Learning from the impacts of the 2018 freeze-thaw

Final report on actions taken by the water sector

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www.water.org.uk

Executive summary

Early Spring 2018 was a testing time for customers. One of the coldest winters on record (the result of a 'Beast from the East' cold front) was quickly followed by a short, sharp return to above-freezing temperatures (together known as a 'freeze-thaw'). This combination damaged water companies' networks and customer owned pipes and plumbing, leading to at least minor interruptions for around 200,000 households and businesses. A small but significant proportion of those customers experienced interruptions for more than 24hours.

Subsequent assessments and reports carried out by Ofwat, the Drinking Water Inspectorate (DWI) and Consumer Council for Water (CC Water) identified some areas for improvement in individual companies. These have been acted on. Bespoke action plans have been used to deliver measures for better dealing with future events. In addition to individual company plans, Water UK, working with all water companies, also proposed eight areas of collaborative action to be delivered by the whole water industry.

While the shape and form of future events are unlikely to replicate precisely those that took place in 2018, in this, our final report on actions taken as a result of freeze-thaw, we set out the improvements made to provide better response and recovery for whatever events do occur – particularly in the face of an increasing likelihood of extreme weather.

We set out improvements in three areas:

- **Prepare:** drawing on learning and best practice across the UK, each company's winter readiness plans have been reviewed, enhanced and tested to ensure that, when we experience another extreme winter, customers can expect a better service, with interruptions better-managed and services likely to recover more quickly.

- **Predict:** new technologies are being incorporated into the suite of tools available to companies, drawing on lessons from other sectors and through better intelligence on cutting-edge analytical tools and data streams. Better foresight means better prevention and management of impacts.

- **Respond and inform:** improvements have been made to how the sector collectively manages its most significant incidents and events. Preparations for a potential 'no-deal' EU Exit or similar drew on experiences from 2018's freeze-thaw and the heat wave that followed to develop a new structure of tactical ('national incident management') and strategic ('platinum incident management') control.

We do not expect to stop here. There are continual opportunities to learn and build better services. Water UK, through its role as facilitating the sharing of good practice across the water companies and wider water sector, will continue to work with our members to build on activity undertaken since the Beast from the East.

For example:

- The impact on customer-side pipes of cold weather was found to be particularly significant during freeze-thaw events. This coupled with potential changes to drinking water standards for lead are contributing to an ongoing review of the manner in which customer side pipes are managed. This work programme will continue into 2020.;

- Understanding the benefits of data and a digital approach is a theme in many areas of water company activity. Our workshop on 11th November 2019 with the Smart Water Networks Forum (SWAN) and the Open Data Institute (ODI) will provide opportunities for companies and supply chain to explore the application of such approaches to managing cold weather events.

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Introduction

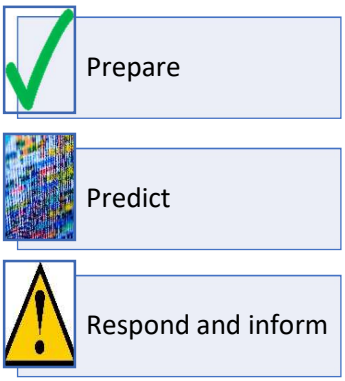
In September 2018, Water UK published a report[i] on the freeze-thaw event that affected 200,000 water customers in arts of the country[ii]. In that report we committed to work with water companies to take forward eight collaborative actions, building on the measures being taken individually by companies as part of their own plans to strengthen preparedness for, and our response to, cold weather events. The eight collaborative actions (as well as our progress against each, and the impacts they have had) are described in the Appendix.

This is the fourth and final quarterly update report (previous reports are available on the Water UK website[iii]) which we are using to provide transparency on progress for the duration of the programme.

The report highlights the specific actions being taken both collectively and individually to ensure that when the next extreme weather event occurs, the impacts on customers are less severe than those experienced in 2018.

The net effect of the activity undertaken to address these collaborative actions, in combination with those being taken to deliver company action plans, will enable industry to:

- ✓ scale-up preparedness for future events (Prepare);
- ✓ better understand and so manage risk (Predict);
- ✓ provide better information to customers and, should the situation escalate, better manage a multi-company incident (Respond and Inform).



Actions taken by companies

Since the events of February and March 2018, we have supported all UK water companies as they reviewed their own internal approaches to managing extreme events, including but not limited to freeze-thaw.

Prepare:

Companies have:

- Upgraded and enhanced winter readiness plans, as well as wider-ranging severe weather plans covering both the response and recovery phases (e.g. Affinity Water has established a new, integrated Rapid Response and Restoration team as part of its refreshed planning);

- Increased capacity of emergency equipment, more backup 'alternative water supplies' like bottled water or stand pipes, and more access to alternative water supplies through Mutual Aid between companies (e.g. Thames Water have increased access to of backup clean water tanks by 115% and improved the availability of multi-skilled drivers – who deliver the supplies - by 120%);

- Improved training and support for emergency specialists and staff volunteers to increase the resources available to manage widescale events (e.g. Yorkshire Water have trained 72 control room staff and provided new IT to allow 24/7 surge capacity from wherever they happen to be - without having to travel into sites that might be themselves blocked by poor

weather; they have also trained new specialist teams to bolster emergency planning and secured Customer Liaison Vehicles to be ready to provide customers with real-time advice on the ground);

- Engaged with local councils and service providers to develop joint plans for access to essential sites (e.g. Wessex Water have worked with local Highways England on issues like gritting schedules to improve access to sites that might be important in poor weather).

Predict:

Companies have:

- Embraced more innovative approaches to monitoring and modelling their critical network (e.g. Severn Trent Water has developed digital tools to monitor reservoir levels and create a Virtual Incident Room);

- Developed new platforms to simulate networks and model likely impacts (e.g. "ICM Live" is a new modelling tool designed by Anglian Water to enable operational modelling for sewerage systems. It's an automated programme which uses real-time data to run and simulate networks, with six-hourly forecasts issued to operational teams to respond to in advance of problems even occurring).

- Built relationships with weather data services to increase the time available to respond to adverse conditions (e.g. Yorkshire Water are working with Meteogroup, including on sub-seasonal outlooks tailored to the region, with direct information flows supported by live Weather stations providing early and real-time warning and monitoring of events).

Respond and inform:

Companies have:

- Revised communication protocols improving the ability to inform and update customers, and particularly priority and vulnerable customers, during cold weather and other incidents (e.g. Bristol Water established Customer Care Team and dedicated contact for priority and vulnerable customers).

Actions taken collaboratively

In addition to improving individual company preparedness, Water UK has been working with all water companies to address the priority areas identified in our September 208 report. For example:

Prepare:

Water UK has:

- Established a community (Risk Good Practice Network) to share good practice on understanding attitudes to managing the risks of extreme weather impacting the supply of water ensuring that examples and lessons are shared widely across water companies;

- Reviewed the regulations and frameworks for the provision of Alternative Water Supplies (AWS). While these were found generally to be fit for purpose, we identified customers' changing expectation that more bottled water should be available. We are responding to

this expectation by examining changes to planning frameworks and the accessibility of bottled water though both company-owned and contracted sources.

Predict:

Water UK has:

- Provided platforms to engage with supply chain and service providers on alternative water supplies and big data. This has resulted in a noticeable increase in our understanding of cutting-edge products and technologies – including by drawing on developments outside the water sector. We have also been looking ahead to what possibilities the future could bring to modernise the service to customers during extreme or unforeseen events, for example through harnessing big data and open information systems;

- Working with WRc, we have synthesised thinking in companies and regulators about issues around customer water supply pipes; this will be used in conjunction with on-going work on lead pipes and customer side leakage to inform future policy decisions, particularly around asset ownership.

Respond and inform:

Water UK has:

- Built a new emergency-management structure, supported by new protocols, ways of working, information flows, tools, templates and relationships with stakeholders like Government, to significantly strengthen the water industry's in-sector capability for managing major, industry-wide events. This structure can call upon sector-wide specialists (e.g. communication staff, lawyers, supply chain experts) to support any national efforts.

- Improved how water companies can support each other by updating protocols and procedures for the management of Mutual Aid and of bulk supplies between companies;

- Worked with non-household (NHH) providers to test the protocols developed through the Retail Wholesale Group (RWG)[iv] to share information with NHH customers in both planned and unplanned incidents. The learning from the exercise will be embedded into company protocols and tests will be carried out again in early 2020, particulary to prepare for any water restrictions that may result from a dry winter.

More detail on the activity and outcomes against each of the priority areas is shown in summary in the Appendix.

Building on preparing for a potential no-deal EU Exit

Perhaps the most significant area where the industry has worked together to improve its operational preparedness is in the work carried since October 2018 to ensure that the impacts of a potential no-deal EU Exit or similar are managed and mitigated. This involved a full re-think of the approach to managing national scale incidents in a way that supports and augments the steps taken by individual companies. Water UK and water companies developed a new structure of tactical ('national incident management') and strategic ('platinum incident management') control. This has been subject to three national exercises and one formal review and will be used for other kinds of event. The processes and protocols put in place put the industry in a robust position for the possibility of no-deal.

The industry is reviewing the extensive incident management and planning work carried out for a potential no-deal EU Exit to draw out best-practice implications for future events, including extreme weather. This will assess: working with suppliers, coordinating across companies, managing information flows, interfacing with Government and regulators, communications with the public, and taking or recommending cross-cutting policy or operational decisions. The result being a sector that is better placed to respond to future widescale events, no matter what the ultimate trigger.

Leading continual improvement

Water UK continues to facilitate opportunities for all UK water companies to share their approaches, best practice and promote continued learning and development across water companies and our supply chain. As and when water systems are put under stress – be it from extreme weather or other causes – the sector will be better placed to manage these and to minimise impacts on consumers.

Conclusion

As an industry we are committed to ensure that all are in a better place to manage the impacts of future cold weather events. Companies are currently preparing their winter readiness plans and we expect to see the outcomes of the collaborative work to be integrated into these as well as the fulfilment of their individual action plans.

Water UK will continue to provide oversight and encourage learning from all future events and embed this function into the role and remit of the Water UK Operations Strategy Group.

Appendix: Summary of progress in addressing priority areas

Priority 1: Agreeing an industry approach to planning for supply risk associated with extreme weather-related incidents

Water UK's members formed an expert community (Risk Good Practice Network) to share good practice on managing the impacts of extreme weather and its impact on customers. The good practice covers learning lessons, company actions and collaborative actions and identifying risk factors that will affect the impact of extreme weather. The work programme will continue under the guidance of the Water UK Operation Strategy Group (OSG[v]).

The aims of the network are to share knowledge, best practice, that can subsequently be implemented in the respective organisations, and assess the risk appetite for any other extreme weather events (i.e. freeze-thaw, prolonged drought, etc.), across the industry. The shared industry understanding will enable future events to be better predicted and the risk of supply interruptions managed better.

The work plan brings together the outputs of relevant groups offering a holistic view of the relevant options and identify other potential areas of concern. The network has agreed a set of deliverables, namely:

- Develop a deeper understanding of the causes leading to a demand surge as a result of an extreme weather event leading to an inability to supply customers with potable water;
- Identify industry wide risk events of concern: the risk event will be quantitatively specific to each company, and will be defined in the best practice guidance document as a surge in demand because of an extreme weather event (hot or cold) that increases the risk of supply interruptions of potable water;
- Collaborative work around risk prevention: The best practice guidance document will offer recommendations on mutual aid to avoid supply interruptions, particularly in areas of low resilience, by collaborating with neighbouring water companies and communicating effectively with big consumers;
- Mutual support to mitigate risks: the outputs of other OSG groups respective to potential EU Exit plans will be collated and included in the good practice guide;
- UK wide assessment of risk: several options for assessing risk will be captured as part of the best practice guidance document;
- Development and adoption of a common method of measuring resilience across the industry.

Priority 2: Assess the availability of alternative water supplies

A full review was carried out on the manner in which alternative water supplies (AWS) are available for customers during supply interruptions. The review found that provisions for non-bottled water supplies are relatively robust but that more attention needs to be given to the use of bottled water. The limit of the availability of such water mean it is impractical for wide distribution during large or prolonged events priority should be given to vulnerable customers or premises. The review also found also a general support for the principle of industry-controlled bottling plants (either static or mobile) to boost resilience and reduce reliance on a small number of key suppliers. Should individual

companies progress with the procurement of static or mobile bottling plants then this equipment would fall within the scope of Mutual Aid.

The review indicated the need for a review and refinement to the approach for multiple requests for Mutual Aid. This has been carried out by the emergency planning professionals a working group of the Water UK Security and Emergency Planning Network (SEPN). An updated version of the Mutual Aid manual has been published on the Water UK pages of Resilience Direct.

It has been exercised and refined as part of the planning activity for a potential no-deal EU Exit resulting in greater co-ordination across the industry. Part of the protocols for the incident management structure now provide for decision making in the event of multiple concurrent requests for support using Mutual Aid, thus addressing one of the challenges faced during the freeze-thaw event.

Companies are working on their contractual arrangements with third party suppliers to make them more resilient and in some cases developing their own bottling capability. On-going review and assessment will be overseen by emergency planning professionals to ensure the capacity is accessible and resilient.
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Priority 3: Hold an Innovation Exchange on alternative water supplies

An Innovation Exchange event was held in December 2018 hosted by Severn Trent Water and Future Water Association. The event brought together water companies, suppliers, associations and academic institutions, providing a platform for exchange and learning. The event focussed on showcasing and sharing innovative approaches to AWS was held on 20th December 2018 with the Future Water Association[vi]. This provided opportunities for water suppliers and the supply chain to explore new approaches to addressing the challenges of provision of AWS.

This event completed this specific collective priority. Companies continue to collaborate through the technical networks.

Priority 4: Review the regulations on the provision of alternative water

Defra are in the process of considering a review of the Security and Emergency Measured Direction 1998 (SEMD) and associated guidance and advice. Water UK have had initial discussions with Defra officials and will support them in their activities to review and update this legislation. This will take the form of workshops in late 2019 and early 2020 and a subsequent consultation. The learning from all recent events will factor in such discussions.

A data gathering process captured the views of companies as to the suitability of current planning thresholds for the supply of alternative water contained within the SEMD. Companies considered whether the existing planning thresholds are fit for purpose given changing customer expectations and, if not, what changes should be introduced and how. The outputs from this will contribute to Defra's plans to review SEMD in 2019.

The review indicated that existing regulations are largely fit for purpose, although companies recognise that as expectations evolve there will need to be revisions to support enhanced planning for example consideration should be given to reviewing the way populations are set for planning

purposes based on a percentage of the customer base and ensuring a regular review of planning thresholds. The industry will continue to keep SEMD requirements under review and maintain dialogue with Defra.

Priority 5: Improving the robustness of arrangements under which bulk supplies are provided between companies

Water UK's Drinking Water Policy Advisory Group (DWPAG) assessed the data resulting from an all company survey on the extent of bulk supplies, the types of agreement in place and the criticality of the supply. DWPAG produced a Memorandum of Understanding (MOU) that will augment existing and new agreements. The MoU (see Box 1) was approved by Water UK's Operation Strategy Group (OSG). The DWPAG also made a series of recommendations to improve the way all parties operate bulk supplies with focus on ensuring bulk supply commitments during periods of stress.

The approach proposed by the DW PAG was accepted OSG and the MoU will be integrated into company plans and procedures.

Box 1: Memorandum of Understanding for bulk supplies

All parties operating or receiving bulk supplies agree to ensure that there is:

- Proper process in place for routine dialogue on the operation of the supply. This will include disclosure of any planned activity by the supplying company and the strategic importance of the supply to the receiving company;
- Proper process in place to manage variances to the agreement both short-term and long-term and considering the impacts on water quality and water quantity. Both parties should agree the lead times needed to manage specific variations;
- Proper process is in place to ensure full communication between operational and control room staff during unplanned or emergency situations;
- Full discussion of risks identified in DWSPs or mitigation measures being addressed by Undertakings and Notices.

Priority 6: Improving engagement with affected customers

Dialogue with NHH retailers through workshops related to both the freeze-thaw and to the dry weather have highlighted a general lack of awareness of roles and responsibilities and of procedures, codes and guidance that exists to support the management of unplanned events. Several workshops over the past 12 months have tried to address this but to date the progress has been limited. For example:

- In November 2018, South West Water hosted an event for NHH retailer organisations to share the lessons learned on the freeze-thaw. The feeling at the workshop was that there was an overall lack of awareness of the protocols and systems that are already in place to support the management of extreme weather incidents.
- In December, Yorkshire Water hosted an exercise with retailers which ratified the findings from the South West Water event. 11 retailers and 5 wholesalers were present. Yorkshire Water will be sharing these learnings with the industry and will be developing a notification

and communication procedure for extreme events, proposing that wholesalers adopt this as part of their incident management plans and protocols.

Working with non-household (NHH) retail associations, self-supply organisations, Ofwat and EA an approach has been agreed that improves the interaction / engagement between wholesalers and NHH retailers to ensure that communication with customers during extreme weather events are improved. This approach, jointly developed through our dry weather workstream aims to:

- Collate existing material (e.g. market codes, TUBS code, sensitive customers);
- Raise awareness of existing material to key audience;
- Build on lessons learned, especially from self-supply;
- Test existing documents (e.g. through exercises or scenarios);
- Promote and ensure awareness of the structure of the arrangements in place for managing extreme weather to both retailers and wholesalers

Water UK engaged with the MOSL Retail Wholesale Group (RWG)[vii] and the UK Water Retailer Council (UKWRC) to carry out exercises to test the communication protocols between wholesale and retail organisation outlined in the "Unplanned Events Good Practice Guide"[viii]. This testing took place in September 2019 resulting in areas for potential improvement that will be undertaken in the continued work programme of the RWG.

On *"ensuring coordinated communication throughout the event to regulators, Local Resilience Forum (LRF) partners and customers"* the SEPN have developed minimum standards for water companies in terms of liaising with LRF's, from planning phase to triggers and incidents. This document was published to Water UK members in September 2019.

Priority 7: Sharing insights on the use of big data to understand network performance better

The use of big data is a promising tool to increase ability to understand and react to extreme events. The is a perceived nervousness on taking up digital approaches and embracing big data. To help overcome this the OSG has undertaken to share examples of where big data is being used in companies to benefit the understanding of the network and its behaviour in extreme weather conditions. At the December workshop on winter preparedness, Severn Trent Water outlined how it had been using big data to develop its approach to system visualisation (a graphic representation of network modelling and diagnostic capability) and work prioritisation. In addition, several companies are working together to demonstrate the use of big data. The topic cuts across many aspects of water company activity and the subject was an area of focus at the 20th Annual Leakage Conference in October 2019 for example.

Water UK are working with SWAN Forum[ix] to establish a showcase workshop event leveraging both water company and supply chain networks and smart water expertise. This workshop will be focussed on how companies can harness and utilise big data in improving their operational resilience[x]. This follows a series of regional and local event (e.g. Anglian Water and Essex and Suffolk Water's Innovation East event) along similar themes.

Priority 8: Enhance customer side resilience

Lessons learned from freeze-thaw have exposed that customer owned supply pipes are often more adversely affected in extreme weather. Leakage from customer pipes is estimated to have accounted for over 70% of the additional demand.

WRc have been engaged to carry out three key pieces of research for the sector on this subject – for UKWIR on customer side leakage, for DWI on lead and for Water UK on attitudes towards supply pipe policy. In combination these workstreams will enable Water UK to establish a robust evidence base. The work for UKWIR and DWI will conclude in early 2020.

The review carried out for Water UK has concluded that there is an overall support for a change of approach in how supply pipes are managed, including potential adoption by water companies, but that there are risks that need to be addressed as part any change in policy.

Water companies are also working with their customers to increase the ability to identify and remedy leaks on or in properties. Examples of actions taken include:

- Companies have improved and maintained the free supply pipe repair schemes or increased their 'find and fix' resource; changed the way they interrogate billing data to proactively identify customer side leakage and carried out enhanced home and business visits from a water efficiency perspective;
- Companies have established winter readiness campaigns and support programmes to help customers prepare for (free lagging or tap covers) to advice and information presence on websites and social media.

Water UK have also completed a project to considering the range of interventions available both to water companies and other stakeholders to drive a reduction in water use (PCC). This project will look at all options – including addressing customer side leakage – and will be a cornerstone of the industry's contribution to Defra's consultation and call for evidence on reducing personal water use[xi].

ENDNOTES

[i] https://www.water.org.uk/publication/learning-from-the-impacts-of-the-2018-freeze-thaw/
[ii] https://www.ofwat.gov.uk/pn-26-18-hard-lessons-water-sector-following-beast-east-review/
[iii] https://www.water.org.uk/publication/learning-from-the-impacts-of-the-2018-freeze-thaw-3/
[iv] https://www.mosl.co.uk/groups/rwg
[v] Water UK's Operation Strategy Group is a forum comprising senior operational executives from all water companies. It was established in 2018 to "To support companies in improving performance and delivery, by discussing common challenges and ways to overcome them collaboratively".
[vi] https://www.stwater.co.uk/news/news-releases/we-hosted-industry-wide-event-to-look-at-weather-related-operati/
[vii] https://www.mosl.co.uk/groups/rwg
[viii] https://www.mosl.co.uk/documents?cat=31&from=&to=&sort=latest&pp=&
[ix] https://www.swan-forum.com/
[x] https://www.eventbrite.co.uk/e/big-data-beats-beast-from-the-east-tickets-67995066073
[xi] https://consult.defra.gov.uk/water/measures-to-reduce-personal-water-use/supporting_documents/Consultation%20on%20reducing%20personal%20water%20use%20FINAL.pdf