

# Water Resources Management Plan 2014

## **Appendix 9 : Our preferred plan**

## Executive Summary

1. This Appendix includes further information in support of our preferred plan described in section 9 of the WRMP14. It provides further clarification and response to a number of representations we received on our dWRMP14. The Appendix comprises four sub-appendices (A to D) described below.
2. Appendix 9A: Describes the sensitivity tests completed to confirm our plan is robust to different future scenarios and assumptions.
3. Appendix 9B: Describes the methodology we will employ to monitor and trigger 'alternative options' in the event that one of our preferred plan options becomes infeasible during the programme.
4. Appendix 9C: Includes detail of our National Environment Programme (NEP) for AMP6 (period 2015 to 2020) including catchment management.
5. Appendix 9D: Summarises further progress made with other water companies to ensure shared resources and transfers information is consistent and reflected in updates to our respective dWRMP14s.

## Appendix 9A: Sensitivity Testing of the Preferred Plan

1. A number of sensitivity tests on key assumptions in the preferred plan have been carried out to particularly explore the impact of differing assumptions on the final demand forecast, impact of climate change, different levels of service and various levels of risk assumptions in the target headroom calculation. The test on the impact of including the uncertainty relating to the options in the preferred plan was considered equivalent to the headroom test 15 and has not, therefore, been carried out as a separate model.
2. A summary of the tests are set out in the Table 1 below.

**Table 1: Summary of Sensitivity Tests on the Demand Forecast**

Test No.	Description	Base Forecast	Sensitivity Test	Impact on Plan
1	Props and Props	Uses Plan based forecasts	Uses <b>Trend based</b> forecasts	All schemes brought forward, with Arlington by 4 years, and additional schemes required. <b>Major impact.</b>
2	Props and Props	Uses Plan based forecasts	Uses <b>Most Likely</b> forecasts	All schemes brought forward, with Arlington by 4 years, and additional schemes required. <b>Major impact.</b>
3	Props and Props	Uses Plan based forecasts	<b>5% lower</b> than Plan based forecasts	Most schemes delayed by up to 1 year. <b>Minor impact.</b>
4	New Properties PCC	Assumes reduction of about 20% from Avg mPCC.	Applies about 15% reduction from Avg mPCC.	No change to schemes. <b>No impact.</b>
5	Misc. Usage	Assumes continuous reduction	No reduction in Misc. use	All major schemes brought forward by 2 years, and an additional scheme required. <b>Moderate impact</b>
6	External Usage	Assumes continuous increase	No increase in External Use	All major schemes are delayed by 1 year. <b>Minor impact.</b>
7	Impact metering of	Applies reduction of about 15% from umPCC	Applies reduction of about 10% from umPCC	Aylesford and Arlington brought forward by 1 year. <b>Minor impact</b>
8	Impact metering of	Applies reduction of about 15% from umPCC	Applies reduction of about 20% from umPCC	Arlington and Broak Oak delayed by 1 year, Aylesford delayed by 2 years. <b>Minor impact.</b>
9	Household Peak Factor A	Increasing peak factor to 2040	Hold HH peak factor at start level	Aylesford delayed by 2 years, Broad Oak by 4 years, and Arlington not required. <b>Major impact.</b>
10	Household Peak Factor B	Increasing peak factor to 2040	Hold HH peak factor at mid-range	Broad Oak delayed by 2 years. <b>Moderate impact.</b>

Test No.	Description	Base Forecast	Sensitivity Test	Impact on Plan
11	Occ Rate Assumptions	Difference Occ Rates applied to all property groups	Same Occ Rate to all property groups	No changes to the schemes are required. <b>No impact.</b>
12	Outage	Updated WRMP14 figures	Apply WRMP09 Outage figures	Schemes brought forward by 2 years. <b>Moderate impact.</b>
13	1 in 100 DO	1 in 50 year Deployable Outputs	1 in 100 year Deployable Outputs	Schemes brought forward by 1 years. <b>Minor impact</b>
14	70%ile Headroom	65%ile Headroom	Apply 5%ile higher risk to THR	Some schemes brought forward by 1 years. <b>Minor impact</b>
15	75%ile Headroom	65%ile Headroom	Apply 10%ile higher risk to THR	Schemes brought forward by 1 years. <b>Minor impact</b>
16	60%ile Headroom	65%ile Headroom	Apply 5%ile lower risk to THR	Schemes delayed by 1 year. <b>Minor impact</b>

3. The impact on the supply demand balance deficit at the end of the planning period in 2040 is quantified in the Table 2 below. A worsening of the deficit is noted in red as an INCREASE.

**Table 2: Impact of sensitivity test by 2040**

Test #	Test Description	Impact SDB Deficit	ADO (MI/d) by 2040	PDO (MI/d) by 2040
1	Trend based Pop&Prop	INCREASE	27.8	38.1
2	Most Likely Pop&Prop	INCREASE	24.4	33.3
3	5% lower Pop& Prop	REDUCE	2.7	3.7
4	New Props Higher consumption	INCREASE	1.8	2.4
5	Misc Use no reduction	INCREASE	16.6	22.5
6	External use no growth	REDUCE	6.6	9
7	Univ metering less impact	INCREASE	5.2	7
8	Univ metering greater impact	REDUCE	5.2	7
9	No peak factor growth A	REDUCE	0	34.3
10	No peak factor growth B	REDUCE	0	20.8
11	Occupancy Rate test	INCREASE	0.1	0.2
12	Half PR09 Outage	REDUCE	-2.0	7.0
13	1:100 DO	INCREASE	9.6	7.4
14	High Headroom (+5%ile)	INCREASE	4.5	5.9
15	High Headroom (+10%ile)	INCREASE	9.4	12.3
16	Lower Headroom (-5%ile)	REDUCE	4.1	5.1

4. Details of each of the tests are discussed in the sections below but the impact on the timing of the schemes in the preferred plan is shown in Table 3.

**Table 3: Impact on scheme timings from sensitivity tests (numbers represent years)**

The numbers show the movement in each scheme timing under the test condition. A positive number delays the scheme and a negative sign means the scheme is brought forward.		Trend based Pop&Prop	Most Likely Pop&Prop	5% lower Pop&Prop	New Props Higher cons	Misc Use no reduction	External use no growth	Univ metering less impact	Univ metering greater impact	No peak factor growth A	No peak factor growth B	Occ Rate check	Half PR09 Outage	1:100 DO	High Headroom (+5%ile)	High Headroom (+10%ile)	Lower Headroom (-5%ile)
Scheme	WRMP14 Pref Plan	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Barcombe	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cowbeech	2017	0	0	2	0	0	0	0	0	3	0	0	2	-1	0	-1	1
Forest Row	2018	0	0	2	0	0	0	0	1	2	0	-1	2	-1	0	-1	1
Coggins Mill	2019	0	1	2	2	0	2	1	3	3	1	-1	3	0	0	0	2
Maytham Farm	2019	-1	-1	0	0	-1	0	-1	2	2	-1	0	3	-1	-1	0	0
Outwood to Whitely Hill	2020	0	-1	2	1	0	2	0	3	4	0	0	4	-1	-1	-1	3
Aylesford	2023	-2	-2	1	0	-2	1	-1	2	2	0	0	2	-2	-1	-1	1
Peacehaven	2027	-1	-1	1	0	0	1	0	1	3	1	0	2	-1	0	0	2
Bough Beech to Riverhill	2023	-3	-3	0	0	-2	1	-1	1	4	2	0	2	-1	0	-1	1
Matts Hill to Detling	2022	-3	-3	1	0	-2	1	0	1	4	2	0	2	-1	0	-1	1
Broad Oak	2033	-3	-3	1	0	-2	1	0	1	4	2	0	2	-1	0	-1	1
Arlington	2036	-4	-4	1	0	-2	1	-1	1				2	-1	-1	-1	1
Reculver (Desalination)		Y	Y			Y											
Boxalls Lane	2016	0	0	5	5	5	5	5	7	5	5	0	5	5	5	5	5
Bray	2020	-5	0	0	0	0	1	0	4	3	0	0	0	0	0	0	1
Windsor to Surrey Hills	2030	-4	-3	1	-1	-4	1	-3	2		3	0	-1	-1	-1	-2	1
Clanfield to Tilmore	2040	-2	-1	n/r	0		n/r	-1	n/r	n/r	n/r	0	0	0	0	0	n/r

Note: "Y" means the new scheme is required.

n/r means the scheme is not required.

### Test 1: Sensitivity Test on Property Growth rates

**Test Title:** Impact of Trend based property and population growth rates

**Baseline condition:** Adopts the Plan based property and population growth rates.

**Test condition:** Assumes Trend based property and population growth rates from Experian Phase 2 outputs are achieved.

**Impact:** Results in table below. The impact is a higher Average Day Demand of 27.8 MI/d by 2040 and 38.1 MI/d on peak. The impact on the major schemes in the company's Preferred Plan is that all schemes need to be brought forward, with Arlington New Reservoir by 4 years, and additional schemes are required to meet the deficit at the end of the period. This is considered a major impact.

**Table 4: Test 1 results: Impact of Trend Based Property and Populations**

		2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
	Baseline Population ('000)	2132.3	2210.4	2279.1	2347.1	2417.3	2491.6
	Modified Population ('000)	2166.5	2271.9	2377.9	2483.5	2589.4	2695.3
IMPACT	ADD Change	+5.0	+8.6	+13.7	+18.7	+23.5	+27.8
	DYCP Change	+6.4	+11.0	+17.9	+24.9	+31.8	+38.1

**Test 2: Sensitivity Test on Property Growth rates**

Test Title: Impact of Most Likely estimate property and population growth rates

Baseline condition: Adopts the Plan based property and population growth rates.

Test condition: Assumes Most Likely estimate property and population growth rates from Experian Phase 2 outputs are achieved.

Impact: Results in table below. The impact is a higher Average Day Demand of 24.4 MI/d by 2040 and 33.3 MI/d on peak. The impact on the major schemes in the company's Preferred Plan is that almost all schemes need to be brought forward, with Arlington New Reservoir by 4 years, and additional schemes are required to meet the deficit at the end of the period. This is considered a major impact.

**Table 5: DF Test 2 results: Impact of Trend Based Property and Populations**

		2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
	Baseline Population ('000)	2132.3	2210.4	2279.1	2347.1	2417.3	2491.6
	Modified Population	2161.5	2259.0	2360.4	2464.3	2569.0	2673.6
IMPACT	ADD Change	+3.8	+5.9	+10.5	+15.4	+20.1	+24.4
	DYCP Change	+4.8	+7.4	+13.6	+20.3	+27.0	+33.3

**Test 3: Sensitivity Test on Property Growth rates**

Test Title: Impact of lower property and population growth rates

Baseline condition: Adopts the Plan based property and population growth rates.

Test condition: Assumes 5% lower property and population growth rates compared with the Baseline condition.

Impact: Results in table below. The impact is a lower Average Day Demand of 2.7 MI/d by 2040 and 3.7 MI/d on peak. The impact on the major schemes in the company's Preferred Plan is that most schemes are pushed back, with Aylesford, Broad Oak and Arlington New Reservoir all delayed by 1 year. This is considered a minor impact.

**Table 6: Test 3 results: Impact of 5% lower Property and Populations growth rate**

		2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
IMPACT	ADD Change(MI/d)	-0.3	-0.8	-1.3	-1.7	-2.2	-2.7
	DYCP Change (MI/d)	-0.3	-1.0	-1.7	-2.3	-2.9	-3.7

**Test 4: Sensitivity Test on New Property consumption**

Test Title: New Property Assumptions.

**Baseline condition:** Assumes new properties have a PCC that is about 20% below the average metered PCC.

**Test condition:** Assumes the difference between new properties and average metered PCC is about 15%. New properties PCC slightly higher, starting at 130 l/hd/d declining to 124.5 l/hd/d.

**Impact:** Results in table below. The impact naturally increases over the planning period with the growth in the number of new properties, rising from 0.4 to 1.8 MI/d on average and 2.4 MI/d on peak by 2040. This test has minimal impact on the plan, and only in the phasing of scheme timings at the end of the planning period.

**Table 7: Test 4 results: New Property Per Capita Consumption**

		2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
	Baseline New Props PCC (l/hd/d)	125.4	123.4	121.1	120.6	120.7	120.9
	Modified New Props PCC (l/hd/d)	130.0	127.6	124.9	124.4	124.3	124.5
IMPACT	ADD Change (MI/d)	+0.3	+0.7	+1.0	+1.2	+1.5	+1.8
	DYCP Change (MI/d)	+0.4	+0.9	+1.2	+1.6	+2.0	+2.4

#### Test 5: Sensitivity Test on Miscellaneous Use

**Test Title:** No reduction in Miscellaneous use for households.

**Baseline condition:** Assumes a continuous reduction in Miscellaneous use.

**Test condition:** Assumes no growth in the Miscellaneous use.

**Impact:** Results in table below. Average demand is higher by 16.6 MI/d by 2040 and 22.5 MI/d higher on peak compared with the Baseline. The impact on the major schemes in the company's Preferred Plan is that Aylesford Effluent Reuse, Broad Oak Reservoir and Arlington New Reservoir are brought forward by 2 years and an additional scheme is required at the end of the period. This is considered a significant impact.

**Table 8: Test 5 results: No reduction in Miscellaneous Use.**

		2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
IMPACT	ADD Change (MI/d)	+3.3	+7.8	+12.2	+13.6	+15.1	+16.6
	DYCP Change (MI/d)	+4.1	+9.8	+15.8	+17.9	+20.1	+22.5

#### Test 6: Sensitivity Test on External Use

**Test Title:** No increase in External Use for households.

**Baseline condition:** Assumes a continuous increase in External Use.

**Test condition:** Assumes no growth in the External Use.

**Impact:** Results in table below. Average demand is reduced by 6.6 MI/d by 2040 and 9.0 MI/d on peak compared with the Baseline. The impact on the major schemes in the company's Preferred

Plan is that Aylesford Effluent Reuse, Broad Oak Reservoir and Arlington New Reservoir are pushed back by 1 year. This is considered a minor impact.

**Table 9: Test 5 results: No increase in External Use.**

		2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
IMPACT	ADD Change (MI/d)	-0.6	-1.5	-2.6	-3.8	-5.2	-6.6
	DYCP Change (MI/d)	-0.8	-2.0	-3.4	-5.0	-6.9	-9.0

### Test 7: Sensitivity Test on the the Impact of Metering

Test Title: Impact of metering is less than Baseline.

Baseline condition: Assumes a reduction of between 20% to 15% from unmeasured PCC.

Test condition: Assumes a lesser reduction between 15% and 10%. The Universal Household PCC is therefore higher by between 9 and 8 l/hd/d, with PCC declining from 152.3 l/hd/d down to 147.8 l/hd/d by the end of the period. This compares with unmeasured PCC which declines from 178 l/hd/d down to 166 l/hd/d by the end of the period.

Impact: Results in table below. The impact of this higher PCC is that DYCP demand is higher by 8.3 MI/d by 2020 and 7.0 MI/d by 2040. The impact on the major schemes in the company's Preferred Plan is that Aylesford Effluent Reuse and Arlington New Reservoir are brought forward by 1 year. This is considered a minor impact.

**Table 10: Test 7 results: Reduced impact of universal metering**

		2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
	Baseline Univ PCC (l/hd/d)	143.4	145.4	143.7	142.8	141.7	141.0
	Modified Univ PCC (l/hd/d)	152.3	153.5	151.0	149.9	148.7	147.8
IMPACT	ADD Change(MI/d)	+2.9	+6.5	+5.8	+5.6	+5.4	+5.2
	DYCP Change (MI/d)	+3.6	+8.3	+7.5	+7.3	+7.2	+7.0

### Test 8: Sensitivity Test on the the Impact of Metering

Test Title: Impact of metering is greater than Baseline.

Baseline condition: Assumes a reduction of between 20% to 15% from unmeasured PCC.

Test condition: Assumes a greater reduction between 25% and 20%. The Universal Household PCC is reduced by between 9 and 8 l/hd/d, with PCC declining from 134.4 l/hd/d to 134.2 l/hd/d. This compares with unmeasured PCC which declines from 178 l/hd/d down to 166 l/hd/d by the end of the period.

Impact: Results in table below. The impact of this lower PCC is that DYCP demand is lower by 8.3 MI/d by 2020 and 7.0 MI/d by 2040. The impact on the major schemes in the company's Preferred Plan is that Arlington New Reservoir and Broad Oak Reservoir are delayed by 1 year, and Aylesford Effluent Reuse is pushed back by 2 year. This is considered a minor impact.



Table 11: Test 8 results: Greater impact of universal metering

		2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
	Baseline Univ PCC (l/hd/d)	143.4	145.4	143.7	142.8	141.7	141.0
	Modified Univ PCC (l/hd/d)	134.4	137.3	136.4	135.6	134.7	134.2
IMPACT	ADD Change(Ml/d)	-2.9	-6.5	-5.8	-5.6	-5.4	-5.2
	DYCP Change (Ml/d)	-3.6	-8.3	-7.5	-7.3	-7.2	-7.0

**Test 9: Sensitivity Test on the Household Peak Factor A**

Test Title: Household Peak Factor retained at start level.

Baseline condition: Assumes a continuous growth in the peak factor.

Test condition: Assumes no growth in the peak factor. The modified peak factor is retained at 1.25 across the period.

Impact: Results in table below. The impact is on only on DYCP demand which is lower by 5.8 Ml/d by 2020 and 34.3 Ml/d by 2040 compared with the Baseline. The impact on the major schemes in the company's Preferred Plan is that Aylesford Effluent Reuse is pushed back by 2 years and Broad Oak Reservoir is delayed by 4 years. Arlington New Reservoir is not required at all. This is considered a significant impact.

Table 12: Test 9 results: No growth in Household Peak Factor

		2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
	Baseline Peak Factor	1.250	1.269	1.289	1.309	1.329	1.349
	Modified Peak Factor	1.250	1.250	1.250	1.250	1.250	1.250
IMPACT	ADD Change (Ml/d)	0.0	0.0	0.0	0.0	0.0	0.0
	DYCP Change (Ml/d)	0.0	-5.8	-12.5	-19.3	-26.6	-34.3

**Test 10: Sensitivity Test on the Household Peak Factor B**

Test Title: Household Peak Factor retained at mid-range level.

Baseline condition: Assumes a continuous growth in the peak factor.

Test condition: Assumes no growth in the peak factor. The modified peak factor is retained at 1.289 across the period.

Impact: Results in table below. The impact is on only on DYCP demand which is higher by 6.1 Ml/d in 2020 but lower by 20.8 Ml/d in 2040 compared with the Baseline. The impact on the major schemes in the company's Preferred Plan is that Aylesford Effluent Reuse requirement is unchanged, and Broad Oak Reservoir is delayed by 2 years. More importantly, the company has a greater supply demand deficit in the early part of the plan which requires early delivery of some of the early schemes. This test is considered to have a moderate impact on the plan.

Table 13: Test 10 results: No growth in Household Peak Factor

		2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
	Baseline Peak Factor	1.250	1.269	1.289	1.309	1.329	1.349
	Modified Peak Factor	1.289	1.289	1.289	1.289	1.289	1.289
IMPACT	ADD Change (Ml/d)	0.0	0.0	0.0	0.0	0.0	0.0
	DYCP Change (Ml/d)	+8.2	+6.1	0.0	-6.6	-13.5	-20.8

In summary, we consider that there is sound evidence of increasing peak factors which is reasonably reflected in the approach adopted by the company. Furthermore, the company's approach which starts from a mid-range peak factor rather than the upper end of the historic factors can be considered conservative in terms of driving demands, particularly in comparison with other neighbouring companies.

### Test 11: Sensitivity Test on the Occupancy Rates

Test Title: Occupancy Rate Assumptions.

Baseline condition: Assumes difference occupancy rates for the various property groups. In particular, unmeasured Households are around 2.8 and measured households are around 2.4.

Test condition: Assumes similar occupancy rates for all property groups. Occupancy Rates all at around 2.5 declining to 2.4.

Impact: Results in table below. The impact is most marked in the early years, but it still less than 1% of demand. post 2020 the effect is negligible, mainly due to the fact that the majority of the company's customers are in metered properties. This test is considered to have no impact on the plan.

Table 14: Test 11 results: Sensitivity Test on Occupancy Rate Assumptions

		2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
	Baseline HHm O/R	2.360	2.460	2.453	2.439	2.423	2.407
	Baseline HHum O/R	2.800	2.700	2.600	2.508	2.456	2.418
	Modified HHm O/R	2.511	2.487	2.465	2.444	2.424	2.407
	Modified HHum O/R	2.523	2.496	2.474	2.453	2.434	2.418
IMPACT	ADD Change (Ml/d)	-5.2	-3.5	-0.7	-0.0	+0.1	+0.1
	DYCP Change (Ml/d)	-6.4	-4.4	-0.9	-0.1	+0.1	+0.2

### Test 12: Lower Outage

Test Title: Half PR09 Outage

Baseline condition: The WRMP14 outage has been developed using the most up-to-date information from the company's data systems. Average Outage 27.4 Ml/d, Peak Outage 36.7 Ml/d.

Test condition: Applies an outage figure which is mid way between the lower outage reported in PR09 and the current updated figure. Average Outage is 23.2 Ml/d, Peak Outage 28.6 Ml/d.

**Impact:** Results in table below. The impact is across the whole planning period and the changes to the major scheme timings are shown in the table. In general, the schemes are brought forward by 2 years which is a moderate change to the preferred scheme timings.

**Table 15: Test 12 Results:Sensitivity test using 1 in 100 year DOs**

Strategic Schemes	WRMP14	Test 12 Timing	Comment
Forest Row: Closing Gap	2018	2020	+2 years
Aylesford Effluent Reuse	2022	2024	+2 years
SWS Bulk Supply Matts Hill	2023	2025	+2 years
Peacehaven: Effluent Reuse	2027	2029	+2 years
Broad Oak: 32.5m, Option 1b	2033	2035	+2 years
Arlington New Reservoir	2036	2038	+2 years
Bray WTW extension	2020	2020	unchanged
Thames Bulk Transfer	2030	2029	+1 year
Reculver Desalination	not required	not required	

### Test 13: Sensitivity Test of 1 in 100 year Deployable Output

**Test Title:** 1 in 100 year DO

**Baseline condition:** The baseline DO is developed from a 1 in 50 year return period.

**Test condition:** Applies a 1 in 100 year return period, which is significantly more severe climatic event, to the calculation of DO.

**Impact:** The equivalent 1 in 100 year DOs are shown in Table 3 of Appendix 3. The reductions are 7.4 MI/d on average and 8.0 MI/d on peak. This has the impact of reducing the DO by this amount across the whole planning period with a reduction in the supply demand balance. This requires schemes to be brought forward by 1 to 2 years, as shown in the table, which is a minor change to the preferred scheme timings.

**Table 16: Test 13 Results:Sensitivity test using 1 in 100 year DOs**

Strategic Schemes	WRMP14	Test 13 Timing	Comment
Forest Row: Closing Gap	2018	2017	+1 years
Aylesford Effluent Reuse	2022	2021	+1 years
SWS Bulk Supply Matts Hill	2023	2021	+2 years
Peacehaven: Effluent Reuse	2027	2026	+1 years
Broad Oak: 32.5m, Option 1b	2033	2032	+1 years
Arlington New Reservoir	2036	2035	+1 years
Bray WTW extension	2020	2020	unchanged
Thames Bulk Transfer	2030	2029	+1 year
Reculver Desalination	not required	not required	

**Test 14: 70% Percentile Headroom**

Test Title: Raise the risk percentile for the target headroom by 5 percentile.

Baseline condition: The adopted risk level for target headroom is 65 percentile.

Test condition: Applies a 70 percentile level of risk for target headroom.

Impact: The details of the target headroom are included in Appendix 5. This test raises the target headroom by 3.1 MI/d on average in 2025 and 4.6 MI/d on average by 2040 as shown in the table below. This requires the bringing forward of a few schemes including Aylesford by 1 year. In AMP6 this may require additional leakage reduction to be brought forward if groundwater schemes cannot be delivered in time.

**Table 17: Test 14 Results: 70 Percentile Headroom**

		2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
	Baseline DYAA Headroom	13.7	26.8	34.1	42.1	50.1	58.9
	Baseline DYCP Headroom	15.9	33.4	43.6	54.7	66.0	75.7
	Modified DYAA Headroom	14.8	29.4	37.2	45.7	54.4	63.5
	Modified DYCP Headroom	17.2	37.1	48.2	59.1	71.1	81.9
IMPACT	ADD Change (MI/d)	1.1	2.6	3.1	3.6	4.3	4.6
	DYCP Change (MI/d)	1.3	3.7	4.6	4.4	5.1	6.2

**Test 15: 75% Percentile Headroom**

Test Title: Raise the risk percentile for the target headroom by 10 percentile.

Baseline condition: The adopted risk level for target headroom is 65 percentile.

Test condition: Applies a 75 percentile level of risk for target headroom.

Impact: The details of the target headroom are included in Appendix 5. This test raises the target headroom by 6.2 MI/d on average in 2025 and 9.4 MI/d on average by 2040 as shown in the table below. This requires the bringing forward of the majority of schemes including by 1 year. In AMP6 this may require additional leakage reduction to be brought forward if groundwater schemes cannot be delivered. It may also be necessary to develop a new transfer to allow spare water in WRZ7 to be transferred to WRZ2. This is considered to be a moderate change.

**Table 18: Test 15 Results: 75 Percentile Headroom**

		2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
	Baseline DYAA Headroom	13.7	26.8	34.1	42.1	50.1	58.9
	Baseline DYCP Headroom	15.9	33.4	43.6	54.7	66.0	75.7
	Modified DYAA Headroom	15.8	32.5	40.3	49.6	58.5	68.3
	Modified DYCP Headroom	18.4	41.4	53.1	64.1	77.1	88.3
IMPACT	ADD Change (MI/d)	2.1	5.7	6.2	7.4	8.4	9.4
	DYCP Change (MI/d)	2.5	8.1	9.5	9.3	11.1	12.6

**Test 16: 60% Percentile Headroom**

Test Title: Reduce the risk percentile for the target headroom by 5 percentile.

Baseline condition: The adopted risk level for target headroom is 65 percentile.

Test condition: Applies a 60 percentile level of risk for target headroom.

Impact: The details of the target headroom are included in Appendix 5. This test reduces the target headroom by 2.8 MI/d on average in 2025 and 4.1 MI/d on average by 2040 as shown in the table below. This majority of schemes can be delayed by 1 year and the Portsmouth transfer at the end of the planning period is not required. This is considered a minor change.

**Table 19: Test 16 Results: 60 Percentile Headroom**

		2014/15	2019/20	2024/25	2029/30	2034/35	2039/40
	Baseline DYAA Headroom	13.7	26.8	34.1	42.1	50.1	58.9
	Baseline DYCP Headroom	15.9	33.4	43.6	54.7	66.0	75.7
	Modified DYAA Headroom	12.6	23.9	31.2	39.1	46.8	54.8
	Modified DYCP Headroom	14.8	30.1	39.6	49.3	60.7	70.5
IMPACT	ADD Change (MI/d)	-1.1	-2.9	-2.8	-3.0	-3.3	-4.1
	DYCP Change (MI/d)	-1.1	-3.3	-3.9	-5.5	-5.2	-5.2

**Additional Sensitivity Testing carried out**

We produced a technical note on sensitivity testing in January 2014 and provided a copy to the Environment Agency, this is provided as Annex 3 to this Appendix. Further information on the sensitivity testing is also included in our Target Headroom report.

The technical note sets out the options we will employ, were it necessary, to manage any supply demand balance deficits identified by the two sensitivity stress tests.

Under the less severe of the two scenarios we will increase our leakage control efforts to reduce leakage temporarily. Whilst arguably not cost effective in the long term this approach would allow us to meet levels of service and maintain a positive supply demand balance.

Under the more severe of the two scenarios we can develop an additional transfer to allow water from an area of surplus to support the areas of deficit in addition to leakage reduction described above. This scheme could be comfortably delivered in less than three years and certainly in time maintain a positive supply demand balance.

We have committed to monitoring our position with regard to the two stress test scenarios via the annual review process, so we can demonstrate how we have maintained a positive supply demand balance position during AMP6 and delivered our planned levels of service to customers.

# Annex 3: Technical Response Sensitivity Testing and in particular the transfer from Bewl to Best Beech.

January 2014

This paper sets out SEW's answer to a post-Statement of Response query from the EA regarding some of the work we undertook on sensitivity analysis; and in particular the early start dates of the Bewl to Best Beech Scheme. A summary note was sent to the EA on the 29<sup>th</sup> December, and this note confirms our position.

In Appendix 9 of our rWRMP we have presented the results of our sensitivity analysis work. Two of the scenarios include the changes to our plan we would propose if risk increased DI (increasing Target Headroom from the 65<sup>th</sup>ile to the 70<sup>th</sup>ile and 75<sup>th</sup>ile – Scenarios 14 and 15).

As we have stated previously, in the event of an increase in DI in AMP6, as modelled in these two 'higher headroom' scenarios, we would introduce leakage reduction schemes initially. Our note to the EA set out the following response:-

*Scenarios 14 and 15 are the increases in demand from the increased target headroom calculations. The scenario data we presented in the rWRMP shows only the impacts at 2039/40. Below is a table summarising the impacts at 2019/20 and our proposed approach to addressing such deficits in the unlikely event they should occur. You will see that we believe we can use leakage schemes to mitigate most of the deficits, but in the 75<sup>th</sup>ile scenario it may be necessary to introduce a new transfer to allow spare capacity in WRZ7 to be transferred to WRZ2. The dossier reference for this option (Bewl to Best Beech) is SEW-CTR-RZ2-5112. It is on page 28 of the transfer dossier PDFs which we have provided.*

Scenario	Impact on SDB at 2019/20 (Ml/d)		Impact on Groundwater Sources	Alternative Options
	Peak	Average		
70 <sup>th</sup> %ile	3.7	2.6	Brought forward 1 year	<p>Leakage schemes could be implemented to reduce leakage.</p> <p>These could either be temporary changes (i.e. the introduction of more Active Leakage Control (ALC)) or bringing forward the schemes we propose between 2020 and 2030.</p> <p>Previously during droughts we have implemented leakage schemes (such as ALC) which can reduce leakage temporarily, though which may not be economic in the long term.</p>

				<p><i>The permanent leakage schemes in our plan (initially to be implemented between 2020 and 2025) will reduce leakage by 2.5MI/d. This reduction is based on an economic analysis. We could implement these schemes in AMP6. Other leakage schemes in our plan will reduce leakage by a further 2.1MI/d over the period (2025 to 2040). It may be possible to implement these schemes, but there is more risk associated with this.</i></p> <p><i>Overall we are confident that if it was necessary to meet the 70<sup>th</sup> %ile and groundwater options could not be advanced, then leakage options would be suitable alternative options.</i></p>
75 <sup>th</sup> %ile	8.1	5.7	Brought forward 1 year	<p><i>Leakage schemes could be implemented to reduce leakage as set out above however it is unlikely that leakage schemes to deliver the full 8.1MI/d could be implemented.</i></p> <p><i>In addition we may need to implement one of the transfers. This would be the Bewl to Best Beech transfer, (RZ7 to RZ2) which would allow utilisation of spare capacity in WRZ7 of approximately 5MI/d. This scheme does not require an HRA and has a construction period of 2 years. The pipeline length is 6.9Km. The dossier reference is SEW-CTR-RZ2-5112.</i></p>

Based on the table above we propose the following actions:-

In Table 9.12 of the rWRMP main document in the 2015 to 2020 period we will change the word 'retain' against the groundwater options to 'enhance leakage reduction and transfer more water from WRZ7 to WRZ2'.

We will update Appendix A Test 14 to "... by 1 year. In AMP6 this may require additional leakage reduction to be brought forward if groundwater schemes cannot be delivered in time."

We will update Appendix A Test 15 to "... by 1 year. In AMP6 this may require additional leakage reduction to be brought forward if groundwater schemes cannot be delivered. It may also be

*necessary to develop a new transfer to allow spare water in WRZ7 to be transferred to WRZ2. This is considered to be a moderate change.....”*

## Further Information

As stated in the table above, we believe that leakage schemes would play an important part of managing any supply demand imbalance in AMP6. This can mostly be met by temporary increases in Active leakage Control which, whilst expensive, can be used to reduce leakage for short periods. This is a tried and tested approach. We may also need to investigate bringing forward investment in our other leakage schemes, but this would require some feasibility studies to be undertaken.

The Bewl – Best Beech transfer is a 6.9km pipeline and associated assets. The dossier reports that (assuming the scheme does not require a public inquiry) the scheme would take up to three years to undertake feasibility studies and then a further three years for construction.

We have undertaken a review of the timing of this scheme with both the environmental team and engineering team at South East Water.

When we developed the dossiers we took a responsible and cautious approach to the lead in time for schemes. i.e. we built in more than sufficient time to give confidence of being able to manage any environmental issues if any arose and needed to be avoided. This was a standard approach and used across all our options.

The benefits of adopting this cautious approach is that when we look at individual schemes in more detail, we can see that we can deliver some of these schemes quicker than stated in the dossiers. In some cases we may need to re-route options or change our construction methods, but this is an example of a scheme which, now we have looked at it in more detail, we believe can be delivered quicker than stated in the dossiers, without further impacts on the environment. There may however be an additional cost as a result of bringing the scheme forward. A recent example of how this works in practice is the Friston/Folkington Main. This was an AMP5 scheme we proposed to deliver over a 2-3 years period, but in response to the pressures on the supply demand balance from the drought, we have constructed in approximately 1 year.

Having spoken to the Environment Team the main concern is on Registered Parks and Gardens. A way to mitigate the effects would be to directionally drill the pipeline through sensitive areas, rather than construct a trench. We may also be able to re-align the pipeline to reduce other impacts. Overall we are confident that, if necessary, a year to 18 months is a reasonable time for feasibility studies.

The engineering team have confirmed that once the scheme was approved, a realistic procurement, construction and commissioning period would be 18 months. The costs of the scheme may be increased compared to the costs in the dossier as a result, but the scheme would nevertheless be able to be built within 18 months from the completion of feasibility studies.

In total our review suggests that the scheme could be delivered comfortably in approximately 3 years. There may be opportunities to reduce this further, but would require further study. As a result the scheme could be constructed in AMP6 in the unlikely event that the need arise.



## Appendix 9B: Alternative Options and Triggers

### Background

In our dWRMP and WRMP we have presented a range of alternative options to our strategic schemes (see Table 9.12 of the WRMP).

We recognise that we need to ensure that if our preferred plan is not deliverable, (for instance because of environmental issues) we have alternative schemes which can be delivered in a timely manner to maintain levels of service.

The key is that when we plan and develop our preferred plan options we ensure there is sufficient time in the programme to deliver alternative options in the event that the preferred plan options cannot be developed.

This is particularly important for strategic and complex schemes which are inherently more 'risky' than smaller schemes, or those which have less social or environmental impact. Our approach is therefore focussed on strategic and groundwater schemes, but can also be applied to other schemes if necessary.

The approach is set out below.

### Strategic Options Preferred Plan and Alternative Plan

The strategic schemes are classed as those which have a yield of greater than 10MI/d and which our risk assessment says are likely to be the most complex to deliver. The list of strategic schemes and alternative options is identified in Section 9 of the WRMP and summarised below.

Period	Preferred Plan Strategic Option	Alternative Options
2021 to 2030	Aylesford Water Reuse	Transfer from RZ8 to be considered as part of East Kent Strategy /Medway Desalination/
		Additional leakage reduction could also contribute
2031 to 2040	Peacehaven Water Reuse	Extension to Arlington Reservoir
	Broad Oak Reservoir	North Kent Desalination, Plucks Gutter and/ or Transfer (with Southern Water/ Affinity Water) and/ or Weatherlees Water re-use.
	Extension to Arlington Reservoir	Bunded Reservoir on the River Ouse

### Strategic Options Triggers

For this initial phase of work we have identified a draft list of the key triggers for each Strategic Option. These are set out in the following Table.

It is important to recognise that this list of triggers will change as we consult with stakeholders and undertake our feasibility studies. Key stakeholders on these options will include Natural England, the EA, English Heritage, local planning authorities and communities.

## Strategic Scheme Triggers

Type of Assessment	Trigger	Outcome	Relevant Scheme and Trigger Date
<b>WFD Assessment/ water quality assessment</b>	Likelihood of non-temporary deterioration of WFD water body which cannot be avoided through mitigation or mitigating conditional use.	<ol style="list-style-type: none"> <li>1. Identify mitigation</li> <li>2. Assess effectiveness and cost</li> <li>3. Consult with EA and NE on mitigation</li> <li>4. Consider alternative scheme (s) and assess to same level</li> </ol>	<b>Aylesford - 2015 Peacehaven – 2018 Broad Oak - 2018 Arlington - 2018</b>
<b>Water Quality Assessment for reservoir</b>	Unable to avoid poor water quality which would affect viability of the scheme.	<ol style="list-style-type: none"> <li>1. Identify design approaches and mitigation</li> <li>2. Assess effectiveness and cost</li> <li>3. Consult with EA and NE on mitigation</li> <li>4. Consider alternative schemes</li> </ol>	<b>Broad Oak – 2018</b>
<b>HRA appropriate assessment</b>	Unable to avoid significant effect on Natura 2000 site.	<ol style="list-style-type: none"> <li>1. Mitigation considered as part of appropriate assessment alongside design development</li> <li>2. Liaise with Southern Water on design</li> <li>3. Consult with EA and NE</li> </ol>	<b>Aylesford 2015</b>
<b>National designations</b>	Significant permanent impact on nationally important designated landscape or cultural heritage site/feature which could not be mitigated through design	<ol style="list-style-type: none"> <li>1. Check any design changes and construction proposals do not cause significant conflict with nationally important sites e.g. SSSI on adjacent Arlington site or near to Broad Oak</li> <li>2. Consider design changes to avoid</li> <li>3. Consider alternative options to same level</li> </ol>	<b>Broad Oak - 2018 Arlington – 2018</b>

Type of Assessment	Trigger	Outcome	Relevant Scheme and Trigger Date
<b>Protected species surveys</b>	Significant impacts on protected species which cannot be adequately addressed through mitigation and licensing	<ol style="list-style-type: none"> <li>1. Identify mitigation /compensatory measures/licensing</li> <li>2. Assess effectiveness</li> <li>3. Consult with EA and NE on mitigation</li> <li>4. Consider alternative scheme (s) and assess to same level</li> </ol>	<b>Aylesford - 2016</b> <b>Peacehaven – 2018</b> <b>Broad Oak - 2018</b> <b>Arlington – 2018</b>
<b>Archaeological surveys and investigations</b>	Significant loss of nationally important archaeological remains which English Heritage advise cannot be satisfactorily addressed through adequate investigation and recording.	<ol style="list-style-type: none"> <li>1. Identify investigation required</li> <li>2. Consult with county archaeologist and English Heritage</li> <li>3. Consider mitigation such as design changes to avoid</li> <li>4. Consider alternative options to same level.</li> </ol>	<b>Aylesford - 2015</b> <b>Peacehaven – 2018</b> <b>Broad Oak – 2018</b> <b>Arlington - 2018</b>
<b>Public Health</b>	Risk to public health – e.g. treatment options for water reuse schemes will need to demonstrate sufficient safeguards for water quality and meet DWI requirements.	<ol style="list-style-type: none"> <li>1. Identify mitigation along with option design</li> <li>2. Assess effectiveness and cost</li> <li>3. Consult with DWI and EA and on mitigation</li> <li>4. Consider alternative scheme (s) and assess to same level</li> </ol>	<b>Aylesford - 2016</b> <b>Peacehaven - 2018</b>
<b>Land ownership</b>	Land owner not willing to negotiate reasonable terms and timescale	<ol style="list-style-type: none"> <li>1. Identify scope for negotiation</li> <li>2. Assess impact on cost/timescale/deliverability.</li> </ol>	<b>Arlington - 2018</b>
<b>Local Authority and Public objections</b>	Major objections to the scheme which cannot be addressed by consultation	<ol style="list-style-type: none"> <li>1. Proactive consultation</li> <li>2. Identify and address concerns</li> <li>3. Consult with Local Authority and local community</li> <li>4. Consider alternatives where deliverability of option affected</li> </ol>	<b>Aylesford - 2016</b> <b>Peacehaven 2018</b> <b>Broad Oak – 2018</b> <b>Arlington - 2018</b>
<b>Geological survey</b>	Technically unfeasible due to unforeseen ground conditions	<ol style="list-style-type: none"> <li>1. Identify mitigation</li> <li>2. Assess effectiveness and cost and safety</li> <li>3. Consult on mitigation</li> <li>4. Consider alternative scheme (s) and assess to same level</li> </ol>	<b>Arlington -2018</b> <b>Broad Oak - 2018</b>

## Groundwater Options Triggers

There are five groundwater options in the Preferred Plan (Cowbeech, Boxall's Lane, Forest Row, Coggins Mill and Maytham Farm).

The preferred plan options were assessed as low to medium risk in terms of impacts on water body status or impacts on adjacent habitats or archaeological deposits. However the WFD assessment highlighted that there is still some uncertainty over the actual effects which will not be possible to determine further without investigation or monitoring. These options will be assessed further over the next AMP cycle to ensure that if WFD deterioration or change of water body status other significant environmental impacts cannot be avoided there is sufficient time to investigate the suitability of alternative groundwater or other options.

Type of Assessment	Trigger	Outcome	Relevance and Trigger Date
<b>WFD Assessment covering surface water and groundwater status</b>	Likelihood of non-temporary deterioration of WFD water body which cannot be avoided through mitigation or mitigating conditional use.	<ol style="list-style-type: none"> <li>1. Investigation or monitoring indicates likely deterioration of water body status</li> <li>2. Consider scope for mitigation e.g. in terms of borehole location of operational restrictions, or catchment management</li> <li>3. Consult with EA</li> <li>4. Consider effectiveness and feasibility of mitigation</li> <li>5. Bring forward alternative options and assess to same level where relevant.</li> </ol>	Boxall's Lane -2015 Cowbeech - 2015 Coggins Mill - 2017 Forest Row - 2016 Maytham Farm - 2017
<b>Designated areas and Priority Habitats</b>	Likely hood of significant impact on designated sites – where potential pathway exists	<ol style="list-style-type: none"> <li>1. Investigation or monitoring indicates likely significant deterioration in status</li> <li>2. Consider scope for mitigation e.g. in terms of borehole location of operational restrictions, or catchment management , or compensatory measures</li> <li>3. Consult with EA &amp; NE</li> <li>4. Consider effectiveness and feasibility of mitigation</li> <li>5. Bring forward alternative options and assess to same level where relevant</li> </ol>	Cowbeech – 2015 (unconfined aquifer) Coggins Mill 2017 (unconfined aquifer) Forest Row - 2016 (Locally confined)
<b>Archaeological deposits</b>	Likelihood of loss of archaeological deposits due to water table draw down	<ol style="list-style-type: none"> <li>1. Consult and identify potential for archaeological deposits that could be affected - with County Archaeologist</li> <li>2. Consider mitigation and severity of effects,</li> <li>3. Bring forward alternative options and assess to same level where relevant</li> </ol>	Cowbeech -2015 (unconfined aquifer) Coggins Mill - 2017 (unconfined aquifer) Forest Row -2016 (Locally confined)

## Planning for the Preferred Options and Alternatives

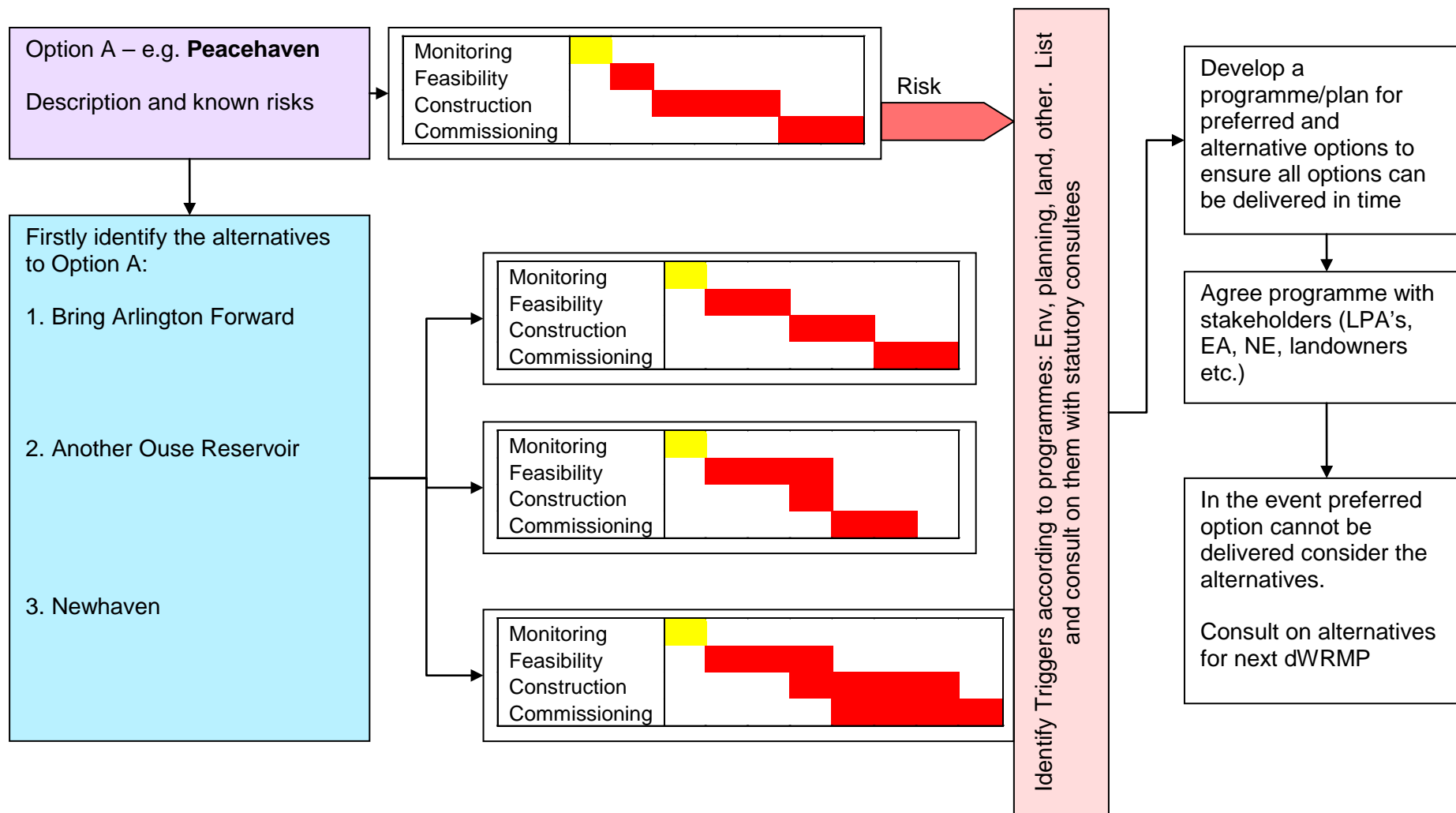
Once the list of triggers is fully developed we will develop a set of plans which will inform our development programmes for the strategic schemes and groundwater options.

The approach we are proposing is set out in the diagram on the following page where initially we list the preferred options and the alternative options. These are the boxes on the left of the diagram.

Then we identify a programme for the preferred plan options and the alternative schemes as shown in the next boxes on the diagram. This programme will be refined to ensure that the alternative options can be delivered in time to ensure the supply demand balance is maintained in the event if the preferred scheme is not feasible.

Once the programme is developed we will re-evaluate our triggers on a continual basis along with key stakeholders. This is shown as the vertical box on the diagram and, as discussed above, we have identified a draft list of triggers already, but these would need to be refined for each strategic option.

Depending on the outcome of the work we will either develop the preferred option or an alternative option.



## Appendix 9C: Our AMP6 National Environment Programme (NEP)

### Introduction

The National Environment Programme (NEP) is a statutory driven programme developed by the Environment Agency and Natural England. The programme is driven, in the main, by European Directives and once finalised is signed off by DEFRA. Once signed off, the programme becomes a statutory programme with measurable outputs and it is this programme that contributes to us achieving some of our statutory environmental objectives.

In tandem with NEP development, Defra produced a 'Statement of Obligations for Water/Sewage Undertakers and Regulators'. This describes the Government's understanding of the main environmental statutory obligations that apply to water undertakers over the Price Review 2015-2020. This covered both domestic and legislation requirements of European Directives. It is this document that provides a reference to how the statutory NEP programme should be delivered and funded in AMP6 (period 2015 to 2020).

### AMP5 NEP

In AMP5 (period 2010 to 2015) South East Water was funded to undertake six environmental schemes. All of these schemes were related to the potential environmental impact of abstraction on water dependent habitats. A summary of the individual schemes, their purpose and outcomes are included in the table below:

**Table 1. Schemes included in Amp5 National Environmental Programme.**

NEP Scheme	Abstraction Licences Affected	Purpose of Study	Outcome of Study	Final Position
Greywell	Greywell	Investigate impact of abstraction on river Whitewater and Greywell Fen SSSI (scheme carried over from AMP4).	Abstraction unsustainable due to impact on SSSI.	Source substituted via WRMP, move to close 2020-2025.
Poynings	Poynings	Investigation/options appraisal of impact on abstraction on Poynings chalk stream & neighbouring SSSI.	Abstraction sustainable at current abstraction level.	Continued monitoring in AMP6 NEP to demonstrate sustainability.
Maidenhead Ditch	Cookham College Avenue	Investigation of impact of abstraction on the Maidenhead Ditch	Link between abstraction and ditch draw down.	Included in AMP6 as options appraisal.
Farnham Bourne	The Bourne Boxhalls Lane Tongham	Investigation of impact of abstraction on the Farnham Bourne (ecology showing flow stress).	Abstraction sustainable.	No further action required.
Bourne & Leybourne	Trosley Group licence	Investigation of impact of abstraction on the Bourne and Leybourne streams.	Abstraction sustainable.	No further action required.
Little Stour	Kingston	Joint options appraisal with Southern Water and Affinity looking at impact of joint abstraction on the Little Stour	Link between abstraction and reduced flows in river.	No further action required.

## AMP5 NEP Outcomes

The investigations have concluded that our abstraction at Greywell is environmentally damaging (on designated SSSI features) and that abstraction should cease at the source when this does not present an undue risk to security of supply. This will be delivered through the Water Resource Management Planning Process (WRMP) and require a new source development and/or network improvements, (incorporated into the draft WRMP). The current aim is to move the source output of 6.82Ml/d away from the Greywell site in the period 2020-2025.

Investigations at Poynings and on the Maidenhead Ditch have demonstrated that abstraction is creating a degree of surface water impact. At this stage options are available to offset this impact and as a result, these schemes will carry over into AMP6 (period 2015 to 2020) as Options Appraisals and are included in the AMP6 NEP.

The Trosley Group abstraction licence (Leybourne and Bourne scheme), and licences at The Bourne, Boxalls Lane and Tongham (Farnham Bourne scheme) have been found to be environmentally sustainable at current conditions and levels of output.

The Farnham Bourne suite of abstraction investigations were signed off as complete by the Environment Agency in the autumn of 2011. The study found that the Farnham Bourne geomorphology appeared to be unaffected by South East Water abstractions and was more significantly impacted by urban development (Jacobs, Farnham Bourne, Phase 1 inception report, 2011).

The Trosley Group of abstractions were found to be sustainable and were not impacting the flows or aquatic ecology of the Bourne and Leybourne Steams under the current climatic conditions (Jacobs Leybourne and Bourne, phase 2 report, April 2012).

The Little Stour scheme was approached slightly differently with Southern Water taking a lead role in the investigations. The final conclusions drawn from the investigation have resulted in our output at Kingston not requiring sustainability reductions to be applied.

## AMP6 NEP

This section summarises our NEP based on data provided to us by the Environment Agency.

The AMP6 National Environment Programme differs to AMP5 because it has both water quality and abstraction investigation elements to it. The Government has adopted an integrated approach to meeting the requirements of the Water Framework Directive (WFD) and achieving the strategic objectives set out in the *'Natural Choice and Water for Life.'* This focusses on a joined-up approach to achieving environmental and drinking water quality goals as well as ensuring that all requirements, strategies and programmes contribute towards compliance with related Directives.

In March 2011 the Government announced a new catchment-based approach to managing the water environment, building on the River Basin Management Planning approach established under WFD. The key issues that arise from this are that there has to be a joined up approach (water operators have a part to play in the delivery of WFD). Through our work measures have to be taken to ensure water bodies achieve 'good-status' and all future projects and current operational activities must ensure 'no deterioration' of water bodies (in WFD terms).



The inclusion of a new statutory requirement in WFD to prevent deterioration is one which will have a potential impact on new source development (even if sources are developed within the headroom of current abstraction licences). As a statutory requirement, WFD No Deterioration schemes are not subject to assessment of affordability. Water bodies are not permitted to deteriorate from the baseline status reported in the first River Basin Management Plans published in December 2009.

River Basin Management Plans set out an objective for each water body and summarise programmes of measures which will be implemented to achieve this. The second iteration of this, River Basins Two, is currently undergoing public consultation. River Basins Two will provide a list of specific measures to ensure that Government reaches or steps towards WFD good status. Current guidance has indicated that it is expected that a number of these programmes of measures will be delivered and funded by water undertakers via NEP.

**NEP Version 5** covers this programme of measures – **released by the Environment Agency to us in January 2014**. At this stage we have included catchment management investigations as outlined in **NEP Version 3** in our rWRMP14. We believe these investigations go a long way to satisfactorily covering off new requirements that might be included in **NEP Version 5**. We have based this view on no programmes of Significant Water Management Issues (for which we might be responsible for delivering) having been flagged with us during our liaison with the Environment Agency.

Other elements of our AMP6 NEP are supported by other legal drivers, these include:

- Countryside and Rights of Way (CROW ) Act;
- Biodiversity 2020, the NERC Act and policy objectives.
- The Eel Directive, 2009.

#### List of AMP6 NEP schemes

For ease of understanding we have divided our AMP6 NEP into various ‘topics’, these being: catchment management; flow; biodiversity; and, restoring sustainable abstractions (RSA).

The programme comprises the following list of schemes:

- **6 surface water catchment management and metaldehyde control schemes** on the rivers Ouse, Cuckmere, Wallers Haven, Thames, Eastern Rother and Medway.
- **8 catchment management investigation schemes on groundwater catchments** covering our abstractions at Hartlake, Pembury Springs, Tonbridge, Boxalls Lane, Woodgarston, College Avenue, Borough Green and Beenhams Heath.
- **11 flow schemes relating to flows from our discharges**, all 11 sites will require installation of an MCERTS accredited flow monitor.
- **6 Eel Screens and 1 elver ladder** (covering our abstractions at Ardingly, Barcombe, Arlington, Hazards Green, Bray and Crowhurst Bridge.
- **1 biodiversity scheme for chalk grassland, (within the South Downs National Park).**

➤ **8 Restoring Sustainable Abstraction (RSA) / Water Framework Directive (WFD) programmes.**

- 3 Water Framework Directive abstraction investigations/options appraisals covering our abstractions on the Stour, Greatham, Itchel and Lasham;
- 2 monitoring programmes which are continued schemes from AMP5. These will cover our abstractions at Poynings and Greywell;
- 1 option appraisal on the Maidenhead Ditch, covering our abstractions at Cookham and College Avenue.
- 2 abstraction optimisation studies working jointly with neighbouring water companies.

The funding required to deliver the AMP6 NEP has been included in our Business Plan submitted to the economic regulator, Ofwat.

## Appendix 9D: Other water company correspondence

### Introduction

The purpose of this Appendix is to provide detail of the further discussions we have held with water companies, post the publication of our respective dWRMP14s, concerning consistency of timing and volume assumptions included in dWRMP14s for shared resources and transfers.

The commentary below sets out the information we have agreed with other water companies to be reflected in updates to our respective dWRMP14s, and included in our respective Statement of Response's.

### Thames Water

We have worked with Thames Water to ensure that our WRMP14s are consistent. We are pleased to confirm that Thames Water has verified that the proposed transfer from Windsor to Surrey Hills, which was included in our dWRMP14, is available as a bulk import and is included in their updates to their dWRMP14. Our plan includes the scheme to be constructed between 2030 and 2035 at provide a yield of up to 10MI/d.

In AMP6 and AMP7 we will continue work with stakeholders to review the service reservoir extension at Surrey Hills proposed for this scheme and alternative storage options associated with this scheme and we will agree allocation of costs with Thames Water.

### Portsmouth Water

In our dWRMP14 we requested a 10MI/d transfer from Portsmouth Water from 2037. In our rWRMP14 we require a 10 MI/d Peak only transfer from Portsmouth Water from 2040 instead.

Portsmouth Water has confirmed this change is acceptable to it, and our respective updates to our dWRMP14s have been amended accordingly. Both water companies have agreed to work together to confirm the details of this new bulk supply during AMP6 (period 2015 to 2020).

### Sutton and East Surrey Water

Since the publication of our dWRMP14 we have consulted with Sutton and East Surrey Water on the two proposed transfers between the companies. Sutton and East Surrey Water has confirmed that it has included the same options as ourselves within its modelling and allowed for the equivalent export volumes within its own plan. It has also provided us with water quality information so we can ensure that the concentration of Metaldehyde (and other possible contaminants) is acceptable.

Our Plans assume that we will pay the capital and maintenance costs of the two transfers, and that Sutton and East Surrey Water will make a volumetric and standing charge based on their large user tariffs.

The final agreement will of course be subject to negotiation as the schemes are progressed. We will continue to work with Sutton and East Surrey Water during AMP6 (period 2015 to 2020) to ensure progress with the delivery of the schemes and agree contractual matters.

## Southern Water

We have agreed with Southern Water the following text to be reflected in our respective WRMP14s.

### River Medway Scheme

#### Text that will go in our plan

Since our dWRMP14 was published we have consulted with Southern Water on the yield of the River Medway Scheme. In our dWRMP14 we committed between 2015 and 2020 to incorporate 25% of the DO of the RMS that Southern Water calculated for WRMP09 (i.e. our volume in a dry year would be 16.4MI/d). For their dWRMP14 Southern Water has undertaken more work and our entitlement of the dry year yield has been reduced to 10.7MI/d. We have agreed this change and included the further reductions in our rWRMP14, but not until the 2020 to 2025 period. This is to allow time for alternative supplies to meet the shortfall created by this reduction to be developed. We acknowledge that further work needs to be done to understand the yield of the scheme in the summer peak period.

During AMP5 (period 2010 to 2015) Southern Water has progressed a licence variation to the River Medway Scheme that will increase the yield of the scheme by 5 MI/d in 2016. Following agreement of our financial contribution to the scheme South East Water will be entitled to 25% of the additional yield i.e. 1.25 MI/d on average and 1.6 MI/d during summer peak periods. This additional yield has been included in our rWRMP14.

#### Text to go in SWS's Plan

Since our dWRMP14 was published we have consulted with South East Water on the yield of the River Medway Scheme. In its dWRMP14 South East Water committed between 2015 and 2020 to incorporate 25% of the DO of the RMS that Southern Water calculated for WRMP09 (i.e. our volume in a dry year would be 16.4MI/d). For its dWRMP14 Southern Water has undertaken more work and our entitlement of the dry year yield has been reduced to 10.7MI/d. South East Water has agreed this change and included the further reductions in our rWRMP14, but not until the 2020 to 2025 period. This is to allow it time for alternative supplies to meet the shortfall created by this reduction to be developed. We acknowledge that further work needs to be done to understand the yield of the scheme in the summer peak period.

During AMP5 (period 2010 to 2015) Southern Water has progressed a licence variation to the River Medway Scheme that will increase the yield of the scheme by 5 MI/d in 2016. Following agreement of South East Water's financial contribution to the scheme South East Water will be entitled to 25% of the additional yield i.e. 1.25 MI/d on average and 1.6 MI/d during summer peak periods. This additional yield has been included in South East Water's rWRMP14.

## Aylesford water re-use scheme

### Text to go in SEW's Plan

We consulted with Southern Water and agreed Southern Water will investigate the development of the Aylesford water re-use scheme during 2015 to 2020. This investigation will include an outline design for the proposed scheme, and will be worked on by both companies, with Southern Water taking the lead role.

In our dWRMP14 we included a jointly developed and utilised scheme with Southern Water, to take the tertiary treated water from the Aylesford wastewater treatment works and treat for potable supply. South East Water requires a yield from the scheme of 12.5 Ml/d in 2023.

The key elements of the joint scheme are: constructing a new pipeline and pumping facility to take tertiary treated water away from Aylesford wastewater treatment work to discharge on the River Medway at a point upstream of the existing Southern Water Springfield river abstraction point; re-abstracting the water at Springfield; treating the water to potable supply standard using existing treatment capacity at the Southern Water treatment works; input of potable water to South East Water's water supply distribution system. At this stage we have not ruled out the potential need for further Reverse Osmosis treatment after tertiary treatment, and this has been factored into South East Water's scheme costs.

Southern Water is still undecided about when it requires the Aylesford water re-use scheme, and is considering a potential alternative licence trading scheme that could come forward in its plans ahead of the Aylesford water re-use scheme.

Southern Water has advised us to assume any tertiary treated water it receives as part of the Aylesford scheme will be provided under a raw water bulk supply type agreement. We have agreed with Southern Water during AMP6 (period 2015 to 2020) to continue with feasibility studies and planning to develop the Aylesford wastewater treatment works option. With each company paying a contribution to the joint elements of the final scheme dependent on utilisation rates. If Southern Water decides not to promote the Aylesford water re-use scheme in the future, in preference to alternative options, we might consider developing the joint elements of the Aylesford water re-use scheme independently of Southern Water.

### Text to go in SWS Plan

We consulted with South East Water and agreed Southern Water will investigate the development of the Aylesford water re-use scheme during 2015 to 2020. This investigation will include an outline design for the proposed scheme, and will be worked on by both companies, with Southern Water taking the lead role.

In its dWRMP14 South East Water included a jointly developed and utilised scheme with Southern Water, to take the tertiary treated water from the Aylesford wastewater treatment works and treat for potable supply. South East Water requires a yield from the scheme of 12.5 Ml/d in 2023.

The key elements of the joint scheme are: constructing a new pipeline and pumping facility to take tertiary treated water away from Aylesford wastewater treatment work to discharge on the River Medway at a point upstream of the existing Southern Water Springfield river abstraction point; re-abstracting the water at Springfield; treating the water to potable supply standard using existing treatment capacity at the Southern Water treatment works; input of potable water to South East

Water's water supply distribution system. At this stage we have not ruled out the potential need for further Reverse Osmosis treatment after tertiary treatment, and this has been factored into South East Water's scheme costs.

Southern Water is still undecided about when it requires the Aylesford water re-use scheme, and is considering a potential alternative licence trading scheme that could come forward in its plans ahead of the Aylesford water re-use scheme.

Southern Water has advised South East Water to assume any tertiary treated water it receives as part of the Aylesford scheme will be provided under a raw water bulk supply type agreement. South East Water has agreed with Southern Water during AMP6 (period 2015 to 2020) to continue with feasibility studies and planning to develop the Aylesford wastewater treatment works option. With each company paying a contribution to the joint elements of the final scheme dependent on utilisation rates. If Southern Water decides not to promote the Aylesford water re-use scheme in the future, in preference to alternative options, South East Water might consider developing the joint elements of the Aylesford water re-use scheme independently of Southern Water.

### **Possible benefits of considering future inter-connectivity between South East Water and Southern Water near the Sussex coast**

Our list of feasible options included bi-directional transfers (TR-62/62a) between Swan Service Reservoir in Southern Water's Sussex Coast zone and Barcombe Service Reservoir in SEW RZ2. These options were not selected in the WRSE Phase 2B modelling runs. They were excluded from our list of modelled options from which the preferred plan for dWRMP14 was selected as Southern Water indicated that the water was unlikely to be available to us.

It is our intention to review these options with Southern Water for potential inclusion in the feasible options list for consideration when preparing our next dWRMP to be completed by 2019.

### Proposed Text for both water companies' WRMPs

Discussions between Southern Water and South East Water have explored transfers in Sussex between the two companies. Work has shown that in AMP6 (period 2015 to 2020) no new transfers are required, but both companies are committed to reviewing these options during AMP7 through the WRSE group or jointly as part of on-going studies. We note that these options were included in the WRSE work, and rarely selected, but we will work together to review the potential for them in the future.

### **Peacehaven water re-use scheme**

We have agreed joint wording with Southern Water and this is included in Section 9 of the rWRMP14. This is set out below.

### Text to go in SEW's Plan

The Peacehaven preferred water re-use option comprises a transfer pipeline from Southern Water's Peacehaven WwTW, expected to be operational during 2013, to Newhaven WwTW, where a new tertiary treatment plant would be required. The combined treated effluent would then be transferred inland for release into the River Ouse and abstraction at one of our water treatment works in water resource zone 2. Southern Water has confirmed it supports our proposals for the treatment of effluent supplied from Peacehaven Wastewater Treatment Works. Southern Water

has confirmed it has no plans to utilise this water at Peacehaven. We have agreed to work with Southern Water in AMP6 (period 2015 to 2020) to complete further feasibility studies.

The scheme as proposed at this stage will deliver up to 25 Ml/d, and is required by 2027.

Text to go into SWS's Plan

The Peacehaven preferred water re-use option comprises a transfer pipeline from Southern Water's Peacehaven WwTW, expected to be operational during 2013, to Newhaven WwTW, where a new tertiary treatment plant would be required. The combined treated effluent would then be transferred inland for release into the River Ouse and abstraction at one of South East Water's water treatment works in water resource zone 2. Southern Water has confirmed it supports our proposals for the treatment of effluent supplied from Peacehaven Wastewater Treatment Works. Southern Water has confirmed it has no plans to utilise this water at Peacehaven. South East Water has agreed to work with Southern Water in AMP6 (period 2015 to 2020) to complete further feasibility studies.

The scheme as proposed at this stage will deliver up to 25 Ml/d, and is required by 2027.