Appendix 20: Environment Agency

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Major issues identified for Affinity Water's Water Resources Management Plan Major issues are those that we consider highly significant to the draft plan that may result in an unnecessary risk to public water supplies and/or major risk to the environment. They also include issues with compliance with relevant legislation, such as Directions. These are reported as recommendations in our representation submission.		
Recommendation 1 – Affinity Water should ensure its plan fully aligns with companies that share its strategic options and that all options are considered		
R1.1	Area of Issue	Cost for shared strategic options is limited to local infrastructure
	Issues and evidence	The company states that it will incur 1/3 of the total expenditure for the site investigation (rdWRMP s6.4.12, p 105) and that alignment with Thames Water includes the costs and development period of the South East Strategic Reservoir (SESR) (rdWRMP s6.11.3, page 117). However, the company has not outlined full cost information for its strategic options in its options dossiers, and instead, describes costs associated with local infrastructure development and upgrade. For the strategic options linked with Thames Water: • No indication has been made if Affinity Water is contributing to the construction and developing cost of the SESR; similarly, Thames Water does not mention Affinity Water in Appendix XX of its plan. • There is evidence of working with Thames Water around the timing of the preferred options (e.g. SESR). However there is no clarity on how Thames and Affinity will work on other options to develop regional solutions (e.g. Severn Thames Transfer, Grand Union Canal transfer and Beckton effluent reuse).
	Implications	The lack of cost information beyond local infrastructure needs means it is not possible to compare costs of strategic options, or to assess the screening process for the preferred options. It is uncertain whether Affinity Water's best value plan truly represents best value, whether Affinity Water and Thames Water agree on the relative contribution to developing joint strategic schemes, or whether a joint programme of actions is being developed.
	Information or changes required	For its final WRMP the company should present the full cost estimates of the investigation and development phase of all strategic options in the options dossier to enable better comparison between schemes. The company should work with Thames Water to clarify the share of contribution to any jointly developed schemes. This should include the investment needs and a programme of work, for both the feasibility study and construction phases of joint options and the role of Water Resources in the South East group (WRSE) and the new All Company Working Group. A joint, aligned programme should be presented in both companies' final plans.
	Our response	**An Addendum to our option dossiers will be provided to the EA that will provide a breakdown of the infrastructure cost beyond the local cost. It should be noted that this information was provided by other parties and is commercially sensitive information. We are bound by non-disclosure agreements which means we cannot provide this information publicly. To clarify, at this stage we have assumed that we will incur 1/3 of the cost of development of the SESR, which includes the investigation as well as development stages.** **Our business plan submission on the 1st April 2019 (and the update provided on the 3rd May 2019) provide further information relating to our proposals for joint working and collaboration with partners for all of our strategic regional options. These proposals include the shared understanding of the scheme descriptions, our approach to joint working methods and activities, scheme costs and programmes, and gated deliverables linked to an Outcome Delivery Incentive type mechanism. We have also included extensive text on how our Plan aligns with Thames Water specifically, and other water companies and strategic partners more generally within Chapter 6 of our Plan.**

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		We have also included an Addendum in our business plan submission that explains the role of the All Company Working Group and the role that WRSE play as chair to the group.
	Summary of any change to our final WRMP	No change – option dossers updated and provided.
R1.2	Area of Issue	Inconsistencies in timing and volume of key strategic resource options
	Issues and evidence	The timing of the key decision points for strategic options appear to align between Affinity Water and Thames Water's rdWRMPs, however, the timing and quantity of water supplied to Affinity from the SESR option differ between Affinity's plan and Thames' plan. Affinity states transfers from the Abingdon reservoir will be required in 2038 (50 Ml/d; Iver) and 2043 (40 Ml/d; Harefield). Thames Water states that a total of 100Ml/d supply to Affinity starting in 2037, but has tested alternative volumes in its 'what-if' scenario analysis.
	Implications	This could present a security of supply issue to Affinity Water if assumptions and expectations between the companies on the timing and volumes required from the reservoir option do not align. This may also have an impact on the selection of options and justification for the SESR option.
	Information or changes required	For its final WRMP the company should ensure consistency in the timing and quantity of water supplied from strategic options presented in both companies' plans.
	Our response	**Significant coordination has been undertaken between ourselves and other water companies when producing our respective WRMPs. This included coordination between the companies on approaches to adaptive planning, checking volumes of existing and proposed transfers and shared options to address deficits in supply-demand balance. As part of both the Business Plan and WRMP updates we have directly coordinated with Thames, Anglian, Southern, United Utilities and Severn Trent Water to ensure our proposals for AMP7 (2020 to 2025) strategic scheme investigations are fully aligned. The dates presented for our adaptive strategy and monitoring plan reflect that process.** **For the strategic scheme investigations, we will carry them out as co-developments with other water companies or the Canal and Rivers Trust (CRT). This will be delivered in two stages, or "gates", with governance, including the decision or not to proceed beyond the first gate (Quarter 3, 2022), provided by our regulators (as described in the fWRMP19 Monitoring Plan).** **Clear alignment with other company plans has been presented in the fWRMP19. Our alignment with Thames Water's fWRMP19 are detailed in the Statement of Response and in Chapter 7 of our fWRMP19.** **We would like to point out that the references to the 'Affinity states transfers from Abingdon reservoir will be required in 2038 (50 Ml/d; Iver) and 2043 (40 Ml/d; Harefield)' is incorrect. The date of the second transfer to Affinity is 2054 (50 Ml/d; Harefield).** **The SESR option is selected in our Plan, with operational use required in 2038/39 (effectively summer 2038). The Thames Water Statement of Response and addendum to the rdWRMP is aligned, stating 'Affinity Water requires a supply from the reservoir in summer 2038, so the completion date in order to deliver the supply is 2037/38'. (See https://corporate.thameswater.co.uk/-/media/Site-Content/Your-water-future-2019/Main-Report--April-2019.pdf?la=en). Similarly, our plan selects two transfers linked to the SESR option, a 50Ml/d transfer to Iver (in 2038) and a second 50 Mld/d transfer to Harefield (in 2054). Thames Water have tested both a 100Ml/d requirement in 2038 and the split 50/50 Ml/d requirements for both dates, in both cases the requirement is selected in the Thames Water Plan. We also tested the 100Ml/d as a single development and this was selected in our plan.**

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		Overall we can confirm that we require the full 100Ml/d and both our plans show that this is economic, even if pipeline and transfer development is in two stages. **Both final WRMPs will continue to ensure this consistency in the timing and quantity of water supplied to Affinity Water in relation to the SESR option.** **Further to the clarification provided in both final WRMPs, both companies will be working together as part of the SESR option working group (along with Southern Water). That work sets out the programme of activities and timing of that work throughout AMP7.**
	Summary of any change to our final WRMP	None required.
R1.3	Area of Issue	Alignment of development programme for SESR with Thames Water
	Issues and evidence	There is conflicting information about when the SESR option can be built. Affinity Water has stated both a 15 year and 17 year (Technical Report 4.9, s8.4.17) total programme. In addition, various timeframes are mentioned by Thames and Affinity for the feasibility and construction phases.
	Implications	There could be a risk to security of supply if Affinity Water is assuming a shorter lead in time than Thames Water.
	Information or changes required	For its final WRMP Affinity Water and Thames Water should work together to: • Ensure the timings and assumptions within the timeframes for the SESR option align. • Provide clarity on the time split between the feasibility phase and construction phase of delivering the SESR option. • Ensure that these timings are aligned with OFWAT's gateway process. The company should set this out in its final WRMP through an updated and improved monitoring and option development programme.
	Our response	**Both final WRMPs will continue to ensure this consistency in the timing and quantity of water supplied to Affinity Water in relation to the SESR option. The SESR development has always been stated as 15 years, but in some references it was noted that a 2 year pre-development investigation phase was required to address project uncertainties associated with flood risk and other issues. The gated process that has now been developed incorporates the pre-development activities, and allows for 15 years development prior to the earliest need in summer 2038. We will ensure that any inconsistencies are removed and that the fWRMP19 explains the lead-in time clearly.** **Both companies will be working together as part of the SESR option working group (along with Southern Water). That work sets out the programme of activities and timing of that work throughout AMP7.**
	Summary of any change to our final WRMP	None required, although this will be clearer through the fWRMP Chapter 6 text.
R1.4	Area of Issue	Programme of work on strategic options before the 2022/23 decision point, including demand and leakage management options
	Issues and evidence	Whilst Affinity Water has provided a programme of work, including a monitoring plan, this needs to be more closely aligned with Thames Water given the interaction between the plans and Affinity's supply/demand balance driving the need for a strategic resource in Thames Water's plan.

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	Implications	There is a risk that if the companies are not aligned on the further work that is needed on all strategic options, including monitoring the progress and success of demand management and leakage reduction, the companies will not be in a position to make a fully informed joint decision on when and which strategic option will be needed at the 2022/23 decision point.
	Information or changes required	For its final WRMP Affinity Water should work closely with Thames Water and provide a programme of works that refers to the joint work to be undertaken from the beginning of the planning period up to the decision point in 2022/23. The programme of work should refer to each company's monitoring plans and clearly demonstrate how both companies will work together (and with the other WRSE companies) to share information on the progress and success of their demand and leakage reduction programmes. Within this there should be consideration of short term risks and what action would need to be taken if leakage, metering and water efficiency reduction targets are missed.
	Our response	**We have reviewed our monitoring plan and amended it to ensure alignment with the programme that we agreed with both Thames Water and our other regional partners. This is included within the fWRMP text, and we have expanded on the activities that will inform the 'case of need' that will be examined at a regional level through WRSE. Our business plan submission on the 1st April 2019 (and the update provided on the 3rd May 2019) provide further information relating to our proposals for joint working and collaboration with partners for all of our strategic regional options. These proposals include the shared understanding of the scheme descriptions, our approach to joint working methods and activities, scheme costs and programmes, and gated deliverables linked to an Outcome Delivery Incentive type mechanism.** **To be clear, the decision point for the strategic direction we will take, will be in spring/summer 2023. The AMP7 investigations and No Deterioration Assessments will be completed by the end of AMP7, so after Spring 2023. By this point however, we will have some indication as to the likely direction we would need to take and inform our decision making. Also, a further unknown volume has been modelled to cover any remaining uncertainty from future abstraction reductions within the planning timelines.**
	Summary of any change to our final WRMP	Additional text added, plus a 'rapid development' option included in the adaptive plan.
R1.5	Area of Issue	Alignment of Affinity Water and Thames Water's Plans beyond 2022/23 decision point, including demand and leakage management options
	Issues and evidence	The company does not refer to the decision points and adaptive pathways detailed in Thames Water's rdWRMP beyond the first decision point in 2023. The company states that both companies have adaptive strategies that provide viable alternatives to provide resilience to customers if the SESR option is not jointly pursued at that decision point (rdWRMP, s6.11.3, p117), but gives no further details. There is no cross-referencing to Thames Water's monitoring strategy in Affinity Water's Plan. As both companies' plans and associated decision points rely on successful and ambitious demand management the companies need agreed parameters and thresholds within the monitoring plans so that key decisions are joined up.
	Implications	It is uncertain how the companies' adaptive pathways align beyond the 2023 decision point, and how the companies will make future decisions on strategic schemes using consistent measures and thresholds to trigger decision-making. As the plans stand there is a risk that the companies may make decisions in isolation or may make inconsistent decisions based on different evidence from individual monitoring programmes.

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	Information or changes required	See R1.4. For its final WRMP the company should ensure its monitoring and work programme refer to, and aligns with, Thames Water both before and after the 2022/23 decision point to ensure continued consistent understanding of the supply-demand problem over the medium and long-term.
	Our response	**See above under response 1.4. Although we were generally aligned at the rdWRMP stage, our final WRMP will be fully consistent with neighbouring company WRMPs in respect of shared option timing and magnitude of water supplied to Affinity Water. Our adaptive strategy allows us to do that.** **Since the revised draft WRMP submission we have continued to work with our strategic regional option partners. Our final WRMP provides a summary of that work to help enable further transparency to stakeholders and customers.** **Our Business Plan submission on the 1st April 2019 also provides additional information relating to our proposals for joint working and collaboration with partners for all our strategic regional options. These proposals include the shared understanding of the scheme descriptions, our approach to joint working methods and activities, scheme costs and programmes, and gated deliverables linked to an Outcome Delivery Incentive type mechanism.** **As stated above, we have aligned our WRMP monitoring plan to that of Thames Water, to further help with alignment between the activities being carried out ahead of the spring/summer 2023 decision point. Beyond 2023 the plans are higher level, as the situation with RAPID is still developing, but we have incorporated them into our fWRMP Technical Report 5.3 to demonstrate the programme and confirm alignment between companies.**
	Summary of any change to our final WRMP	As above.
R1.6	Area of Issue	Screening of strategic options
	Issues and evidence	There is misalignment between Affinity Water's and Thames Water's plans regarding the feasibility and preference of strategic options. Thames Water's options appraisal has included a greater number of options and variations that could potentially provide deployable output (DO) benefit to Affinity Water. Compared to Affinity Water's preferred options list, Thames Water also included a larger selection of strategic options in its preferred programme. Affinity Water has not provided sufficient justification for screening out the Severn Thames Transfer and desalination plant as feasible options in its preferred programme. There is no reference to options that may also enable licence trading / resource sharing, such as Beckton effluent reuse (rdWRMP, section 7).
	Implications	The two companies may not have applied consistent criteria in selecting preferred options. For Affinity Water, the selection process is not well explained and lacks clarity and transparency. Viable strategic options may have been screened out too early, or not considered at all, which potentially reduces the plan's resilience by reducing the pool of available strategic options.
	Information or changes required	Affinity Water should review its options appraisal and ensure that its final WRMP has assessed all feasible options that could provide a DO benefit to the company. The company should ensure that, if there are alternative feasible options from Thames Water, these are assessed alongside its current option list. For its final WRMP Affinity Water should provide further justification of its screening decisions for strategic options included in Thames Water's Plan, especially for the Severn Thames transfer. The Severn Thames Transfer is the strategic option selected by Thames Water if the SESR cannot be delivered. Affinity should consider whether the

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		scheme or an alternative variation is feasible, and can form part of the solution in an alternative adaptive pathway. Further work is also required on Beckton Effluent Reuse. Affinity Water should work with Thames Water to confirm if it could be an alternative strategic option to provide resilience to its plan. This should be completed for the final WRMP and the company should commit to developing this option further with Thames Water if it believes that it is feasible ahead of the 2022/23 decision point.
	Our response	**Our options reports and option screening report provides a record of our options appraisal and screening and ensures how we have assessed all feasible options that could have provided a DO benefit to the company.** **The River Severn to River Thames transfer was not screened out of our rdWRMP, and was appropriately included within our economic and best value modelling. Within the rdWRMP had simply stated the current issues with the scheme as matters that will need to be addressed as part of the ongoing option feasibility work. Currently our modelling shows that it would not be economic for us to develop the scheme by ourselves, but we will engage with the Thames, Severn Trent and United Utilities investigations and will evaluate the resulting costs associated with trading as part of our pre 2023 monitoring and decision making. This will be done through the regional WRSE modelling in AMP7.** **Our decision-making report has been updated and provides further clarifications of our work on multi criteria selection of feasible options.** **The Thames to Affinity regional transfer scheme includes an element to scope the potential for adapting to the scheme to include an alternative water trading source with Thames Water. It is likely that Thames Water would need to construct another option, possibly the Beckton re-use development, to offset this trade, but our Plan has been kept open on this point so that we can accommodate any updates to the economic analysis that Thames Water and WRSE provide prior to 2023.**
	Summary of any change to our final WRMP	Amended the text surrounding the Severn Thames Transfer. Included a specific alternative trade option and separated out the abstraction and transfer from the River Thames from the source options (SESR, STT or other) to make sure that the transfer can accommodate the range of options that could be available from the River Thames.
Recommendation 2 – Affinity Water should allow for planned development and ensure its forecasts do not underestimate supply and demand risks		
R2.1	Area of Issue	Forecast household and population growth in draft New
	Issues and evidence	The company has not included revised estimates of household and population growth in greater London from the draft New London Plan 2017 in its baseline forecasts. This is contrary to WRMP guidance that draft local authority (LA) plans should be taken into account. The company quantified the sensitivity of the additional households forecast in the draft New London Plan 2017 and found that it would increase demand by 38 Ml/d (rdWRMP, s5.7, page 85). This increased demand has not been included in the Adaptive Pathways risk analysis (Technical Report 2.3.1, page 4). The company states that the population growth for the CaMkOx corridor has been quantified, but not included in the baseline assessment (rdWRMP, s3.3.36), adaptive pathway analysis (s5.7.4), or the target headroom (s5.7.4). The company acknowledges that no investment has been identified to address the growth and it will need to rely on Drought Orders and Permits during periods of deficits.
	Implications	The company may be underestimating demand by not accounting for the estimated household and population growth in Greater London and CaMkOx corridor. It has not demonstrated how the plan would be adapted if the additional growth is realised. There is a risk to security of supplies if demand from this additional household and population growth is not in the plan.

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	Information or changes required	For its final WRMP the company should include the forecast household and population growth for Draft New London 2017 Plan and CaMkOx Corridor in its WRMP, either in its baseline demand forecast, or include the increase in demand in its Adaptive Pathways risk analysis. The company should set out how it will meet any additional demand and ensure that security of supply and the environment are not put at risk.
	Our response	**We have included an additional scenario in our final WRMP19 and Decision Making Technical Report 4.9. This includes household forecast from the New London Plan 2017, together with the detail of how we would plan to meet the potential additional demand. This scenario has been used to increase the flexibility in our adaptive strategy, as detailed in Chapter 6.** **Additional growth from the CaMkOx development corridor has not been explicitly included as no planning figures are available at the moment but we will continue to review our forecasts as new information becomes available as reflected in our adaptive plan.**
	Summary of any change to our final WRMP	Additional scenarios included in Chapter 5 and a rapid development pathway added into the adaptive plan in Chapter 6
R2.2	Area of Issue	Property estimate adjustments
	Issues and evidence	The company identified a need to adjust household numbers in its original draft WRMP because the base year number of households recorded on its billing system was lower than estimated by Experian, who were contracted to complete population and property forecasts for the company. For the rdWRMP, the company has added these properties, together with planned new builds, into its forecast progressively at a flat rate from the base year to 2044/45. The company has assumed the household discrepancy to be a result of properties which were expected at 2011 to have been built by 2016/17, but have not been (Technical Report 2.3, s6, page 25). The way the adjustment has been made has resulted in the forecast being lower than Experian's Local Authority plan based forecasts in every year until 2044/45. The adjustments may not have been correctly applied and the uncertainties around the assumptions have not been well explained.
	Implications	It is not clear whether the assumptions that have been made around the reasons for household discrepancy are valid. The way the adjustments have been made result in the plan-based forecast being lower than the Experian forecast, which may understate household growth. There is a risk to security of supplies if household growth is underestimated and not accounted for in the WRMP.
	Information or changes required	The company should demonstrate in its final WRMP that it has investigated the reasons for household property differences to justify whether the discrepancy is genuine and significant. If a genuine discrepancy is identified, no adjustment to billing system numbers is needed. If an adjustment is needed, the company should explore how the gradual increase can be applied to ensure it reaches the plan-based estimate by 2029/30 and how the Experian trend rate will be followed thereafter to demonstrate the most appropriate forecast has been chosen. The company should demonstrate that it has considered any uncertainty around the assumptions it has made.
	Our response	**This assessment is not quite correct, as both our population and property forecast end up slightly above the Experian figures by the end of the planning period.** **We have made two adjustments to our forecasts to account for differences between the billing system and Experian's data:** **1) We made population equal to the Experian forecast at the end of the statutory planning period (2044/45). For consistency we have also made properties equal to the Experian forecast by the same year. This still left a shortfall in population and properties, which we consider is likely to be**

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		associated with multiple 'households' being billed through a single customer (it appears that these relate to flats and shared houses). **2) In 2020 we incorporate a move from non-households to households for customers dwelling in flats, which closes much of the gap between our figures and Experian, although this adjustment does mean our forecasts end up marginally higher than Experian by the end of the period. This adjustment is intended to account for the change in volume from non-household to household (14Ml/d moved between the two categories), but it shows that our demand forecast is reasonably consistent with the Experian figures in both the short and long term.** **These adjustments have been more clearly explained in our response to issue R3.2 below. Based on this we consider that we have taken a balanced approach given the change in non-household to household re-classification and adequately considered local authority planning figures in the context of growth in our supply area resulting in a flat build rate applied to our forecast. The uncertainty associated with our property forecast is accounted for in our headroom forecast together with the additional modelling scenario that takes into account GLA planning numbers.**
	Summary of any change to our final WRMP	Clarified the analysis in technical reports 2.3 (Domestic Housing and Population Forecast) and 2.7. (Overarching Demand Forecast report).
R2.3	Area of Issue	Population estimate adjustments
	Issues and evidence	The company has applied adjustments to its population forecast as a result of transferring properties in the non-household category to household for the revised draft WRMP (Technical Report 2.3, figure 11, page 25). The impact of changes to the classification of non-household customers has an effect on total population and occupancy values. It is not clear why the company has not recorded this population before. It is also not clear how this compares to the Experian forecast and how the company has reconciled different population and property classification between its own data and the Experian forecast. Along with a number of other adjustments this has resulted in population forecasts higher than the Experian forecasts from 2026/27. These adjustments have not been adequately explained or justified. There remain concerns around: • How the size of the population adjustment for transferred non-household properties has been calculated • The explanation provided around property adjustments • The justification for why population forecasts exceed Experian forecasts from 2026/27.
	Implications	It is not clear whether the population forecast is accurate as the adjustments made have not been fully explained. There is potential concern that the company's demand forecast is not adequately taking account of LA planned housing growth. The population forecast underpins the demand forecast. An inaccurate demand forecast has implications on the magnitude of supply-demand deficits and the schemes included in the WRMP.
	Information or changes required	For its final WRMP the company should investigate the reasons for changes to projected population and better explain the reasons for its adjustments and how they relate to the Experian forecast in its final WRMP. The company should provide explanation of the adjustments and their implications for household and non-household population; consumption volumes and per capita consumption (PCC) values. The company should demonstrate that validation checks have been carried out.

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	Our response	**As discussed above, our method for calculating population considers both our base year population and the Experian population at the end of the statutory planning period (2044/45). A graphical plot of our population and property forecasts in comparison to the Experian figures has been incorporated into Technical Report 2.3.** **We used Experian zonal population as target for our population forecast, so our initial forecast reconciled demand with base year, billing system and occupancy rate survey based populations and properties, and then included growth rates that mean the forecasts matched by the end of the 2045 planning horizon. This left a shortfall in population and properties in the near term in comparison to Experian, but the *demand* from that lower population was accounted for in the base year PCC and other water balance components (not withstanding the gap between components and measured DI, as discussed below).** **We then adjusted our population forecast as a result of transferring non-household properties that will be classified as household from the beginning of AMP7 (2020/21). When applying this adjustment, we looked at the volume that those re-classified properties use on average. Our assessment is based on past meter readings and shows that their typical aggregate consumption is c.14 Ml/d.** **When we transferred this volume across from the non-household to the household segment, we also transferred around 98,000 people as a way of handling the volumetric switch without altering our PCC assessment and MLR modelling. Therefore, they represent a model artefact, although this does bring populations and properties closer to Experian forecasts in the short and medium term.** **In the longer term our forecasts marginally exceed Experian's as a result of the adjustments, but we considered this was reasonable as we have been reporting a positive water imbalance in the past few years (i.e. component demand less than measured DI), so we suspect some population and hence demand may be unaccounted for in the base year figures.. It is also worth noting that the net effect of adding this additional volume and additional population is lower than other factors such as CaMkOx or GLA. For this reason, we have taken a cautious approach by transferring c.98,000 customers and their relative consumption to the household demand forecast. By 2040, the difference between our demand forecast and a demand forecast that would be produced using Experian population alone is in the order of 6-7 Ml/d so the difference does not materially affect our WRMP19.** **We will revise our population forecast in time for WRMP24 to account for census 2021 data plus the updated GLA forecasts and CaMKOx growth implications.**
	Summary of any change to our final WRMP	Clarified the analysis in technical reports 2.3 (Domestic Housing and Population Forecast) and 2.7. (Overarching Demand Forecast report).
R2.4	Area of Issue	Demand from HS2 is not included in the plan
	Issues and evidence	The plan infers that the water for High Speed Rail will be developed separately and will not have an impact on Affinity Water's supply/demand balance. This appears to be different from recent information presented to us where the company was looking at using its own sources to supply the water. Affinity should identify in the plan if and how it is planning to meet the supply demands of HS2.
	Implications	Additional demand is likely to put further pressure on the company's supply-demand balance. If the company is unable to meet this from existing supplies, further increases in abstraction may have local impacts on the environment. There is little if any new water available in this catchment.
	Information or changes required	The company's final WRMP should include all known demand in its baseline and ensure that it has sufficient water to maintain its supply-demand balance. The company should ensure that any proposed increase in abstraction will not affect the environment and show how it will do this in its plan.

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		If insufficient water resources are available, the company should undertake further options assessment work to identify suitable alternative options to ensure that there is not risk to security of supply or the environment.
	Our response	**The water demand for High Speed 2 (HS2) is considered temporary in nature (i.e. within AMP7), hence is dealt with outside of the WRMP and will be developed separately by HS2. All necessary provisions will be in place to indemnify our assets against risks from HS2 works during construction and are designed to cover peak demand periods. Moreover, a long-term monitoring plan will be in place to measure any deviation from the current baseline in terms of both source yield and water quality. Any additional infrastructure required to enhance resilience during the HS2 works, will be funded by HS2 directly. We will ensure that the fWRMP19 explains the above.**
	Summary of any change to our final WRMP	
R2.5	Area of Issue	Cessation of abstraction from the company's Friars Wash source not in the baseline
	Issues and evidence	We remain concerned that the requirement to cease abstraction at this site is only considered in the company's adaptive pathway analysis. It implies that the loss of 2.9Ml/d is a potential future risk to supply. This is not the case, as ceasing the abstraction at this site has already been agreed as part of a past sustainability change. We acknowledge that there is a need for the Environment Agency and Affinity Water to agree on a date the abstraction will cease and how quickly the company can reasonably change the way it operates without risking security of supply to customers.
	Implications	Continued abstraction from this source puts the environment at risk.
	Information or changes required	The company should include all known sustainability changes in the baseline of its final WRMP and ensure it has sufficient water to maintain its supply-demand balance. The company should engage with the Environment Agency to confirm the date to cease abstraction at Friars Wash as soon as possible.
	Our response	**Friars Wash has been changed and modelled as zero Ml/d output on an annual average basis (average deployable output), which we have included in the baseline of our fWRMP. The emergency peak capability remains as peak deployable output, as this appears not to be a driver for investment for the short-mid term in the WRMP timelines. It needs to be noted that this source was not included in the WINEP tables hence the implementation of a full cessation is not accounted for in AMP7. We will continue our discussions with the Environment Agency around the future operation of Friars Wash source in order to retain the emergency peak capability in the interim, until a permanent solution is identified.** **We are also committed to monitoring the River Ver catchment to understand the groundwater level and river flow response from historic and more recent reductions in abstraction under all background groundwater level conditions. The total catchment abstraction in the Ver has been reduced by approximately 40% since the 1990s, with further reductions planned for AMP7. Friars Wash source itself was reduced by an average of 13Ml/d in 1993 leaving more water in the aquifer at this location. Despite this, the river still goes dry under low groundwater level conditions in the vicinity of the source. Our monitoring programme in both AMP6 and AMP7 is focused on quantifying the river flow responses under all groundwater level conditions and better define the groundwater-surface water interactions.**

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	Summary of any change to our final WRMP	The impact of this is included in all adaptive futures and sensitivity tests referred to in the main plan, and the change is referenced in both the main plan Chapter 5, plus the Technical Report 4.9.
Recommendation 3 – Affinity Water should ensure its existing and planned metering and water saving programme delivers the required results		
R3.1	Area of Issue	Delivery of the company's compulsory metering programme is behind forecast in its WRMP14 and the Price Review in 2014 (AMP6)
	Issues and evidence	Affinity's Water's delivery of its compulsory metering programme and associated water efficiency programme is behind its original forecast. On average across its Central Area in 2017/18 meter penetration was 8.23% behind the company's WRMP14 forecast (range -44% to +10 % across resource zones). This indicates that the company has not followed or delivered its WRMP14 metering plan. Slower than expected delivery of compulsory metering has caused a rebasing/lowering of WRMP19 forecast (see issue R3.2).
	Implications	The poor performance on the delivery of compulsory metering does not provide confidence in the delivery of Affinity's ambitious metering and water efficiency programme for WRMP19, and puts the delivery of a demand led WRMP at risk.
	Information or changes required	For its final WRMP the company should review and explain the reason why its metering performance is below target in AMP6, and provide reassurance that the WRMP19 metering target is achievable.
	Our response	**We anticipate 80% meter penetration by 2025 and 90% meter penetration by 2045. We recognise this represents a lower target than at the dWRMP19. This is largely as a result of the higher than anticipated need to install internal meters, with a large proportion of those being impractical to deliver using standard installation approaches. This reconciles with the practicalities encountered by other companies carrying out compulsory metring programmes. An explanation of the reasons for the slower rate of metering as part of the Water Saving Programme is included in Chapter 6.2 'Our demand management strategy' in the fWRMP19, where we also note that it does not have a material impact on the supply side investments that are required as we reach the intended 90% by 2040.**
	Summary of any change to our final WRMP	**Updated fWRMP Chapter 6.2 our demand management strategy.**
R3.2	Area of Issue	Metering target in rdWRMP is lower than those in both WRMP14 and the original PR19 dWRMP, with no explanation provided
	Issues and evidence	The company has reassessed its metering programme due to slower delivery over previous years but does not explain why the household metering target is now only 88.2% in 2039/40, when in WRMP14 this target was 93.5%. In the dWRMP, by 2024/25 meter penetration was forecast to be at 87.5%. And for zones 1-6 this would reach 95% by 2025 (table 34). In the rdWRMP, this figure is 78.9 % for 2025. There is no explanation for this significant decrease between draft plans. This does not give confidence in the high savings forecast in the baseline Water Saving Programme (WSP) from metering, at 18%, which is higher than most other water companies in the south-east.
	Implications	Demand management is central to the Affinity's Water's strategy to balance supply and demand, particularly until strategic supply options come on line in the 2030s. There is little evidence to explain why the Affinity Water has reduced its ambition on meter penetration. Reduced pace and ambition on metering will reduce associated demand savings and has implications for security of supply.

Environment Agency		
	Information or changes required	For its final WRMP the company should explain why forecast meter pentation is at a slower rate and to a lower target in its rdWRMP than both its WRMP14 and the PR19 dWRMP. The company should consider if there is any action it can take to improve its meter penetration rate. The company should continue to report on progress with its metering programme and delivery of its WSP in its annual reviews.
	Our response	**As noted under response R3.2, an explanation of the reasons for, and very limited implications of, the slower rate of metering as part of the Water Saving Programme is included in Chapter 6.2 Our demand management strategy in the fWRMP19.** **We will continue to closely monitor the saving of our Water Saving Programme and enhanced water efficiency initiatives and as we increase meter coverage and time span of data we will be able to learn more about customer behaviours around water usage and able to share progress with our stakeholders and customers more frequently.**
	Summary of any change to our final WRMP	**Updated fWRMP Chapter 6.2 our demand management strategy.**
R3.3	Area of Issue	Inconsistent PCC and leakage ambition values reported in the plan
	Issues and evidence	The company's ambitions on PCC and leakage are not clear in the plan. The company has set out 4 adaptive scenarios, but it is unclear which one it has used to populate its demand planning tables. It is unclear if the company is referring to 'normal' or 'dry-year' demand PCC throughout its plan and which numbers are referred to in its adaptive pathways. The company states (rdWRMP, s6.9.2) 'The demand management and leakage option selections are reflective of our 'Optimistic' future (run 13) which meets our Business Plan commitment of 129 l/p/d (PCC target) and 18.5% leakage reduction by the end of AMP7. This also shows a commitment to a long-term leakage reduction of 50% by the end of 2044/45. This is in contrast with the planning tables which show companywide leakage reduction to be only 38% by 2050. The company is not clear on which base year it is using for PCC and leakage targets and this creates confusion about its ambition.
	Implications	Delivery of demand management and leakage reduction options is critical to the company's plan and the need for and timing of strategic options. The confusion about which options and target the company is planning to, and expects to deliver reduces confidence for Affinity Water's customers and stakeholders in the selected options and its preferred strategy. This means that the plan may not be able to withstand the potential level of scrutiny that will take place when justifying the need for and choice of strategic options.
	Information or changes required	For its final WRMP the company should clarify its proposed demand management, PCC and leakage targets and options. The company should ensure that its planning tables align with its main plan, align with its adaptive pathways approach, and reflect its ambition on PCC and leakage accurately.

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	Our response	**We welcome the leakage ambition that has been set out by the EA, and have incorporated it into our adaptive strategy. Our leakage ambition is set to achieve a 50% reduction in leakage between 2015 to 2045. This 30-year programme to reduce leakage by 50% is planned five years earlier than most other water companies because we started the process in 2015, and will already have delivered a 14% reduction by 2020, followed by a further 18.5% reduction between 2020 and 2025.** **Our fWRMP19 includes clarification of the 50% target and the potential stretch to 50% post AMP7 (57% overall) along with clarification of how we have handled mains renewals for leakage and trunk mains schemes. Explanation of how we will achieve leakage efficiencies and details of our leakage reduction strategy are provided in Technical Report 4.8: Leakage Strategy Report and referenced in the fWRMP19** **Our fWRMP19 includes significant additional explanation of the components of our household demand management programme, along with quantification of the expected benefits. This has been added to Chapter 6 of the fWRMP19 to demonstrate how we will meet our AMP7 PCC target of 129 l/h/d AMP7 and the strategy beyond that.** **Our planning tables are consistent and aligned with our fWRMP19 and adaptive strategy.**
	Summary of any change to our final WRMP	**Updated fWRMP Chapter 6.2 our demand management strategy and updated Technical Report 4.8: Leakage Strategy Report**
R3.4	Area of Issue	Zonal PCC figures vary significantly and differ from recently reported annual return data
	Issues and evidence	Household PCC reported in the rdWRMP planning tables differs widely from recent outturn data at a resource zone level. Company-wide PCC is similar to recent data, but resource zone figures vary significantly. For example, for Stort (WRZ5), reported PCC in the company's most recent annual review in 2017/18 was 176.74 l/h/d, This is nearly 40 litres higher than the company's forecast in the planning tables for the start of the planning period (2020/21) at 137.8 l/h/d. The company has not explained the reason for these differences or how it intends to get to the lower values by the start of the planning period.
	Implications	The significant changes and differences in data between reports, and lack of clear explanation for these, reduces confidence for Affinity Water's customers and stakeholders in the selected options and its preferred strategy. This means that the plan may not be able to withstand the potential level of scrutiny that will take place when justifying the need for and choice of strategic options.
	Information or changes required	Please see the actions required for R3.3.
	Our response	**The PCC is forecast to fall significantly in many WRZs as a result of the rollout of the Water Saving Programme, and in some WRZs this occurs during AMP6. This is particularly the case for WRZ5. The reduction in demand is currently out-turning at 18% for compulsory metered customers, which accounts for much of the fall indicated in the tables. In addition, we note that the balances at a WRZ level rely on relatively small numbers of customers in the consumption monitor, so can vary year on year. The 2016/17 data that were used for the baseline were considered to be representative of the PCCs that have been reported over a number of years. As our WSP programme progresses the demand in each WRZ will be much more dependent on measured PCC, so the uncertainties at the WRZ level will be resolved.**
	Summary of any change to our final WRMP	None required, although we have made it clear that the WSP is included in the baseline demand forecast.
Recommendation 4 – Affinity Water should increase its ambition to protect the environment by reducing abstraction from sensitive sites		

Environment Agency		
R4.1	Area of Issue	The need for further sustainability changes to reduce pressure on chalk streams is not considered in the plan
	Issues and evidence	rdWRMP, s5.7.5 indicates that Affinity Water has allowed for 10Ml/d of sustainability changes in its challenging future for its Central Region. This includes the agreed AMP7 reduction from no deterioration investigations plus Friars Wash. However, the actual sustainability changes needed, as acknowledged by the company, could be much larger. This is because the current planned abstraction reductions (and those being delivered in AMP6) may not be sufficient to achieve long-term ecological objectives, based on accepted evidence. It is essential that the company demonstrates a clear commitment to working with the Environment Agency to deliver future sustainability changes. Also see R4.2 below.
	Implications	The company has not looked at all risks to its plan and does not have an investment strategy to cope with significant additional demand or supply side pressures. This could put security of supply, and the environment under threat if these risks emerge, due to the company's reliance on drought permits and orders.
	Information or changes required	For its final WRMP the company should clearly recognise the need to deliver sustainability changes beyond the AMP6 and AMP7 schemes, and demonstrate a firm commitment to developing a programme of works with the Environment Agency to identify the relevant sources, and the scale of reductions to be applied. We encourage the company to take initiative to set ambitious sustainability change objectives. The company should use the output of this programme to complete additional scenario testing to show how the WRMP could adapt to deliver a more ambitious programme of sustainability changes, in combination with demands from higher growth as outlined in R2.1 and R2.2. The scenario testing should be completed ahead of the 2022/23 decision point, and contribute to decision-making for the selection of strategic options. We expect the company to report on progress of this programme through its annual reviews.
	Our response	**We have taken these comments on board and have included in the fWRMP19 a possible need to further reduce abstraction from chalk catchments by 7Ml/d in our Challenging future. We have added a "further reductions in abstraction from chalk" scenario to our sensitivity testing. This considers the position if we are required to deliver up to an additional 40 Ml/day of abstraction reductions The logic of this is presented in Technical Report 1.4 Sustainability Reductions. We have economically modelled the implications of our extended sustainability reduction scenario and presented the implications and costs in the fWRMP19 in Chapter 5. Potential adaptations to accommodate this are reflected in our revised adaptive strategy.**
	Summary of any change to our final WRMP	Chapter 5 includes the scenario and Chapter 6 includes an adaptation to manage the scenario as part of the adaptive plan.
R4.2	Area of Issue	The company has not shown that its proposed investigation of further sustainability changes will be completed to inform the 2022/23 decision point.
	Issues and evidence	The monitoring and options development programmes proposed for the adaptive plan does not include delivery of investigations for the currently planned sustainability changes. There is limited detail on how Affinity Water plans to ensure that these investigations are completed to contribute to decision-making at the 2022/23 decision point.
	Implications	Uncertainty over the scale of further sustainability changes at the 2023 decision point will add to uncertainty over the need for and timing of future options. Some of the further sustainability changes could be significant, such as the River Brett, and could have implications for the selection and delivery of strategic options.
	Information or changes required	The company should progress with all proposed sustainability change investigations in parallel and at the same pace as the company's investigation of feasible options.

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		For its final WRMP the company should provide further details of how it plans to complete the current sustainability change investigations ahead of the 2022/23 decision point. The company should engage the Environment Agency to agree data collection and monitoring methodologies and to report on progress through its annual reviews.
	Our response	**The investigations and options appraisals listed on WINEP3 have a completion date of 31/03/2022, except for the River Brett investigation which has a completion date of 31/03/2021. This work will therefore be completed in advance of the Spring 2023 decision point. In order ot identify the likelihood and extent of sustainability reductions beyond that we have provided more detail within our Monitoring Plan in Chapter 6, which includes the commitment to close working as required by the EA.**
	Summary of any change to our final WRMP	We have added this comment into our main plan, under our adaptive strategy in Chapter 6.
R4.3	Area of Issue	Reliance on drought permits as options
	Issues and evidence	We welcome the company's commitment to reduce reliance on potentially damaging drought permits as resilience options from 2024 (rdWRMP, s3.6.3, 6.10). However we are concerned that under scenarios where growth may be higher than forecast in the company's baseline (rdWRMP, s5.7.4) that the company will have to continue to rely on drought permits, which could reverse the improvements to resilience it plans to make. See also R2.1.
	Implications	The company has not identified any alternative investment strategies if new supply or demand side risks emerge beyond those it has considered in its adaptive pathways. This limits the company to continue to rely on options (i.e. drought permits) that risk damaging vulnerable chalk stream habitats.
	Information or changes required	For its final WRMP the company should complete further options appraisal work to identify alternative solutions that will enable it to cope with additional demand without the need to rely on drought permits. If the company must use drought permits it should set out how it will minimise any impact to the environment, including the sequence for use of any such permits, to defer use of the most damaging options for as long as possible.
	Our response	**We have modelled the implications of higher growth and larger sustainability reductions and derived a plan to manage that situation as part of our overall adaptive strategy. That plan includes acceleration of strategic resource development with much more limited reliance on Drought Permits (only 12Ml/d as a maximum until the strategic option is delivered). It is not practicable to deliver strategic scale solutions before this (that includes the option of trading with Thames Water, which would be delivered to a similar timescale). Any smaller supply side alternatives (e.g. Birds Green reservoir) are highly uncertain in terms of yield, are not cost effective and would require long lead times, so we consider that the proposed strategy represents the best available to us.**
	Summary of any change to our final WRMP	Included the 'rapid development' option into our adaptive plan.
Recommendation 5 – Affinity Water should ensure its plan is legally compliant by adhering to the WRMP Directions		
Direction 3 (d);	Area of Issue	the emissions of greenhouse gases which are likely to arise as a result of each measure which it has identified in accordance with section 37A(3)(b), unless that information has been reported and published elsewhere and the water resources management plan states where that information is available
	Issues and evidence	The company has presented greenhouse gas emissions associated with its best value plan as a total, however it has not provided greenhouse gas emissions associated with each preferred plan option individually, or for its baseline operations.

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	Implications	The company is not compliant with Direction 3 (d).
	Information or changes required	The company must state in its final WRMP its numerical estimate of greenhouse gas emissions associated with each preferred (best value plan) option individually, as well as emissions associated with its baseline operations (this can be as a total), to meet Direction 3(d).
	Our response	We have included a table in **Technical report 4.9 Economics of Balancing Supply and Demand Modelling and Decision Making Process, Appendix 3** to show total greenhouse gas emissions associated with each preferred plan option individually.
	Summary of any change to our final WRMP	Updated Technical report 4.9
Direction 3 (e);	Area of Issue	the assumptions it has made as part of the supply and demand forecasts contained in the water resources management plan in respect of— (i) the implications of climate change, including in relation to the impact on supply and demand of each measure which it has identified in accordance with section 37A(3)(b)
	Issues and evidence	The company has presented the impact of climate change on its supply demand balance as a total, however it is unclear how climate change will impact each of its preferred (best value plan) options individually.
	Implications	The company is not compliant with Direction 3 (e).
	Information or changes required	The company must clearly state in its final WRMP the impact of climate change on each preferred (best value plan) supply and demand option individually for the duration of its plan, including the assumptions made in the assessment, to meet Direction 3(e). If the impact on an option is too small to be quantified, the company must clearly state it assumes there will be no climate change impact.
	Our response	A further explanation to describe the impact of climate change on each preferred supply and demand option t is included in **Technical report 4.5 Supply Side and Constrained Options Report Vol 1, Appendix E.**
	Summary of any change to our final WRMP	Updated Technical report 4.5
Direction 3 (f);	Area of Issue	Direction 3 (f); its intended programme for the implementation of domestic metering and its estimate of the cost of that programme, including the costs of installation and operation of meters
	Issues and evidence	It is not clear how the company intends to implement its preferred or baseline metering programmes. The implementation and operational costs associated with the metering element of its baseline water saving programme (WSP) are also not clear.
	Implications	The company is not compliant with Direction 3 (f).
	Information or changes required	The company must describe in its final WRMP its approach to implementing its preferred and baseline metering programmes (for example, which areas will be prioritised for meter installation and why). It must also outline installation (CAPEX) and operational (OPEX) costs for the metering element of its WSP, to meet Direction 3(f).

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	Our response	The cost of our metering programmes as CAPEX and OPEX is presented in **fWRMP19, Chapter 6.8 'Cost of our Plan', Table 26.** The implementation of our baseline metering programme as part of WSP and preferred metering programme (smart metering) approach and timing is further described in fWRMP19 in **Section 6.2 Our demand management strategy under Water Saving Programme and new demand management options.**
	Summary of any change to our final WRMP	Updated fWRMP, Chapter 6.8 'Cost of our Plan
Direction 3 (h);	Area of Issue	its assessment of the cost-effectiveness of domestic metering as a mechanism for reducing demand for water by comparison with other measures which it might take to meet its obligations under Part III of the Act
	Issues and evidence	The company has provided a cost-assessment of the different types of meter (AMI, AMR and dumb), but not for the methods of metering available to it.
	Implications	The company is not compliant with Direction 3 (h).
	Information or changes required	The company must provide in its final WRMP an assessment of the cost-effectiveness for the following methods of metering available to it to meet Direction 3(h): • Selective • Change of occupancy • Compulsory • Optant An assessment of cost-effectiveness should include an estimate of the costs for the above types of metering together with the associated reductions in demand, to enable comparison between options.
	Our response	We have updated our assessment to further include the cost-effectiveness of the different methods of metering in **Technical Report 2.6 Metering Cost Benefit Analysis (CBA), Section 3.4.**
	Summary of any change to our final WRMP	Additional analysis provided in Technical Report 2.6.
Moderate issues identified for Affinity Water's Water Resources Management Plan Moderate issues are those that we consider significant to the draft plan and may reduce the effectiveness of the plan, stakeholder/customer understanding and/or present a moderate risk to the environment. These are reported as improvements in our representation submission.		
Improvement 1: Revise the Strategic Environmental Assessment (SEA)		
I1.1	Area of Issue	SEA reporting and assessment of impacts
	Issues and evidence	We welcome the company's commitment to phase out use of drought permits as options, but note it will still rely on them up to 2024 and after this date if supply or demand side risks which have not been accounted for in the plan emerge (rdWRMP s5.7.4). We do not agree with the SEA scoring that has been provided for these drought options in Table 4.17 of the SEA report (Technical Report 4.11) and believe that the environmental impacts have been under represented.

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		We have also identified the following issues with the company's assessment and reporting of potential impacts of its feasible options: • As a general point, the SEA objectives should include a specific reference to the need for water companies to contribute to attaining good ecological potential and good ecological status under the Water Framework Directive (WFD), and certainly the requirement to avoid deterioration. • There are a lot of question marks in the SEA assessment for transfer options. "?" seems to equal a neutral score. This may not be appropriate where best judgement of risks indicate a likely risk. For example invasive non-native species (INNS) risk is put as either "?" or -1. This may under-represent the risk. • For all of the SEA Summary Finding Tables the assessment of options 5.c (INNS impact), 5.e (biodiversity enhancement options) and 6.b (landscape enhancement) have largely been populated with a "?". This means that these aspects of the SEA have not been adequately assessed. It is important that they are scored, in order for options to be properly assessed as to their potential negative or positive impact. • SEA report, section 6.3.5, which makes an assessment of INNS risk, is not consistent with guidance for the Water Industry National Environment Programme (WINEP). This requires all raw water transfers to be assessed, whereas the statement here indicates current transfers are all "no risk". • SEA report, summary table 4.17, which assesses impact of drought options, has a score 0 against 11a (protect & restore river flows) for the OUGH, UTTL and WELL options, all of which propose that support water (flow augmentation) is diverted to supply side. This scoring for the drought options look over-optimistic. Against 5b – degradation of priority habitats the options to increase abstraction from levels of past sustainability reductions score 0. We believe this should be given a lower score given the likely impact on chalk river priority habitat. • Page 25 of the SEA report states that there are no AONBs in the company's East Region (WRZ 8). The Dedham Vale and Stour Valley AONB covers part of Affinity Water's operational area (i.e. in the Brett and Stour valleys) and should be included in the report. Character Area 86 (South Suffolk and North Essex Claylands) should be added to the list of National Character Areas in the East Region. • SEA report, section 7 – one of the questions in the template return is whether cumulative impacts have been properly assessed. This is from section 7.2.1: 'Overall, it is considered that the potential risk for the rdWRMP19 and the DMP (Drought Management Plan) to have cumulative effects are low. Once the location of particular drought actions is known there may need to be some consideration as to how these could interact with ongoing or emerging rdWRMP19 schemes'. This statement in combination with an assumption that drought options are temporary, would not properly assess risks of cumulative impacts. See also comments above relating to concerns of drought option impact assessment. • SEA report, section 8 – the mitigation measures are not comprehensive but more suggestions of actions which could be considered. • SEA report, section 9 – the monitoring proposals are high level and make a number of assumptions that other organisations will hold (or be collecting) sufficient information. In Table 9.1, there is no suggestion of any INNS monitoring.
	Implications	The SEA is an important part of the company's decision making process. Without a full assessment of the likely impact of options on the environment it is possible the company

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		has selected less favourable options or has not included adequate mitigation to minimise the impact of its preferred plan on the environment.
	Information of changes required	We expect the company to update its SEA for its final WRMP and to ensure it has fully assessed the likely impact of proposed options and that this is consistently reported. The company should ensure that its revised SEA is accounted for in its decision making and that risks around some options, including drought options, are not underestimated. The company should provide further information on how its SEA scores have influenced its selection of options (see Improvement 3 for further details).
	Our Response	**The SEA has been updated and our response to Improvement 3 is covered below in the relevant section; we will be pleased to meet with the Environment Agency in due course to discuss detailed queries on the SEA.**
	Summary of any change to our final WRMP	**Updated SEA**
I1.2	Area of Issue	Collation methodology needs further explanation
	Issues and evidence	The collation approach described in SEA report, section 5.2.1 is difficult to follow. In Table 5.1 negative SEA scores are given as positive environmental scores, and vice versa. The purpose for this unusual scoring system has not been explained.
	Implications	It is unclear how the collation method has been designed and why negative/positive scores have been switched. The method has not been explained and this leads to questions over the validity of the assessments.
	Information or changes required	For its final WRMP the company should clearly explain how the collation approach has been undertaken and how it has been used. Explain why negative SEA scores are given as positive environmental scores in Table 5.1 and vice versa. It would also be useful to use figures 1.1, 4.1 and Table 5.1 as visual indicators of the methodology in the relevant sections where the outputs of these methodologies are being reported.
	Our response	**During our modelling, we introduced a series of metrics and the environmental metric was one of these. We took the scores derived from the collation approach, rather than each of the scores for the 12 objectives to enable the creation of a single environmental metric rather than multiple metrics. (For more info on how these were used, see Technical Report 4.9). Table 5-1 shows that the SEA negative scores have been flipped into positive environmental scores, and vice versa for the positive scores. The reason for this 'flip' is that we had a series of other metrics within our modelling that had negative scores as high values, and positive scores as negative values – simply to show the higher the score, the worse performing against that particular metric.**
	Summary of any change to our final WRMP	None required.
Improvement 2: Improve the assessment and explanation of target headroom		
I2.1	Area of Issue	Uncertainty in supply forecasts
	Issues and evidence	The company has included an allowance in target headroom under component S6 (accuracy of supply side data) for "environmental issues." The company does not explain what these issues are and why it is appropriate to include them in component S6 of target headroom.
	Implications	The company has not fully explained this element of its target headroom assessment.

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	Information or changes required	For its final WRMP the company should include information about the environmental issues included in component S6 of its target headroom assessment.
	Our response	**We have different constraints which fall under 'environmental issues', namely:** • **Drought DO/Drought DO - anecdotal** • **Prescribed river flow** • **WRMP14 DO** • **Historic output** **Of these 4 'environmental issues' constraints, there are 7 sources in the S6 component which fall into these categories for DYAA. These are:** • **RZ3 – London Road and Queen's Road** • **RZ3 – Oughton Head** • **RZ3 – Watton Road** • **RZ5 – Uttlesford Bridge** • **RZ5 – Hempstead** • **RZ5 – Thundridge** • **RZ7 – Denge** **For ADPW, there are 12 sources, which are:** • **RZ3 – London Road and Queen's Road** • **RZ3 – Therfield Heath** • **RZ3 – Oughton Head** • **RZ3 – Watton Road** • **RZ5 – Uttlesford Bridge** • **RZ5 – Hempstead** • **RZ5 – Stanstead Nr 2** • **RZ5 - Dunmow** • **RZ5 – Thundridge** • **RZ6 – Walton Surface Water** • **RZ7 – Denge** • **RZ8 – Dedham** **Summary details of these constraints have been include in Technical Report 3.2.**
	Summary of any change to our final WRMP	Clarification included in Technical Report 3.2.
I2.2	Area of Issue	Presentation of target headroom information
	Issues and evidence	The company does not include detailed information about the demand-side aspects of target headroom. Compared to the supply-side components, there is very little information presented on the demand side. This is a particular issue given the importance of demand-side uncertainty for the plan.
	Implications	The company has not fully explained and justified the inclusion of demand-side uncertainties in its target headroom assessment.
	Information or changes required	For its final WRMP the company should update the plan to include a similar level of detail on demand-side uncertainty as it does on supply-side uncertainty.
	Our response	**The available details on Demand Side aspects of Target Headroom are presented in Technical Report 3.2 in sections 3.7 onwards.**
	Summary of any change to our final WRMP	Details included in the technical report.

Environment Agency		
Improvement 3: Complete the technical work and explanations to improve confidence in the company's methodologies and choice of options		
A. Demand forecast		
I3-A1	Area of Issue	Reliability of occupancy and PCC forecasts
	Issues and evidence	There are inconsistencies in the occupancy values from the company's occupancy surveys. The company has been transparent in identifying this and has undertaken modelling to achieve the best central estimates from the available data. However, there remains concern that the company is using occupancy data that is inaccurate because it is outdated. Affinity Water's household occupancy at the beginning of the plan period is significantly higher than that of other water companies, and falls close to average towards the end of the plan period. The falling occupancy rate from an initial high is reported to link to the rise in Household PCC from 2040/41 (rdWRMP, s6.2.17, p92). This relationship is not sufficiently explained - the company reports (rdWRMP, p24) that its base year occupancy and population estimates have been revised to take account of improved central occupancy estimates, but does not explain how this may have affected PCC values. The plan does not provide assurance that the company adequately understands the occupancy of different groups of homes in its supply areas (Technical Report 2.7, s4.2.4, page 11)
	Implications	The impacts on the supply-demand balance of this potential inaccuracy in consumption forecasts are likely to be small. They do however reduce confidence in the analysis the company has undertaken, in particular because of the "high level of concern" problem characterisation for Affinity Water's Central Area. Affinity Water identifies a "high level of concern" in its problem characterisation, therefore it would have been beneficial to undertake a new, up-to-date and comprehensive occupancy survey to derive better quality and consistent estimates.
	Information or changes required	To address this issue the company should, for the final WRMP: • Clarify how occupancy forecasts by meter status type have been derived and the implications for PCC estimates, presenting the occupancy consistency checks. • Explain why there is a sharp change in occupancy trend for metered households at 2027/28. And as part of the annual review process: • Update and improve its occupancy survey and data.

Environment Agency		
	Our response	**The occupancy model used to collate the different occupancy surveys undertaken by Affinity Water was initially created using four occupancy sources: DJS, PR14 Micro-component, Watcom and Experian FY17. During the model build, two further sources of occupancy data became available. These were:** • **DJS survey of Southeast and East regions – sample size 3793 properties carried out in 2017;** • **HWEC (Home Water Efficiency Checks) using a sample of 53,128 properties surveyed in 2017 in water resources zones 1 to 5.** **These surveys were also used to train the model, but importantly in the testing and validation. Having over 50,000 properties surveyed in the base year of the demand forecast demonstrates that the survey data is extremely recent, and that the modelling has been undertaken using a large enough sample size for the surveys to be significant.** **The occupancy model used by Affinity Water to reconcile their survey results used a Poisson model which included variables such as: meter type (measured/unmeasured), water using group (WUG), WRZ and property type. This related the occupancy of these four groups from the survey data into a single coherent result for each water resource zone. Achieving this is based on the understanding of different occupancy rates in each of the property types, WUG groups and billing classes, as each variable is assigned a coefficient in the Poisson model.** **The results of the occupancy model for the rdWRMP19 base year show occupancy rates in line with those of other water companies in the South East.** **The final occupancy values derived by the model were used to re-calibrate the base year Experian occupancy rates which provides the forecast of company population and property values. The split of occupancy rates by meter type modelled for each zone was used as the starting point for the split of these company occupancy trends into measured and unmeasured groups.** **Affinity Water's WSP programme is a compulsory metering programme in which the last 'switchers' will be automatically moved onto a metered bill in 2027/28. At this point, the number of unmeasured properties in each zone is low and will rely on Affinity Water's optant policy to further increase the meter penetration in each zone. Therefore, the decline in the number of unmeasured properties is halted in 2027/28, and thus the changing occupancy rates caused by moving properties into different bill types stops. This has caused the sharp change in the occupancy trend for unmetered properties in 2027/28. Note that this does not occur for measured properties.**
	Summary of any change to our final WRMP	The above clarification has been added to the Technical Report 2.7
I3-A2	Area of Issue	Average PCC at zonal level in the rdWRMP higher than in the dWRMP**.**
	Issues and evidence	There have been significant changes in forecast PCC between the original and revised draft WRMP reported in the planning tables. The reason for these changes are not explained. In some WRZ these changes are significant, for example average PCC at the start of the planning period in three zones (Colne WRZ2, Lee WRZ3, and Pinn WRZ4) are significantly higher in the rdWRMP than in the dWRMP.
	Implications	Limited explanation for the changes and differences between versions of the WRMP reduces the level of confidence in the company's forecast and use of PCC data. It also increases the level of uncertainty in the accuracy and effectiveness of the demand management strategy of the plan.

Environment Agency		
	Information or changes required	The company should, for its final WRMP: • Clarify its proposed demand management, PCC and leakage targets and options. • Ensure its planning tables align with its main plan and accurately reflect its ambition on PCC, leakage, and adaptive pathways approach.
	Our response	**The difference in PCC targets in the text (e.g. 129l/h/d by 2025) and the tables is due to the fact that PCC in the main plan is expressed in Normal Year Annual Average (NYAA) figures, compared with the Dry Year Annual Average (DYAA) in the tables. We have made this clear in the main plan text. As discussed previously, we have also added significantly more detail to the Chapter 6 demand management text to show how much benefit is provided by the different aspects of demand management.** **In terms of the changes in the baseline forecasts, since the publication of the rdWRMP, Affinity Water has collated the results of all of their occupancy surveys using an occupancy model, which is described in the Technical Report 2.1, as well as in response I3-A1 above. This model revised the occupancy rates for each of the 8 WRZs, increasing the accuracy of the final values, and bringing together the results of the different occupancy sources.** **The change of occupancy has ultimately affected the final PCC results. Increasing occupancy will lead to higher household consumption (more people in each household using water) but will also reduce per capita consumption as each person uses less water on average, due to economies of scale. Average PCC reduces with increasing occupancy, but this trend is not linear. At higher occupancies, this trend will tail off, as the economies of scale cannot continue indefinitely. As Affinity Water are reporting decreasing occupancy rates during the planning period, PCC is likely to increase.** **In addition to the occupancy model, since the dWRMP, Affinity Water increased the granularity of their demand forecast by separately modelling properties on a social tariff. These customers pay for their water on an assessed charge as opposed to being based on how much water flows through the meter. For this reason, their consumption is reflective of an unmeasured property. These properties were previously included in the 'metered' group of properties in the dWRMP, and so they artificially inflated PCC, but moved over to the unmeasured category in the rdWRMP.** **Therefore, the inclusion of social tariff properties as a separate consideration in the demand forecast, resulted in demand changes, which in combination with the occupancy modelling, impacted total PCC.**
	Summary of any change to our final WRMP	Clarification of the targets and details of demand management added into Chapters 5 and 6 of the Main Plan.
I3-A3	Area of Issue	Micro-component - dishwashing forecast unusually high
	Issues and evidence	Affinity Water's micro-component forecasting is broadly appropriate and analogous to other water companies in the south-east with similar socio-economic make up, except for dishwashing consumption, which is unusually high. At the start of the planning period, Affinity Water's dishwashing as a percentage of PCC is at or more than double of all other water companies in the south-east. This rapidly declines through the planning period. Considering the high occupancy rate this is especially difficult to understand as it should mean lower dishwashing consumption.
	Implications	The exceptional dishwasher consumption increases the level of uncertainty in the accuracy and effectiveness of the demand management strategy of the plan.
	Information or changes required	The company should explain in the final WRMP why dishwashing consumption is so high.
	Our response	**The dishwashing row and the clothes washing row have been transposed between the percentage split in the Micro-component model and the published WRP Tables.**

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		The correct percentage figures for the base year should be 9% for dishwashing and 15% for clothes washing. **Therefore, at 9% the dishwashing component would then be more in line with the range in the South East companies. We do not consider this to be exceptional dishwasher consumption, and therefore will not increase the level of uncertainty in the effectiveness of the demand management strategy**
	Summary of any change to our final WRMP	Updated WRP Planning Tables
I3-A4	Area of Issue	Water savings may be over or underestimated due to the modelling approach adopted
	Issues and evidence	The company reports in Technical Report 4.7, Appendix C, that it is appropriate to use a 5-year rectangular saving distribution for all water efficiency (WEFF) options on the grounds of simplifying calculations, and that has a minimal impact on saving when considering NPV discounted values. This potentially overestimates savings in the short term while underestimates savings in the longer term. NPV discounted water available for use (WAFU) is presented in the rdWRMP planning tables (Table 5) but this is not useful in understanding the annual supply demand balance. For comparison, Thames Water has assumed 10 years fixed saving resulting from efficient devices, and 7-year savings from behavioural change. As a result Thames Water has assumed repeat activity (and repeat costs) will be needed every 7 or 10 years to maintain savings.
	Implications	Over or underestimating the effectiveness of the company's demand management activities may affect the choice of options and timing of future deficits.
	Information or changes required	The company should, for its final WRMP: • Undertake sensitivity testing to ensure that its approach to modelling accurately estimates demand savings from its WEFF options.
	Our response	**The approach presented in Technical Report 4.7, Appendix C was taken to allow the savings to be fed into the EBSD model and allow the options to be selected at any time, without the need to include a complex decay curve.** **Whilst it is true that the annual volume is increasingly overstated in years 2 to 5, and understated in subsequent years, this would be true of any fixed saving assumption. There is uncertainty applied to the savings in headroom which will mitigate this in the early part of the programme.** **When considering the option savings within the wider context of the demand forecast, there are a few mitigating factors:** • **Within the demand forecast modelling, there is a downward trend applied to represent the improvement in water efficiency of devices and fittings. Therefore, when the modelled savings cease, the PCC will have decreased due to this downward trend, taking account of the improvement in fittings that will replace those removed;** • **Where the savings are required to be sustained, then the option can be repeated. However, we consider that simply repeating AMP7 activities such as water audits are unlikely to represent a sustainable approach to demand management, so our longer-term (Post AMP7) benefits are primarily gained from the smart metering and 'concerted action' programmes, which deliver permanent, ongoing reductions in demand. The 'temporary' approach and associated distributions are therefore only applied to the initial water efficiency savings, whilst larger metering savings, the 'concerted action' programme and water efficient new homes initiatives are forecast to be sustained. The choice of distribution in the early demand management initiatives therefore has very little impact on the longer-term forecasts.** **The key sensitivities in our water efficiency programme therefore lie in the ability of these longer term programmes to deliver sustained savings above and beyond the**

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		baseline assumptions contained in the demand forecast, so are addressed through the adaptive pathways analysis provided in Technical Report 4.9
	Summary of any change to our final WRMP	Updated Technical Report 4.9
I3-A5	Area of Issue	Effects of smart metering may be double counted
	Issues and evidence	It is not clear whether the savings seen from switching to smart metering have been double counted as these savings could already have been taken into account in the Water Saving Programme (WSP).
	Implications	The lack of clarity in reporting increases the level of uncertainty in the accuracy and effectiveness of the demand management strategy of the plan.
	Information or changes required	The company should, for the final WRMP: • Clearly state what savings are being realised in the WSP, especially for smart metering, to ensure double counting does not occur.
	Our response	**The option that covers the switch to smart metering is MET904. In the Technical Report 4.7, section 5.2, it states that "Option 904 is deployed in different years by WRZ. The start year for each WRZ is after the finalisation of the WSP programme." Therefore, there is no double counting in terms of deployment.** **With regard to savings, the WSP will already be delivering savings that are included in the baseline forecast. For option MET904, we have assumed that the increase in savings is 2.5%, which corresponds to the assumption for a property moving from a measured bill onto a smart measured bill., above and beyond the benefits that we anticipate from home water audits carried out as part of our WSP programme and concerted action on water efficiency programmes. Therefore, there is no double counting in terms of savings.** **The savings being realised from the WSP are explained clearly in the demand forecast report (Technical report 2.1).**
	Summary of any change to our final WRMP	Additional explanation provided in fWRMP, Chapter 6.
I3-A6	Area of Issue	Failing to achieve water UK's 50% leakage reduction commitment by 2050
	Issues and evidence	Company-wide leakage reduction by 2050 is forecast to be 37.7% from 2020. Only the Misbourne zone (WRZ 1) meets this commitmet of 50%, with a reduction of 56.3% by 2050. The Brett resource zone (WRZ 8) falls well short at only 13.1%.
	Implications	The failure to plan to meet the Water UK's 2050 leakage commitment for the industry without clear explanation reduces the confidence in the company's commitment to reduce leakage when compared to the rest of the water industry
	Information or changes required	The company should, for the final WRMP: • Clarify the leakage target • Review leakage options and confirm its reasons for selecting and rejecting options and its impact on leakage targets. • Provide better explanation for the variation in leakage reduction across its resource zones • Explain why it has not committed to a 50% reduction in leakage by 2050

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	Our response	**We welcome the leakage ambition that has been set out by the EA, and have incorporated it into our adaptive strategy. The leakage targets we have set will achieve a 50% reduction from 2015 to 2045. This 30-year programme to reduce leakage by 50% is planned five years earlier than most other water companies because we started the process in 2015, and will already have delivered a 14% reduction by 2020.** **Clarification of the 50% target and the potential stretch to 50% post AMP7 (57% overall) is included in Chapter 6 of the fWRMP19 along with clarification of how we have handled mains renewals for leakage and trunk mains schemes. Explanation of how we will achieve leakage efficiencies and details of our leakage reduction strategy are provided in Technical Report 4.8: Leakage Strategy Report and referenced in the fWRMP19.**
	Summary of any change to our final WRMP	The additional stretch target has been included as a further ambition under our 'optimistic' and 'aspirational' futures. We have also clarified the 2015 to 2045 leakage savings programme.
B. Leakage and other demand management options		
I3-B1	Area of Issue	Cost reduction (ALC) and justification of ALC options
	Issues and evidence	The final active leakage control (ALC) analysis taken forward includes a significant (12% per annum) efficiency assumption, but there is little justification given for the assumption (Technical Reports 4.8 and 4.8.1). A cost efficiency has been included in the ALC cost curve that underpins the evaluation of ALC as a means to drive down leakage (Technical Report 4.8.1). This is reported to be 60% (12% per annum) in the SELL analysis, which is reduced to 30% (6% per annum) through sensitivity analysis. Finally, there is a statement in Section 4 of Technical Report 4.8 that indicates a final 40% economic efficiency was included in the cost curves. There is little evidence or justification for such significant efficiency levels. Section 6.2.21 of the main report (Technical Report 4.8) states "The change in ALC activities represents our largest leakage innovation in AMP7. We have already purchased over 20,000 noise loggers, which we will use in a new, technology-led approach based on targeted District Meter Area sweeps on our mains distribution network. Through this we intend to achieve a 30% efficiency in our current ALC detection and repair costs." however this evidence is not presented in Technical Report 4.8, leading us to have concerns over the validity of this significant assumption. Given the size of this assumed efficiency and its overall impact on both the SELL calculation and overall level of leakage selected, we would suggest that evidence of how this will be achieved is required before the analysis is considered acceptable. See also I3-B2, B3.
	Implications	We note that the company has made good progress with reducing leakage through its use of innovative acoustic logging technology. However without further information it is not possible to determine if ALC may have been selected preferentially over other options, both within SELL and least cost planning. To improve confidence in the company's plan and its selection of options the company needs to ensure it has clearly and consistently appraised its options, including those to reduce leakage. This will improve the confidence in the company's plan and its justification for its preferred leakage and demand strategy.
	Information or changes required	The company should, for the final WRMP: • Provide evidence for the assumed efficiency percentages. • Clarify how ALC options have been appraised in the company's decision making process. • Provide further justification for its choice of leakage and demand options and clarify the expected reductions across its range of adaptive planning scenarios.

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	Our response	**The efficiency applied in the SELL model is 12% per annum to a maximum reduction of 60%. This equates to an average over the AMP of 30% as mentioned in Technical Report 4.8. and applies to the ALC find and fix option. This was done purely for modelling purposes to test the impact on SELL. In reality, we would not be able to meet the 60% efficiency target, and instead intend to meet the overall AMP7 efficiency through initiatives that are already underway and expect to deliver the 30% early in AMP7. In order to test the *sensitivity* around ALC cost in the RPS model we applied a 6% per year cost efficiency. This gave rise to an increase in the SELL of 7%.** **Find and fix costs form a significant part of our overall cost to deliver the leakage target and it is where we consider the greatest efficiency savings can be achieved. By adopting processes that improve our use of available technology we are changing the way we find and fix leaks with the aim of targeting leaks more efficiently and reducing the run times of these leaks. The ability to locate leaks at points of interest rather than through whole DMA surveys will reduce overall leak repairs by approximately 20%. Improved planning and management of the work pool will reduce the unit cost of repairing leaks. Using new software to separate night use and leakage when measuring at night will help focus our efforts during the summer therefore reducing the risk of additional reactive costs during the winter with an overall further reduction in cost.**
	Summary of any change to our final WRMP	Clarification added to Chapter 6 of the main Plan and Technical report 4.8.
I3-B2	Area of Issue	Calculation and recording of trunk mains leakage
	Issues and evidence	Technical Report 4.8 - Trunk mains leakage does not appear to be fully considered within the plan. Affinity Water's contractor, RPS, comments that further consideration of trunk mains leakage would be an improvement to the SELL modelling. Trunk mains metering is screened out with the comment that 'trunk mains leakage is quite low at the moment' but limited metering could suggest a lack of knowledge of trunk mains leakage. On page 84 this is confirmed in the comment: "we should draft an outline strategy to understand trunk mains leakage... at the moment it is an estimate from the Background and Bursts Estimates (BABE) analysis". Better understanding of trunk mains leakage may provide options offering better savings at lower cost. In the unconstrained options screening (Technical Report 4.7) mains renewals options are all screened out. This is perhaps surprising, as flexibility scores have been stated as low, and the longer term reduction in disruption, bursts and repeat visits have perhaps not been fully considered. We would have expected some options to be carried forward to the least cost planning process. See also I3-B3, B4
	Implications	Potentially beneficial schemes may have been screened out ahead of the options appraisal process.
	Information or changes required	The company should commit to improving knowledge of water losses for trunk mains of its distribution network and report on progress through the annual reviews of WRMP19.
	Our response	**We confirm that progress in this area will be reported through the annual review process; we have provided a response to the screening of Mains Renewal in I3 B3 below.**
	Summary of any change to our final WRMP	Added text for trunk mains leakage into Chapter 6 and Technical report 4.8.
I3-B3	Area of Issue	Exclusion of trunk main schemes

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	Issues and evidence	Technical Report 4.8 - The company's SELL methodology includes an approach to pressure optimisation and mains replacement for leakage driven purposes. However, there is a lack of detail on the stage at which the leakage driven mains renewal has been screened out of the process. There is also a risk that the assumed efficiency on ALC (see I3-B1) may have altered the likelihood of mains renewal being selected, without sufficient evidence to justify or explain the scale of efficiency savings. Trunk mains schemes are screened out due to the level of leakage on trunk mains being low. However, with limited measurement in place and quite old BABE analysis being used to estimate trunk main leakage it is possible that opportunities for cost effective measures have been overlooked. On page 32 of Technical Report 4.7 there is the comment: "In 2012 Affinity Water carried out a review of trunk mains leakage, which included the analysis of trunk mains lengths, the development of background and burst component model for trunk mains and a review of service reservoir leakage. These have been used as the starting point for investigating options to reduce trunk mains leakage". This work should be reviewed, updated, and a flow balance approach considered. See also I3-B4.
	Implications	Potentially beneficial schemes may have been screened out ahead of the options appraisal process.
	Information or changes required	The company should, for the final WRMP: Review documents and clarify the stage at which each leakage driven mains renewal options was screened out, and the extent to which different 'steps' of mains renewal were considered (similar to the approach for ALC).
	Our response	**Mains renewal options have been included in the modelling and not screened out; for example, in Run 13 (optimistic future) option 1009 Mains Renewal options are selected in 4 WRZs. They are not contained in certain runs because they are not economic. The one exception to this was option 1008, where the methodology used to derive the benefits of CP renewals carried out during mains renewals programmes assumed unrealistic levels of advanced knowledge about comms pipes leaks. This option was therefore only selected if the wider mains renwals scheme (option 1009) was selected by the economic model, and added to the benefits of that option.**
	Summary of any change to our final WRMP	No change required.
I3-B4	Area of Issue	The selection of preferred demand and leakage options is not clear and assumptions should be better explained
	Issues and evidence	The company has identified a programme of preferred leakage and demand options, but has not provided consistent and clear information for the choice of selected options and associated demand savings in the plan. This includes: Technical report 4.7: • Option 0423 – Pressure Relief Valves (PRVs) – giving a consistent saving through to 2039/40 – it is unclear why this saving ceases at this point. • Option 1009 – Mains and communications pipe renewal – gives a rising saving from 2030 to 2050 then remains constant. • ALC is selected in 6 of the 8 WRZs, this represents by far the largest water saving, but has not been included in Technical Report 4.7 as a feasible option. However, the company's main report (rdWRMP, s.6.6.21) states that 20,000 noise loggers are to be deployed. • Option 1000 - Water Audits Retail (Non-process) – the company has based its unit saving (1000 l/prop/day) on evidence from Thames Water's programme of "Smarter Business Visits", but has provided limited evidence of how the assumed savings will be relevant and deliverable in its supply area. We note that Thames Water's smarter business visits include fixing "leaky loos". This can lead to big savings. Affinity Water's description of the option seems to suggest that that the first stages may not include these kinds of activities.

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		• Option 1010 - Fast logging – It is not clear how savings from this have been calculated and there may be some risk in it (note however, that there is high headroom early in the planning period). The number of district metering areas (DMAs) or the breakdown in savings is not clear. This makes it difficult to understand how additional savings are achieved above and beyond baseline Water saving Programme (WSP), and how double counting could be prevented with other options. • Option 0904 - Smart metering/fixed network – It is not clear how savings arising from smart metering post-AMP7 are separated from savings already achieved through fast logging. These savings are assumed to come from behavioural changes – assuming between 2 and 3% saving, in addition to 75% supply pipe leakage reduction in properties identified as having significant leaks through smart meter data. These statements are not supported clearly by evidence. • Option 0569 - Housing associations – targeted programme - This is listed within the planning tables as a preferred option, but has no savings associated with it. If this is to be listed, it is not clear how the savings given in technical appendices have been determined. • Option 1050 - Concerted action on WEFF –Household water audits plus longer-term intentions to influence supply chain in water fixtures, planning policy, behaviour change and development design. Savings given have been built up through micro-components but there is limited supporting evidence to indicate how reliable these savings will be in addition to those already achieved through preceding options. • Option 0567 - Community water efficiency scheme - This begins and ends in AMP8 and yields no savings afterwards due to the “rectangular” yield assumption. This results in average savings over the planning period being very low (5 years of saving followed by 20 years at zero). Assuming full benefit from year 1 of implementation and then zero afterwards might both overestimate initial benefits, and subsequently underestimate longer term savings. The option assumes 1 community in 1 WRZ per year of implementation. It includes home audits, marketing and installation of efficiency devices. No indication is given as to the size of the communities, or uptake rates (relating to offered audits, incentives, messaging etc). An assumption that any savings made per community in each year are completely lost by the subsequent year seems pessimistic. The aim of these community exercises is to both facilitate efficient water use (through home audits and fixtures) but also to affect behaviours. A residual benefit into subsequent years surely can be assumed. Other companies have either assumed steady decay rates (e.g. half-life of 10 years) or assumed savings persist for 10 years unless reinforced through repeat campaigns. On page 85 there is a 'NEW' scheme in the unconstrained list described as 'asset renewal on specific DMAs' with a comment that this options should go forward for cost-benefit assessment, but it does not appear in Table 2 on page 7 of Technical Report 4.7 - Water Demand Management Framework - Assessment of Demand Side Options. It appears to be Option 1012 in section 5.4 of the same report alongside Options 1007 and 1008 which were apparently screened out at the unconstrained stage. • The company states in the 'excluded' list that 'Leakage control - new technologies' is 'requested to be included'. However, this option does not appear in the unconstrained list. This may have been a preferable way to handle the use of acoustic loggers (the impact of which should have been considered at a DMA level basis, similarly to other options such as CSL) so that the efficiencies in ALC did not have to be assumed.
	Implications	Delivery of demand management and leakage reduction options is critical to the company’s plan and the need for and timing of strategic options. The lack of clarity about which options and target the company expects to deliver reduces confidence for Affinity Water’s customers and stakeholders in the selected options and its preferred strategy. This means that the plan may not be able to withstand the potential level of scrutiny that will take place when justifying the need for, and choice of, strategic options.

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	Information or changes required	The company should make the improvements to resolve the issues shown for its final WRMP and clarify its proposed demand management, PCC and leakage targets and options. Where future data are required to refine the demand saving from these options, the company should clearly highlight these areas and commit to report on progress through the annual reviews of WRMP19.
	Our response	**We have included further relevant details of the makeup of the savings from our demand management programme within Chapter 6 of our Plan, which details how our proposed savings are generated through each scheme, and demonstrates that there is no 'double counting'. As described previously we have also clarified any confusion around NYAA versus DYAA PCC targets and forecasts.**
	Summary of any change to our final WRMP	Explanation added into Chapter 6.
C. Reporting and appraisal of supply options		
I3-C1	Area of Issue	Option feasibility and environmental impacts
	Issues and evidence	We have identified a number of areas where significant further work will be required to demonstrate the feasibility of the company's proposed options. We have provided a list of issues below. This is not exhaustive and the company is expected to fully investigate all options, including collecting all necessary data so that it has sufficient information to inform its adaptive plan and critical decision trigger points. • Grand Union Canal (GUC) option: This option poses potential significant risks to both donor and receiving waterbodies. The interconnection of the GUC and the Bulbourne (and the downstream Gade and Colne) mean that water quality changes could significantly affect the downstream river network. Changes to flows also represent a significant risk. Engineering modifications to the GUC could be required to separate water in the canal and the Bulbourne to ensure protection of the chalk river. Mobilisation of contaminated sediments, increased phosphate levels leading to algal blooms, risk of transfer of specific pollutants or priority substances, differing water chemistry between catchments, invasive species transfer and the impact of step change in water quality on canal ecology will need to be assessed and mitigated. The proposed 2 years water quality monitoring may not be enough to provide robust evidence - a 3 years programme would be preferred. Continuous water quality loggers rather than just spot sampling will also be required, because spot sampling is not suitable for assessing the severity of algal blooms, which is one of the key water quality concerns. The company / Canal & Rivers Trust (CRT) will need to model the impact of the proposed discharge to the GUC. The discharge should not cause WFD failure in any element, achange in WFD class and significant deterioration in concentrations of any determinant (<10%). Modelling the impact of the loss of dilution in the River Tame is also required. The loss of final effluent could be seen as a positive step but there are numerous other discharges of treated effluent and storm related discharges in the vicinity and the loss of 50Ml/d could create a situation of reduced dilution for these discharges, causing deterioration in water quality. There is concern that CRT's canal model may be out of date, and further monitoring followed with a model update may be required. An early start to this work will be needed to ensure the data collection and modelling is completed to inform the 2022/23 decision point. Canal losses in the Tring area have been estimated as 5.46 Ml/km/week (compared to typical losses of 1.75 Ml/km/week). An improved assessment should be made of how

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		much water would be lost in order to understand how much of the transferred water can be sustainably abstracted. Groundwater models may also need updating to understand the influence of the canal on groundwater levels. A potential benefit from this option is that it could remove the need for the CRT groundwater abstractions which impact the River Bulbourne. • Lower Greensand abstraction: We are concerned about the timescales for making assessments of the Lower Greensand sources and Brent Reservoir options (which although not needed until AMP9 in the expected pathway, a decision on viability is needed by the 2023 decision point). There is a risk that the required data may not be available in time to make a robust decision on environmental risk. These decisions will have significant scrutiny as they could trigger the need to develop a strategic resource. We remain concerned about the potential impact to the surface water catchments fed by the Woburn Sands aquifer from additional Lower Greensand abstractions. The company's Technical Report 4.13, Appendix C provides some details on how the company proposes to investigate the risk of deterioration. The company recognises that the final approach requires further discussion and agreement with the EA, which we welcome. There is a difference in view as to the scale of the investigations. For example, the company probably isn't considering all of the surface water bodies that the Environment Agency considers need assessing for any groundwater abstraction. The company indicates that risks can be mitigated and that groundwater investigations would be used to identify an appropriate sustainable yield. The company needs to assess the impact of this yield using the Environment Agency's groundwater models to demonstrate that the cumulative effect of abstraction in the long run is acceptable for us to support the finding. • Brent Reservoir option Monitoring of the River Brent downstream of the reservoir likely to need improvement. Monitoring of water quality of tributaries entering the Brent Reservoir may also be needed. More flow and water quality monitoring is likely to be needed in the GUC between River Colne and River Brent to understand the impacts of changing the flow direction to flow west towards the Colne Catchment. Ecology (WFD) monitoring is also needed in this reach. • SESR The plan refers to data previously collected by Thames Water. This indicates the scheme was previously assessed and considered acceptable, but details of the scheme will need to be re-assessed with our current understanding of the Thames system to ensure the environmental risks remain acceptable with the design. Perceived benefits of increased flows need to be confirmed. Artificial augmentation will affect the shape of the hydrograph and changes to flow velocities may affect key life stages and ecological processes in impounded reaches. It is also not clear how additional augmentation and subsequent abstraction of up to 100Ml/d would work operationally. Affinity Water's proposed abstraction(s) will also need to be looked at in combination with any increases in abstraction by Thames Water and South East Water and how this will be managed to ensure no deterioration to the environment. Options involving abstraction from the Lower Thames (Egham and Sunnymeads sources) are likely to require changes to the Lower Thames Operating Agreement (LTOA). Any changes to the LTOA will need to be agreed between the Environment Agency, Thames Water and Affinity Water and must not cause further environmental deterioration. • GSK trade

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		The primary environmental concern arises from the (previous) GSK borehole use and the potential impacts on the Salthill Stream. It is expected that these impacts can be mitigated if appropriate monitoring and work is put in place to build understanding of the system. However, the Environment Agency has limited data on the Salthill Stream and the company will need to ensure it has plans in place to collect all the necessary data to inform its assessments. • Egham ASR (Aquifer Storage and Recovery) This scheme will require exploration boreholes and testing. The company may need to bring this option foreword to manage potential risks in its plan. • Didcot trade There is little detail of how this option would operate. Further information is required to assess any potential impacts to the environment and how this would work operationally. • Brent / East resource zone (WRZ 8) – potential desalination option There are potential adverse impacts on the designated intertidal and marine sites (SSSI, SPA, SAC, MCZ, Ramsar). These impacts would need to be looked at in greater detail at the feasibility stage if these projects move forward. A Habitats Regulations Assessment/CRoW assessment would be required.
	Implications	The company has identified the need for further work for both local and strategic options, but has only provided high level information of its proposed actions. Although the company has identified the need for further work, the current plan does not contain sufficient detail of the studies the company will need to undertake. This includes the impact of the options on the environment, how they will operate and what permissions they will require. Without this information we are unable to determine if the company's proposals are sufficient, or if it will be able to demonstrate the feasibility of its proposed options in the timescales assumed in the plan. This risks delaying option delivery which could put security of supply and the environment at risk.
	Information or changes required	The company should consider the issue we have outlined and should commit to developing detailed feasibility studies as early as possible, especially for areas where the current programme may not be long enough, to maximise the period for data collection. This includes monitoring programmes and Habitats Regulation assessments. Where appropriate, the company should complete this work in partnership with neighbouring water companies, third parties and regulators. The company's proposals should be aligned with neighbouring companies' plans and Ofwat's proposed gated process for strategic option development. We expect the company to commit to this in its final WRMP and to report on progress through its annual reviews.
	Our response	**Although we were generally aligned at the rdWRMP stage, our final WRMP will be fully consistent with neighbouring company WRMPs in respect of shared option timing and magnitude of water supplied to Affinity Water. Our adaptive strategy allows us to do that. Since the revised draft WRMP submission we have continued to work with our strategic regional option partners. Our final WRMP provides a summary of that work to help enable further transparency to stakeholders and customers.** **We have also aligned our WRMP monitoring plan to that of Thames Water, to further help with alignment between the activities being carried out ahead of the Spring 2023 decision point. This alignment is specifically identified in the fWRMP.** **In response to EA representations we have created a new 'stand alone' option based on the treatment and transfer (from the River Thames) elements of the SESR and Severn Thames Transfer (STT) schemes, but with an option that the source water may be provided by a trade with Thames Water if the regional modelling in**

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		AMP7 demonstrates that this is better value than the SESR or STT. We have clarified our position on the STT to show that we will be openly considering this as an alternative to the SESR based on water trading if it becomes a preferred regional option through the AMP7 investigation process that is being carried out by Thames, Severn Trent and United Utilities. **Significant coordination has been undertaken between ourselves and other water companies when producing our respective WRMPs. This included coordination between the companies on approaches to adaptive planning, checking volumes of existing and proposed transfers and shared options to address deficits in supply-demand balance. As part of both the Business Plan and WRMP updates we have directly coordinated with Thames, Anglian, Southern, United Utilities and Severn Trent Water to ensure our proposals for AMP7 (2020 to 2025) strategic scheme investigations are fully aligned. The dates presented for our adaptive strategy and monitoring plan reflect that process.** **For the strategic scheme investigations, we will carry them out as co-developments with other water companies or the Canal and Rivers Trust (CRT). This will be delivered in two stages, or "gates", with governance, including the decision or not to proceed beyond the first gate (Quarter 3, 2022), provided by our regulators (as described in the fWRMP19 Monitoring Plan).** **For our strategic regional options our business plan submission on the 1st April 2019 (and the update provided on the 3rd May 2019) we provided further information relating to our proposals for joint working and collaboration with partners on the 'strategic' options referred to in the EA response (SESR and GUC transfer). These proposals include the shared understanding of the scheme descriptions, our approach to joint working methods and activities, scheme costs and programmes, and gated deliverables linked to an Outcome Delivery Incentive type mechanism. The programmes of investigation associated with those schemes, plus the South Lincolnshire Reservoir and a separate programme for the River Thames to Affinity transfer element of the SESR and STT schemes, include detailed feasibility studies and proposals on the type of investigations that are required under each strategic option in order to confirm their viability at the Gate 1 (2022) and Gate 2 (2023) review points. We have incorporated the more detailed investigation programmes that underpinned the IAP submission within a new Technical Report for the fWRMP, Ref 4.15)** **We have added a 'rapid development' pathway to manage high growth and/or high levels of sustainability reductions, which potentially involves acceleration of the Grand Union Canal (GUC) transfer or a water trading option for delivery by 2032 (these are the only options with shorter development times), but with customer consultation if that is not a best value solution.** **We have also incorporated further clarity and detail on the AMP7 Monitoring Plan in Chapter 6 of our fWRMP19.** **One of the options we have put forward in our WRMP is the progressive increase in groundwater abstraction from the Lower Greensand (LGS) aquifer in the Luton area. Following a pumping test in one of our existing LGS sources, we intend to confirm the longer-term yield characteristics and the environmental sustainability following the proposed increase in abstraction from that source. Once that is confirmed in Years 1 and 2 of AMP7, the option to further increase abstraction by the end of AMP7 or early AMP8 will be considered in close liaison with the Environment Agency and pending the outcome of the monitoring. Within AMP7, we will also consider exploring the LGS aquifer in alternative locations, such as East of Luton, where the likelihood of the aquifer thickness being present to support the desired yield, is higher. A key caveat to all the above options, is that the appropriate groundwater level monitoring is in place and discussions will be ongoing with the EA to ensure no environmental impacts in the short or long term. To help achieve this, the Environment Agency's groundwater models can be utilised alongside our proposed monitoring strategy to collectively inform the level**

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		of yield that can be anticipated from the overall Greensand development. We have included this commitment within our adaptive strategy. **For the Brent Reservoir option we propose to carry out the investigations in two stages:** **1. Up-front discussions and initial site visits to review the viability of the scheme in relation to its SSSI status and change of use from flood storage to water supply. These will occur in 2020 and 2021 and we will work closely with the CRT, EA and NE to determine the reliable yield that can be obtained given the environmental constraints, covering hydrological modelling of reservoir levels and the implications of that on flood risk and the SSSI ecology.** **2. More detailed investigations that will commence in AMP8 if the scheme appears viable at the 2023 decision point, which will include all relevant water quality and ecological modelling required for ESIA.** **We have included this commitment within our Monitoring Plan in Chapter 6.**
	Summary of any change to our final WRMP	Updated Chapter 6 plus new Technical Report 4.15.
D. Decision making methods		
I3-D1 EBSD	Area of Issue	Least cost modelling lacks evidence
	Issues and evidence	The revised draft WRMP lacks evidence on the data input, results and calculated metrics of the Economics of Balancing Supply and Demand (EBSD) model. Four 60 year futures were developed. It is not readily apparent how these were decided upon, or if the range of futures is suitably broad. EBSD least cost analysis was carried out for each future for both an “adaptive” and a “wait and see” strategy. The company has not provided a full set of model inputs and results are not provided, making it difficult to assess the modelling beyond the described approach.
	Implications	The plan does not provide enough evidence to enable an assessment to be made as to whether the data is appropriate for purpose.
	Information or changes required	For the final WRMP the company should provide the data input, results and calculated metrics as supporting evidence to the plan.
	Our response	**We have updated Technical Report 4.9: Economics of Balancing Supply and Demand Modelling and Decision Making Process to include the most up to date assessment of our supply demand balance for each future which supports the timing of the requirement for the transfers. As part of our response we have continued to provide additional cost transparency where is it is possible to do so in Technical Report 4.4 LRMC cost model update, and have agreed the approach to the representation of financing and repayment costs for large capital schemes in Table 5 of the WRMP**
	Summary of any change to our final WRMP	Updated and clarified Chapter 5 and expanded Technical report 4.9.
I3-D2	Area of Issue	Reporting of EBSD analysis of futures lacks detail
	Issues and evidence	A full set of results from the four futures in the EBSD modelling is not provided. It is difficult to compare the key outputs for each reported future.
	Implications	The plan does not provide enough evidence for this stage of the decision making process to be transparent.
	Information or changes required	The company should provide a full set of results from the four futures in the EBSD modelling for the final WRMP.

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	Our response	**We have updated Technical Report 4.9: Economics of Balancing Supply and Demand Modelling and Decision Making Process to include the most up to date assessment of our supply demand balance for each future which supports the timing of the requirement for the transfers. The individual balances within each WRZ for each future are provided as graphs within the technical report.**
	Summary of any change to our final WRMP	Updated and clarified Chapter 5 and expanded Technical report 4.9.
I3-D3	Area of Issue	Reporting of Multi Criteria Analysis (MCA) lacks information and clarity
	Issues and evidence	Affinity Water scored all options against a range of metrics to identify high risk options and any potential mitigation measures which might be required. Options were scored on option deliverability, yield and cost uncertainty, environmental impacts and resilience. The plan lacks evidence on the metrics of each option, whether or not they were modified and the overall metric score of the least cost models. It is not clear why some options were given a resilience score of zero (WAFU and internal transfers). The scale runs from +1 to +5, with +5 being negative for resilience. The resilience metric is also omitted from the list of metrics first introduced in section 4 of the rdWRMP. Consequently it is not clear how this metric is incorporated into the decision making. Options which had large absolute uncertainty in yield or deliverability were identified as part of the Multi Criteria Analysis (MCA). It is not clear how the uncertainty in yield was isolated from the uncertainty in cost, as both are in the same metric. This has the potential to impact the selection of options (See Appendix A of Technical Report 4.9). However, neither the original nor the modified metrics of each option are provided for stakeholders to review.
	Implications	The plan does not provide enough evidence to enable an assessment of the MCA results and to determine the suitability of metrics. Stakeholder clarity on this element of the approach is lacking. Providing clarity on this would improve stakeholder understanding of the approach undertaken.
	Information or changes required	The company should, for the final WRMP: • Provide additional evidence on the metrics of each option, whether or not they were modified and the overall metric score of the least cost models. • Update the plan to clarify why some options were given a resilience score of 0. It should detail how this metric is incorporated in the decision making process and what decisions were made on the preferred programme as a result of the resilience metric. • Clarify how the uncertainty in yield was isolated from the uncertainty in cost.
	Our response	**Technical Report 4.9 (paragraph 6.2.1 onwards) documents the Multi Criteria Analysis approach, as well as how it was used to inform our investment strategy. • There are no scores of zero under the resilience metric. See Appendix 1 in Technical Report 4.9 for the multi criteria scores of each option. Yield and Cost scores were not isolated from other another, they were combined to provide one metric score. Technical Report 4.9. has been expanded to include a further MCA review in Step 3 of the analysis, and the MCA scores for shortlisted options within the Appendix,**
	Summary of any change to our final WRMP	Updated and clarified Chapter 5 and expanded Technical report 4.9.
I3-D4	Area of Issue	Impact of climate change within the decision making model
	Issues and evidence	There is a contradiction in how the potential impact of climate change is presented. Figure 16 of the main report presents a trajectory of climate change impact on DYAA in the Central Region from ~10 to ~40 Ml/d over the planning horizon. In particular, WRZ2 (Colne) has a high impact from climate change in comparison to Affinity Water's other water resource zones. However, Technical Report 4.9 states that Affinity Water "are not

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		exposed to some of the supply side uncertainties (e.g. climate change and hydrology) that affect other companies".
	Implications	The plan does not provide enough evidence on how climate change impact is accounted for in the decision making model.
	Information or changes required	For the final WRMP the company should clarify why WRZ2 (Colne) has a higher potential impact of climate change. The company should ensure Figure 16 in the main report aligns with the text in Technical Report 4.9.
	Our Response	**We have reviewed and amended the text within Technical Report 4.9. as we agree this is potentially misleading. In terms of climate change impacts in Central region, we have included a more detailed explanation of the vulnerability of the Clay Lane group of sources in section 3.4 of the fWRMP19.**
	Summary of any change to our final WRMP	Additions to the text in Chapter 3 and updated Technical Report 4.9.
I3-D5	Area of Issue	Developing adaptive pathways
	Issues and evidence	No evidence is provided by the company to justify the decision to merge Future 1a and Future 1b into a single future for the adaptive pathways plan, except that they produce similar outputs. The company acknowledges the risk that both challenging futures could occur simultaneously but has decided to manage the risk through final plan target headroom allowances. (See Technical Report 4.9 page 50).
	Implications	The plan does not provide enough evidence on how the challenging future is justifiably developed, or that it adequately accounts for the resilience risks that the company faces.
	Information or changes required	The company should provide evidence to justify its decision to merge future 1a and 1b into a single future in the final WRMP.
	Our response	**Greater clarity has been added to the Technical Report 4.9: Economics of Balancing Supply and Demand Modelling and Decision Making Process and the fWRMP19 in Chapter 5. This includes a full description of how we have appropriately used Final Plan Target Headroom to manage the risk of both futures occurring simultaneously. In addition, a new cross-comparison stage between economic modelling and Multi Criteria Assessment has been included in the adaptive pathway analysis.**
	Summary of any change to our final WRMP	Updated and clarified Chapter 5 and expanded Technical report 4.9.
I3-D6 Ellie	Area of Issue	Reporting of the decision making process as a whole
	Issues and evidence	In step 0 of the decision making process Affinity Water carried out a pre – modelling step to ensure their adaptive plan could manage 36 Ml/d sustainability reductions. It is not clear what this resulted in, and this facet of the process is not mentioned in Figure 25 of the rdWRMP summarising the decision making process. The options removed as part of Step 0 of the decision making process are not listed. This reduces stakeholder clarity in the approach. The plan states that sensitivity testing is inherently incorporated in the adaptive pathways analysis. However, the plan only includes limited description of assessment of non-monetary factors through the CSA and MCA analysis. There is not enough evidence in how sensitivity testing has been undertaken, or whether sensitivities have been

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		appropriately addressed in the decision making model (See Technical Report 4.9 page 21)
	Implications	The plan does not provide enough evidence for the decision making process to be clear and transparent.
	Information or changes required	The company should, for the final WRMP: • Provide additional information to increase the consistency of reporting and transparency of the approach taken in Step 0 and its implications on subsequent modelling; • Update Figure 25 in the rdWRMP main report to demonstrate that this step ensures that the adaptive plan can manage 36Ml/d sustainability reductions; • Provide detailed results of the pre-modelling phase, specifically which options were removed as part of this step in the process; • Better explain how sensitivities have been addressed.
	Our response	**The three basic assumptions that we derived in Step 0 and applied to all subsequent modelling have been clarified and laid out in Chapter 5, plus Technical Report 4.9. The 36.3Ml/d (green and amber) sustainability reductions for Central and East region are included in our baseline supply forecast. These are therefore included in all modelled futures. That includes the initial least cost plan (Step 1), all futures in Step 3 and the sensitivity testing of the Plan. We have clarified this in the Technical Report 4.9: Economics of Balancing Supply and Demand Modelling and Decision Making Process and updated Figure 25 (now Figure 28) in the fWRMP.** **We have made it clear in the main Plan that these reductions are included in all runs, including the 'least cost plan'.** **We have included a list of the Chalk groundwater options that were excluded as a result of the Step 0 analysis as an appendix to the Technical Report 4.9.** **We have expanded our sensitivity testing Section to include more details of the management of high growth and sustainability reductions (beyond the 36 plus 11 scenario presented in the 'challenging' future).**
	Summary of any change to our final WRMP	Updated fWRMP and Technical report 4.9
I3-D7	Area of Issue	Options screening process requires further evidence
	Issues and evidence	The company has not provided enough evidence in the options appraisal rejection list to demonstrate how it has screened out options from the unconstrained to the constrained list. It has not shown how it has then moved to a preferred list of options - see also R1.6.
	Implications	The plan does not provide enough evidence that options have been appropriately screened out from the unconstrained to the constrained list in a transparent, balanced and auditable way leaving choice within option types and between option types in the feasible list. It is not clear how the company arrived at its preferred options and whether the preferred options are justified economically, socially and environmentally.
	Information or changes required	For the final WRMP the company should update its options selection reporting to make it clear which options have been screened out and why. The company should share with the Environment Agency the complete Appendix A to Technical Report 4.1, which should include a list of all unconstrained options including their yield/benefit. The company should provide a narrative to explain how it arrived at its preferred strategic options. This should include how its preferred option set is justified economically, socially and environmentally. It should also explain how it appraised constrained and feasible options to arrive at a preferred set of options - see also R1.6.
	Our response	**The Appendix referred to was shared with the EA via email on 02/04/2019. This explains which options have been rejected from the process at the unconstrained**

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		stage, along with a reason as to why. Technical Report 4.3 is available to describe the Screening Methodology followed as part of the WRMP19 optioneering.
	Summary of any change to our final WRMP	None
I3-D8	Area of issue	Improved supply systems modelling to aid decision making
	Issues and evidence	Affinity Water has adopted an extended approach to decision making for its rdWRMP. The company justifies that an aggregated approach is suitable as the company's system is not overly reliant on surface water sources (rdWRMP, s5.2.6). This approach should be reconsidered for future plans and to inform the 2022/23 decision point. The company selects surface water storage options such as Grafham transfer and SESR option over the planning horizon. It should also further consider options for licence trading and resource sharing with Thames Water - see also R1.6. This suggests that a systems simulation approach will be needed to test the resilience of the company's supply system in conjunction with neighbouring companies, and to test the performance of complex shared resource options and trades.
	Implications	The company's current approach to estimating deployable output and the resilience of its supply system is unlikely to be suitable for future planning rounds. The current approach may limit the selection of optimal options or fully understand the risks to its supply system.
	Information or changes required	The company should commit to developing a system simulation approach, including conjunctive use modelling. The company should report on progress for this approach in its annual reviews.
	Our response	**The Problem Characterisation identified an aggregated approach as the most suitable for this WRMP given our current supply base. Our review of enabling actions and risks from the adaptive pathways analysis indicated that system simulation modelling will be required with the addition of the SESR, but that the modelling will need to be carried out jointly with Thames Water. We have therefore committed to the development of a conjunctive use model and system simulation in line with the Enabling Actions for 2020-23, which we intend to deliver through the WRSE group. This is explicitly included in our adaptive strategy.**
	Summary of any change to our final WRMP	Updated fWRMP Chapter 6, addition to the adaptive plan
Minor issues identified for Affinity Water's Water Resources Management Plan Minor issues are those that do not fall into the above categories, and do not pose a direct risk to the security of supplies or the environment. We consider that resolving these issues will improve the presentational quality, consistency and/or customer understanding of the draft plan.		
M1	Area of Issue	Raw water and treatment works losses and operational use (RWTWLOU)
	Issue	RWTWLOU increases by almost 1 Ml/d in the Dour resource zone in 2022/23. In the final planning supply demand balance, this increase in RWTWLOU is cancelled out by an option that reduces losses by the same amount. The reasons for this water accounting is not clear.
	Recommended change to plan	The company should better explain why RWTWLOU in the Dour zone increases and therefore needs an option to reduce it back to the pre-increase level.
	Our response	**We can confirm that the RWTWLOU in the Dour zone has 2.02 Ml/d flat line across planning period**

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	Summary of any change to our final WRMP	
M2	Area of Issue	Raw water and treatment works losses and operational use (RWTWLOU)
	Issue	The Wey zone planning tables includes a negative figure (-0.3 Ml/d) for RWTWLOU. This may be an input error or it implies ingress of water into the raw water network. No other water company in England reports a negative figure for RWTWLOU.
	Recommended change to plan	Affinity Water should review this and either explain why it is justified or change it in the next version of its WRMP19.
	Our response	**This negative figure is a product of the data available and methodology used in the derivation of this parameter, which is based on a comparison of abstraction meters versus DI meters at our major works. The negative figure for WRZ 6 is therefore a result of meter measurement uncertainty, which is then carried into the calculation process. This reflects our application of a consistent approach across all WRZs, and does not have a material impact on our Plan. The balance between the abstraction and DI meters for all WRZs will be investigated on an ongoing basis through our annual performance review (APR) process**
	Summary of any change to our final WRMP	No change
M3	Area of Issue	A zone by zone summary of current leakage, and forecast leakage over AMP7 is not clearly provided in the reporting
	Issue	Explanations of the leakage are provided but not summarised. No uncertainty around figures is provided.
	Recommended change to plan	The company should provide a more detailed description of the current, baseline and future leakage by WRZ.
	Our response	**Zonal baseline leakage and forecast leakage over AMP7 is presented in the WRP Tables. We have provided a more detailed description of the baseline and forecast leakage levels by WRZ as part of the final WRMP19 submission. This includes identification of the levels of leakage in each WRZ in each future in the charts provided in Technical Report 4.9.**
	Summary of any change to our final WRMP	Updated Technical Report 4.9
M4	Area of Issue	An outline of remaining actions to full compliance with the consistent reporting methodology is not provided.
	Issue	It is unclear if there is a risk to the baseline and subsequent leakage figures changing.
	Recommended change to plan	The company should outline any remaining leakage actions being implemented to become fully compliant.
	Our response	**There is almost no difference between our 'legacy' reporting of leakage and the 'convergence' method so we have not had to make allowances for this issue in the WRMP. Nevertheless, there are areas where we can improve reporting and to become fully compliant with the leakage convergence reporting methodology, Affinity Water is planning to:** • **Increase its coverage so that 95% of all properties have continuous night flow monitoring through the year** • **Increase availability to at least 90% as a result of the increased coverage** • **Use own data in Southeast and East regions to determine household night use**

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		• **Use own data in Southeast and East regions to determine plumbing losses included within the fast logging method** • **Provide evidence that the fast logging sample is representative of the company as a whole** • **Ensure that the stratification of non-household to a number of groups and consumption bands is representative of the varying characteristics of commercial and industrial properties** • **Ensure that non-household night consumption is estimated by means of a reliable annual billed volume (ABV) model linked to the billing system** • **Ensure that flow checks are carried out on DI meters consistent with the principles of the document 'EA Abstraction Good Metering Guide' and in particular the frequency of flow checking defined in Table 6.2 of the EA guide** • **Establish a robust way to estimate unmeasured PCC in Southeast and East regions** • **Ensure that our Individual Household Monitor (IHM) Watcom is representative of the company's demographics** • **Carry out a new assessment of unmeasured non-household consumption** • **Update our assessment of company own use, operational use and water delivered unbilled (legally and illegally)**
	Summary of any change to our final WRMP	None required.
M5	Area of Issue	Separate SELL models for upstream, distribution and downstream leakage have not been developed.
	Issue	Potentially beneficial schemes may not have been considered due to lack of knowledge regarding the scale of upstream losses.
	Recommended change to plan	The company should commit in its final WRMP to improve its understanding of the leakage on this part of the network.
	Our response	**We acknowledge that separate SELL models for upstream, distribution and downstream leakage have not been developed. However, our level of trunk mains leakage is low (6-8Ml/d), so opportunities for addressing leakage in this way are limited. Our focus on leakage reduction is therefore within our DMAs.** **As part of improvements being considered for the next round of WRMP, we will aim to develop a robust understanding of upstream losses and consider any potential schemes that may be available to us on this part of the network.**
	Summary of any change to our final WRMP	Clarification included in fWRMP, Chapter 6.
M6	Area of Issue	No text summary for SEA assessment of constraint options
	Issue	Within Chapter 4, summary matrices are provided for the assessment of the constrained options. In the previous Environmental Report that accompanied the dWRMP2018 a text summary of the effects was provided. In this version the text summary has been omitted making it difficult to understand the likely significant effects of the options considered.
	Recommended change to plan	The company should provide a text summary to accompany the summary matrices in Chapter 4.
	Our response	**The summary tables are available but we considered the report would be much more of an accessible document without overloading the reader with more text. We can provide these tables to the EA upon request.**
	Summary of any change to our final WRMP	None proposed.

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M7	Area of Issue	Consultation procedures for SEA unclear
	Issue	Section 9.2 and the Non-Technical Summary confirm that the rdWRMP and Environmental Report will be consulted on. There is also a general statement that comments will be taken into account when finalising the WRMP2019. Section 9.2 also outlines how a SEA Adoption Statement will be prepared following publication of the final WRMP2019. There is no specific information, however, on how consultees/stakeholders can comment (e.g. email/website) or an outline of any proposed consultation questions, which can help to facilitate comments. Further information on the process through which the consultation responses will be taken into account would be beneficial at this stage.
	Recommended change to plan	The company should expand on the information provided on the next consultation stage in both the main Environmental Report and the NTS.
	Our response	**Full details of our further consultation approach with customers and stakeholders, methods and findings, including the consultation questions asked, are given in Technical Report 7.1: Engaging with Customers, Communities and Stakeholders. A summary is provided in Sections 2 and 3 of the Statement of Response, along with an summary of customer and stakeholder engagement in Chapter 2 of the fWRMP. We have continued to describe how customer and stakeholder responses informed our decision making process within Chapter 5 of the fWRMP, plus the Technical Report 4.9.** **The Monitoring Plan, Chapter 6 of fWRMP19, sets out our future plans for consultation and engagement with customers and stakeholders. Affinity Water will publish an SEA Post Adoption Statement, describing how the SEA and the responses to consultation have been taken into account during the preparation of the fWRMP19. There is no requirement to consult on this statement but it will be published on our web site.**
	Summary of any change to our final WRMP	Updates to the main Plan and technical reports as described above.
M8	Area of Issue	Categorise different effects on SEA separately
	Issue	It would have been preferred that the hydrological effects, based on transfer and abstraction etc. were treated separately from the infrastructure effects**, because the mechanisms** and pathways of impact are quite different. A clearer split between the effects of the plan in terms of the water use, and the effects of the measures being proposed to transport the water would have been preferable.
	Recommended change to plan	Make the suggested changes.
	Our response	**We note these preferences in presentation of effects and will take these suggestions on board in future updates to the SEA**
	Summary of any change to our final WRMP	None
M9	Area of Issue	Problem characterisation
	Issue	As the problem characterisation is a qualitative assessment, additional transparency in the reporting the approach addressing how many responses were collected and how they were vetted would provide additional clarity to the report. The plan has not demonstrated what measures have been taken to manage the subjectivity inherent in the problem characterisation process. This is unlikely to affect the outcome of the problem characterisation, however stakeholder confidence in the approach would be improved with additional information (See Technical Report 1.7).

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	Recommended change to plan	The company should detail in the plan how responses were collected and vetted and demonstrate what measures have been taken to manage any subjectivity inherent in the process.
	Our response	**Our problem characterisation exercise was undertaken on three occasions:** • **Initial Assessment for dWRMP19 (July 2016)** • **Final Assessment for dWRMP19 (September 2017)** • **Reassessment for rdWRMP19 (September 2018)** **Each exercise involved in house staff comprising approximately three Water Resources Specialists, two Asset Strategy Managers and the Director of Asset Strategy. The makeup of the team varied slightly between the initial exercise in 2016 and final reassessment in 2018 due to natural staff movement. Each person provided their professional opinion for the strategic and complexity questions. A group discussion was held and a generic company response formulated from the individual responses, which was then reviewed internally through the WRMP review process. The number and range of staff consulted on several occasions and the approval process undertaken ensured any personal subjectively was discounted and that the responses represented that of the Company.**
	Summary of any change to our final WRMP	The above clarification has been included in the Decision Making Report (4.9).
M10	Area of Issue	Reporting of decision making process
	Issue	It is not clear why Modelling to Generate Alternatives (MGA) in Figure 25 of the main report is listed as an UKWIR Method. This method has not been implemented. Whilst this does not have an impact on the rdWRMP, it would improve stakeholder clarity on the approach undertaken.
	Recommended change to plan	The company should update figure 25 in the main report to reflect the correct UKWIR method reference.
	Our response	**This was an error, and should have referred to MCA, not MGA. We have corrected this in the fWRMP main plan and Technical Report 4.9.**
	Summary of any change to our final WRMP	Changes made as above.
M11	Area of Issue	Reporting of futures
	Issue	A clear summary of the four futures is provided in Technical Report 4.9. Stakeholder clarity of the similarities and differences between the futures could be improved.
	Recommended change to plan	The company could provide a visualisation of the different futures.
	Our response	**We have updated Technical Report 4.9: Economics of Balancing Supply and Demand Modelling and Decision Making Process to include the most up to date assessment of our supply demand balance for each future which supports the timing of the requirement for the transfers. The individual balances within each WRZ for each future are provided as graphs within the technical report.**
	Summary of any change to our final WRMP	Updated Technical Report 4.9.
M12	Area of Issue	Completion of water resources planning (WRP) tables

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	Issue	A combination of futures has been selected to complete the WRP tables in the Central region. As this no longer provides the least cost plan for a single future, this decision at the end of the decision making should be clearly reported to stakeholders.
	Recommended change to plan	The company should clarify in Technical Report 4.9 which combination of futures has been selected to complete the WRP tables in the Central region.
	Our response	**We have clarified this within Chapter 6, which states how the tables were completed. To support clarity of reporting we have also ensured that the supply/demand balances for the four futures are shown graphically in Technical Report 4.9, with reference to the timing of supply side schemes included in the charts.**
	Summary of any change to our final WRMP	Updated fWRMP Chapter 6 and Technical Report 4.9