Southern Water

Ensuring water for life

IAP Technical Annex 7

Aligning risk and return

1. SRN.RR.A1

Ofwat action	How we have responded
The company targeted a credit rating for the notional company with that is one notch above a minimum investment grade and lower than the target for its actual structure. The company should provide evidence to support its view that this is reasonable for the long term financeability of the notional company or actions that could be taken to secure the long term financeability of the notional company.	Further information provided

Our detailed response

Our notional credit rating at Business Plan submission of Baa2 was a function of the allowed WACC and our interpretation of credit rating metrics based on anticipated "real world" adjustments to excess fast money. Typically credit rating agencies exclude the impacts of accelerated cashflows from the calculation of key coverage metrics such as AICR, as in rating agencies' view these adjustments to not enhance resilience on a sustainable basis and can reduce comparability of metrics across the sector.

For the purposes of our base case financeability in the September 2018 business plan we assessed the financeability of the notional structure based on standard assumptions that relate to the notional capital structure e.g. dividend yield less than 5%, opening balance sheet (67% fixed rate debt, 33% index-linked debt), Cost of Debt (4.36% nominal consistent with Ofwat's early view of the WACC), treatment of post-financeability adjustments (excluded from financial projections under the notional structure), and on a basis consistent with the assessment of the actual structure using prevailing credit rating methodologies.

We have reviewed Ofwat's IAP Technical Appendix 3, which sets out how companies sought to address financeability constraints under the notional structure in the context of falling regulatory returns through adjustments to regulatory levers and assumptions. Ofwat highlights that the following could be used to ensure the financeability of the notional capital structure:

- Use of RCV run off and PAYG levers;
- Type of debt (e.g. proportion of index-linked debt)
- Restriction of dividends; and
- Equity injection.

Specifically, Ofwat states:

"We noted that as the real cost of capital has fallen in successive price reviews, companies receive a smaller portion of their return through in-period revenues and a larger proportion from indexation of the RCV, meaning lower cash flows and potentially weaker financeability metrics…

Four companies have used PAYG or RCV run-off to address a notional financeability constraint. A number of companies note that this may not necessarily be effective due to certain of the credit rating agencies reversing the effects of advancing revenue in calculating the financial ratios. However, as we do not target a specific credit rating agency or specific financial ratios for the notional company, we maintain that the use of PAYG or RCV run-off may be an appropriate mechanism where it does not have a material impact on financial resilience over the longer term and there is sufficient evidence of customer support. We consider the use of PAYG or RCV run-off to address a financeability constraint to be preferable to increasing the cost of equity above the level expected by market participants for the period of the price control. The PR19

methodology also discusses other options that companies could adopt, which include reduced dividends or equity injections."

Having re-visited notional financeability post IAP revisions we would conclude that our notional structure is financeable against a target credit rating of Baa1 if we take into account the difference between our proposed PAYG rates and "accounting natural rates" in our interest coverage metrics (AICR) to address financeability constraints. Whilst not adjusting for excess fast money is a departure from rating agency methodologies we note that it is consistent with Ofwat's view that *as financeability constraints are driven by the cash flow effect of a real return on an inflating regulatory capital value it may be reasonable for companies to make some use of PAYG or RCV run-off to address issues around notional financeability.*

On this basis our ratios would be as follows:

RR.A1.Table 1 – Unadjusted Financial ratios

	PR19 average – adjusting for excess fast money	PR19 average – not adjusting for excess fast money
AICR	1.35x	1.95x
Category sub-rating	Ba	Baa
Gearing (Net debt/RCV) (%)	61.3	61.3%
Category sub-rating	Baa	Baa
FFO/Net Debt (%)	11.2%	11.2
Category sub-rating	Baa	Baa
RCF/Net Debt (%)	10.3	10.3
Category sub-rating	A	A

Applying Moody's rating methodology this would increase our achieved credit rating from Baa2 to Baa1, driven by the improvement in Adjusted Interest Coverage where this metric is not adjusted for excess fast money.

RR.A1.Table 2 – Application of Moody's rating methodology

Criteria	Weighting (%)	PR19 average – adjusting for excess fast money	PR19 average – not adjusting for excess fast money
Business profile			
Stability and Predictability of Regulatory Environment	15	Aa	Aa
Asset ownership model	5	Aa	Aa
Cost and Investment Recovery (Sufficiency & Timeliness)	15	A	A
Revenue risk	5	A	A
Scale and complexity of capital programme	10	Baa	Baa
Subtotal	**50**		
Financial policy			
Financial policy	**10**	Ba	Ba
Leverage and coverage			
Adjusted Interest Coverage OR FFO Interest Coverage	12.5	Ba	Baa
Net Debt / Regulated Asset Base OR Debt/Capitalisation	10.0	Baa	Baa
FFO/Net Debt	12.5	Baa	Baa
RCF/Net Debt	5	A	A
Subtotal	**40**		
		Baa2	Baa1

On this basis, we can submit a notional capital structure consistent with a Baa1 credit rating and supports the long term financeability of the notional company.

2.SRN.RR.A2

Ofwat action	How we have responded
The company should provide further evidence to support the calculation of PAYG rates and demonstrate that the rates are consistent with the approach set out in the business plan.	Further information provided

Our detailed response

Each individual investment area comprising the Wholesale Totex plan has been reviewed to determine whether the nature of the expenditure should be treated as Fast Money (PAYG) or Slow Money. In making this judgement, we adopted the principle that we would treat as PAYG the expenditure required to maintain operating capability of the business. Conversely, we would treat as Slow Money an enhancement to the asset base for the benefit of future customers.

This has resulted in an allocation of expenditure to PAYG which is greater than that implied by the level of operating costs.

The table below summarises the position for each price control (using weighted average values for each price control from the analysis in Table 2). The total proportion of wholesale expenditure allocated to PAYG is 48.8%.

RR.A2.Table 1 – Wholesale Totex gross of grants & contributions

	Water Resources	Water Networks +	Water Networks +	Bio Resources	Total
Opex (%)	67.5	41.4	32.8	49.9	**37.7**
PAYG (%)	70.7	43.9	48.1	65.3	**48.8**
Variance (%)	3.2	2.4	15.3	15.4	**11.1**
Variance (£m)	3.9	23.8	309.9	31.2	**368.8**

The allocation of investment area expenditure for PAYG is greater than operating costs where we have included expenditure required to maintain operating capability of the business rather than an enhancement to the asset base for the benefit of future customers. These additional areas are summarised below:

- Reactive renewals expenditure has been allocated to PAYG, as this is considered to be a level of expenditure required to maintain operating capability of the business rather than an enhancement to the asset base for the benefit of future customers.
- IT expenditure which relates to maintaining corporate systems has been allocated to PAYG, as this is considered to be a level of expenditure required to maintain operating capability of the business.
- Expenditure relating to studies, investigations, and inspections have been allocated to PAYG where they do not specifically relate to the location and construction of a new project. This treatment best reflects the regulatory financial model where these investment areas are capitalised for accounting purposes and subsequently written-off to depreciation where the expenditure does not specifically relate to a new project.

The tables below illustrate the position for each price control.

RR.A2 Table 2 – Water Resources PAYG

Water Resources	2020/21	2021/22	2022/23	2023/24	2024/25	Total
Opex (£m)	16.899	16.698	16.573	16.387	16.138	**82.695**
Capex (gross) (£m)	9.955	8.804	7.390	7.804	7.978	**41.931**
Grants & conts (£m)	0.778	0.497	0.372	0.364	0.152	**2.163**
Totex (£m)	26.076	25.005	23.591	23.827	23.964	**122.463**
Fast Money	17.539	17.656	17.014	17.072	17.336	**86.616**
Slow Money	8.537	7.349	6.577	6.755	6.628	**35.847**
Opex (%)	64.8	66.8	70.3	68.8	67.3	**67.5**
PAYG (%)	67.3	70.6	72.1	71.7	72.3	**70.7**

RR.A2 Table 3 – Water Networks+ PAYG

Water Networks +	2020/21	2021/22	2022/23	2023/24	2024/25	Total
Opex (£m)	82.633	81.031	79.940	80.229	78.498	**402.331**
Capex (gross) (£m)	147.099	152.672	136.890	116.520	132.667	**685.848**
Grants & conts (£m)	21.713	23.638	25.786	23.777	22.559	**117.473**
Totex (£m)	208.019	210.065	191.044	172.972	188.606	**970.706**
Fast Money	92.922	87.072	82.149	81.297	82.647	**426.087**
Slow Money	115.097	122.993	108.895	91.675	105.959	**544.619**
Opex (%)	39.7	38.6	41.8	46.4	41.6	**41.4**
PAYG (%)	44.7	41.5	43.0	47.0	43.8	**43.9**

RR.A2 Table 4 – Wastewater Networks+ PAYG

Wastewater Networks +	2020/21	2021/22	2022/23	2023/24	2024/25	Total
Opex (£m)	137.546	134.754	133.137	130.707	127.775	**663.919**
Capex (gross) (£m)	240.396	346.295	356.018	285.712	223.856	**1,452.277**
Grants & conts (£m)	19.366	18.775	18.514	18.250	17.703	**92.608**
Totex (£m)	358.576	462.274	470.641	398.169	333.928	**2,023.588**
Fast Money	195.280	199.286	202.611	189.847	186.833	**973.857**
Slow Money	163.296	262.988	268.030	208.322	147.095	**1,049.731**
Opex (%)	38.4	29.2	28.3	32.8	38.3	**32.8**
PAYG (%)	54.5	43.1	43.1	47.7	56.0	**48.1**

RR.A2 Table 5 – Bioresources PAYG

Bio Resources	2020/21	2021/22	2022/23	2023/24	2024/25	Total
Opex (£m)	20.843	20.388	20.382	20.139	19.547	**101.299**

Capex (gross) (£m)	15.432	20.306	38.103	16.595	11.234	**101.670**
Grants & conts (£m)	0.000	0.000	0.000	0.000	0.000	**0.000**
Totex (£m)	36.275	40.694	58.485	36.734	30.781	**202.969**
Fast Money	25.044	25.133	26.289	27.249	28.768	**132.483**
Slow Money	11.231	15.561	32.196	9.485	2.013	**70.486**
Opex (%)	57.5	50.1	34.8	54.8	63.5	**49.9**
PAYG (%)	69.0	61.8	45.0	74.2	93.5	**65.3**

3. SRN.RR.A3

Ofwat action	How we have responded
The company should set out how the approach to setting RCV run-off rates reflects the underlying RCV for the company for each wholesale control and provide more evidence to demonstrate that the rates are consistent with the company's approach.	Further information provided

Our detailed response

In order to set natural RCV run-off rates for PR19 we have looked at a range of indicators to inform our view on appropriate rates which reflect economic circumstances and the long term nature of its investments. This range of indicators includes historical accounting depreciation, current cost depreciation, capital maintenance expenditure, our forecast estimated asset lives over the PR19 period, and our relative RCV run-off compared to peers for PR14 period.

We consider that an appropriate RCV run-off rate for the Wholesale business is 5.13%, which is a little lower than the RCV run-off rate for PR14 of 5.35%, but which moves us closer to the industry average RCV run-off.

The table below illustrates the data points used with reference to our most recently audited 2017/18 Annual report and Annual Performance Report, plus a separate current cost assessment.

RR.A3. Table 1 – Assessment of appropriate RCV run-off rate

	Water resources (£m)	Water networks+ (£m)	Wastewater networks+ (£m)	Bioresources (£m)	Total Wholesale (£m)
Depreciation charge - Tangibles	3.4	42.1	139.9	20	205.4
Depreciation Infrastructure	0.3	8.3	20.9	0	29.5
Depreciation charge - Intangibles	1.6	0.2	10.8	0	12.7
Depreciation charge per Accounts	5.3	50.6	171.6	20	247.6
Reduction to Infrastructure depreciation	-0.1	-2.2	-2.7	0	-5
Depreciation charge for the year	5.2	48.5	168.9	0	242.6
Reference:					
CCA depreciation (non-infra)	8.2	55.9	189.3	34.6	288
Capitalised Maintenance spend	6	84.9	144.7	13.6	249.3
Net Book Value per Accounts	124.5	1,195.30	4,090.60	328.8	5,739.2
RCV	77.2	884.2	3,566.60	201.3	4,729.3
Asset Life	14.8	18.2	21.1	10.1	19.5
RCV run-off	6.75%	5.48%	4.74%	9.93%	5.13%

	Water resources (£m)	Water networks+ (£m)	Wastewater networks+ (£m)	Bioresources (£m)	Total Wholesale (£m)
PR14 RCV run-off for SRN					5.35%
PR14 RCV run-off for water sector					4.05%

By way of explanation:

- The depreciation charge in the table has been taken from the 2017/18 Audited Accounts and depreciation of infrastructure assets has been separately shown. We adopted FRS101 for our 2015/2016 Accounts. Adoption of FRS101 included a revaluation of fixed assets with reference to the RCV plus a premium to RCV of 20% in order to present a fair value. The historic value of infrastructure assets was the main class of assets to be uplifted as part of the fair value revaluation and we have reduced the accounting depreciation associated with the infrastructure assets in order to align the historic depreciation charge to RCV (rather than RCV plus 20%) for each price control.
- We have carried out a calculation for current cost depreciation of non-infrastructure assets which results in an RCV run-off of 6.09% for the Wholesale business. This level of RCV run-off is materially higher than that calculated for PR14 and significantly higher than the industry average. The profile of current cost depreciation is broadly consistent with the profile of historic cost depreciation which provides comfort on the balance of RCV run-off rate for each price control.
- Capitalised maintenance expenditure results in an RCV run-off of 5.27% for the Wholesale business. This result is similar to the 5.13% calculation for historic cost depreciation.

We have selected a RCV run-off rate for the Wholesale business of 5.13% to reflect the economic reality of the expenditure which the company is incurring. This run-off rate is a little lower than the RCV run-off rate for PR14 of 5.35%, but moves us closer to the industry average RCV run-off.

We have also considered whether the RCV run-off rate should change over the course of PR19 in order to reflect any change to asset lives from PR19 totex. The table below shows the estimated asset lives for all assets for each price control (this is based on analysis of existing asset stock from our SAP financial ledger together with assumption of additions through the PR19 period).

RR.A3. Table 2 – Estimated lives of all assets

Estimated asset lives of all assets	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25
Water Resources	78.3	73.3	69.2	67.0	65.3	64.0	62.7	61.4
Water Networks +	60.1	58.2	56.6	54.6	52.9	51.5	50.5	49.5
Wastewater Networks +	57.1	56.2	55.2	54.5	53.5	52.6	51.9	51.4
Bio Resources	31.3	31.3	31.3	31.3	31.3	31.3	31.3	31.3

The table above shows that the asset lives of all assets reduced over the PR19 period as long life assets have become fully depreciated. However, given our RCV run-off rate is higher than the industry average (and was the highest for PR14) we have maintained the RCV run-off at current levels so as to support affordability whilst we continue to monitor how our actual rates of depreciation develop over time.

The table below shows the natural Run-off rates for the PR19 period.

RR.A3. Table 3 – Natural RCV run-off rates for PR19

Natural RCV Run-off rates for PR19	2020/21	2021/22	2022/23	2023/24	2024/25
Water Resources (%)	6.75	6.75	6.75	6.75	6.75
Water Networks + (%)	5.48	5.48	5.48	5.48	5.48
Wastewater Networks + (%)	4.74	4.74	4.74	4.74	4.74
Bio Resources (%)	9.93	9.93	9.93	9.93	9.93

4. SRN.RR.A4

Ofwat action	How we have responded
The company should provide further evidence that the level of the proposed adjustments to RCV run-off rates do not result in overall revenue being transferred between price review periods and are supported by customer preferences.	Further information provided

Our detailed response

For PR14 we used RCV run-off as a lever to balance bills between Water and Wastewater as a means to manage affordability in response to customer preference. For PR19 we have again used the RCV run-off rate as a 'lever', to re-balance bills between Water and Wastewater as a means to manage affordability in response to customer preference for stability & predictability around the amount they pay for their bill.

The use of RCV run-off as a means to manage affordability has resulted in:

- Amending the average household water bill for the PR19 period from a 5.5% increase to a 2.1% decrease, and
- Correspondingly amending the average household wastewater bill for the PR19 period from a 10.5% decrease to an 8.0% decrease.

We have achieved this change to RCV run-off by reducing RCV run-off of the Water Networks + by 1.6% and increased RCV run-off for the Wastewater Network + by 0.5%. We have also ensured that this change to RCV run-off for PR19 has been calculated to ensure that overall no revenue has been transferred between price review periods (note: we have carried out this calculation within the financial model in a separate tab 'RDR for water-waste balancing', and will leave this tab in the model we submit as part of our response to the IAP).

RR.A4. Table 1 – NPV neutral RCV run-off rates

Output from NPV neutral calculation for adjustment to natural RCV Run-off rates	Water Resources	Water Networks +	Wastewater Networks +	Bio Resources
Natural rates of RCV run-off				
RPI b/f RCV pot	6.75%	5.48%	4.74%	9.93%
CPIH b/f RCV pot	6.75%	5.48%	4.74%	9.93%
CPIH RCV additions pot	6.75%	5.48%	4.74%	9.93%
Adjustment to Natural rates				
RPI b/f RCV pot	0.00%	-1.64%	0.51%	0.00%
CPIH b/f RCV pot	0.00%	-1.63%	0.50%	0.00%
CPIH RCV additions pot	0.00%	-1.63%	0.50%	0.00%
Adjusted Rates				
RPI b/f RCV pot	6.75%	3.84%	5.25%	9.93%
CPIH b/f RCV pot	6.75%	3.85%	5.24%	9.93%
CPIH RCV additions pot	6.75%	3.85%	5.24%	9.93%
NPV checks				
NPV pre-reprofiling - Pre adjustment	123.256	836.179	2,252.028	246.685
NPV pre-reprofiling - Post adjustment	123.256	760.741	2,327.439	246.685
NPV Variance	**0.000**	**75.438**	**(75.411)**	**0.000**

We have in addition used the re-profiling functionality (npv neutral) to ensure we have a flat annual bill in real terms for each price control in response to customer preference.

5. SRN.RR.A5

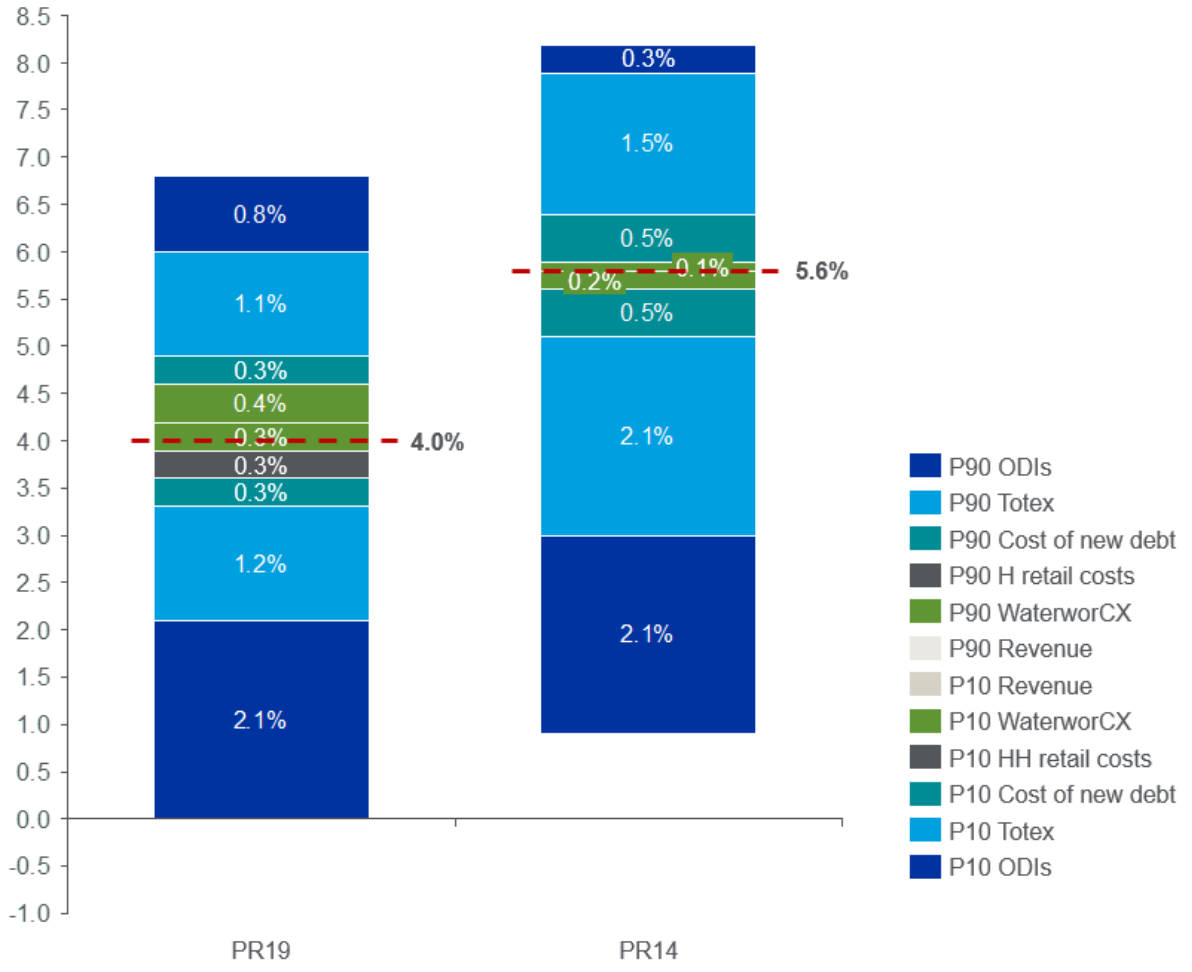
Ofwat action	How we have responded
The company should check that the base RoRE value of 3.8% shown in the business plan has been calculated correctly and amend/re-present if necessary.	Plan updated

Our detailed response

We have updated the base RoRE value to 4.01%, the value for cost of equity for the notional company quoted in Appendix 13 of the Ofwat PR19 methodology.

We have updated the RoRE chart that appeared in our original plan - *BP_Ch 16_Risk, Return, and Financeability_pg 275*. This chart, APP 26 and the associated commentary have also been updated for the change in totex risks as a result of Action SRN.RR.A6, and our updated ODIs. Details of the changes to totex risks are given in the supporting information to *IAP_TA7_Aligning Risk and Return_RR.A6* and the revised commentary to App26.

RR.A5.Figure 1 - Revised RoRE chart



6. SRN.RR.A6

Ofwat action	How we have responded
The company should amend its overall assessment of RORE outcomes or provide convincing evidence to explain why it is reasonable to assume totex outcomes should be asymmetrically skewed to the downside for a notional company within an incentive-based regime.	Partially updated

Our detailed response

Our RORE analysis draws on a number of sources (e.g. the corporate risk register and historic events,) and expert judgement to identify the nature and magnitude of the risks at the P10 level. The upsides are modelled in a similar manner where business experts have diligently tried to identify plausible outperformances at the P90 level. These risks and potential outperformances are then used to create a number of company-specific scenarios and a P10/P90 combined scenario. The company-specific scenarios are intended to capture a narrower range of events than all those that could happen but, where risks crystallize, they are more severe.

We acknowledge Ofwat's comment that the potential TOTEX upsides identified in the RORE analysis are lower than the downsides. This is due to the following reasons:

Low historic TOTEX outperformance

In the first three years of AMP6, SRN has underperformed the TOTEX allowance by a small margin of the order of 10bp in RoRE terms.[1] Our forecasts for totex performance at the end of AMP6 also do not indicate material outperformance. These two recent precedents on the ability to outperform the allowances for efficient costs therefore does not suggest significant outperformance potential for AMP7, all else equal.

Tougher cost challenge during PR19

The cost challenge set by Ofwat during PR19 is tougher than at PR14, as shown by the size of the gap between companies' plans and the assessment of the efficient cost allowance in the IAP. Companies have been asked to target the upper quartile without any allowance for a glide path, and to deliver step changes in performance (e.g. leakage) without any additional funding. The tough cost challenge combined with a challenging frontier shift assumption makes TOTEX outperformance less likely than in AMP6. Moreover, after the initial assessment of business plans, Ofwat has challenged us to reduce its costs by c20%, thereby further reducing the potential for TOTEX outperformance during PR19.

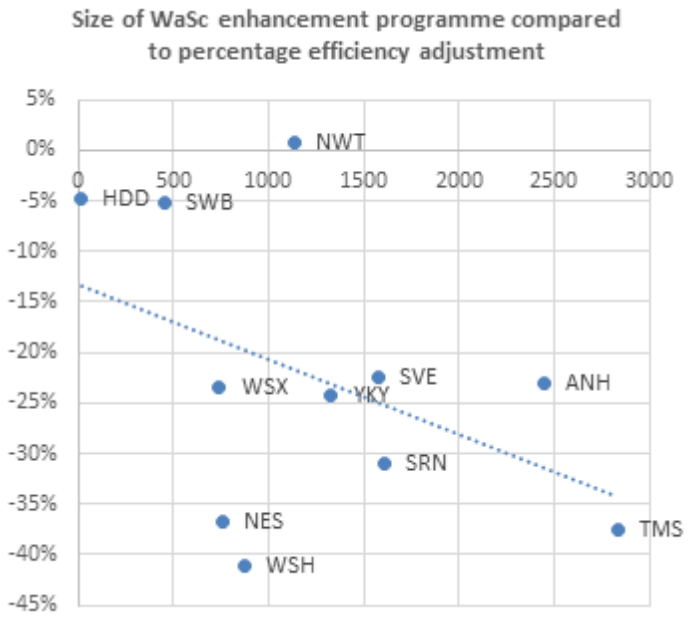
We have commented elsewhere (*IAP_TA6_Securing Cost Efficiency_CE.A1*) that in general those companies with large enhancement programmes experience higher efficiency challenges after the IAP. In this response we say that:

"We note that Ofwat has applied significantly larger efficiency adjustments to enhancement than to base costs in its IAP. As the figure below shows, the average adjustment to base costs across the industry was 5% at the IAP, the same figure for enhancements was approximately five times higher at 23%."…

… the implication is that companies with larger enhancement portfolios have been exposed to greater efficiency challenges and therefore carry a greater delivery risk. This risk is primarily a result of the relative size of their enhancement programme rather than a fair reflection of risk, based on the true level of a

companies' efficiency. As we show in the chart below companies with larger enhancement programmes have generally been subject to greater efficiency challenges on their enhancements.

RR.A6.Figure 1 - Enhancement programme v size of efficiency



Regarding asymmetric ODI ranges, our potential ODI rewards are consistent with our customer research and we have not changed the upside potential from ODIs. The penalty ranges we show are generally in line with the industry. We set out this research in our September 3rd submission - see BP_Ch 6_Outcomes, Performance Commitments and Outcome Delivery Incentives, in particular section 6.7:

"Our focused ODI research (set out in our Technical Annex 4.4 part 3) gave us a clear view on the extent to which customers would be willing to pay for performance beyond the level of our target. We have used this evidence to set a cap and collar for each ODI (after adjustment based on the triangulated research). This way we can be certain that customers will not pay more than they have said they are willing to pay for outperformance. And, equally, we face a set of incentives that are balanced and not systemically skewed towards penalties.

Separately, we are also proposing to limit the change in bills that result from ODIs to £5 between any two years, based on customers' preference to limit bill volatility. This does not operate as a cap and collar mechanism but instead simply has the effect of smoothing ODIs in excess of this level over multiple years." (See our as part of our original submission - BP_TA4.4_part 3)

More negative than positive shocks

We consider that even the notionally efficient company performing at the cost frontier could still experience asymmetric cost risks. Any notionally efficient company should be forecasting and managing costs in such a way that outperformance of an allowance was equally as likely as underperformance, while delivering a given set of performance commitments and ODIs.

Managing delivery to an expected set of costs in forecast circumstances can still be subject to shocks beyond managements control that exceed the ability of management to mitigate them. Despite diligent enquiries, we were unable to come up with material analogies for droughts, floods, economic downturns, accidents etc. that would produce positive rather than negative shocks. This is a different issue from delivering a given set of outcomes from a cost forecast which is unbiased, i.e. where cost outperformance could be as likely as under-performance.

We note though that the considerations we used for our totex risk assessment may apply more to the actual company (ourselves) than the notional company. We have as a result amended our totex analysis to include a more symmetrical distribution. If we have identified a totex downside in the P10 probability case we have in the majority of cases now assumed an equivalent magnitude upside in the P90 case. The table below

shows the value of the changes introduced at the P10 and P90 cases in our original plan, and now. The original of these tables were BP_TA 16.1_ Risk Assessment; methodology and assumptions_Section 4.7 and Table 5.1 carried out for us by Oxera.

RR.A6.Table 1 – Summary of totex impacts

Shock	P10 impacts (£m)	P90 impacts – original (£m)	P90 impacts – new (£m)
Totex			
Volume growth: water	9.5	-9.5	-9.5
Volume growth: waste	9.8	-4.9	-9.8
Business Rates	12.1	-5.6	-5.6
Data protection breach	10		
IT systems failure	15		
Environmental compliance	20		
Too cold	5		
Too wet	15	-3.2	-3.2
Too dry	15.8	-5.0	-5.0
Power loss	10		
Asset health deterioration - water	3		
Asset health deterioration - waste	40		
Health and safety	20		
Opex – water	26.3	-7.0	-7.0
Opex - waste	17.5	-8.8	-17.5
Opex - retail	5		
Capex - water	73.5	-36.8	-73.5
Capex - waste	40	-20.0	-40

Retail – bad debt	10		

RR.A6.Table 2 – Summary of all totex impacts included in RoRE analysis

Impact	P10 impacts – original (£m)	P10 impacts – new (£m)	P90 impacts – original (£m)	P90 impacts – new (£m)
Revenue	0	0	0	0
Totex	121	121	-78	-111
Residential retail costs	30	30	0	0
ODIs	116	217	-35	-87
WaterworCX	35	35	-37	-37
Financing	28	27	-28	-27
Total	**330**	**430**	**-178**	**-262**

We have updated App 26 and the associated commentary accordingly.

The actual risks we face, and the specific downside only scenarios we considered, remain relevant for considering the financeability in the actual capital structure we are required to carry out, and we have retained the downside risks for that analysis.

7.SRN.RR.B1

Ofwat action	How we have responded
Acknowledging the explanatory material that the company has provided on its assessment of P10/P90 values for RoRE risk scenarios, and that values have been presented on a post-mitigation basis, please provide views on why Southern's risk ranges are relatively low, compared to the majority of companies.	Further information provided

Our detailed response

Ofwat commented that our overall RORE range is narrower than submitted by most companies. We have commented in SRN RR A6 that we consider that our ODI upside range is limited by the findings of our customer research, and that this would also be the case for the notional company.

We have updated our totex ranges to indicate more upside potential for a notional company, while retaining our view that the analysis presents a fair view of the risks we face (as the actual company).

In addition, we have used a statistical method for the P10 / P90 combined TOTEX scenarios, which have been estimated by combining shocks so as to ensure that the probability of each of the combined scenarios for underperformance and outperformance occurring is 10%. We set this method out in our commentary to APP26 and summarise here.

Companies which have presented substantially wider RORE ranges (for instance, Severn Trent[1]) present the combined overall scenario by summing the RORE ranges of all the P10/P90 shocks on TOTEX, ODIs, revenue and finance costs, thereby assuming that the extremes of all the component ranges could occur simultaneously. We note that the probability of all the individual P10/P90 RORE ranges occurring simultaneously in one scenario would be significantly lower than the probability of an individual event materialising.

We believe our approach to combining multiple low probability but significant events accounts for our apparently lower RoRE range, rather than large inherent differences in risks. We also consider it possible that different companies have taken different approaches to showing results post mitigating actions, though we have not investigated this.

Our method for producing overall P10/P90 scenarios[2]

Likelihood

For each specific risk, [our company] experts have used judgement to identify the magnitude of a P10 (downside) and P90 (upside) event. The “centre” of the event is assumed to be what is expressed in the plan, i.e. zero totex out or underperformance, delivery performance is on target, ODIs do not trigger etc. Oxera has then used these inputs to model the distribution of P10 and P90 RORE impacts overall.

Specific Scenarios - Development

The individual risks and the impact data described above have been used to create a number of company-specific scenarios, that are intended to capture a narrower range of events but, where risks crystallize, they are more severe. So for example, the single year dry weather costs identified above have been used to extend the risk to a three year long drought occurring within AMP7. A severe wet weather event is assumed to cause flooding sufficiently severe that both an important water treatment works and waste water treatment works are out of action at the same time, incurring extra remedy costs, penalty ODIs and fines for non-

compliance with our permits at the treatment works. These scenarios are intentionally downside only, in order to explore our resilience in the case of reasonably severe large scale or long duration events.

Specific Scenarios - Mitigation

The scenarios generally use individual mitigated annual risks in combination, but sometimes over several years. In reality in the event of long duration incidents we anticipate we could take further action by re-prioritising activity, using learning from the early stages of a sustained event to find lower cost solutions, finding temporary solutions that increase resilience in the short term etc.

Specific Scenarios - Likelihood

We have considered downside-only scenarios, so as a result the company-specific scenarios do not show upside values. We consider that, while large scale upside shocks are possible, they are both less likely and would be of smaller magnitude than downside shocks.

We do not attach a specific probability to the company specific scenarios. By combining a limited number of individual risks at the P10 level, and extending the scope and / or duration as appropriate, we are implicitly creating scenarios with a probability between p10 and P50. Since we have not added extra mitigation actions the company could take in the event of severe or extended duration events, it is likely that the probability of the company-specific scenarios is in the lower half of the P10 – P50 range.

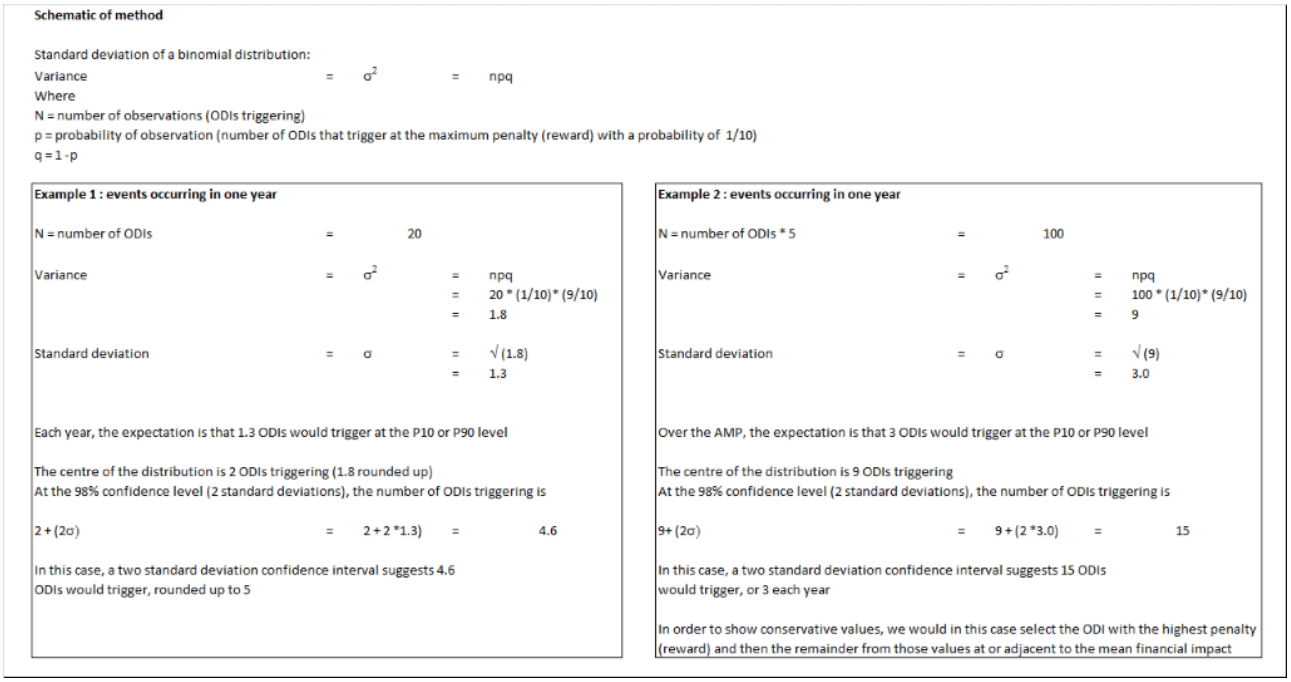
P10 / P90 scenario ODIs and approach to totex shocks

The overall P10 / P90 scenario has been created by Oxera's modelling process, described in their report, and submitted in our September 2018 plan as *BP_ 16.1_ Risk Assessment: methodology and assumptions* (carried out for us by Oxera).

We have used a statistical approach to construct an overall P10 and P90 scenario. We have considered the likelihood of each ODI triggering to be represented by a series of bi-nominal distributions, and have taken the standard deviation of the distribution in order to identify how many ODIs, each individually calibrated at the P10 and p90 levels, might trigger over the five year period.

This approach is illustrated schematically in the figure below.

RR.B1.Figure 1 – Statistical approach illustration



Schematic of method

Standard deviation of a binomial distribution:

Variance = σ^2 = npq

Where

N = number of observations (ODIs triggering)

p = probability of observation (number of ODIs that trigger at the maximum penalty (reward) with a probability of 1/10)

q = 1 -p

Example 1 : events occurring in one year

N = number of ODIs = 20

Variance = σ^2 = npq = 20 * (1/10)* (9/10) = 1.8

Standard deviation = σ = √(1.8) = 1.3

Each year, the expectation is that 1.3 ODIs would trigger at the P10 or P90 level

The centre of the distribution is 2 ODIs triggering (1.8 rounded up)
At the 98% confidence level (2 standard deviations), the number of ODIs triggering is

2 + (2σ) = 2 + 2 *1.3) = 4.6

In this case, a two standard deviation confidence interval suggests 4.6 ODIs would trigger, rounded up to 5

Example 2 : events occurring in one year

N = number of ODIs * 5 = 100

Variance = σ^2 = npq = 100 * (1/10)* (9/10) = 9

Standard deviation = σ = √(9) = 3.0

Over the AMP, the expectation is that 3 ODIs would trigger at the P10 or P90 level

The centre of the distribution is 9 ODIs triggering
At the 98% confidence level (2 standard deviations), the number of ODIs triggering is

9+ (2σ) = 9 + (2 *3.0) = 15

In this case, a two standard deviation confidence interval suggests 15 ODIs would trigger, or 3 each year

In order to show conservative values, we would in this case select the ODI with the highest penalty (reward) and then the remainder from those values at or adjacent to the mean financial impact

The first example shows that in a single year, with a population of 20 financial ODIs, we might expect 5 to trigger at the p10/p90 level, to a 98% confidence interval. Over the AMP, 15 would trigger, or about 3 a year

In order to show a conservative value, we have intentionally chosen the largest ODI by absolute value of penalty (reward). The remainder of the ODIs required to make up the number indicated by the statistical analysis are chosen by selecting the ODI nearest to the median by absolute value, and the relevant number of ODIs on either side of the median.

We have adopted a similar approach in the P10 and P90 scenario for the individual totex, revenue or other cost shocks we have identified. We do not have a framework that can assign specific probabilities to the risks we identified. Instead we ranked the risk in order of absolute size, and chose all the risks in the second and third quartiles as those that would be included in the overall p10 / p90 scenario.

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