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7 April 2026

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Dear [redacted]

DRINKING WATER QUALITY EVENT

Location:	**Tunbridge Wells, Kent**
Nature:	**Loss of Supplies and Media Interest – (Pembury works)**
Date of event:	**29 November 2025**

1. Introduction

1.1 The purpose of this letter is to inform you of the conclusions and recommendations arising from the Inspectorate's assessment of the event involving loss of supplies and issuing a boil water notice in the Tunbridge Wells, Kent area. This has been classified using a risk-based approach as a **serious** event.

1.2 When notified of an event, the Inspectorate gathers information considered to be relevant and assesses this in conjunction with information provided by the company (South East Water) about the circumstances of the event and any actions taken. The Inspectorate then considers the way in which the event was handled, whether any breaches of the Water Supply (Water Quality) Regulations 2016 (as amended) (the Regulations) occurred, and whether potential offences under either the Regulations or the Water Industry Act 1991 (the Act), may have been committed. This event assessment letter should be read in conjunction with the Inspectorate's Security and Emergency Measures Direction (SEMD) event assessment letter.

1.3 The company notified the Inspectorate of this event on 30 November 2025. The Inspectorate's conclusions and recommendations are set out below.

2. Executive summary

2.1 Overview of the event

2.1.1 On 29 November 2025, a serious loss of supply event occurred affecting up to 60,170 consumers in the Tunbridge Wells area supplied by Pembury works.

2.1.2 Pembury works relies on treatment of gravel-spring and Greensand groundwater by coagulation, dissolved air flotation and filtration (DAFF), granular activated carbon (GAC) filtration and disinfection. From 26 November 2025 the site experienced repeated shutdowns linked to unstable coagulation, elevated post-DAFF turbidities, incomplete backwashes, and increasing GAC headloss. These shutdowns progressively reduced output to levels insufficient to maintain treated water storage at Blackhurst service reservoir (SR), resulting in a loss of supply event and subsequent issuing of a boil water notice so that the site could be operated outside of the normal turbidity disinfection requirement.

2.1.3 The Inspectorate's assessment, based on site visits, a review of site logs, SCADA trends, sampling data and information provided by the company, has concluded that the event was foreseeable and preventable. The site had experienced earlier signs of instability that, if appropriately investigated and acted upon, would have prevented the works failure and subsequent loss of supply and impact on consumers.

2.2 Raw water quality considerations

2.2.1 Analysis of five years of raw water data demonstrated that raw water conditions prior to and during the event were within normal historic operating ranges. There is no evidence of a sudden change in raw water quality which would explain a sudden treatment failure. Turbidity, conductivity, pH and alkalinity were all within seasonal ranges, however it is noted that alkalinity experienced a more prolonged (but not higher) autumnal seasonal peak than in previous years. While alkalinity had remained slightly elevated for the time of year, sample results show that this prolonged peak had already been declining for several weeks by the time of the event.

2.2.3 Raw water temperature decreased sharply from ~12°C to ~8.5°C between 15 and 23 November 2025 due to a cold snap. This reduction, while operationally important given its impact on coagulation efficiency, the works would have historically performed at similar temperatures.

2.2.4 Raw water monitoring at Pembury was insufficient for effective process optimisation with no continuous temperature monitoring at the works inlet and pH and alkalinity sampling alone insufficient for short-term or real-time decision making without constant review. Regular jar testing to confirm optimal coagulant dose had not been performed despite this being a requirement under a regulatory notice.

2.2.5 The event cannot be attributed to an extreme raw water quality event. Instead, failures in process management, visibility and control compromised the site's ability to cope with the conditions seen.

2.3 Failure of the treatment process

2.3.1 The treatment process breakdown began with coagulation instability, which led to inadequate floc formation. Because dosing was manual, non-flow-paced, and dependent on a single injector prone to blockages, dosage was not being applied consistently and optimally. Manual recording of coagulant dose in the site log reduced operational visibility, both for day-to-day control and for longer-term review of coagulation performance.

2.3.2 Evidence-based dose setting was absent due to the lack of regular proactive jar testing being completed at Pembury works, despite this being the requirement of the enforcement notice in place for this site. The company failed to undertake a quarterly proactive jar test in October 2025 when raw water quality was similar to that of the event, leaving the site coagulation unoptimized since July 2025. This left the works more vulnerable to other factors which contributed to the event.

2.3.3 As a result, poorly formed floc passed through the DAFF stage, causing post-DAFF turbidities to rise. DAFF backwashes became increasingly ineffective, allowing solids to accumulate and compact in the filters and making subsequent filtration and washes less effective still. Excess particulate matter then carried into the GAC filters, causing rising head loss and shortening run times. This created a compounding cycle of ineffective coagulation and overloaded DAFF and GAC units which ultimately caused particulate breakthrough. Poor performance of the DAFFs have been identified on individual vessels from 9 November 2025, with a progressive deterioration from 19 November.

2.3.4 There did not appear to be adequate recognition of the deterioration of the performance of the DAFF stage onsite, with failed washes on 21 and 23 November 2025 and alarms being raised on 22 November. The company has not provided specific details of any corrective actions that were taken between the 21 to 25 November and any actions that may have been taken onsite were not sufficient to prevent the performance from worsening.

2.3.5 Results from onsite tests and samples taken post the DAFF stage also showed an increase in aluminium in October and November 2025, which also indicates worsening performance. There does not appear to have been adequate recognition or acting on the aluminium results.

2.3.6 The company has also provided details of completed general site duties that were scheduled and completed onsite. Seven of 13 scheduled site duties relating to the DAFF stage were not started or completed from the 9 to 25 November, suggesting that required routine DAFF maintenance (and also full observation of the treatment stage) was not being undertaken and recorded as the site deteriorated through November.

2.3.7 As solids loading increased, post-GAC water turbidity repeatedly breached shutdown triggers, causing the site to shut down to protect disinfection. The site operated as it should, with the safeguards that were in place to protect the disinfection stage operating correctly. No undisinfected water left the site during these shutdowns, however the repeated shutdowns were ultimately what lead to the loss of supply as storage levels at Blackhurst service reservoir (SR) started to deplete without an alternative source of supply.

2.3.8 Attempts taken to restart the works (adjusting dose, washing filters and running to waste) were not sufficient due to the underlying optimisation problem remaining unresolved.

2.3.9 The company pursued a batch chemical (coagulant) batch theory during the early stages of the loss of supply event. The theory has since been disproven with the chemical being confirmed within specification. The focus on a bad batch theory also meant operational resource distracted from identifying the need and attempt to optimise the current coagulant and process.

2.3.10 The reactive jar testing which was completed onsite was delayed by a day due to staff availability. This wasted valuable time to try and recover the works and prevent the loss of supply from occurring. When the first set of reactive jar testing was completed it was insufficient to provide a suitable dose as key parameters were not sufficiently considered. Much higher doses should have been used in the initial testing protocol, which in the later testing was shown to be able to achieve a suitable floc.

2.3.11 Focusing on processing the dirty washwater and freeing up capacity for additional and extended filter backwashes would also have helped the site to recover more quickly.

2.4 Lack of Real-Time Monitoring and Information

2.4.1 Critical treatment parameters were not monitored online, including raw water temperature and conductivity, coagulant flow and dose and aluminium concentrations. A post filtration aluminium monitor is in place at Pembury works, but the company confirmed that this is no longer operational and has not been replaced.

2.4.2 The company has provided a document detailing a functional design specification dated 2015 which provided details of an automated coagulant dosing system and SCADA control and visibility, which is presumed to be related to the previous works upgrades around this time. The company confirmed that this had never been installed but has not been able to provide any explanation as to why this was the case. The need for improved coagulant control and visibility at Pembury works had therefore been previously identified approximately a decade ago but never implemented.

2.4.3 Operators therefore lacked the real-time information needed to adjust chemical dosing as conditions changed, especially following the drop in raw water temperature which was observed in November.

2.4.4 The lack of a comprehensive online record for such parameters at the works also prevents comprehensive regular reviews of the site performance. This has very likely impacted the company's long-term understanding of the works, quantified risk assessment and their ability to both proactively and reactively address evolving challenges.

2.5 Drinking Water quality during the event

2.5.1 The company collected a total of 217 treated water samples across the Pembury supply system, including at the treatment works, service reservoirs, and consumer properties within the Blackhurst supply zone. An additional 89 samples were taken from alternative water supplies such as tankers, tanker fill points and bottled water batches. The samples were analysed for a wide range of parameters, including microbiological and chemical. The results demonstrated that there was no evidence of a microbiological risk from the Pembury works or in the network. One Enterococci detection in the water supply zone was found to be a domestic plumbing issue and not related to the public supply. One sample failed the standard for aluminium from a sample taken at Pembury works and two samples failed the standard for iron in samples taken within Blackhurst water supply zone but these results were within the safe health limits.

2.6 Overall conclusions

2.6.1 The Inspectorate's assessment concludes that this incident was both foreseeable and avoidable, arising not from raw water deterioration alone but from long-standing weaknesses and failures in process control, monitoring, maintenance and operational management.

2.6.2 Raw water quality during the period remained within historical norms, and there is no evidence of a sudden or exceptional raw water event that could explain the treatment breakdown. Instead, a series of preventable failures including unstable coagulation, a lack of proactive jar-testing for coagulation optimisation, ineffective backwashing, increasing GAC head loss, poor visibility of critical treatment parameters, and the absence of reliable real-time monitoring, progressively reduced the site's ability to maintain itself or operate correctly and ultimately led to the works failure.

2.6.3 The assessment highlights systemic organisational issues, including insufficient adherence to required procedures and site tasks, missed opportunities for early intervention, inadequate investment in automation and monitoring systems, and an over-reliance on unsubstantiated external explanations during incident response. These factors collectively impaired the company's ability to diagnose and resolve the underlying process issues quickly enough to prevent loss of supply and consumer impact.

2.6.4 Overall, the incident reflects a multi-factor breakdown within the company's operational, procedural, and management controls, rather than circumstances outside its control. As a result, consumers experienced prolonged disruption to essential drinking water supplies.

2.6.5 Further enforcement is needed to ensure that the company addresses the identified deficiencies and implements the necessary improvements at Pembury works to ensure a resilient and reliable supply for consumers.

3. Overview of the event. Overview of Pembury works

3.1.1 Pembury works receives raw water from a mixture of gravel springs and greensand groundwater sources supplying a raw water storage reservoir at Pembury works, which has a maximum capacity of [redacted]. The raw water from the reservoir is pumped to the works, where it is aerated to remove iron, dosed with polyaluminium chloride (PACl) coagulant, sodium hydroxide (caustic, as needed) and chlorine, treated through dissolved air floatation and filtration (DAFF) to remove solids, treated by granular activated carbon (GAC) to remove pesticides, then super-chlorinated in a contact tank for disinfection. Maximum site flow per day is approximately [redacted]. The site was last refurbished between 2010 and 2015, with work listed as being focused on the boreholes, raw reservoir and inlet pumps.

3.1.2 Pembury works outputs into Blackhurst service reservoir (SR). There is a contributing feed from [redacted] Blackhurst SR is the [redacted] with two boosted supplies for higher elevations and a gravity feed. One of these Blackhurst boosted supplies feeds into Tangiers service reservoir for feeding two rural District Metered Areas (DMAs). Blackhurst reservoir can be partially fed via the Yew Tree Road valve if needed and available, which links it to the Tonbridge supply system (itself fed by several treatment works) although this is not normally open when the Blackhurst/Tunbridge Wells system is operating as expected.

3.2 Raw water quality

3.2.1 Raw water online monitoring at Pembury works is relatively limited, consisting of reservoir level, raw water flow, raw pH and turbidity only. The reservoir and individual boreholes are part of a raw water sampling programme. The vast majority of samples are taken from the raw water reservoir, predominantly pesticides, physio-chemical (for example pH, turbidity, alkalinity, hardness), PFAS, algae, *Cryptosporidium* and N-group (nitrate, nitrite, ammonium) with most parameters collected approximately weekly. The boreholes themselves are generally only sampled for pesticides as part of notice SEW-2024-00006.

3.2.2 Key raw water parameters pH, electrical conductivity, turbidity, and alkalinity were relatively stable and within expected historical operating ranges for the site for weeks prior to the event (monitored from a sample point on the outlet of the raw water reservoir, the inlet to the works). Raw turbidity had remained below 2 NTU since September 2025. Alkalinity at the site historically exhibits a broad autumnal peak usually around 200-225 mg/L HCO_3. This appears somewhat prolonged for 2025 compared to the previous five years, although the frequency of company sample data for alkalinity is sparse at times. Alkalinity leading up to the event appears to have been relatively stable and above 200 mg/L since June and peaking at ~225 mg/L in September. It was on a slow, steady decline at the time of the event at approximately 200 mg/L HCO_3; at no point leading up to or during the event did alkalinity reach a historic high, nor was there any rapid change.

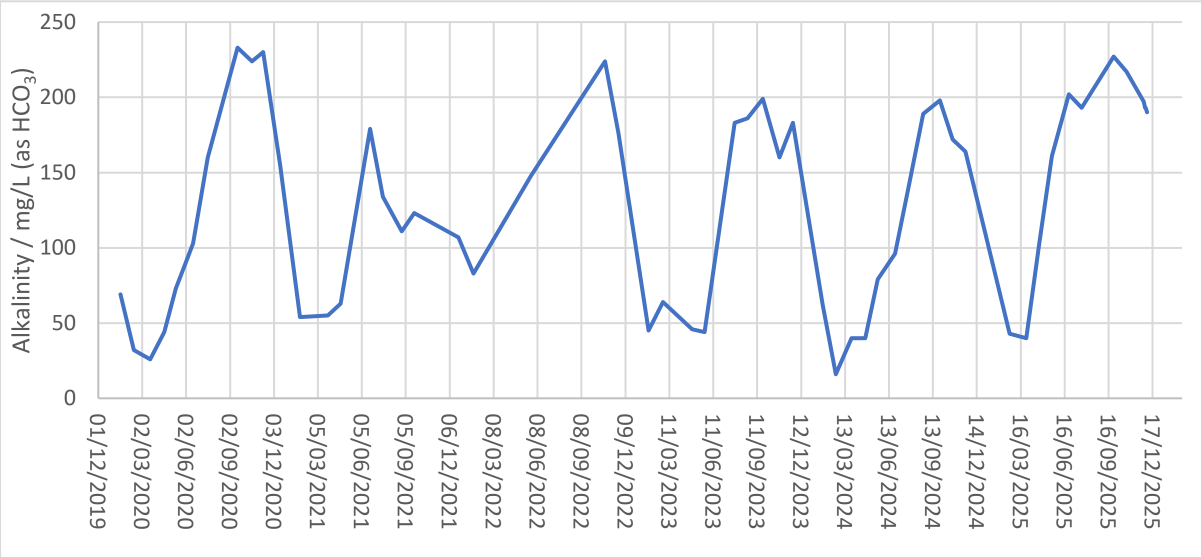

Figure 1: Raw alkalinity at Pembury works, 2020-25

3.2.3 The raw water electrical conductivity (EC) can be seen to be similar to alkalinity (which is expected given alkalinity contributes to EC), with a broad seasonal autumnal peak observed as in previous years reaching a maximum of around 530 µS/cm in mid-September 2025. This was a little higher than 2023 or 2024 (470-490 µS/cm), but almost exactly matching the patterns, dates and peak concentrations of 2020 and 2022. In the weeks leading up to the event in late November 2025, the conductivity had remained between 480 and 510 µs/cm and was in gradual decline in line with previous years' seasonal peaks. At no stage leading up to or during the event did this parameter rapidly or suddenly shift beyond established patterns.

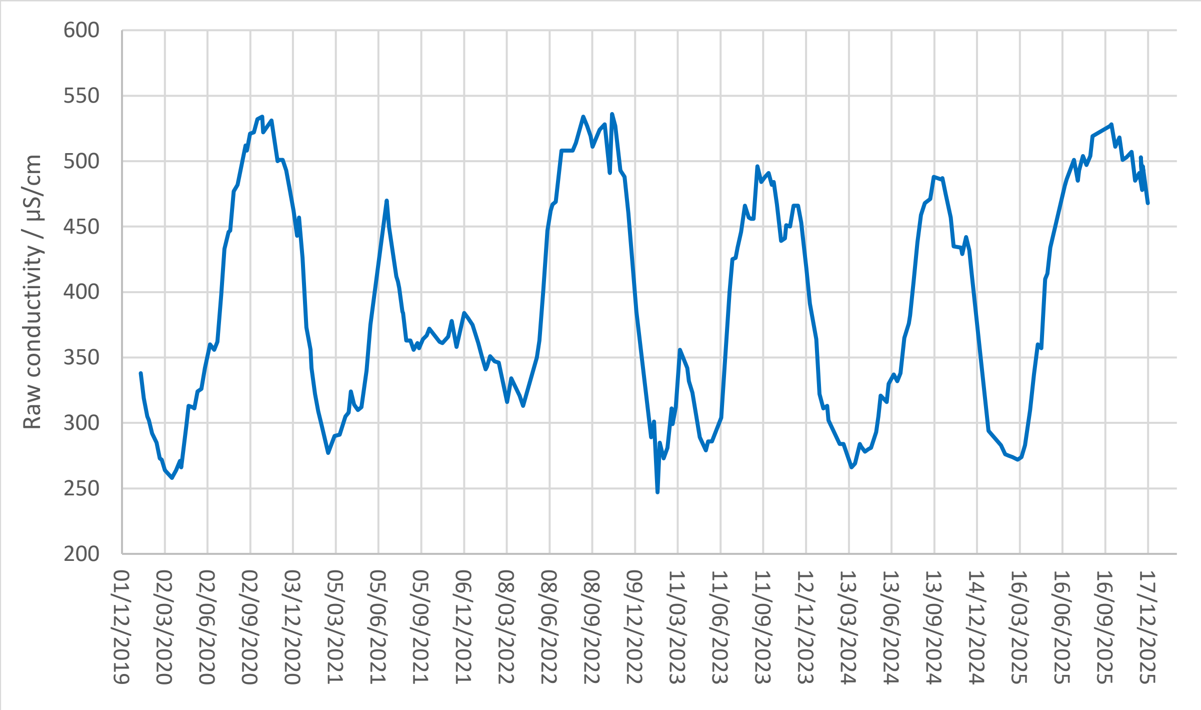

Figure 2: Raw EC at Pembury works, 2020-25

3.2.4 Raw pH was approximately 8 at the time of the event, making it relatively high for the site but it had been between 7.8 and 8.2 since June 2025 and had been around this level for significant parts of 2020 and 2022 seemingly without consequence.

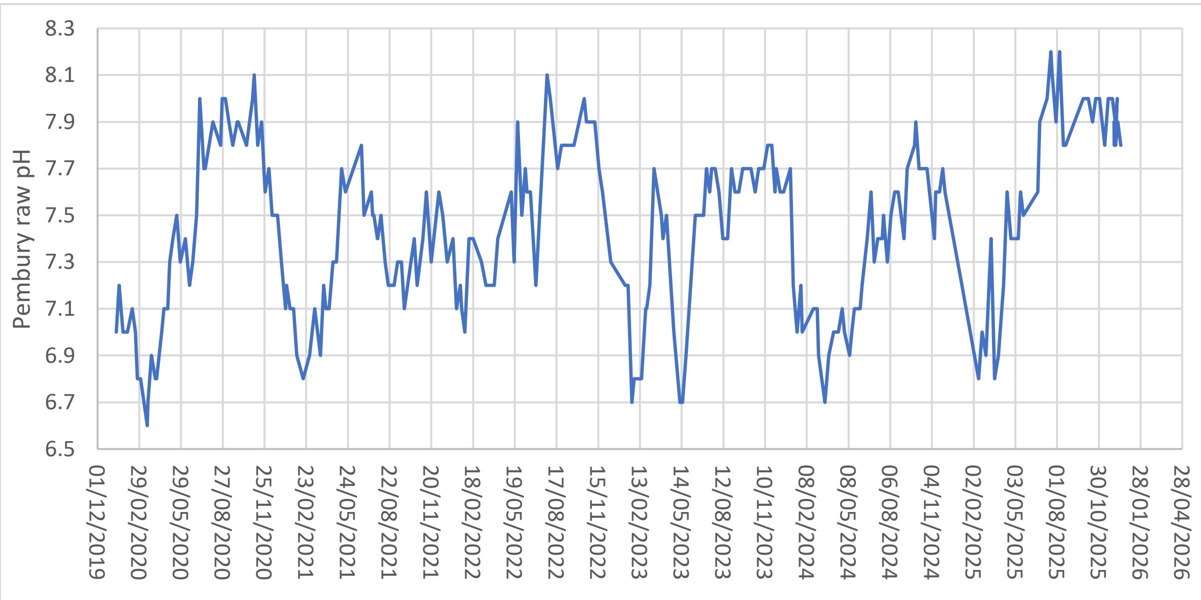

Figure 3: Raw pH at Pembury works 2020-2025

3.2.5 Water temperature is not monitored at the inlet to Pembury works, although a floating monitor in the reservoir, referred to as the ‘algae star’, has some water temperature monitoring that can be manually downloaded. Data was downloaded after the event and so the data was unavailable to inform operational decisions or potential mitigative actions in the lead up to or during the event. The 'algae star' ceased recording temperature data on 15 November 2025 due to an unknown fault and briefly recorded again on 23 November before failing again. The limited raw water temperature data available (shown in Figure 1 below) indicates a drop to around 8.5°C on the 23 November having dropped from 12.2°C on the 15 November, corresponding to a cold snap recorded in air temperature between 16 and 21 November. Given the rapidly recovering air temperatures after 21 November, it is likely that the water temperature leading up to and during the event was around 8-9°C although this number is extrapolative and cannot be proven definitively.

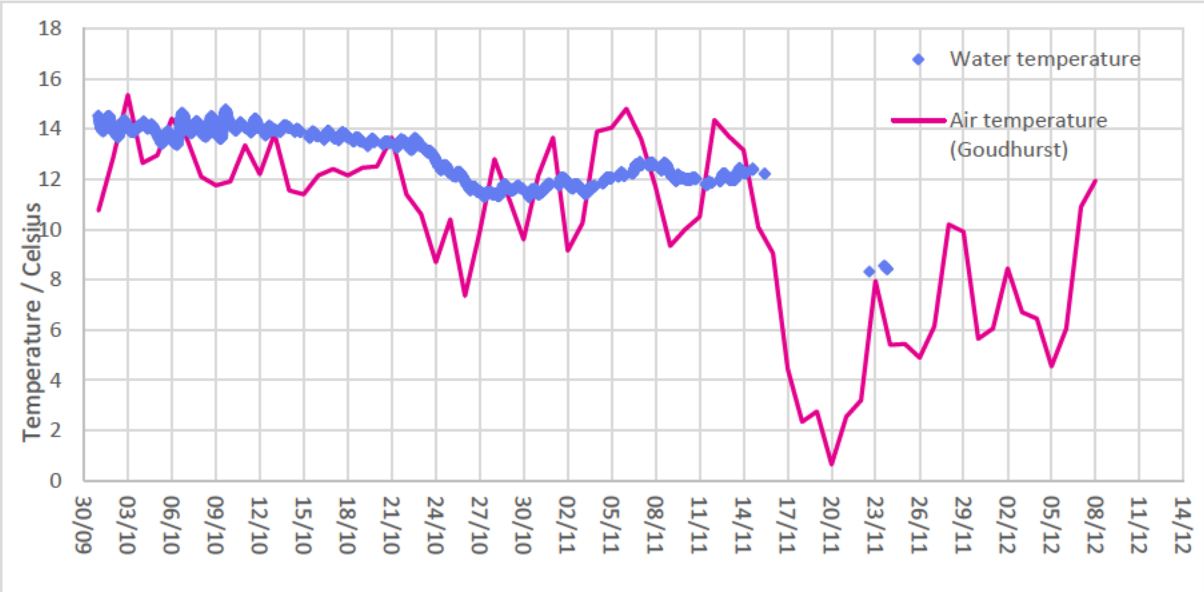

Figure 4: 2025 data for water temperature (from the 'algae star') and air temperature (from the nearby Goudhurst weather station -source Met Office), November-December 2025

3.2.6 Pembury raw water reservoir sat at around 95% full for 2025 up to 19 May 2025. The level gradually dropped after this point, oscillating around 50% by the start of November 2025 and staying between 49 and 53% full in the leadup to the event. The reservoir level increased sharply after 26 November 2025, correlating closely with the first of the site shutdowns. Given the temperature data known and the reservoir level being within a few percent of half full, it is not likely that the raw water reservoir turned over or stratified to a meaningful degree before or during the event.

3.3 Coagulation dosing overview

3.3.1 The coagulation dosing at Pembury consists of a bulk tank of stored coagulant leading to two pumps (in a duty-standby arrangement, with one pump working at a time) and a single injection point after the works aerators and before the DAFF vessels, adjacent to caustic dosing for positive pH control. The bulk tank was last inspected and cleaned in June 2024. Leading up to the event and prior to 2 December 2025, the site had a dosed pH (approximately where the coagulant injector is located) setpoint of 7.4 where pH below this value (caused by changes in raw pH and the mildly acidic coagulant) would trigger caustic dosing to compensate.

3.3.2 There is no dose for coagulant recorded online, instead being noted manually from a digital display on the pump when the dose setpoint is changed by site staff. This dose change is also achieved manually. The lack of flow-paced automatic feedback means that the actual coagulant dose applied will vary with the site flow (flow proportional and not flow paced dosing). The lack of a corresponding flow meter at the point of injection means there is no direct way for company staff to confirm the set flow is being achieved, nor to notice any blockages as they form.

3.3.3 The coagulant pump setpoint prior to 25 November was recorded in the site logbook as being 9.5 L/hour for the site flow of ~70 L/s at the time, which would correspond to a dose around 34 ppm at 78 L/s site flow and 37.5 ppm at 70 L/s according to the calculation methodology used on-site detailed in a in witness statement collected from company staff.

3.3.4 The coagulant dose setpoint was noted to have been increased on 25 November to 11.5 L/hour, but it was believed that there was a blocked injector on or around 26 November. There is a corresponding steady increase in post-aerator pH from 25 November, which could indicate a progressing blockage of the PACl injector but this is not definitive.

3.3.5 Coagulant doses had been higher than this on previous occasions: the maximum coagulant which can be dosed by the currently installed pumps (installed in May 2025) is given in documentation as 17 L/hour. Site diary entries for April and May 2025 note coagulant flow of 16.5 L/hour. The entry on 6 May 2025 also refers to the coagulant flow as 'reduced to 16.5 L/hour' when the low lift pumps were at 88 L/s. The flow information from the event suggests a similar site flow to this at times, varying from around 60 to 80 L/s (not including any contribution from [redacted]).

3.3.6 Doses of over 16.5 L/hour would be significantly more than what the site was dosing at the time of the event and would suggest that at times significantly more coagulant was required to treat the raw water conditions.

3.4 DAFF performance

3.4.1 The DAFF process at Pembury works incorporates a dissolved air floatation (DAF) process followed by filtration in a single unit, with four units installed onsite. The site diary notes issues with the DAFF process throughout the year, with filter runs often being backed up. From March 2025, the site diary also documents increasing filter run times. This appears to stem from the wash order being disturbed when washes fail or the dirty washwater tank is full, resulting in washes being delayed and longer filter run times than planned when they happen. Inefficient washing will result in extra loading and particulate material making its way further into the filter bed and subsequently being compacted. If the washes are not adjusted following this, or if there are issues with air blowers/injection either for the DAF process or the backwash for the filters, this will compound the issue.

3.4.2 Difficulties with the air system were noted within the site diary in March, June and October 2025 particularly for the DAFF unit where filter washes were occasionally run without the air scour. This includes an instance on 24 October where DAFF 2 dry bedded itself after a level probe fell into the vessel and subsequently washed without air scour. Lack of air scour would have inevitably made the vessels less effective and increase the potential for the filters to accumulate more particulate matter.

3.4.3 The DAFF turbidity monitor information (provided from 2 November 2025) indicated that filter in-run turbidities started rising before the main event above the background levels. For DAFF 1 this is around 16 November, for DAFF 2 it is 18 November, for DAFF 3 it is 9 November, and for DAFF 4 it is 9 November and then again on 18 November. The filter run times between washes before turbidity rises get progressively shorter and eventually the baseline turbidity is higher, indicative that the filters were not washing fully clean and had reached their capacity to hold any further carryover. This is a sign of a poorly operated DAFF process as smaller floc and non-coagulated particulate matter will have to be captured by the downstream filter process. At some point, breakthrough will occur.

3.4.4 From approximately 19 November, the situation worsened from individual DAFF vessels showing signs of difficulty (higher turbidity, worsening baseline and shorter run times) to all four vessels showing continuous signs of progressive deterioration in running and cleaning performance for approximately the following week.

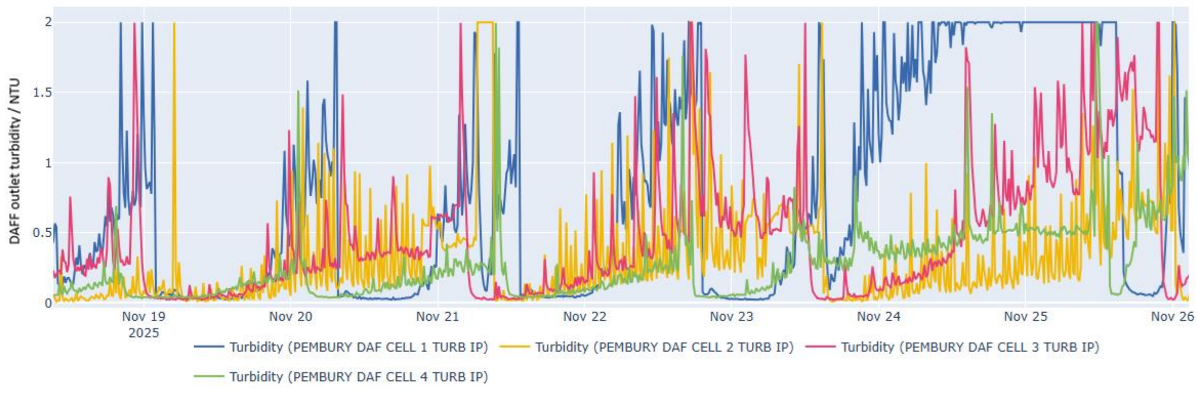

Figure 5: Pembury DAFF outlet turbidities, approximately November 18-26 2025

3.4.5 There does not appear to have been adequate recognition of this onsite, with the site log noting that DAFF 3 failed to wash on 21 and 23 November due to insufficient drain down in the allotted time, being reset manually and washed again. Failure to drain down the vessel would be indicative of the filter becoming blocked. There appears to have been two work orders raised at 15:01 and 15:02 on 22 November regarding 'ALARM LEVEL: 5 - PEMBURY DAF FILTER NO2 TURBIDITY VERY HIGH' although from the information provided and collated from site there does not appear to have been any specific follow up to this action. Another log entry on 25 November noted the DAFF outlet turbidity was high and that DAFF 1 and DAFF 4 had both failed to wash for 60 and 64 hours, respectively. This failure was attributed by staff onsite to a sludge blockage in the site's dirty washwater tank keeping that tank full and preventing washing. It can be extrapolated from the failed-wash times specified and the site online process trends that these observations were made around 08:30 to 09:00 on 25 November. By this stage, DAFF 1's outlet turbidity had been continuously above 1 NTU for around 36 hours and off-scale (>2 NTU) for around 20 hours with no apparent corrective actions taken.

3.4.6 It should be noted that company records for general site duties (GSDs) for the DAFFs have thirteen entries between 9 and 25 November (from when the site first started deteriorating to when it was on the verge of shutting down), with all entries being 'hose off DAFF cell launders', 'check DAFF air score pattern and backwash' or 'visually check DAF scrapers, chains and floc'. Seven of these thirteen entries are listed as either 'not started' and two are listed as 'not completed', suggesting that routine DAFF maintenance and observation of the treatment stage was not being undertaken and recorded as the site deteriorated through November.

3.4.7 With respect to other measures of DAFF performance, total aluminium concentration is recorded on handheld monitors and documented for further analysis. It is also recorded in laboratory samples taken from within the process and final water for operational purposes, although the frequency varies. High post-DAFF aluminium would indicate the DAFF vessel is not performing well, as aluminium should be being removed as stable floc and not remaining in solution (or as pin floc) to weir over downstream. The only treatment stage post-DAFF are the GAC vessels, which are not intended to operate as filters as a primary function.

3.4.8 High aluminium levels are observed much more frequently for samples taken in October and November 2025, indicating a general deterioration in DAFF vessel performance (Figure 6 below).

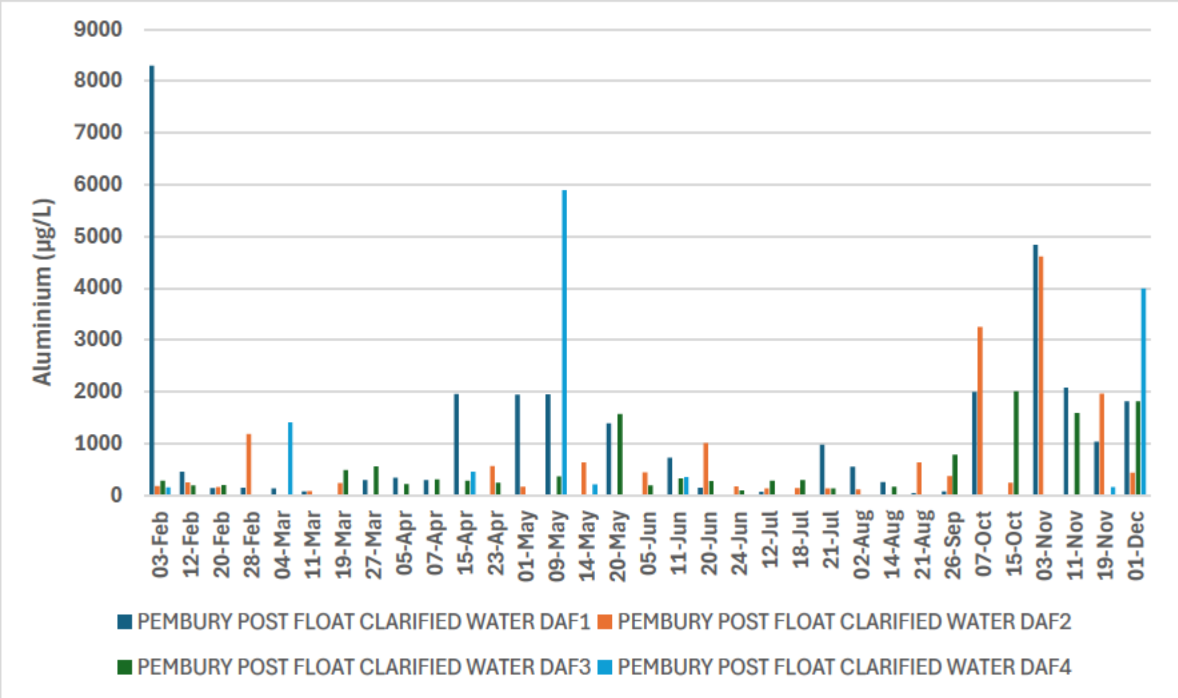

Figure 6: Total aluminium, recorded in lab samples from the individual DAF units during 2025

3.4.9 Throughout 2025, onsite/handheld aluminium concentrations were relatively sparsely monitored and only listed for DAFF unit 1. Only 25 samples are recorded for the year up until 9 December 2025, with gaps between samples of two–three weeks not being uncommon. Despite coagulation and flocculation being recognised as problematic leading up to and during the LOS event, no handheld total aluminium data is listed between 19 November and 9 December (with both samples on these dates recording a relatively high 50 µg/l concentration).

3.4.10 Operational laboratory samples are more frequent and consistent at a very approximately weekly schedule. A significant proportion of post-DAFF samples are at elevated levels, including a 23 April 2025 sample not pictured on the graph in Figure 7 that recorded 1481.1 µg/l of total aluminium and a noticeably elevated series of post-DAFF samples in the two months prior to the event.

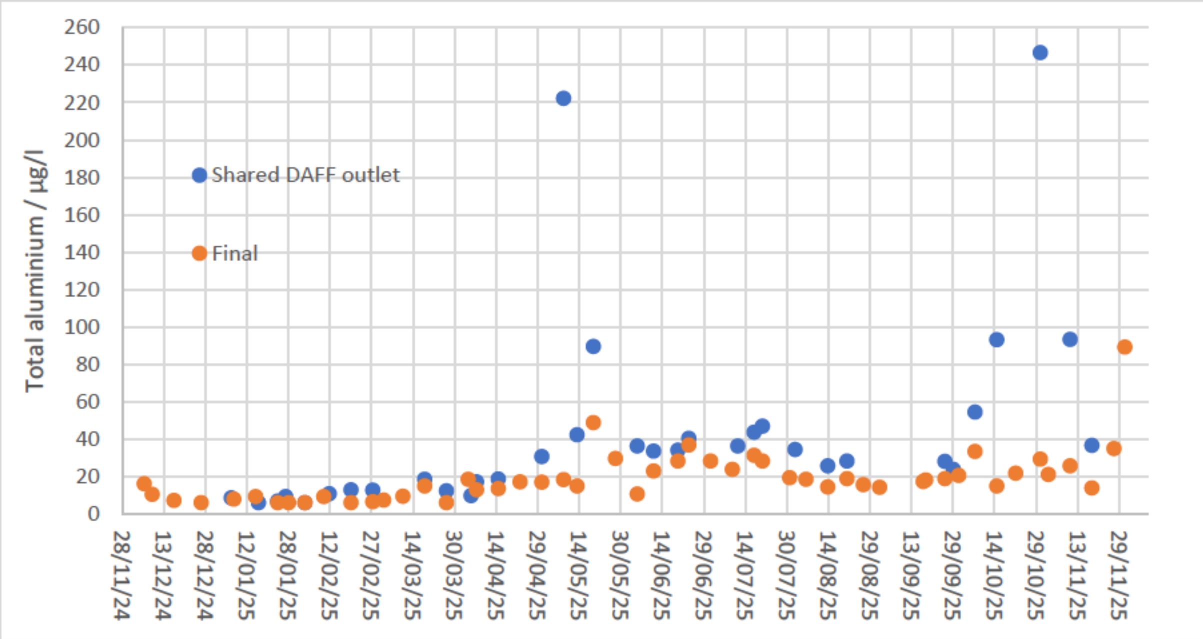

Figure 7: Aluminium (total) concentrations from lab samples on the combined DAFF outlet and works final at Pembury, 2025

3.4.11 Company documentation provided as part of the company's discolouration strategy and dated January 2024 indicates that a treatment works using PACl exhibiting a final water total aluminium concentration over 20 µg/l should trigger an investigation following three consecutive breaches of this alert level. The documentation details where an action plan is already in delivery, the appropriateness of agreed actions will be reviewed in light of any subsequent alert level breaches. As shown in Figure 7, Pembury works was routinely exhibiting consecutive final aluminium concentrations in excess of this alert level in the second half of 2025. It should be noted that the samples of final water for Pembury will very often be diluted around 20-30% with water from Kipping's Cross SR.

3.5 GAC vessel performance

3.5.1 Pembury works has three GAC vessels as the final permanent stage of physical treatment before disinfection, labelled GAC A, B and C. They were installed primarily to deal with pesticides and are not designed to routinely act as second-stage filters after the DAFFs.

3.5.2 One relatively routinely recorded company measure of the performance of the GAC vessels is the level, that is the amount of partially treated water built up above the GAC bed while in operation. The site log notes that this level is usually around 60-62% of maximum for normal operation, also noting that levels higher than this are indicative of 'blinding up', that is becoming blocked with excess material and reducing the flow rate of water through the GAC bed itself. This pattern is accurately reflected in the site process trends.

3.5.3 In a similar pattern to the progressive deterioration of all four DAFF vessels, the levels of GAC A and GAC C both started rising quickly from the early hours of 21 November 2025, with GAC A reaching 85% full when it washed around 12:00 on 22 November and GAC C reaching around 95% full by approximately 15:00 on 22 November and staying near that level until washing around 09:30 on 23 November. The level of GAC B also rose quickly from approximately 10:00 on 23 November (correlating with the wash of GAC C), reaching 96% full by 22:00 on 24 November. All three GAC vessels were above 95% full by 08:00 on 25 November, indicating they were all substantially blocked by this point and that the normal washing process was unable to rectify the situation.

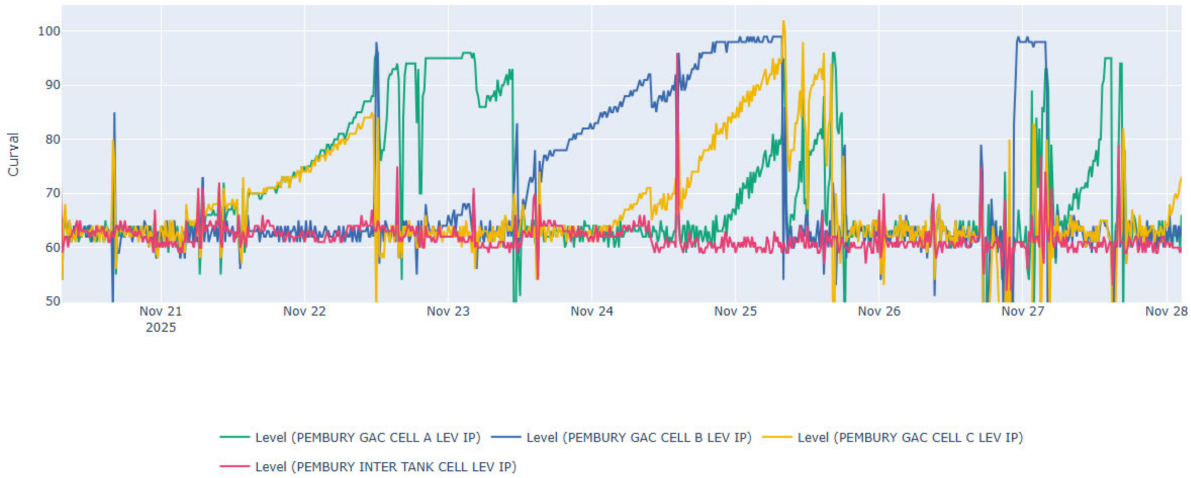

Figure 8: Pembury GAC levels, approximately November 21-28 2025

3.5.4 Until this time, the GAC outlet turbidities had remained generally stable (below 0.2 NTU with a single spike to around 0.4 NTU on GAC B around 11:30 on 23 November), indicating that material had not yet broken through the vessels.

3.6 Initial shutdowns and immediate lead-up to loss of supply

3.6.1 On 25 November 2025, a company operative arrived onsite in the morning to note the high GAC levels, high DAFF turbidities and failure(s) to wash (as described above in paragraphs 3.4 and 3.5). It was determined that GAC B had the longest time since washing (113 hours) – after this GAC was manually put into a wash at 07:45, it caused a turbidity spike from the GAC B outlet of 1.4 NTU about an hour later although pre-CT turbidity only increased briefly to 0.27 NTU.

3.6.2 In consultation with company personnel off-site, the site flow was reduced from around 78 L/s to 70 L/s and the coagulant dosing setpoint was increased from 9.5 L/hr to 11.5 L/hr (approximately changing from 34 to 45 ppm, accounting for the flow change). The GAC vessels were washed manually in turn although it was noted the GAC backwash valve was passing and leaking water into the dirty washwater tank continuously filling it up. Replacement of this valve was arranged for the next day (26 November). Around 21:00, an operator attended the works for the failed wash of DAFF 3, which had failed again on drain down and was reset from the control room. An apparent subsequent annotation in the site logbook states that the reset should not be completed from the control room and to instead go to the DAFF to observe and not keep pressing the reset button from the control room.

3.6.3 On 26 November, DAFF 3 was reset for another attempted wash. The operator went to observe this wash and noticed the DAFF level probe had fallen into the vessel, triggering the site to believe it was constantly in draining down and hence failing to wash normally. The level probe was reattached in place with a temporary fix and a work order made for a permanent fix to be arranged. The site logbook noted a conclusion that the missing level probe must be responsible for DAFF 3 failing to wash reliably in the previous days.

3.6.4 From approximately 17:00 on 26 November, the site's pre-contact tank (pre-CT) turbidity (the regulation 26 monitoring point) increased from a baseline around 0.1-0.2 NTU to peaking at 0.4 NTU around 17:16 and remaining above 0.3 NTU for some time after. This increase exactly matched turbidity spikes on the outlet of GAC B at the same time. Pembury works was operating on its standard pre-CT turbidity regulation 26 shutdown triggers of 0.3 NTU for 10 minutes and 0.8 NTU for one minute. Therefore, at approximately 17:25, the site exceeded 10 minutes at greater than 0.3 NTU on the pre-CT turbidity monitor and shut down. The site's SCADA operating system recorded chlorine dosing becoming highly erratic from 17:24 onwards, approximately matching the pre-CT turbidity increase with a 10-minute delay and giving confidence that this is when the site shutdown began. The shutdown was functionally complete no later than 17:30 and it is apparent that the site acted as it should with respect to protecting disinfection.

3.6.5 An operative was sent to Pembury works to investigate and rectify the situation. The site log noted that the outlet to GAC C had failed and that GAC B still had high turbidity. GAC C was reset and a series of site restarts were attempted between around 19:30 and 22:00, all ultimately unsuccessful and shutting down again each time on elevated pre-CT turbidity.

3.6.6 Consultation within the company water quality process science team determined, from historical precedent, that the coagulant injector may have been blocked although rectifying such an issue would be a two-person job. Upon inspection (understood to be late in the evening sometime after 22:00 hours) the operators found there to indeed be a PACl blockage in the injector and removed it to flush it before reinstalling the injector. All DAFFs were washed in turn along with GAC B. A temporary modification was made to the pre-CT turbidity shutdown triggers to allow 0.6 NTU for 10 minutes with 0.8 for one minute left unchanged. Another site restart was successfully made around 02:00 on 27 November, although the DAFF outlet turbidities remained high despite the flushing out of the PACl injector. The site was deliberately shut down briefly to re-inspect the injector, which was observed to be blocked again and subsequently re-flushed. It is not clearly recorded when the second injector flush took place, but the site was nominally stable and in supply by around 05:00 on 27 November.

3.6.7 Throughout most of 27 November, the output of Pembury works was relatively stable compared to the previous day, with GAC outlet and pre-CT turbidities back to below 0.3 and 0.2 NTU, respectively. The DAFF turbidities however be seen to deteriorate and increase. The site was deliberately shut down between 15:00 and 16:00 to perform a more thorough cleaning of the PACl dosing injector, including a successful drop test to confirm coagulant dosing.

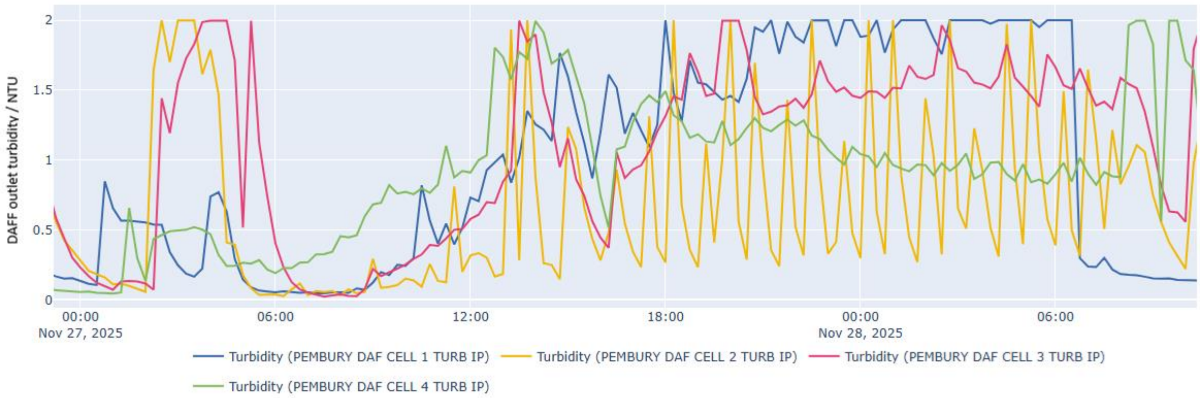

Figure 9: DAFF outlet turbidities worsening on 27 November 2025

3.6.8 Around 17:30 on 27 November, the decision was made to increase the PACl coagulant dosing setpoint to 14 L/hr. At the same time the pre-CT turbidity triggers were modified to 0.4 NTU for 10 minutes with 0.8 NTU for one minute unchanged. It did not appear that the coagulant dosing setpoint increase had much beneficial effect and DAFF turbidities remained extremely high throughout the night of 27 November.

3.6.9 At around 08:00 on 28 November, the works shut down again on pre-CT turbidity after GAC B was washed, suggesting that the GAC vessel(s) had become re-saturated with material that normal washing was insufficient to remove. The site was restarted running to waste through GAC B only and the coagulant dose setpoint was increased to 15 L/hr (approximately 51 ppm). Between 19:30 and 20:00, all three GAC vessels were washed in turn, which shut the works down again on elevated pre-CT turbidity at approximately 20:00. The site was restarted around 23:30 but DAFF turbidities remained high throughout the night. According to a statement collected from company staff, the company's WQ team approved an increase in the pre-CT turbidity shutdowns to 0.6 NTU for 10 minutes and 0.8 NTU for one minute at 22:30 on 28 November 2025.

3.6.10 The first reactive jar testing was undertaken at Pembury works on 28 November, with the process scientist unavailable to attend the day before on the 27 November. Further details of jar testing are detailed in paragraph 3.12.

3.6.11 An incident call relating to the situation at Pembury was held at 14:30 on 28 November. Tonbridge works was removed from supply on 28 November following detection of cleaning solvents in one of its source boreholes. This removed it as a potential source of water via the Yew Tree Road valve into to the Tunbridge Wells supply system.

3.7 29 November 2025 Loss of Supply

3.7.1 At approximately 05:00 on 29 November 2025, Pembury works shut down again on elevated pre-CT turbidity after all GACs washed. Upon restart around approximately 07:00, the site quickly shutdown once again on elevated pre-CT turbidity, with the site log noting all GAC vessels as showing very high turbidity. In consultation with the company water quality team, the pre-CT turbidity shutdowns were again modified to 0.6 NTU for 10 minutes and 0.8 NTU for one minute. The site was restarted running to waste through GAC C at around 09:00, with all GACs set to wash in turn. At this restart, the site flow setpoint was reduced from 80 to 70 L/s, then again to 60 L/s around 11:30 with the coagulant dose set to 14.68 L/hr (approximately 68 ppm at that flow). The GAC wash times were reduced (although the site log does not specify by how much) and the site's operating PLC was modified to allow both the duty and standby PACl coagulant pumps to run simultaneously. The simultaneous pump running was intended to allow an increased dosing setpoint of around 110 ppm that the company's jar tests on 28 and 29 November had suggested would perform better (see paragraph 3.7.2).

3.7.2 This dose does not appear to have been set until approximately 09:00 on 29 November, when both pumps were run at their operational maximum of 15 L/hr. This equates to approximately 139-152 ppm for the 55-60 L/s site flow, through most of the day (reported as at least 'am' in the company's 20-day report) without any apparent improvement in the performance of the DAFF vessels. It should be noted that a dose rate of around 110 ppm had been identified by the company's reactive jar testing as optimal and that the actual dose applied appears to have been higher than this. The site log for the day also notes an unsuccessful attempt to slowly build up a DAFF blanket with a 'low' dose of coagulant with a single dosing pump, listed as 11 L/hr (approximately 56 ppm for site flow of around 55 L/s) but the precise time given for when this trial was undertaken is not given beyond 'pm' in the company's 20-day report. The site continued running to waste until approximately 18:45 on 29 November, with a roughly 90-minute shutdown from 15:15 noted in company records to confirm that the coagulant injector was still clear.

3.7.3 A company incident call around 18:00 on 29 November concluded that the site was unable to treat the water under the conditions at the time, with the site completely shut down by 19:00. A new batch of [redacted] PACl coagulant was also ordered for the next day after company staff hypothesised there may have been a problem with the chemical already on site.

3.7.4 By 29 November, the repeated and ongoing outages/running to waste of Pembury works had significantly decreased the level of Blackhurst SR. Prior to 26 November and the first Pembury shutdown, the reservoir had been between approximately 70% full with the level varying throughout the rest of November between around 45 and 80%. By 10:00 on 29 November, both Blackhurst SR1 and SR2 were at 30% and dropping rapidly.

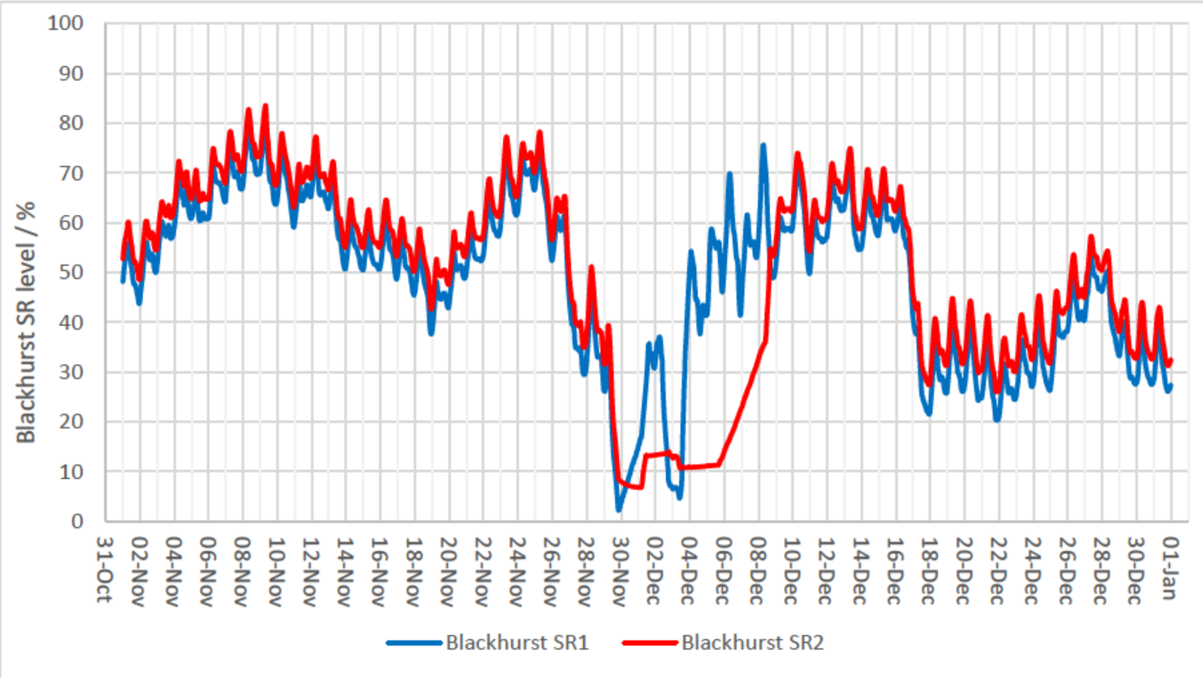

Figure 10: Levels in Blackhurst SR, 1 November - 31 December 2025

3.7.5 The first consumer contacts for low pressure and loss of supply were received by the company at approximately 12:00 on 29 November as the level in Blackhurst dropped below the intakes of the booster pumps. The company held the first escalated incident call at 10:00 the same day and began mobilisation of tankers and other alternative water, including deliveries to priority services register (PSR) consumers and care homes.

3.7.6 A number of properties (approximately 1,100) in Pembury Boosted DMA were able to be rezoned onto the Bewl water supply system. However, the unavailability of Tonbridge works due to the solvent issue described in paragraph 3.6.11 meant that there was no further water available to be rezoned into the Tunbridge Wells supply system/Blackhurst SR via the Yew Tree Road valve.

3.7.7 The first bottled water station was set up at Sovereign Way East Car Park (TN9 1QH) around 19:30 on 29 November.

3.7.8 By 20:45 on 29 November 2025, Blackhurst SR was functionally empty and was isolated. Approximately 6,000 consumers were without a supply of water through the night.

3.8 Works restarts

3.8.1 Pembury works remained completely offline between approximately 19:00 on 29 November and 16:00 on 30 November 2025, with company staff onsite determining treatment was not possible with the current arrangements. The company's 20-day report lists 'improvements in the process were seen leading to early resolution timescales being provided in communications' although this does not appear to match the site being completely offline. Throughout 30 November, with the main works for the Tunbridge Wells supply system unavailable, the number of properties affected rose to around 24,000 (approximately 57,600 consumers) as the remaining water in the local network continued to drain. This dropped to around 23,000 properties (approximately 55,200 consumers) as detailed in paragraph 3.7.6 as some properties in Pembury Boosted DMA were rezoned onto the Bewl supply system.

3.8.2 The requested new batch of [redacted] PACl coagulant was delivered to Pembury works at approximately 09:00 on 30 November and connected to the works dosing system. By around 12:00, the [redacted] feed was restarted into the Pembury contact tank to allow the works to wash the DAFF and GAC vessels throughout the day.

3.8.3 At approximately 16:00 on 30 November, the site was restarted running to waste through GAC B with the remaining site flow being directed into the contact tank with the outlet closed off. The works site log notes that pre-CT turbidity did spike over 1 NTU but that no water was leaving the site at the time. The contact tank drain was opened for approximately five hours through the night to drain the out of specification water, with the turbidity confirmed to be below 0.3 NTU before the tank was refilled to approximately 75% full and the high lift pumps were restarted at 02:30 on 1 December to feed into the supply network again.

3.8.4 Throughout 30 November, the company set up three new bottled water stations at Tunbridge Wells Sports Centre (TN4 9TX, 11:30 to 22:30, restocking 14:00 to 15:00), at RCP Parking car park (TN2 5TP, 18:00 to 22:30) and Tunbridge Wells Odeon cinema (TN2 3UW, 18:30 to 21:00, closing early due to stock depletion). The original bottled water station at Sovereign Way East car park was closed down due to large volumes of traffic making it difficult for consumers to use it.

3.8.5 Following recharge of the network between Pembury works and Blackhurst SR, the latter began to increase in level. The company left Cell 2 (Blackhurst SR2) isolated to achieve greater level in Cell 1 (Blackhurst SR1), thereby allowing restart of the reservoir boosters sooner. Blackhurst SR1 reached approximately 20% full by 06:00 on 1 December and around 30% full by 12:00, allowing a brief restoration of supplies including those areas supplied by the Blackhurst boosters. By the afternoon, the number of properties still without water supply had decreased to approximately 18,000 (approximately 43,200 consumers). While DAFF and turbidities remained highly erratic and elevated through the morning of 1 December, the site experienced a brief shutdown around 13:00 on elevated pre-CT turbidity. This suggests that the continued poor performance of the works front end was still causing excess material to pass forward and contribute to saturation of GAC vessels that were unable to fully wash to clear that material.

3.8.6 Following further jar testing (as described in paragraph 3.12.6) on 1 December, the company ordered overnight delivery of a 1,000 L IBC container of the sulphated [redacted] PACl coagulant that had shown to be more effective at forming floc than the site's normal [redacted] PACl. There is conflicting information regarding when this new coagulant was introduced, with the company's own 20-day report listing both 2 December and the afternoon of 3 December as the switchover time, apparently at a 25 ppm dose rate.

3.8.7 Despite generally worsening DAFF performance still being seen after the site restarted at roughly 14:15 on 1 December 2025, Pembury works continued to feed into supply overnight, keeping the level in Blackhurst SR between 30 and 35%. However, from around 09:00 on 2 December, a GAC backwash caused a rapid increase of pre-CT turbidity from around 0.35 NTU to over 1 NTU by 09:06 and around 1.7 NTU by 09:20, triggering an automatic site shutdown to protect disinfection. The works was again run to waste with the contact tank isolated from the works and the [redacted] transfer left in place, essentially using the Pembury contact tank as a distribution booster station for the [redacted] water.

3.8.8 This latest shutdown resulted in the level in Blackhurst SR rapidly dropping again, decreasing from circa 32% at 09:00 to less than 10% by 18:00 on 2

December 2025. This meant that while there were no consumers in the area without water at the start of 2 December, between 12,000 and 14,000 properties (between approximately 28,800 and 33,600 consumers) were without water by the end of the day. Given the recurrent outages and treatment difficulties at Pembury works and the complete depletion of Blackhurst SR, the company started making considerations to operate the site under regulation 26 (5) with a boil water notice as mitigation to allow the works to avoid shutting down as often and to keep supplying water for sanitation purposes.

3.8.9 By 2 December 2025, ten tankers were directly injecting into Blackhurst SR with another ten tankers in support. The three bottled water stations remained open.

3.8.10 The Pembury works site log makes mention of changing the pH setpoint for the works front end from 7.4 to 7.0, although it is not apparent when on 2 December 2025 this change was implemented.

3.9 Boil Water Notice (BWN) on 3 December

3.9.1 On the 3 December 2025, the company decided to issue a boil water notice to allow Pembury works to operate under regulation 26 (5) to restore supplies and allow the works to stabilise in continuous operation. This boil water notice was listed in the company's 20-day report as applying to approximately 24,000 properties (approximately 57,600 consumers) from 12:00 on 3 December and was issued via text, emails, media, social media and direct to local stakeholders, hospitals and care homes.

3.9.2 At approximately 10:00 on 3 December, the works was restarted into supply, having been running to waste since around 16:30 on 2 December. The triggers for shutdown on pre-CT turbidity were revised to 3.8 NTU for three minutes in line with the operation under regulation 26(5) and to avoid breaching 4 NTU.

3.9.3 There were a series of turbidity spikes for pre-CT turbidity between around 13:00 and 19:00 on 3 December, all between 1 and 1.55 NTU at maximum with that maximum generally decreasing each time. These matched corresponding turbidity spikes from GAC A and C that appear related to washes and the washing of all four DAFF vessels. Ordinarily, these would have shut the site down before the limits was reached but with the revised triggers the site remained in supply. After the last pre-CT turbidity spike was over around 20:30, the pre-CT turbidity generally stayed below 0.1 NTU for around the next week, a significant change and improvement from the preceding days.

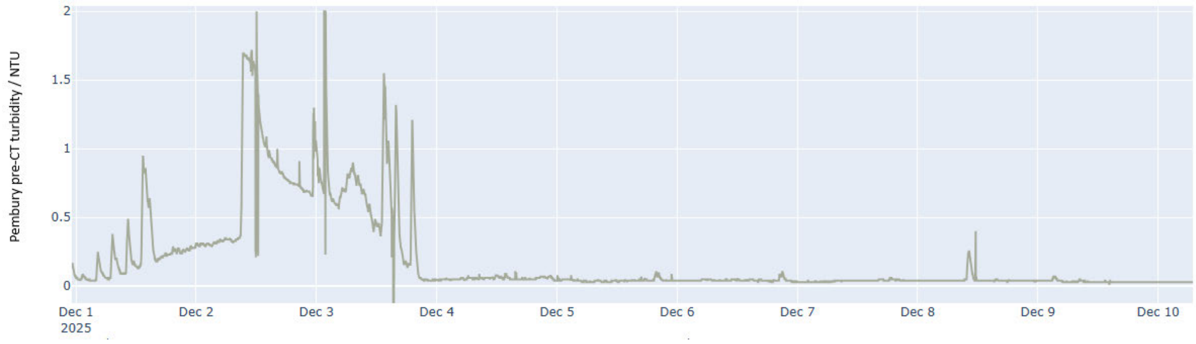

Figure 11: Improvement in pre-CT turbidity after 3 December 2025

3.9.4 The combination of a new sulphated PACl coagulant, the revision of the pre-CT turbidity shutdown triggers (also allowing the site to shut down less often) and the revision of the site's operating pH appear to have combined to allow Pembury works to significantly stabilise from around 19:15 on 3 December. Works flow also increased back to around 80 L/s. DAFF outlet turbidities appeared generally improved compared to the previous days; although still spiking, the baselines were much closer to 0 NTU as during normal operation. GAC vessels were also operating again at baseline turbidities with the level pattern also matching what is considered a more normal operation (Figure 12).

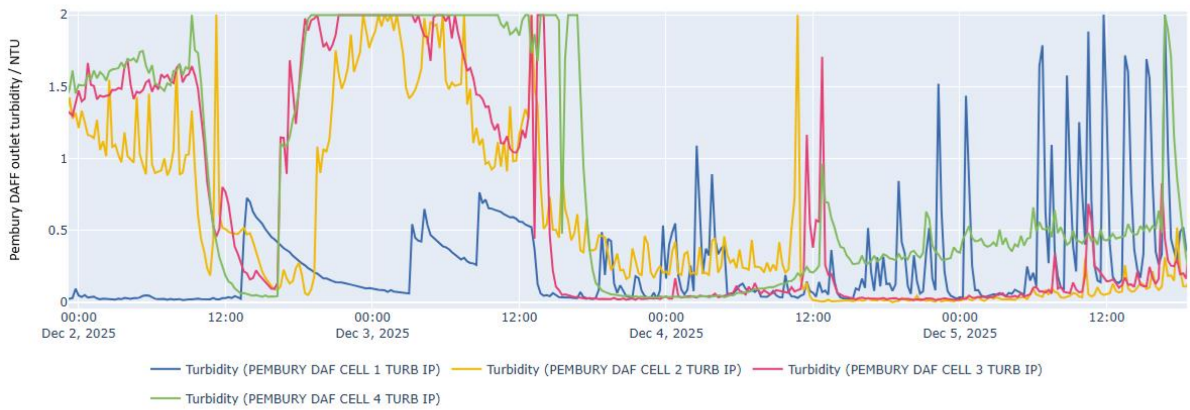

Figure 12: General improvements in DAFF turbidities after changes during 3 December 2025

3.9.5 A fifth bottled water station was opened on 3 December at B&M store (TN2 5QL), initially with sanitation-only grab bags.

3.9.6 A sample collected from the Pembury works outlet on 3 December later recorded an aluminium concentration of 335.6 µg/l (in excess of the regulatory limit of 200 µg/l), indicating that the coagulation and DAFF processes were not yet stable. Subsequent resamples were compliant as the works stabilised.

3.9.7 By the morning of 4 December, approximately 16,500 properties were back in supply with Blackhurst SR Cell 1 recovering to between 40 and 55% full across the whole day. The company report details that 23,000 properties (approximately 55,200 consumers) were back in supply by midday and 24,000 properties by the evening (approximately 57,600 consumers). The RCP car park bottled water station was closed for a planned Christmas event at the site and did not reopen, with the B&M store station expanded to also provide bottled water to compensate.

3.9.8 Around 06:30 on 5 December 2025, Pembury works (and the [redacted]) briefly shut down due to PACl bund alarm where the temporary hose connects. Later on 5 December, Blackhurst SR cell 2 was removed from isolation, refilling over the course of around three days to match Blackhurst SR Cell 1.

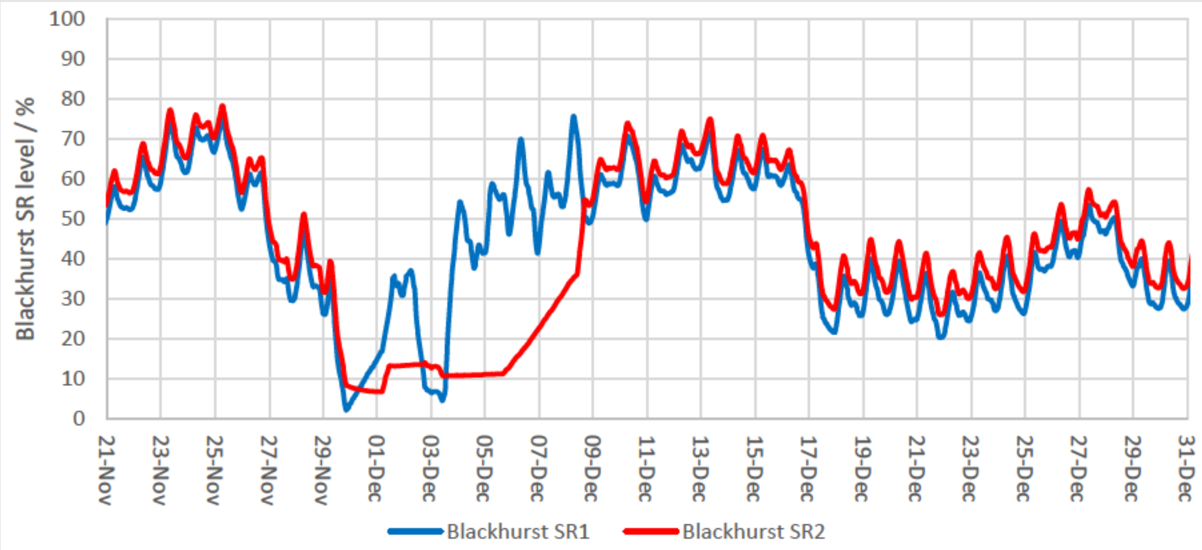

Figure 13: Blackhurst SR levels, 21 November to 31 December 2025

3.9.9 On 8 and 9 December, the company collected 57 extra samples from consumer properties in all affected DMAs, plus routine samples from Pembury works and Blackhurst reservoir. 46 routine samples were also collected from properties in affected DMAs between 4 and 12 December while the boil water notice was still in effect. All these samples returned as satisfactory with one exception; a sample from a property on 6 December which recorded an *Enterococci* concentration of 1 per 100 mL. The property was resampled alongside others in the same street and a water fittings inspection was undertaken. All resamples were satisfactory and the fittings inspection suggested that an internal plumbing issue was the root cause of the *Enterococci* detection and not a wider issue within the network.

3.9.10 The site shut down around 10:00 on 10 December for planned work to begin installing a set of [redacted] microfilters in the Pembury treatment process after the GAC vessels to mitigate against any further turbidity spikes that would shut the site down on pre-CT turbidity. This initial work was complete by the afternoon with the site restarting around 19:00.

3.10 Boil Water Notice lifting on 12 December 2025

3.10.1 At 15:00 on 12 December 2025, significantly improved and consistent performance of Pembury works, plus a series of clear samples in distribution, led the company to revoke the boil water notice. This revocation was communicated via email, letter, AquaAlerter texts and social media. The revocation also corresponded with Pembury works reverting to normal operation under regulation 26 (1), with pre-CT turbidity limited to 1 NTU to protect disinfection.

3.10.2 The [redacted] filters that had been physically installed on 10 December 2025 were not commissioned or online when the boil water notice was revoked. The company made this decision because the works had been within regulation 26(1) parameters for approximately one week by this time.

3.11 [redacted] filters and the issuing of the regulation 28(4) notice reference SEW-2025-00041

3.11.1 As the event progressed, the company had identified a set of microfiltration units made by [redacted] that were already in its possession, which could be used to mitigate the high and spiking pre-CT turbidity being observed between 26 November and 3 December 2025.

3.11.2 It later became apparent that these specific filters had been designed to operate under a significantly greater pressure (approximately 5 bar) than was achieved by the Pembury process at their intended installation point (between the GAC vessels outlet and before disinfection, which was fed under gravity rather than pressurised). This led the company to conclude that the initial installation would not work and an engineering solution to boost the pressure would be needed.

3.11.3 The Inspectorate considered that the filters should still be installed as an extra resilience measure, regardless of the relative stability of the works, as the root cause of the event (and therefore how it could be prevented again) had not been conclusively established by the company at that time.

3.11.4 The Inspectorate issued a regulation 28(4) notice (reference SEW-2025-00041) on 12 December 2025 which included the installation of the [redacted] filters. The notice required that the company install and commission a microfiltration stage at Pembury water treatment works no later than 5:00 p.m. on 17 December 2025. The company did not complete the installation of the filters by this time, and on the 24 December 2025, the Inspectorate wrote to the company to give notice under (and as required by) section 20 of the Act, that it was considering making a final enforcement order under section 18 of the Act. The company provided formal representations to the Inspectorate on 21 January 2026. The representation set out that the company were committed to an installation of the process (membrane filters) by 13 February 2026. However, on 3 February, the company wrote to the Inspectorate, stating the installation and commissioning of the filters would now be completed by the end of February. The section 18 final enforcement order was made on 4 February 2025. The completion date for the installation and commissioning of the filters was set at 28 February 2026. The company confirmed the completion on the installation of filters on the 19 March 2026.

3.12 Jar testing

3.12.1 Jar testing background

3.12.1.1 Jar testing is a bench-top process, usually completed by water companies in an onsite laboratory at a water treatment works. The testing aims to evaluate optimum coagulation conditions by dosing samples of raw water with different concentrations of coagulant under varying conditions and the effectiveness of the coagulation process is observed and measured.

3.12.1.2 As well as investigating the concentration of coagulant, as part of the testing process the pH is usually also altered within the coagulant's operational range, for specific coagulation doses, to find the optimum combination of coagulant concentration and pH. This is useful as some raw water components are better removed at different pH values, and different coagulants form floc better at different pH levels depending on the raw water quality and composition.

3.12.1.3 The jar testing aims to replicate as much as possible the coagulation and clarification processes on the water treatment works, and so the coagulant is dosed, followed by a rapid mix, a slower mix, and some settling time.

3.12.1.4 The size of the floc is recorded, and companies often undertake chemical testing for parameters such as turbidity, residual coagulant (iron or aluminium), UV_{254} , and colour. The optimum dose is then determined from this information to minimise turbidity, residual coagulant, and organic carbon whilst maintaining floc which is of suitable size and stability.

3.12.2 Jar testing at Pembury works prior to the event

3.12.2.1 Two sets of proactive jar testing have been provided for February and July 2025 in addition to reactive jar testing work undertaken during the event from 28 November 2025. These jar tests are required to be done quarterly for the site as an ongoing measure under the regulation 28(4) notice SEW-2024-00006. This had not been completed by the company.

3.12.2.2 The first jar test information, for February 2025 varies doses of PACl by 2 parts per million (ppm) (v/v), between 16 and 26 ppm. The only analysis performed was a visual assessment after 15 minutes, including floc settlement speed. The raw water turbidity was noted as 1.2 NTU, but no pH information was recorded. The conclusion was that small floc was generated at 16 and 18 ppm but much larger floc at 11 and 24 ppm. The site was advised to stay at its then current dose of 22 ppm.

3.12.2.3 The second jar test information available, from July 2025 used doses which varied by 3 ppm. The raw water turbidity on this occasion was listed as being 7 NTU. The settlement speeds varied but after 15 minutes the largest floc was formed with 33 ppm of coagulant. As per February 2025, the only analysis performed was a visual assessment of floc size and settlement speed.

3.12.2.4 Given the last quarterly jar test was performed in July 2025, the next quarterly jar test would have been due by October 2025, where sample results (as shown in paragraph 3.2) indicate October 2025 was within the autumnal seasonal peak of alkalinity, electrical conductivity and pH for the site. Raw water quality was similar to that leading up to and during the event. No proactive jar testing was done in October or November 2025, indicating a missed opportunity to have the site better optimised.

3.12.3 Jar testing at Pembury works during the event

3.12.3.1 According to a statement collected from company staff, jar testing was delayed by a day due to the availability of process science staff.

3.12.3.2 The first jar tests completed during the event were on the 28 November 2025. They were not completed on the standard company jar test form and were instead recorded and provided in an Excel document.

3.12.3.3The coagulant doses used ranged from 30 ppm to 70 ppm in the main sheet, but a sheet labelled only with the date contained what appears to be an additional set of jar testing, conducted at 13:00 and varying coagulant doses by 20 ppm between 30 ppm and 110 ppm, a much wider range.

3.12.3.4 Jar tests varying pH was not done until the testing that was supported by the chemical supplier from 1 December 2025 and demonstrated the criticality of understanding and interpreting jar testing results in the context of coagulation pH.

3.12.3.5 PACl is an acidic coagulant and will depress the pH. The more coagulant that is added, the more the pH will be reduced and so the relationship between PACl coagulant concentration and effectiveness is more complex.

3.12.3.6 For the jar tests completed on 28 November, floc settlement speed was recorded as well as floc size, but no further chemical analyses were apparently recorded on the jar test water. There is a box with some apparent detail on turbidity but this is unclear for meaning as there are no headings to the tables and was not put into context.

3.12.4 Company conclusions from jar testing

3.12.4.1 The company conclusions drawn from these initial jar tests appears to be that the coagulant dose needed to be greatly increased. The second set of jar testing indicated improved floc sizes of C (0.75 to 1.00 mm) after the slow cycle and F (2.25 to 3.00 mm) shortly after the cycle had ended at a dose of 110 ppm. The site coagulant dose was intended to be changed to a concentration of 110 ppm.

3.12.4.2 The previous jar testing (February, July 2025) had indicated no issues with needing to vary the dose at the time due to the application onto the DAFF. Whilst the optimum doses for sites can vary, the jar test, when completed fully, is a strong indicator of the coagulant dose needed on site.

3.12.4.3 The company does not appear to have made comment regarding how close the jar test mixing and settlement conditions were to those on site such as mixing speed, settlement time, and coagulant delivery.

3.12.4.4 It is also unknown if samples were taken in the mixing chamber before the water entered the DAFF unit to confirm if the dose in the jar testing did not work at this point to create floc, or if the flotation component was causing most of the issues.

3.12.4.5 Previous jar testing had not indicated that there was a mismatch between the jar test dose and the best dose on site: The previous jar test forms were not annotated with any information like this.

3.12.4.6 The floc sizes of C and F should have been sufficient to achieve clarification, although a full understanding is not possible due to the lack of chemical testing recorded as part of the jar test procedure.

3.12.4.7 Further investigation of floc stability would have provided clearer and more useful information at this time and flocculant aids, such as polyelectrolyte, should have been considered to make the floc more stable for flotation if this was the issue.

3.12.4.8 The contribution of the location of the chemical dosing to the effectiveness of the coagulation process does not appear to have been adequately considered as a potential complication. The acidic PACl chemical and the alkaline sodium hydroxide are dosed close to each other and therefore some neutralisation effects could be expected, particularly at higher doses. This could have further reduced the amount of effective PACl dose being applied to the raw water, despite the dosing being greatly increased.

3.12.5 pH

3.12.5.1 The site doses sodium hydroxide (caustic) to maintain clarified water pH. It is not known for definite at the time if this was running or not as the company does not record this on SCADA and there is not a flow meter installed. However, given the dosed pH setpoint of 7.4 and the raw and aerated pHs observed at the time, in conjunction with statements collected from company staff, it is likely this was dosing prior to and around 29 November. Given the slightly acidic nature of PACl, the greatly increased dose of 110 ppm or higher (and between 139 and 152 ppm based on the site flow at the time) would have caused a pH drop compared to the previously modest dose and it is unknown if this needed to be corrected, was corrected, or was overcorrected.

3.12.5.2 It should be noted that none of the previous jar tests done on site were pH corrected.

3.12.6 Sulphated PACl

3.12.6.1 Throughout 30 November 2025, further jar tests were done by company scientists, with the jar tests concluding that the new batch of [redacted] PACl was not forming any better floc than the original batch, suggesting that there was no functional difference between the batches. Samples of the original bulk coagulant at Pembury works were also analysed at an independent external laboratory, which confirmed it was within specification. However, a sample of PACl that was stored at Bewl works was also jar tested that performed better than the [redacted] which was later determined to be a sulphated [redacted] PACl product.

3.12.6.2 By 1 December, further jar tests were completed onsite by company staff and representatives from the chemical manufacturer, including samples of sulphated [redacted] PACl. This type of coagulant is more basic than the [redacted], allowing better performance at high pH and under high alkalinity conditions as the increased basicity is better able to neutralise the alkalinity. It should be noted that the manufacturer did correct their jar tests for pH. Other coagulants tested included [redacted] PACl, ferric chloride and aluminium sulphate, with the sulphated [redacted] PACl being determined as the best performer for the conditions at the time.

3.13 Consumer contacts

3.13.1 In total, the company received 1,578 water sufficiency and 156 water quality contacts during the event. Most of the former were received between 29 November and 4 December 2025, with contacts reducing as the system recharged following the introduction of the boil water notice and the return to supply of Pembury works and Blackhurst SR. Following the introduction of the boil water notice on the 3 December, the number of water quality related contacts rose significantly.

4. Actions taken

4.1 Actions taken by the company

4.1.1 Company records show just two proactive jar tests were completed in 11 months, with the last jar test being completed in July 2025. A series of reactive jar tests were undertaken onsite from 29 November 2025 by company staff at Pembury, accompanied by comparison tests from chemical manufacturer.

4.1.2 The company gradually increased the coagulation dosing setpoint between 25 and 29 November 2025, including a modification to the coagulation dosing pump PLCs to allow both pumps to operate simultaneously.

4.1.3 A faulty GAC backwash valve was identified and replaced.

4.1.4 Company operatives recognised the potential for the single coagulation dosing point to have become blocked, prompting the removal of and cleaning of the dosing injector several times.

4.1.5 DAFF and GAC vessels were repeatedly washed in an attempt to remove accumulated particulate matter from them after systemic buildup from a deteriorating works front end. The works was also repeatedly run to waste to stabilise, including running to waste through individual vessels in an effort to clean/remove particulate buildup.

4.1.6 As the condition and performance of Pembury works deteriorated, regulation 26(1) shutdown triggers were revised in an attempt to allow the works to keep operating while still protecting disinfection.

4.1.7 As supplies were lost with Blackhurst depleting, some consumers (~1,100 homes) were rezoned onto supply from Bewl works.

4.1.8 The company ordered fresh batches of [redacted] PACl coagulant and subsequently ordered new types of coagulant after jar testing results indicated likely improved performance with the alternative sulphated [redacted] PACl coagulant. This new coagulant was used from 3 December 2025.

4.1.9 The site's dosed pH setpoint was lowered from 7.4 to 7.0 on 2 December 2025.

4.1.10 The company issued a boil water notice as mitigation for operating the works under regulation 26(5). This permitted the restore of supplies for sanitation uses and allowed the works to remain online more consistently rather than shutting down on pre-CT turbidity.

4.1.11 Five bottled water stations were set up to distribute water to consumers. priority service register (PSR) consumers had water delivered directly to them.

4.1.12 Water was supplied by tanker for direct injection into Blackhurst SR.

4.1.13 Samples were taken from Pembury works, Blackhurst SR, Tangiers SR and from affected consumer properties in the distribution network, including reactive samples from consumer contacts. Samples were collected from tankers and tanker fill points and from bottled water batches.

4.2 Actions taken by the Inspectorate

4.2.1 The Inspectorate has completed a detailed investigation into the circumstances that lead to and the impact of the Pembury works shutting down, leading to the loss of supply event.

4.2.2 The investigation has included two site visits to Pembury works on 5 and 19 December 2025. Data from the company site operating system was downloaded, processed and analysed. Available water quality data was also processed and reviewed. Site documentation including the site logs, general site duty records and procedures have also been reviewed and witness statements were collected from personnel onsite. The Inspectorate would like to acknowledge the co-operation of the site operatives, managers and the water quality team with the site visits.

4.2.3 During the event the Inspectorate also answered enquiries from concerned members of the public, press and liaised with external stakeholders and within government.

4.2.4 Following this event, the Inspectorate issued a regulation 28(4) notice which has subsequently been reissued as a Section 18 enforcement order as detailed in paragraph 3.11.

4.2.5 Prior to this event, Pembury works was audited in March 2024. The audit identified deficiencies requiring upgrades and improvements to be made. Issues were identified relating to site capacity, lack of resilience, as well as poor maintenance and management of treatment processes.

4.2.6 Eleven recommendations were made and the Inspectorate served a regulation 28(4) improvement notice on Pembury works (SEW-2024-00006) following this audit.

4.2.7 The notice is currently on version 3 with the company having reported delays relating to contractor availability for the installation of the return wash water flow monitoring and in relation to the work to de-sludge, inspect and undertake remedial work on the sludge lagoons.

4.2.8 As part of the notice, the company is required to complete a number of actions to improve the site. The company has a capital scheme in AMP8 which includes some of the items covered by the notices plus others that have been identified by the company as being required. This is discussed further in paragraph 5 below.

5. PR24 scheme

5.1 As part of notice SEW-2024-00006 the company has provided details of the capital scheme for upgrades at Pembury works. The company has provided the following details of work included in the capital scheme, with the items covered by the notice detailed:

- Complete the installation and commissioning of a new contact tank 30 September 2028. At all times, the [redacted] must be available. (DWI notice)
- Complete the upgrading works of the boosters and the replacement of the MCC at Lilley Farm. 30 September 2027 (DWI notice). Engineering will install [redacted]. This [redacted] from the [redacted]. A new driver will be required for this [redacted], as the previous one was reutilized for the [redacted].
- Complete the maintenance work on the springs network 30 September 2028 (DWI notice)
  - 1. Chamber & Spring Works Vegetation Clearance: Clear all vegetation, including saplings and mature trees, from around every chamber. Chamber Repairs: Repair all spring chambers to capture water that is currently being lost Cleaning: Remove all sediment and roots from spring and weir chambers. [redacted] on all spring chambers, prioritising the [redacted] system. Decommissioning: [redacted] with little or no flow [redacted] by [redacted] and [redacted].
  - 2. Pipework Trace Mains: Trace and map the routes of [redacted]. Replace Pipes: Replace all [redacted] connecting the springs and weir chambers to the [redacted]. Separate Flows: During any future replacement of the [redacted] borehole, install separate

pipework for the borehole and the [redacted] springs to improve spring flow.
    - 3. Monitoring Reinstate System: Re-establish the overall monitoring system. Install Flow Gauges: Install individual flow monitors for each spring and borehole. Add a new gauge downstream of the combined [redacted] main to calculate spring flow. Install continuous flow gauging on the [redacted] to measure flow from the reservoir.
- Complete the upgrading of the GAC treatment 30 September 2028 (DWI notice). GAC volume to the existing asset, will be required to achieve an EBCT of 15 min and filtration rate of 6-8 m/h.
- Complete the enlargement to the capacity of the settlement tank. 30 September 2028 (DWI notice)
- Complete the installation and commissioning of the new borehole at Matfield. 30 September 2028 (DWI notice). To drill and equip a new production BH to replace the existing Matfield BH. The project will involve drilling and equipping a new production BH, which will necessitate a pilot BH and test pumping. Additionally, discussions with the Environment Agency (EA) regarding licensing will be required. The engineering team is requested to liaise closely with the water resources (WR) department on all aspects of this project. Our intention is to reuse [redacted] to Pembury via [redacted] and to either reuse or upgrade the current starter and building.
- DAFF condition survey and replacement of flocculator motors.
- Hydraulic improvements for [redacted]. Engineering to assess necessary hydraulic improvements, design a solution, and oversee its implementation. The goal is to ensure full abstraction capabilities in accordance with our license conditions and to facilitate appropriate onward pumping to the [redacted] Transfer Station. Currently all wells are pumped and interconnected into a single outlet main to [redacted] raw water storage. Operations report this prevents all wells achieving their designated yields due to a [redacted] on the interconnecting mains.
- Engineering to increase the size of the existing DWWT, install a poly dosing unit to thicken the backwash and sludge return flows. Upgrade PLC/MCC of Sludge works – replace all valves with actuators. Re-program PLC for supernatant discharge and sludge density monitor control
- Engineering to complete any necessary and/or outstanding remedial works for the Sludge Lagoons. While it is expected that these works will be carried out by our operations team, it is recognised that there may be complexities beyond their current capabilities. Should this occur, the remedial works are to be completed under this scheme. Engineering will liaise with and assist the operations team as these works progress, which are based on output from a [redacted] report.

6. The Inspectorate’s Conclusions and Recommendations

6.1 **On the quality of water supplied to consumers**, the company collected 217 treated water samples from the Pembury supply system at locations including the treatment works, service reservoirs and from properties within the Blackhurst water supply zone. In addition, a further 89 samples were taken from the alternative water supplies (tankers, tanker fill points and bottled water batches). Sample results data provided by the company for this event showed a single sample collected from Pembury works on the 3 December had a concentration of aluminium at 335.6 µg/l in excess of the prescribed concentration(s) specified in Schedule 1 of the Water Supply (Water Quality) Regulations 2016 (as amended). In addition, two samples collected from the Blackhurst zone on the 1 December had iron in excess of the prescribed concentration(s) at 333 and 357.5 µg/l. I therefore **conclude** that water supplied to consumers may have been unwholesome, in contravention of regulation 4(2). However, I **note** that the concentration of aluminium and iron detected in the samples were significantly below the respective suggested no adverse reaction limit (SNARLs) for these parameters. One sample from a consumer property detected 1 Enterococci per 100 ml on 6 December 2025. Subsequent resamples and samples from nearby properties proved satisfactory and a fittings inspection was completed which identified the domestic plumbing as the root cause.

6.2 **On compliance with regulation 26**, I **conclude** there is no evidence that there was an issue with disinfection at the works during this event, with the works shutting down as designed to prevent disinfection becoming compromised.

6.3 On the company reports and commentary

6.3.1 I **note** that the company’s own timeline in their three-day and 20-day reports does not start until 27 November 2025 despite key developments and actions taking place in the days and weeks prior. I **also note** that there is significant detail lacking in the dates the company has commented upon. All commentary and events listed, discussed, further commented and concluded upon are substantially augmented by the Inspectorate’s own investigations, including a review of site logs, process trends, sample results and witness statements. This is information that was freely available to the company but not necessarily commented on or assessed by the company in their own report(s) with respect to the context of the event. I therefore **conclude** that the company has breached regulation 18 by not adequately investigating the cause of the event. I therefore **recommend (ref: 2026/0252)** that future event investigation and subsequent reports include adequate consideration of all factors which may have contributed to the event to better the company’s own root cause analysis and understanding of why an event has occurred.

6.3.2 I **note** that the company has concluded that several factors contributed to the root cause of the event, including raw water reservoir level, raw water chemical composition (alkalinity and pH), water temperature, the dose rate and chemical composition of coagulants.

6.4 Raw water quality

6.4.1 With respect to raw water parameters and based on the company's 20-day report, I **note** that the company appears to have repeatedly drawn conclusions based on sample data taken from 2024-2025 only. However, with reference to paragraph 3.2 and analysis of five years of data rather than approximately two, I **note** that there is very limited evidence of a dramatic or sudden change raw water quality or any historic high levels/concentrations in the lead-up to or during the event; for example, alkalinity and conductivity had peaked just as high or higher in both 2020 and 2022 without apparent impact on the works. One limited exception to this is an apparently prolonged autumnal peak for alkalinity that was slowly decreasing when the event happened, although this had been over 200 mg/L since June 2025 and so would not constitute a sudden change. It is likely that higher alkalinity in the raw water would require higher doses of coagulant to achieve suitable clarification and flocculation for otherwise similar conditions under low alkalinity. I **note** that the raw water pH of 8, and a post-aerator pH 8.15 would likely result in a coagulation pH of around 7.8 and that this is substantially within the stated operating window for the [redacted] PACl historically used at the site. I **also note** that the turbidity was recorded to be less than 2 NTU for weeks prior to the event. The combination of relatively high alkalinity and relatively high pH, along with low turbidity would make coagulation and floc formation difficult without coagulant dose optimisation.

6.4.2 The limited raw water temperature data available shows a drop to around 8.5°C on the 23 November having dropped from 12.2°C on the 15 November following a cold snap between 16 and 21 November. I **note** that the lower temperature would have negatively impacted the speed and efficacy of all the chemical processes at the works, particularly including coagulation. There was no temperature information available to operators or scientists (or on the site's SCADA system) as the situation developed and deteriorated and hence no ability to mitigate against it. I **conclude** that a lack of readily available water temperature data meaningfully degraded company operatives' situational awareness in the leadup to the event, preventing mitigation against the impacts of a cold snap which might often occur during colder months of the year. I **also conclude** that a lack of historical data on record has led to temperature being insufficiently considered in the optimal running of the works, with no quantified precedent established for how the works would/could be affected and hence no information available on how best to combat the effects or adapt/improve the works as mitigation. I **conclude** this constitutes a breach of regulation 28 for failure to adequately risk assess and address a factor which has material impact on the operation of Pembury works. I therefore **recommend (ref: 2026/0253)** that the company retrospectively assesses the risk of raw water quality changes that may impact on coagulation efficiency, ensures suitable monitoring is in place and that there is effective ongoing review of coagulation based parameters to allow proactive operational changes to be made. This recommendation should include the updating and re-issuing of standard operating procedures (SOPs) and policies as necessary.

6.5 Jar testing and coagulant optimising/switching

6.5.1 I **note** reactive jar tests conducted as part of the event were the first such tests completed since July 2025, with only two sets of tests completed in 11 months, despite a requirement under notice SEW-2024-00006 to complete these quarterly. I **also note** that a quarterly jar test would have been due in October 2025, when raw water quality was similar to that leading up to and during the event and different to the July 2025 conditions, preventing the site from being optimised for coagulation for several months.

6.5.2 I **note** that the reactive tests were inadequate by not sufficiently considering coagulation pH, chemical dose, temperature or flocculation aids. Much higher doses should have been used in the initial testing protocol, across multiple jar tests if necessary to incorporate coagulation pH. The incorrect assumption that there was an issue with the chemical delayed the site recovery, as there was a wait before a new batch of chemical could be delivered. I **conclude** that timely and full sets of jar tests incorporating pH and consideration of coagulant/flocculant aids would likely have produced a suitable dose for the works with the [redacted] chemical.

6.5.3 I **also note** that this work was delayed in starting by a combination of scientist unavailability and an apparent lack of urgency from the company to prioritise the deteriorating situation. I **also note** that company jar testing standard operating procedure (SOP) documentation lists the site operators as being responsible and trained for jar testing, although this does not appear to have been the case at Pembury works with jar testing only being completed once a scientist was available. This lost valuable time to investigate the deteriorating process and potentially recover the situation earlier. Consideration of the suitability of the [redacted] PACl in conjunction with the raw water conditions the site was experiencing, and whether a switch to the sulphated PACl (or any other alternative coagulant) would have been the better option for the site conditions at the time, was not made early enough in the event.

6.5.4 I **conclude** that the company's failure to undertake routine coagulant dose optimisation through regular jar testing (and mandated as per legal instrument SEW-2024-00006), or for site operators undertaking jar tests as per company SOP exacerbated the challenge to be overcome leading up to and during the event, both in keeping the works running well and in preventing and/or recovering from the flocculation process breaking down. I **also conclude** that specifically not performing the quarterly proactive jar test due October 2025 was a missed opportunity for the company to optimise the works for similar raw water quality, increasing the works' vulnerability to other factors which contributed to the event. I **also conclude** this reactive jar testing work was not completed fully and/or acted upon soon enough to recover the works and prevent Blackhurst SR from reaching a critically low level. I therefore **recommend (ref: 2026/0254)** that the company reviews its jar testing procedure to ensure that it is appropriately thorough and undertakes suitable training and procedural roll-out to ensure that this is functionally embedded within the business, including site operator participation in routine jar testing.

6.6 On the company focus on external factors

6.6.1 I **note** that the company's initial 'bad batch' theory for the breakdown of the works' coagulation process and the triggering of the event was held for several critical days as the works continued to struggle. I **also note** that the company appears to have fully discarded this theory after manufacturer and company testing by 1 December 2025 and both the original coagulant type and batch were shown to be functional. Once the 'bad batch' theory was discarded, the company's position migrated to the unprecedented and/or suddenly changed raw water conditions as detailed in paragraph 3.2. I **note** that both above proposed root causes would be external factors outside of the company's control and fitting the narrative of an unavoidable and unforeseen event, although neither cause has sufficient basis in evidence. I **conclude** that the company's apparent willingness to blame factors beyond their control has negatively impacted critical assessment of the circumstances surrounding the event. I therefore **recommend (ref: 2026/0255)** that the company reviews the circumstances surrounding this event and improves its operational event response to ensure that critical analysis of all factors are considered to help steer operational response decisions.

6.7 On the works condition, operation and monitoring

6.7.1 There is significant evidence that Pembury works had been operated sub-optimally in the weeks and months prior to the event. Review of the site diary gives evidence of poor filter performance, inadequate coagulation management, reduced backwash capacity, and reliance on manual interventions and a lack of online performance visibility to enable a critical assessment and response.

6.7.2 With respect to aluminium monitoring at the works, consecutive final water aluminium concentrations are seen to be above the alert level requiring further investigation, remediation and a review of action plans (if already in place) at a PACl-equipped treatment works. Several consecutive results in the months immediately prior to the event also recorded samples high (and in one instance, over 1,400 µg/l) of combined post-DAFF aluminium, indicative of a treatment process that was in routine distress and invariably passing material down the process that should have been removed. There is also an aluminium online monitor installed at the site adjacent to the DAFF vessels but following the 2024 site audit the company confirmed that this is non-operational. I **conclude** that the company was either not aware of this situation with the post DAFF-aluminium or had become complacent to the implications of aluminium routinely bleeding through the entire treatment process. I therefore **recommend (ref: 2026/0256)** that the company improves and embeds its operational processes for monitoring and actioning of water quality parameters which are above internal alert levels.

6.7.3 According to site log entries from at least March 2025, DAFF filters were often not washed adequately, with inconsistent or delayed wash times and turbidity seen to have been rising between washes more quickly. Issues were also documented for the DAFF air scour system with incidences of washes occurring without air scour.

6.7.4 I **note** issues have been seen with the backwash system, for example the passing valve on 25 November 2025 leaking into the dirty wash water tank. This led to washes being held off at a critical time as the dirty wash water tank was full. Focusing on processing the dirty washwater and freeing up capacity for additional and extended filter backwashes would also have helped the site to recover more quickly.

6.7.5 I **note** the site diary contains multiple incidences, from January 2025 onwards, of the site shutting down following a GAC wash, indicating the GAC vessels were routinely not being adequately washed by normal site operation and remaining particulate material on the vessel was being moved forward when the vessel was returned to service.

6.7.6 I **note** that company records of General Site Duties at Pembury works for the weeks leading up to the event have entries relating to the DAFF and GAC vessels listed as not started or not completed, suggesting that routine tasks on these parts of the process were not being adequately completed.

6.7.7 Coagulant dosing is not visible on SCADA and there is no validated dose available on screen with the coagulant dosing based on manual pump setting rather than being flow paced. This will result in the actual dose changing with flow changes through the works (flow proportional), which from company records provided can be up to several times a day. It also means no historical record beyond what is recorded manually in writing in the site log, typically as L/hr coagulant dosing but sometimes as ppm. I **conclude** such a manually operated system of coagulation dosing (control, recording and calculating) is extremely vulnerable to changing conditions/situations. There is evidently no other historical record for long-term review or verification, thereby impacting the long-term assessment and understanding of the process. I therefore **recommend (ref: 2026/0257)** that the company implements a more robust method of recording coagulant doses until an automated system can be installed (this is discussed further in paragraph 6.9.3).

6.7.8 The lack of real-time online data for coagulant flow and dose also means there is no way for site operators to notice and intervene for coagulant dosing injector blockages as they occur. I **note** that the site has a 'flow switch' installed on the coagulant dosing system, which is linked to a one minute shutdown of the entire site if the switch detects there is zero flow in the dosing line. However, I **also note** that there were blockages of the PACl dosing injector leading up to and during the event which would have gradually starved the process of coagulant as they worsened and that required removal of the entire dosing injector for clearing out. I **also note** that the first blockage was only discovered because company staff recalled it had happened before rather than from any available data at the time, prompting the injector removal to first investigate and then clean out.

6.7.9 I **also note** that the works was shut down for approximately 90 minutes on 29 November to investigate the injector for a third time only to discover it was still clear. There is no record of the flow switch system triggering in these instances and the site remained online likely due to there being some flow in the line through the mostly blocked injector. I **conclude** that the coagulant monitoring and flow switch systems are not fit for purpose, as functional blockages of the dosing system were neither detected as they developed and worsened nor did the site shut down as intended to protect the process and diagnose the fault. I **also conclude** that having no accurate or reliable online flow information for the coagulant system and company staff having to investigate the dosing injector's status by physically removing it wasted valuable time at critical stages of the event, in particular the 29 November shutdown which lasted at least 90 minutes when consumers were already losing supply and the injector was not blocked. This is discussed further in paragraph 6.9.3.

6.7.10 In response to questions, the company provided a Functional Design Specification (FDS) document dated from 2015, the last year of the last refurbishment of Pembury works. This document included details of proposed upgrades, including (but not limited to) automatic coagulation control, monitoring and recording on the site SCADA operating system and fully integrated flow metering for coagulant. The company has so far confirmed that the coagulant system upgrades were not completed although has not yet been able to provide reasoning as to why these features were either deemed unnecessary or were otherwise never installed leaving Pembury works reliant on manual observations and interventions.

6.7.11 I **note** that while there is typically a duty-standby arrangement of coagulant dosing pumps (except when both pumps are run in tandem for higher doses as per paragraph 3.7.1 and 3.7.2), there is only a single coagulant injector at Pembury works. I **also note** that there is significant evidence that this injector often blocks up with coagulant, necessitating a complete site shutdown for its removal and cleaning out as there is no other injector to act as a standby. I **conclude** that such an arrangement constitutes a critical single point of failure for the works which had a material impact on the event for lack of standby dosing; even if the injector blockages described above had been detected early, they would still have required a full site shutdown each time to resolve. This is discussed further in paragraph 6.9.3.

6.8 On the company response time leading up to the event

6.8.1 Filter performance drops away on the DAFF filters at various dates from 9 November 2025 with a noticeable and cumulative deterioration of all vessels from 19 November through into the start of the event, as detailed further in paragraph 3.4. This is seen in increasing turbidities as the filters go through their run, and eventually the filters not returning to a baseline turbidity with increasing material being passed forward to the GAC stage. As more particulate material built up in the beds of the DAFF and GAC vessels, their ability to remove other particulate material would reduce and the particulate material already embedded would likely compact further and become harder to remove by the overtaxed wash system. Optimal coagulation at the DAFF unit was needed to cease the progressive and self-reinforcing buildup of particulate material through each treatment stage. I **note** that despite these signs, the company's apparent actions between 19 and 26 November 2025 were to marginally increase coagulant flow, reset of DAFF and GAC washes as and when they failed and to identify the passing valve for the GAC backwash, none of which had any substantive effect on preventing the deterioration of the works. I **also note** the company did not call an incident until 28 November 2025, by which time the works had shut down multiple times on pre-CT turbidity, indicating the process was saturated with particulate matter that had been allowed to build up over the preceding week. I **conclude** that the failure to fully recognise or adequately and promptly address the signs of a progressive and reinforcing breakdown of the treatment process was a missed opportunity to prevent the event. I therefore **recommend (ref: 2026/0258)** that the company reviews its escalation triggers for when operational issues may impact on water quality and continued supply of water so that any emerging issues can be effectively dealt with and supported promptly onsite.

6.9 Overall conclusions

6.9.1 I **conclude** that there is no evidence that a sudden or dramatic change in raw water quality was the sole root cause of the event. There is limited evidence that the condition (temperature) of the raw water was contributing factor. However I **also conclude** the event was compounded by the failure of the company to maintain adequate long-term and real-time monitoring and assessment of the works, to have sufficient company procedures in place, to adequately invest in maintaining and upgrading the works in line with its own internal risk assessments and design specifications and an apparent company affinity for blaming external factors that did not have sufficient basis in evidence.

6.9.2 Overall I therefore **conclude** that this event was both foreseeable and avoidable. There were a multitude of factors which have contributed to the event occurring, almost all of which were and are in the company's power to overcome and many of which had opportunities to overcome early that were missed or could potentially have prevented the event happening altogether. These include the works design and operation, actions and investigations taken to try and recover the site and the overall speed with which the company acted.

6.9.3 Considering the above conclusions, I am now **recommending further enforcement under section 18 of the Water Industry Act.** The enforcement will include measures for the company to address the lack of automated, flow-paced coagulant dosing, real-time monitoring of pH, temperature, turbidity, and aluminium at critical stages and redundancy for critical dosing components. The enforcement will also include the AMP8 work to improve the condition and operability of the works covered by legal instrument SEW-2024-00006. Due to the critical nature of the treatment works, the enforcement will also require the company to undertake a Hazrev-based review for the identification of single points of failure and any other operational weaknesses in the process which may require additional mitigation.

6.9.4 I was **minded to recommend** that the deficiencies highlighted in this event which may affect or be present at other company sites or relate to wider company policies, procedures and practices should be assessed however this will now be addressed as part of the company transformation programme.

7. Event Risk Index (ERI)

7.1 This event has been assessed and given a (provisional) ERI Score of 172.133. This is calculated through a seriousness score of 5, population of 60,170, duration of 338 (hours) and Inspector's assessment score of 4.

8. Other relevant matters

8.1 We are copying this letter to the EFRA Parliamentary select committee, UKHSA Kent Health Protection Team (South East) and Tunbridge Wells Borough Council.

Please respond to the seven recommendations listed above within 20 working days of the date of this letter.

Please contact me if you have any queries regarding this letter.

Yours sincerely

[redacted]