Appendix 8.2 – Stress Test Evidence

March 2019

Stress Tests Appendix – Updated March 2019

Appendix Section 8: Risk & Reward – Stress Tests

In this we have been supported by KPMG, who have conducted stress tests on our behalf under ‘agreed upon procedures’ to support this work.

We have carried out a series of stress tests based on the eight downside scenarios as set out in Ofwat’s final guidance of July 2018. These have been carried out using Ofwat’s Financial Model, populated by our business plan table data.

Additionally, we have also considered a further 19 NWL stress test scenarios, including what we believe to be a more plausible variation of a totex performance test, given our position as a leading company in terms of efficiency and service delivery and a number of more severe combined scenario tests also including more plausible tests, including the revised totex performance test. These are shown in the table below:

- Stress Test 12 covers a more plausible overall 3% totex overspend test, which we pass;
- Stress Test 27 combines ODI penalty, totex overspend of 3% and higher cost of new debt, which is also passed post mitigation.

Finally, we have set out in the following sections the mitigation plans in place for any scenario where our target thresholds would not be met. In our view, all the stress tests set out are either directly met or can be met through mitigation.

1 Stress tests carried out

Originator	Scenario	Name	Description
NWL	1	Base case	Base case financial projects, prior to the overlay of any downside scenarios.
Ofwat	2	Totex overrun	10% totex underperformance each year
Ofwat	3	ODI penalties	3% of RoRE in one year
Ofwat	4	Penalty (Appointee revenues)	2.4% of residential revenue in one year
Ofwat	5	Bad debt cost shock	5% bad debt cost shock each year
Ofwat	6	High inflation	RPI 4%, CPIH 3% each year
Ofwat	7	Low inflation	RPI 2%, CPIH 1% each year
Ofwat	8	Debt refinancing	2% increase in the cost of new debt relative to base case
Ofwat	9	Combination scenario, totex, ODI, penalty	10% totex and retail expenditure underperformance each year, ODI penalty of 1.5% of RoRE in each year, financial penalty 1% of revenue in one year
NWL	10	Opex overrun - Ofwat	10% opex underperformance each year
NWL	11	Capex overrun - Ofwat	10% capex underperformance each year
NWL	12	Totex overrun (3%)	3% totex underperformance each year
NWL	13	Operational incident	Operational incident resulting in £25m opex shock in 2021
NWL	14	C-MeXand D-Mex penalties (2.4%)	2.4% of residential revenue each year
NWL	15	C-MeXand D-Mex penalties (1.2%)	1.2% of residential revenue each year
NWL	16	Revenue under-recovery	5% decrease in wholesale revenues in 2021 and 5% increase in 2023
NWL	17	Financing downside	Phased increase in interest costs by 0.2% per annum over AMP 7
NWL	18	CPIH	Decrease of CPIH to 1.5% in all years
NWL	19	High interest & inflation	Outturn cost of debt and inflation are assumed to be 1% higher than pre-set by the end of the AMP, with a phased increase in the variance over the AMP (0.2% variance in 2020, 0.4% in 2021 etc.).
NWL	20	High inflation (divergence)	Outturn inflation is assumed to be 1% higher than pre-set by the end of the AMP, with a phased increase in the variance over the AMP (0.2% variance in 2020, 0.4% in 2021 etc.). No variance between pre-set and outturn cost of debt.
NWL	21	Very high interest & inflation	Outturn cost of debt and inflation are assumed to be 2% higher than pre-set by the end of the AMP, with a phased increase in the variance over the AMP (0.4% variance

			in 2020, 0.8% in 2021 etc.).
NWL	22	Low interest and inflation	Outturn cost of debt and inflation are assumed to be 1% lower than pre-set by the end of the AMP, with a phased increase in the variance over the AMP (0.2% variance in 2020, 0.4% in 2021 etc.).
NWL	23	Low interest (divergence)	Outturn cost of debt is assumed to be 1% lower than pre-set by the end of the AMP, with a phased increase in the variance over the AMP (0.2% variance in 2020, 0.4% in 2021 etc.). No variance between pre-set and outturn inflation.
NWL	24	Low inflation (divergence)	Outturn inflation is assumed to be 1% lower than pre-set by the end of the AMP, with a phased increase in the variance over the AMP (0.2% variance in 2020, 0.4% in 2021 etc.). No variance between pre-set and outturn cost of debt.
NWL	25	Very low interest & inflation	This scenario assumes that there is a phased increase in inflation of 0.4% to 2% over the AMP, and also a phased increase in the cost of debt from 0.4% to 2% over the AMP, relative to the base case.
NWL	26	Combination case totex, ODI, cost of debt	This scenario assumes a 3% ODI penalty in 2020/21, which has a revenue impact of c. -£55m in 2020/21 relative to the base case. This scenario also assumes a capex and opex overspend of 3% and a phased increase in the cost of new debt by 0.2% per annum over AMP7.
NWL	27	Tax increase	This scenario assumes a tax increase to 26% from 2022.
NWL	28	Pension deficit	This scenario assumes an increase in target liabilities equivalent to an additional £50m per annum.

2 Stress Tests Metrics and Thresholds

We carried out our stress tests against the following primary credit metrics, noting importantly that other factors are taken into consideration as well by the credit rating agencies (as described further in section 6.1 below):

Gearing (Moody's)
Adjusted Cash Interest Cover (Moody's)
FFO/Net Debt

The Moody's metrics & thresholds used are confirmed in the following Moody's notes:

Source: Moody's note: 2018 outlook changed to negative as tough price review outweighs current performance: 15 January 2018

Exhibit 5

Moody's generic ratio guidance for the UK water sector

Rating	RCV gearing	Adjusted Interest Coverage Ratio
A2	50% - 60%	1.8x - 2.5x
A3	60% - 68%	1.6x - 1.8x
Baa1	68% - 75%	1.4x - 1.6x
Baa2	75% - 85%	1.2x - 1.4x

Note: Ratio guidance applies to stand-alone regulated businesses funded on a corporate basis. Actual credit quality may also reflect the consolidated financial profile of a wider group or the benefits of structural enhancements. Due to their smaller size and the associated risks in relation to cash flow stability, Moody's would expect smaller companies, such as the water-only companies, to exhibit a stronger AICR for an equivalent gearing level.
Source: Moody's

Source: Appendix 10.3 Moody's note on Northumbrian Water Dec 2017

Factors that Could Lead to a Downgrade

The rating could be downgraded if, taking into account such measures as management and shareholders may implement, it appears that Northumbrian Water will likely have insufficient financial flexibility to accommodate the expected reduction in allowed returns at PR19. In particular, downward pressure could result from (1) NWG's consolidated leverage persistently above 100% (net debt/RCV); or (2) Northumbrian Water's stand-alone net debt (including Kielder) exceeding 80% of the company's RCV, or an Adjusted Interest Coverage Ratio (Adjusted ICR) below 1.4x on a persistent basis. Furthermore, a downgrade would be considered if business risk in the sector increased due to legal and/or regulatory changes, which are not offset by other credit-strengthening measures; or the company faced unforeseen funding difficulties.

3 Summary of the Stress Tests Results (run on an actual gearing basis)

		Test	Pre Mitigation	Post primary mitigation
1		Base case	Pass	Pass
2	Ofwat	Totex overspend 10%	Fail	Fail
3	Ofwat	ODI penalties	Fail	Pass
4	Ofwat	Penalty (Appointee revenues)	Fail	Pass
5	Ofwat	Bad debt cost shock	Fail	Pass
6	Ofwat	High inflation	Pass	Pass
7	Ofwat	Low inflation	Fail	Pass
8	Ofwat	Debt refinancing	Fail	Pass
9	Ofwat	Combined scenario 10% totex	Fail	Fail
10	NWL	Opex overspend 10%	Fail	Fail
11	NWL	Capex overspend	Fail	Pass
12	NWL	Totex downside 3%	Fail	Pass
13	NWL	Operational incident	Fail	Pass
14	NWL	C-MeX and D-Mex penalties 2.4%	Fail	Pass
15	NWL	C-MeX and D-Mex penalties 1.2%	Fail	Pass
16	NWL	Revenue under-recovery	Fail	Pass
17	NWL	Financing downside	Fail	Pass
18	NWL	CPIH	Fail	Pass
19	NWL	High interest and inflation	Pass	Pass
20	NWL	High inflation (divergence)	Pass	Pass
21	NWL	Very high interest & inflation	Pass	Pass
22	NWL	Low interest and inflation	Fail	Pass
23	NWL	Low interest (divergence)	Fail	Pass
24	NWL	Low inflation (divergence)	Fail	Pass
25	NWL	Very low interest & inflation	Fail	Pass
26	NWL	ODI penalties, Financing downside and Totex overrun	Fail	Fail
27	NWL	Tax increase	Fail	Pass
28	NWL	Pension deficit	Fail	Pass

Thus, the only four stress test scenarios to fail post primary mitigation relate to the Ofwat very severe 10% totex or our severe 10% opex overspend scenarios (which assume a 10% overspend across each year of the price control period). All these stress tests are in our mind unrealistic scenarios to consider as robust indicators of our financial resilience. These scenarios, would require **secondary mitigation** through considering the NWL efficiency position resulting in **more plausible totex scenarios, macro economic effects as well as an interim determination, given the severe cost consequences that underpin such scenarios.**

As discussed below NWL's primary mitigations include **targeted management actions, flexible dividend policy and single year 'look through'**.

4 Addressing the Ofwat Totex Underperformance Scenarios

As stated above we believe that a 10% totex underperformance for NWL is not a plausible scenario given our leading efficiency position.

Our plan indicates that we expect to be below the Upper Quartile (UQ) baseline for the overall wastewater wholesale control. Under Ofwat's proposals, this should mean we outperform that baselines, making any overall underperformance extremely unlikely.

We have thus amended the totex stress tests as follows to reflect what we believe is a more realistic stress test. As a weighted average, these **are 3% of totex.** These amended variances are included in Stress Test 12, which we pass.

Price Control	Comment on totex positon	NWL Stress test
Water resources	NWL costs are at UQ baseline by application of a stretch target	5%
Water network plus	NWL costs are at the UQ baseline	5%
Wastewater service	NWL costs are below the UQ baseline	0%
Retail HH	NWL costs are at the UQ baseline	5%

Consideration of the likelihood of cost increases by major component

UK Government charges (primarily abstraction charges and business rates)

Around 13% of total totex relates to UK Government charges. These are viewed by Government as indirect taxation and are thus constrained by Government policies.

Abstraction charges have been stable in absolute terms for NWL for at least 10 years, with the Government requirement that they are limited to cost recovery meaning they cannot be varied without justification.

Business rates for NWL have recently increased significantly, despite review and extensive challenge, making a further material increase unlikely, as the cost shock has already happened in effect and is in our base totex projections.

For this reason, a more plausible scenario is believed to be a 5% cost increase.

Enhancement totex

Enhancement totex represents 28% of total totex in the NWL plan. It has been costed based on our current cost database. We have adjusted the costs for input price pressures. Our track record on delivering enhancements efficiently is good, with our recent Whitburn scheme in 2015-20 being delivered efficiently for example.

For this reason, we believe that a 5% cost increase is a more plausible scenario.

Wages and salaries

Around 20% of totex relates to direct wages and salaries. As pay awards are likely to be broadly correlated to CPIH, any variation in these aggregate costs would be related to increased employment. As we employ directly over 3,000 employees, a 5% increase would mean an extra 150 people employed, enough to cover any activity related workload increase that we have experienced in the past. Our capacity headroom for water resources and treatment and our commended response to the recent ‘Beast from the East’ thaw confirms that we can handle increased demand on our services without a dramatic increase in our workforce.

For this reason, we believe a 5% increase in costs is a more plausible scenario.

5 Notional Gearing

Finally, the above full set of stress test scenarios has also been carried out under the notional gearing assumptions. As notional gearing (60%) is less than actual (65-70%), all the financial metrics have improved results compared to actuals, so mitigation is either not required or is required to a lesser extent than on an actual gearing basis.

6 Mitigation (primary and secondary)

6.1 Primary Mitigation

Targeted management actions

Our Executive Leadership Team implements the Board's strategies and closely monitors performance. This includes making sure sufficient and suitable resources are applied to scrutinise performance and identify and manage risk. It also makes sure there is appropriate assignment of responsibilities, corporate structures and clear Board reporting lines and accountabilities, supported by annual positive assurance on systems and controls.

Flexible dividend policy

Our flexible dividend policy is demonstrated by the decisive actions we took in 2017/18 to make sure that we would be in a strong and stable financeable position for the remaining years of this price control and then for 2020-25 and beyond. It is this forward looking approach that should allow us to mitigate any short-term revenue and cost shocks as set out in the stress tests.

Credit rating agency 'look through' of a single year shortfall

Credit rating agencies do not look at a single year in isolation when assessing the strength of credit metrics of companies. The agencies generally assess credit strength by considering forecast trends in key credit metrics over a number of years, typically over a three to five year horizon. The agencies will also take account in any assessment of a company's track record in taking decisive targeted actions, as well as the credit strength and support that may also be forthcoming from a company's ultimate shareholders.

6.2 Secondary Mitigation

Interim determination (opex increases)

Whilst NWL is not proposing any specific notified items, the substantial effects (SE) interim determination (IDOK) mechanism could apply should totex increase significantly. The SE mechanism applies a 15 year net present value calculation of opex impact to a threshold of 20% of turnover.

In practice, for NWL, this would mean increase of 4% or more of opex would qualify for an SE IDOK. We would not anticipate this applying immediately at that threshold, but it would have to be considered as mitigation of any opex increase stress test scenario of more than 5% for example.

Correlation of macro-economic effects between Company costs and CPIH/RPI

Significant cost shocks to the UK economy would impact both the UK and the Water industry. Macro-economic events that drive increased costs, such as changes in exchange rates or increases in energy prices will increase both company costs and CPIH. In this way, the increase in Revenue and RCV through an increase in CPIH/RPI will offset the impacts on company costs, although there would be a significant P&L timing difference which would arise as increases in allowed revenue would be lagged, whilst higher opex and index-linked debt costs would arise immediately. Additional RCV growth would provide additional debt capacity which would help to cover the increased costs from a cash perspective.

Broad economic trends such as recession or growth tend to have marginal impacts on NWL, however any recessionary impacts which may occur linked to household debt issues, would likely be more pronounced than seen historically given the combined effects of changes to universal credit arrangements and likely higher base rate costs. Demand for water is generally price inelastic and the main impact of recession on the industry has been through the reduction in the cost of debt.

Index-linked debt

The issuance of index-linked debt does mitigate some of the risks of variation in inflation, particularly when inflation falls below the 2% CPIH level forecast in the plan.

6.4 Summary of Ratios for Actual Gearing Stress Tests: Post primary mitigation

	Appendix - Actual Gearing			AICR	FFO/Net Debt	Gearing	
1			Base case	1.59	9.1%	66%	Pass
2		Ofwat	Totex overspend 10%	1.26	7.8%	70%	Fail
3		Ofwat	ODI penalties	1.52	8.8%	67%	Pass
4		Ofwat	Penalty (Appointee revenues)	1.55	9.0%	66%	Pass
5		Ofwat	Bad debt cost shock	1.58	9.1%	66%	Pass
6		Ofwat	High inflation	1.65	9.4%	65%	Pass
7		Ofwat	Low inflation	1.54	8.9%	67%	Pass
8		Ofwat	Debt refinancing	1.54	9.0%	66%	Pass
9		Ofwat	Combined scenario 10% totex	1.07	7.1%	71%	Fail
10		NWL	Opex overspend 10%	1.24	7.9%	68%	Fail
11		NWL	Capex overspend	1.61	9.0%	68%	Pass
12		NWL	Totex downside 3%	1.49	8.7%	67%	Pass
13		NWL	Operational incident	1.55	8.9%	66%	Pass
14		NWL	C-MeX and D-Mex penalties 2.4%	1.53	8.9%	66%	Pass
15		NWL	C-MeX and D-Mex penalties 1.2%	1.56	9.0%	66%	Pass
16		NWL	Revenue under-recovery	1.60	9.1%	66%	Pass
17		NWL	Financing downside	1.58	9.1%	66%	Pass
18		NWL	CPIH	1.57	9.0%	66%	Pass
19		NWL	High interest and inflation	1.62	9.3%	66%	Pass
20		NWL	High inflation (divergence)	1.63	9.4%	66%	Pass
21		NWL	Very high interest & inflation	1.64	9.6%	65%	Pass
22		NWL	Low interest and inflation	1.57	8.9%	66%	Pass
23		NWL	Low interest (divergence)	1.61	9.2%	66%	Pass
24		NWL	Low inflation (divergence)	1.55	8.9%	67%	Pass
25		NWL	Very low interest & inflation	1.54	8.7%	67%	Pass
26		NWL	ODI penalties, Financing downside and Totex overrun	1.39	8.3%	68%	Fail
27		NWL	Tax increase	1.47	8.7%	67%	Pass
28		NWL	Pension deficit	1.56	8.9%	67%	Pass

6.5 Summary of Ratios for Notional Gearing Stress Tests Post primary mitigation

Appendix - Notional Gearing						
			AICR	**FFO/Net Debt**	**Gearing**	
1		Base case	1.54	10.6%	57%	Pass
2	Ofwat	Totex overspend 10%	1.18	8.8%	61%	Fail
3	Ofwat	ODI penalties	1.41	10.0%	58%	Pass
4	Ofwat	Penalty (Appointee revenues)	1.49	10.4%	57%	Pass
5	Ofwat	Bad debt cost shock	1.54	10.6%	57%	Pass
6	Ofwat	High inflation	1.59	10.9%	56%	Pass
7	Ofwat	Low inflation	1.50	10.3%	58%	Pass
8	Ofwat	Debt refinancing	1.44	10.3%	57%	Pass
9	Ofwat	Combined scenario 10% totex	0.93	7.7%	62%	Fail
10	NWL	Opex overspend 10%	1.18	9.0%	59%	Fail
11	NWL	Capex overspend	1.53	10.3%	59%	Pass
12	NWL	Totex downside 3%	1.43	10.0%	58%	Pass
13	NWL	Operational incident	1.48	10.3%	57%	Pass
14	NWL	C-MeX and D-Mex penalties 2.4%	1.47	10.3%	57%	Pass
15	NWL	C-MeX and D-Mex penalties 1.2%	1.51	10.4%	57%	Pass
16	NWL	Revenue under-recovery	1.54	10.5%	57%	Pass
17	NWL	Financing downside	1.52	10.5%	57%	Pass
18	NWL	CPIH	1.52	10.4%	57%	Pass
19	NWL	High interest and inflation	1.55	10.8%	56%	Pass
20	NWL	High inflation (divergence)	1.57	10.9%	56%	Pass
21	NWL	Very high interest & inflation	1.55	11.0%	56%	Pass
22	NWL	Low interest and inflation	1.54	10.4%	57%	Pass
23	NWL	Low interest (divergence)	1.57	10.7%	57%	Pass
24	NWL	Low inflation (divergence)	1.51	10.3%	57%	Pass
25	NWL	Very low interest & inflation	1.54	10.2%	58%	Pass
26	NWL	ODI penalties, Financing downside and Totex overrun	1.28	9.3%	59%	Fail
27	NWL	Tax increase	1.45	10.2%	57%	Pass
28	NWL	Pension deficit	1.52	10.3%	58%	Pass