

<on Severn Trent Plc letterhead>

## **Review of freeze/thaw incidents – Severn Trent Water**

6 April 2018

Dear Rachel

The impact of the recent freeze/thaw event on a number of our customers is something that we wholeheartedly apologise for. Our ongoing customer research - and the additional insight we have gained from our PR19 customer insight work - is clear that customers expect to receive a reliable water supply. We know that when it is not available, it has an almost immediate impact on people's daily lives. Therefore the loss of water service is a significant driver of dissatisfaction for customers. Our company vision is to be the most trusted water company and reflects the passion we have as a business to provide the best possible service for our customers. Hence we take very seriously any disruption to customers' supplies that has an impact on our customers' trust in us.

We seek to learn from events such as these when our customers' lives are affected - and already have in place a review process (something that is standard for events such as this). We welcome the opportunity to share sector-wide learning afforded by Ofwat's investigation.

For eleven consecutive days the minimum temperature was below freezing. The nature of the thaw, which had not been forecasted, caused a significant increase in estimated operational leakage (of more than 70%). This was mainly driven by an increase in bursts on customers' pipes, which accounts for around 70% of the total increase in leakage. There are a number of lessons learned in this space, which I pick up on later in this letter. Notwithstanding this increase in leakage, the vast majority of customers in the Severn Trent region (98%) were unaffected by the event. We had sufficient resources deployed to find and fix leaks on the network, and increased our water into supply by 22% to mitigate the impact of the increase in demand. Furthermore we believe we were on target to meet our year end leakage target before the incident.

A number of customers did experience interruptions to supply. This related to 78 specific incidents which group into four parts of our region (south west Birmingham, rural Derbyshire, rural Leicestershire and Rugby, Warwickshire). In these areas we experienced higher levels of leakage and bursts on our network; experienced issues with certain critical assets which were affected by the weather; and in some cases (e.g. in rural Derbyshire) faced difficulties with our operational response due to restricted access caused by the weather (e.g. deep snow). We provide more detail on these four separate geographical incidents below - and the number of customers that were affected.

The core of the incident lasted for six days from 4<sup>th</sup> March to 9<sup>th</sup> March, 2018, although there were a number of customers in rural Derbyshire who experienced intermittent supplies beyond this period. We have included these customers in the tables we have completed.

We have completed the data tables based on the maximum number of customers who could have been affected by using flow and pressure data from our district meter areas (DMAs). The method we have applied is consistent with how we usually report such data (e.g. in our Annual Performance Report). However, we are usually able to refine this number by incorporating data from temporary loggers that we deploy in a targeted manner into the affected areas on the network during the incident, which gives us a more accurate picture on customers actually affected. This typically

resulting in lower reported numbers for supply interruption incidents (reducing numbers by circa 30%-50%). However, during this incident we were unable to deploy temporary loggers in our usual way given the widespread nature of the incident as we focused our teams on finding and fixing leaks. We have, however used data from our 'Pipe Up' process, which is the means by which we seek views from customers after issues they have encountered. This data would suggest that the numbers we are reporting could be reduced by circa 50%-60%.

We have already put in place a number of actions to drive future improvements for any such future events building on the lessons learnt that are emerging from our own internal ongoing investigations. One such example is that we had already decided to invest in the wider deployment of data loggers for our network.

### **Planning and preparation**

Based on our experience of planning for and responding to severe weather conditions, including our lessons learned from the last extended cold period in 2010, we initiated Operational Bronze incident status on 1 March 2018, and in line with that took the following preparatory actions:

- a) Proactively launched a heightened awareness campaign providing tips and recommendations to our customers on how they could prepare for the cold weather to avoid burst pipes, and report leaks.
- b) Stopped/postponed some non-essential maintenance work on the weekend 3-4 March 2018 to minimise the disruption to our network.
- c) Delayed the low flow trial at Frankley Water Treatment Works and the Elan Valley Aqueduct shut down.
- d) Ensured that our works were running at the maximum available production output.

The temperature across our region increased by approximately 10 degrees from below freezing over the two days following 3 March 2018. While we had been expecting a thaw event, the scale of this temperature change was much greater than had been forecast in the preceding days.

In the two days leading up to the thaw, our operational leakage increased by approximately 70% (300 MI/d) as a result of pipe bursts. That was a much more rapid increase in leakage than experienced in the 2010 freeze/thaw incident, when leakage increased by approximately 40% over a similar two day period in terms of temperature increase. That meant that we faced an increase in demand that was significantly higher than we had been anticipating.

As noted above, we estimate that 70% of the increase in leakage was the result of customer-side pipe bursts. We are as yet unclear as to why the weather conditions resulted in such a high level of customer pipe bursts, and – as explained below – intend to ensure this issue is thoroughly investigated, and an appropriate response identified and implemented. Overall, however, the majority of the increased leakage was recovered more rapidly than in 2010.

### **Incident response and customers affected**

Our Strategic incident status was triggered on 4 March 2018. A series of operational responses were implemented rapidly. In particular:

- We increased the amount of water into supply by 22% to 2,200 MI/d on 5 and 6 March and maintained a level of 2,100 MI/d throughout the incident until 9 March.

- We mobilised over 500 additional field staff to find and fix leaks (an increase of 58%) over the period of the incident.

As a result of our response, 98% of our customers' supply was unaffected. However, we experienced operational issues in a number of areas leading to customers being without a piped water supply. The areas impacted were due to a combination of factors: the extent of localised bursts/leakage; the impact of the weather on critical assets (e.g. trunk mains); and further extreme weather hindering burst identification and repair work. The circumstances in each geographical area were different and we were, in effect, concurrently handling a large number of incidents in four distinct geographical locations:

- In the South-West part of the **Birmingham** area, the thaw resulted in a number of bursts across the distribution system within the city, known as the Northfield system, which serves 118,000 customers. Effectively demand on the service reservoir increased by 120% and causing a rapid declining water levels. Teams were deployed to find and fix bursts in the area, subsequently repairing 23 burst mains and 14 communication pipe leaks across the entire area, eliminating 30% of the total water demand increase. The residual demand was driven by customer side bursts within the boundaries of customer properties and water drawdown from the treated water reservoir declined as repairs were affected by customers and levels quickly recovered. Despite the significant drawdown on the system we managed to maintain supply to a large number of customers in this control group, however the increased demand did result in a pumping station failure for pumps feeding the reservoir on low pressure, exacerbating the supply challenge. Three bottled water stations were opened for affected customers and contingencies were deployed for hospitals and prisons in the area in the form of tankers. We also delivered bottled water direct to vulnerable customers. The bulk of impacted customers supplies were restored within 12 hours, but a significant number of customers were affected.
- The water distribution network in **rural Derbyshire** is extensive and complex due to; the geography and topography of the area, especially in and around the Peak District; and the relatively low population density and disparate spread of rural communities. During the initial thaw event a 75% - 100% increase in leakage was experienced in various parts of rural Derbyshire. We deployed additional front-line field engineers to the areas and found only a limited number of bursts across the Severn Trent asset base and the increased water demand was primarily driven by bursts on customer owned pipes. We did have a specific issue related to the Breamfield service reservoir, which is located in a rural part of North Derbyshire. This service reservoir feeds customers and a number of smaller service reservoirs across a comparatively large area. At 0300 hrs on 5 March 2018 we experienced a burst on a 12" pipe into the Breamfield service reservoir which meant that insufficient volumes of water could be fed into the service reservoir to meet the increase in demand caused by private supply side bursts. The reservoir level dropped significantly within a short period of time and consequently a number of service reservoirs fed off the Breamfield system ran empty. The main was repaired and water supply restored to the reservoir within 21 hrs despite the extremely challenging weather conditions in the area, and all service reservoirs in the area were being supplied by the evening of 6 March.

There was a further secondary weather (freeze and further snowfall) event on 7 March, which resulted in a further increase in bursts across the network and on customer owned pipes. Consequently, there was a further 25% increase in water demand across some parts of the area. Extensive tankering helped ensure that all reservoir levels were maintained in a healthy position despite the further extreme weather period. Unfortunately, some customers in rural communities in the area did experience prolonged periods of intermittent supplies – and this area experienced the most customers going without water for >12 hours. A combination of the geography of the area, land topography and continuing bad weather, including significant residual and fresh snow fall, hampered efforts to remove air locks from the water distribution network and full restoration of flows to customers. Alternative supplies were made available to customers through bottled water provision in three locations and daily deliveries were made directly to vulnerable customers.

- Within parts of **rural Leicestershire**, a combination of customer private supply bursts and network bursts resulted in a 100% demand increase across the area, caused by a rapid thaw driven by a double digit temperature increase on 5 March. Additional resources (field engineers) were deployed to the area, locating and repairing 15 pipe mains bursts and three communication pipe bursts contributing to reducing the water consumption in the area by a third. An extensive tankering operation was established for the area, however there were continuing intermittent supply issues until demand reduced as network and customer side bursts were repaired. Bottled water was made available to affected customers, with daily deliveries made directly to vulnerable customers.
- The thaw event resulted in an increase in treated water demand of 125% across the **Rugby area in Warwickshire**. Additional field engineers were deployed, quickly identifying and repairing 14 pipe bursts across the network. This equated to around 40% of the increased water demand, the additional demand being driven by customer-side bursts. The network repairs and supplementary tankering of treated water into the area ensured supply was quickly restored to all customers within the area and no customers experienced a loss of supply >12 hours. A bottled water station was established but not utilised due to the speed of which supplies were restored. We also delivered bottled water direct to vulnerable customers. Demand continued to drop as customers repaired bursts on private side pipes.

A summary of the customers affected is provided in the table below:

**Table L1: Numbers of customers experiencing supply interruptions during the freeze/thaw event**

	0-4 hours	4-12 hours	>12 hours	Total
<b>Birmingham</b>	24,904	29,320	1,426	55,650
<b>Rural Derbyshire</b>	2,476	10,834	9,975	23,285
<b>Rural Leicestershire</b>	926	1,078	224	2,228
<b>Rugby, Warwickshire</b>	1,010	1,719	0	2,729
<b>Other areas</b>	7,654	230	1,961	9,845
<b>Total</b>	<b>36,970</b>	<b>43,181</b>	<b>13,586</b>	<b>93,737</b>

As I mentioned above, we consider that the actual number of customers affected is likely to be significantly less (circa 50%-60%) than the numbers reported in the above table as we have been

unable to apply our normal process of using temporarily installed data loggers to ascertain a more accurate picture.

After the event we sent a survey to all customers in our affected areas ('Pipe Up') asking for feedback on how we supported them during the event. Within the survey we ask them to provide information on how they were impacted by the event. We have received responses from over 6,500 customers with the following results: 39% of customers who responded said they had experienced a complete loss of water at some point; 44% experienced some water pressure issues; and 29% said they were not impacted at all. These rough percentages do suggest that our actual numbers of impacted customers could therefore be between 50% and 60% lower than those reported above and in the Ofwat data tables.

Furthermore the total number of customers reported as experiencing interruptions greater than 12 hours (13,586 in the table) includes a number of customers who experienced intermittent supplies (that did not exceed 15 hours). The actual number of customers experiencing a continued interruption of greater than 12 hours was **7,231**.

In total over 2,000 of our employees were involved in this incident. In addition to our operational actions, we mobilised a comprehensive incident response team, deployed over 550 people from across the company (with more than 1,150 additional shifts worked), and worked closely with our LRFs. We focused on ensuring vulnerable customers were served, and on minimising impacts to customers and communities that faced interruptions by deploying alternative supplies, whilst restoring piped supplies as quickly as possible:

1. We endeavoured to provide regular deliveries of bottled water to all our customers on the Priority Services Register whose supply had been interrupted. We contacted all customers who were the most vulnerable/high risk and endeavoured to call other vulnerable customers who for example have mobility issues. We mobilised quickly our bottled water supplies and delivered to 5,271 customers within four hours and maintained regular deliveries thereafter.
2. No major hospitals had their supplies interrupted, and we provided tankers to 8 hospitals as a back-up in case of loss of supply although these were not required.
3. We opened and simultaneously operated 11 bottled water collection points at various locations, including supermarket parking lots in affected areas, open from 06:30 to 22:00, depending on demand, staffed by our management and employees. We delivered almost one million bottles of water for impacted customers over four days, and at no point ran out of bottled water at any of our stations. The scale of our available bottled water supplies reflected lessons learnt from previous events.

### **Communications**

We worked on ensuring regular communication with our customers and with key stakeholders throughout the incident, using a range of different channels. We also significantly bolstered our 24/7 contact centre and social media teams to manage the higher than normal inbound queries. We proactively contacted our vulnerable customers as well as hospitals, schools, care homes, prisons in the affected areas to offer alternative supplies. During the event we specifically:

- Operated a full incident response communications team 24/7 throughout the event to keep customers informed with key updates, including the locations of any bottled water stations and stations and when supplies would be affected / restored.

- Proactively sent out over 852,000 direct messages to customers' phones via SMS text or voicemails, and contacted all of our most vulnerable customers directly.
- Proactively contacted all our sensitive non-household customers including hospitals, care homes and prisons.
- Liaised directly with farmers and schools in the affected areas to offer them alternative supplies and as a result we are only aware of one school that had to close as a result.
- Proactively worked with the media and conducted TV and radio interviews which helped to generate c700 media updates on TV, radio and local press.
- Posted 91 website updates and registered 1.6 million page hits, 100% higher than normal.
- Increased staffing in our operational call centres 24/7.
- Ran a 24/7 social media team. We responded to all customer tweets needing a response and proactively issued updates on social media helping to generate c1.9m impressions on Twitter and reach circa 277,000 people on Facebook. Our analysis of social media sentiment shows that 80% of posts we received from customers were either positive or neutral in tone.
- Provided 200 updates to MPs, Councils and our regulators including Ofwat, DEFRA, CCW, EA and DWI. We would like to acknowledge the support they provided in helping us to communicate and engage with their constituents.

## **Compensation**

To demonstrate our commitment to delivering the best for all our customers, we increased our standard levels of compensation and paid compensation by 4 April to the full list of customers we identified accepting, of course, that we may have paid compensation to customers who may not have experienced an interruption to their supply.

Our existing policy was that customers who have been off supply for over 12 hours continually were eligible for our 'emergency supply interruption' GSS and received a payment of £30 which is the equivalent of a month free on the average combined water and waste bill. We would also have made further payments to customers who were still off supply for over 24 hours.

In addition under our old policy where a customer had been on and off supply a number of times and the cumulative time off supply exceeds 15 hours they were eligible for a 'repeat interruptions to supply' GSS and received a payment of £30.

Prior to this incident we had already started a review of whether our approach to GSS truly matches the impact that having no water has on our customers, especially when they have been without water for a long period of time. This event gave us the opportunity to reflect on this and as a result we have decided to make a permanent change to our Code of Practice and the payments made to customers who are impacted for a significant length of time.

The changes we have made are;

- A first additional payment is made at 24 hours rather than 36 hours to make it easier for customers to understand.

- Additional payments for household customers have increased from £10 to £20 for 24-48 hours and £25 for any additional 24 hours.
- Additional payments for non-household customers have increased from £25 to £50.
- We have introduced additional payments where cumulative intermittent interruption exceeds 24 hours.

These changes have been discussed with CC Water who were fully supportive of our approach and the changes we have made. We are currently working through our Codes of Practice, and our new GSS compensation levels are effective as of 1 March 2018 - and therefore any customers impacted in this incident will benefit from them.

In total for this event we have paid compensation to 8,819 customers. This is split between 7,231 customers receiving payments under our 'emergency supply interruption' GSS and 1,588 customers receiving payments under our 'repeat interruptions to supply' GSS. This number differs from the total number of customers who experienced interruptions of greater than 12 hours (13,586) as some of these experienced intermittent supplies (that did not exceed 15 hours in total).

### Lessons learned and future actions

There are a number of reflections and lessons learned from the incident, which we are already putting into action in advance of fully completing our own internal investigation of the issues.

A number of things worked well, in particular our ability to find and fix leaks quickly; our overall communications (and social media in particular); the processing and level of customer compensation; our governance structures and processes where we have a high level of competency; and our support to vulnerable customers.

Nevertheless, there are some specific issues we are seeking to learn from and take action on:

- The more extensive deployment of **data loggers** throughout our distribution network. The scale of this event has highlighted that our current data logger deployment does not provide a sufficiently comprehensive view of pressure levels throughout our distribution system. This constrains the effectiveness with which we can identify the numbers of customers affected by supply problems, and period of time over which they are affected. We already have plans in place to invest in additional data loggers. This incident has served to further demonstrate the benefits of having more extensive pressure data across our network. This will enable us to assess the impact of any interruptions, bursts or significant demand increases on our customers' levels of service more rapidly and more accurately.
- Our **Northfield service reservoir** (which serves parts of Birmingham) ran empty during the freeze/thaw event following the considerable increase in demand that resulted from pipe bursts. Our existing resilience within the Birmingham area resulted in us maintaining supplies to around 55% of the customers served from this reservoir, with 97% of these customers' supplies restored

in less than 12 hours. We have not experienced such an incident before in this part of our network and we will review the operation of our Frankley Water Treatment Works to identify what further opportunities exist to support the Northfield reservoir system.

- Our comprehensive Incident Management Plans from our Strategic Incident Management Response Plan (SIMRP) down to operational incident plans contain core triggers for the instigation of pre-specified responses and governance escalation. These include **triggers for sustained cold temperature periods**, but we do not currently have triggers reflecting the risks associated with significant temperature differentials arising within a short time period. In partnership with the Met Office (or other similar bodies), we will identify and review options for putting in place formal triggers aimed at assisting with the management of temperature differential risks. We will assess ways in which this might enhance our incident management preparedness, and seek to develop, test and implement appropriate trigger arrangements.
- **Breamfield Service Reservoir, Derbyshire.** This reservoir has two 12" feeds into it and was therefore thought to have sufficient resilience to an inlet pipe failure. In this event one of the 12" inlet pipes burst. This had the unforeseen consequence that the pumps at the water treatment works failed. While partial supplies were restored within 6 hours this event highlights the need to ensure all the failure mechanisms for resilience are understood and mitigated. We will build this into our processes for identifying resilience and single points of failure and into our solution designs.
- Our water into supply increased as the incident developed. Our priority is to ensure our distribution input matches the demands we predict on our network. Our peak distribution input was on 6 March. We experienced issues with increased raw water turbidity which impacted the rate at which works outputs could be increased. We will investigate options for **more rapid increase in production** over and above our predictions without compromising water quality.
- **Airlocks** in our network occur both in the water mains in our network and within customers premises. They result from air entering the system following reservoirs running empty or during burst pipe repairs, where air effectively becomes trapped at high points in our network. We were monitoring reservoir levels as supplies were restored which reassured us that customers would be back on supply. Due to the weather impacts on mobility and access to our valves and hydrants it took longer to remove the air from our network than it would under normal weather conditions. We will review our operational processes to identify what more we could do to improve this aspect of our operation during extreme weather events. This may include industry benchmarking to identify best practice.
- We are taking actions to allow us to make better use of **local resilience forums (LRFs)**. Our review work so far has highlighted the benefits from engaging effectively with LRFs from the early of an incident, as we did, for example in Birmingham and Warwickshire. In those areas, we worked very effectively together with the LRFs. We believe that we could, however, have worked better with the LRF in Derbyshire, where closer liaison may have proven to be useful in relation to clearing roads. This may have reduced the time it took us to access our assets (for example, in

order to clear airlocks), and could have facilitated a more rapid restoration of supplies in some rural areas.

- The scale and impact of water supply losses as a result of **burst pipes on customer properties** was a particular feature of the freeze/thaw incidents, and was a major driver of the supply pressures that we experienced across our network (and experienced particularly acutely in some areas). While a high proportion of these losses reduced within the first 24 hours of the incident (as customers took action to address the resulting leaks), the scale of the associated water losses had the effect of heavily depleting available stores in some areas, and made supplies more vulnerable to subsequent problems arising. We plan to review experience from this incident alongside our current review of our Burst on Private Pipes Policy. We will seek to identify how we might better support our customers in the protection of their pipes from freeze/thaw incidents. This will include considering how we could work better with customers, plumbers and home protection services, such as HomeServe, to expedite the fixing of bursts on customer pipes so as to help ensure the availability of supplies across the broader network. We will seek to review this in collaboration with Water UK.
- While recognising the benefits that **social media** could provide for engaging with our customers and stakeholders, our communications strategy also recognises the importance of not relying too heavily on social media and internet based communications methods. In line with this, throughout the incident, we utilised the wide variety of platforms available to ensure we reached out to all our customers through their preferred communication methods, be that radio, TV, social media, print or local resilience forums.

We also believe we need to consider how we might work better collectively across the water sector when events like this have a UK-wide impact.

The attached report provides an overview of the incident and sets out our responses to Ofwat's review following the structure of your questions. We have prepared this report applying our normal three lines of assurance model. However, since our own internal review is still ongoing, as part of this we may identify further opportunities to improve and validate our operational performance data. We have also used expert third parties in the preparation of our report to ensure robust challenge and oversight of our data and accompanying analysis.

I am very proud of the way in which my Severn Trent colleagues responded to the incident and while a number of things worked well – based on experience of previous incidents – there are nevertheless a number of lessons to be learnt and actions to be taken. As I said at the start of this letter, the impact on our customers is something that we take very seriously. As ever we will be seeking to take action at pace to improve the resilience of our network to any future such events.

Yours sincerely,

**Liv Garfield**

**Chief Executive**