1. BACKGROUND AND PURPOSE OF PAPER

This paper provides a short, factual summary of our 2017/18 performance in relation to our Outcomes and Performance Commitments (PCs). Its purpose is to facilitate a conversation with Water Forum members on 8 June 2018, in advance of publishing our full Annual Performance Report (APR) in July 2018.

Some figures in this paper are currently draft, pending completion of assurance activity.

When we reviewed our annual performance with Water Forum in 2017, a request was made for more detailed graphical information. For this year's review, additional graphs have been provided in Appendix 1 attached.

A highlight of 2017/18 which we are very proud of is our response to the extreme weather in February and March: "The Beast from the East". A copy of our response to Ofwat regarding this event is attached as Appendix 2 is an excellent example of operational resilience.

2. PERFORMANCE SUMMARY

This following table summarises our performance against our key Measures of Success (MoS) for 2017/18. This represents the third year of our 2015-20 Business Plan period.

Each measure has an associated PC, which represents the level of performance we agreed to deliver in our 2015-20 Business Plan, based on the service levels that customers have told us they value.

A number of these PCs were also adjusted by Ofwat as a result of comparing commitments across the industry.

Some of these measures relate to the concept of 'asset health'. These are a means of monitoring, protecting and incentivising the long-term sustainable stewardship of our assets. As these are longer-term measures they are assessed based on three year average performance, with the first assessment having occurred this year.

Measure of Success	Units	2016/17	2017/18		
		Performance level	Performance level	Our Performance Commitment	Did we meet our Commitment?
We provide excellent service and impress our customers					
Ofwat Service Incentive Mechanism (SIM)	Score out of 100	87.53	86.39	N/A	At or close to industry leading
Independent overall customer satisfaction survey	Score out of 10	8.5	8.7	8.2	Yes
Domestic customer satisfaction, net promoter score	% customer satisfaction	46	44	32	Yes
Our customers consider the services they receive to be value for money					
Independent value for money survey	Score out of 10	8.2	8.2	7.9	Yes
We supply clean, clear drinking water that tastes good					
Overall drinking water quality compliance	Compliance %	99.935	99.938	100	No (1)
Discoloured water complaints	No. of complaints	2,874	2,532	2,908	Yes (1)
Satisfaction with taste and smell of tap water	No. of complaints	1,229	978	987	Yes
We provide a reliable and sufficient supply of water					
Leakage – Northumbrian area	Mega litres per day	133.82	137.66	137	No
Leakage – Essex & Suffolk area	Mega litres per day	68.08	67.26	66	No
Interruptions to water supply for more than 3 hours	Average mm:ss per property	02:26	05:23	05:56	Yes
Properties experiencing poor water pressure	No. of properties	199	186	216	Yes (1)
Water mains bursts	No. of burst mains	4,273	4,214	4,586	Yes (1)
We provide a sewerage service that deals effectively with sewage and heavy rain fall					
Properties flooded externally	No. of properties	839	944	1,318	Yes
Properties flooded internally	No. of properties	119	96	186	Yes
Repeat sewer flooding	No. of properties	46	38	496	Yes (1)
Properties flooded externally (TDS) (2)	No. of properties	2,730	2,726	2,931	Yes
Properties flooded internally (TDS) (2)	No. of properties	215	205	228	Yes
Sewer collapses	No.	55	46	58	Yes (1)
Sewer collapses (TDS) (2)	No.	72	51	84	Yes
We help improve the quality of rivers and coastal waters for the benefit of people, the environment and wildlife					
Pollution incidents (category 3)	No. of incidents	102	58	115	Yes (1)
Bathing water quality compliance	No. of bathing waters categorised as sufficient	34	34	34	Yes
Sewerage treatment works discharge compliance	No. of failing works	1	2	0	No (1)

Footnotes:

1. Asset health measures. Data in the summary table is single year performance. The three year average performance from 2015/16 to 2017/18 is discussed in the paper.
2. Reflects performance of what were privately owned drains and sewers which transferred into water company ownership in October 2011.

3. PERFORMANCE HIGHLIGHTS AND EXCEPTIONS

3.1 Ofwat Service Incentive Mechanism (SIM)

Ofwat's SIM measures our customers' experience of dealing with us and provides a good indication of how well we are serving those customers who have had a reason to contact us.

There are two elements to the SIM measure; a customer satisfaction survey and a quantitative element which counts how many times customers have contacted us about a negative subject - including written complaints. These elements are combined to give an overall SIM score out of 100, with a higher score being better. The satisfaction survey contributes to 75% of the overall score.

SIM is assessed on a comparative basis, as opposed to companies having a fixed PC. Above average companies will earn a reward, with below average incurring a penalty.

We have seen a slight dip in our performance from an industry leading position of 87.53% in 2016/17 to 86.39% in 2017/18. When compared to water and sewerage companies the 2017/18 score places us third. When water only companies are included we are placed fourth. We are responding by refreshing our Customer Experience strategy to make sure it is inclusive for all and are determined to regain an industry leading position.

3.2 Independent overall customer satisfaction score

We also conduct our own customer satisfaction research which is carried out quarterly by an independent company. In 2017, we achieved our best ever satisfaction score of 8.7 and we are delighted with such a high level of performance.

3.3 Net Promoter Score (NPS) for domestic customers

NPS measures customer advocacy which is the loyalty that exists between a company and its customers. It serves as an alternative to traditional customer satisfaction research. It also enables companies to assess their performance across a wide spectrum of industries. Our performance in 2017 of 44 was better than our PC and close to 2016 performance. We continue to be proud that our NPS ranks us alongside leading UK companies.

3.4 Independent customer satisfaction with value for money

In our independent customer satisfaction survey, we also ask customers how satisfied they are with value for money. We sustained a score of 8.2, beating our PC of 7.9.

3.5 Overall drinking water quality compliance

The water we supply must meet strict national standards, set by the Drinking Water Inspectorate (DWI), to ensure that it is safe to drink and the quality is acceptable to customers.

The figures show our annual performance in 2017 was 99.938%. This is a small improvement from 2016 of 99.935%. Out of the 70,341 tests carried out there were 45 failures in 2017 compared to 57 in 2016.

None of the failures represented a risk to health and our performance represents a very high level of compliance. Nevertheless, this level of performance places us behind other companies and we are committed to improving. We aim to achieve this through a combination of improved water treatment and targeted maintenance of the network.

Drinking water quality is an asset health measure, with performance assessed on a three year average basis. Whilst we have not attained the PC of 100%, we have not incurred a penalty.

The asset health three year average performance is 99.943%.

3.6 Discoloured water complaints

Very occasionally, for a brief period, our water may appear discoloured. This is caused by the disturbance of harmless material in our water supply network, possibly caused by a burst or a leak, which make the water appear brown, black or orange in colour.

This measure reflects the number of times we have been contacted by customers due to their tap water being discoloured.

We have been working to improve discoloured water complaints for many years and the current good performance is due to culmination of this work. Our current strategy continues to 2019 focusing on the reduction of discolouration material coming from water treatment works and accumulating in pipes.

An error was made when Ofwat adjusted our PC for this measure at PR14. Ofwat has now corrected this and as a result our 2017 PC has been tightened from 2,962 to 2,908 contacts. The three year average PC has also tightened from 3,508 to 3,490.

Our annual and three year average performances are significantly better than these levels.

3.7 Satisfaction with taste and odour of tap water

Our drinking water is of a very high quality but, occasionally our customers become aware of a different taste or smell. This could be due to:

- The use of chlorine to maintain good hygiene in our water supply network.
- A change in where a customer's water comes from.
- Issues with customer's own plumbing, inside their house.

This measure reflects the number of times we have been contacted by customers to complain about the taste or smell of their water.

An error was made when Ofwat adjusted our PC for this measure at PR14. Ofwat has now corrected this and as a result, our 2017 PC has been revised to 987 contacts from 903. This new commitment is still ahead of the industry upper quartile.

We received 978 taste and odour contacts in 2017. This level of performance is better than the industry upper quartile, and better than our revised performance commitment.

3.8 Leakage

Our leakage levels in 2017/18 are a little higher than our PCs in both the Essex & Suffolk and the Northumbrian regions.

We have recently faced challenging weather conditions in both regions and worked hard to improve our leakage performance. By February we were on target to meet our PCs, but the very cold weather in February and March 2018 increased our annual average daily leakage to just above the PC level.

Our increased focus on this area has still paid dividends though, with leakage levels in a healthy position for the beginning of the next reporting year.

In Appendix 2, details our response to the "Beast from the East" weather event earlier this year. We are very proud that despite the operational challenges this posed, our customers experienced no significant disruption to services.

3.9 Interruptions to supply

This measure reflects how often water supplies to customers have been interrupted as a result of needing to carry out planned work on our water pipes, or as a result of an unexpected event such as a burst pipe.

Our 2017/18 performance has deteriorated from the 2016/17 position of 2 minutes and 37 seconds to 5 minutes 23 seconds, due to a small number of longer duration interruptions. We are still beating our PC of 5 minutes 56 seconds and continue to compare well to wider industry performance.

3.10 Pressure

Our customers should expect water to arrive at their home at a certain pressure so that it flows well from the tap. The number of properties experiencing pressure below the minimum standard has reduced to 186, beating our PC. This measure is an asset health measure and the three year average performance of 202 is better than our PC of 216.

3.11 Bursts

This asset health measure is the number of repairs we have made to fix water mains bursts. Performance from 2015/16 to 2017/18 is better than the PC on both an annual and three year asset health basis. Performance in 2017/18 was similar to 2016/17 performance.

3.12 Sewer flooding

Sewer flooding can occur when rainfall is so heavy that there is more water than the sewers are designed to transport and they become 'overloaded'. It can also happen when sewers become blocked or broken. In either case, sewage escapes from our network and finds its way into our customers' gardens (external flooding), homes and business premises (internal flooding).

This is one of the worst service failures our customers can experience. It is very unpleasant and distressing and any escape of sewage from our network can also have a detrimental effect on the environment.

We have five MoS for sewer flooding, covering internal and external flooding and also repeat flooding. There are two measures focused on the performance of what were previously privately owned drains and sewers which were transferred into water company ownership in 2011.

We are currently achieving or beating our PCs for all these measures, and in the cases of internal flooding and repeat flooding, are outperforming our commitments by a substantial margin.

3.13 Sewer collapses

Occasionally the structure of a sewer pipe fails and the pipe 'collapses'. This can be due to a number of reasons including the age and condition of the pipe, ground movement or other factors. These collapses can result in other problems such as sewer flooding or pollution.

The number of sewer collapses is a key measure of the health of our sewerage network.

We are currently beating both our PCs for sewer collapses.

3.14 Pollution incidents

Problems with our sewerage system can result in untreated sewage escaping from our sewers and causing environmental damage. Very rarely, problems with our water supply systems can also result in environmental damage.

While every effort is made to reduce the risk of this happening, a small number of pollution incidents do occur. Incidents are categorised by the Environment Agency (EA), with category 1 incidents being the most serious. Category 2 incidents have a significant environmental impact and category 3 incidents have minor or minimal environmental impact.

Pollution has been an area of significant attention, and our performance for category 3 pollution incidents is improving, currently beating our annual and three year average asset health PC.

The number of more serious category 1 and 2 pollution incidents also improved from nine in 2016 to four in 2017. We are awaiting a final verdict on one of these incidents.

We continue to work closely with the EA to identify lessons that can be learned to ensure that serious incidents are not repeated. Our aim is to have zero serious incidents; it is worth noting that in the last 12 months (ie up to and including May 2018) we have had no serious incidents.

3.15 Bathing water quality compliance

Sea water at beaches in the North East are amongst the cleanest in the country.

Under the current regulations, each bathing water is classed as Poor, Sufficient, Good or Excellent. 'Sufficient' is the minimum acceptable standard.

We have a key role to play in maintaining the quality of our region's bathing waters. These can also be affected by a number of other factors such as run-off from agriculture and other sources of pollution.

All 34 designated bathing waters in our region now meet the minimum standard of Sufficient or better. This meets our PC that all 34 bathing waters are Sufficient or better by 2020. We are industry leading with the highest percentage of Good (7) and Excellent (25) bathing waters in England out of just three companies with no Poor bathing waters.

3.16 Sewage treatment works (STWs) discharge compliance

Our STWs treat waste water from homes and businesses so that it can safely be returned to the environment: to rivers or the sea.

Before it can be returned, this waste water must comply with strict permits. Compliance is assessed by taking regular samples which are analysed for the levels of chemicals present including phosphorous and ammonia.

This MoS shows the number of STWs which failed these standards. Our performance against this measure has been excellent for a number of years, although this is becoming increasingly challenging as standards become even tighter. Our performance in 2017 was two discharge failures; our PC is set at zero failures reflecting the fact that these are statutory standards. We do not expect to incur a penalty for this level of performance.

4. PENALTIES AND REWARDS

In our APR, we are obliged to share our expectations for rewards and penalties for the period 2015-2020. We currently expect to achieve a net reward for the five year period in the region of £23m. This is largely based on our excellent performance for interruptions to supply and sewer flooding, off-set by a small penalty for leakage. Previously we were forecasting a significant penalty for taste and odour performance, which is no longer the case now that our PC for this measure has been reset.

These numbers exclude any potential reward for our performance against SIM.

5. MAINTAINING TRANSPARENCY OF REPORTING

In order to maximise transparency we will continue to publish two versions of our APR: a fully detailed version for all stakeholders and a simpler, more accessible version for customers.

In addition to publishing our APR, we continue to be a strong supporter of the Discover Water website where details of our performance and how it compares to the rest of the industry are shared. This is enhanced by further comparative performance information being provided on our website.

We continue to conduct an extensive customer engagement programme within which, where appropriate, we share details of our actual and comparative performance.

Each year we consult with our customers and stakeholders on our Draft Assurance Plan, this details the arrangements we have in place to firstly ensure that we meet our PCs and secondly to ensure that we report on progress in an accurate and transparent way. This plan sets out risk associated with meeting our PCs (performance risks) as well as those associated with providing data of appropriate quality (reporting risks) along with our proposed mitigations.

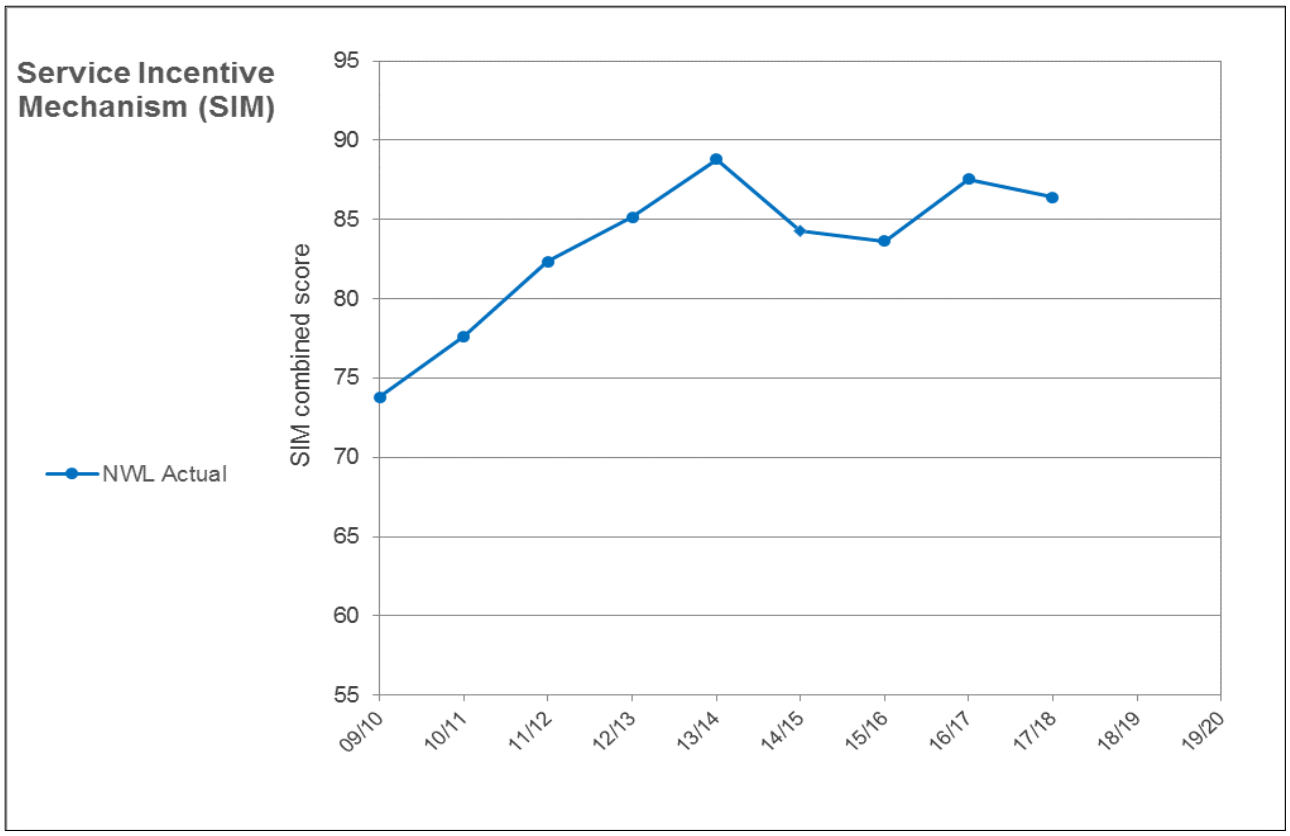
Consultees are specifically asked whether there are any gaps, whether our plan adequately addresses the risks identified, and finally whether we should provide any further information to enhance trust and confidence. The response is reflected in our Final Assurance Plan and/or APR.

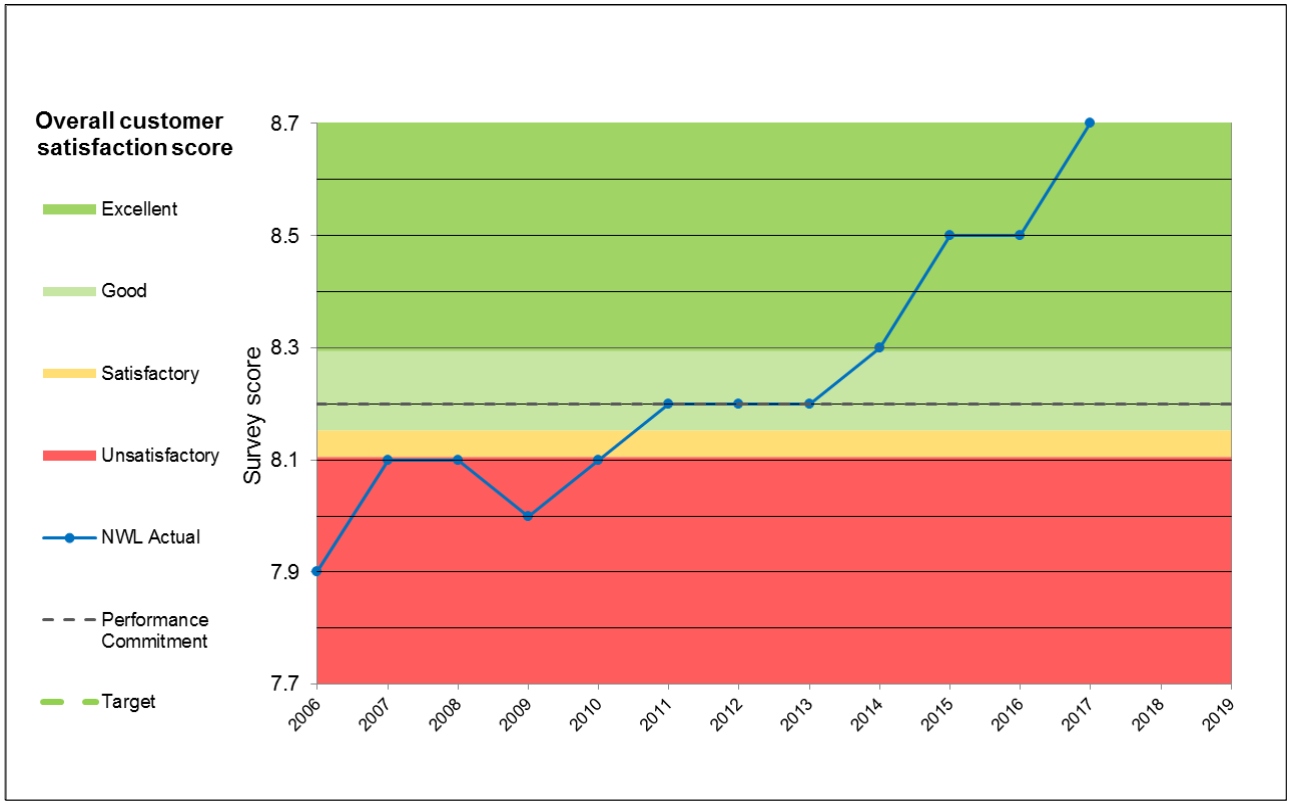
In November 2017, we were awarded “Self Assured” status by Ofwat indicating a very high degree of trust and confidence in Northumbrian Water. An element of this assessment was based on our Assurance Plan which was assessed as “Exceeds Expectations”.

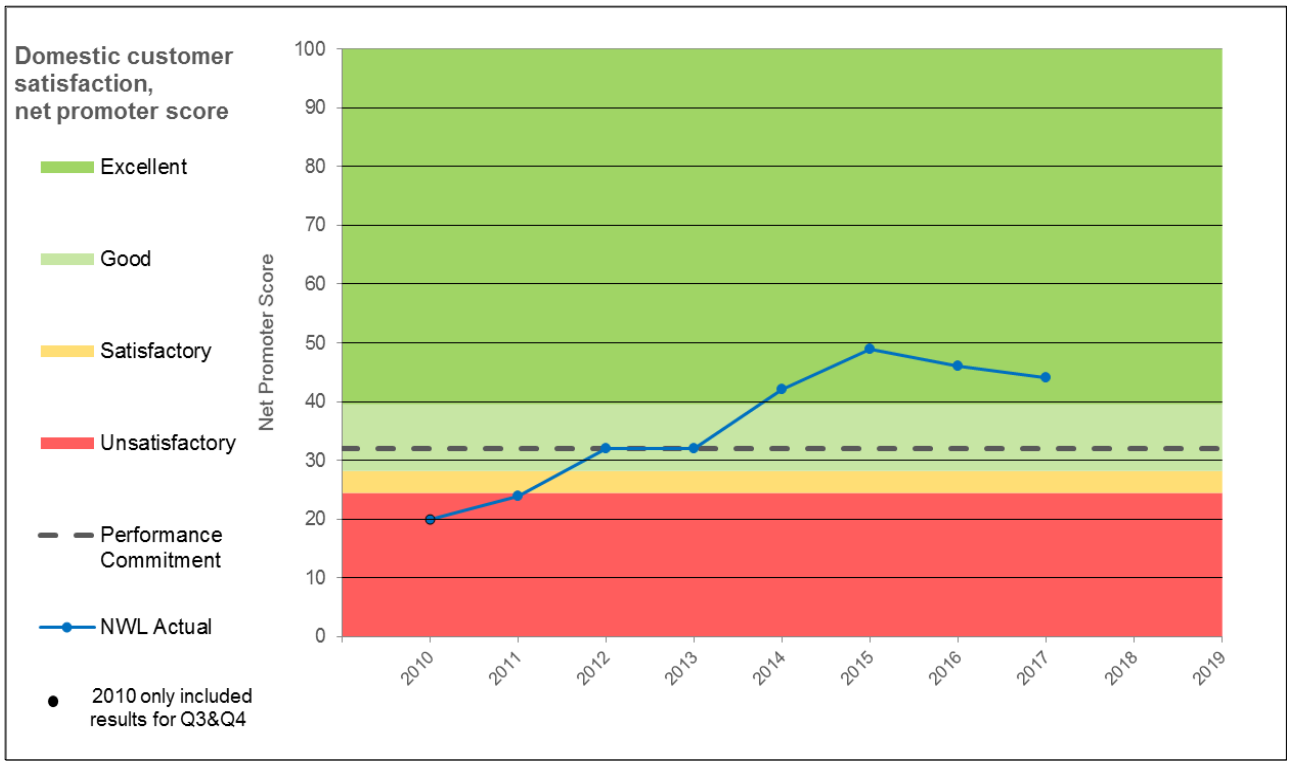
We will continue to improve our approach.

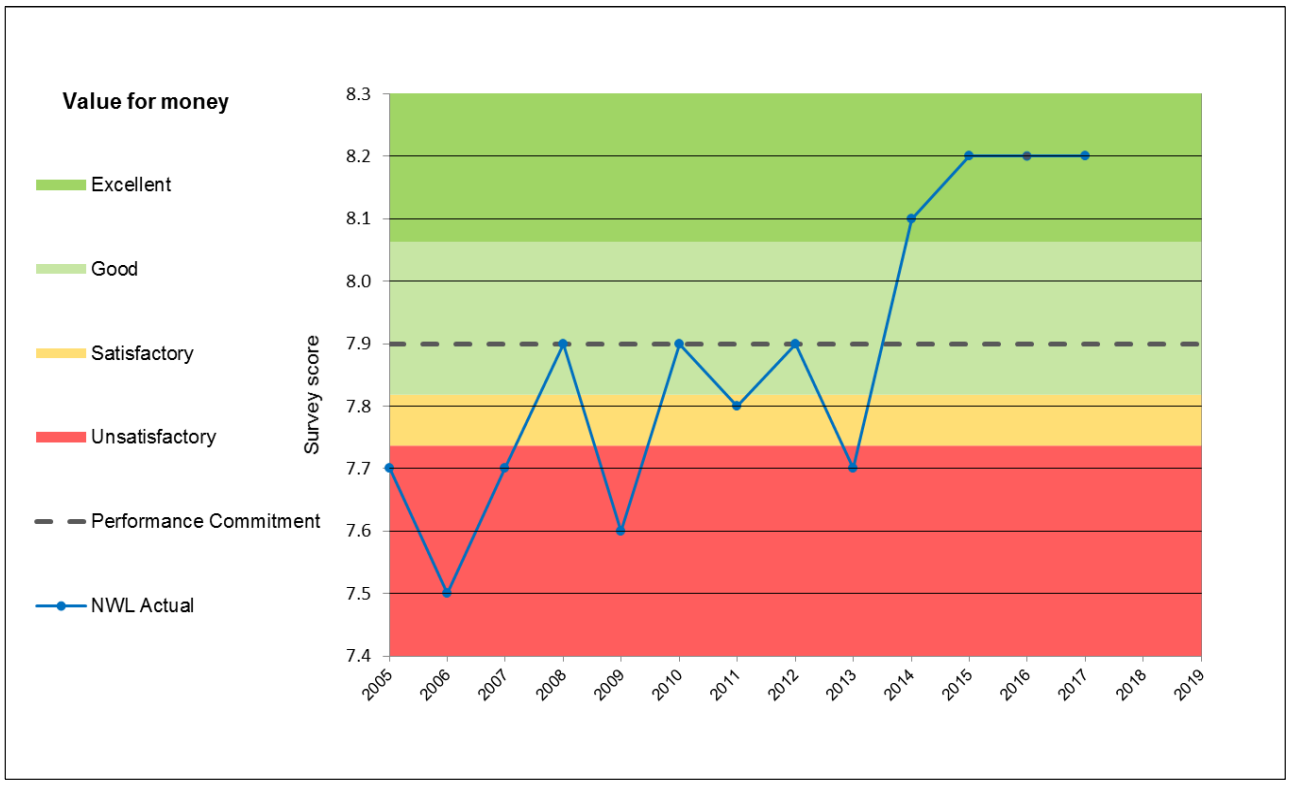
JIM STRANGE
Strategic Planning Manager

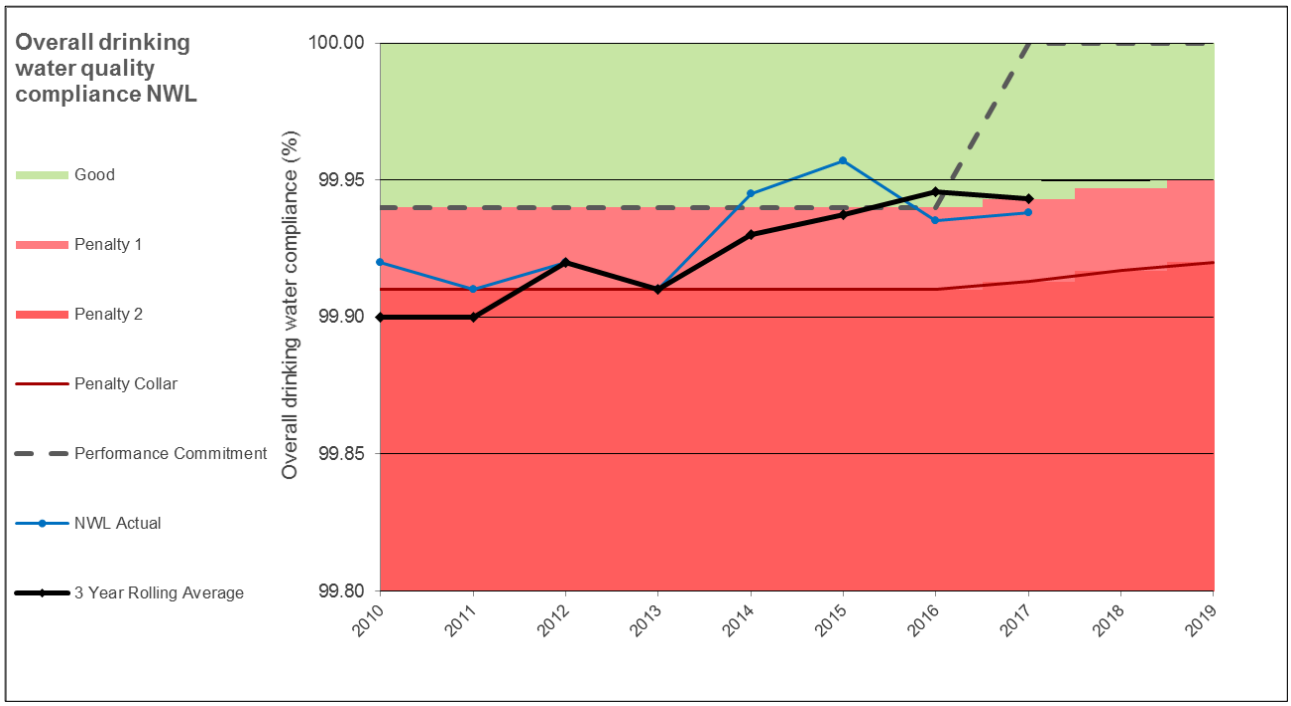
21 May 2018

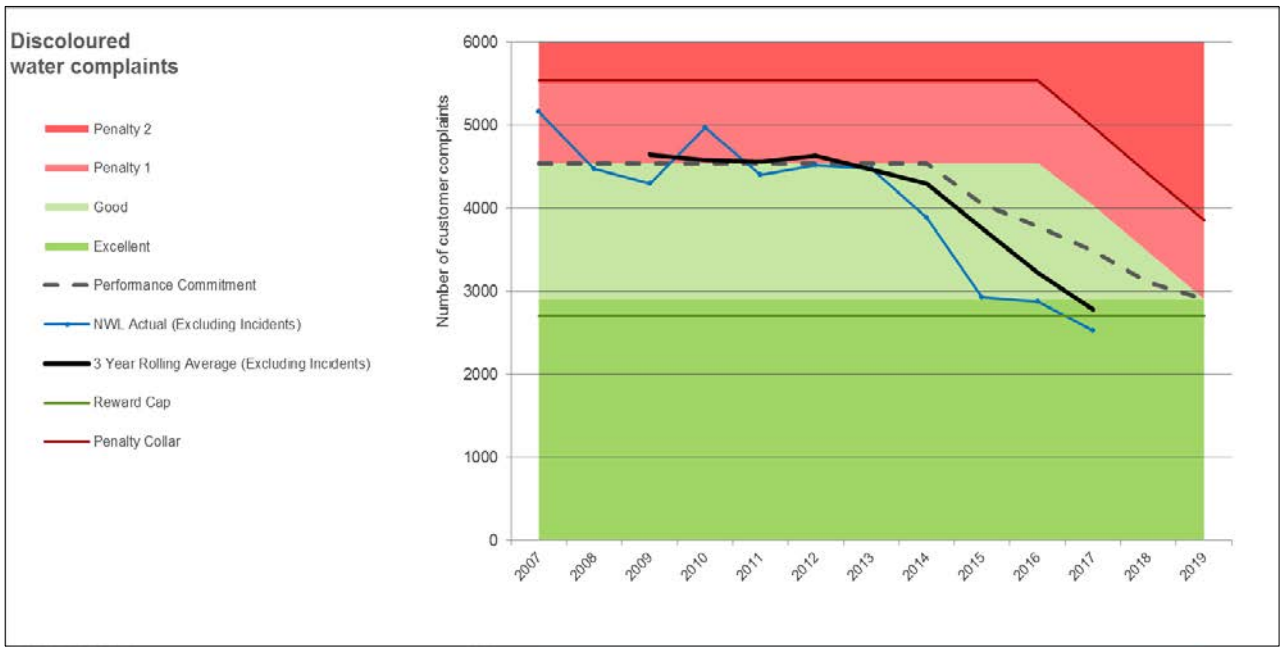

Service Incentive Mechanism (SIM)
SIM combined score
95
90
85
80
75
70
65
60
55
09/10
10/11
11/12
12/13
13/14
14/15
15/16
16/17
17/18
18/19
19/20
NWL Actual

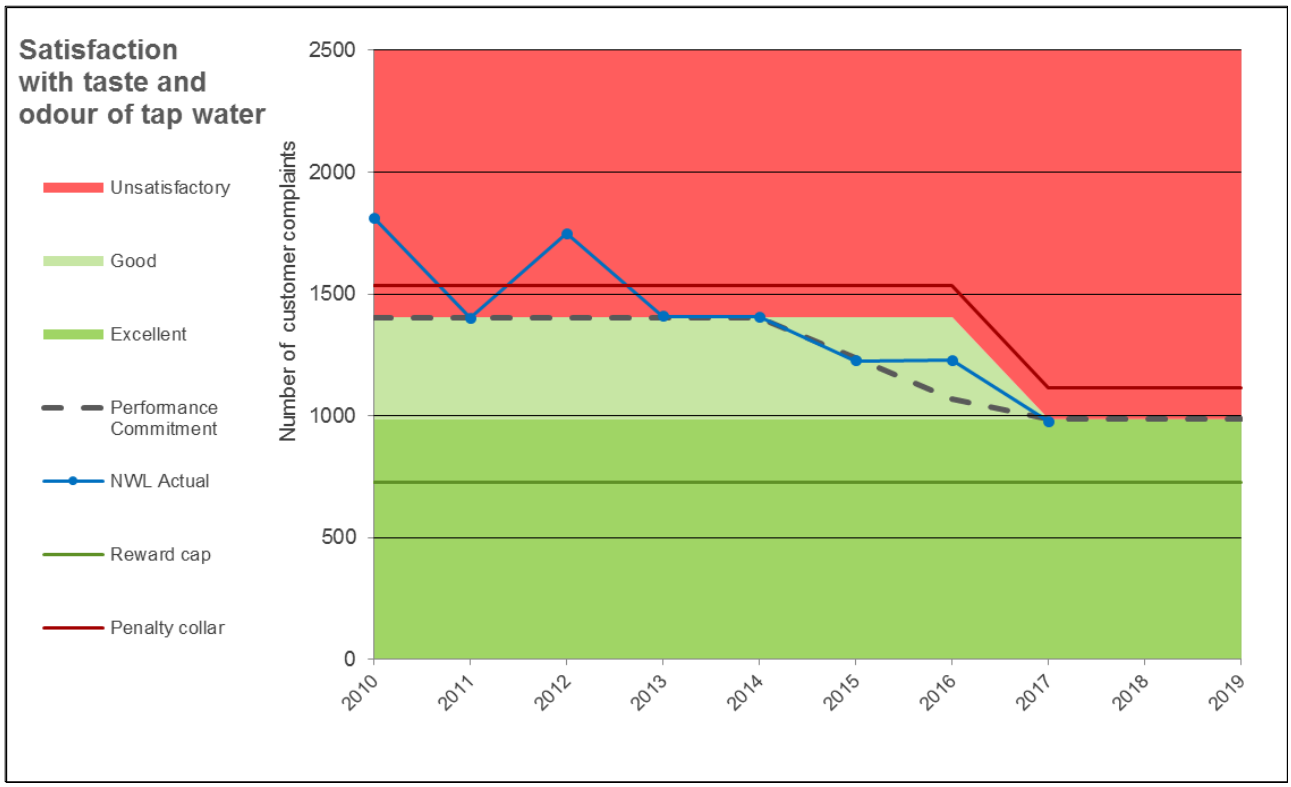

Overall customer satisfaction score
Survey score
8.7
8.5
8.3
8.1
7.9
7.7
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
Excellent
Good
Satisfactory
Unsatisfactory
NWL Actual
Performance Commitment
Target

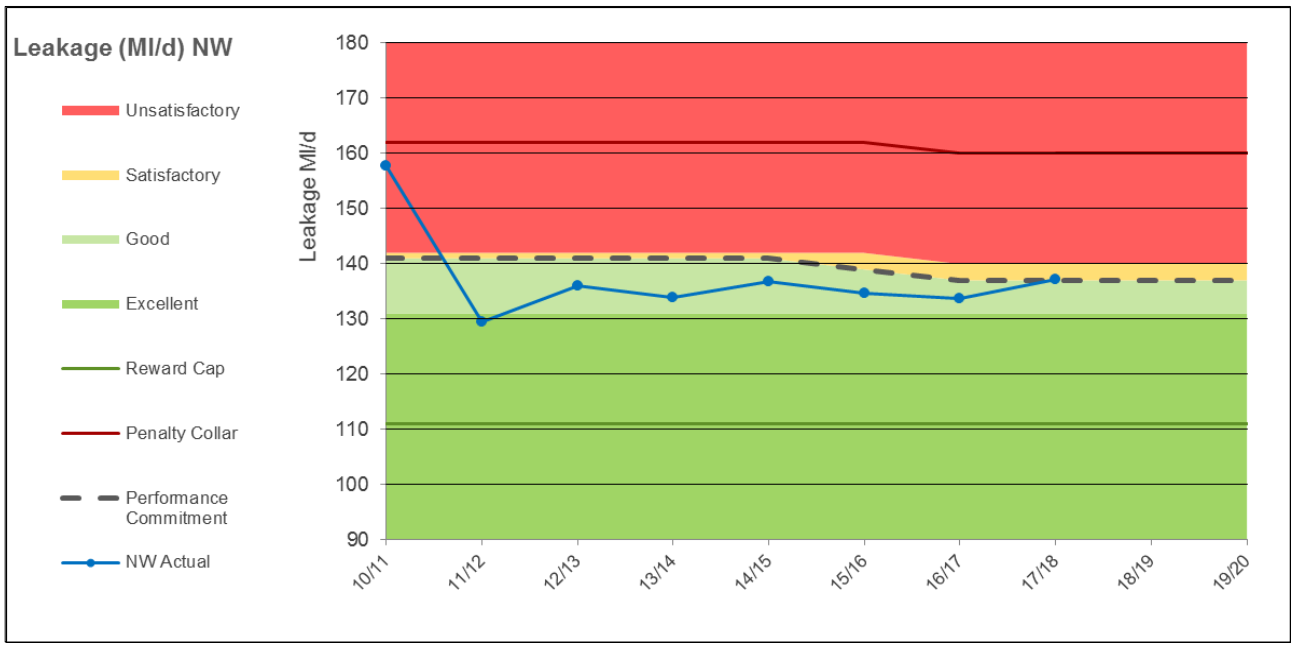

Domestic customer satisfaction, net promoter score
Excellent
Good
Satisfactory
Unsatisfactory
Performance Commitment
NWL Actual
2010 only included results for Q3&Q4
Net Promoter Score
100
90
80
70
60
50
40
30
20
10
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

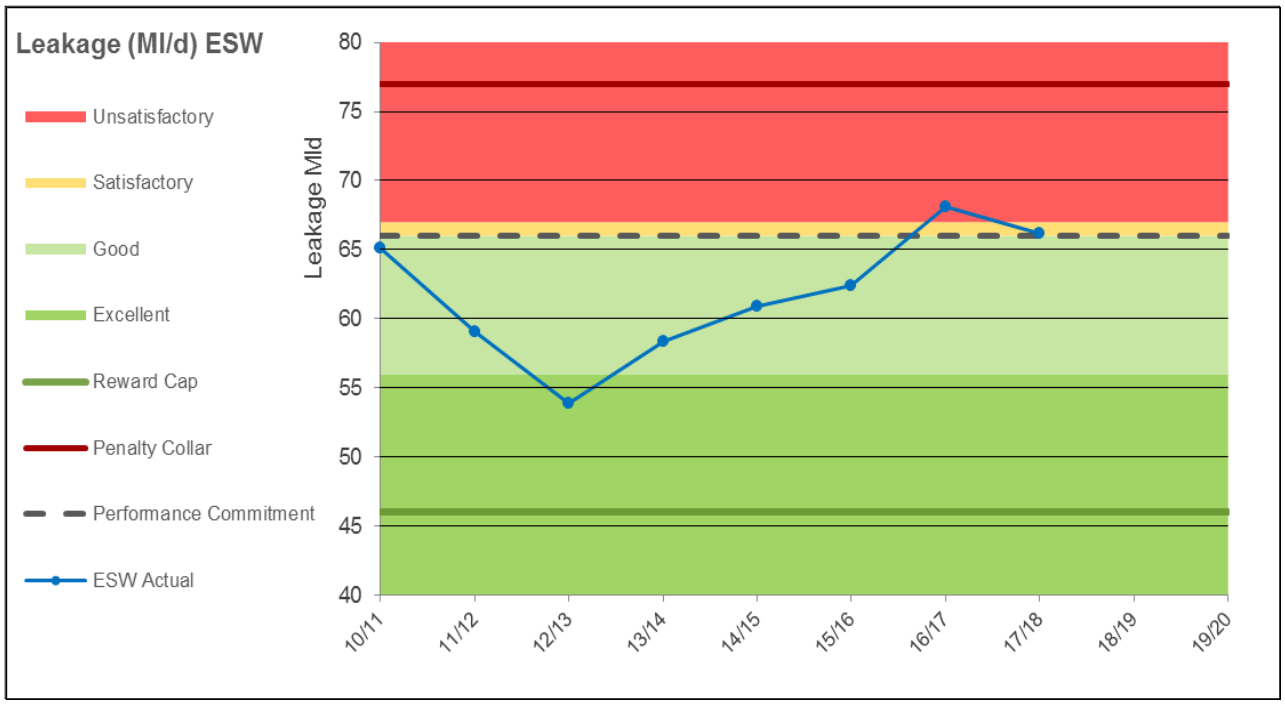

Value for money
Excellent
Good
Satisfactory
Unsatisfactory
Performance Commitment
NWL Actual
Survey score
8.3
8.2
8.1
8.0
7.9
7.8
7.7
7.6
7.5
7.4
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

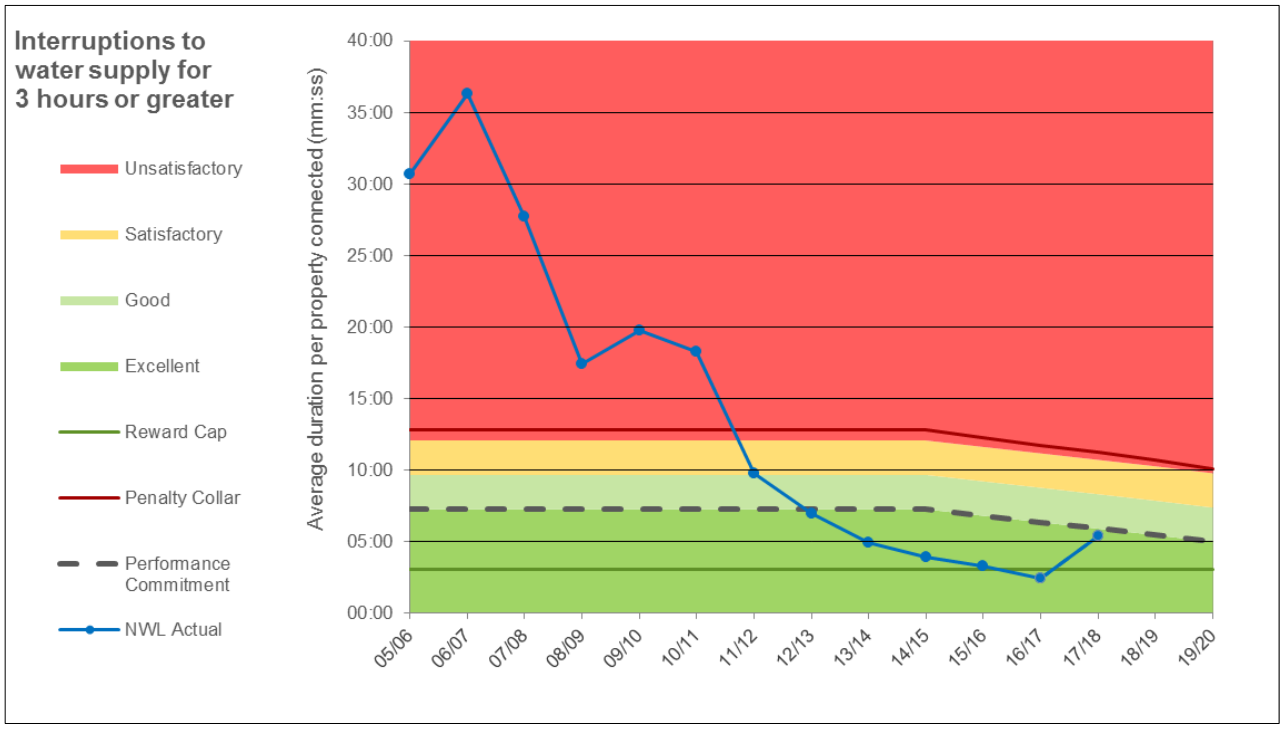

Overall drinking water quality compliance NWL
Good
Penalty 1
Penalty 2
Penalty Collar
Performance Commitment
NWL Actual
3 Year Rolling Average
Overall drinking water compliance (%)
100.00
99.95
99.90
99.85
99.80
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019


Discoloured water complaints
Penalty 2
Penalty 1
Good
Excellent
Performance Commitment
NWL Actual (Excluding Incidents)
3 Year Rolling Average (Excluding Incidents)
Reward Cap
Penalty Collar
Number of customer complaints
6000
5000
4000
3000
2000
1000
0
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019


Satisfaction with taste and odour of tap water
Unsatisfactory
Good
Excellent
Performance Commitment
NWL Actual
Reward cap
Penalty collar
Number of customer complaints
2500
2000
1500
1000
500
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019


Leakage (Ml/d) NW
Unsatisfactory
Satisfactory
Good
Excellent
Reward Cap
Penalty Collar
Performance Commitment
NW Actual
Leakage Ml/d
180
170
160
150
140
130
120
110
100
90
10/11
11/12
12/13
13/14
14/15
15/16
16/17
17/18
18/19
19/20


Leakage (Ml/d) ESW
Unsatisfactory
Satisfactory
Good
Excellent
Reward Cap
Penalty Collar
Performance Commitment
ESW Actual
Leakage Mld
80
75
70
65
60
55
50
45
40
10/11
11/12
12/13
13/14
14/15
15/16
16/17
17/18
18/19
19/20


Interruptions to water supply for 3 hours or greater
Unsatisfactory
Satisfactory
Good
Excellent
Reward Cap
Penalty Collar
Performance Commitment
NWL Actual
Average duration per property connected (mm:ss)
40:00
35:00
30:00
25:00
20:00
15:00
10:00
05:00
00:00
05/06
06/07
07/08
08/09
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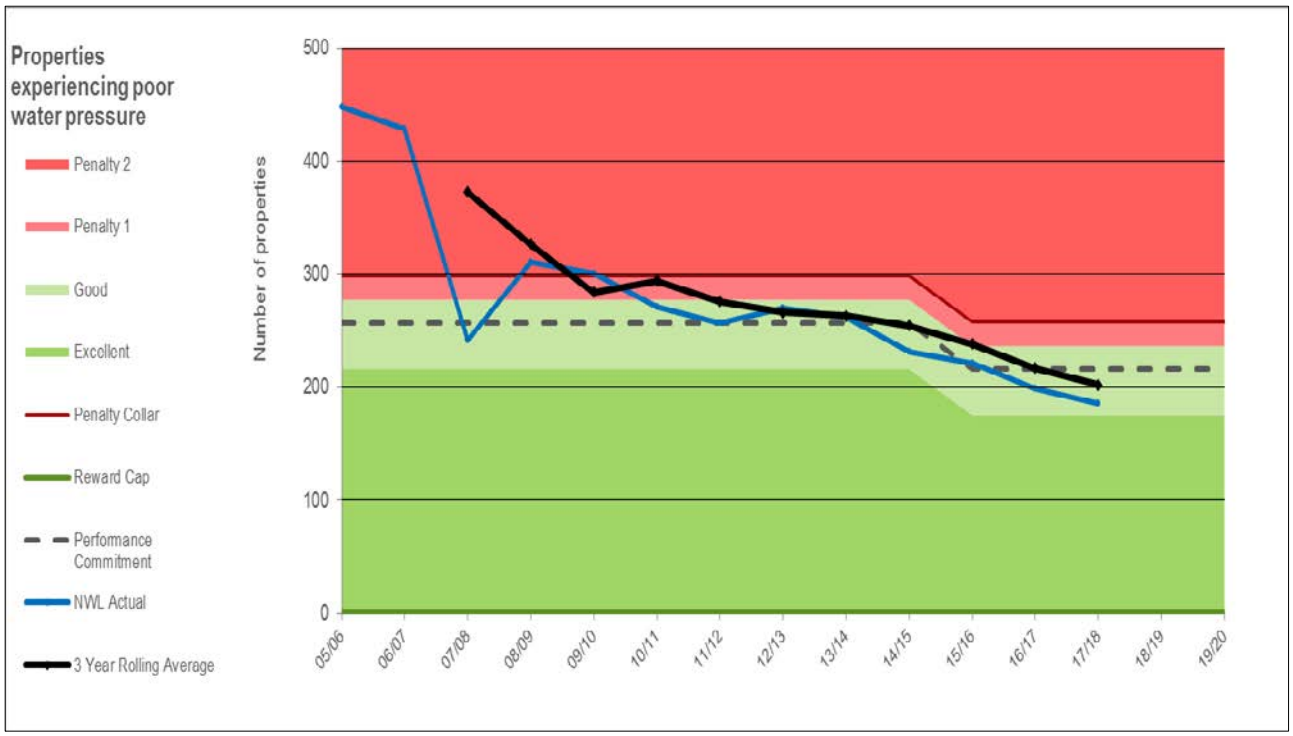
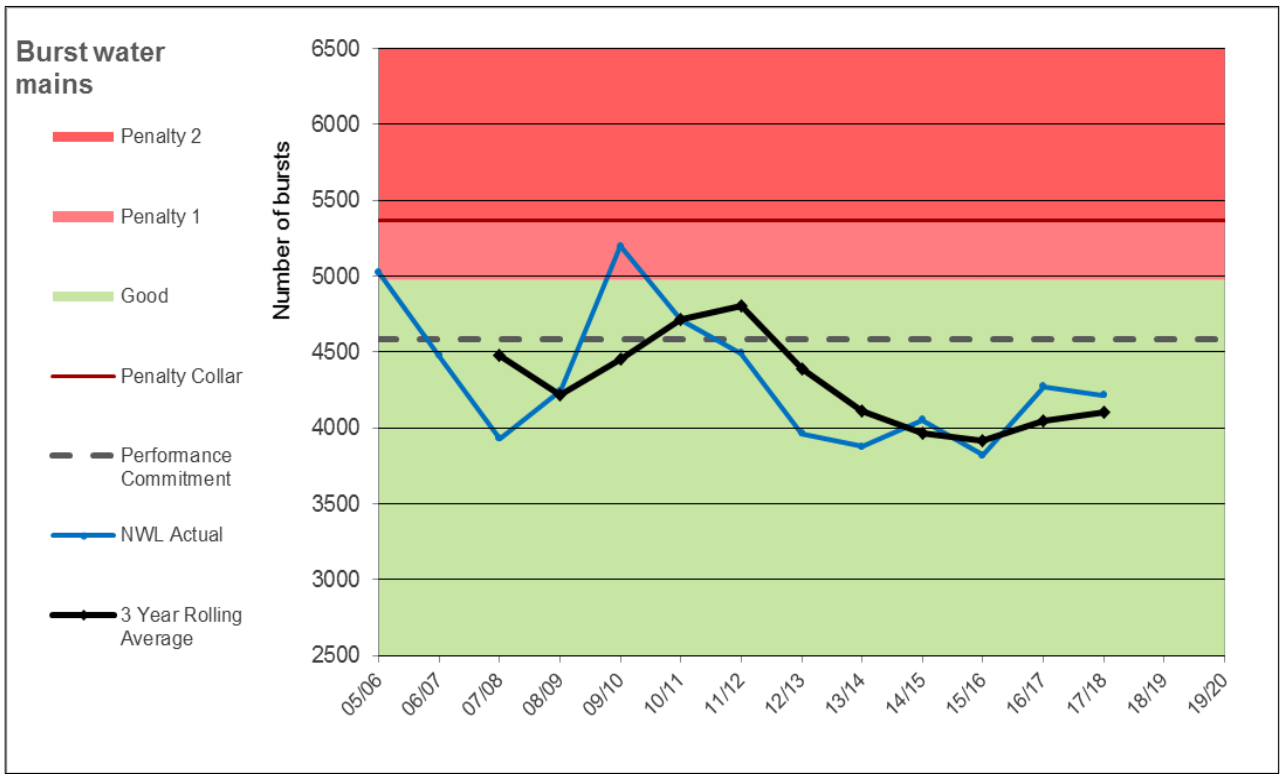
12/13
13/14
14/15
15/16
16/17
17/18
18/19
19/20


Properties experiencing poor water pressure
Penalty 2
Penalty 1
Good
Excellent
Penalty Collar
Reward Cap
Performance Commitment
NWL Actual
3 Year Rolling Average
Number of properties
500
400
300
200
100
0
05/06
06/07
07/08
08/09
09/10
10/11
11/12
12/13
13/14
14/15
15/16
16/17
17/18
18/19
19/20


Burst water mains
Penalty 2
Penalty 1
Good
Penalty Collar
Performance Commitment
NWL Actual
3 Year Rolling Average
Number of bursts
6500
6000
5500
5000
4500
4000
3500
3000
2500
05/06
06/07
07/08
08/09
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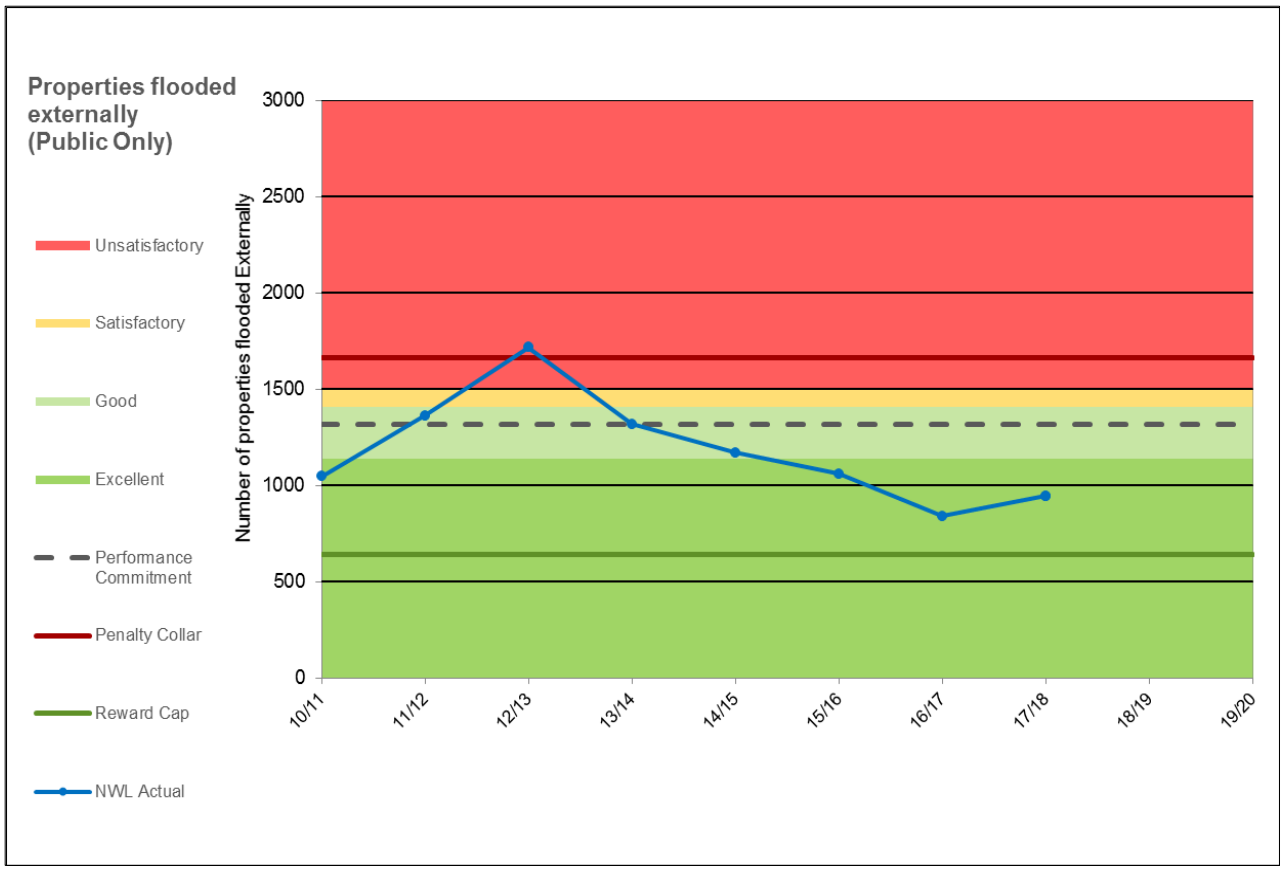
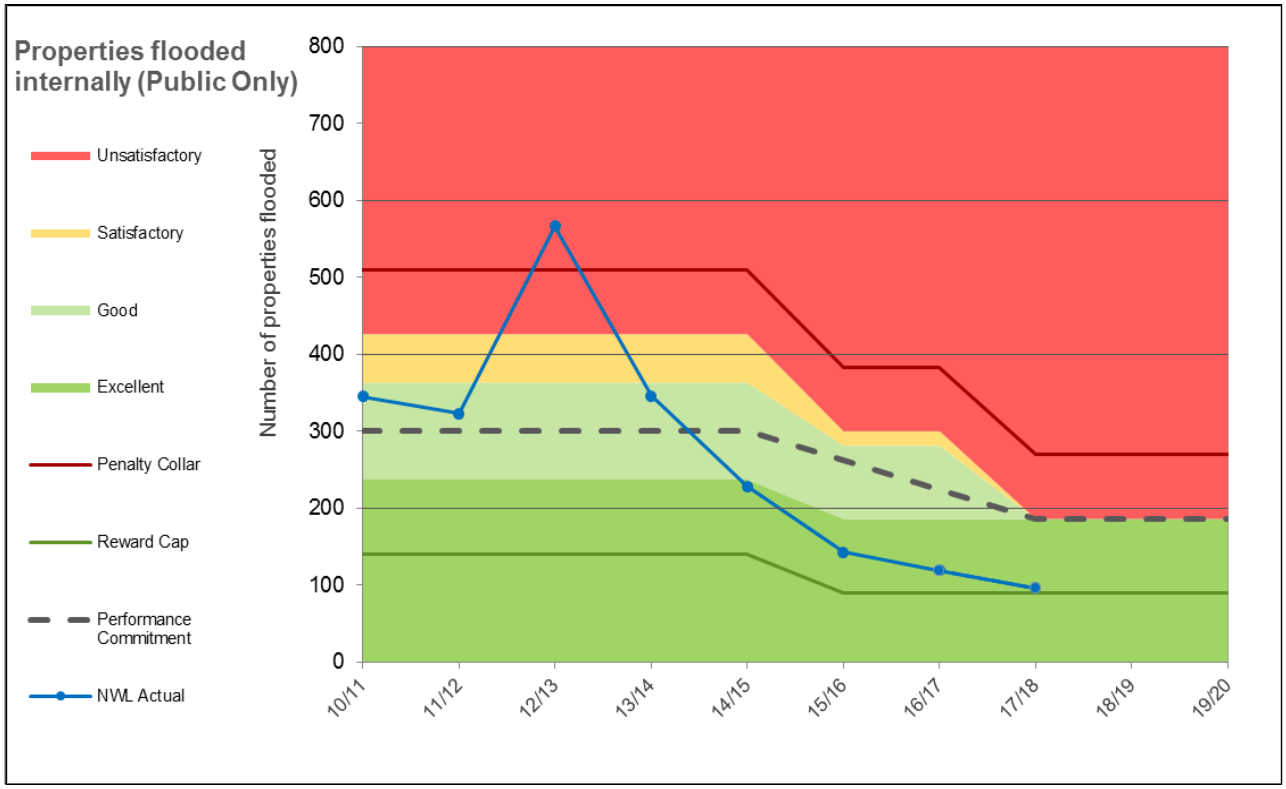
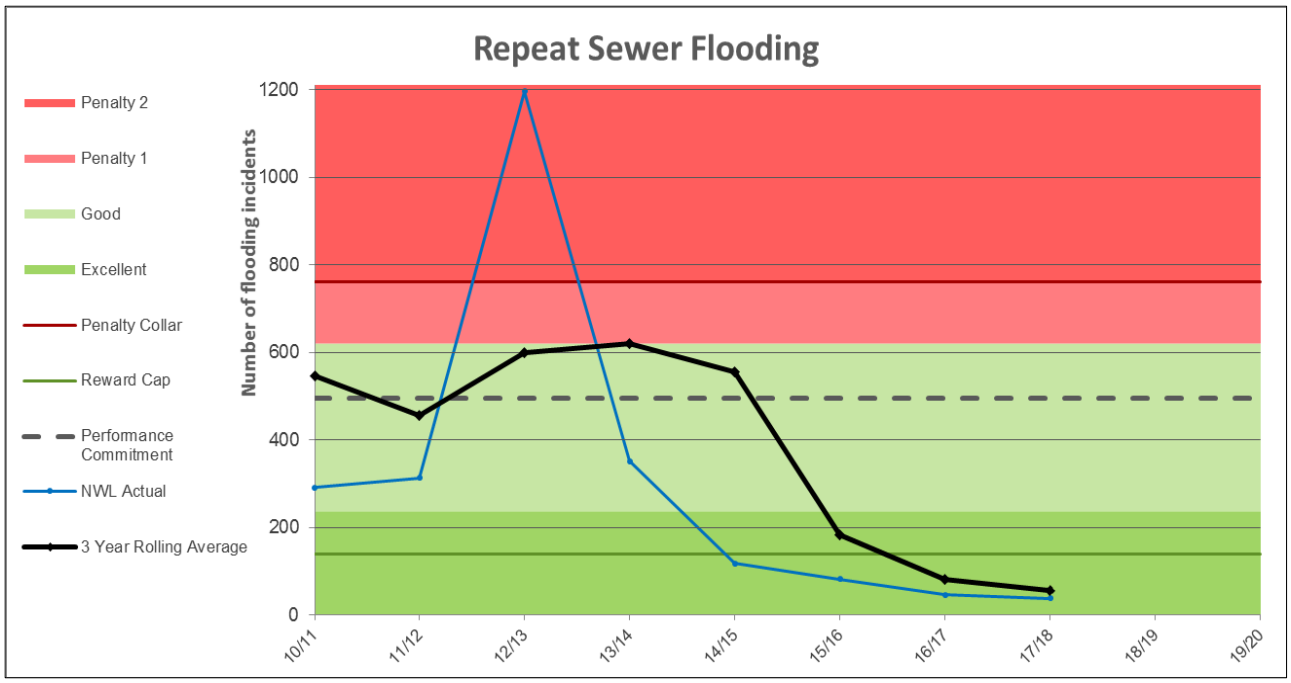
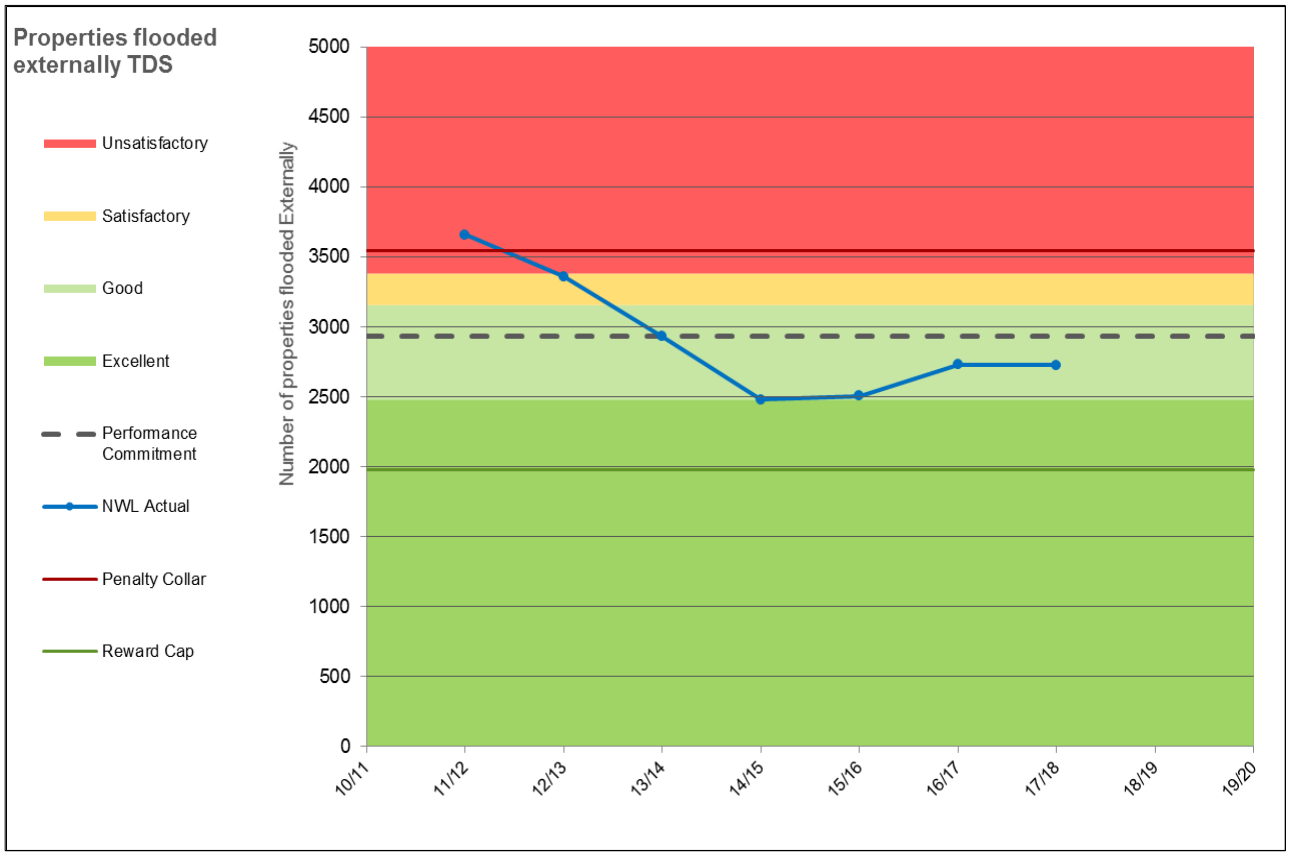
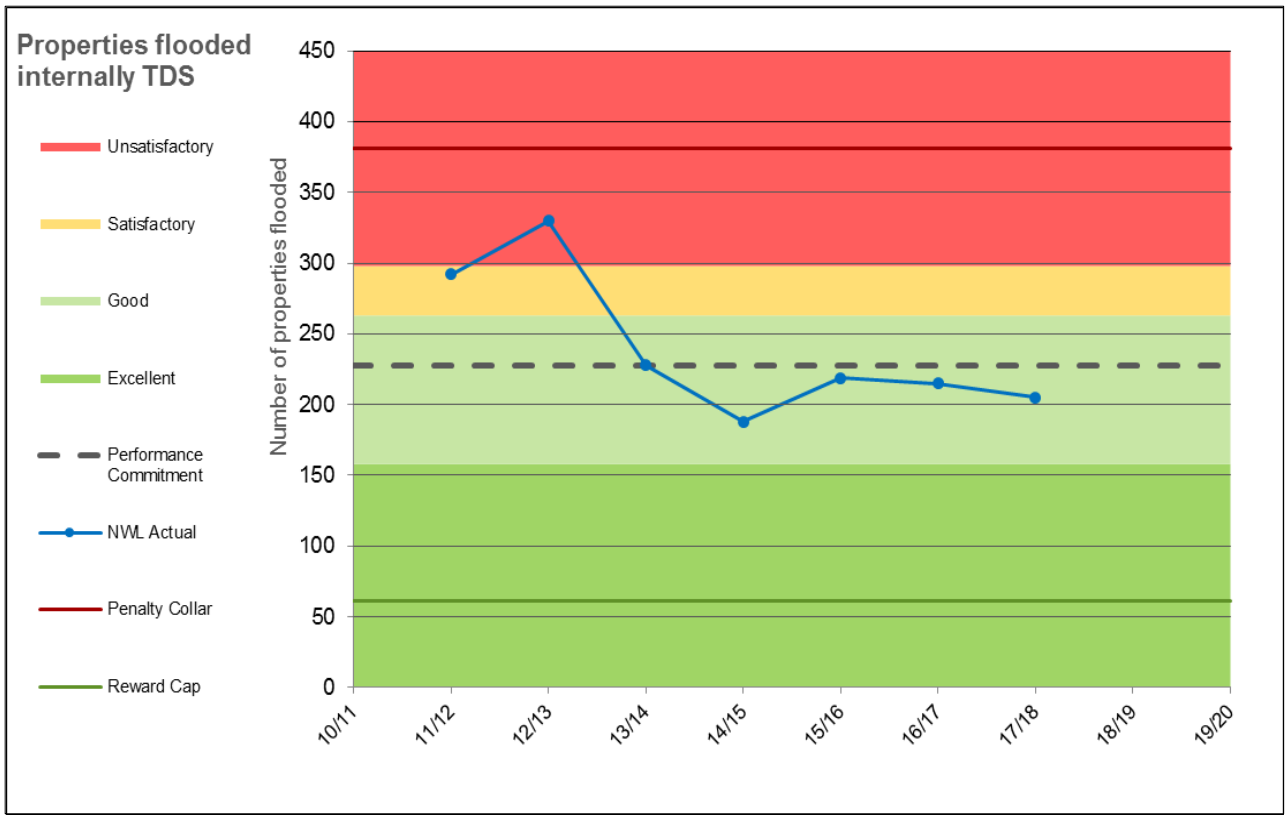
12/13
13/14
14/15
15/16
16/17
17/18
18/19
19/20

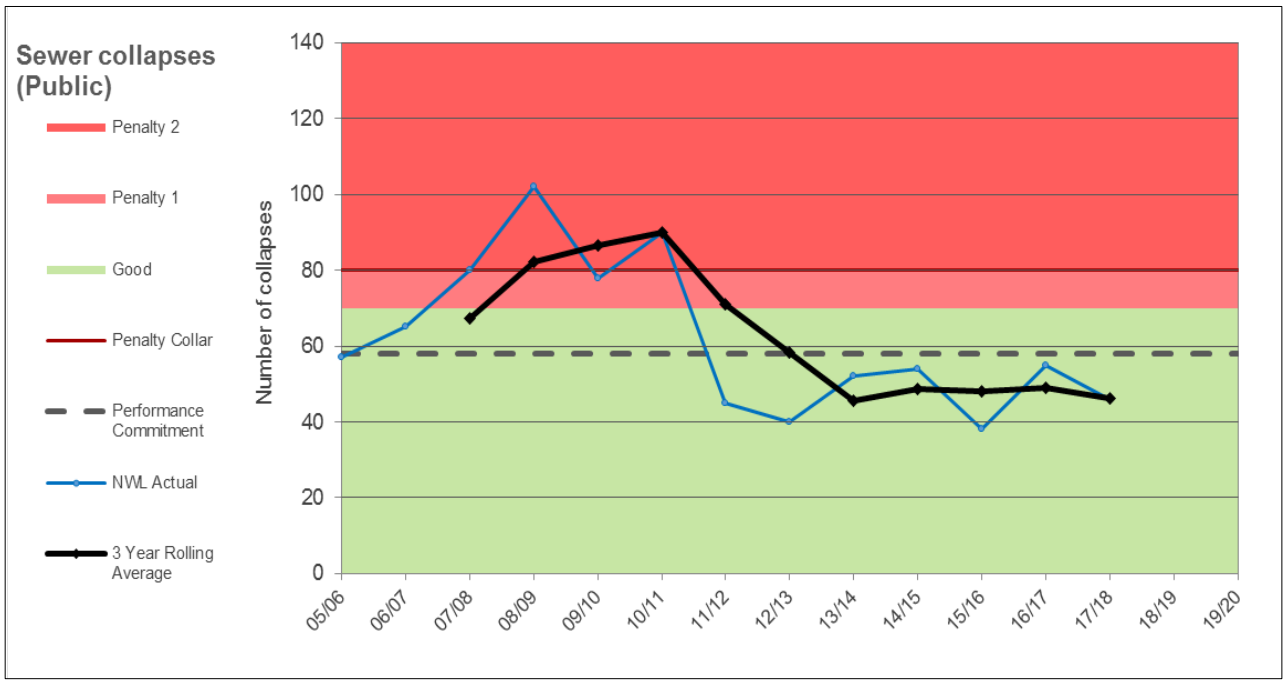

Properties flooded externally (Public Only)
Unsatisfactory
Satisfactory
Good
Excellent
Performance Commitment
Penalty Collar
Reward Cap
NWL Actual
Number of properties flooded Externally
3000
2500
2000
1500
1000
500
0
10/11
11/12
12/13
13/14
14/15
15/16
16/17
17/18
18/19
19/20


Properties flooded internally (Public Only)
Unsatisfactory
Satisfactory
Good
Excellent
Penalty Collar
Reward Cap
Performance Commitment
NWL Actual
Number of properties flooded
800
700
600
500
400
300
200
100
0
10/11
11/12
12/13
13/14
14/15
15/16
16/17
17/18
18/19
19/20


Repeat Sewer Flooding
Penalty 2
Penalty 1
Good
Excellent
Penalty Collar
Reward Cap
Performance Commitment
NWL Actual
3 Year Rolling Average
Number of flooding incidents
1200
1000
800
600
400
200
0
10/11
11/12
12/13
13/14
14/15
15/16
16/17
17/18
18/19
19/20


Properties flooded externally TDS
Unsatisfactory
Satisfactory
Good
Excellent
Performance Commitment
NWL Actual
Penalty Collar
Reward Cap
Number of properties flooded Externally
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
10/11
11/12
12/13
13/14
14/15
15/16
16/17
17/18
18/19
19/20


Properties flooded internally TDS
Unsatisfactory
Satisfactory
Good
Excellent
Performance Commitment
NWL Actual
Penalty Collar
Reward Cap
Number of properties flooded
450
400
350
300
250
200
150
100
50
0
10/11
11/12
12/13
13/14
14/15
15/16
16/17
17/18
18/19
19/20


Sewer collapses (Public)
Penalty 2
Penalty 1
Good
Penalty Collar
Performance Commitment
NWL Actual
3 Year Rolling Average
Number of collapses
140
120
100
80
60
40
20
0
05/06
06/07
07/08
08/09
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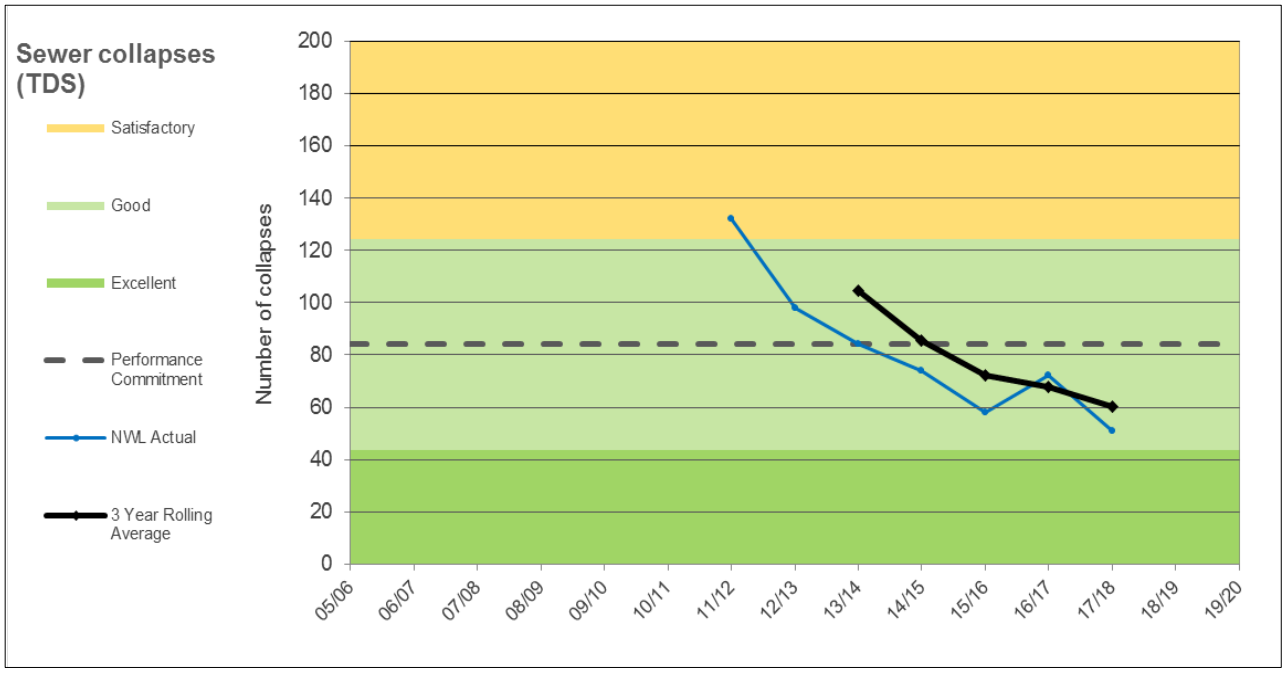
12/13
13/14
14/15
15/16
16/17
17/18
18/19
19/20


Sewer collapses (TDS)
Satisfactory
Good
Excellent
Performance Commitment
NWL Actual
3 Year Rolling Average
Number of collapses
200
180
160
140
120
100
80
60
40
20
0
05/06
06/07
07/08
08/09
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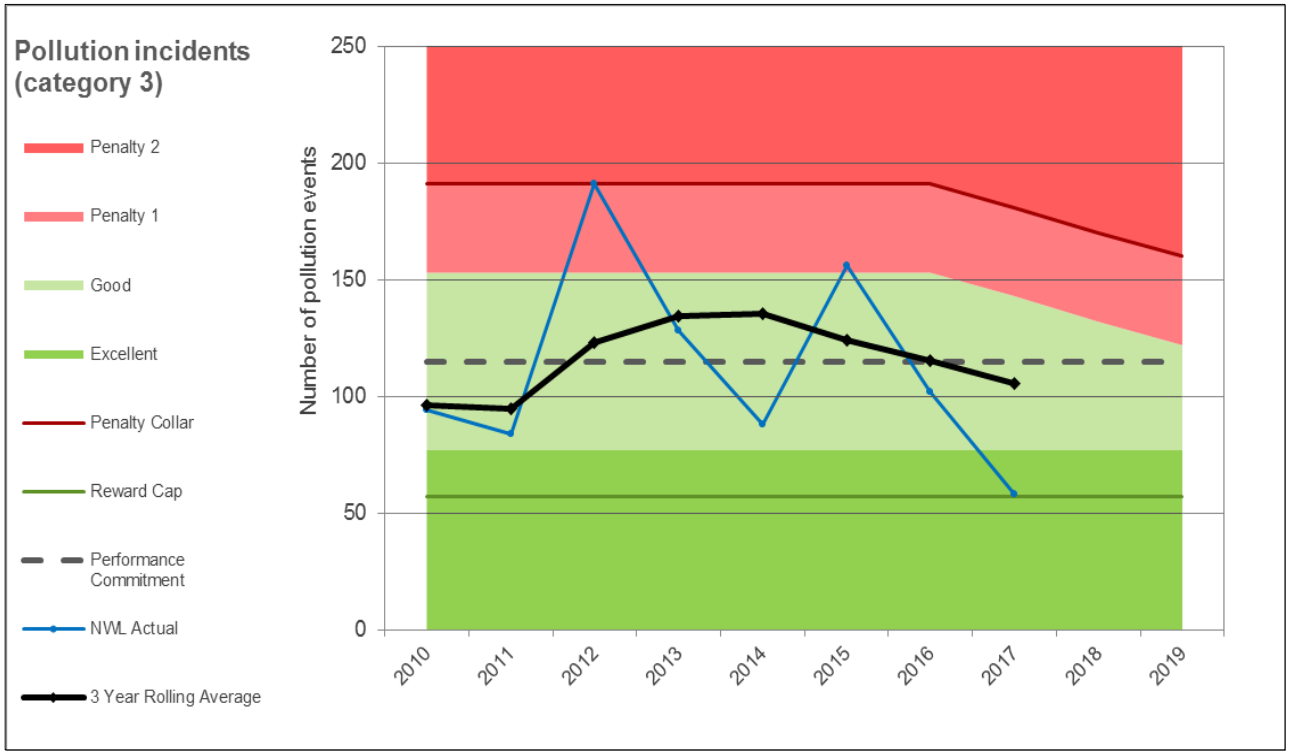
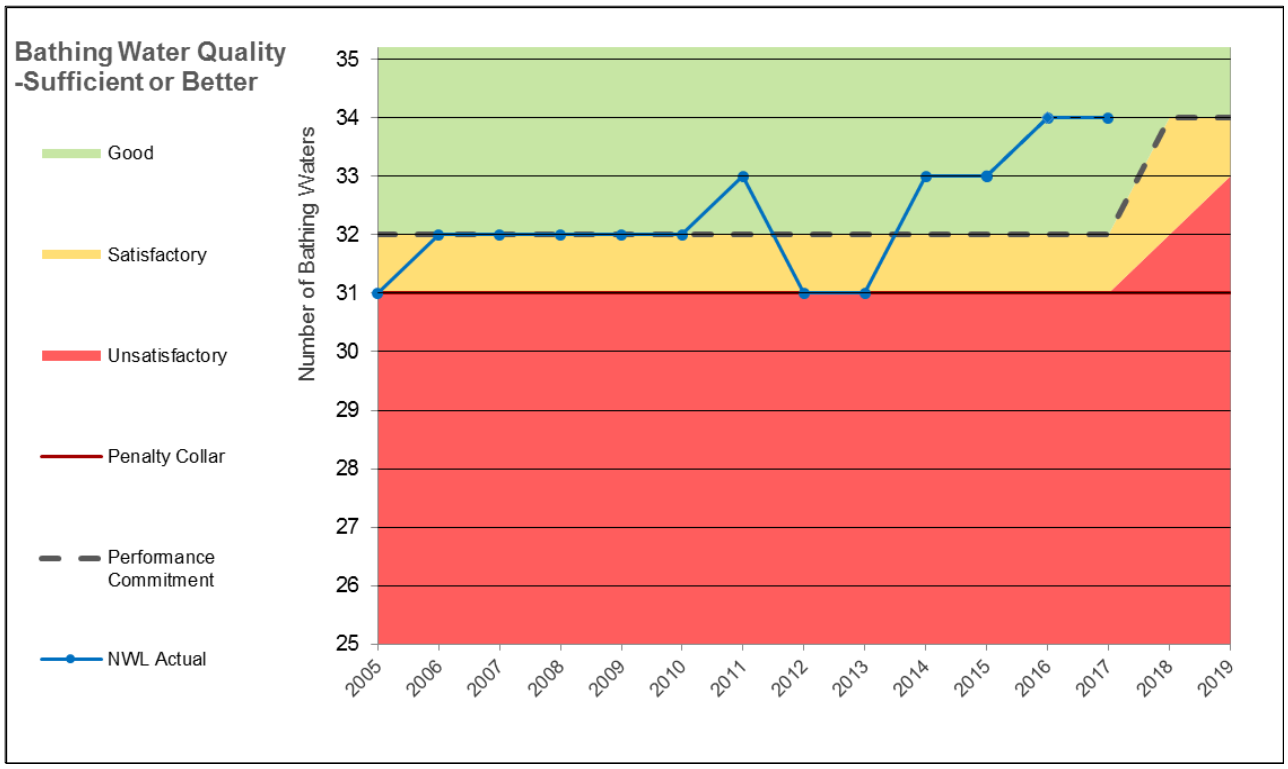
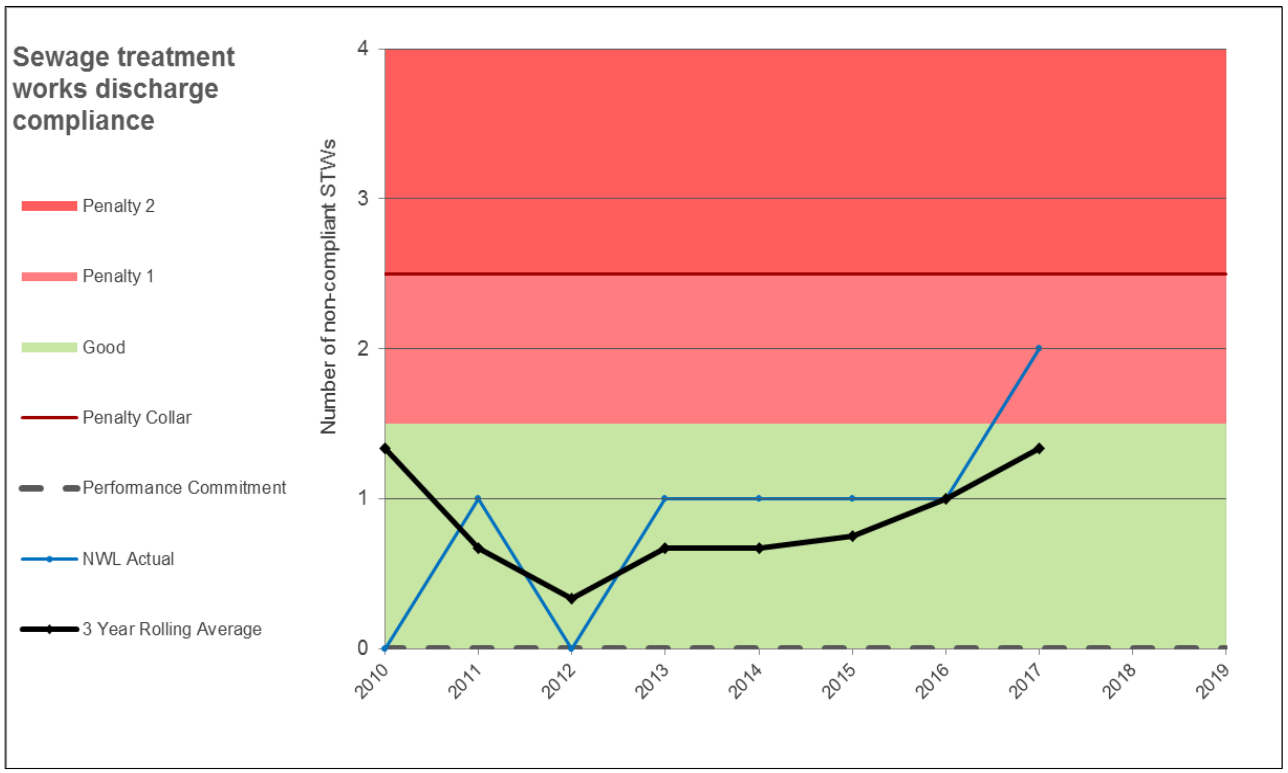
14/15
15/16
16/17
17/18
18/19
19/20


Pollution incidents (category 3)
Penalty 2
Penalty 1
Good
Excellent
Penalty Collar
Reward Cap
Performance Commitment
NWL Actual
3 Year Rolling Average
Number of pollution events
250
200
150
100
50
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019


Bathing Water Quality -Sufficient or Better
Good
Satisfactory
Unsatisfactory
Penalty Collar
Performance Commitment
NWL Actual
Number of Bathing Waters
35
34
33
32
31
30
29
28
27
26
25
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019


Sewage treatment works discharge compliance
Penalty 2
Penalty 1
Good
Penalty Collar
Performance Commitment
NWL Actual
3 Year Rolling Average
Number of non-compliant STWs
4
3
2
1
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019

Request for Information – review of freeze/thaw events

Response from Northumbrian Water Group

Further to the request for information from Ofwat on 19 March 2018, this is the response for Northumbrian Water Group (NWG).

NWG operates in three unconnected geographic areas, each with different physical and operational characteristics. During the events of 27 February to 10 March, these differences were highlighted with the markedly different responses to the effects of the weather.

This response looks to demonstrate those differences and highlight the lessons learned which may be applied elsewhere. Accordingly, where the requested data is available split between the Northumbrian and Essex & Suffolk regions, it is provided, and where we have figures only for the whole company (lines 28-36) it is shown in its aggregated form. Therefore there are five sheets included in the data return.

Overview

We are pleased to confirm that throughout the period, our customers experienced no major disruption, although operationally there were many challenges to overcome. In very general terms these were largely down to the very rapid thaw experienced in Suffolk and Essex and the consequent need to reduce leakage, especially on the customer side, and access to water treatment works in the Northumbrian and Suffolk areas, where some sites could not be reached by vehicles for a number of days.

To ensure we could cover all of our operational activities, we had made arrangements in advance for our people to stay at local hotels, other employees' houses and, in one case, at a water treatment works for 3 days, as well as hiring in extra 4x4 vehicles.

Whilst all areas of the UK experienced severe weather, the evidence is that the north-east of England had some of the worst, with many people including our managers and front line not being able to leave their houses. Indeed, several of the pictures used in the national media were from County Durham to recognise how difficult the conditions were.

The photographs on the following pages provide some context to the conditions that our people were dealing with to ensure all of our customers remained on supply.

Wooler, Northumberland, Near Fowberry

Murton, WTWs Berwick

Access to Honey Hill WTWs
(snow up to roof line of houses)

Bleakridge, Northumberland

(this is the road and fence line)

Teesdale

Access route to Barsham WTWs, Suffolk

Lound WTWs, Suffolk

This response is structured in line with the information request and then concluded with our view as to why Northumbrian Water fared better than many other companies.

Section A: Factual details of freeze/thaw events

*A1. Provide details of the impacts of events on your network / customers using the **attached tables** (please complete both sheets). We are requesting information from the period 14 February 2018 to 14 March 2018. Please specify on which dates your company considered it was managing events rather than business as usual (the end date should be no earlier than all customers being back on supply). If you consider it appropriate, you may extend the date range (e.g. to the start of February) and explain why additional dates are relevant. You may not reduce the date range.*

Data is provided on the attached spreadsheet. The event for NWG started on Wednesday 28 February with preparations well underway several days beforehand to ensure all our water treatment works (WTWs) were ready to produce the expected increase in quantity of water. The event was concluded on Saturday 10 March. However, as the weather conditions were so well forecast, the preparation was in place a week in advance. We didn't actually trigger our full incident management processes, although the event management had to be co-ordinated closely as there were many events which could have escalated, and the issues were different in each geographic area.

A2. Beyond the issues highlighted in Tables 1 and 2, please provide details of any further impacts your network or customers (by customer type) experienced that your company had to respond to?

Despite a notable increase in bursts during the freeze thaw period, there were minimal customer impacts over and above those we would experience during normal operations, on a day to day basis. Our team mind set is to focus on maintaining supplies and to keep water flowing to our customers in line with our industry leading interruptions to supply performance.

In our Northumbrian region, only 0.10% of our customers experienced supply interruptions and in Essex and Suffolk 0.63%. The vast majority of supplies were fully restored within four hours thus minimising disruption.

In our Northumbrian region, only one event was greater than four hours. This was a scenario in rural Northumberland which affected 41 customer properties intermittently over a four day period. Customers experienced low pressure and no water at peak times due to an air-locked trunk main. Heavy snow and drifting prevented access to pipework to resolve the problem and our team remained in regular contact with customers providing updates on the situation and supplying a bowser and bottled water.

In the Essex and Suffolk regions, 93% of our customers experiencing supply interruptions were restored within four hours. We experienced 16 events

greater than four hours, affecting 363 properties in total, and of these 82% of properties were restored within six hours.

Events of note include a burst on a pipe length, scheduled for imminent renewal which affected 182 properties. Through rezoning and repair all customers were restored in under six hours.

One event affected 34 properties for just over seven and a half hours and required an immediate shut down.

A further event affecting 21 properties for just over twelve hours was caused by multiple bursts on the same pipe. Hazardous working conditions which, as always, made the health and safety of our repair team a priority caused us to take longer than would have been the case in normal conditions.

In Essex, only two separate properties were affected for over 24 hours in duration. Initially thought to be private pipework issues, they were later found to be a result of our own network problems. Both customers promptly received our apologies and compensation payments.

The only other issue worthy of note is that one burst main led to a road being under-mined and needing reconstruction. This was the A414 in Danbury in Essex which was closed to traffic for two days.

The main challenges for NWG and our customers related to getting around our areas with numerous major roads closed for extended periods and hazardous travelling conditions.

Additionally, our wastewater service encountered similar access issues and during the thaw period, many alarms were received by our Regional Control Centre causing difficulties for resourcing, which we overcame.

A3. Details of how responding to the incident impacted on your wider business's "business as usual" operations during the incident period. Where possible provide an indication of the scale and nature of these impacts.

For three days we were only able to carry our emergency work, so planned activities (e.g. meter installations) were cancelled. About 100 non-urgent customer appointments were subsequently rescheduled and our customers were particularly understanding given the prevailing weather conditions.

Our virtual customer centre which handles all billing and account related enquiries at sites in Durham and Lowestoft also operated reduced opening hours between 28 February and 3 March. This was primarily for safety reasons as travelling conditions were treacherous and it was often impossible for our advisors to make journeys to work. Childcare was also difficult for many advisors as the vast majority of schools across our regions were closed for at least two days. We used communication channels such as our websites, telephony line messaging and social media to keep customers informed and

provide details of alternative options for services such as making payments, leaving meter reads etc.

A4. What have you judged to be the cause of the issues, particularly water supply interruptions, for your customers (by customer type) during this period? What factors were relevant?

As there was no significant impact on our customers, the specific question is not relevant to NWG. However, the main factors that cause difficulties in such circumstances are:

- The speed of the thaw (and the need to find leaks quickly –especially those on the customers side which can often be in factories and industrial units as well as gardens – and to increase water treatment works outputs very rapidly whilst ensuring water quality is not compromised)
- The potential for rezoning (when big burst mains happen, the ability to quickly identify how to operate the right valves to move water to keep customers on supply)
- The ability to access sites (where snow drifts can limit access to vehicles, and for extended periods, chemical deliveries could be compromised)
- Heavy and drifting snow which caused travel disruption and access issues
- The risk of SCADA and telemetry links failing due to phone and mobile network issues.
- The use of technology to monitor and observe what is happening in the network and to help target appropriate interventions
- Our Regional Control Centre was under significant pressure. It covers both water and wastewater services and during the thaw we also received many thousands of alarms from the wastewater operations.

Section B: Planning and preparation

B1. How did your established processes for gathering intelligence and insight into the potential effects of forecast bad weather on your network help you to prepare for this event? Did they highlight any particular risks and what did you do to mitigate these? (e.g. network preparation, communications with customers, increased engineering or call centre resources) Did you share insights with other utilities/services?

NWG has tried and tested processes for preparing for such events. Historically these events have not been so unusual, and the winter of 2010/11 in particular, resulted in several lessons that we have since consistently applied. Whilst this is the first severe weather event since then, we have, for example, retained a rigorous approach to winter planning. This includes ensuring we have sufficient headroom in our water treatment capacity, and limiting the number of process units or strategic storage tanks, that are out of supply for maintenance or enhancement. We do currently have a major programme of WTWs enhancement ongoing in the Northumbrian region and as the event was towards the end of our winter planning period, we did have slightly less headroom than we would have liked, although this did not result in major difficulties.

The preparation in the week beginning 26 February included arranging transport, manpower plans and chemical deliveries, and getting treatment capacity increased to ensure we reached target storage before the worst of the weather arrived.

We also hired in 4x4 vehicles and have a contract in place to secure them given the demand increases during severe weather events.

A simple example of the preparation in place is shown in this photograph. It is at Barsham WTWs in Suffolk where the rapid gravity filter valves were lagged as they are known to be prone to freezing.

We routinely advise our customers on matters such as water efficiency, ways they can lag their pipes in readiness for winter, and to watch out for and report leaks. This communication continued throughout the severe weather period, however we strongly disagreed with the approach in other areas of the country that customers should be requested to use less water specifically at this time. Our belief is that this would convey a level of panic and result in some customers 'stock-piling' water, thus leading to higher demand.

B2. What impact, if any, did your preparation have on your ability to handle this event? What role did your Executive take in preparing for these severe events?

Ensuring WTWs capacity and increased storage in advance of the expected increase in demand enabled us to delay potential impacts on customers for a number of days. In practice, as our response to the rapid thaw was so effective, there was no concern for supplies at any point. The Water Director was involved throughout, but not in the decisions relating to preplanning as these activities are engrained in our operational teams.

In a similar manner, our Customer Director received regular updates regarding customer service and contact operations and was available to provide guidance throughout.

The Chief Executive Officer was briefed regularly through each day and the Board was informed of progress as appropriate.

B3. What emergency plans were in place and were they adequate to cope with the problems? Were those emergency plans appropriately enacted? If so, when?

Extensive emergency plans are in place although they were not initiated during this event. The detailed pre-planning ensured that the impacts of the weather could be managed without triggering full incident protocols. Due to the nature of the event, with many issues cropping up throughout the period, it was essential that we had experienced people at every level who are empowered to make decisions and use their judgement, to avoid such issues escalating and becoming incidents or supply failures.

B4. What training have your staff had for responding to severe weather events, particularly freeze/thaw incidents?

The main training our staff have is about keeping safe. We have a strong ethos that as well as putting the customer at the heart of everything we do, we insist that they look after themselves and others. In the conditions we experienced across our regions, our teams went to great lengths to keep customers in supply (e.g. digging through snow for 4 hours to reach a WTWs which had shutdown), they constantly reviewed whether what they were doing was safe.

To support this we have 'toolbox talks' on keeping safe in winter and, for example, the PPE they should wear, as well as support for driving in winter conditions.

Beyond this, the sorts of situations they will find in severe weather will largely be similar (repairing mains, operating WTWs) to normal operation, but significantly impacted by the prevailing environmental conditions. We expect them to do dynamic risk assessments and '60 second checks' which become even more important in these situations.

We also have a competency framework which is a combination of generic skills and knowledge training, and direct application on specific activities. This helps to reinforce the positive learning and equip people to use their judgement when unusual situations occur. Together with extensive service training on how to engage positively with and help our customers, alongside take ownership of issues, this enables our people to act independently.

We have trained many of our people over recent years in emergency response and take the opportunity to constantly learn from emergency exercise testing and events and incidents. As a result of this learning we have recently completely reviewed our Emergency Management Manual and issued this at the beginning of March this year. We also have outage plans in place for situations that necessitate major re-zoning around strategic sites.

An important component of the training is in the Regional Control Centre (RCC) where the teams ensure the networks are full, monitor and report distribution input and undertake the network predictor role. All of this is documented and trained within the team and is a key lesson learned through the more severe incident of 2010/11.

B5. *What did you learn from previous incident management events, including through working with other water companies, local / regional partners, emergency services or other service providers, and how is this reflected in your current processes?*

The most important lesson leaned from previous events (in particular 2010/11 which was a far more severe event than experienced by the UK this time) is the critical need for preplanning. This is not just for the few days beforehand, but for the investment plans over typically two years. Preparing the system to cope with most known circumstances is the most basic requirement of any operating team.

Whilst this event did not necessitate escalation, good relations and networks with local authorities and emergency services is important. When events occur that are not company specific, then the scope for support between water companies is limited as typically everyone will be needing their own people, supply partners and materials. That said, good links are in place with all companies and where possible there is a strong feeling of wanting to help each other when it is possible.

We have strong relationships with our Local Resilience Forum (LRF) partners. Several of the LRFs were running daily teleconference Strategic Co-ordinating Groups (SCGs), which we were part of. This allowed us to feed in requests for any support and to advise the SCG on our status, as well as any potential consequences. In particular, we received significant support in County Durham and Northumberland in being able to direct the clearing of snow from roads to assist our access to WTWs. Although this was done directly with our contacts

and relationship with the Local Authority we had an escalation route available through the SCG, should this have been required.

One specific lesson that did come out of this event was the need to have good contacts with local farmers. Local Authorities have arrangements with some farmers to acquire snow ploughs and similar heavy equipment for use to clear main roads when snow drifts occur. We were able to build on this and work with farmers to gain access to some of our remote sites (including following a plough for a round trip of 8 hours to reach a water treatment works).

Section C: Incident response

C1. Provide details of your established processes for responding to issues during severe weather events, particularly late winter freeze/thaw incidents (e.g. operational, governance, communications, working arrangements with other authorities through local / regional partnerships). Were these processes effective during this incident? In your response, make clear the role of your Executive in any decision making within these processes.

Regular weather forecast updates from the Met Office, that could flag up potential issues, are routinely shared with operational and customer service teams across the business. This helps us to plan ahead and prepare effectively. Any forecast change in normal operation (e.g. it could be hot weather, heavy rainfall, high winds) has triggers in our Regional Control Centre (RCC) for particular actions and interventions. These will be enacted by the RCC Controllers and only if they go beyond certain parameters would they be escalated to manager, senior manager or director level.

If escalation occurs, depending on the nature of the event, then a range of further actions are triggered such as contacts with local authorities and internal and external communications, if appropriate.

During this event, all appropriate escalations were followed and worked as planned. The senior director was informed throughout and the Chief Executive Officer briefed twice a day.

C2. For this incident, please describe how your company went about deploying the resources required to respond to the incident. In responding, please detail the scale of resource deployed and from which parts of the business and/or external resources (e.g. supply chain, local / regional partners, business retailers) they were drawn.

All of the direct response was solely from the Water team and its supply partners. The event management was co-ordinated by senior managers in the Water team. Representatives from Communications and Customer were involved in all event meetings. When the focus was on finding leaks that were our customers' responsibility, especially business customers, we utilised the Water Rangers, who are volunteers from our customers who support our wastewater teams spot and negate pollution events.

Several of our major WTWs routinely have a rotating 24 hour shifts. As previous similar events have resulted in problems for access, we arranged to move to 12 hour shift patterns (limiting the number of times we would need to use farmers to help dig our people into and out of the WTWs), and those WTWs where we no longer have 24hr shifts, we decided to 'man' them for 24hrs for the duration of the event.

Our operational customer centre, routinely the first point contact for water and wastewater issues, made resourcing plans a priority ahead of the severe weather. In order to ensure we remained open and a consistently high standard

of customer service was provided, a number of team members even stayed in a local hotel within walking distance of the centre for several nights.

C3. Provide details of how your company assessed the operational implications and prioritised its responses during the incident period.

This activity is centred in our Regional Control Centres (one in NW area and one in Essex). This is primarily focussed on monitoring storage levels in service reservoirs and distribution input from WTWs. The Controllers are able to modify WTWs outputs or request changes from WTWs managers.

A particular benefit during this event was the use of ***Aquadapt*** – our software that supports our optimisation of energy use for pumping around the water system. We had excellent visibility of what was happening in the network and early ability to make any changes necessary, as well as modelling some scenarios. A screen print is shown in Appendix 1.

The other priority was controlling demand and, in particular, leakage. All non-emergency work was stopped and all of our network teams were targeted at fixing leaks or talking to customers to advise them of leaks on their properties. We operate ***Netbase*** software for understanding our range of District Metered Areas (DMAs), together with a network of flow and pressure loggers. Active management and interrogation of this helped us target the DMAs with the highest flows. Typically we are looking for our DMAs to be 'running' below 2 litres per second. On Sunday 4 and Monday 5 March, many DMAs were around 5 or 6 l/s with some as high as 9 l/s. This information meant we could quickly go to these DMAs and in many cases the high flows were due to big leaks on customers properties (e.g. one accounted for 80% of the water leaking in that DMA). We have also learned from other thaw events that caravan parks are prone to high usage/leakage and these became our highest priority over those two days.

C4. What challenges/barriers did your company face in resolving problems that customers experienced? How did you overcome them?

Our customers experienced no significant problems relating to water supply (other than an occasional interruption that would happen most normal days). The biggest challenge we faced in ensuring this remained the case was gaining access to some of our sites, especially in rural Northumberland and Suffolk.

We discussed with Northern Gas Networks who operate in much of the same region as our Northumbrian area and they also experienced major challenges in travelling around and were dealing with a five-fold increase in incidents.

Many of our staff were encouraged to work from home and the technology in place was effective and reliable.

In addition we encouraged customers to check pipework, make sure it was lagged and provided useful guidance about leaks via our websites and social media channels.

C5. Provide details of how your company identified customers in vulnerable circumstances before, during and after the incident. What support was offered to these customers and how was this delivered?

For every interruption to supply, we proactively contact our customers who are on the Priority Services register. During the severe weather, we called all of these customers back to make sure their water was restored when expected. In one instance a 96 year old women who had frozen pipes contacted us and due to her location, it was hazardous for us to attend. We called her regularly throughout the day to check on her wellbeing and make sure she had received water from her neighbour. She was very appreciative of the contact we had with her. In another case, an elderly customer had frozen pipes so we delivered bottled water until the pipes were defrosted.

Section D: Communication and support

D1. How effective were your communication processes before, during and after this incident for each of the below:

a. Customers? (residential and business);

b. Customers in vulnerable circumstances and business customers for whom a water supply is critical (e.g. hospitals, schools)?

c. Water retail businesses?; and

d. Wider stakeholders? (e.g. local authorities, other agencies, Government, Ofwat)

We have effective incident procedures for communication to all customers and stakeholders. We did not need to initiate these procedures, however we did use our websites and social media to ask customers to check their own plumbing and to report any visible leaks they may come across.

For any interruptions to supply, where we have contact details for customers, we routinely send a text to proactively let them know about the interruption and all Priority Service Register customers are called with advice and guidance. Where bottled water is requested, we will deliver this.

For business customers, our Wholesale team was able to contact those actually affected (i.e. those with suspected high leakage). We were able to obtain the required contact details and liaise successfully both with the customers directly and the two Retailers concerned (NWGB and The Water Retail Company). Regular updates were provided to affected Retailers and Customers as required. Additionally as a precautionary measure we contacted a number of other Retailers to make them aware of the situation just in case matters escalated or if potentially any of their customers were to become affected. This was less successful and we still await explanations as to why the out of hours contact arrangements didn't work for the other three Retailers. This matter is still being investigated directly with the Retailers concerned.

D2. What channels did you use for communication with customers and key stakeholders before, during and after the event? (e.g. local, regional or national news media, social media, e-mail, SMS, hard copy letter) What were your key messages at each stage? Please provide examples of your communications material with your submission.

Before and during the event, we used Twitter and Facebook as well as our own websites to communicate with customers, and also emailing stakeholders. We also responded to requests from various news agencies. The primary message was that we were operating in a challenging environment and that we were expecting to continue to supply as all our customers would expect.

We also advised customers to check their own pipework and to protect exposed pipes to avoid damage during the freezing conditions. Additionally we asked that if they observed burst pipes then they should notify us.

We provided information on our website and via social media to show customers the conditions our teams were working in to keep water flowing to them and protect the environment. This also allowed us to share some of the positive feedback and messages of thanks and support we received from customers during the event.

A collection of some of the press releases and website information are shown in Appendix 2

D3. How did you proactively engage with customers (by customer type) before, during and after the event?

As in D2 above, we advised customers to check their plumbing and pipework and continued to advise them to use water wisely. We also emphasised the importance of using WaterSafe accredited plumbers.

Additionally, we explained that we were operating in challenging conditions and were fixing leaks 'around the clock' to ensure we could maintain supplies throughout.

We also shared information via social media and our websites to make sure customers knew our operational customer centre was open and ready to help throughout the event.

D4. What processes do you have in place for managing properties that are vacant, void or difficult to access (e.g. businesses that are closed at weekends) in the event of a major incident?

During the severe weather over the Christmas holiday period in 2010/11, where schools, colleges and many businesses were closed, we experienced a peak in customer side leaks being discovered as customers reopened their premises. Learning from this, we've ensured proactive advice and guidance is provided to customers during cold weather spells and during holidays to protect and check pipework.

During this year's event similar messages were shared and where we knew of businesses that are at great risk from the effects of severe weather, for example caravan parks we proactively contacted them, as well as visiting directly to provide advice.

D5. What ongoing support after the incidents have you put in place, in particular for customers in vulnerable circumstances?

As above, and routinely, wherever we had interruptions to supply, we called all of the customers on our Priority Services Register to let them know. After every interruption we called again to make sure supplies are restored and there are no issues for our customers.

Section E: Impact on customers and compensation arrangements

E1. Provide details of how you will identify which customers (by customer type) are entitled to compensation.

There was no significant impact on customers beyond normal operations, so it is expected that the vast majority of compensation payments are largely limited to goodwill payments.

However for completeness we explain how we would identify customers who would be entitled to compensation.

Water pressure

For customers experiencing a reduction in pressure, an annual review post 1 April 2018, is carried out routinely to identify any failures under regulation 17G of the Customer Service Standards 2017. For each failure identified a payment is paid to the affected customer.

Supply interruptions

Where an interruption failure is identified under regulation 17E and 17F of the Customer Service Standards 2017 an interruption form is completed by the operational team in attendance. In this report we identify all customers affected by a loss of supply and report whether they are a household (HH) or non-household (NHH) customer.

We have undertaken a review of calls received reporting no water between 14 February and 14 March as well as written communication reporting disruption to supplies, and any resulting failures will be identified and payments made.

Part of our investigations includes the recording of meter readings taken at the District Metered Area's (DMA) meter throughout the period in question. By reviewing the height of the affected properties in comparison with readings taken at the DMA meter we can determine when pressure was at a level sufficient to supply the affected properties.

E2. Provide details of the automatic GSS payments, including any payment penalties, you expect to pay (or already have paid) to customers (by customer type) as a result of the incident period and the total value associated to these payments.

Water pressure

For HH and NHH customers qualifying for payment under the pressure standard, a single payment of £25.00 will be paid post 1 April 2018 following our annual review.

Supply interruptions

For customers experiencing an interruption to their supply which qualifies under the interruption standard, a payment of £20.00 (HH) or £50.00 (NHH) will be

paid. For any additional complete periods of 24 hours they were without supply a further payment of £10.00 (HH) and £25.00 (NHH) will be paid.

Payment under the interruption regulation is due within 20 working days of it becoming payable. Should we fail to make payment within the required time an automatic penalty payment of £20.00 (HH) or £50.00 (NHH) will be paid.

Investigations are largely complete, and any remaining customers identified as requiring payment will be paid before 30 April 2018.

E3. Provide details of any further compensation you will be providing to customers beyond automatic GSS payments and how the level of compensation was calculated relative to the disruption customers experienced. In doing so please provide details of the numbers of customers (by customer type) you expect to receive this and the total value associated to these payments.

Whilst investigations are ongoing, we do not expect any further compensation beyond what may be expected under normal operating conditions. A review of each individual customer's circumstances is carried out on a case by case basis. A judgement is made based on the level of disruption and inconvenience caused to that customer, taking into account any financial cost incurred by them (for example to cover the cost of purchasing bottled water) as well as the duration of the disruption.

E4. Provide details of how long you anticipate the process of compensating all affected customers will take and the methods by which the compensation will be paid (e.g. automatic, cheque). Will there be an application process for any elements of compensation? If so, please describe the process.

The majority of our investigations are complete and those remaining, some of which are more complex, will be completed by 30 April 2018. Any customers not identified by us as being affected may make a written claim within three months of the event and so there is a possibility we may process claims into the month of June.

Payments for HH customers are usually made via cheque. On occasion, where customers are in arrears with their water charges, we may credit a GSS payment to their account and offset the outstanding balance.

Payments for NHH customers will be passed to the retailer to send direct to their customer.

Section F: Reflection and lessons learnt

F1. Provide details of what you considered to work well and what you considered to need future improvement for your company and why in relation to:

a) Identifying and repairing supply interruptions and actions taken to prepare the supply and network system;

Lessons learned over a long period proved effective at enabling us to manage the event without impacting customers. The key to limit the impact of interruptions is to be able to rezone to keep customers on supply which then allows a more measured response to undertaking the repair, which helps in ensuring safety, quality and avoiding pollutions. The investment carried out 10 to 20 years ago included installing several more strategic valves and then the recognition that these need to be maintained in an operable condition. A further benefit has resulted from the "Acceptability of Water" programme around Tyneside. This work spanned more than 10 years with the aim of reducing discolouration Not only was it spectacularly successful in reducing complaints (~80% reduction), it ensured the critical strategic mains in that area can be readily operated thus avoiding extended interruptions.

Much of this work together with our team's mindset "to keep customers on supply" has enabled both NWL and ESW to be industry leading on interruptions to supply (ITS) for many years.

Further to this, the pre-planning which is now effectively 'business as usual' in our Regional Control Centre whenever bad weather is forecast, ensures our water treatment works can produce the required quantity of water, and also that storage in the network is at target levels.

In terms of targeting our response to elevated bursts and leakage, our network management system, Netbase has excellent data on the performance of each District Metered Area (DMA) and together with the extensive network of loggers we were able to identify which DMAs were 'running high'. From this knowledge, we could target the deployment of our Distribution Technicians to the known customers where they may have leaks (businesses like caravan parks), and our Leakage Technicians to find the source of spikes in leakage on our network.

b) Communicating activities to customers/stakeholders (by customer/stakeholder type);

The communication to our customers and stakeholders worked well for the level of event we were managing. This is an area we constantly review and knowing that this event could have become more serious, together with the experiences of some other companies, we are going to carry out some incident exercises to optimise our response.

c) *Identifying and supporting the needs of customers in vulnerable circumstances; and*

We have a comprehensive database on our vulnerable customers and we were ready to proactively contact them and provide extra supplies, should that have become necessary. As with F1b) above, we will further test our ability to respond effectively.

d) *Having the appropriate governance processes in place.*

We operate a well structured bronze/silver/gold approach for managing events. This has proven successful in the past and should we have needed to escalate, we are confident it would have worked well in this situation. In practice we were managing multiple bronze events and the management structure had to be agile and adaptive to ensure we were able to maintain supplies.

There are two important lessons from this event for NWG:

- Firstly how important it is to have experienced people at every level who are empowered and trusted to make decisions 'on the ground'. The situation required them to use their judgement in an agile way. If every event had needed to be escalated to a manager then it is likely we would have lost some supplies.
- Secondly, the essential use of technology – in particular Skype. Due to the geographical structure of NWG across three areas of the country, our normal way of working relies heavily on both video conferencing facilities and Skype. During this event, several of our senior managers and directors could not leave their homes for several days, but because they could all easily move to using Skype, this was no constraint to managing the events.

e) *What were the biggest constraints to your company doing more, faster to respond to issues customers faced?*

The most significant issue for NWG was being able to move around and access sites. In Suffolk and Northumbria, as can be seen from the earlier photographs, for several days, this relied on working with farmers to clear roads, and access routes; sometimes numerous times. Moreover, several of the main roads, like the A1, were closed for extended periods.

Summary and Discussion

Before summarising the main points from our experiences, it is important to analyse the actual weather conditions that prevailed.

From news reports and conversations with other companies, it is clear that some of them had particularly challenging times. Some were using the phrase "unprecedented" in relation to the weather conditions they were experiencing.

We strongly refute this (and commissioned work from the Met Office to provide evidence to support our view). It is correct that we have not had a severe winter for seven years, but the period over Christmas and New Year 2010/11 was far more extreme than the recent period and even in December 2017, we had a much more rapid thaw event in our Northumbrian area that resulted a greater increase in leakage on our own network than we had in early March.

The evidence from The Met Office confirms that the maximum daytime temperature on the coldest day across England and Wales during the event period ranged from **minus 0.4 degree** (in South-west England) to **minus 3.0 degrees** in Northumberland. Moreover, most of these maximum temperatures were 'exceeded' (i.e. lower) in December 2010.

The minimum temperatures recorded across the UK during the event were largely between **minus 6.1 degrees** and **minus 7.4 degrees**. The exception to this is in a small part of the south-east where temperatures dropped to **minus 9.5 degrees.** Most of these minimum temperatures were exceeded (i.e. lower) in several recent winters and indeed the minimum in Northumberland (minus 6.4 degrees) was surpassed only three months earlier in December 2017.

To add more context, temperatures have been lower between 60 and 215 times (since 1960) across the UK than the lowest minimum temperature during the freeze/thaw event.

The most relevant fact associated with the weather is the speed of thaw. In the Essex area, the temperature increased by 5.3 degrees in one day (11.9 degrees over 3 days). This is the most rapid thaw since 2010 and resulted in an increased demand of **85 Mld (22%)** over one day, which is the 5th biggest daily increase since 1990. Much of this demand was associated with customer-side leakage and levels returned to almost normal relatively quickly.

In Suffolk the impact of the thaw between 2 and 4 March resulted in a **20 Mld (32%)** increase in demand and this took longer to reduce to normal levels.

The contrast is in the Northumbrian area where, (due to the insulating effects of large volumes of snow), the thaw was more gradual (2.1 degrees over one day and 8.4 degrees over 4 days) and the impact on demand was commensurately less dramatic. Between 1 March and 4 March, demand increased by **60 Mld (9%).**

On investigation, we consider a big factor in this is the fact that we had been impacted by a much more significant thaw event in mid December 2017. This had resulted in a much greater impact on demand and, in particular, a large rise in 'real' leakage on our network. This took several weeks to recover from and the belief is that after during the seven years since the last severe weather event, the mains network was tested and the weak points that will naturally have occurred through normal deterioration were challenged and resulted in bursts. With the February/March freeze/thaw event occurring so soon after this, it can be concluded that there were few remaining weak points on the network.

From our overall experiences of managing the event, a number of important points come through and these are summarised below:

1) The critical importance of planning and pre-planning. This covers all aspects of ensuring our water treatment works and strategic network are in a good condition to meet any expected stresses on the system. This includes medium term planning three months to two years, and short term – one day to one month, for both assets and people. The weather was forecast well in advance and we have processes embedded in our Regional Control Centre that are triggered in such circumstances.

2) Having good people at every level who have a lot of experience and feel empowered to make decisions. The situation over the 4/5 days encompassed many 'little' events, any of which could have resulted in major incidents. There were too many to manage centrally (albeit through virtual means) and this necessitated frontline people and their supervisors/senior technicians making decisions throughout to maintain customer supplies. I.e. not feeling they needed to constantly ask for permission.

3) Agile event management and judgement. The nature of the situation with a myriad of 'small' of events occurring in our three different areas necessitated a flexible approach to managing overall which was ready to adapt to the changing situation over an hour, let alone a day.

4) Related to (3), whilst we stopped short of calling it an incident, the event management teams went into roles naturally and the nature of it meant we had to be dynamic and adapt. The use of technology (Skype) greatly aided this

approach and was preferable to having a physical meeting, especially as half of the people would not have been able to travel to a common location.

5) There was a clear demarcation of roles. Whilst the Water Director was involved throughout (mainly to provide advice and guidance to operational teams and briefings to the CEO), it was clear who was the event controller in every circumstance, with senior managers fulfilling these roles.

6) The physical network is relatively robust and resilient. Over many years we have invested to ensure that the system is integrated and has a degree of flexibility for re-zoning. This has been a big factor in our success in maintaining industry leading performance on interruptions to supply, for so many years.

7) Our strategic network application, Aquadapt was particularly effective for giving visibility of where we needed to move water.

8) Our customer network application Netbase and the associated system of loggers was used to target DMA recovery plans.

9) Previous experience of knowing that certain customer types (e.g. caravan parks) will leak meant we could target them immediately.

10) The importance of having good relationships and communication with all relevant retailers.

11) The flexibility of our staff to stay in hotels, water treatment works and to work from home.

12) The importance of conveying to our customers that we were in control and NOT asking customers to use less water specifically during this period was critical, and so avoiding panic use and 'stock-piling'.

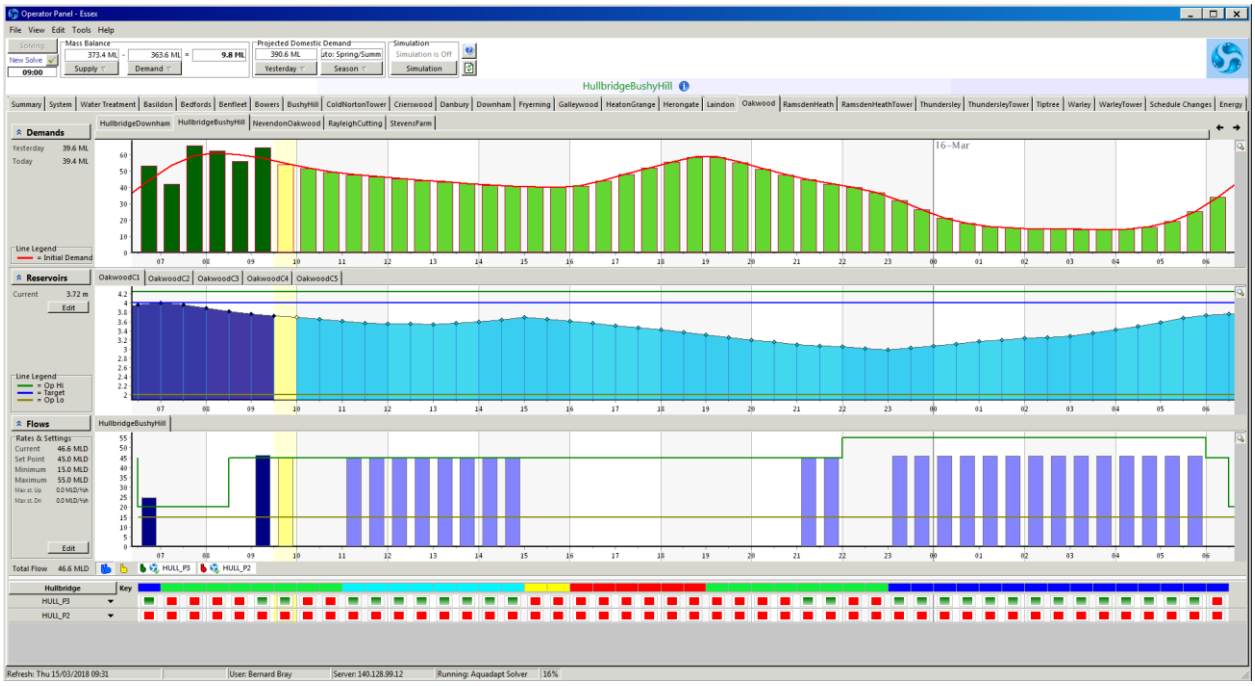
    It should also be noted that the weather did bring significant challenges to our wastewater business. Again we managed well throughout, so whilst this information request response solely relates to water supply, we would not want it to be seen as just a water supply event.

Appendix 1 – Network Management

The use of ***Aquadapt***

The introduction of the optimisation software that "runs" the Essex and Northumbrian systems some six years ago has on a number of occasions enabled a controlled management of storage under difficult conditions.

The image below shows the *Aquadapt* interface, the top graph is Demand, middle is Storage and the bottom the pumping station schedule. The dark colours represent recent history the lighter colours represent the future. The blue line on the middle chart represents the target level that *Aquadapt* works to – whilst its shown as a line it is really only applicable at 07:00 each day. During the recent high demand period we managed the short fall in the supply/demand balance by reducing target levels across the larger storage sites in support of the smaller ones. Because *Aquadapt* has sight of how demand is most likely going to react in the future we can see with some certainty what will happen to the storage into the future. This worked particularly well for the Essex system due to its inter-connective nature.



Appendix 2- Press Releases and Website Information

Friday 2 March 2018

It's been a testing few days for the North East but here at Northumbrian Water we've certainly been up to the battle with the #BeastFromTheEast.

All across the region our teams have been going above and beyond to ensure that our networks have kept going and people's water has kept flowing.

From North Northumberland to the borders of North Yorkshire our people have faced unprecedented temperatures, snow blizzards and relentless conditions during what has been a tough couple of days for our communities.

We've dealt with frozen pipes, network disruptions, power-cuts to our sites and high levels of calls and contacts from concerned customers 24 hours a day.

All while ensuring the day to day business gets done and with a smile!

Customer praise
We've received lots of lovely messages of support and thanks for the work we've been doing from customers across the region.

Appendix 2- Press Releases and Website Information

Hidden Heroes

Our Wastewater team operate over 425 sewerage treatment works, 1000 pumping stations, and 220 combined sewer overflows, plus 19 sludge tankers right across the region…even in snow!

A large proportion of these sites are covered by SCADA alarms and the team has been dealing with an increase in alarms from sites, as the snow was so deep that the filter rotation arms could not move round and the bridge scrapers struggled to rotate due to wheels slipping on ice.

In the water directorate, the Network Services and Customer Field Services team have been carrying out emergency work only until weather conditions improve. They've been working together to keep our network flowing 24/7.

Our Water Supply teams are based over 33 sites in some of our most rural locations. The team has moved from 8 to 12 hour shifts on some sites and doubled up on standby to provide additional support. Those with 4x4's have also been acting as a taxi service to help people get to extreme rural sites in the Wear Valley, Berwick, Rural Northumberland and Suffolk.

The team has also been working with Business Continuity and local councils to help clear the way and allow us access to our sites in our most rural locations, not just for the team, but also to get important chemical deliveries on site. An amazing effort to make sure they are still supplying us with clean, clear and great tasting water.

The sampling team has been really braving the elements. As part of our regulatory commitment to the Drinking Water Inspectorate (DWI) we complete our sampling programme, even in adverse weather conditions. So the team has pulled on their thermals and got to work fashioning a sledge to carry their sampling equipment and in some cases, walked two miles to get to treatment works.

To make sure everyone gets home safe every day our caring people have been covering shifts and giving people lifts. Clearing footpaths and car parks, digging out stranded cars and gritting the paths and roads and doing whatever it takes to lend a hand.

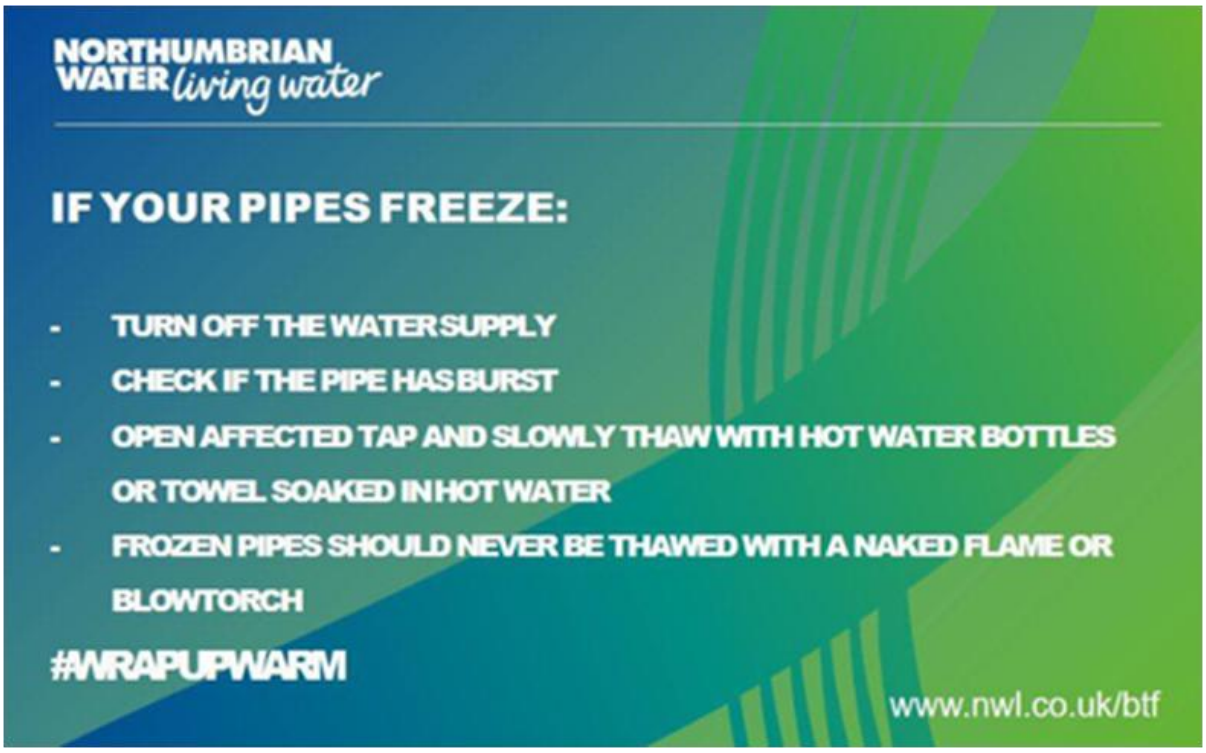
We even had some of our Operations Centre of Excellence team staying at a local hotel to make sure there is someone available to get in to the office to answer our customer calls, as well as being nearby and able to come back to the office in case of an emergency.

As well as answering customer calls and keeping them up to date on social media, the team is also making sure our vulnerable customers who are calling in are safe, in particular one 96 year old lady who's pipes had frozen. The team made sure she had heating, water and everything she needed after she mentioned she was boiling snow to flush her loo!

Appendix 2- Press Releases and Website Information

Appendix 2- Press Releases and Website Information

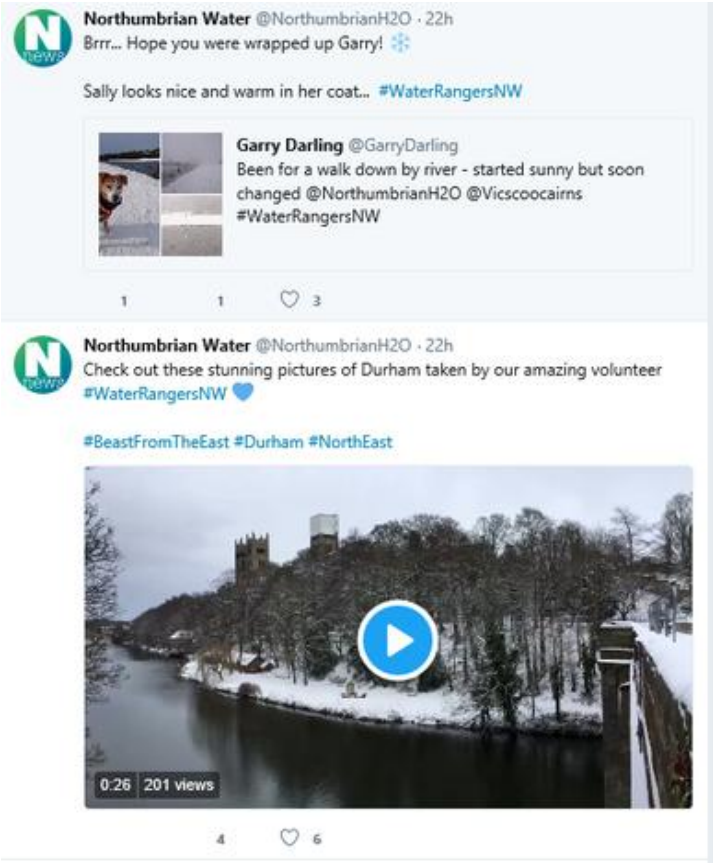
Issued Advice We've been issuing lots of useful advice to our customers about keeping their pipes warm and what to do in emergencies!



Appendix 2- Press Releases and Website Information

In the midst of it all, we've even had a little time for some fun and to appreciate just how beautiful the region looks in the snow…

Appendix 2- Press Releases and Website Information



Appendix 2- Press Releases and Website Information

Collection of some of the Press releases issued

Northumbrian Water

05.03.2018

Customers encouraged to report leaks

As the Beast from the East retreats, the milder temperatures may bring some problems of their own for pipework and plumbing.

Northumbrian Water is encouraging customers to keep an eye out for bursts pipes and leaks across the region caused by the recent change in extreme temperatures.

While some leaks are easy to see - think water gushing from pavements and manholes and shooting from the ground - others are much more difficult to spot and people might not even realise there is a leak until they are out of water or begin to lose pressure when they turn on the tap.

Our leakage teams are working around the clock fixing bursts and our networks are currently operating as expected after the unprecedented temperatures and conditions the region faced last week.

We currently have no properties without water and we are working hard to maintain water supplies for our customers.

Claire Sharp, Customer Director, said: "We're beginning to thaw out and as the temperature rises this causes bursts and leaks to appear on both our own water network and our customers' pipework.

"We see this behaviour every winter and are prepared for it, however the Beast from the East has pushed it to the extreme and that's why we've been busier than we might have ordinarily been for the beginning of spring.

"We're doing all we can, but our customers are our eyes and ears on the ground and we would encourage them to keep an eye on their pipes and let us know about any interruptions to their supply.

"If you do find that you've lost supply then there are some really simple things you can do straight away yourself that might help otherwise contact us for assistance.

Appendix 2- Press Releases and Website Information

"We also want people to contact us if they do spot a burst. If you see water gushing from a pavement, if the footpath or road has raised or water is gushing from somewhere it shouldn't - then ring it in and we'll take a look".

To let Northumbrian Water know about any leaks or bursts, customers can call the leakline on 0800 383 084 or by filling in the online form at www.nwl.co.uk.

The water company is also encouraging customers to use water wisely by checking out the water saving tips on the website.

Things to do if your water isn't working:

1. Check your pipes for any signs of a split or a leak.
2. If you find a leak within your property, turn off the supply using the internal stop tap.
3. Drain the cold water system by flushing the toilet and opening cold taps over sinks and baths.
4. Call a reputable plumber immediately. Northumbrian Water supports an approved list of plumbers, found on the WaterSafe website at www.watersafe.org.uk.

For further media information, call 0191 3015678.

Notes to Editors: Northumbrian Water Limited supplies 2.7 million customers in the North East with both water and sewerage services, trading as Northumbrian Water, and 1.8 million customers in the South East with water services, trading as Essex & Suffolk Water.

In the most recent survey by the Consumer Council for Water, Northumbrian Water was named the UK's most trusted water company by its customers. 2017 also saw Northumbrian Water named the world's most ethical water company for the seventh successive year and Utility of the Year at the Utility Week Awards, for the second time in four years.

Abbey Road, Pity Me, Durham DH1 5FJ. Telephone 0345 6047468. Website: www.nwl.co.uk

Appendix 2- Press Releases and Website Information

Essex & Suffolk Water

Monday 5 March 2018

Customers encouraged to report leaks

As the Beast from the East retreats, the milder temperatures may bring some problems of their own for pipework and plumbing.

Essex & Suffolk Water is encouraging customers to keep an eye out for bursts pipes and leaks across the region caused by the recent change in extreme temperatures.

While some leaks are easy to see - think water gushing from pavements and manholes and shooting from the ground - others are much more difficult to spot and people might not even realise there is a leak until they are out of water or begin to lose pressure when they turn on the tap.

Our leakage teams are working around the clock fixing bursts and our networks are currently operating as expected after the unprecedented temperatures and conditions the region faced last week.

We currently have no properties without water and we are working hard to maintain water supplies for our customers.

Claire Sharp, Customer Director, said: "We're beginning to thaw out and as the temperature rises this causes bursts and leaks to appear on both our own water network and our customers' pipework.

"We see this behaviour every winter and are prepared for it, however the Beast from the East has pushed it to the extreme and that's why we've been busier than we might have ordinarily been for the beginning of spring.

"We're doing all we can, but our customers are our eyes and ears on the ground and we would encourage them to keep an eye on their pipes and let us know about any interruptions to their supply.

"If you do find that you've lost supply then there are some really simple things you can do straight away yourself that might help otherwise contact us for assistance.

"We also want people to contact us if they do spot a burst. If you see water gushing from a pavement, if the footpath or road has raised or water is gushing from somewhere it shouldn't - then ring it in and we'll take a look".

Appendix 2- Press Releases and Website Information

To let Essex & Suffolk Water know about any leaks or bursts, customers can call the leakline on 0800 526 337 or by filling in the online form at www.eswater.co.uk.

The water company is also encouraging customers to use water wisely by checking out the water saving tips on the website.

Things to do if your water isn't working:

1. Check your pipes for any signs of a split or a leak.
2. If you find a leak within your property, turn off the supply using the internal stop tap.
3. Drain the cold water system by flushing the toilet and opening cold taps over sinks and baths.
4. Call a reputable plumber immediately. Essex & Suffolk Water supports an approved list of plumbers, found on the WaterSafe website at www.watersafe.org.uk.

Appendix 2- Press Releases and Website Information

Some examples of some tweets. Tweets were replicated on both ESW and NW.

Northumbrian Water
@NorthumbrianH2O

From a trickle to a puddle, flowing to a burst, please report any water leaks before they get worse.

Urgent leaks please call >> 0800 393 084

Less urgent leaks please use our short, online report form >> nwl.co.uk/your-home/cont... #NorthEast

11:35 AM - 5 Mar 2018

21 Retweets **11** Likes

Sunderland UK, MiddlesbroughCouncil, NewcastleCityCouncil and 7 others

1 21 ♡ 11

Northumbrian Water @NorthumbrianH2O · Mar 5

Brrr... It's canny cold on a night, best to wrap your water pipes up tight! ❄

Follow these top tips to help avoid frozen & burst water pipes in your home >> nwl.co.uk/your-home/your...

#WrapUpWarm #BeatTheFreeze #NorthEast

Northumbrian Water, Ofwat and CCWater

2 ♡ 3

Northumbrian Water
@NorthumbrianH2O

The milder weather can lead to an increase in burst pipes and we need you! You're our eyes and ears on the ground for spotting leaks and letting us know about them. Call us on 0800 526 337 or fill in our online form at bit.ly/2vl31cW

11:37 AM - 4 Mar 2018

1 Retweet **2** Likes

Northumbrian Water
@NorthumbrianH2O

The temperatures are starting to increase (yey!) but this can lead to burst pipes (boo). Please give us a ring on 0800 526 337 if you spot any urgent leaks or fill in our online form on bit.ly/2vl31cW

2:05 PM - 4 Mar 2018

3 Retweets **2** Likes

Appendix 2- Press Releases and Website Information

Northumbrian Water
@NorthumbrianH2O

On another freezing day, we hope you don't have any trouble with frozen pipes etc, and that your home is keeping you toasty warm! But if you do, this handy video might just help you locate and use your stop tap. #beastfromtheeast #beatthefreeze

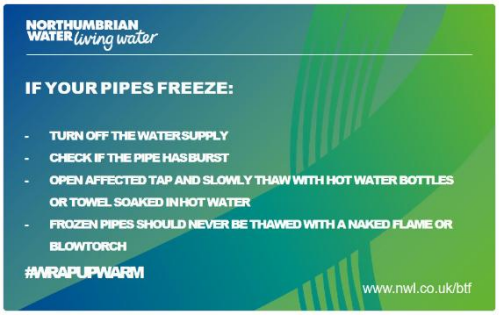
How to locate and use your internal stop tap
Advice on finding and using your internal stop tap. To find out how to reduce the chances of your pipes freezing, and for advice on what to do if they do fre...
youtube.com

11:13 AM - 1 Mar 2018

3 Retweets **3** Likes

Northumbrian Water
@NorthumbrianH2O

We hope that as many of you as possible are wrapped up warm at home, staying safe and problem-free in this chilly weather ❄️ Likewise, we hope you won't need this handy list of tips, but just in case your pipes do freeze, you might want to keep hold of them... #BeastFromTheEast



1:16 PM - 1 Mar 2018

37 Retweets **19** Likes

MiddlesbroughCouncil, Hartlepool Council, Stockton Council and 6 others

Northumbrian Water
@NorthumbrianH2O

Be prepared for the thaw - when temperatures rise we are likely to see a rise in the number of burst pipes across the water network. Check out what to do if you discover one: nwl.co.uk/your-home/cont...

10:27 AM - 3 Mar 2018

22 Retweets **16** Likes

MiddlesbroughCouncil, Sunderland UK, NewcastleCityCouncil and 7 others

1 22 ♡ 16

Appendix 2- Press Releases and Website Information

Tweets which mention WaterSafe

Tweets which mention using water wisely