

Water Resources Management Plan 2014

Appendix 8 : Developing our preferred plan

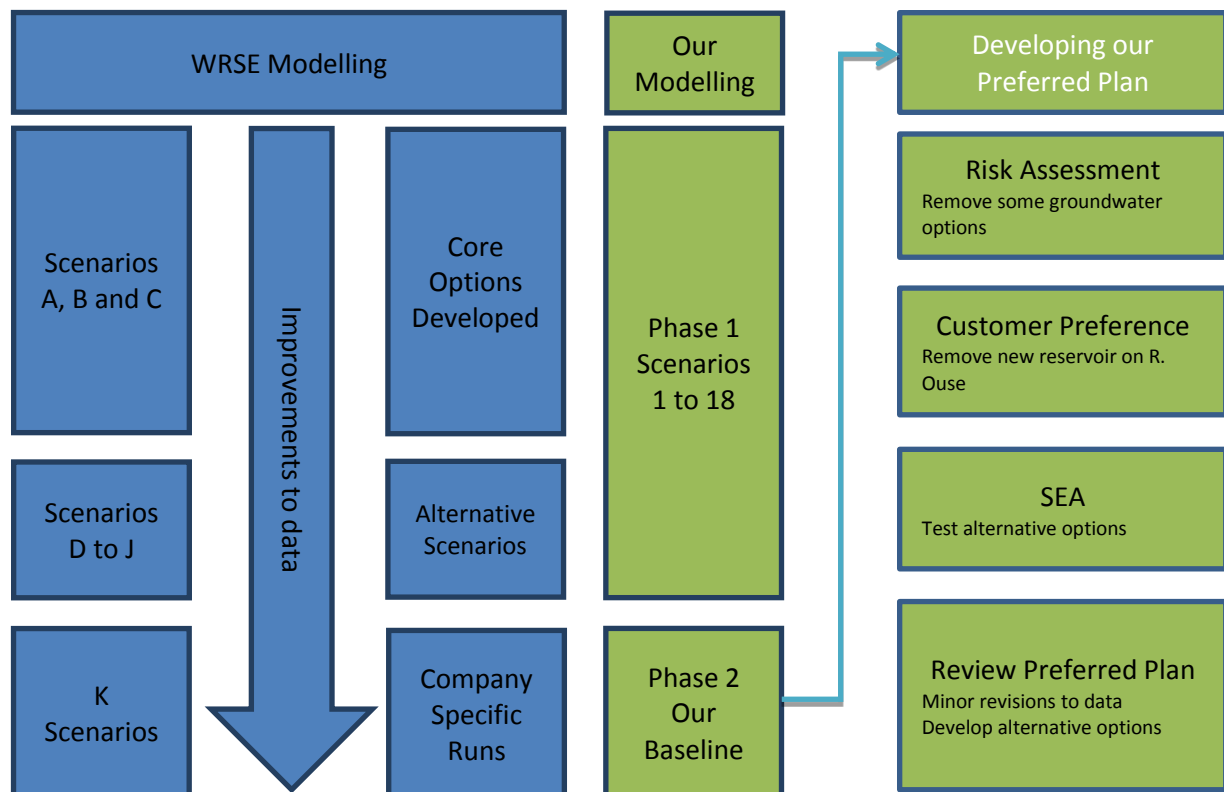
Executive Summary

We have developed a preferred plan for WRMP14 which is underpinned by the WRSE Phase 2b modelling work, which we have then refined in our own modelling and testing. This appendix explains how we have developed our preferred plan and why it has to be different to the WRSE Phase 2b modelling. This appendix also explains how we have tested that plan using a risk assessment, taking on board our customers' preferences, and included a Strategic Environmental Assessment (SEA).

The development of our preferred plan has been an iterative process which began with the initial Phase 2b modelling within the WRSE Group. As the Phase 2b modelling progressed changes to the data have been made. It has not been possible to re-run the initial model runs so some of the earlier Phase 2b work, whilst valuable, is not consistent with the revisions to the data, so we cannot directly use the Phase 2b work in our preferred plan.

As the Phase 2b modelling progressed, we undertook our own modelling. Our modelling uses exactly the same model as the WRSE Group, and it also includes the same data. This means that we can be assured that the modelling for our own preferred plan is consistent with the data other companies have provided. Again our own modelling has been iterative and the data has improved with time. Essentially there were two modelling phases; the first phase included an initial baseline which was consistent with the WRSE work. The second phase included more detailed modelling which was based on our better data. In particular neighbouring companies have advised us of changes to the transfers they can offer us as bulk supplies. We have had detailed meetings with neighbouring companies and our optioneering has included all transfers which companies have said are available.

The diagram below summarises the development of our preferred plan.



During our modelling we developed a Base Case which was the lowest cost model. This Base Case is not our preferred plan as it does not apply our Risk Assessment, Customers' Preferences and SEA.

On completion of initial economic modelling we have undertaken a qualitative risk assessment of the options in our plan. This risk assessment takes on board the Environment Agency's 'Red List' of schemes which it believes may have environmental impacts in the future. The assessment also accounts for our preference, and our Regulator's concerns, for improving resilience in our ability to supply water.

We have also included our customers' preferences for different types of schemes to be included in our plan. Our preferred plan broadly aligns with those preferences.

We have undertaken an SEA which has confirmed our preferred plan and identified alternative options we need to consider. We have completed a HRA of the plan options. We have included detail of the carbon emissions relating to the preferred plan.

The increased population forecast for our supply zone means that we will have to develop new options to meet the forecast deficit. This includes a deficit of 8.2 MI/d on peak week from 2015 to 2020. Our work has shown that strategic options are required to meet the deficit in the longer term, and it is important that work commences in 2015 to 2020 to refine the option details so that the plan can be delivered with minimum risk.

Our preferred plan is set out below:

1. Total leakage reduction is 4.91MI/d over the planning horizon.
2. New water efficiency options provide a further reduction of 1.0MI/d in 2015 to 2020. This is over and above the large reduction in PCC included in the baseline demand forecast forecasts that are supported by our water efficiency strategy and micro component modelling described in Appendix 4.
3. Two reservoirs are selected, including the extension of our existing Arlington reservoir and a new surface water resource at Broad Oak. The combined yield is 35.6MI/d.
4. In addition to the extension of the existing transfers, six new transfer schemes are selected; these are:-
 - a. Two transfers from Sutton and East Surrey Water totalling 10MI/d
 - b. One transfer from Thames Water (10MI/d)
 - c. One transfer from Portsmouth Water (10MI/d)
 - d. One transfer from Southern Water (5MI/d)
 - e. A transfer to Affinity Water's South East Zone which is bi-directional but utilises existing infrastructure.
5. Five groundwater options are selected with a combined yield of 11.5MI/d.
6. Improvements to the existing treatment works in WRZs 2 and 4 are selected (combined yield 31.0MI/d)
7. Water Re-use is selected at two sites (Peacehaven and Aylesford) with a combined yield of 37.5MI/d.
8. We propose a strategic review of options in East Kent with Southern Water and Affinity Water

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Introduction

1. There are four key elements to developing the preferred plan:
 - Undertaking economic analysis, using a model developed by the WRSE Group, to find the costs of the preferred plan, and compare that with the WRSE scenarios and our alternative options.
 - Understand the risks of those options and see if the options meet the objectives set out in the plan, in particular the wish of Defra to increase resilience in our plan following the drought of 2010 to 2012.
 - Compare the results of the economic modelling with customers' preferences and their willingness to pay, and see if the options selected are consistent with customers' views.
 - Ensure that the preferred plan meets the SEA objectives set out in the SEA Scoping Report.
2. This appendix describes how we have used these four approaches to develop our preferred plan and our alternative options. Section 8 presents details of both.

Economic Analysis

3. We have used the results of the economic modelling by the WRSE Group to underpin our approach to the options selection process to meet the supply demand deficit. In order to include customer preferences and to understand the risks in the preferred plan and alternative options, we have undertaken our own modelling, in addition to the WRSE work, to determine our preferred plan.
4. Details of the WRSE modelling can be downloaded from www.wrse.org.uk including a description of the economic model developed by Halcrow.
5. The WRSE modelling uses the supply and demand data provided by companies and identifies the deficits in each WRZ. Companies also provided option costs for each option, including financial costs (Capital Costs (CAPEX), Fixed Operational Costs (FOPEX), Variable Operational Costs (VOPEX)) and Environmental and Social (E&S) costs where they could be developed (we used the EA Environment Agency's Benefits Assessment Guideline (BAG) to derive these costs and benefits). In addition carbon costs were also developed. Appendix 7 describes our approach to developing these costs.
6. Our optimisation model considers the costs of our existing water resources against the costs of new schemes. Initially our plan includes the development of more groundwater options and these can be cheaper than our existing sources. However, the increase in demand means that our existing sources are quickly fully utilised. Later on our plan includes schemes with higher capital and/or Opex costs and the AISCs of the options are more expensive than our existing sources. In some cases the options are so expensive that they are only used to manage peak demands rather than provide a base deployable output.
7. The WRSE model produces an optimal solution set for the WRSE area. Some key features of the model are:-

- Where it is economic to do so and there is a surplus, the model will allow for the transfer of water from one WRZ to another. If it is more economical to do so the model will select alternative options, including demand management (leakage, water efficiency and metering) or supply (surface water, groundwater, water re-use, desalination etc.).
 - The model determines when an option is selected and reports the utilisation of the option (the amount of yield taken from that option) which may change over time. This utilisation calculation is used in the determination of the VOPEX costs of the preferred option set.
 - The model optimises for supply demand balances (Dry Year Annual Average, Average Day Peak Week (also known as Dry Year Critical Period), Minimum Deployable Output and Normal Year). It solves these four balances simultaneously.
 - The model solves on a least cost discounted calculation (Net Present Value) of all the costs. However, if there is a deficit at a point in time, the model is restricted to selecting options which can be developed by that time. This means that in some situations expensive options are selected because they can be delivered in time, rather than because they would otherwise be economic.
 - Companies supplied 25 years of supply demand balance data for the WRSE modelling. This limits the period over which the model can optimise. The NPV figures quoted in this appendix are based on the summary output tables from the WRSE model which uses annuitized costs for CAPEX. These NPV figures do not include costs beyond 2040 so that only that proportion of the total capital costs attributable to water delivered up to 2040 are included.
8. The model was originally developed for the WRSE Group, and companies within the WRSE Group had the option to use the model for their own analysis. We decided that, to ensure as much consistency as possible with the WRSE analysis, we would use the same model. As well as consistency benefits we can also use the model to understand the availability of transfers, as the data provided by other companies to the WRSE group is included in our modelling. We can therefore be assured that our modelling fully tests both the economic costs of transfers from other companies and the availability of water for those transfers.
 9. As described above we have used the results from the WRSE modelling and our own modelling to define our preferred plan.

WRSE modelling

10. When we predict 25 years into the future, we accept that there is uncertainty in our demand and supply forecasting, and that some of the options which we think are deliverable now, may not be deliverable in the future. In order to understand the impacts of this uncertainty, the WRSE Group has identified groups of Scenarios (A to K) and different assumptions within those runs (e.g. 1 to 4). The list of scenarios is given below.
 - A - Base Case Scenario
 - B1 to B4 - Alternative Scenarios
 - C1 to C3 - Sensitivity tests for Environment Agency
 - D - Sensitivity Runs
 - E1 to E2 - Exploration of downstream network costs

- G1 to G3 - Further modelling (peer review requested)
 - H - Additional Sustainability reduction tests as requested by companies
 - I1 to I8 - Force in or exclude options as requested by water companies
 - J1 to J10 - Additional requested runs
 - K1 to K13 – Additional requested runs
11. It should be noted that each scenario has been run several times as the data has been improved upon by companies. As a result of these improvements Scenario A has been published on at least four different occasions, each with an improved data set.
12. It was originally envisaged by some members of the WRSE Group, if not all, that one of these scenarios would be 'adopted' by all companies and all plans would reflect this scenario. However, more recently, given the complexity of the modelling and changes to data supplied by some companies, the WRSE Group has adopted an approach of using the modelling as a starting point for the development of companies' preferred plans, with negotiations with other companies and stakeholders influencing the options selection. Example reasons of why a single scenario cannot be adopted are:
- Several companies have stated that the transfer options originally offered to the model are no longer viable.
 - The model cannot assess risk of the mix of options, nor can it incorporate cumulative impacts required to be addressed by our SEA.
 - The options offered to the model do not include customer willingness to pay as such studies were completed after the start of the WRSE modelling.
 - Some companies (including ourselves) updated our supply demand data part way through the WRSE modelling programme.

Scenario A

13. Scenario A is one of the reference scenarios we have used in the development of our preferred plan. Some of the key features of this scenario for South East Water are:
- Leakage options provide a reduction of 3.06MI/d¹ over the planning horizon
 - Water efficiency provides a reduction of 3.48MI/d over the planning horizon
 - Almost all the groundwater schemes are selected and they provide a total yield of 42.54MI/d over the planning horizon. In addition an ASR scheme at Beenhams Heath and the construction of a new water treatment works at Maytham Farm are selected.
 - The following transfers are selected:²
 - a. Three transfers from Sutton and East Surrey Water (total 25.0MI/d)
 - b. Six transfers from Thames Water (total 55.0MI/d)
 - c. Five transfers from Southern Water (total 43.6MI/d)
 - d. Two transfers from Affinity Water (total 22.0MI/d)
 - Improvements to the treatment works in WRZs 2 and 4 are selected (combined yield 31.0MI/d)
 - A selection of intra-company transfers to move water within our supply area are also selected.

¹ All yields given in this section are for the summer peak (ADPW)

² Due to a modelling error, extensions to the existing transfers at Darwell, Weir Wood and Belmont Scheme were not selected in Scenario A.

14. The NPV of the costs of this scenario for our plan are set out below:

Table 1: Summary of Costs for Scenario A

	Total cost (£k)	CAPEX Economic (£k)	FOPEX Economic (£k)	VOPEX Economic (£k)	CAPEX E&S (£k)	FOPEX E&S (£k)	VOPEX E&S (£k)	CAPEX Carbon (£k)	FOPEX Carbon (£k)	VOPEX Carbon (£k)
Scenario A	242,260	145,244	19,242	5,494	178	-	-	1,884	-2,376	1,356

Scenario J4

15. Scenario J4, undertaken as part of the WRSE modelling, is a more constrained model run which does not allow for the extension of existing transfers between companies, or the development of new transfers. It therefore provides one of the more extreme scenarios modelled by the WRSE Group. The results for South East Water are presented in Table 2 , and are the options included are summarised below.

- More leakage options are selected than in Scenario A and provide a reduction of 5.12MI/d over the planning horizon.
- As with Scenario A water efficiency provides a reduction of 3.48MI/d over the planning horizon.
- Whereas in Scenario A no reservoirs were selected in our area, in Scenario J4 three are selected (Broyle Reservoir, Raise Arlington and Raise Ardingly) with a combined yield of 36.45MI/d.
- All the groundwater schemes are selected and they provide a total yield of 42.83MI/d over the planning horizon. In addition an Aquifer Storage Recovery (ASR) scheme at Beenhams Heath and the construction of a new water treatment works at Maytham Farm are selected.
- As in Scenario A, improvements to the treatment works in WRZs 2 and 4 are selected (combined yield 31.0MI/d)
- An option to transfer water from the River Adur to the River Ouse with a yield of 6.5MI/d is selected.
- In addition water re-use, which is not selected in Scenario A, is selected in J4 at three sites (Aylesford, Bexhill and Weatherlees) with a combined yield of 43.7MI/d.
- Desalination at Reculver with a yield of 8.4MI/d is also selected.

16. The costs of Scenario J4 are included in the Table below.

Table 2: Summary of Costs for Scenario A

	Total Cost (£k)	CAPEX Economic (£k)	FOPEX Economic (£k)	VOPEX Economic (£k)	CAPEX E&S (£k)	FOPEX E&S (£k)	VOPEX E&S (£k)	CAPEX Carbon (£k)	FOPEX Carbon (£k)	VOPEX Carbon (£k)
Scenario J4	469,909	359,692	14,529	8,717	109	533		12,218	-465	4,248

Comments on Differences in Scenario Runs

17. As we expected, constraining the model by not allowing the transfer of water between companies results in a different set of options being selected. In particular reservoirs, water

re-use and desalination options feature in the J4 model results. The cost of the set of options also increases as shown in the table below.

Table 3: Summary of the differences between Scenarios A and J4

	Scenario A	Scenario J4
Leakage	3.06MI/d	5.12MI/d
Water Efficiency	3.48 MI/d	3.48 MI/d
Reservoirs	None	Three (36.45 MI/d)
Groundwater	42.54MI/d	42.83MI/d
Transfers from Other Companies	145.6MI/d	None
Water Re-use	None	Three (43.7MI/d)
Desalination	None	One (8.4MI/d)
Surface Water Transfers	None	Adur to Ardingly (6.5MI/d)
Water Treatment Works Improvements	WTWs in WRZs 2 and 4 (31MI/d)	WTWs in WRZs 2 and 4 (31MI/d)
Total Cost (discounted NPV)	£242.6M	£469.9M

Other Scenarios

18. The results from other scenarios from the WRSE modelling work are presented in appendix 8A as a series of NPV graphs for the different scenarios.
19. As the modelling progressed companies reviewed the option data provided and there were gradual improvements in the data; in particular there were refinements to the list of feasible options. It was only at the K Scenarios that the data in the WRSE modelling became closely aligned. This means that the K Scenarios are a better representation of companies' data than the earlier A to J Scenarios.
20. The WRSE Group commissioned Richard Critchley and Dene Marshallsay to prepare a report on the results of the modelling. The report is available from the WRSE website at http://www.wrse.org.uk/sites/default/files/WRSE_report_19Feb2013.pdf
21. The report includes a summary of the modelling (Scenarios A to E) and, by examining the modelling results across all ten of the Scenarios reviewed, a set of 'core' strategic options were identified which have been defined by the following constraints:
 - The option must have been selected in five of the 10 A, B, C and E scenarios.
 - The options must deliver a DYCP capacity of 5 or more MI/d.
 - The confidence grade for the option must be 'very high' or 'high' in at least half of the years that the option is selected in the sensitivity tests.
22. In addition to the core options members of the WRSE Group also put forward a range of options, which they selected as being important, based on a more subjective assessment using expert judgment. This range of options is described as 'alternative' strategic options. The tables on the following pages summarise the core options.
23. Because they are core options we might expect to see these options feature in water companies plans. A comparison of the core options and our preferred plan is given in later in this appendix in the Section *Our Baseline and Preferred Plan*.

Table 4: Summary of the Core Options for 2015 to 2020

Option ref.	Details	Source Co.	Receive Co.	No. of scenarios	Red lists	Category
TWU-RTR-LON-5360	Intercompany transfer	AW	TW	10		Core
SWS-EFF-KME-0200	Water re-use		SWS	10		Core
TWU-RTR-LON-0610	Intercompany transfer		TW	10		Core
SWS-RTR-SNO-5330	Intercompany transfer	PRT	SWS	10		Core
SEW-RTR-RZ7-5015	Intercompany transfer	SWS	SEW	10		Core
VWC-ESW-VW6-801	Surface water		AW	10		Core
SEW-RTR-RZ4-5931	Intercompany transfer	TW	SEW	10		Core
TWU-RTR-VW?-5540	Intercompany transfer	TW	AW	10		Core
SWS- RES-KTH-0054	Storage		SWS	10		Core
TWU-NGW-LON-0680	Ground water		TW	10		Core
SWS-ETR-SWO-5411	Extension to existing transfer	PRT	SWS	10		Core
TWU-RTR-SWX-0741	Intercompany transfer		TW	10		Core
TWU-RNC-SWA-0560	Other supply option		TW	10		Core
SWS-ESW-KME-0160	Surface water		SWS	10		Core
VWC-RTR-VW4-713	Intercompany transfer	TW	AW	9		Core
SWS-CTR-IOW-5011	Intra company transfer	SWS	SWS	9		Core
VWS-RTR-VWS-843	Intercompany transfer	SEW	AW	9		Core
SWS-NGW-HSO-0241	Surface water		SWS	8	Yes	Core
SEW-EGW-RZ4-2143	Ground water		SEW	8	Yes	Core
SES-EGW-SUT-0100	Ground water		SESW	8	Yes	Core
SWS-WTW-HSO-0285	Water treatment works		SWS	7	Yes	Core
PRT-ESW-PRT-0070	Surface water		PRT	6	Yes	Core
VWC-RTR-VW6-752	Intercompany transfer	TW	AW	10		Alternative
SEW-RTR-RZ8-5263	Intercompany transfer	AW	SEW	10		Alternative
SEW-NGW-RZ3-2224	Ground water		SEW	10		Alternative
VWS-RTR-VWS-639	Intercompany transfer	SWS	AW	10		Alternative
VWS-RTR-VWS-450	Intercompany transfer	SWS	AW	9		Alternative
SWS-RTR-HSO-5392	Intercompany transfer	PRT	SWS	5		Alternative
SWS-DES-KTH-0151	Desalination		SWS	5		Alternative
VWS-DES-VWS-0020	Desalination		AW	4		Alternative
SWS-DES-HSO-0062	Desalination		SWS	2		Alternative
VWS-RTR-VWS-842	Intercompany transfer	SEW	AW	1		Alternative
SWS-DES-SBR-0032	Desalination		SWS	0		Alternative
SWS-RES-KTH-0053	Storage		SWS	0		Alternative
SWS-DES-IOW-0084	Desalination		SWS	0		Alternative

Key: AW = Affinity Water, SWS, = Southern Water, PRT = Portsmouth Water, SESW = Sutton and East Surrey Water, TW = Thames Water, SEW = South East Water

Table 5: Summary of the Core Options for 2020 – 2025

Option ref.	Details	Source Co.	Receive Co.	No. of scenarios	Red lists	Category
TWU-EFF-LON-0645	Water re-use		TW	10		Core
SES-WTW-ESU-0015	Water treatment works		SESW	10		Core
SEW-RTR-RZ1-5890	Intercompany transfer	SESW	SEW	10		Core
SEW-CTR-RZ2-5901	Intra company transfer	SEW	SEW	10		Core
SEW-CTR-RZ1-5902	Intra company transfer	SEW	SEW	10		Core
SEW-RTR-RZ6-5011	Intercompany transfer	SWS	SEW	10		Core
SEW-RTR-KTH-5430	Intercompany transfer	SEW	SWS	10		Core
SEW-RTR-RZ8-5431	Intercompany transfer	SWS	SEW	10		Core
SEW-ASR-RZ4-2139	Aquifer recharge		SEW	10		Core
SEW-ETR-RZ2-0021	Extension to existing transfer	SWS	SEW	10		Core
SWS-ETR-SHA-5110	Extension to existing transfer	SWS	SWS	9		Core
SEW-RTR-KME-5050	Intercompany transfer	SEW	SWS	9		Core
SEW-RTR-RZ6-5051	Intercompany transfer	SWS	SEW	9		Core
SWS-CTR-IOW-5012	Intra company transfer	SWS	SWS	7		Core
SEW-RTR-SBR-5640	Intercompany transfer	SEW	SWS	10		Alternative
SEW-CTR-RZ1-5525	Intra company transfer	SEW	SEW	10		Alternative
SES-RTR-ESU-5040	Intercompany transfer	SEW	SES	9		Alternative
VWC-RTR-VW5-161	Intercompany transfer		AW	8		Alternative
VWC-RTR-VW4-706	Intercompany transfer	TW	AW	7		Alternative
PRT-RES-PRT-0010	Storage		PRT	7		Alternative
SEW-CTR-RZ6-5521	Intra company transfer	SEW	SEW	6		Alternative
SES-RES-ESU-0020	Storage		SESW	4		Alternative
SWS-EFF-IOW-0090	Water re-use		SWS	3		Alternative
TWU-EFF-LON-0644	Water re-use		TW	0		Alternative
TWU-EFF-LON-0301	Water re-use		TW	0		Alternative

Table 6: Summary of the Core Options for 2025 - 2030

Option ref.	Details	Source Co.	Receive Co.	No. of scenarios	Red lists	Category
SEW-ETR-RZ3-0080	Extension to existing transfer	SWS	SEW	10		Core
VWS-ASR-VWS-0397	Aquifer recharge		AW	10		Core
SES-RTR-SUT-5110	Intercompany transfer	TW	SESW	6		Core
SEW-RTR-VW6-5593	Intercompany transfer	SEW	AW	9		Alternative
SEW-RTR-RZ1-5361	Intercompany transfer	SESW	SEW	5		Alternative
SES-RTR-SUT-5030	Intercompany transfer	TW	SESW	3		Alternative
SEW-RES-RZ2-1350	Storage		SEW	3		Alternative
TWU-RTR-LON-0224	Intercompany transfer		TW	0	Yes	Alternative
TWU-RES-LON-0762	Storage		TW	0		Alternative

Table 7: Summary of the Core Options for 2030 – 2035

Option ref.	Details	Source Co.	Receive Co.	No. of scenarios	Red lists	Category
TWU-ASR-SWA-0540	Aquifer recharge		TW	7		Core
SEW-CTR-RZ7-5115	Intra company transfer	SEW	SEW	6		Alternative
VWS-EFF-VWS-0070	Water re-use		AW	4		Alternative
TWU-NSW-LON-0710	Surface water		TW	2	Yes	Alternative

Table 8: Summary of the Core Options for 2035 – 2040

Option ref.	Details	Source Co.	Receive Co.	No. of scenarios	Red lists	Category
TWU-DES-LON-0060	Desalination		TW	1		Alternative
SEW-DES-RZ8-4010	Desalination		SEW	1		Alternative
SWS-DES-SHA-0120	Desalination		SWS	1		Alternative

Summary of the WRSE Modelling

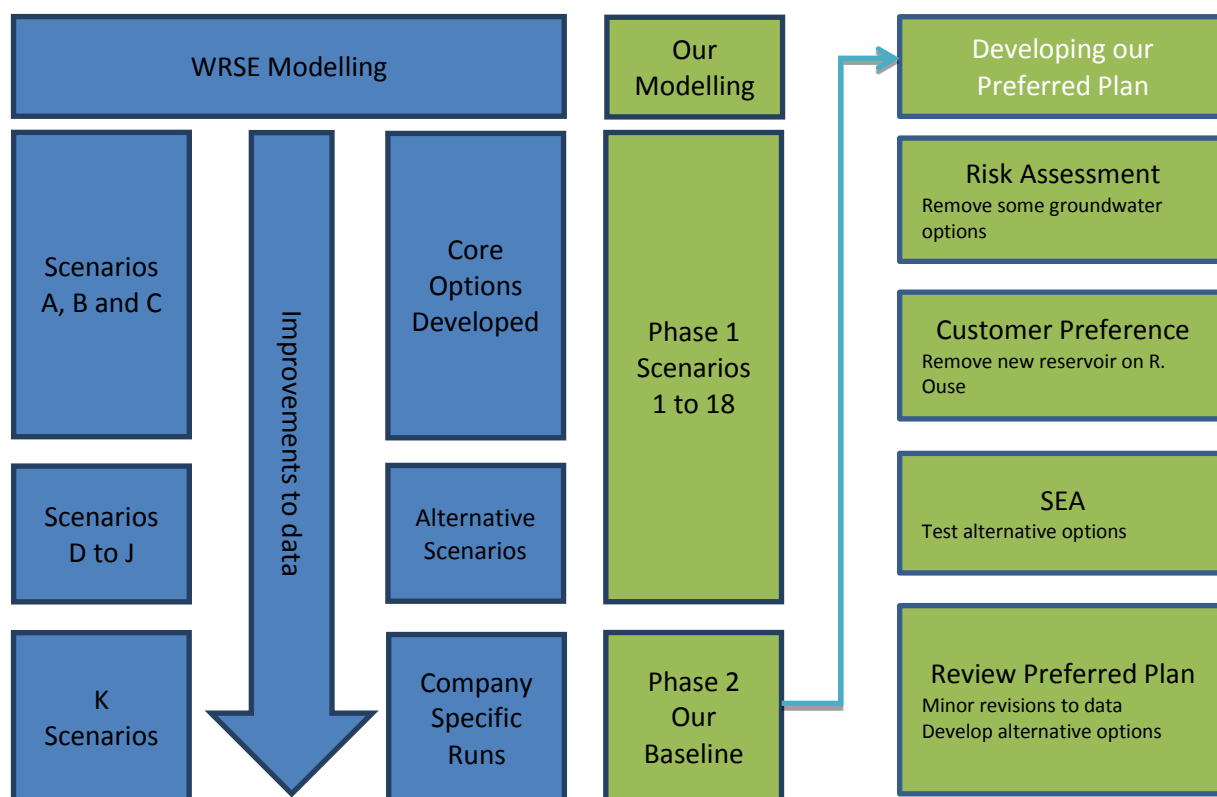
24. The WRSE modelling provides a comprehensive data set and a proven optimisation model which should underpin water companies' strategies.
25. Because of the complexities of what was modelled, companies have improved data during the modelling process, and therefore the model runs, whilst valuable, cannot be used directly as our preferred plan.
26. Key benefits of the WRSE modelling are:-
 1. The different scenarios provide a range of costs for our strategy, and we can benchmark our preferred plan against those.
 2. The core options list provides an indication of options which companies might expect to feature in their plans
 3. The modelling allows us to test those options which are picked and focus on those options in more detail.

Our Own Modelling – Overall Approach

27. As described earlier, because of data changed during the WRSE modelling, there is no single WRSE scenario which we can use directly for our preferred plan.
28. We have undertaken our own modelling using the results of the WRSE model as a basis for the development of our preferred plan. By undertaking our own modelling we are able to:
 - Develop a new baseline which is consistent with the best data provided by all companies.
 - Include more sensitivity testing to improve the resilience in our preferred plan.
 - Understand the impact of our customers' preferences.
 - Consider the wider environmental costs and benefits which are not included in the environmental, social and carbon costs.
 - Undertake testing to determine the availability of transfers from other companies and understand the costs of those transfers, which were not included in the WRSE modelling.

- At each stage, because we are using the WRSE model, we can ensure that our plan is consistent with the regional supply demand balance context.

29. The approach we adopted is set out in the flow diagram below.



29. As the diagram shows, our modelling ran in parallel with the WRSE modelling work, such that we split our modelling into 2 Phases. Phase 1 was undertaken in early 2013 at the same time as the WRSE scenarios A to J. During this time there were improvements to companies' data - so whilst our Phase 1 modelling was useful, as with the WRSE modelling, it was not based on the most up-to-date data set.

Our Scenario Testing – Phase 1

30. As described above the WRSE Group undertook its own scenario testing. We also included scenario tests in our own modelling to understand the impact of uncertainty in the development of our preferred plan. We undertook 18 scenario runs during the Phase 1 work and these are presented in the following Table. Key scenarios, are identified in **bold**.

Table 9: List of Scenarios from our own Phase 1 Modelling

Number	Name	Description	Comments
1	Baseline WRSE Test run	To test the output of the WRSE model on SEW Model	This run was to test our version of the WRSE model against the results from WRSE Group to ensure that the results were the same.
2a	(a) Baseline	In line with WRSE (for comparison with WRSE)	There were minor modifications to the WRSE Test Run (1) due to some data errors, so they were corrected and a baseline, consistent with the WRSE work was developed.
2b	(b) Baseline	In line with SEW - Annuitised principles	We have slightly different accounting practises to those used in the WRSE modelling so we undertook another run to account for these differences.
2c	(c) Baseline	In line with SEW - Jacobs Start Dates (Jacobs dbase start dates)	There were some minor revisions to start dates for some options, so this run was to test the impact of those changes.
3	Turn off new bulk supply imports	To provide estimated cost of bulk supplies based on schemes brought forward to replace them and would test resilience in drought scenario or loss of bulk supply	This run was similar to the WRSE J4 run so we could compare results.
4	Turn off Southern Water bulk supply imports	To test resilience in drought scenario or loss of bulk supplies and impact of possible strategy of more dependency on SEW own resources	Given concerns in recent droughts regarding the Bulk Supplies from Southern Water, we undertook a run which considered turning off the existing Bulk Supplies.
5	Turn off new groundwater options	To test resilience in drought scenario or dry winters	Because we are dependent on groundwater at the moment and because the Environment Agency had listed groundwater sources in its Red List, we undertook a run which did not include new groundwater options.
6	EFG challenge Reservoirs Off	(a) Excluding all new reservoir sites [on the basis that their delivery is risky], from any models that would otherwise include them;	The Environment Focus Group (EFG) asked that we undertook a run which excluded new reservoirs.
7	EFG challenge Inclusion of Water Re-use Schemes (x2)	(b) Forced inclusion of water recycling schemes from Peacehaven and Newhaven WwTWs to supply existing WTW in WR22	The Environment Focus Group (EFG) asked that we undertook a run forced the inclusion of a new Water Re-use Scheme.
8	Headroom	Proposed alternative THR run	Not required
9	SEW Initial Preferred Scenario 9	After discussions with some water companies this scenario excluded some of the Bulk Transfers which Companies had offered in the WRSE modelling.	For a short time this scenario became our baseline as it was based on what we understood to be the best data from other companies.
9b	Variant of Scenario 9	Allowed all GW options. Broadly similar option set to Scenario 2a but with updated data.	Excluded the option to raise Bewl Reservoir which Natural England had concerns with.

Number	Name	Description	Comments
9c	Variant of Scenario 9b	As Scenario9b with SWS Raising Bewl included and (x3 SEW Bewl transfers included) – from 2030 onwards	This scenario allowed the option for Bewl to be raised, but only after 2030. Transfers from Bewl to our supply area were also allowed after 2030.
9d&9e	Variant of Scenario 9b	As Scenario9b & 9c, but with the SEW Annuitised costs used (CAPEX only - no other changes)	These are variations of scenarios 9b and 9c but used our accounting practices (see Scenario 2b)
10	SEW Preferred Scenario 10	Using Scenario9b - Remove all TWU water transfers except Windsor; Remove all VWC water transfers to/from Egham. Remove all New GW options.	After discussions with Thames Water we removed some of the Transfer Options which Thames Water had initially offered to the WRSE model. For a period of time this scenario 10 became our baseline.
11	Variant of Scenario 10	Using Scenario 10, with New GW switched back on, but all RTS (External regional transfers) switched off	This scenario tests the difference between allowing groundwater schemes, and allowing regional transfers.
12a	Variant of Scenario 10	Using Scenario10 - Red List and Red list+ GW options excluded, Two 'Closing-the-Gap' GW options included - All SWS Transfers On	After reviewing the Environment Agency's Red List we included groundwater schemes which were not on that list.
12b	Variant of Scenario 10	Using Scenario10 - Red List and Red list+ GW options excluded, Two 'Closing-the-Gap' GW options included - All SWS Transfers Off	After reviewing the Environment Agency's Red List we included groundwater schemes which were not on that list and allowed transfers from Southern Water (note the start date for raising Bewl was 2030)
13	Variant of Scenario 10	Using Scenario 10 - No New Surface Water Reservoirs	In response to the EFG request we did not allow the model to select any new reservoirs.
14	Variant of Scenario 10	Using Scenario 10 - Newhaven Water Reuse Option Forced ON	In response to the EFG request we forced in the inclusion of a Water Re-use scheme at Newhaven.
15	Variant of Scenario 10	Using Scenario 10 - Level of Service 1:20yr Hosepipe Ban: Increase the Distribution Input (DI) for the Critical period (DYCP) by 2.5% and reduce the Deployable Output (DO) for the DYCP (& MDO) periods by 5.0%.	We wanted to test the impact of improving levels of service so that restrictions would be in place once every 20 years rather than once every 10 years.
16	Variant of Scenario 10	Using Scenario 10 - Level of Service 1:100yr Severe Drought: Reduce the Deployable Output (DO) for the DYAA and DYCP (& MDO) periods for each WRZ	We wanted to test the options selected if we were planning for a 1:100 type drought event.
17	Variant of Scenario 12a	Using Scenario 12a - Groundwater Reduced DO for EFG: Reduce Groundwater deployable output (DO) for the DYAA (inc NYAA) and DYCP (inc MDO) periods by 5.0%	The EFG asked that we looked at a scenario which allowed for further reductions in our existing yields from groundwater to improve flows in rivers and water levels in wetlands.

Number	Name	Description	Comments
18	Variant of Scenario 12a	Using Scenario 12a - Zero SDB for SEW: Adjust Distribution Input (DI) for the DYAA, DYCP, MDO and NYAA periods for each WRZ to produce a zero supply/demand balance (SDB) for all SEW zones.	This scenario was to test what a regional plan would look like if we did not have a supply demand deficit, and in particular if Aylesford Water Re-use Scheme was picked.

31. Scenarios 1 and 2a are described as 'Baseline' in the Table above and they compare against the WRSE scenario A. As described above, after the WRSE scenario A was run, discussions with donor water companies identified that some of the options included in WRSE scenario A were no longer deliverable. This means that whilst scenarios 1, 2a, 2b and 2c are initial Baselines, none can be our preferred plan because some of the options proposed are not feasible.
32. In essence the scenario modelling listed in the table above became an iterative process, with model results being discussed with donor companies and options being refined, until a time when there was agreement with other companies on the set of transfer options.
33. During those discussions scenario 9 was our Baseline for a period of time until Thames Water advised us that some of the transfers from Thames Water to our Western Region were no longer available. At this point scenario 10 became our Baseline, however further discussions with Southern Water meant that scenario 10 was also not representative of the available supplies from Southern Water.
34. Whilst these clarifications with other companies were obtained, we undertook our modelling. The timing of the clarification meant that we had already completed some of our analysis. Early model results therefore include options which were subsequently considered not to be deliverable. A summary of the results of those discussions is set out below:-

Portsmouth Water:

35. Portsmouth Water has confirmed that the Tilmore to Clanfield option is available and should be included in our modelling.

Sutton and East Surrey Water:

36. Sutton and East Surrey Water has confirmed that only two transfers are available, these are the transfer from Outwood to Whitely Hill (5MI/d available at all times) and the transfer from Bough Beech to Riverhill which is available at 5MI/d and only at peak period.

Southern Water:

37. Southern Water has said that the existing bulk supplies (Darwell, Belmont and Weir Wood) will be available. Southern Water have also confirmed that a transfer of treated effluent is available from their Aylesford Wastewater Treatment Works. There are different options available at Aylesford, but it is currently proposed that if selected, the two companies would jointly build a water re-use plant. This water could support transfers from Southern Water's sites at Dunkirk and Matts Hill which Southern Water has said are both available.

38. Southern Water has also confirmed that other transfers, including transfers from Sussex North and Sussex Brighton are not available.

Thames Water:

39. Thames Water has confirmed that only two options (both Windsor to Surrey Hills) are available. Other transfers including ones from the Kennet, Guildford and Henley would not be available because of constraints on the Lower Thames Operating Agreement, which regulates abstractions from the River Thames and the implications of the Water Framework Directive.

Affinity Water

40. Affinity Water initially confirmed that additional bulk transfers from Egham to our Western Region would be available; however this was based on Affinity Water being able to solve its own supply demand deficit with additional transfers from Thames Water or Anglian Water. Because these transfers are no longer available to Affinity Water, it was agreed that the additional transfers from Egham should not be included in our modelling.
41. Affinity Water had asked for additional bulk supplies from South East Water into its South East Zone and we had included these in our modelling. One of these transfers is bi-directional and was included in our modelling options. However, after submission of the dWRMP, the required volume of these transfers changed as a consequence of the outcome of ongoing AMP5 NEP studies. It has now been confirmed that the required transfers can be effected within the constraints of the existing infrastructure.

Inclusion of Costs for Transfers from Donor Companies

42. As described earlier the WRSE modelling did not include the full costs of transfers from donor companies. In order to understand the impacts of these costs on the economic analysis we used data obtained from donor companies to test if, when we included all the costs, those transfers were still economic.
43. In some cases companies provided specific information on potential costs. These were provided in confidence and are not described here. In other cases we used published Large User Tariffs from companies' websites. These additional costs were included as VOPEX and FOPEX costs in our modelling.
44. At the same time as the list of transfer options was being refined, our own analysis, data from the Environment Agency, and preferences from customers and the Environment Focus Group (EFG³) was used to inform our preferred plan. In particular our approach to the groundwater options was refined through the development of the scenarios, and this is described in the next section where we describe our Phase 2 modelling and the development of our preferred plan.

³ See section 2 of the main report

Risk Assessment

45. As described in the introduction to this appendix, to ensure that the objectives set out in WRMP14 are met and consistent with the Guidelines, we included a qualitative risk assessment as part of the development of our preferred plan. The risk factor categories used in the risk assessment are given below in Table 10, along with the weightings given to each category (the higher the weighting the more importance is assigned to that Risk Factor).

Table 10: Risk Factors and Weightings

Risk Factor	Explanation	Weighting
Improves Mix	Does the option improve the mix of sources so that the company will have a balanced mix of different types of supply and demand options? For example groundwater options will score poorly because the Company is already groundwater dependent.	15
Water Available	What is the certainty that the water is available? For example how confident are we in the yield of a new source and does the yield depend upon another scheme being built first. For example chalk groundwater schemes score poorly because of the Environment Agency's water scarcity work. Water re-use schemes tend to score well.	25
Drought Resilient	Is the scheme likely to be resilient in a drought as well as during normal operations? Leakage and water re-use schemes are likely to score well.	15
Environmental impacts and delivery	Is the scheme difficult to promote for environmental reasons? Some reservoir options score poorly whilst demand management schemes are likely to score well.	25
Third Party Risk	Is the scheme dependent on one or more third parties to deliver the option? For instance schemes which require customer behaviour changes are likely to score poorly along with options from other water companies where they are dependent upon a complex scheme being built.	20

46. We discussed some of the transfer options which were originally considered high risk with donor water companies. Independently of our risk assessment, the donor water companies identified that some of those higher risk options were not available. However, no demand management schemes were excluded as a result of the risk assessment, indeed some water efficiency options were further developed into our overall water efficiency strategy.

47. The risk assessment formed part of our decision making regarding the exclusion of some groundwater options which is described in the following section.

Groundwater Options

48. The Environment Agency has developed a list of schemes which it considered to be options that are at risk of becoming unsustainable because there is some concern about the environmental effects of these options⁴. This list became known as the 'red list' and then

⁴ Critchley and Marshallsay, Progress towards a shared water resources strategy in the South East of England, Phase 2B Report, February 2013

‘red list plus’ and was used in the WRSE scenarios C1, C2 and C3. The ‘red list plus’ includes more options than the original red list and so is a more severe test. Whilst the Environment Agency has stated that inclusion of an option in either of these lists does not mean that it has been automatically rejected, it does indicate that the option was more likely to be more risky and less resilient than alternatives.

49. The red list includes almost all the groundwater options in our area, with only two groundwater schemes not included on the list (Boxalls Lane and Coggins Mill). As stated in Section 1 of the main report, given the recent drought and susceptibility of groundwater to three years of little recharge (often referred to as three dry years), we wanted to develop a preferred plan which included more resilience and therefore less dependency on ‘riskier’ groundwater options. Given the Environment Agency’s concerns over future groundwater development (as shown by the inclusion of groundwater in the red list), and indeed many members of the EFG having shared strong concerns too, we decided to constrain the amount of new groundwater in our preferred plan to ensure alternative options were selected.
50. As a result of both considering the Environment Agency’s red list and our objective of developing a preferred plan which was more resilient than the present situation, we constrained groundwater development to the two options not on the Environment Agency’s red list (Boxalls Lane and Coggins Mill), along with three schemes which we believe can be delivered without environmental impact (Cowbeech, Forest Row and Maytham Farm), all of which have been studied in the past as potential drought options.
51. The exclusion of the other groundwater schemes from our preferred plan has the benefits of identifying alternative options which are more resilient to drought (in particular water re-use) but increases the costs of the preferred plan in the longer term.

Customers’ Preferences

52. Preference surveys were undertaken to help understand the types of options customers would prefer to be included in the preferred plan.

Early analysis indicated that a sample of customers would accept increases to their water bills if some types of options were included; however later refinements indicated that whilst customers had preferences for some options over others, there was no clear willingness to pay increase for different option types; essentially customers were not prepared to pay but instead rated the package of options in a “least worst” order as set out below:

- Leakage reduction
- Compulsory metering
- Water saving measures
- Water transfers from other companies
- Expanding existing reservoirs
- Stepped tariff
- Water Re-use
- Seasonal tariff
- New reservoirs
- Desalination

53. Had there been a clear willingness to pay for certain option types we could have included this within our economic modelling; however with no indication that customers are prepared to pay more on their bills we have not incorporated the results in any economic analysis - instead we have used the preferences expressed by customers and checked them against our preferred plan to ensure that there is clear commonality.
54. Behavioural change in terms of understanding and reducing water use can only be achieved if customers have actively shaped and supported the strategy in the first place. For our WRMP14 we carried out a specific piece of qualitative research with household customers, via focus groups, that explored a range of water efficiency ideas and initiatives that could help meet any shortfall in water, and to understand their views and identify which demand management options they are most likely to engage with. For each idea, we also tested how much customers would contribute, and how much they would expect from South East Water. The research findings have been used to determine the preferred demand management options we have included in our WRMP14.

SEA Assessment

Introduction

55. A Strategic Environmental Assessment (SEA) is required under the *Strategic Environmental Assessment (SEA) Regulations (SI. 1633 of 2004)*. SEA is a process for identifying the overall environmental impact of a plan or programme; to ensure that the environmental effects are taken into account; and that the environmental implications are appropriately reported and consulted on. Our WRMP was finalised along with an accompanying SEA Post Adoption Statement.

Our Approach

56. The WRMP Guidelines recognise the need to include SEA in formulating the preferred plan alongside cost, risk and other deliverability issues. Initially an SEA scoping report was produced and this was sent to a wide range of Stakeholders. Comments were received and they have been incorporated in our further analysis.
57. A detailed Environmental Report has been produced which is in a separate document available from our website (South East Water, Strategic Environmental Assessment, Environmental Report), however the process we have adopted is described below:
58. Individual options have been appraised against SEA objectives and specific criteria covering magnitude and extent, short and long term impacts and without and with mitigation. The results are recorded in a summary matrix. The table below summarises the objectives used in our assessment.

Table 11: SEA Objectives and Issues Scoped In

WRMP SEA Topic	SEA Objective	Key Issues - positive, negative, short-term, long term, permanent and cumulative effects.
Population & Health	1. To protect public health and promote well being	<ul style="list-style-type: none"> • Level of service: changes in access to water supply for customers domestic and business. • Implications for vulnerable groups: how changes in access to water supply, e.g. from tariff changes, can affect the vulnerable. • Properties, recreational facilities, tourist facilities, community facilities or access: various effects to their usage. • Water environment effects on human activity: knock-on effects to how the study area's water bodies are used. • Interaction with flood risk: changes in flood risk and any effect on communities or the infrastructure which they use. • Temporary disruption due to construction.
	2. To protect and enhance to recreational amenity and public access.	
Material Assets	3. To avoid conflict with strategic infrastructure, and support viable land use, businesses and sustainable resource use.	<ul style="list-style-type: none"> • Water environment effects on businesses: knock-on effects to businesses. • Key infrastructure: changes to existing infrastructure. • Resource use: non-renewable materials, and also any waste generation (see Climate - carbon footprint in relation to energy use).
Biodiversity and Fisheries	4. To protect and enhance aquatic and terrestrial biodiversity including designated nature conservation interest, protected species (including fisheries) and important habitats.	<ul style="list-style-type: none"> • Statutory and non-statutory designated sites and priority habitats – integrity and connectivity • Ecosystem services • Hydromorphological changes: the levels or flow of a water body and links with habitats and species. • Species mobility: the connectivity between habitats. • Direct species conflicts: activities directly in conflict with the activities of a species of wildlife, or off-site changes which alter ecosystems. • Invasive species: assisting their spread • Wildlife and water pollution: changing pollutant levels to benefit or reduce populations of important species.
Landscape, and Visual Amenity	5. To protect and enhance valued landscapes and visual amenity	<ul style="list-style-type: none"> • Land use or design changes within a landscape (including townscape): changes to character (including designated landscapes) or visual amenity. • Visual amenity: effects to views from various receptor points, including removal of existing barriers.
Climate	6. To contribute to Company carbon footprint reduction.	<ul style="list-style-type: none"> • Construction CO₂ emissions. • Operational CO₂ emissions.
	7. To contribute to climate change adaptability of the environment	
Water Environment	7. To protect and improve surface and groundwater body status.	<ul style="list-style-type: none"> • Legal compliance under The Water Framework Directive: the key test of 'no deterioration' of a WFD water body on a non-temporary basis. • Long-term ability to achieve 'good status' or 'good potential': physical modification of water bodies.

WRMP SEA Topic	SEA Objective	Key Issues - positive, negative, short-term, long term, permanent and cumulative effects.
		<ul style="list-style-type: none"> • Compliance with the River Basin Management Plan: contribute towards vs. prevent the achievement of RBMP objectives. • Risk of water pollution: pollution within water bodies. • Renewal of water resources: the availability of water for other uses.
	8. To minimise the risk of flooding.	<ul style="list-style-type: none"> • Flood risk: loss of flood plain, hydrology and drainage changes, altered water levels such that flood risk is changed, either negatively or positively.
Cultural Heritage and Archaeology	9. To conserve and enhance cultural heritage and archaeological interests.	<ul style="list-style-type: none"> • Statutory designated or non-designated cultural heritage features: enhance vs. adversely affect historic features (their integrity or their setting). • Access to cultural heritage features: as a recreational and educational resource.
Geology and Land Quality	10. To protect and enhance soil quality and avoid conflict with identified mineral resources	<ul style="list-style-type: none"> • Mineral resources: areas containing useful or valuable minerals and their future extraction. • Geological features: designated or non-designated geological features. • Access to geological features. • Productive soils: agricultural land or other areas of productive / functional soil. • Soil contamination: contaminated land, and the possibility of contaminants spreading to other soils.

59. An overall SEA risk category for each option was provided to help inform the modelling scenario testing (the categories excluded consideration of the carbon footprint as this is already fully covered in environmental costs for modelling purposes). Three simple categories red, amber, green were allocated, according to the level of risk. This list has been compared to the Environment Agency's red list, and the option concerns discussed with Natural England and the EFG. The SEA risk categories differ from the Environment Agency's red list in a few cases, as they are based on more detailed assessment of the options and specifically in relation to environmental impacts.

60. It is recognised that stakeholders are likely to ask if a viable plan be formed using only lower risk options (green and amber options). This has been done by running the economic model and excluding the red high risk options. The results have been used to identify specific options which should be removed from our economic modelling to see if alternative options would be better. A number of further modelling runs were undertaken testing specific options and option types, for example without reservoirs or without a specific water re-use option.

61. The preferred plan and the other scenarios have been assessed and compared through the SEA considering both the individual options assessments and taking account of cumulative impacts i.e. the combined effect of the schemes in each scenario. The results have been considered in terms of potential significant effects (as part of the SEA) and in terms of how they meet other WRMP14 objectives. These results are included in the Environmental Report.

62. The Environmental Report includes a formal assessment of the preferred plan in terms of significant environmental effects and mitigation and monitoring requirements are identified.

The purpose of consultation and engagement

63. Consultation has been an important part of the development of the preferred plan and the accompanying SEA from the start of the process. The consultation approach has specifically aimed to include engagement of stakeholders in the process.
64. There are two stages of consultation in SEA; seeking views on what the report should include (called scoping consultation) and on the full Environmental Report itself that accompanies the preferred plan. Regarding scoping, the SEA Regulations require that the statutory consultation bodies are consulted at an early stage in the SEA process on the scope and level of detail of the information which must be included in the environmental report. The objective of an Environmental Report is to document, and to facilitate public and stakeholder consultation on, the SEA process.

Pre-scoping and on-going engagement

65. An Environment Focus Group (EFG) was set up at the beginning of the WRMP process in January 2012. The EFG membership and schedule of meetings can be found in both Section 2 and Appendix 2.
66. The EFG has been consulted on the long list of possible options and the screening process through which the Feasible Options for consideration in WRMP14 have been selected. Suggestions for additional options and options types have been invited from the group. The group has also been kept informed of the overall WRMP process and the on-going studies which will feed into it such as climate change assessments. Comments from the EFG to-date have been taken into account throughout the option selection process.
67. Key comments included the need to integrate environmental considerations from the very early stages of option appraisal work, including identification of environmental or feasibility concerns on specific options. In addition, there have been discussions with the Environment Agency, Natural England and Local Authorities. On-going discussions will form part of further detailed studies for location specific options that are identified to go forward as part of the WRMP14.

Consultation to date

68. Table 12 summarises the main comments received in response to the Scoping Report and how they have been addressed by the SEA process. A more detailed summary of comments made by the consultees is included in the Environmental Report.

Table 12: Summary of key points raised in the Scoping Consultation

Key issues/Themes raised	Response within the SEA
Ensure that cumulative impacts of the dWRMPs across different companies are accounted for.	There is a difficulty in covering cumulative impacts across different company plans being produced in parallel. Potential cumulative impacts are identified based on information available. There may be some limitations to this information and there may be a requirement for coordinated updating of the assessment as part of the finalisation of the WRMPs which may need to be reflected in ER addendums or in the post adoption Statement.
Climate change adaptation should be listed as a specific SEA objective, rather than incorporated across all of the SEA objectives.	Climate change adaptation has been included under a separate SEA objective (as sub heading under Climate). Climate change implications for options are addressed as part of option definition, risk and yield uncertainty, and therefore the focus for the SEA will be on the environmental effects.
There should be a stronger reference to the tariff implications of each option so that it is clearer what the financial impacts on the customer will be.	The potential implications of tariffs to affect some groups more than others is covered although mentioned generally in terms of effects of changing access to water supply rather specifically due to pricing. This has been clarified to include references to tariffs.
Data on flood risk was identified as missing from the baseline provided in the scoping report and flood risk issues should be specifically recognised within the SEA	Flood risk was included as part of the options assessment as a consideration from early options identification. It has been included as a separate objective within the revised objectives list and the baseline on flood risk expanded.
Amendments to the baseline identified within the SEA and need to be included. (The majority of comments related to the baseline)	Suggested amendments to the baseline have been addressed in the revised baseline section as well as in the accompanying baseline figures where relevant. The mapped information is a summary of the some of the key spatial information used. The baseline text describes the information used in more detail. In some cases baseline information requested was considered too detailed to be appropriate for the SEA assessment but would be expected to be part of assessments for the plan implementation.
Impacts of core strategies and local development targets should be explicitly recognised as part of demand forecasting	Forecasting demand for water from growth is being addressed separately for the WRMP through Experian and a consultation exercise with the local authorities. The SEA will look at the demand information collected through this process and will also look at relevant local plans for the different resource options to identify potential conflicts and opportunities. This has been reflected in the revised wording of the SEA.

SEA Options and Plan Assessment

69. The scenarios we have modelled cover:

- **Do minimum** – This is a baseline case to assess against the other options. It looks at what will happen to the baseline demand and supply deficit in the absence of delivering new options
- **Least cost no constraints scenario** – This gives the Baseline Plan
- **Generation of alternative scenarios** - a range of scenarios generated to examine different environmental, risk and uncertainty issues

70. Table 13 below summarises the criteria used to assess each option against the SEA objectives.

Table 13: Assessment criteria/questions for options

SEA Topic and Objectives		Criteria/Questions – Option
Population and Health		
1. To protect public health and promote wellbeing	1a	Are there health risks associated with the option e.g. closed loop effluent reuse/water supply, or through the treatment method?
	1b	Will this option help contribute to public health and quality of life?
	1c	Will construction or operation of this option cause significant nuisance from dust and noise and traffic? Will construction or operation of this option cause transport disruption?
	1d	Does this option help to raise public awareness of the need for water conservation?
2. To protect and enhance recreational amenity and public access	2a	Will this option result in a loss of recreational amenity, footpaths, or access to recreational amenity?
	2b	Will this option affect water based recreation (including marine)?
	2c	Are there any conflicts with current and known planned recreation use/development and this option? Could this option contribute to improvements to recreational amenity?
Material Assets		
3. To support sustainable resource use including supporting viable land use and business, minimising waste and avoid conflict with strategic infrastructure	3a	Will this option conflict with critical infrastructure, or does the option conflict with existing business or planned land use?
	3b	Will this option make effective use of existing assets? Will this option use large quantities of non-renewable resource?
	3c	Will this option generate waste which cannot be reused or recycled?
Biodiversity and fisheries		
4 To protect and enhance aquatic and terrestrial biodiversity including statutory, and non-statutory sites, protected species and fisheries and priority habitats	4a	European/Internationally designated sites - is there the potential for the option to have significant effects on the integrity of (from HRA screening)?
	4b	Nationally important statutory sites such as, NNRs and SSSIs - are there any potential impacts such as direct effects on site area, close proximity, changes to hydrology, impacts on conservation objectives, or changes to surrounding habitats associated with this option?
	4c	Are there the potential impacts on Ancient Woodland or LNRs such as direct loss and/or potential change to hydrology?
	4d	Non-statutory sites e.g. SNCIs, Wildlife trust sites and Priority habitats - is there the potential for direct loss and/or potential change to hydrology for wetland habitats associated with this option?
	4e	Would this option result in the severance/fragmentation of any designated sites, habitats. Would there be changes to the connectivity of habitats?
	4f	Protected species and priority BAP species - would this option result in impacts which would affect these species?
	4g	Is there the potential for this option to affect designated salmon and cyprinid fisheries through changes to hydrology, water quality or barriers to migration?
	4h	Is there the potential for this option to contribute to priority habitat creation or improvement to fish migration?
	4i	Is there the potential for this option to contribute to the spread of invasive species?

SEA Topic and Objectives	Criteria/Questions – Option	
Landscape and visual amenity		
5. To protect and enhance designated and valued landscapes and visual amenity	5a	Statutory designated landscapes - could this option impact landscape character within these areas – detract or improve?
	5b	Landscapes or townscapes of value – could this option lead to changes to landscape character detract or improve?
	5c	Visual amenity - does option change important views?
Climate		
6. To contribute to reducing company carbon footprint	6a	What is the level of construction carbon emissions associated with option - one off tonnes?
	6b	What is the level of operational Carbon emissions associated with option - tonnes per year?
7. To contribute to Climate change adaptation	7a	Is there the potential for this option to contribute to adaptation to climate change or to add to potential stress to environment which could exacerbate vulnerability to climate change?
Water Environment		
8.1. To protect and improve surface WFD quality status	8a	Would option avoid potential for non-temporary deterioration of surface water body status (taking into account potential sensitivity of water body)?
	8b	Does this option contribute towards RBMP objectives for achieving good status?
8.2. To protect and improve groundwater status	8c	Is there a risk of water pollution to water bodies - due to nature of activities and also considering location of groundwater vulnerability zones/source protection?
	8d	Is there a potential for this option to place the quantitative status (based on WFD status and CAMS information) of groundwater at risk?
	8e	Would this option reduce pressure on water environment through water savings?
9. To minimise the risk of flooding and contribute to flood risk management	9a	Is there a potential for this options to increase flood risk - e.g. increase base flow?
	9b	Is there a loss of flood plain associated with this option?
	9c	Does this option have the potential to contribute to, or conflict with, flood risk management objectives?
Cultural heritage		
10. To conserve and enhance the historic environment and heritage assets	10a	Does this option avoid direct damage to, or detract from the setting of, designated cultural heritage assets, or does it contribute to protecting them?
	10b	Could this option affect the historic environment including palaeo-environmental and archaeological deposits?
	10c	Could this option affect hydrological setting for water dependant historical/archaeological/palaeo-environmental assets?
Geology and land quality		
11. To protect and enhance soil quality and avoid conflict with valued geological features	11a	Would any geological features be affected - designated and non-designated?
	11b	Would significant areas of productive soils be affected by permanent loss?
	11c	Is there potential for disturbance of contaminated land potential for increasing risk

71. The results of the SEA are included in the Environmental Report, but are summarised in the section below from paragraph 83.

Phase 2 of our Modelling - Our Baseline and Preferred Plan

Our Baseline

72. As described earlier, in our own modelling we developed key Scenarios (2a, 9 and 10) which were baseline plans. We tested these baselines (for instance incorporating the EFG comments) in the scenarios.
73. Each time we prepared a baseline we checked the transfer options with donor water companies and made revisions to those transfers based on those discussions. By the time we had developed scenario 19 our discussions with those companies were drawing to a conclusion. The table below summarises the final baseline scenario we ran.

Table 14: Scenario 19, Revised Baseline

19	Variant of Scenario 12a	Using Scenario 12a - Exclude Selected SWS Water Transfer Options: Brighton, Stopham, Burham and Dunkirk SWS transfer options removed.
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74. Scenario 19 was our revised baseline after discussions with Southern Water confirmed that transfers from its Sussex Brighton, Sussex North and Kent Medway (via Dunkirk) were not available. The groundwater options available were at Coggins Mill and Boxalls Lane.
75. The baseline is summarised below:
- More leakage options are selected than in WRSE Scenario A and provide a reduction of 6.00 MI/d over the planning horizon.
 - Water efficiency provides a reduction of 1.06 MI/d in 2015 to 2020. Additional water efficiency is included in a separate water efficiency strategy which we have developed as a stand-alone plan.
 - Three reservoirs are selected, including raising Ardingly, Broad Oak and a new reservoir on the River Ouse. The combined yield is 45.3MI/d.
 - In addition to the extension of the existing transfers, six new transfer schemes are selected; these are:-
 - Two transfers from Sutton and East Surrey Water totalling 10MI/d
 - One transfer from Thames Water (10MI/d)
 - One transfer from Portsmouth Water (10MI/d)
 - One transfer from Southern Water (5MI/d)
 - A transfer from Affinity Water's South East Zone which is bidirectional.
 - Based on our risk assessment (Section 4), we have removed all the red list groundwater options from this baseline which results in only two groundwater schemes being available (Coggins Mill and Boxall's Lane). Both of these options are selected with a combined yield of 3.31MI/d.
 - As in the WRSE scenarios, improvements to the treatment works in WRZs 2 and 4 are selected (combined yield 31.0MI/d)
 - In addition Water Re-use is selected in our baseline at two sites (Peacehaven and Aylesford) with a combined yield of 37.5MI/d.
 - In the baseline we had two new transfers totalling up to 10MI/d to Affinity Water's South East Zone. However, as noted in paragraph 41 above, this option is no longer required.

76. The costs of our baseline are included in the Table below and approximate start dates are shown below.

Table 15: Scenario 19, Revised Baseline

	Total Cost (£k)	CAPEX Economic (£k)	FOPEX Economic (£k)	VOPEX Economic (£k)	CAPEX E&S (£k)	FOPEX E&S (£k)	VOPEX E&S (£k)	CAPEX Carbon (£k)	FOPEX Carbon (£k)	VOPEX Carbon (£k)
Baseline	276,281	164,381	15,287	7,375.	36	649.	0.	5,364	-1,704	1,869.78

Preferred Plan

77. The baseline provides a useful reference. It is a deliverable set of options using the latest data supplied by companies. However, to develop a more robust plan, we have made some changes to the options within the model. These changes are set out below.

- Reservoirs – The baseline had three reservoirs selected, including a new reservoir on the River Ouse. In line with customers' preferences we have restricted the number of new reservoir options and excluded new reservoir options on the Ouse to see if alternative reservoirs are selected.
- Groundwater – we have included three additional options which were on the Environment Agency's red list, these are Maytham Farm, Cowbeech and Forest Row, and we have included these because our own work suggests that these schemes are low or medium risk.
- Given uncertainty about the transfers from Thames Water, we made the earliest start date for the transfer from Windsor to the 2030.

Table 16: Scenario 20 preferred plan

20	SEW Preferred Scenario 20	Using Scenario 19 - Forest Row GW, Cowbeech GW and Maytham Farm WTW added back; Ouse banded reservoirs on new sites removed; TWU Transfer options (Windsor) deferred to 2030;
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78. When we re-ran the economic analysis, including these changes, the following solutions were identified.

- Total leakage reduction is 4.91MI/d over the planning horizon.
- Water efficiency provides a reduction of 1.0MI/d in the first AMP period. This is over and above the large reduction in PCC included in the baseline demand forecast forecasts that are supported by our water efficiency strategy and micro component modelling described in Appendix 4.
- Two reservoirs are selected, including the extension of Arlington and Broad Oak. The combined yield is 35.55MI/d.
- In addition to the extension of the existing transfers, six new transfer schemes are selected; these are:-
 - Two transfers from Sutton and East Surrey Water totalling 10MI/d
 - One transfer from Thames Water (10MI/d)

- One transfer from Portsmouth Water (10MI/d)
- One transfer from Southern Water (5MI/d)
- A transfer from Affinity Water's South East Zone which is bidirectional.
- All five groundwater options are selected with a combined yield of 11.5MI/d.
- Improvements to the treatment works in WRZs 2 and 4 are selected (combined yield 31.0MI/d)
- In addition Water Reuse is selected in at two sites (Peacehaven and Aylesford) with a combined yield of 37.5MI/d.
- In the Baseline we had two new transfers totalling up to 10MI/d to Affinity Water's South East Zone. However, as noted in paragraph 41 above, this option is no longer required.

79. The costs of our Baseline are included in the Table below.

Table 17: Summary of Preferred plan

	Total Cost (£k)	CAPEX Economic (£k)	FOPEX Economic (£k)	VOPEX Economic (£k)	CAPEX E&S (£k)	FOPEX E&S (£k)	VOPEX E&S (£k)	CAPEX Carbon (£k)	FOPEX Carbon (£k)	VOPEX Carbon (£k)
Preferred Plan	258,862	168,442	16,766	8,565	30	-177	0	6,586	-954	3,028

80. When we look at this preferred plan and the options being developed we can see that there is considerable overlap between our plan and those of other companies in the East Kent area over the 25 year planning period. In order to ensure that our plan, Southern Water's plan and Affinity Water's Plan are consistent, we propose a joint project to be completed during 2015 – 2020 that considers the long term options for East Kent.

81. This joint project will be important to us as we update our WRMP in the future. In particular it will address the amount of water Southern Water may need to take from the proposed Aylesford Water Re-use scheme. Depending on the results of this review we may need to develop a desalination scheme on the North Kent Coast towards the end of our plan period.

82. Appendices 8A and 8B summarise the NPV costs for the WRSE Scenarios (8A) and our own modelling (9B). It can be seen that the range of NPV costs in the WRSE modelling is from approximately £200m to £470m. Our own modelling generally produces a lower set of costs, due in part to improvements to companies' data post the WRSE core model runs. The NPV costs for our modelling range from £130m to £460m. It should be noted that the lowest NPV cost scenarios include transfers from neighbouring companies which are no longer available.

Summary of SEA Environmental Report on Preferred Plan

83. The Environmental Report provides a detail of the assessment of each option in the preferred plan and recommends mitigation measures to be undertaken. Habitats Regulations Assessment screening has also been undertaken for the preferred plan and a report provided with the results incorporated into the Environmental Report.

84. Key issues identified are summarised below:

Potential Impacts	Key mitigation measures
Leakage reduction	
<ul style="list-style-type: none"> Some schemes will involve mains replacement and repair works - temporary short term adverse impacts from traffic disruption. Long term benefits through water and associated energy savings and reduction in carbon emission. As group of schemes – contribute to reducing additional water needed from the environment. 	<ul style="list-style-type: none"> Review potential works locations to check for any potential environmental sensitivity and take appropriate measures Good construction practice
No significant residual adverse impacts and measures contribute towards SEA objectives	
Water efficiency	
(Additional water efficiency included in a separate water efficiency strategy in a stand-alone plan)	
<ul style="list-style-type: none"> Voluntary schemes minimising disruption to customers Long term beneficial water and energy/ carbon emission savings Potential benefits through savings for customers Opportunity to raise awareness of the need for water conservation. 	<p>Ensure equality of access to the schemes within relevant WRZs.</p> <p>No significant residual adverse impacts and measures contribute towards SEA objectives</p>
Two reservoirs, Arlington and Broad Oak.	
<p>Broad oak</p> <ul style="list-style-type: none"> Potential significant negative impacts from temporary construction disturbance for reservoir and pipelines. Permanent loss of productive agricultural land including grade 2 ALC land. Loss of grade II listed building, hedge boundaries and stream corridor with associated ecological interest. Unknown archaeological interest. Sensitive habitats in the wider area around the reservoir and downstream including SPA, SAC, SSSIs and Ancient woodland. Potential impact on water flow downstream of Plucks Gutter Intake and change to Sarre Penn and water quality status of Stour downstream Potential for long term positive effects through extensive habitat enhancement in area around reservoir including improvement to wider habitat connectivity <p>Arlington Reservoir</p> <ul style="list-style-type: none"> Potential significant negative impacts from temporary construction disturbance for reservoir and pipelines, especially related to adjacent reservoir SSSI Permanent loss of productive agricultural land Conflict with overhead power lines Abstraction from Ouse – potential long term adverse impacts on water quality status and fisheries Potential significant impacts to local visual amenity from reservoir bund Cross catchment transfer of water – potential for 	<ul style="list-style-type: none"> Good construction management practice to minimise local disruption. Design of reservoir and surrounding area to provide significant habitat creation. Advance habitat establishment before construction Water treatment to reduce nutrient levels and risk of algal blooms Link to potential for wider catchment management to improve water quality Operational water management to limit water abstraction to outgoing winter high flow on tidal Stour within acceptable environmental flow conditions and taking account of downstream designations. HRA screened out need for further HRA/AA Good construction management practice to minimise local disruption especially timing restrictions for works potentially disturbing wintering birds on adjacent SSSI. Design of reservoir and surrounding area to provide significant habitat creation including compensation land to replace loss of grassland. Consider extension of existing and new reservoir as part of detailed investigations. Advance habitat establishment before construction. Link to potential for wider catchment management actions to improve water quality and flow Operational water management to limit abstraction to winter high flows within

Potential Impacts	Key mitigation measures
<p>release to Cuckmere in emergency drawdown conditions – with invasive species transfer risk.</p> <ul style="list-style-type: none"> Unknown archaeological risk. Potential long term positive biodiversity and recreational effects which provide additional value with existing adjacent reservoir. <p>Winter water storage also has potential, depending on operation with other schemes, to alleviate abstraction pressure in low flow conditions</p>	<p>environmentally acceptable limits – including any special restrictions needed for fish migration periods.</p> <ul style="list-style-type: none"> Design to address emergency drawdown solutions to avoid invasive species transfer risk eg through returning water to Ouse. Design to improve overall recreational amenity compatible with, and adding to, the adjacent facilities. <p>The potential significant adverse impacts can be reduced to low or moderate impacts. Potential for long term significant positive impacts for biodiversity and recreation. Winter water storage can positively contribute to climate change resilience.</p> <p>Mixed in terms of contribution/conflict with SEA Objectives</p>
Six Intercompany transfers	
<ul style="list-style-type: none"> Main impacts the temporary short term adverse impact due to disturbance to traffic, business, and people during construction. There are potential for cumulative impacts for transfer construction within the same time period affecting same areas or routes. Pipelines close to sensitive sites eg SAC, SPAs and SSSIs. Temporary short term adverse impacts on pipelines through the National Park or through AONBs. Potential permanent impacts on Ancient Woodland and wetland habitats and Registered Parks and Gardens. Potential permanent impacts on buried archaeological interest. Potential cumulative effects through number of transfers affecting same designation or type. 	<ul style="list-style-type: none"> Further detailed routing to avoid sensitive sites especially Ancient Woodland and other irreplaceable habitats. There are potential alternative route solutions. Detailed routing to take account of additional detailed constraints and consult appropriately eg for nature conservation interest, protected species, and cultural heritage / archaeological interest. Good construction practice to minimise disturbance eg through timing or works, traffic management and use of no dig technologies. Good reinstatement practice to return to original state or provide enhancement. <p>Potential short term significant impacts especially cumulative impacts within AONB and also within the National Park. Potential to reduce long term significant impacts through careful routing.</p> <p>Some conflicts with SEA objectives but, use of transfers can contribute to SEA objectives by distributing water resources and alleviating pressure for abstraction on scarce areas.</p>
Five groundwater options	
<ul style="list-style-type: none"> Groundwater abstraction all have some inherent uncertainty over potential effects on nearby and downstream environments, however three of the options involve increasing abstraction within existing licence and one is reinstatement of previously used abstraction. Potential adverse impacts on base water flow downstream which could effects water quality status. Pipelines can also have temporary construction impacts 	<ul style="list-style-type: none"> Detailed siting of any new boreholes and pipelines to minimise effects Good construction practice Plan level WFD assessment concluded further detailed study to determine potential effects on any nearby habitats and on downstream flows and to inform operational/timing restrictions needed to avoid potential for deterioration of water quality status of water bodies and to avoid impact on designated or priority habitats.
	Uncertainty over potential significant long term adverse impacts relating to SEA water

Potential Impacts	Key mitigation measures
	objective/WFD water body status can be addressed through study and mitigation. Potential conflicts with SEA objectives but can reduce to neutral.
Improvements to the existing treatment works in WRZs 2 and 4 are selected	
Potential for temporary and short term disturbance during construction but within sites works.	Good construction practice No significant impacts and contributes to SEA objectives through use of existing infrastructure
Water Re-use at two sites (Peacehaven and Aylesford)	
<ul style="list-style-type: none"> Both water reuse with reverse osmosis discharge to rivers – potential significant long term impacts on river water quality status and fisheries due to effluent temperature and chemistry. Potential beneficial support to river flow in low flow conditions. Potential health impacts from remaining pollutants. Potential to for adverse impact through increase flood risk Temporary short term impacts from construction disturbance especially on pipeline through National Park. High energy use and associated carbon footprint for operation. 	<ul style="list-style-type: none"> Detailed routing of pipelines and good construction practice and to minimise effects. Further study of potential water quality and fisheries and flood risk effects to determine operational and mitigation requirements. Potential health impacts avoided through additional safeguard of release to environment and avoidance of closed loop. Potential restrictions on use in very low flow or at fish migration times –when effect of temperature and chemistry changes will be greatest. Restrictions on use in high flow to avoid flood risk Oxygenating cascade to avoid reducing dissolved oxygen. For Peacehaven, alternative to use bankside storage at the existing WTW in WR22 can avoid risk of significant adverse effects on river. Potential to reduce carbon footprint by limiting use to peak demand. HRA indicates further HRA/AA study for Aylesford to cover in-combination effects on downstream Medway Estuary and Marshes SPA/Ramsar.
	Potential significant long term effects on water environment but with potential to avoid or reduce with mitigation and potential benefits including significant contribution to climate change resilience. Mixed conflict/contribution to SEA Objectives

Post Modelling Revisions to Preferred Plan

85. Once we had undertaken the economic assessment we considered our preferred plan and reviewed all the data both before and after publication of dWRMP14. Revisions have been made as follows:

- Deployable output assessments - Section 3 and Appendix 3 for details.
- Demand forecast - Section 4 and Appendix 4 provide details
- Outage and Headroom - Sections 5 and 7 and accompanying appendices provide details
- Further discussions on the details of the transfers with other water companies which are summarised in Appendix 9.

These revisions result in some minor changes to the timing of some options.

86. We have discussed a joint scheme with Southern Water to build a water re-use plant at Aylesford. At this stage it is not clear what Southern Water's requirements are, and this

would be part of the East Kent study we have proposed. It may be necessary for us to build a desalination plant on the North Kent Coast towards the end of the planning period, depending on the results of that East Kent Strategy.

Differences between our Baseline and Preferred Plan

87. The Table below summarises the differences between the baseline and our preferred plan.

Table 18: Summary of the Differences between our Baseline (Scenarios 19) and Preferred Plan (Scenario 20)

	Baseline	Preferred Plan
Leakage	6.0 MI/d	4.91 MI/d
Water Efficiency	1.06MI/d (plus water efficiency strategy)	1.0 MI/d (plus water efficiency strategy)
Reservoirs	Three (Broad Oak, Arlington and River Ouse)	Two (Broad Oak and Extension to Arlington)
Groundwater	3.31 MI/d	11.5 MI/d
Transfers from Other Companies	37 MI/d	37 MI/d
Water Reuse	Two (Peacehaven and Aylesford) 37.5 MI/d	Two (Peacehaven and Aylesford) 37.5MI/d
Desalination	None	None
Surface Water Transfers	None	None
Water Treatment Works Improvements	WTWs in WRZs 2 and 4 (31MI/d)	WTWs in WRZs 2 and 4 31 MI/d
Total Cost (discounted NPV)	£276.3M	£258.9M

Core Options and Our Preferred Plan

88. Table 19 lists the options in our preferred plan and states if they are included in the WRSE core options. It can be seen that some of the options in our preferred plan are not core options because their yields are too small. The main reasons why our preferred plan does not include the core options are that several transfers, which feature heavily in the core options, are no longer available to us, so alternative options have been selected instead.

Table 19: Our Preferred Plan and the list of Core options

Scheme	Core / Alternative Options	Comments
Leakage Schemes	N/A	Not part of Core or Alternative Review, but selected in core modelling
Water Efficiency Schemes	N/A	Not part of Core or Alternative Review, but selected in core modelling
Extension to Arlington Reservoir	No	One reservoir included in the Core or Alternative Lists (Broyle reservoir)
Broad Oak Reservoir	No	One reservoir included in the Core or Alternative Lists (Broyle reservoir), alternative to Broad Oak was North Kent desalination
Coggins Mill Groundwater	N/A	Yield too small to be a Core option, but selected in core modelling
Boxalls Lane Groundwater	N/A	Yield too small to be a Core option, but selected in core modelling
Cowbeech Groundwater	N/A	Yield too small to be a Core option, but selected in core modelling
Forest Row Groundwater	N/A	Yield too small to be a Core option, but selected in core modelling
Maytham Farm Groundwater	N/A	Yield too small to be a Core option, but selected in core modelling
Bough Beech to Riverhills Transfer	Yes	
Outwood to Whitely Hill Transfer	Yes	
Windsor to Surrey Hills Transfer	Yes	
Clanfield to Tilmore Transfer	No	Transfers from Thames Water were selected in early WRSE Scenarios. Many of these are no longer available.
Matts Hill to Detling Transfer	Yes	
Barham to Kingston Transfer	Yes	
Water Treatment Works in WR22	No	Yield too small to be a Core option, but selected in core modelling
Water Treatment Works in WR24	No	Transfers from Thames Water were selected in early WRSE Scenarios. Many of these are no longer available.
Peacehaven Water Reuse	No	Transfers from Southern Water were selected in early WRSE Scenarios. Many of these are no longer available.
Aylesford Water Reuse	Yes	Southern Water scheme at Aylesford was selected in Core options

SEA Testing the Plan

89. As part of the planning process, and in particular as part of the SEA, we have further tested our preferred plan. Additional model runs were undertaken to test alternative options and these are described in the Environmental Report and summarised in Table 20.

Table 20: Alternative Scenarios we have Included in our SEA Analysis

Reference		Description	Total NPV (£k)	CAPEX NPV (k)	FOPEX NPV (k)	VOPEX NPV (k)
23	SEA Run 1	Using Scenario 20 with SEA Red List groundwater options excluded (but all amber GW allowed)	£210,818	£182,777	£11,754	£10,672
24	SEA Run 2	Using Scenario 20 with Peacehaven water reuse option excluded	£256,637	£173,573	£15,374	£9,976
25	SEA Run 3	Using Scenario 20 with SEA Red List water transfers and groundwater options excluded	£295,712	£186,163	£16,774	£9,964
26	SEA Run 4	Using Scenario 20 with all reservoir options excluded	£286,371	£193,448	£16,667	£13,942
27	SEA Run 5	Using Scenario 20 with all SEA Red List options excluded	£211,797	£90,532	£13,698	£9,481
28	SEA Run 6	Using Scenario 20 with Peacehaven and Newhaven water reuse options no longer mutually exclusive	£283,038	£178,614	£16,164	£9,269

Notes: With a number of these scenarios there is a varying extent of unserved demand (especially in the early years when groundwater options are excluded) and of changes in the operating costs of the existing system. The impact of these effects is not represented in the NPV values available from the WRSE model output.

Habitats Regulation Assessment (HRA)

90. South East Water is the competent authority, responsible for undertaking Habitats Regulations Assessment (HRA) on its Water Resource Management Plan as set out in the Conservation of Habitats and Species Regulations 2010.
91. HRA is a multi-stage process which helps determine likely significant effect and assess adverse impacts on the integrity of a European site. The purpose of the screening stage of an HRA is to identify all aspects of a plan or project which would potentially have a significant effect on a European site, either alone or in combination with other aspects of the same plan or other plans or projects. Where no impact is anticipated (usually because there are no 'pathways' between the plan or project and a European site, or because an impact is considered to be not significant) the plan or project can be eliminated from further consideration.
92. HRA screening or stage 1 assessment was undertaken on the draft WRMP14 in accordance with the requirements of the Habitats Regulations, and, following the approach set out for the WRMP process in the UKWIR SEA & HRA guidance (UKWIR 2012). A stage 2 assessment was completed for the WRMP14 including in-combination assessment and cumulative assessment with other plans and plan level appropriate assessment. This is reported in the HRA report (stage 1 and 2) and includes justification for 'down the line' appropriate assessment for two options.
93. There are forty two internationally important nature conservation sites considered by this assessment. The study area included sites between the east and west supply areas, downstream of the supply areas as well as sites outside these areas with species that could be affected by habitat changes within it. Factors affecting the integrity of these sites (with regard to their conservation objectives) were reviewed to provide a basis for considering whether the options and plan under consideration might exacerbate any existing adverse trends or affect site integrity.

Feasible Options

94. The feasible options were subject to HRA screening, to determine if they are likely to adversely affect internationally important nature conservation sites (European sites and Ramsar sites) either alone or in combination with other plans or projects. A total of 136 options were assessed during this preliminary screening stage. This screening provided information influencing the option appraisal and selection process for the plan, alongside other issues.

WRMP14

95. Twenty seven resource or transfer options (and sub options) have been included in the WRMP. These options were rescreened taking into account potential for in-combination effects with other company dWRMPs and comments from Natural England. Of these options, twenty three are considered unlikely to result in a significant impact to an international site and need not be considered for Appropriate Assessment. These options have been screened out because there are no pathways to European sites and/or the level of impact is not considered to be significant or can be mitigated.

96. Four options at three locations (Aylesford water reuse EF-11 and the Thames Water Windsor to Surrey Hills transfer TR-136a and the Matts Hill to Detling TR-22/TR-22a transfer) were considered likely to result in significant effects to a European site either alone or in combination with other plans or projects, or because sufficient uncertainty existed whereby the potential for significant effects could not be ruled out; these options were subject to Appropriate Assessment.
97. The transfer is screened in because of the potential extension to the water service reservoir at Surrey Hills which lies wholly within the Thames basin Heaths SPA. Further iterations to the design and scope of this scheme could remove the need for the extension of this reservoir and enable it to be screened out of the HRA. Further investigation, and if possible amendment of this option will be undertaken before a final decision on its implementation. The option is planned for implementation in 2030.
98. The Aylesford scheme is screened in due to treated effluent discharge into the River Medway at East Barming which although located in excess of 15km upstream cannot be ruled out at this stage as having a significant effect on the Medway Estuary and Marshes SPA/Ramsar. The scheme is planned to be implemented for 2023.
99. The Detling to Matt's Hill transfer options were screened in due to the proximity of the proposed pipelines to North Downs Woodlands SAC and Queendown Warren SAC (to avoid direct impacts on the SSSI). These options are planned for implementation in 2022.
100. Due to the complexity of modelling or studies required to assess the significance of impacts associated with EF-11 (to Medway Estuary and Marshes SPA and Ramsar) and TR-136a (to Thames Basin Heaths SPA), and given the late delivery date of these options within the WRMP, a 'down the line' assessment is proposed. In the event that no adverse effects on integrity cannot be concluded, South East Water commits to bringing forward suitable alternatives with all options subject to a Habitats Regulations Appraisal.
101. Significant impacts associated with TR-22 and TR-22a (to Queendown Warren SAC and North Downs Woodland SAC) have been ruled out as the implementation of standard best practice guidelines and pollution prevention measures would be sufficient to ensure that the integrity of the respective sites is not adversely affected.
102. Detailed monitoring and modelling work undertaken in 2015 to 2020 will provide further information relating to the potential impacts to these European/International sites, if any. Where necessary, the results of this work would inform the details of a mitigation strategy that would be designed to reduce the severity of any impacts to within acceptable levels thus allowing the option to proceed without having a significant effect to a European/International site.

Carbon Emissions

103. In accordance with the Guideline we have calculated the Carbon we predict will result from our preferred plan. For each option we have calculated the construction carbon associated with building or installing the option, and the operational carbon associated with the utilisation of the option. In some cases Carbon savings are made (e.g. as a result of Water Efficiency options).

104. In Figure 1 we have presented the 25 year profile of the current total company carbon calculated (2011/12) combined with the predicted carbon usage from our preferred plan as tonnes equivalent of carbon dioxide.

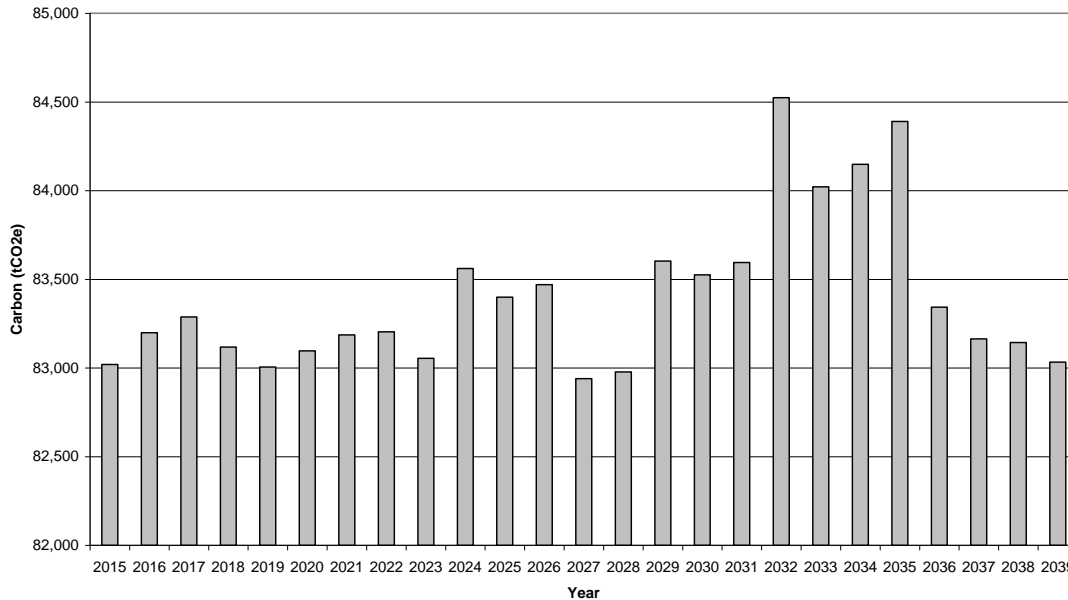


Figure 1 Estimated preferred plan carbon usage by year (tCO₂e)

105. Figure 1 shows that in general the tonnes of carbon is gradually increasing with each year from the 2012 baseline of 83,000 tonnes of carbon. Some of the future years have a large increase due to the proposed implementation of major schemes e.g. in 2031 the construction of the new Arlington reservoir is planned to commence.

106. Carbon savings, and reduction in total carbon is also achievable with the following:

- leakage reduction;
- water efficiency;
- some of the schemes may only be partially utilised in some year;
- in some years there are fewer construction phases; and

107. Therefore, in some of the years i.e. 2019, 2023, 2028 to 2029, 2036, onwards the carbon usage is reduced.

108. In addition we will seek to explore and implement future strategies as they arise that can reduce and minimise carbon further.

Conclusions

109. By developing a revised baseline, which uses the most up-to-date supply demand balance data from water companies in the area, we can be sure that our plan is based on least cost principles. As a reference our plan has a baseline NPV cost of £276m. This compares to costs from the WRSE modelling (Appendix 8A) of NPV cost £200m to £470m. We can see therefore that our baseline is towards the lower end of the range of WRSE scenario modelling costs.
110. Our preferred plan takes into account our risk assessments, the SEA and customer preferences and has a marginally lower NPV than the baseline,
111. Not only does our preferred plan compare well on cost with the WRSE modelling work, it also meets our own, and Government's guiding principles to:
- increase resilience;
 - manage risk;
 - promote sharing of resources;
 - deliver further demand reductions;
112. In addition the options selected provide a balanced set of options from an SEA perspective.

Residual Risk

113. Although we have taken great care in developing our preferred plan, and have used the most up-to-date information we have, there are still residual risks. These are summarised below:-

Transfers

114. Appendix 8C includes copies of letters between ourselves and donor companies prior to the publication of our dWRMP14 regarding the new bulk supplies, via additional transfers of water. It can be seen from those letters and our discussions with companies that there were still risks about the availability of those bulk supplies. For instance Thames Water have said that bulk supplies are dependent on its metering strategy, and Sutton and East Surrey Water have since said that the start dates it has assumed, are different to those in our preferred plan. We have not received confirmation from Southern Water regarding its specific transfers into our supply area, which remains a significant risk in our plan.

115. The risks include:

- The bulk supplies not being available at all, or at the volumes assumed in our preferred plan
- The costs of the bulk supplies being different
- Planning risk around the development of new assets

116. Further discussions on the details of the transfers with other water companies are summarised in Appendix 9.

Strategic Schemes

117. There are several strategic schemes in our preferred plan, including water re-use schemes (which require us to develop schemes with Southern Water), the construction of a new reservoir at Broad Oak and an extension to our existing Arlington Reservoir.

118. The risks include:

- Planning risk around the development of new assets
- The costs of the schemes being different to our assumptions
- Complexities of working with other companies to jointly develop options, including agreeing prices for treated wastewater

Demand Management

119. Our demand management assumptions, including the reduction in PCC we are using in our demand forecast, are ambitious and dependent upon customers using less water in the future than now.

120. The risks include:

- Customers not responding as expected to our water efficiency strategy, in particular our metering programme
- The more efficient devices we have assumed in our demand forecast not being developed by manufacturers, or not being installed and used as designed for, by customers
- Lack of support for water efficiency in new homes by national and local government

Supply Demand Balance

121. Changes to our supply demand balance (which we cannot foresee) as a result of climate change, the National Environment Programme, population or demand forecasts, beyond the assumptions we have made in Target Headroom.

Risk Categorisation

122. We understand the residual risk in our preferred plan, and have set them out below. We have not re-run our Target Headroom analysis to include these residual risks, as there is the potential we would account for them twice in our plan. We have categorised these risks into three groups: Environmental Risk (the risk might impact on the Environment), Customer Risk (the risk might impact on customers) and Shareholder Risk (the risk might impact on Shareholders). The results are summarised in a traffic light system in the following table.

Table 21: Summary of Residual risks

Risk	Impact on Environment	Impact on Customers	Impact on Shareholders
Delays to Transfers	Alternative schemes may need to be selected which are worse for the environment.	Levels of service may not be met due to delays and lead times on schemes. More expensive options need to be developed increasing bills	Reputation risk to shareholders and company from failure to meet levels of service. Fines for failing to meet levels of service Increases in spending (later recovered in price reviews)
Yields from Transfers not available	Alternative schemes may need to be selected which are worse for the environment.	Levels of service may not be met. More expensive options need to be developed increasing bills	Reputation risk to shareholders and company from failure to meet levels of service. Fines for failing to meet levels of service Increases in spending (later recovered in price reviews)
Planning risk from Transfers	Alternative schemes may need to be selected which are worse for the environment.	Levels of service may not be met due to delays. More expensive options need to be developed increasing bills	Reputation risk to shareholders and company from failure to meet levels of service. Fines for failing to meet levels of service Increases in spending (later recovered in price reviews)
Planning risk of strategic schemes	Alternative schemes may need to be selected which are worse for the environment. Environmental benefits from schemes do not materialise	Alternative options, which our customers like less, may be built. More expensive options need to be developed increasing bills Levels of service may not be met due to delays.	Reputation risk to shareholders and company from failure to meet levels of service. Fines for failing to meet levels of service Increases in spending (later recovered in price reviews)
Supply Demand Not met because PCC assumptions do not occur.	More water is needed to be taken out of the environment leading to reduced flows in rivers or lower groundwater levels. Carbon increases as a result of additional supply requirements.	Bills will increase as more investment is required.	Efficiency targets not met by the company. Reputation risk to shareholders and company from failure to meet levels of service. Fines for failing to meet levels of service Increases in spending (later recovered in price reviews)

Risk	Impact on Environment	Impact on Customers	Impact on Shareholders
Changes in Supply Demand Balance (beyond Target Headroom)	<p>More water is needed to be taken out of the environment leading to reduced flows in rivers or lower groundwater levels.</p> <p>Carbon increases as a result of additional supply requirements.</p>	<p>Alternative options, which our customers like less, may be built.</p> <p>More expensive options need to be developed increasing bills</p> <p>Levels of Service may not be met due to delays.</p>	<p>Reputation risk to shareholders and company from failure to meet levels of service.</p> <p>Fines for failing to meet levels of service Increases in spending (later recovered in price reviews)</p>

No Restrictions Testing on Levels of Service

123. The Guidelines (s2.9) require us to report what the impacts are on our plan of meeting 'reference' levels of service - that is temporary water use restrictions 1 in 10 years, non-essential use restrictions 1 in 40 years, and no rota cuts or standpipes should be used within the period of record; and of meeting a 'no restrictions' levels of service.

124. Our preferred plan already aligns with the reference levels of service requirement, and so no further explanation is provided here.

125. In order to assess what the impacts of a no restrictions level of service would be on our preferred plan we compared our scenario 16 model run with our scenario 10 model run for consistency. Scenario 16 differs to scenario 10 because it adopts revised deployable output estimates of 1 in 100 years (rather than our standard 1 in 50 years) and so provides a more severe test that would lessen or even exclude the need to impose restrictions. The differences between these runs are set out in the table below:-

Table 22: Impacts of changing our levels of service to no restrictions

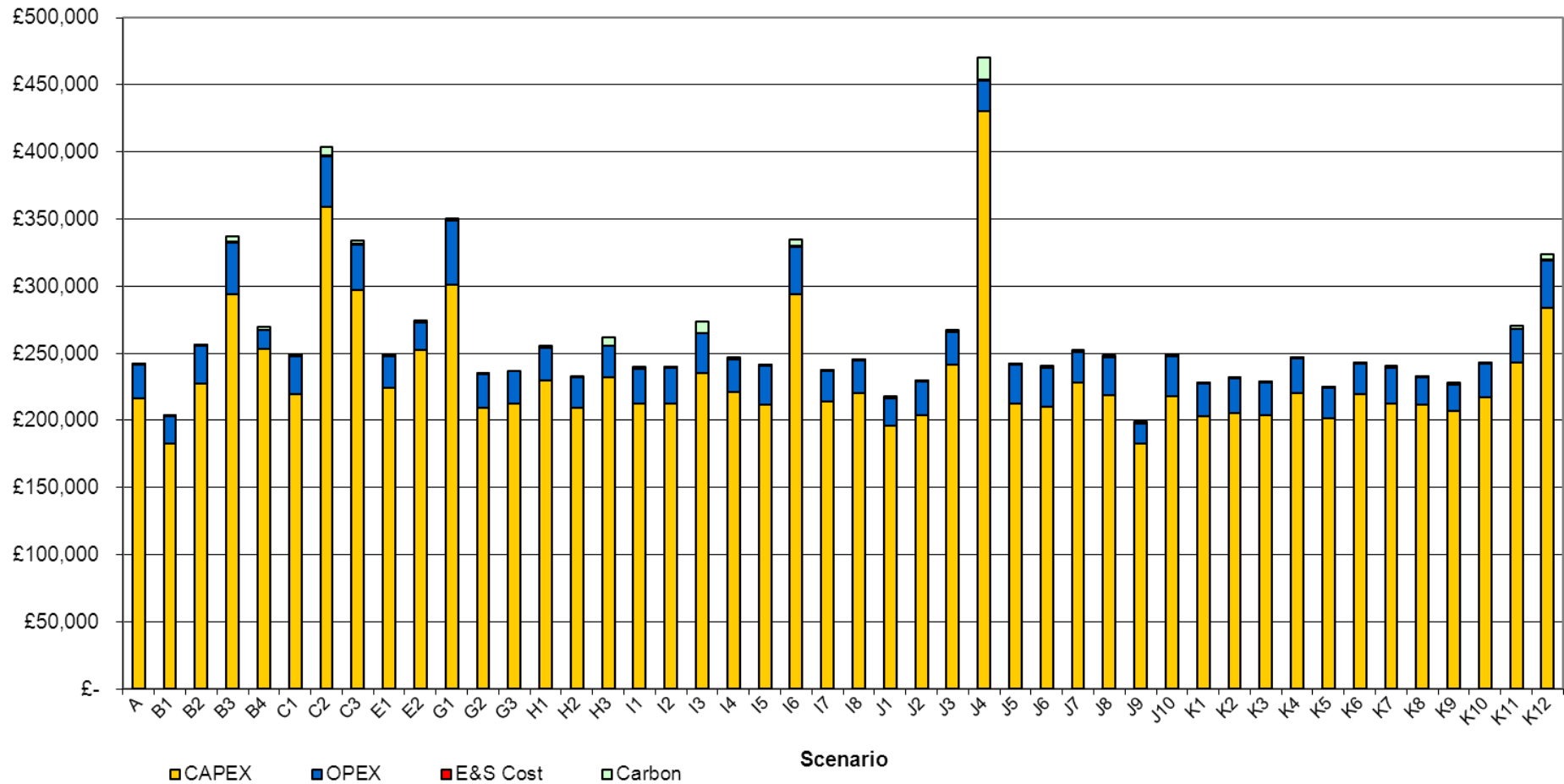
	Scenario 10	Scenario 16
Leakage	5.19MI/d	5.87
Water Efficiency	3.84MI/d	5.47
Reservoir	Broyle Reservoir (25.7MI/d)	Broyle Reservoir (25.7MI/d)
Groundwater	Maytham Farm (4.3MI/d)	Maytham Farm (4.3MI/d)
Transfers	11 options (73.76MI/d)	12 options (111.76MI/d)
Aquifer Storage Recovery	1 option (7.5MI/d)	1 option (7.5MI/d)
Water Treatment Works	2 in WRZs 2 and 4 (31.3MI/d)	2 in WRZs 2 and 4 (31.3MI/d)
Surface Water Transfers	None	Adur to Ardingly Transfer
Water Reuse	None	None
Desalination	None	None
Total Cost (£M NPV)	£133.5	£267.7

126. We can see from the table the key differences are increased transfers from neighbouring companies. The cost of moving to no restrictions as a level of service would be approximately £144m (more than a 100% increase on costs).

127. Our preferred plan has developed further since scenario 16 was run. In particular the level of transfer options available to us has markedly reduced following further validation, and these are being replaced by water re-use, desalination and new storage options. Applying similar reductions to our deployable output of 1 in 100 years (rather than our standard 1 in 50 years) to our preferred plan would therefore result in similar, if not higher,) cost increases.

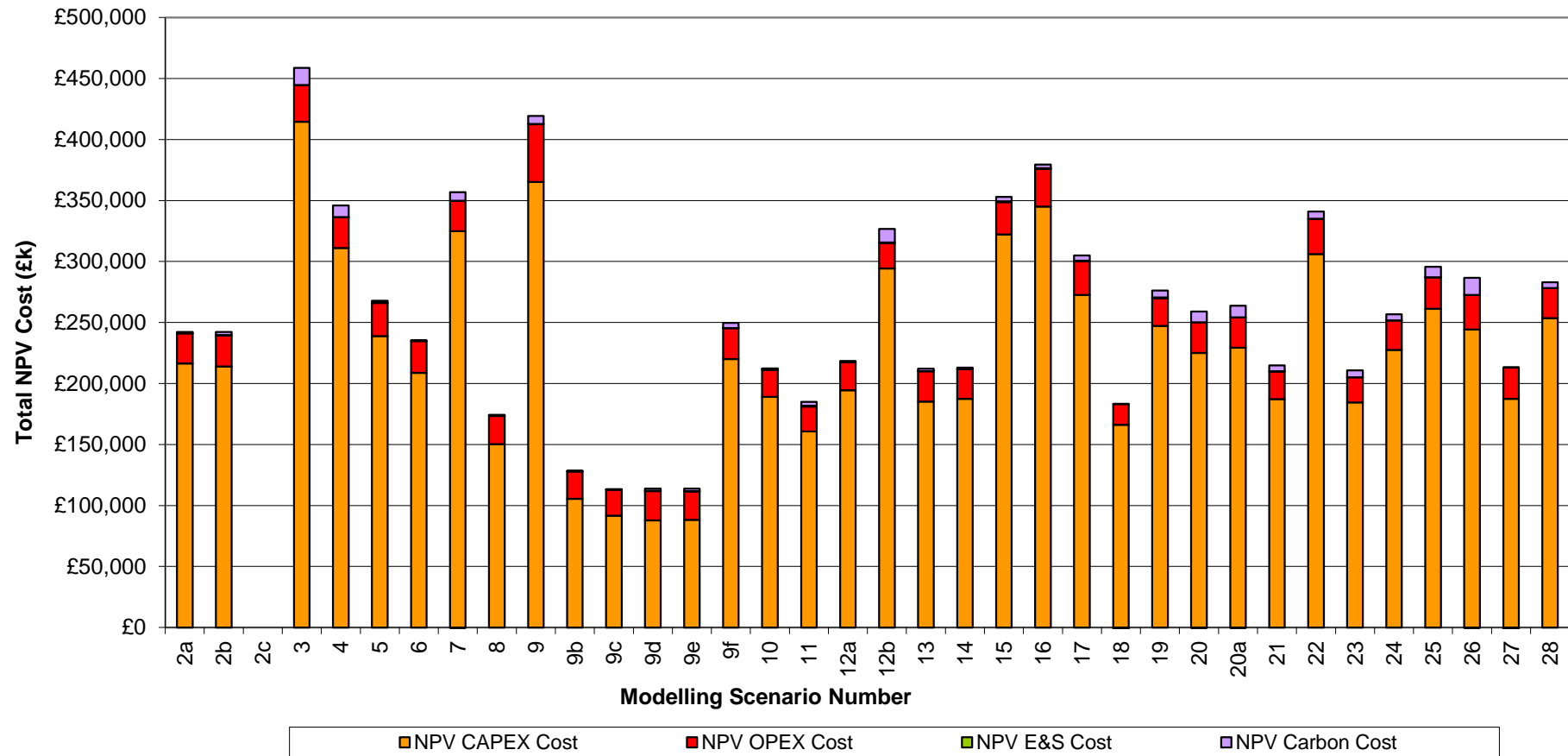
Appendices

Appendix 8A: Summary of NPVs for South East Water from WRSE Modelling (£000s)

WRSE Modelling Scenarios
Comparison of Scenario Costs

Appendix 8B: Summary of NPVs for our Modelling (£000s)

Modelling Scenarios - NPV Costs
SEW Cost Comparison - CAPEX/OPEX/E&S/Carbon



Appendix 8C: Correspondence between Water Companies

Provided below are copies of correspondence between ourselves and neighbouring water companies. Including:

SEW to:

1. Portsmouth Water
2. Southern Water
3. Sutton and East Surrey Water
4. Thames Water
5. Affinity Water

Responses from:

6. Portsmouth Water
7. Southern Water
8. Sutton and East Surrey Water
9. Thames Water
10. Affinity Water

From: Dance, Lee
Sent: 03 March 2013 19:50
To: 'Simmonds, Gareth'; Ball, Andrew
Cc: 'Sansby, Paul'
Subject: RE: Bulk Supplies

Evening Gareth,

We have been running our final scenarios, and our modelling is selecting a bulk supply import to SEW from Portsmouth Water (PRT Clanfield to SEW Tilmore) of 10 MI/d right near the end of the planning period.

For our preferred draft WRMP we would like to agree with Portsmouth Water including the transfer in our respective plans. Given this is a long way off we do not expect to have a great level of detail agreed around the transfer at this stage and for the draft WRMP.

Could we discuss in the coming week what the best way forward might be with regard to draft WRMPs.

Many thanks
Lee

From: Simmonds, Gareth [<mailto:G.Simmonds@portsmouthwater.co.uk>]
Sent: 22 January 2013 15:58
To: Dance, Lee
Subject: FW: Bulk Supplies

Lee

We are in the process of trying to tie down our WRMP plan one of the big uncertainties is if any neighbouring companies require bulk supplies. It would be useful if you could indicate your intention regarding the possible bulk supply from Portsmouth Water to yourselves so we can reflect this in our plan. If it is not a likely option then I do not believe a meeting is required however if your intention is to include it in your plan I think it would be helpful to meet.

Regards

Gareth Simmonds
Portsmouth Water

From: Simmonds, Gareth
Sent: 17 January 2013 08:45
To: Lee.Dance@southeastwater.co.uk
Subject: Bulk Supplies

Lee

The results from the WRSE indicate that a bulk supply between us is an option to be considered. Can I suggest that we arrange a meeting to discuss if we believe this is a viable option? Our intention is only to include bulk supplies in our plan if we have reached agreement with the other

Company. However we are keen to demonstrate to the stakeholders that we have given serious consideration to each option even if it is not included in the plan.

Would you like to suggest dates? We are happy to come to you if that helps.

Regards

Gareth Simmonds
Portsmouth Water

2012 RoSPA Health and Safety GOLD MEDAL Winner

This e-mail is intended only for the addressee named above. As this e-mail may contain confidential or privileged information if you are not, or suspect that you are not, the named addressee or the person responsible for delivering the message to the named addressee, please telephone us immediately. An e-mail reply to this address may be subject to monitoring for operational reasons or lawful business practices. Please note that we cannot guarantee that this message or any attachment is virus free or has not been intercepted and amended. The views of the author may not necessarily reflect those of the Company.

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This message has been checked for all known viruses through the MessageLabs Virus Control Centre.

This e-mail has been scanned for by Websense Email Security Cloud Service. For more information visit: www.websense.com

Our Ref: PS/cp
Your Ref:



8th March 2013

DL: 01634 873900
Email: Paul.seeley@southeastwater.co.uk

Mel Karam
Director of Asset Management
Southern Water
Southern House
Yeoman Road
Worthing
BN13 1BG

Cc: Matthew Wright CEO Southern Water
Paul Butler MD South East Water
Meyrick Gough Southern Water
Lee Dance South East Water

Dear Mel,

South East Water and Southern Water – WRMP Proposals

Many thanks to both you and Meyrick Gough for meeting with Lee Dance and myself on Friday 1st March 2013 and the dialogue held on our respective WRMP's. I confirmed at the meeting that I would write setting out our proposals regarding the key schemes and interactions between our two organisations so that when our plans are published for consultation in April we are broadly in agreement.

The three key areas we discussed were

- Existing bulk supplies
- Future new bulk supplies as per the WRSE modelling work
- New resource schemes

I set out below what I believe we agreed at our meeting.

Existing Bulk Supplies

The bulk supply at Belmont will continue through to the end of the planning period in 2040. The same is true for the Bewl Darwell supply but it is likely that South East Water will need to take the supply direct from the pipeline, rather than direct from Darwell Impounding Reservoir, in the event that the EA confirm the presence of invasive species.

The bulk supply at Weirwood will continue through to the end of the planning period in 2040 subject to South East Water making the appropriate capital contribution for main laying works to ensure continuity of supply.

The River Medway Scheme deployable output figures will reduce in South East Waters plan in the period 2020 – 2025 to align with those used by Southern Water.

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Supply from Southern Water	2015 - 2020	2020 – 2025	2025 – 2040
RMS	16.8MI/d	10.9MI/d	10.9MI/d
Darwell	8MI/d	8MI/d	8MI/d
Belmont	6.85MI/d	6.85MI/d	6.85MI/d
Weirwood	5.4MI/d	5.4MI/d	5.4MI/d

All of the above bulk supplies will continue at current agreed rates.

New Regional Transfers between Southern Water and South East Water

There are six new transfers quoted in the WRSE documentation that affect our companies. We agreed that three of these schemes are not required in our current plan and will be excluded as options. These are:

- 14.6 MI/d Bewl to SEW Bewl Works (2018)
- 10 MI/d Thanet to SEW Blean (2020)
- 4 MI/d Sussex Coast to SEW Lewes (2025)

The WRSE model refers to a new bulk supply of 8MI/d at Darwell. This is the current supply post 2026 and is included in the existing bulk supplies above and will continue to 2040.

Two new schemes identified in the WRSE modelling, 10MI/d at Aylesford and 5MI/d at Matts Hill should be incorporated in both our plans going forward. The 10MI/d at Aylesford is discussed further below and the 5MI/day at Matts Hill is included in our model at current bulk supply prices.

New Resource Schemes

We discussed three possible schemes, Aylesford Effluent Reuse, resilience at SEW Barcombe Works and finally Plucks Gutter.

We proposed that, based on each company's need, a joint promotion of the effluent reuse scheme at Aylesford based on a 50:50 split of yield would be of benefit with completion in the period 2020 – 2025. South East Water is willing to enter into a commercial agreement as part of our PR14 business plan and WRMP promotion. I look forward to receiving confirmation from you such that we can progress this option further. We require confirmation of capital and opex costs from Southern Water which reflect 50% of the total costs for inclusion in our dWRMP. This information is required by Friday 15th March.

The resilience at SEW Barcombe works is to be addressed by promotion of effluent reuse to the upper Ouse for abstraction at Barcombe. Subject to satisfactory commercial agreement with Southern Water we would be looking to promote, build and operate a plant linked to Newhaven or Peacehaven WTW's with completion in 2025 – 2030. Our initial dialogue with you has been around Southern Water providing a bulk supply at Newhaven but our latest modelling runs have shown that there may be a capacity issue with this and the preferred scheme is for 25MI/d from Peacehaven. We intend to include this option in our dWRMP. South East Water requires a bulk supply cost for the provision of this effluent and again I ask if we may have a figure by Friday 15th March.

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We discussed Plucks Gutter and its possible interaction with Broadoak Impounding Reservoir and concluded that there is a need for both schemes. These schemes are required in the longer term and we believe it would be beneficial for both companies to progress a joint investigation during AMP6, along with Affinity Water, to agree a strategy for East Kent. We understood from our meeting that it is your intention to promote Plucks Gutter earlier in the plan, possibly in AMP6, whereas it is likely our proposal for Broadoak will not be promoted until later. We intend to put an allowance, yet to be agreed, into our dWRMP for further investigations in AMP6 in conjunction with Southern Water and Affinity Water. It would be beneficial to agree a consistent and united way forward for investigations prior to publication of our final WRMP's.

Other issues

I can confirm that the option for a bi-directional pipeline between Southern Water and South East Water – Hardham and RZ2 is not required by either Company.

I also confirmed at our meeting that post 1st April it is my intention to finalise and sign off all of the outstanding bulk supply agreements with Southern Water. It would be very beneficial if we could complete this process by the end of September and I trust that Southern Water will give a commitment to complete these agreements by that time.

Yours sincerely

Paul Seeley
Asset Director

Our Ref: PS/rb
Your Ref:



11th March 2013

DL: 01634 873900
Email: Paul.seeley@southeastwater.co.uk

Lester Sonden
Engineering Director
Sutton & East Surrey Water plc
London Road
Redhill
Surrey
RH1 1LJ

Cc: Anthony Ferrar MD, SESW
Paul Butler MD, SEW
Lee Dance, SEW

Dear Lester,

Draft WRMP – PR14 Submission to Defra

Further to the recent launch of the WRSE model findings and the on-going dialogue between our two companies, I write to confirm that the new bulk supplies detailed below will be included in our draft WRMP which will be submitted to Defra on 31 March 2013.

Our preferred plan includes two bulk supplies from Sutton and East Surrey Water to South East Water.

1. Outwood (SESW) to Whitely Hill (SEW)
This is for 5ML/d (Average, Peak and Drought) to commence in 2020.
2. Bough Beech (SESW) to Riverhill (SEW)
This is for 5ML/d (Peak and Drought) and will commence in 2023.

Both bulk supplies should be for a 25 year term

The Consultants working for both parties have shared the tariff arrangements for the bulk supplies with us which we understand are based on a similar tariff to that which you apply to Gatwick Airport. It is on this basis that the schemes have been selected but clearly we now need to progress to a commercial agreement that is satisfactory to both parties and can be included in our Business Plan submission to Ofwat in due course.

I am writing seeking confirmation from Sutton and East Surrey that you have included this requirement in your dWRMP and would be pleased to receive written confirmation by Friday, 22 March 2013.

Yours faithfully

Paul Seeley
Asset Director

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Our Ref: PS/rb
Your Ref:



11th March 2013

DL: 01634 873900
Email: Paul.seeley@southeastwater.co.uk

Yvette de Garis
Thames Water Utilities Ltd
Clearwater Court
Vastern Road
Reading
Berkshire
RG1 8DB

Cc: Martin Baggs, CEO Thames Water
Paul Butler, MD South East Water
Lee Dance, South East Water

Dear Yvette,

Draft WRMP – PR14 Submission to Defra

Further to the recent launch of the WRSE model findings and the on-going dialogue between our two companies, I write to confirm that the new bulk supply details below will be included in our draft WRMP which will be submitted to Defra on 31 March 2013.

Our preferred plan includes for a bulk supply from Thames Water to South East Water between Windsor (Thames) and Surrey Hills (SEW). This is for 10ML/d (Summer Peak) commencing in 2030 and for a 25 year term.

This scheme is the only bulk supply from the WRSE core list that remains viable between Thames and South East Water. We understand that all other inter-Company bulk transfers identified between Thames and South East Water have been discounted by Thames on the basis that they transfer water out of the River Thames catchment.

The Consultants working for both parties have shared the tariff arrangements for the bulk supplies with us which we understand are based on your large user tariff of 95p/m3. It is on this basis that the schemes have been selected but clearly we now need to progress to a commercial agreement that is satisfactory to both parties and can be included in our Business Plan submission to Ofwat in due course.

I am writing seeking confirmation from Thames Water that you have included this requirement in your draft WRMP and would be pleased to receive written confirmation by Friday, 22 March 2013.

Yours faithfully

Paul Seeley
Asset Director

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13th March 2013

DL: 01634 873900
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Mike Pocock
Affinity Water Ltd
Tamblin Way
Hatfield
Hertfordshire
AL10 9EZ

Cc: Richard Bienfait CEO
Stephen Martin Director of Asset
Management
Paul Butler MD South East Water
Lee Dance South East Water

Dear Mike

Draft WRMP – PR14 Submission to Defra

Further to the recent launch of the WRSE model findings and the on-going dialogue between our two companies, I write to confirm the bulk supply requirements between our two companies as detailed below will be included in our draft WRMP which will be submitted to Defra on 31 March 2013.

We have assumed that the existing transfer from Egham at 36MI/d will continue throughout the planning horizon. We are not expecting any changes to the existing agreement.

We have included in our plan the continuation of the existing transfer from Kingston to Barham at 2MI/d.

Based on the WRSE modelling and subsequent discussions we have modelled two additional transfers from South East Water to Affinity South East. In our discussions with you we have assumed up to 10MI/d will be required, from Aldington to Saltwood Reservoir (maximum 6MI/d) and a further 4MI/d from Kingston to Barham. The Kingston to Barham transfer is bi-directional.

The WRSE modelling suggests that the increase might be phased over a period commencing in 2018. We will need to agree the phasing before publication of our respective final WRMP's. The profile that has come out of the modelling currently proposes approximately 6MI/d at 2018 increasing to the full 10MI/d at 2039.

As mentioned earlier the extension to the Kingston to Barham transfer is bi-directional. This means that under some scenarios this option provides South East Water with a transfer of up to 2MI/d, mainly on peak. We would need to understand how this would work in reality (in some years in the WRSE modelling water is pumped from South East Water to Affinity Water for the DYAA and from Affinity to South East Water in DYCP). We have taken the view that although the MDO constraint is included in the WRSE modelling, there is still uncertainty over the impacts of this scenario, so we are not proposing to use it for investment planning.

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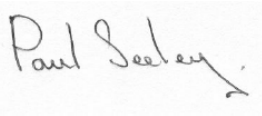
South East Water has been in dialogue with Southern Water regarding the longer term requirements for East Kent which affect all three companies. We believe it would be beneficial for both companies to progress a joint investigation during AMP6, along with Southern Water, to agree a strategy for East Kent. We intend to put an allowance, yet to be agreed, into our dWRMP for further investigations in AMP6 in conjunction with Southern Water and Affinity Water. It would be beneficial to agree a consistent and united way forward for investigations prior to publication of our final WRMP's.

South East Water requires clarification and confirmation from Affinity of your requirements for bulk supplies in East Kent that you intend to include in your dWRMP that may affect South East Water.

We are prepared to enter into legal agreements with you prior to finalising our WRMP

I would be pleased to receive written confirmation by Friday, 22 March 2013.

Yours faithfully,



Paul Seeley
Asset Director

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From: Dance, Lee
Sent: 08 March 2013 16:25
To: 'Simmonds, Gareth'
Subject: RE: Bulk Supplies

At this stage yes please.

Regards,
Lee

Lee Dance
Head of Water Resources and Environmental
South East Water
Tel: 01634 873904
Mob: 07976 820943
Lee.dance@southeastwater.co.uk
www.southeastwater.co.uk

From: Simmonds, Gareth [<mailto:G.Simmonds@portsmouthwater.co.uk>]
Sent: 08 March 2013 16:23
To: Dance, Lee
Subject: RE: Bulk Supplies

Lee

Thanks for the timing of the bulk supply we are assuming that the 10 MI/d is required at ADO, PDO and MDO is this correct?

Regards

Gareth Simmonds
Portsmouth Water

From: Dance, Lee [<mailto:Lee.Dance@southeastwater.co.uk>]
Sent: 07 March 2013 10:22
To: Simmonds, Gareth; Ball, Andrew; Goddard, Emma; Vincent, Ros (Ros.Vincent@jacobs.com)
Cc: Sansby, Paul; Viney, Tracey
Subject: RE: Bulk Supplies

Gareth,

Thank you for the confirmation. The first year of requirement is 2037, at 10MI/d.

Many thanks
Lee

From: Simmonds, Gareth [<mailto:G.Simmonds@portsmouthwater.co.uk>]

Sent: 05 March 2013 09:20

To: Dance, Lee; Ball, Andrew

Cc: Sansby, Paul; Viney, Tracey

Subject: RE: Bulk Supplies

Lee

I am pleased to say we can accommodate your request and will include it in our draft plan, noting that the detail is not necessary at this stage due to the long lead in time.

Can you confirm the year you would like the supply to commence and we can include it in our plan.

We are trying to finalise our SEA are you in a position to give an indication of your options so we can assess the in combination impacts?

Regards

Gareth Simmonds
Portsmouth Water

No response received at time of submission of dWRMP14 from Southern Water Services.

Our Ref: LS/SEW/130318

Your Ref: PS/rb

18 March 2013

Paul Seeley
Asset Director
South East Water
Rocfort Road
Snodland
Kent ME6 5AH



Sutton and East Surrey Water plc
London Road
Redhill
Surrey RH11LJ
Telephone 01737 772000
Facsimile 01737 766807
Email sesw@waterplc.com

BY EMAIL ONLY

Dear Paul,

Draft WRMP - PR14 Submission to Defra

Thank you for your letter dated 11 March 2013 concerning bulk supplies from Sutton and East Surrey Water to South East Water.

You informed us in an email from your Consultants dated 13 February 2013 that the following bulk exports from Sutton and East Surrey Water to South East Water had been selected by your model and formed your baseline requirements at that stage:

1. Outwood (SESW) to Whitely Hill (SEW) for 5 MI/d (Average and Peak), commencing in 2020/21; and
2. Bough Beech reservoir (SESW) to Riverhill (SEW) for 5 MI/d (Peak), commencing in 2028/29.

We responded confirming that we would incorporate these bulk exports in our Draft WRMP modelling, and have since done so. Our preferred plan therefore takes account of these bulk exports. Please note therefore that our modelling assumes the export from Bough Beech reservoir to Riverhill takes place in 2028/29 as compared to 2023 the year stated in your letter. It is unlikely that we can create the additional peak surplus required until after 2025 and would suggest therefore that the original date of 2028/29 is adhered to.

With regards to Outwood to Whitely Hill, our supply /demand baseline indicates we have a surplus at dry year annual average of around 5 MI/d at 2020. Our preferred plan relies on significant demand management measures in order to maintain that dry year annual average surplus beyond 2020 until after 2030 when additional resource is derived from the raising of the top water level of Bough Beech reservoir and a bulk supply from Thames Water. Due to the uncertainty associated with demand management options, the feasibility of raising the Bough Beech embankment, and the reliability of a bulk supply from Thames Water, we would suggest that you should not rely on an average of 5 MI/d at average until say 2025 by which time it should be possible to demonstrate that those demand management options are in place and capable of creating the surplus needed, and the post-2030 options are realisable. In the meantime, the average over and above that necessary to supply 5 MI/d at peak (say 1 MI/d) would be variable depending on rainfall and demand.

Please also note that it is unlikely that we will be able to guarantee any bulk supplies during drought conditions - for example if demand restrictions were in force in our supply area. The terms of any commercial bulk supply agreement would therefore need to reflect such conditions. In addition, we need to confirm with you the conditions that define a 'Peak' transfer.

For the purpose of modelling only, we advised your consultant that an appropriate starting position for a transfer of 5 Ml/d or above would be:

A standing charge of £4,250 p.a. and

A volumetric charge of £0.75 p/m³

For lower annual volumes, I indicated we would have to negotiate a volumetric charge between £0.75 p/m³ and our published large user tariff. Of course, the actual tariff will need to reflect the final costs of supply (to ensure that the Company's customers are not cross-subsidising those of South East Water). We would expect to agree a final tariff when the actual costs (and their regulatory treatment) are clearer

As you will be aware any bulk supply agreement will be contingent on the Regulators and the Secretary of State agreeing to our Water Resources Management Plan, and Ofwat making sufficient allowance within its final determination for us to be able to carry out the necessary programme of works. The duration of any agreement will also be contingent upon the Regulators accepting our long term proposals (including the raising of Bough Beech reservoir), or agreeing some appropriate alternative. We are also considering undertaking investigation during the AMP6 period to try and reduce the uncertainties associated with our preferred plan, especially leakage reduction, reduced consumption associated with metering, and the raising of Bough Beech reservoir embankment .

One further point that needs to be taken into consideration is the fact that we currently have an undertaking in place for metaldehyde in the water from Bough Beech reservoir. We would expect to extend that undertaking (or receive an authorised departure) into the AMP6 period, and beyond, unless a cost effective treatment becomes available, or farmers start using an alternative molluscicide. The DWI have recently indicated that the Inspectorate would not support a new supply, or the wide extension of an existing supply, if there are known quality issues – for example if the supply is covered by a legal instrument for a quality parameter. Metaldehyde is an obvious example. This would need to be resolved before any bulk supply agreement was made.

Yours sincerely



Lester Sonden
Engineering Director

cc Paul Butler MD, SEW
Lee Dance, SEW



Mr Paul Seeley

Environmental Regulation

Asset Director
South East Water
Rocfort Road
Snodland
Kent
ME6 5AH

Your ref
Our ref
Name Yvette De Garis
Phone 07747643546
E-Mail yvette.degaris@thameswater.co.uk

20th March 2013

Dear Paul,

Draft WRMP – Submission to Defra

Thank you for your letter of 11 March.

As you are aware we are keen to reflect the outputs of the WRSE study in our WRMP and see the better use of water resources across the region as vital to achieving sustainable water resource provision across the South East of England. However I am afraid that the timing of the confirmation of the final conclusions of the study means that we are, unfortunately, unable to represent specific schemes from WRSE within our preferred plan. However we do intend to demonstrate the impact of the WRSE transfers identified for our supply area on the preferred plan within a separate section of the WRMP which describes regional considerations.

We agree that the only bulk supply scheme to South East Water from the WRSE core list that remains viable is the supply from Thames Water's S/W/A WRZ Windsor (Thames) to Surrey Hills (SEW). Within our WRSE transfers scenario we have this bulk supply commencing in 2030 and running to the end of the period in 2040. The volume commences at about 6MI/d and rises to 10 MI/d with the following profile. It is for the DYCP only. This is the profile taken from the WRSE modelling K10 but with the start delayed by 4 yrs to begin in 2030.

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DYCP	DYCP	DYCP	DYCP	DYCP	DYCP	DYCP	DYCP	DYCP	DYCP
2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
-6.880	-6.880	-6.880	-6.880	-10.000	-10.000	-10.000	-10.000	-10.000	-10.000

We do not have consultants working for us on the bulk supplies tariff arrangements and so I am not aware of the shared tariff arrangements you refer to although I presume they are from the WRSE work. In our scenario modelling we have not accounted specifically for costs relating to the transfer.

With this transfer in place the WRZ would move into deficit towards the end of the period under baseline conditions. However, if metering and demand management were rolled out as planned,

supply and demand would be maintained in balance. Widespread roll out of metering in this WRZ is not a cost beneficial option, but it is nevertheless the preferred Company approach for this WRZ. The public consultation on our plan will specifically ask customers and stakeholders for their views on this.

I can also confirm that all other inter-company bulk transfers identified between Thames and South East Water have been discounted on the basis that they transfer water out of the Thames catchment, a feature not recognised in the WRSE modelling. Alternative transfers from the London WRZ have been included as options in the modelling but do not feature in the WRSE core options list.

We expect our final WRMP14 preferred programme submitted to Defra in early 2014 to explicitly reflect the outcomes of the WRSE modelling work in light of any related comments that we receive as part of the public consultation on our draft plan, and welcome the opportunity to continue discussions with you on this option in the intervening period. This would include beginning to discuss commercial terms, which would not necessarily be based on our large user tariff.

Yours sincerely,

Yvette de Garis
Head of Environmental Regulation

No response received at time of submission of dWRMP14 from Affinity Water.