,000 repairs. Pressure management will also be carried out on a zonal basis.

- The draft WRMP looks at three main initiatives for leakage reduction – Data Insight (more effectively using the data from smart meters, employing more skilled data analysts), Innovation (for example using satellite imagery to look at the network, intelligent use of data) and Effective Planning (for example working closely with local authorities when planning streetworks).

- The proposed increase in leakage reduction in the next 5 years to 2025 has had no significant effect on TW's proposed investment strategy in terms of the Teddington Direct River Abstraction (DRA) and the Abingdon reservoir.

BW: Can you give us more information about smart metering - what is the frequency of meter readings and the nature of smart meters you plan to use? **TW:** The smart meters provide hourly data.

CPRE: AMR meters have problems in rural areas with phone signal – electricity companies cannot read them as the signal is not strong enough. My other questions is - are you doing habit studies to understand how people use water? People often run washing machines at night. Understanding how people use water is just as important so that when you read it you know whether it is a use or a leak. **TW:** We have invested a lot of resource in developing the data transmission network through London and will extend this to the SWOX and Guildford areas during 2020-2025. We analyse the water use data to understand whether it is genuine water use or if there is a leak, which would be visible as continuous water use.

TRT: Given TW's track record on leakage how much confidence can anyone have in what you plan? It sounds quite good but comes back to deliverability. How do you assess the risk of not achieving what you set out to do – which is quite ambitious. **TW:** To put it into context, for 10 years we hit our leakage target and reduced it by 300 Ml/d. So we do have a track record of achieving reductions. We are looking at different approaches to reduce leakage further; having a whole range of leakage reduction activities allows us to manage risk and we need to manage it properly. The activities planned with leakage and demand management exceed the deficit in AMP7 as such there is a buffer. In the draft WRMP we have a deficit of 129 Ml/d, in London the amount of work we are doing on leakage is 100 Ml/d and we will do more work with usage so the amount of activity we are doing is greater than the deficit.

TRT: On things like the effects of metering and water efficiency, there is a lot of reliance on changes in human behaviour. Our view is you are putting a lot of expectation on demand management - which is popular with Ofwat and NGOs etc. but really you should be taking a strong view on what is at risk for the environment and the customer. **TW:** We are going through an exercise of understanding how we can achieve leakage and PCC and how they impact other parts of our plan. We will look at uncertainty to make sure we are doing the right thing.

PVFF/CCG: I understood from customer research they want you to reduce leakage to 15 per cent, not by 15 per cent. Haven't TW agreed to do that? **TW:** Ofwat's has set out in its methodology for companies to consider reducing leakage by 15 per cent, which is our revised target to 2025. Customers asked us to reduce to 15 per cent of the amount of water we put into supply; we are aiming to do this but it will take longer. **PVFF/CCG:** 15 per cent by when? **TW:** Current work indicates that this would be by 2040 but this is work in progress. We need to be sure the ambitions are deliverable and that reductions in leakage and usage are sustainable. **PVFF/CCG:** So this WRMP is going to be 'by' 15 per cent? **TW:** By 2025 it is 15 per cent reduction in leakage, and by 2040 we will get it down to 15 per cent of the amount of water we put into supply.

KVF: Not all NGOs are thrilled at idea of demand management. Last year TW was fined for failing to meet leakage targets, now you have bigger targets you might be fined again this year. Is the company going to look absurd? **TW:** Over the past 10 years we achieved our targets. We have had a couple of years with problems. Because of how leakage is calculated, as an annual average, we will miss our target again this year. We are committed to leakage reduction and have a plan to improve, in line with customer and stakeholder expectations.

KVF: Your CEO said the ultimate aim of the company is to stop abstractions from all chalk streams. **TW:** Firstly on the financial penalties for missing targets. There is an automatic penalty depending on

how much we miss the target by. Last year a penalty was imposed for missing leakage; we will miss the leakage target again this year with a further penalty. We expect to get back on track by April 2020. Recent cold weather has been a problem. Separately, Ofwat are conducting an investigation on why we missed our target by so much last year. There is the potential for Ofwat to impose an additional fine any year in which we miss the target. There is a lot at stake for the company. In taking on the 15 per cent challenge there is a plan to get to it in five years. Learning from that we will be going to get to the 15 per cent that customers want to see by 2040, or perhaps earlier. To help with the risk, we do a new plan every five years so there is an opportunity to recast some of the investment strategy every five years. If things move very dramatically, there can be a new plan at any time of the company's and the Secretary of State's choosing. The longer term aspiration is to halve leakage from its current level.

The other long-term aspiration is to stop abstracting from chalk streams and other environmentally sensitive sources. We are committed to it, there is no detailed plan but it is a firm public aspiration with support from the Customer Challenge Group (CCG), customers, NGOs, the EA and others. There is a question of what is an aspiration and what is a plan - one moves into the other over time.

KVF: What is the glide path for moving to zero abstractions from chalk streams? Who is doing that work and when will the report be published? **TW:** The aspiration was only set a couple of months ago, and we are all working on it. You saw the EA playing its part in sustainability abstractions. Giving up 9 Ml/d at Hawridge may not sound much but it is coming out of the headwater through the River Chess so that is a step towards where we need to go. We need to start working out with other companies on how to get the best overall plan across the South East. Hence the WRSE group. There is no plan yet but we rely on stakeholders to hold us to it.

KVF: You cannot answer TRT's question because you have revised the WRMP which is dependent upon increasingly difficult to achieve demand management targets. In the context of rising population and ancient infrastructure under London it gets more difficult all the time. Then if you do not meet targets handed down to you by Ofwat or anyone else there isn't the headroom – short of having another WRMP. That is why the plan is not acceptable in its current form. **TW:** Firstly - if we fail targets it is too expensive for our shareholders so we make sure we do meet them. They are also in line with what our customers want; they are paying so their expectations are really important. Also we look at the plan every five years so it will not roll on until 2080. The future will be different from what we expect now. The other point is when we talk about historic efforts to get leakage down they did not have the smart data and acoustic loggers that we have now. The world is changing and the question is whether we can get all this together and make it work. That is our challenge. If you think the plan is not resilient enough, that is the kind of point we need to hear via the consultation.

TRT: The issue is the process because for four years stakeholders have followed TW in a complex procedure. You have used state of art modelling and outside experts. Thames is the most complex catchment and you have followed it to the letter. Even though some stakeholders do not agree with every point, you have brought them along. That was all going well until November when you went to the Board. Before the Board meeting your Chief Executive said he was keen to reduce pressure on chalk streams. Then suddenly the next thing we hear the reservoir has gone backwards and you have put in two or three high risk demand management scenarios which haven't been discussed in much

detail with stakeholders. When asked about risk there did not appear to be any contingency. The longer you push out Abingdon reservoir the harder it is to bring it forward. So it just seems we trundle through your process and at the very last minute because of political pressure you succumb to high risk short term changes. That is the concern – that you did a good job and changed at the last minute so it is difficult to have faith in the plan. **TW:** I would not put it all down to one Board meeting. There are a number of factors here. Certainly the Ofwat expectation that companies would get leakage down by 15 per cent in the next five years was very significant – far more so than what the Board said. It was backed up by the Secretary of State in the 25 year plan so it became commitment we had to meet. Customer research said the same – that our priority to get leakage down. We are doing all that. Whether we have built too much risk into the plan is a good question and is why we consult on it. This plan is a long way from being finished and we are acutely conscious that people in this room have put a lot of effort in over four years. It is the consultation responses now that will make a big difference. **TRT:** I attended the EA Board visit to Henley last week where they talked about the 25 year plan for Oxfordshire. The Henley MP had a go at Steve Robertson about the reservoir. Sir James Bevan said he did not want to demonise the water companies. He also thought people needed to think about future water supply issues and we are going to have to look at the reservoir again. In the past the EA has been against the reservoir and that sounded promising. **TW:** It is quite a fluid situation.

6. Assessing environmental and social impact

John Sanders (Ricardo) leads the environmental and social impact assessments on behalf of TW and outlined the impacts that TW has considered in putting together its draft WRMP. Key points of John's presentation:

- There is a statutory framework which assesses option elements, options, programmes and the WRMP as a whole in three key ways: a Strategic Environmental Assessment (SEA), Habitats Regulations Assessment (HRA) and Water Framework Directive Assessment (WFDA).

- TW has carried out assessments at a range of different levels – firstly option elements such as a river intake, a pipeline or treatment works. We have also examined options such as the Teddington DRA which comprises a number of option elements including a water treatment works (WTW), a pipeline, tunnel and so on.

- TW has also looked at a range of alternative programmes to understand the overall environmental effect of a whole package of measures.

- Environmental and social assessments are an integral part of the programme from the outset. Over 300 different options were initially considered, then screened using the HRA, WFDA and SEA processes approach. As TW has moved through the process, the number of options has been reduced after assessment. As the plan has been developed, the same screening approach has been used on the options at each stage of the process, and ultimately on the draft WRMP itself. Throughout all that we have consulted with this Stakeholder Forum and with a wider range of stakeholders as we have developed methodologies and on the assessment findings.

- Slide 39 of the presentation sets out the key references for the environmental assessments in terms of where they can be found in the draft WRMP documentation. They are available on TW's website in the 'Our reports' section. The SEA, HRA and WFD are summarised in sections 9 and 11 of the draft WRMP.

- A shortlist of alternative programmes was drawn up – the environmental effects of which all looked very similar overall, however the locations of their minor to moderate adverse effects varied. The minor to moderate beneficial effects were similar between the programmes.

- In summary the groundwater options are generally minor adverse and some of the major supply schemes have moderate adverse effects overall – but there are a number of major adverse effects on specific environmental or social receptors as a result of developing those schemes. The programme is compliant with the Habitats Directive subject to mitigation measures during construction, and with the WFD regulations for all but one scheme. Teddington DRA is still subject to agreement, and Beckton reuse scheme does not yet comply because of risks associated with the salinity of the Thames Tideway around Beckton, which could affect saline-sensitive species.

- Teddington DRA has compliance risks relating to aquatic ecology – in particular from changes in water temperature arising from releasing treated effluent into the Thames. Over recent weeks TW has carried out further modelling and investigation work and re-engineered the design to address flow velocity risks to Eels. A concern about oxygen levels of discharged water has been addressed by additional oxygenation of discharged water. The issue about temperature of discharged water has been addressed by operating rules to reduce or cease discharge rates in autumn and early spring when the temperature of discharged effluent could be higher than the river temperature.

- For the Beckton reuse scheme key further work includes a salinity monitoring programme and research into salinity sensitivity of key species including the smelt fish, swollen spire snail and tentacled lagoon worm. This scheme would not exceed the 275 Ml/d threshold until 2084 so there is substantial time to carry out further assessment of these risks. Natural England is proposing a marine conservation zone in the area.

CCT: Another effect on salinity is the Teddington DRA scheme. Most of the flow comes from Mogden STW so if you take it out somewhere else you are already 280 Ml/d down on the current situation so when you say Beckton can get 275-365 Ml/d does that take into account you have already taken 280 Ml/d under the Teddington DRA? **TW:** We have looked at that. Studies have shown that the Teddington DRA may have an effect on salinity but at the point it reduces to negligible. Generally in dry weather it is around Tower Bridge. Under low flow conditions it would lead to the point at which salinity becomes virtually negligible - around Chelsea. There is a minor risk of the saline wedge moving up river but it does not materially change the salinity at Beckton. The threshold of 275 to365

Ml/d takes into account the Teddington scheme as well as the Beckton scheme and the Thames Gateway desalination plant.

GARD: To address an earlier point I am very disappointed to hear from the organisations supporting chalk rivers saying they want the reservoir. I fully support the environmental concerns you have and am disappointed that your answer to environmental concerns is to raise a lot of new ones in other parts of region. We have not touched on the reservoir in detail here but can see moderate environmental effects, and that masks major adverse effects that are in there. We should be looking for a solution from TW that resolves all environmental concerns, not just one particular area. On the environmental assessments there is some very detailed information and one of the issues is that major adverse effects in many schemes are countered by the major beneficial effect of providing water. All schemes provide water so it is a common benefit to them all. I could create a scheme that squashed great crested newts to provide water and it would be offset by having the major beneficial effect of supplying water. The majority of adverse effects are things that will definitely happen. The majority of the moderate or minor beneficial effects are things that might happen, and could happen now but are not. For example when you offset adverse effects of the reservoir by building an equestrian centre – there is nothing to stop someone building one now. **TW:** On your first point we have deliberately kept adverse and beneficial effects separate and independent. We have not sought for them to cancel each other out. **GARD:** I agree, as you have a league table of adverse and positive, but other people might think you have. **TW:** That was not the intention of the methodology and, with this group, other experts and advisers, best practice is to keep them separate. Your second point was around certainty of effect. It is an important consideration for both adverse and beneficial effects. Some are far more certain and some are not, for example with Beckton there is much greater uncertainty about effects of saline sensitive species than there is for knocking down an ancient building. It an important point; we have sought throughout to flag which effects are more certain than others. We can discuss it more this afternoon.

KVF: You said that the plan was WFD compliant. I am struggling with that, given that the direction of travel with WFD means we have a legal requirement to have rivers at good ecological status by 2027. We are actually now going backwards. How many of rivers in the catchment are going to be progressing towards good ecological status as a result of the plan? **TW:** When we say the plan is WFD compliant it means that none of the schemes lead to WFD deterioration and also do not comprise the ability to achieve good ecological status. A wider point is to what extent does the plan contribute to good ecological status for the Thames catchment as a whole. If demand management schemes deliver 250 Ml/d of reduction that will help to make a contribution to achieving good status. Some of the conservation measures attached to larger schemes will deliver some local benefit to the environment.

KVF: On the salinity concern - high spring tides push salinity further upriver; this has an impact on freshwater species in the Tideway. I have a concern about the level of scale and lack of apparent study of what it could mean for freshwater species. Will they bunch up towards Teddington? **TW:** In terms of the wedge, we have done salinity modelling with HR Wallingford and others to understand how it may move upriver under different flow conditions, different abstraction rates, and combined with the Beckton and Thames Gateway schemes. We produced a report last year and are happy to talk about it.

KVF: Have you done any work on the massive benefits the reservoir will deliver by allowing water transfer down the catchment to reduce some of the unsustainable abstractions further up in the Hertfordshire chalk streams? **TW:** This has been a recurring theme and TW produced a catchment management feasibility report on the issue of - when developing a larger scheme - whether can you reduce abstractions from smaller rivers.

AMF: From my own perspective I can assure you there is no inference of robbing Peter to pay Paul. There is a severe regional problem in terms of potential environmental impact of water supply in the south east of England. I am astonished we getting so desperate that we are even having a conversation about Teddington. How have we got ourselves into this position? In terms of the WFD we have gone backwards. What forecasting has TW done should you miss the highly ambitious leakage and metering targets and the potential environmental impact in terms of WFD on the existing river systems? **TW:** As part of developing the WRMP there were a number of sensitivity tests carried out – for example looking at what if this programme only delivered half what we expected and looking at the implications. It is all written up in the SEA reports on the website. That only looked at a certain number of scenarios. **AMF:** If you miss the leakage target where are you going to make up the supply from? **TW:** We did do some sensitivity analysis, but not aware that we covered that specific question. However you can probably deduce from the analysis that has been done what the response would be should that eventuality arise. **AMF:** I encourage you to do something; I would like to see the outputs of that forecast.

HE: You showed maps of the Teddington DRA and the Beckton reuse scheme. I would be interested to know the impact on cultural heritage in terms of the infrastructure. What is new and what is existing? **TW:** The orange coloured part (including the tunnel) is new. **HE:** Is the plant new as well? **TW:** At the Mogden treatment works there will be a small amount of work to improve treatment - all within the site boundary. The orange is a combination of new abstractions and existing. Exact locations have not been decided; there is a lot of flexibility. **HE:** And Beckton? Beckton treatment works already exists so again it would be improvement works within the existing site. The tunnel is the main new feature – we are going underground to try and avoid effects on the landscape and on properties. We will be happy to talk you through it in more detail.

7. Severn Thames transfer

Chris Lambert gave an update on the Severn Thames transfer. The scheme is to potentially take water from Lake Vyrnwy reservoir, release it into the upper reaches of the River Severn and down to be abstracted just above the tidal limit of the River Severn, then pumped over the Cotswold hills to the Thames catchment for discharge below Oxford at Culham. Chris's presentation included the following key points:

- There are other options that contribute to this scheme – for example a supported discharge from Minworth STW to the upper reaches of the Warwickshire Avon, potentially enhancing Draycote reservoir, and two STWs that currently discharge into the Severn at Netheridge and Haydon. That water would be pumped upstream.
- The overall lead time is in the region of ten years.

- There is an assumed 10 per cent loss of water before it is abstracted at Deerhurst. We are investigating a 'put and take' licence with the EA. The EA considered that 10 per cent is too small and would have a detrimental effect on the Severn estuary, so further work has been done and the WRMP will now look at 10, 20, 30 and 40 per cent loss scenarios. Further work will be done on this, including field studies of actual releases from the reservoir.

- Some of the options proposed by Severn Trent had unacceptable hydrological impact on the River Avon. So further work has been done on this and the conclusion is that the Draycote Reservoir option and Hayden effluent transfer option both have unacceptable impacts, so they will remain screened out in our revised draft WRMP. We are taking the Netheridge and Minworth options through to the constrained option list but the EA have said they want to undertake further work to examine environmental implications.

- Welsh Water (Dŵr Cymr) has proposed a River Wye transfer option to provide up to 90 Ml/d to the Deerhurst pipeline. They would develop other options, allowing them to release water into the pipeline for the Severn Thames transfer. Work is being undertaken on costing and a SEA for the pipeline from the River Wye to the Severn Thames transfer pipeline. Welsh Water will have to go through their own assessments in terms of positive and adverse impacts for their region.

- TW is undertaking collaborative customer research with Severn Trent and United Utilities on these transfer options. TW's own customers were not very keen on being dependent upon other areas to supply them with water – preferring things to be kept under TW's control in the Thames catchment.

Question: Is there evaporation? **TW:** Evaporation tends to be quite small. In HR Wallingford's report they have allowed for evaporation but it is quite small. You have losses going into the banks; there is a whole suite of ways in which losses happen.

KVF: Is the Deerhust abstraction looking at 300 Ml/d? How would you treat that to an acceptable standard and put it into the upper Thames during low flow periods without environmental impact? **TW:** There is a treatment works at the Severn estuary end of the pipeline where sediment would be removed, and one element we are doing further work on with CEH is the algal loadings associated with the water and whether they could increase loadings in the Thames catchment. **KVF:** There is a big concern about water transfer and its potential to move invasive species around, and I would like to know the EA's view on that. Also the EA could implement hands off flow regime in some of these catchments, particularly for scarce of protected migration species like salmon or trout so you could have massive infrastructure and not be able to use it. **TW:** There is currently a hands off flow at Deerhurst to protect the Severn estuary and also bring the fish up the river. The EA have said that under current arrangements they would not allow a put and take licence because they want to ensure the Severn estuary is not damaged. We are doing further work to alleviate and agree with EA what loss scenario might enable a put and take licence. On the invasive species question, the EA have requirements for transfers – taking into account the risk of transferring invasive species. Treatment does include mitigation but the treatment does not guarantee 100 per cent that there are no eggs. The only way to do that would be to chlorinate.

CCT: The Cotswold Canals Trust is keen on the Severn Thames transfer using the canals, not a pipeline. It would give us about 70 miles of fishing. I have looked at invasive species studies and a lot of these species are in the Severn and in the Thames. The one that is different is quagga mussels which seem to be close to the end of the Deerhurst pipeline but not the route the canal would take. In terms of sediment, using the canal route it starts off going down the Gloucester and Sharpness canal and before it gets to the Cotswold canal has several miles to settle out and the water not simply Severn water.

CCT: Another point was made about reuse of effluent. I used to live at Cricklade close to the Thames. There you could walk across Thames in a dry year until you got to the confluence with the River Ray. There was plenty of water there, virtually all coming from Swindon STW. So the notion that dirty water from the Severn will mess up the Thames is not that different. All of it has been through sewage works.

AMF: Just to follow up with some background. North Atlantic salmon is a species near extinction, with only a handful of rivers left in southern England and Wales that have natural migrating salmon. One of the main two is the River Wye. In terms of the research you have done where people indicate they prefer water to come from the local region, are they sensitive to the fact – and is it explained to them – that we are running out of water and are going to have to take supplies from somewhere else? **TW:** We did a lot of deliberative customer research and it was explained carefully – we spent a morning explaining the very complex water resources situation.

8. Water Resources in the South East

Chris Lambert explained that the options being looked at are not just to supply TW. They are also for the wider south east area. Many of the other water companies are consulting on their draft plans and this may have an impact on the requirements that they have for options from the Thames catchment. It is a fluid situation and we will get more clarity in due course after their consultations. There is a perception that water companies do not link to each other, which is not strictly correct because water is moved around between them. Chris showed (slide 55) where water is currently moved between companies, and where it potentially will be in the future.

GARD: A question as a customer. The WRMP talks about resources but mostly it is to support transfers from TW to other companies. What about the costs to customers - why are the costs borne by TW's customers? **TW:** If the schemes were to go ahead, they would be jointly funded by the water companies. When they look at the options in their plans they allow for paying for that water. **GARD:** Would the profit on transfers be reinvested? **TW:** It is at cost, not for profit. **GARD:** That is not what it says in the WRMP. **TW:** To develop a resource there are costs and those are funded by customers across the south east companies over a long period.

TRT: Are there transfers in and out of Anglian? **TW:** Rutland Water supplies the Affinity area so there is an existing link into Anglian's area. As well as the WRSE there is a Water Resources East (WRE) area, looking at moving water from the Trent into the WRE area. Affinity sits in both WRSE and WRE.

AMF: Your slide mentions Essex and Suffolk Water. **TW:** We currently supply Essex and Suffolk with an average 90 Ml/d supply. In drought they now have a surplus after increasing the size of Abberton reservoir. We reduce the amount they take during periods of low flow down to about 70 Ml/d. **AMF:** So with Affinity and Essex and Suffolk we are exporting about 200 Ml/d? I want to point out the irony of exporting water from a stressed area, all the scrapping about, and environmental damage – and we think we can still export? **TW:** On Essex and Suffolk, this agreement was put in place in 1963. It is a long standing agreement where the infrastructure has been in place for many years. Not something you can easily stop.

CPRE: Is there any overarching commitment to look at this in terms having a water grid? **TW:** That is essentially what we are looking at with WRSE at a regional level. It is not a grid using pipes, but using existing rivers. **CPRE:** Is it a conscious objective or accidental outcome? **TW:** Conscious – our regulators asked us to look at transfers.

9. Refinements to programme appraisal

Chris Lambert introduced Jenny Kwok and Anna Wallen who have done most of the work on the programme appraisal process. Programme appraisal identifies the best value programme to meet the supply-demand balance. Chris described the appraisal process, which goes from data input through data validation, spreadsheet modelling, river simulation modelling, validation of modelling outputs, shortlisting programmes, SEA and social assessment through to selecting the preferred investment programme. Key points covered in this section were:

- The draft plan is primarily based on the spreadsheet model. TW has used the simulation model but had not got the scheduling element of that tool working robustly. It is now working and so TW will use that tool in the revised draft WRMP to complement the work done using the spreadsheet model.

- TW looks at the long-term costs of each option over an 80 year period, at deliverability confidence, impacts on the environment, resilience to more intensive droughts and flooding, customer preferences, intergenerational fairness in terms of who pays, and adaptability.

- A new tool has been developed to plot performance against the metrics.

- Section 10 of the draft plan contains a variety of current performance metrics covering numerical and grading values, enabling TW to compare the individual programmes. These metrics have recently been enhanced to make them more transparent – moving from comparative grades to units. A description of these is on slide 60. Chris gave more detail of one example, Resilience.

- Previously TW planned against the worst historic droughts in the 20th century – the average frequency being 1 in 125 years. The WRPG requires companies to look at resilience over a 1 in 200 year event but in this metric TW is looking at the probability of a Level 4 failure for a 1 in 200 year event but also a more extreme 1 in 500 year event. The reason for looking at more extreme events in London, on the basis of a 1 in 1,000 year event, is because the capital is seen as having enhanced value is the economic and social impact would be huge.

- The Adaptability metric is not in the draft WRMP as it was still being developed at the time, so a scenario testing approach was used to look at the performance of different investment programmes against different outcomes – for example if a resource option cannot be developed what would the programme look like instead? When an investment programme is identified the Adaptability metric will enable TW to identify how resilient that programme is to differences in climate change, different population, differences in WFD objectives and requirements for resource sharing at a regional level.

- A whole suite of different outcomes results from combining different scenarios together so TW then looks at how robust its preferred programme is in that context. The revised draft WRMP will give visibility of this process.

- Under each scenario a potentially different forecast future can be the outcome, so the forecast is reset at each branch node.

- TW has a series of independent experts who have scrutinised the methodology throughout the process. The leading expert in this field is Professor Julian Harou of the University of Manchester. He was excited by this new post-processing adaptability approach.

AW: What does moving from 9 per cent leakage to 15 per cent do to your options on timing? **TW:** This was covered earlier in Tony's slides. In the short term because we have a resilience deficit, even if we did more for leakage it does not really impact on that requirement to get to a 1 in 200 year resilience in the short term. When you look at longer term the requirement for resources in the long term is not just driven by TW drive but also by other WRSE companies so does not really have a substantial change in timing – for example the requirement for the reservoir is still in the 2040s albeit a bit later.

10. Overview of engagement and next steps

Richard Aylard gave an overview of the engagement on TW's Business Plan and WRMP19 consultation. Both consultations close on 29 April. Other engagement activities include Local Engagement Forums, and Open Day at Mogden STW, shopping centre drop-ins and other drop-ins at Steventon and Oxford.

Next steps – following consultation TW will publish its findings in summer 2018 and on 3 September the Business Plan will go to Ofwat and the draft WRMP will go to Defra. In January 2019 Ofwat will give its initial view of the Business Plan. In the spring/summer of 2019 Defra will respond to TW on the revised WRMP. Their three options are to accept the plan, push it back to TW for more work in certain areas, or call a public inquiry. In December 2019 TW will get the final Business Plan from Ofwat for the next five years, it is implemented in 2020 and the planning cycle starts again.

The remainder of the Forum provided an opportunity to break into groups and discuss with TW experts the following topics chosen by stakeholders:

a. Programme appraisal
b. Demand forecasting and demand management
c. Environmental assessment

d. Resource options

Richard invited stakeholders with any other questions subsequent to the meeting to contact Lesley Tait – lesley.tait@thameswater.co.uk

END

Attendees

Mumin Islam	Affinity Water
Malcolm Jeffery	Albion Water
Feargal Sharkey	Amwell Magna Fishery
James Champkin	Angling Trust
Martin Kent	Action for the River Kennet (ARK)
Patric Bulmer	Bristol Water
Kane Horton	Canal and Rivers Trust
Dr Chris Wilding	Steventon Parish Council
Ken Burgin	Cotswold Canal Trust
Christine Drury	Council for the Protection of Rural England
Caroline Knight	DWI
John Broadbent	Group Against Reservoir Development
David Johnson	Herts & Middlesex Wildlife Trust
Katherine Fletcher	Historic England
Martin Salter	Kennet Valley Fisheries
Amanda Jacobs	Oxfordshire County Council
Kay Lacey	Pang Valley Flood Forum/CCG
Peter Woodcock	RWE Generation UK
William Mackveley	Severn Trent Water
Peter Spillett	Thames Rivers Trust
Ian Binns	Thames Valley Chamber of Commerce
Katya Manamsa	Environment Agency
Jennifer Butler	Scotia Bank

Apologies

Rachel Crabbe	Natural England
Robert Paddison	Royal Borough Of Windsor and Maidenhead
Sarah Wardell	Environment Agency

END