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Consolidated review of the widespread loss of supplies arising from the freeze/thaw event affecting England in December 2022.

Date: 12 December to 25 December 2022

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1. Executive Summary

- 1.1. This report provides the outcome of the investigation by the Drinking Water Inspectorate (the Inspectorate) into the impact of weather conditions during December 2022 affecting the supply of piped water and the consequent provision of bottled water in response by eight water companies.
- 1.2. Eight water companies in England reported 10 events to the Inspectorate and Water Security and Resilience (WSR) team, relating to the freeze/thaw in December 2022.
- 1.3. Freeze-thaw is the phenomena which results in water pipes bursting as periods of cold weather are followed by a period of warmer temperatures, leading to ground movement. Water is then lost from networks due to increased bursts and leaks which depletes storage supply (for example, reservoir levels). In some cases, demand is greater than the speed water companies can refill storage systems.
- 1.4. The Inspectorate's assessment of these events has focussed on companies' compliance with the duties of water undertakers under the Water Industry Act 1991 as amended (the Act), to provide a continuous supply of water to their consumers, and companies compliance with the requirements of the Water Supply (Water Quality) Regulation 2016 (as amended), which apply to companies operating wholly or mainly in England and the Security and Emergency Measures Direction 2022 (SEMD). These are known respectively as 'the Regulations' and 'the Direction'. The requirements of the SEMD are supported by the Emergency Planning Guidance (EPG) (Defra, 2022).
- 1.5. The Inspectorate has also explored if the lessons identified after previous extreme weather-related events, for example the 2018 freeze / thaw 'Beast from the East', had been effectively adopted.
- 1.6. The severe weather event has highlighted the challenges faced by the water industry in England when dealing with a water supply emergency that is affecting all or a significant number of water companies.
- 1.7. The Drinking Water Inspectorate concludes that the majority of companies have demonstrated an improved response from the 2018 freeze/thaw event, companies still require further improvements in their planning, resourcing and response to this type of weather-related loss of supply events.
- 1.8. The Inspectorate made a total of 10 recommendations to Individual companies in their event assessments, and a further 11 in this letter. The Inspectorate on

behalf of the Secretary of State is also considering enforcement proceedings with one company.

2 Summary of the Inspectorates recommendations and suggestions

- 2.1. The common recommendations for improvement and suggestions for best practice arising from the response across the industry are set out below.
- 2.2. **Paragraph 6.2-** The Inspectorate **Recommends** that companies familiarise themselves with and follow the reporting guidance in Annex A of the emergency planning guidance (EPG). A summary of the triggers can be found in Annex 2 of this letter.
- 2.3. **Paragraph 6.5-** The Inspectorate **Recommends** that companies have a comprehensive communications plan, that can adapt to feedback being received across all channels, to ensure consumers received the correct minimum level of service.
- 2.4. **Paragraph 6.7-** The Inspectorate **Suggests** when lessons are learnt from events like the 2018 freeze/thaw, that they are embedded within policies, and actions have owners until they are completed
- 2.5. **Paragraph 6.8-** Several companies had taken the opportunity prior to the predicted event to increase storage in all treated water reservoirs. They had also taken the opportunity to increase detection and repair activity to resolve leaks on the network prior to the event, but also during the event, so that issues were dealt with swiftly. The Inspectorate considers this best practice and **Recommends** that companies consider this when entering periods of uncertainty.
- 2.6. **Paragraph 6.11-** The Inspectorate **Recommends** that companies enter adverse weather forecast events with an incident team, that is empowered to make decisions based on the best outcomes of the event. Furthermore, the Incident should be escalated in line with the companies' escalation procedure, to ensure the best outcome during an event. Where required companies should review their escalation triggers.
- 2.7. **Paragraph 6.14 -**The requirement of SEMD 22 is that all consumers should have access to 10l of alternative water within the first 24 hours of losing a piped supply. Several companies took the opportunity to carry out proactive priority service register (PSR) deliveries before consumers lost water, this allowed companies more time to complete all the deliveries in within the 24 hour window. The Inspectorate **Suggests** that companies consider this proactive approach to ensure everybody has access to the service within the correct timescales.

- 2.8. **Paragraph 6.15** -The Inspectorate **Recommends** that companies ensure all vulnerable customers receive alternative water in the timescales stated within the EPG, and furthermore that these deliveries are recorded to enable verification that the requirements have been met.
- 2.9. **Paragraph 6.17**- The Inspectorate **Recommends** that companies identify how best to share and integrate data with LRF's.
- 2.10. **Paragraph 6.18**- The Inspectorate **Suggests** that companies include in their plans any locations of pressure valves that can be controlled remotely to reduce demand in the network.
- 2.11. **Paragraph 6.19**- The Inspectorate **Recommends** that companies review locations of bottled water stations where they are needed to ensure that everybody receives an inclusive service.
- 2.12. **Paragraph 6.20** - The Inspectorate **Recommends** that companies critically review their local reasonable worst-case scenarios. This should include reviewing the potential scale of an incident, but also a worst-case scenario in response to an incident. It was clear that a number of the events reviewed were larger than the companies reasonable worst-case scenario. Large scale events should also be built into the testing and exercise schedule.
- 2.13. **Paragraph 6.22**-The Inspectorate **Recommends** that companies review site resilience, to ensure that sites continue to function during adverse weather. The principles of SEMD are to provide a piped supply as a primary means.
- 2.14. **Paragraph 6.23**- Several companies had taken the opportunity to ensure there was sufficient water treatment and storage assets available to produce water matching a demand of the 2018 freeze thaw. The Inspectorate considers this best practice and **Recommends** that those companies which did not adopt this strategy consider this when entering potential freeze thaw events
- 2.15. **Paragraph 6.23**- Companies typically use the winter period to carry out intrusive maintenance onsite, as summer demand is usually higher, however as weather patterns become more unpredictable with climate change, the Inspectorate **Recommends** that there is sufficient resilience, within the available asset base, to provide a continual piped supply all year round.

3 Introduction

- 3.1. The Drinking Water Inspectorate regulates Water Companies compliance with the Security and Emergency Measures Direction 2022 (SEMD) on behalf of the Secretary of State within England and Wales. The purpose of this letter is to disseminate some generic outcomes that are applicable to the whole water industry arising from the freeze/thaw event that took place in December 2022.
- 3.2. When assessing an event notifiable under the provisions of the Information Direction, the Inspectorate has a duty to establish whether the company breached any requirement of the Regulations or its duties under the Act to maintain a continuous supply of wholesome water, in particular, whether the company supplied water that was unwholesome, as defined by regulation 4, and whether any other regulatory requirements were contravened.
- 3.3. The Inspectorate's investigation of the event has focussed on whether statutory requirements for drinking water quality and sufficiency were met; the steps taken to reduce potential impact on consumers, to restore supplies and to maintain consumers' confidence; whether current good practice in water supply matters was demonstrated; lessons to be learned; and whether supply resilience was a consideration.
- 3.4. Eight water companies notified events affecting their areas of supply to the Inspectorate, because of the potential for the event to disrupt water supplies, either directly or indirectly; to cause significant concern to consumers, and possibly other third parties; and because of the potential for significant media interest.
- 3.5. During the week leading up to the notification of these events, there was a nationwide period of severe winter weather. The 2022 Freeze-thaw began on 6 December, when air temperatures fell below freezing point. Temperatures remained at or below freezing point for 10 days reaching a low of -12°C on 15 December until 17 December. This period of cold weather was then followed by a rapid increase in temperature with air temperature reaching 8 °C by Sunday 18 December and as high as 14°C by 19 December.
- 3.6. Freeze-thaw incidents present several challenges to the supply of water to consumers. A sustained period of freezing temperatures can allow cold air to penetrate into the ground which can cause water mains and domestic unprotected pipework in properties to freeze. The subsequent rapid warming can result in ground heave and thawing of pipe work, which in turn causes leaks in the water network, in customer supply pipes and private plumbing. This can result in an increase in the demand due to this increase in leakage.

- 3.7. This increase in water demand can put pressure in the treatment processes as many treatment works are designed to operate at a certain output. Weather presenting snow and ice conditions can also make it difficult to access certain remote treatment works and water company sites.
- 3.8. There were several similarities between the 2022 freeze thaw and that from 2018's freeze/thaw 'Beast from the East'. Notably the highest impact day was, for most, a Sunday, and a number of companies reported similar numbers of bursts and volumes of leakage.
- 3.9. Following publication of the Drinking Water Inspectorate's Freeze/Thaw [2018 letter](#) written to the Industry, the Inspectorate welcomed companies having improved outcomes, through learning from previous events and implementation of previous recommendations.

Figure 1 ([Met Office, 2022](#)) below shows the daily minimum temperatures during the period of events experienced by the companies.

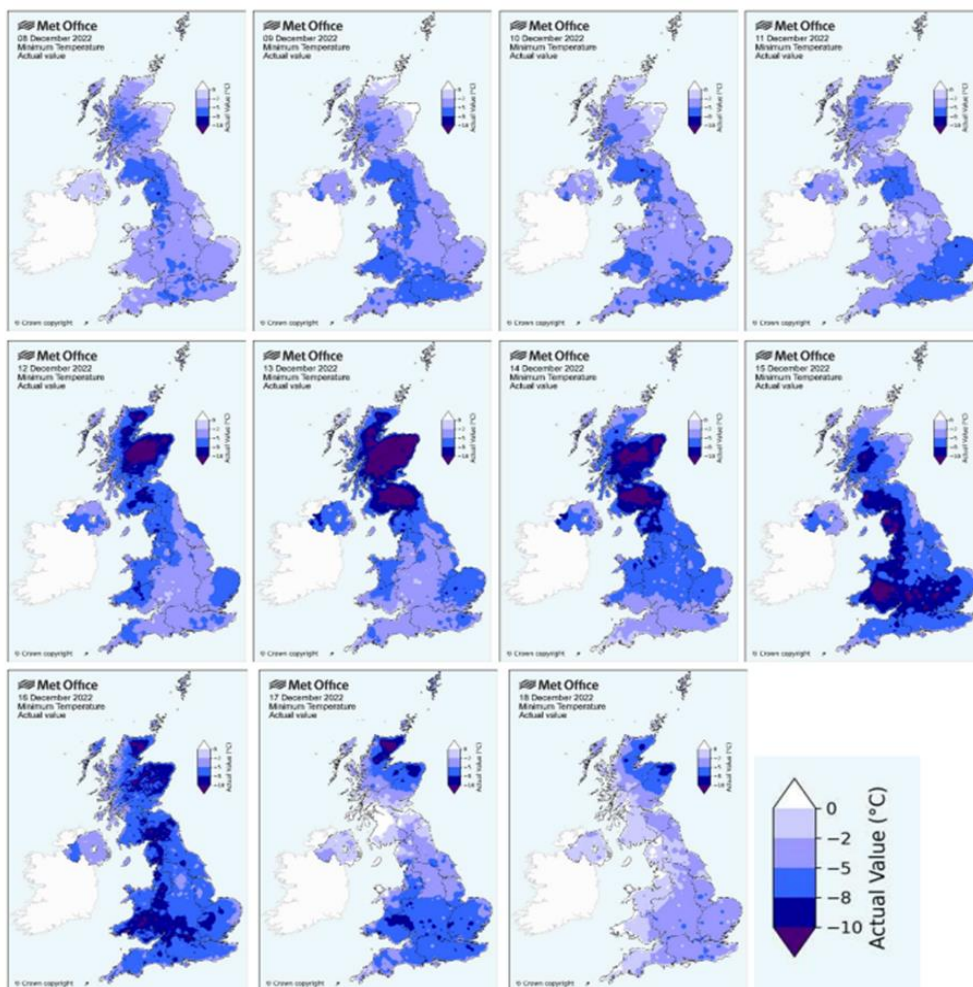


Figure 1 Minimum Temperatures during the events in 2022. Source: Met Office (2022) https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2022/2022_04_december_low_temperatures_v1.pdf

3.10. The Met Office (2022) notes various periods of severe winter weather in the UK since December 2010, notable events include February 2012, January 2013, March 2013, March 2018 and February 2021. They also note that December 2022 was more a sustained nature of low temperature, with hard frosts lasting for over a week.

3.11. The Met Office (2022) note that December 2022 must now also be included as one of the most significant low temperatures to affect the UK since December 2010. **Figure 2** shows the average temperature across the UK for all three significant cold weather events.

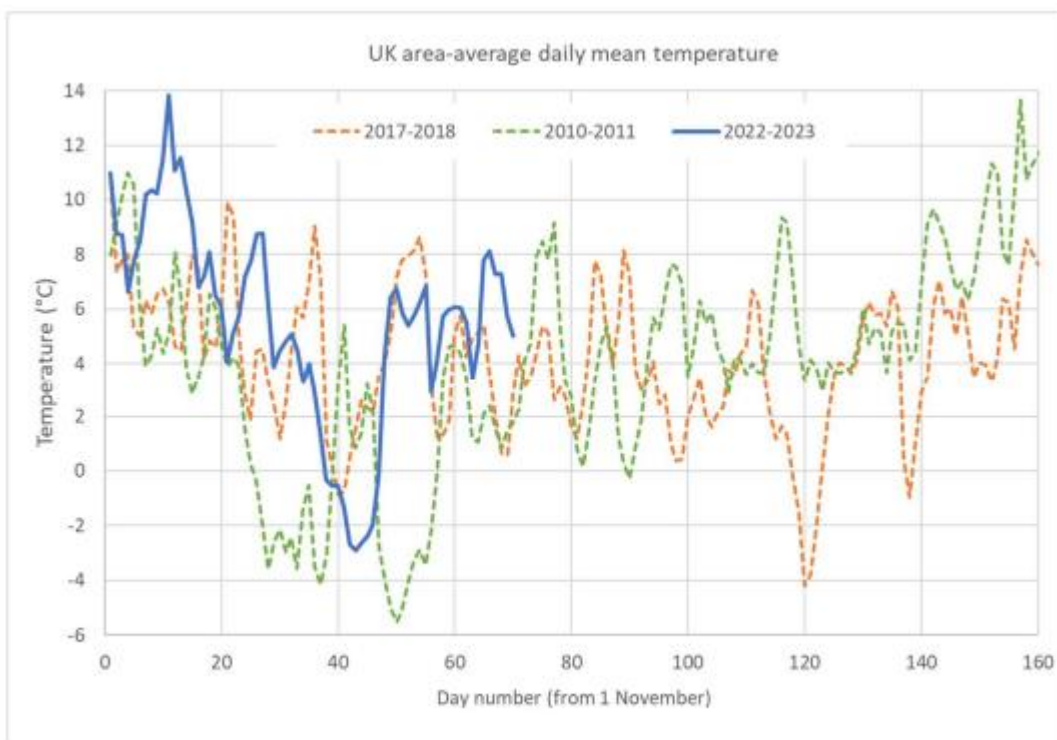


Figure 2 Graph showing average temperature in 2010, 2018 and 2022. Source: Met Office https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2022/2022_04_december_low_temperatures_v1.pdf

3.12. Companies were generally aware of the weather forecast as presenting conditions similar to that of the 2018 Beast from the East. There was however, a marked difference between how companies dealt with it, and in their underlying preparedness.

4 Actions taken by the Inspectorate

- 4.1. The Inspectorate maintained regular contact with companies from the onset of these events, and with affected companies to providing updates on the situations in their areas over the course of the event. Nearly all of the affected companies proactively contacted the Inspectorate due to the potential affect and consumer concern of disruption, as well as national media coverage of the severe weather.
- 4.2. Defra, as the lead Government department in large scale water supply emergencies, facilitated and led regular industry contact in order to establish an overall position across the sector. Calls were with water companies and bottled water suppliers.
- 4.3. In accordance with the requirements of the SEMD, companies who notified events were asked to provide final reports to the Inspectorate 20 working days after the date of notification.
- 4.4. The Inspectorate's investigation of these 10 events involved scrutinising companies' final reports, alternative water plans, water quality data and other information provided
- 4.5. Following receipt of companies' final reports, the Inspectorate requested further information from these companies to establish and confirm certain facts.
- 4.6. The Inspectorate consulted with Ofwat during its investigation and shared certain data and information and liaised with Defra in the preparation of this report.

5 Event Overview

5.1. Table 1 below summarises which companies notified events to the Inspectorate, the areas of the country affected, and the population they reported were at risk of being affected by these events.

Table 1 Overview of company's events

Company	Location	Maximum Properties affected (these varied as the incidents progressed)
Affinity Water	Harlow / Bishops Stortford	17,500
Anglian Water	Ely	10,862
Severn Trent	Gloucester South	4000
South East Water	Tunbridge Wells	41,258
South East Water	East Grinstead	244,938
Southern Water	South Hampshire	44,328
South West and Bournemouth	Allers Supply Network	3500
South West and Bournemouth	Knapp Mill Supply	6000
Thames Water	Ashendon Area	106,646
United Utilities	Morecambe	16,000

A summary of each water company's event(s) is summarised in Annex 1.

6 The Inspectorates Assessment and Recommendations

- 6.1. The majority of companies fulfilled the requirements of the Regulations and the Direction associated with notification and reporting their events. Thames Water had not reported an ongoing incident until Defra made contact with them. It is a requirement of SEMD that the appropriate authority is notified as soon as the company is aware of any actual or likely emergency affecting its water supply.
- 6.2. Thames Water first contacted Defra to give a 'general supply interruption update', and at that time the company had 14,437 properties potentially affected. Companies should familiarise themselves with the requirements of the reporting requirements in Annex A of the emergency planning guidelines (EPG). The Inspectorate **Recommends** that companies familiarise themselves with and follow the reporting guidance in Annex A of the emergency planning guidance (EPG). A summary of the triggers can be found in Annex 2 of this letter.
- 6.3. In general, companies did keep consumers regularly informed through a variety of channels, for example, through radio and TV interviews, emails and text message alerts for affected areas, website and social media updates. For example, Anglian Water was able to use its website and updated the “In Your Area” section of the website and its social media channels and further proactive customer communications were undertaken to vulnerable customers and key stakeholders.
- 6.4. However, a spot check of social media undertaken by the Inspectorate during the event assessments did indicate that in some cases company communication did not meet expectations. This was highlighted where consumers were having to proactively contact companies on social media for updates and information or declaring themselves vulnerable.

Still no water and no update or comms at all, and no water stations!!
What is going on?

7 h Like Reply

please communicate!

7 h Like Reply

██████████
Aren't priority supposed to have bottled water delivered!?!?

My mum and all her neighbours are priority and in over 55 accom and haven't received any....
Me and a couple of my neighbours are priority and haven't received any either?

20 h Like Reply

██████████ - this is NOT on.
Priority vulnerable family of 7 here without water for 30 hours now and STILL no water delivery.

The media really seems to be brushing under the carpet just how bad this actually is. Huge areas in South of England are without running water, and no idea whether we are looking at hours, days or weeks.

You've paid out your fatcat CEOs but neglected to invest back into the infrastructure, so it's let us down on a mass scale right before Christmas. It's being played down online as a "pressure issue" - it's NOT a pressure issue. We have NO water anywhere in the house. The main water pipes bust out when they thawed after freezi... See More

4 h Like Reply

1 🙄

Figure 2 Screenshots taken from social media over the period of the freeze/thaw. None of which appear to have been replied to.

- 6.5. The Inspectorate **Recommends** that companies have a comprehensive communications plan, that is able to adapt to feedback being received across all channels, to ensure consumers received the correct minimum level of service.
- 6.6. The majority of water companies maintained regular liaison with their relevant local authorities, as required by regulation 35(6) for notifiable events and more generally to keep authorities informed of local situations. For example, United Utilities Limited was cited for its proactive communication with Local Resilience Forums (LRFs) including regular incident meetings which were held, and the company's regular discussions with the LRF to provide updates.

Preparation for the Event

- 6.7. The majority of companies set up an incident team prior to the event, in readiness, which the Inspectorate regards as best practice and demonstrated learning from previous freeze thaw events. The Inspectorate **Suggests** when lessons are learnt from events similar to the 2018 freeze/thaw, that they are embedded within policies, and actions have owners until they are completed. The activity and impact of the incident teams appeared to differ widely from company to company, and this was reflected in the outcome of the events.
- 6.8. Good practice was demonstrated by a number of companies proactively meeting several weeks ahead of the event to ensure adequate resource would be available over the forecast weekend period and putting in proactive measures to optimise available water. Several companies had taken the

opportunity prior to the predicted event to increase storage in all treated water reservoirs. They had also taken the opportunity to increase detection and repair activity to resolve leaks on the network prior to the event, but also during the event, so that issues were dealt with swiftly. The Inspectorate considers this best practice and **Recommends** that companies consider this when entering periods of uncertainty.

- 6.9. For example, Severn Trent proactively ran an incident team before any issues, this included using a local freeze/thaw tracker to predict the areas likely to be affected by leakage. The company also filled all of its reservoirs, and increased water production and a review of asset reliability and resilience was undertaken, leak detection and repair was prioritised in the lead up to the event to ensure a more stable network.
- 6.10. A lack of preparedness by some companies was seen to exacerbate the effects of the event in affected areas. For example, South East Water had neither optimised its available storage, nor was it optimising the output from its available treatment works. In addition, Affinity Water observed a restriction in output from one of its works due to an issue with treatment and failed to rectify the issue in a timely manner, thereby further prolonging the recovery of the reservoir following the freeze/thaw period. South West and Bournemouth Water similarly did not optimise, maintain or top up service reservoirs in the weeks leading up to the freeze thaw event.
- 6.11. The Inspectorate **Recommends** that companies enter forecast events with an incident team, that is empowered to make decisions based on the best outcomes of the event. Furthermore, the Incident should be escalated in line with the companies' escalation procedure, to ensure the best outcome during an event. Where required companies should review their escalation triggers.
- 6.12. Companies typically use the winter period to carry out intrusive maintenance onsite, as summer demand is usually higher, however as weather patterns become more unpredictable with climate change, the Inspectorate **Recommends** that there is sufficient resilience, within the available asset base, to provide a continual piped supply all year round

Vulnerable Customers

- 6.13. The Inspectorate welcomed those companies which proactively delivered bottled water to consumers on the Priority Services Register (PSR) prior to the event. For example, Anglian Water made proactive bottled water deliveries to PSR consumers who still had a mains water supply at the time with text messaging sent to explain the situation and the potential loss of supply.

- 6.14. The requirement of SEMD 22 is that all consumers should have access to 10l of water within the first 24 hours of losing a piped supply. Several companies took the opportunity to carry out proactive priority service register (PSR) deliveries before consumers lost water, this allowed companies more time to complete all the deliveries in within the 24 hour window. The Inspectorate **Suggests** that companies consider this proactive approach to ensure everybody has access to the service within the correct timescales.
- 6.15. A number of companies were not able to deliver bottled water to those consumers on their priority services list within 24 hours as required by the Emergency Planning Guidance. For example, South East Water organised its PSR consumers by priority due to need with only “tier 1” consumers receiving the minimum amount within 24 hours and deliveries being made for remaining customers the following day. The Inspectorate **Recommends** that companies ensure all vulnerable customers receive alternative water in the timescales stated within the EPG, and furthermore that these deliveries are recorded to enable verification that the requirements have been met. Companies’ definitions of vulnerable should be aligned with the definition in EPG.
- 6.16. South East Water chose not to open a bottled water station due to the adverse weather on the first day that consumers were without water. The Inspectorate has advised the company that, if it is concerned about consumers getting to a bottled water station safely, and it is aware consumers are without water then it should consider the affected consumers as having a transient vulnerability. The Inspectorate is supportive that health and safety should be considered as a critical part of the planning of these events.
- 6.17. In addition, several companies struggled with collating of additional PSR data from external bodies such as the Local resilience forum (LRF) which led to a delay in the deployment of alternative water supplies. The Inspectorate **Recommends** that companies identify how best to share and integrate data with LRF’s.

Alternative Water supply

- 6.18. Most companies selected bottled water as their main method of alternative supply for consumers, with some companies also deploying other methods such as tankering, rezoning etc. alongside the use of Arlington tanks as additional water for toilet flushing. Arlington tanks were also deployed to farms, whilst tankers were the preferred method for hospitals and prisons. South West and Bournemouth Water were able to use tankering during the event to top up the levels in the reservoirs, which appears to have minimised the number of consumers affected in the areas they supply. In addition, United Utilities Water was able to help maintain supplies by managing pressures in the network

through the use of existing automatically controlled pressure reduction valves to ensure that consumers were still receiving at least 10l of water per person by piped supply, albeit at a low pressure. The Inspectorate **Suggests** that companies include in their plans any locations of pressure valves that can be controlled remotely to reduce demand in the network.

- 6.19. Issues were seen in the location and extent of bottled water stations deployed during the event. For example, Southern water were able to set up six bottled water stations, but these were some distance away from affected consumers in the South of the region. South East Water only set up a single bottled water station in a busy supermarket carpark the week before Christmas, for its Tunbridge Wells event. The Emergency Planning Guidance states that it is the company's responsibility to ensure all impacted customers are able to obtain the minimum amount of water during an incident and that all companies should base their plans for alternative water on their local context and population. The Inspectorate **Recommends** that companies review locations of bottled water stations where they are needed to ensure that everybody receives an inclusive service
- 6.20. The Inspectorate also **Recommends** that companies critically review their local reasonable worst-case scenarios. This should include reviewing the potential scale of an incident, but also a worst-case scenario in response to an incident. It was clear that a number of the events reviewed were larger than the company's reasonable worst-case scenario. Large scale events should also be built into the testing and exercise schedule.

Resilience

- 6.21. The freeze thaw event highlighted a number of key resilience issues at treatment works unable to cope with the extreme cold weather. For example, one treatment works relied on a dual power supply to site to provide power resilience, however during the event both supplies were turned off for emergency maintenance by the power supplier. The Inspectorate has asked the company to investigate if the dual power supply originates from the same substation.
- 6.22. In addition, a frozen pH monitor caused multiple shutdowns at a water treatment works with a total outage time of approximately 16 hours and for every hour this source was out of supply an estimated 200m³ of distribution input was lost. The Inspectorate had previously highlighted in the 2018 freeze/thaw industry-wide letter that several treatment works had suffered from frozen assets.

- 6.23. The Inspectorate **Reminds** companies of the previous recommendation for all companies to review their contingency plans to ensure their treatment assets and sites are resilient, and that critical failure points are identified and feed into their risk assessments for extreme cold weather events. The Inspectorate **Recommends** that companies review site resilience, to ensure that sites continue to function during adverse weather. The principles of SEMD are to provide a piped supply as a primary means.
- 6.24. Several companies had taken the opportunity to ensure there was sufficient water treatment and storage assets available to produce water matching a demand of the 2018 freeze thaw. The Inspectorate considers this best practice and **Recommends** that those companies which did not adopt this strategy consider this when entering potential freeze thaw events. Companies typically use the winter period to carry out intrusive maintenance onsite, as summer demand is usually higher, however as weather patterns become more unpredictable with climate change, the Inspectorate **Recommends** that there is sufficient resilience, within the available asset base, to provide a continual piped supply all year round.
- 6.25. The event did highlight it is essential for companies to ensure that these contingency plans for key sites are regularly reviewed and fit for purpose. In particular, several companies as part of their contingency plan to preserve supplies in the areas to key sites such as hospitals, over the course of the event were left with no choice but to actively shut-in district metered areas (DMAs) and therefore shut off supplies to other consumers. Whilst we acknowledge the action to prioritise the most vulnerable sites is in accordance with the Direction, the fact that these companies were left with no choice but to actively shut off supplies to a large number of consumers means the contingency plan to preserve consumer supplies had failed. The Inspectorate **Reminds** companies that they should have plans ensuring the continued exercise of all of its water supply functions. Furthermore, the Inspectorate does not consider this an “unavoidable failure of piped water supply” as required in section 4 of the direction.

7 Conclusions and Next Steps

- 7.1. The Inspectorate concludes that whilst generally water company's responses to the freeze thaw had improved from the last event of this type in 2018 including real evidence of lessons learnt, there are still several areas around planning, resilience, communications and alternative water supply that water companies require improving.
- 7.2. As set out in paragraph 4 (4) of SEMD 2022, companies must ensure the continuation of all of its water supply functions, and in the event of an unavoidable failure of piped supply, ensure that a minimum supply is provided by alternative means. It is clear that not all companies were able to adequately comply with this requirement through a lack of real planning going into the event combined with pressures on resilience and resource, despite being aware of the impending weather forecast.
- 7.3. The Inspectorate **Reminds** Water Companies of the general requirement set out in in Paragraph 8 of the Direction that the company must— (a) regularly test the effectiveness of its plans to ensure they remain appropriate; and (b) take steps to address any vulnerabilities identified. It was clear that those companies who were able to respond more effectively had learnt from previous weather events and applied this learning to their response.
- 7.4. Nearly all affected companies have now undertaken a lessons-learned exercise to minimise the likelihood of a recurrence of an event of this nature, including using the services of independent consultants to review their response and provide areas for improvement. History has shown that when these lessons are taken onboard by companies and embedded in policies and planning that improved outcomes are achieved.
- 7.5. Separate event assessment letters have been sent to all eight of the water companies involved in the event. A number of general recommendations and suggestions have been made in this report around resilience, planning, alternative water supply and general response to the extreme weather event in December 2022.

Yours sincerely



Michael Wood
Principal Inspector (SEMD)

Annex 1 – Company Summary

Affinity Water

- 8.1. The rapid thaw on 19 December 2022 resulted in an increased number of burst mains and leaks, which affected stored water reservoirs leading to a loss of supply to approximately 42,000 consumers for a prolonged period (over five days).
- 8.2. The event was further protracted by the reduced output and subsequent outage of Causeway works. The output from the Causeway works had been decreasing from 10 December, however it was only when the company attempted to increase output from this works that it took reactive action to remedy a treatment issue. The company had, however, stood up a seasonal readiness plan on 6 December 2022, this included lessons learnt from the 2018 freeze thaw event. Alternative water was arranged proactively with a 3rd party, including tankers to be located within the region and additional bottled water in storage.

Anglian Water

- 8.3. Following receipt of this weather forecast, the company's Operation Management Centre (OMC) reviewed and applied learning from the 2018 freeze-thaw event and the 2022 summer high demand period. The company opened the OMC Incident Room to provide enhanced surveillance of network flows and storage point levels. On the 19 December, the freeze-thaw conditions caused a burst on a 16-inch PVC main resulting in varying levels of low pressure and or sufficiency of supply in their Ely Zone. The company worked with LRFs to open bottled water stations, prior to depressurising the main for repair. Pressure was returned on 21 December once the main had been repaired.
- 8.4. Bottled water deliveries were proactively made to affected consumers on the Priority Services Register (PSR) before they lost supply, with text messaging to explain the situation. The Inspectorate welcomed this approach with the company.

Severn Trent Water

- 8.5. On the week commencing 18th December, there was a burst on a 16-inch main, following the freeze/thaw. The company restored supplies to affected properties across two district metered areas (DMAs) through network rezones, provision of bottled water and the deployment of water tankers to support a local hospital. The company proactively ran an incident team before any issues, this included a local freeze/thaw tracker to predict the areas likely to be affected by leakage. Consumers were kept informed with proactive text messages throughout. The company filled all of its reservoirs, and increased

water production. A review of asset reliability and resilience was undertaken. Leak detection and repair activity was prioritised in the lead up to the event to ensure a more stable network.

- 8.6. The company in its report drew a lot of parallels to the 2018 event, however through lessons learnt, both policy and assets allowed the company to respond in a business-as-usual approach, resulting in no requirement for bottled water stations, and utilising its own fleet of tankers. As a result, the company managed the whole event through a business and usual process. The company also provided mutual aid to help another company.
- 8.7. This compares favourably to the previous Beast from the East freeze/thaw event, where demand was similar. In 2018 the company needed 11 bottled water locations and 180 company volunteers. In 2017/18 the company had 300,000 litres of water on contract with a third-party supplier. In advance of the 2022 event it had 776,000 litres in its own refrigerated trailers with a fully trained and resourced warehouse facility. Given the similarities of the events, the outcomes were a marked improvement on the previous event, this is down to embedding lessons learnt, improved planning and improved resourcing.
- 8.8. The Inspectorate has welcomed the response from Severn Trent and encouraged the company to share its response with the wider industry.

South East Water

- 8.9. South East Water had two events, although by the companies own acknowledgement it was the first event commencing in Tunbridge wells, and then spreading more widely across its region.
- 8.10. **Tunbridge Wells** - A number of ongoing issues at the company works and service reservoirs within the Tunbridge Wells area in the run up to the freeze thaw event led to the company entering the event with a significantly reduced resilience in the area. Out of the possible 32.2 megalitres (MI) of storage assets in the area only 9.36MI was actually stored at the time of the freeze thaw. This, coupled with an average output from supply works of 64.74% compared to potential maximum, resulted in a severe deficit when the freeze thaw occurred.
- 8.11. The company had an incident team setup in preparedness for the freeze thaw from 23 November, although this action did not stop proactive works such as a borehole being removed from service.
- 8.12. During the Incident when consumers had no water, only 1 bottled water station was setup, in a supermarket carpark, which was busy the week before Christmas. The company did not deliver to all PSR customers within 24 hours, and instead only delivered to "tier 1" customers. The company categorises

vulnerability and considers tier 1 the high priority. Deliveries were made for remaining PSR customers in the following days.

8.13. Wider Freeze Thaw Event- Similar to the Tunbridge Wells event, service reservoirs were not at capacity, and the works feeding the various areas were not running to a maximum output. The company response was much quicker to this event, in part because the company was already in a battle rhythm. The company established 10 bottled water stations during this event. The company requested mutual aid from other water companies, but response was limited due to the country wide impact from the rapid freeze thaw, however a stock of bottled water was provided by Thames Water. The company highlighted issues with the availability of bottled water on the 21 December, and this appears to be similar to issues faced in 2018.

Southern Water

8.14. On 20 December increased raw water turbidity was noted entering both Testwood treatment works and Otterbourne groundwater treatment works following increased rainfall. In response the company reduced the output from both works to maintain adequate treatment and therefore final water quality.

8.15. On 21 December, a number of areas [DMA's] were shut in in order to maintain supplies to hospitals in Southampton. This resulted in the loss of supplies to 18,328 properties as the network drained down and the output from Testwood was reduced. This was followed by the company shutting off the supply to a service reservoir. This meant a further 26,000 properties gradually lost supply. Further valve closures were implemented to shut in additional DMAs in order to protect the part of the network containing hospitals. The industrial output from Testwood, was stopped in order to keep Rownhams service reservoir in supply.

8.16. Tankers were deployed and bottled water stations created, although the majority of the activity was in the Yewhill area and not where the original DMA's had been shut in affecting 18, 328 properties.

8.17. The Inspectorate made recommendations around triggers for arrangements to be activated, and identifying and delivering to vulnerable customers, locations of bottled water stations, and staffing arrangements for bottled water stations. A recommendation was also made to review its plans for future events.

South West and Bournemouth Water

8.18. The company had two reportable events. In the Allers supply network, the company experienced an increase in demand, from 17 December, due to an increase in leakage and burst mains in the east Devon area. A number of

consumers contacted the company regarding low pressure, no water and a number of consumers contacted the company reporting discolouration.

8.19. Advice was provided to consumers via the company website, social media and the service centre throughout the event. Supplying water treatment works output was maximised once the impact of the burst and leaks were identified. Bottled water deliveries were made to vulnerable consumers as well as the establishment of bottled water collection points.

8.20. The second event was experienced in the Knapp Mill Supply System and this started on the 19 December. Between 18 and 19 December there was heavy rainfall, which decreased raw water quality in the River Avon which caused the company to reduce the output to maintain adequate treatment and final water quality. The local hospital was prioritised for supply, and bottled water deliveries were made to vulnerable customers.

Thames Water

8.21. On 19 December 2022 water levels in Ashendon service reservoir reduced, resulting in consumer contacts for loss of supply. The company received consumer contacts of no water and low pressure over an eight-day period from an estimated population of 106,646.

8.22. Water tankers were mobilised to help improve storage in Ashendon service reservoir and the distribution network was also reconfigured to supply consumers from other areas. On 22 December 2022 Whitchurch service reservoir also experienced low water levels. In response the company isolated and bypassed the reservoir. However, during the operation one of the remotely operated control valves failed to open. This resulted in loss of supplies to downstream consumers.

8.23. By 27 December 2022, the water demand had returned to normal levels. The company provided the correct volume of alternative supply, and correctly prioritised vulnerable customers, and vulnerable sites. The company also took the opportunity on 19 December to proactively start bottled water delivery, and this was welcomed by the Inspectorate.

United Utilities Water Limited

8.24. The company had been preparing for the thaw by increasing consumer communications relating to frozen domestic plumbing and had increased leak repairs on both the company and private networks. From 17 December 2022 onwards, as demand increased, flows were increased at the supplying works

and rezones were implemented to keep up with demand.

- 8.25. On 19 December 2022, following a consultation with the local resilience forum (LRF), supplies were isolated to approximately 35,000 consumers to maintain supplies to sensitive consumers. Consumers were informed by the company's contact centre and messages on the company's website, on local radio and via statements to local media.
- 8.26. During the event the company was managing pressures in the network with automatically controlled pressure reduction valves to balance the demand with the supply, to ensure that consumers were still receiving at least 10l of water per person, although pressure was low. This part of the response could be managed from the control room and is a good example of how technology helped the company's response, this was welcomed by the Inspectorate.
- 8.27. Bottled water stations were set up at four locations and delivered to priority consumers. The Inspectorate concluded that the company did not have sufficient plans in place based on a reasonable worst-case scenario, however the company had recognised this prior to submitting a report to the Inspectorate and had proactively engaged a third-party supplier to increase its capability during an event.

Annex 2– Reporting Triggers taken from EPG

Paragraph 16 (1) of SEMD 2022 requires companies to notify Defra and/or Welsh Government as soon as it becomes aware of any actual or likely emergency or security event affecting its water supply or sewerage functions.

Most day-to-day incidents such as burst water mains, sewer blockages, discolouration and small-scale supply problems do not need to be reported to government. These fall within companies' business as usual response and do not require notification under SEMD.

Companies should assess the situation and, if any of the criteria below are met, notification to government should be made as soon they become aware that a credible risk exists, or the actual situation meets the following notification criteria.

- 1) Where there is an actual or potential and credible risk to
 - a) the supply of water to 5000 properties or more.
 - b) supply of services to significant local infrastructure (A&E hospitals, prison etc.)
 - c) supply of services to national infrastructure (power generation stations etc.)
 - d) supply from the company's essential sites which could adversely impact customers' services, including to the supply of significant business, economic, or other services of significant public interest in the area.

- 2) An incident is likely to
 - a) impact the end customer for 24 hours or more, continuously or intermittently.
 - b) require the relaxation of the 10 litres per person per day requirement.

- 3) Assistance is required in the form of
 - a) a multi-agency response to manage the water and/or sewerage incident.
 - b) support outside of normal contracted third-party suppliers.
 - c) government support.
 - d) requiring or requesting mutual aid.

- 4) A situation is unusual or out of the ordinary (such as an extreme weather event, or contingency plans outside of a normal mitigation plan are required).

- 5) Actual or credible security threats such as
- a) failure or compromise of cyber systems (relating to water services or ability to initiate an emergency plan)²⁴.
 - b) threat to physical security on any asset in water supply or sewerage systems. For example, a threat to contaminate the water supply or damage the water or sewerage system or a large-scale incident on a company's property, such as an explosive attack.
 - c) a serious personnel security breach. For example, an unauthorised person gaining access to, and tampering with, a secure system.
- 6) Where there is national, or a significant level of local news or social media interest in the incident, or it is anticipated there could be such interest.
- 7) Any other incident where there is serious concern.

Due to the range of situations that may arise relating to an actual or credible risk to customer services (water or sewerage) it is not possible to provide an absolute list of situations for notification to government. The criteria in this guidance are neither exhaustive nor exclusive.

Consideration should be given to notifying government of incidents that do not meet the criteria specified in this guidance. The company should, in particular, take into account local factors (such as seasonal factors and third-party interests) when considering whether to notify Defra and/or Welsh Government of an incident not listed below.

Annex 3 - Definitions

Alternative Water	Water that is supplied by an alternative means, this can be re-zoning / static tanks and bowsers or bottled water.
DEFRA	Department for Environment, Food and Rural Affairs
DMA	District Metered Area – Water supply areas are split into areas.
DWI	Drinking Water Inspectorate – Also referred to as ‘the Inspectorate’
EPG	Emergency Planning Guidance
LRF	Local Resilience Forum
Mutual Aid	Organised by Water UK – Companies can share resources to mitigate a local issue
OFWAT	Office for Water – Economic Regulator
PSR	Priority Service Register – A register held by companies of vulnerable customers.
SEMD	<u>Security and Emergency Measures Direction</u>
Vulnerable Customer	For the purposes of SEMD – this is defined in EPG, and uses the OFWAT definition. <i>“A customer who due to personal characteristics, their overall life situation or due to broader market and economic factors, is not having reasonable opportunity to access and receive an inclusive service which may have a detrimental impact on their health, wellbeing or finances”</i>