



What caused the supply failure at Otterbourne?

15-19 February 2023

This report describes the internal investigation carried out into the cause of the loss of supply that occurred from Otterbourne Surface Water Treatment Works in February 2023. It also includes an overview of how we responded and the actions we have taken to make amends to our customers and the local community for the distress caused.

What happened

A loss of supply occurred from our Otterbourne works following a water quality shutdown. It was triggered automatically when water quality (turbidity) levels fell below acceptable standards for water supply. This was caused by water from one of the work's filters (Rapid Gravity Filters or RGFs) passing into the water supply (contact) tank through an outlet valve that should have been closed. This water is normally held in a separate tank. Our turbidity monitors immediately detected a change in water quality and this triggered an automatic shutdown.

Initially, we expected around 23,000 homes in parts of Winchester and Southampton to be impacted between the 15th and 19th February 2023. However, through a combination of rezoning and tankering treated water into the network, this was reduced to 15,000. Further supplies were brought in late on the 16th reducing the number of homes impacted still further. The remaining 2,200 were out of supply until the 19th.

The investigation

Our investigation has found that the valve controlling the flow of water between the RGF filter and the contact tank had been operated incorrectly, not in compliance with procedures.

The site has a fail-safe mode which automatically shuts the plant down if water quality fails to meet

strict regulatory standard designed to ensure water quality. What's more, these systems trigger well in advance of a quality failure and have a safety factor of more than 30%.

Between the 10th and 15th February 2023 we undertook a range of maintenance tasks at the site. Throughout this period no automatic shutdowns were triggered, we had no sample failures from our proactive sampling regime, and our trend data discloses no operation outside of the very strict standards that we meet.

The incorrect operation of the valve meant that during this final stage of testing, water containing sand and gravel from the filter tank passed into the contact tank. The presence of this sand and gravel triggered the automatic shutdown, stopping any partially treated water entering the supply. Our fail-safe modes operated as designed.

This valve could not have been opened if it had been isolated correctly. This should have happened when the filter was taken out of service for repairs in 2022. As such, a sequence of failings has been found, some of which are operational, and some have to do with the capability and availability of our employees.

Otterbourne Water Supply Works is split into two sites which, combined, serve approximately 180,000 households across Hampshire. It's an important site for us and we have an ongoing investment programme of £350 million over the next eight years to improve the quality and resilience of supply for our customers. In addition to day-to-day operations, there is significant ongoing maintenance and upgrade work happening alongside major building programmes, all designed to ultimately reduce the likelihood of a similar supply outage in the future. We believe that the increased activity and complexity of the site is likely to have contributed to the mistake that was made.

What steps have we taken to make sure this doesn't happen again?

We took immediate action at the time and have revised our policies and procedures at all our treatment sites, with enhanced governance and sign off.

Our regulator, the Drinking Water Inspectorate, also visited the site on 22 February 2023 to carry out a detailed inspection of the tank.

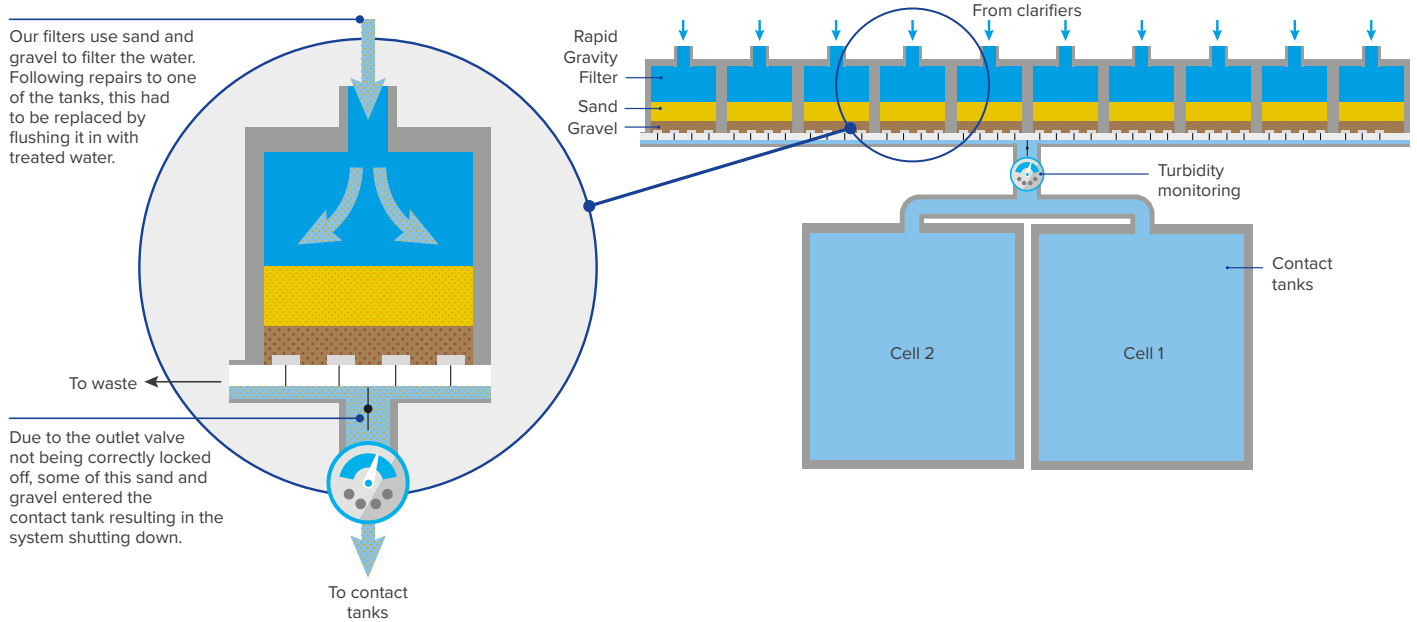
A full list of recommendations and the actions taken to date (April 2023) is in **appendix 1**. The following ongoing improvements are now being implemented on site and, where appropriate, across our estate:

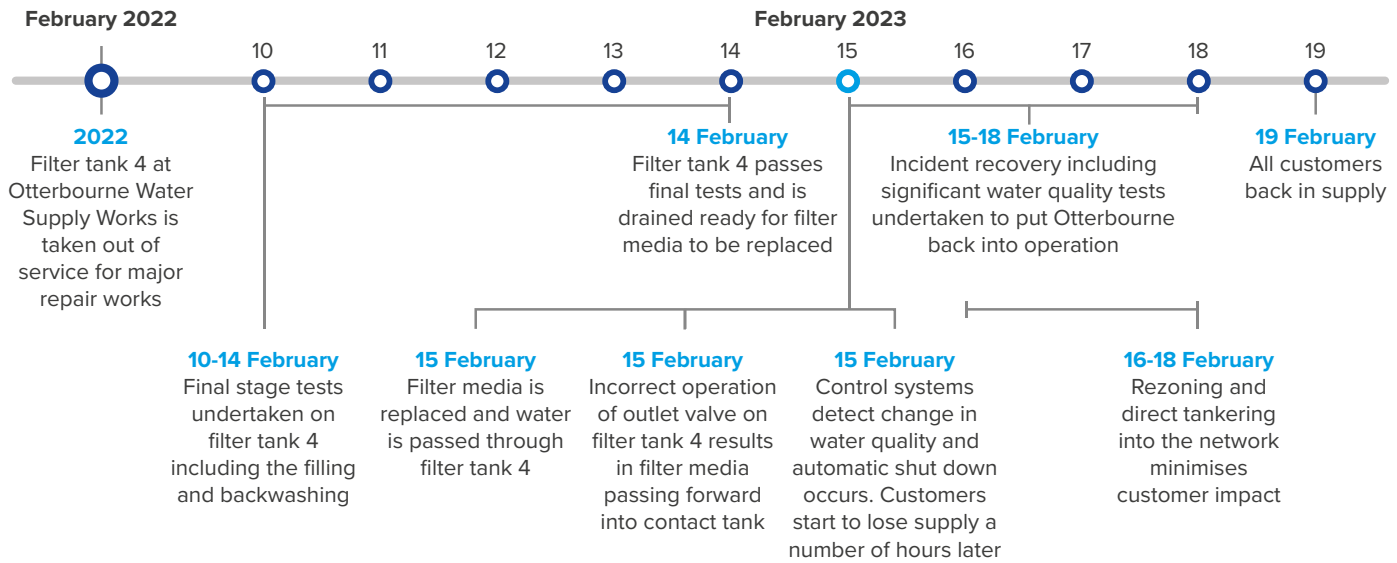
- A formal revision of all valve isolation procedures.
- A tightening of controls at all our water supply works including a review of arrangements for task allocation, oversight and supervision of activities.

- A review and update of Otterbourne's Site Operating Manual, ensuring all cataloguing, labelling and referencing of all valves is up to date and aligned.
- Committing to additional valve-related training for operators to embed new procedures and controls.
- Putting in place a new dedicated Project Manager for all improvement works at the Otterbourne site. Review and validation of requirements and competencies for all key roles, including training and assessment for our managers, scientists and operators.

In addition, a new role has been created for an on-site delivery manager, to assist our Field Performance Managers with the day-to-day management of contractors, maintenance and improvement works on site.

How the system operates





The background

In 2022, during a routine maintenance inspection, a filter tank was taken out of service so that major repairs could be made. This is part of our ongoing investment at our Otterbourne site. It was during the final stage of these repairs, when final checks were completed before returning the filter tank into service, that the event occurred.

What went wrong?

During the final stages of returning the filter tank to service, and during the process to replace the filter media – the fine sand used to filter water during the treatment process – the incorrect operation of a valve meant that filter media passed into the contact tank where disinfection is done.

As the change in water quality was detected the site control systems immediately activated and the site was shut down, stopping the water going forward into supply.

What was being fixed and how did this mistake happen?

We use fine sand to filter water during the treatment process. During an inspection in 2022 it was found that the sand was not settling properly in one of our tanks, due to a blockage in one of the pipes used to wash them.

A project was planned to drain the tank and remove the sand, to allow our teams to complete a detailed inspection and then undertake the necessary repairs. Repairs went as planned, and our contractor was ready to install the new sand filter.

This sand sits on supporting gravel which is put in place by flushing it into the tank using treated water. To do this, the filter tank must be isolated from supply

to make sure the water and gravel don't enter the treatment process.

After the gravel was added to the tank, sand was detected in the water, and this shut down the works.

What did we do about it?

An incident team was formed and alternative water supplies were arranged for our customers, and, an on-site investigation was carried out immediately.

The team at Otterbourne drained the disinfection tank so that it could be cleaned.

The tank was ready to be returned to service by 4am on Friday, 17 February. A controlled restart of the works began soon after this, refilling the tank to 60%. The water was then sampled after two hours to make sure that it met strict water quality standards. This was completed by Saturday morning and the tank was filled to 80%, when a further sample was taken.

The results of samples were received at 8pm on Saturday, 18 February, and showed that the water was safe to supply to customers.

We began a controlled restart of the works straight away, pumping to Yew Hill and recharging the network early on Sunday morning.

What have we done to make amends to customers?

Under our Guaranteed Standards of Service scheme, household customers and businesses will receive payments. However, as this most recent incident happened so soon after the interruption in December 2022, we decided to double the standard amounts awarded.

Household customers, who were without water for the longest received a total payment of £420. Businesses received £900. All credits were applied

directly to customer accounts, and for businesses, credited to their water retailer, by 10 March 2023.

If you have any further questions about these payments, please contact our teams on **0330 303 0277** or if you would like to add friends or relatives to our Priority Services Register, to receive extra support during an emergency, please call our vulnerability team on **0800 027 0800** or email heretohelp@southernwater.co.uk.

Giving back to those affected by loss of supply

We also decided to offer a community donation following the incidents and spoke to local residents to find out how they wanted the money to be spent. They told us that they wanted it to go to local foodbanks so those who were most affected by the loss of water supply would benefit. We donated a total of £50,000 to five local food banks in the area.

One of the foodbanks we donated to gave us the following feedback:

“SCM Basics Bank is an emergency food project in Southampton that gives a four-day food parcel to those who are struggling. This year, Basics Bank has seen a significant increase in the number of people using the service. In 2023 we have already fed people 6,416 times, that’s 500 people a week, a number we do not see going down soon.”

“We are seeing our warehouse run out of certain stock lines weekly and have needed to supplement donations of food by purchasing food ourselves. During this current cost of living crisis, it is not only affecting the amount of people we serve but the costs of running such a large project. This donation from Southern Water will be so helpful in continuing the important work of SCM Basics Bank in our community. We are very grateful to all those who support our project.”

Jen Ball, Southampton City Mission (CIO)

We’re continuing to update our works at Otterbourne

Over the next eight years, we’re investing a total of £350 million at our Otterbourne Water Supply Works to improve the resilience of the site. These works will benefit our customers by reducing the likelihood of a similar supply outage in the future.

The latest project involves upgrading treatment tanks, UV treatment equipment and the pumping station on site. The next phase will include an upgrade of the River Abstraction Building, and the replacement of pre-disinfection treatment and dosing systems. It will also include replacing the existing standby generators and control systems.

Background information about Otterbourne

Otterbourne Water Supply Works is near Winchester in Hampshire. It takes in water from the River Itchen and boreholes drilled into an aquifer (underground storage reservoir).

The two sources require slightly different treatment. The river water is checked for levels of ammonia, and it is then treated in the ‘surface works’. These works include clarifiers and sedimentation tanks, which is where we add chemicals, such as Ferric Chloride and Poly Acrylamide to remove any solid material. The water is then filtered through 10 rapid gravity filters containing fine sand to remove smaller particles. The water is then disinfected.

Disinfection kills any bacteria, and the final treated water is then pumped off site to two water service reservoirs at Yew Hill and Otterbourne, which supply the network and our customers. The on-site rapid gravity filters are washed using air blowers and clean water.

Appendix 1 Full table of steps taken

Action ID	Site	Action	Definition of done	Date of delivery
1	Regional	Operational Management team need to make sure any treatment process, when isolated from the site operation, MUST have all key valves or pumps 'locked off' and mechanically or electrically disabled so they cannot be operated.	Management team roll out and lessons learnt review performed.	Complete
			Safe Control of Operations (SCO) processes, to manage contractor and on-site planned work, reviewed and amended. Amendment includes SCO to apply to all work and new sign off processes with more senior personnel. Water Quality and Public Health risk assessments and action plans must be complete before planned work starts.	Complete
2	Regional	Improve valve isolation process to make sure valve and pumps cannot be used (mechanically or electrically disabled).	Formal revision to procedure rolled out to all field teams. Test understanding of the new procedure.	30/05/2022
	Regional	Competency assessments for all key roles on our Water Supply Works. Review of competency framework and overall management system to make sure it is fit for purpose.	Guidance for Operatives, Senior Process Scientists and Field Performance Managers updated.	Complete
			Training records formally documented and reviewed to identify any gaps.	Complete
			Perform annual Training Needs Analysis assessment. Priority at Otterbourne Water Supply Works.	30/06/2023
			Site-specific training plans for our large surface water Water Supply Works, to be rolled out to all works over time.	31/12/2023
			New Licence to Operate training framework updated and signed off, via EU Skills, as formal part of our Competent Operator management system.	01/02/2024
3	Otterbourne	Review of procedures at larger water supply works, such as Otterbourne Water Supply Works, with an emphasis on the need to make sure a Process Water Quality Risk Assessment (WQRA) and any updates are followed.	Delivery of frameworks to all operatives and asset maintenance technicians. Formal output of the session to be logged confirming individual understanding and clarity of expectations.	30/05/2023
			Further Water Quality stand down with the same roles to give them the chance for clarification and questioning.	30/05/2023
			Review Clever Nelly system (sends questions to all of our field teams to check competency) to make sure questions are linked to level 3 Competent Operator training and procedures.	Complete
			Add E-Learning Level 3 Competent Operator course content to internal 'Learning' pages for all wholesale water employees.	Complete
4	Otterbourne	Review the Site Operating Manual (SOM) for Otterbourne, to make sure all labelling of valves, etc is up-to-date.	Make sure SOM is signed off by experienced operators (over five years' service) at Otterbourne.	30/05/2023
			Revised SOM to be made available to all operatives and maintenance technicians on their work devices.	30/07/2023
5	Otterbourne	All critical valves should be catalogued so that their status can be easily identified.	Catalogue (SCADA) clearly identifies all valves for all filters as well as their current status.	30/07/2023

Action ID	Site	Action	Definition of done	Date of delivery
6	All sites	Review arrangements for management of contractors at site to make sure the correct level of supervision is in place.	Risk assessment and resource on site for any High Risk Safe Control of Operations (SCO).	Complete
			Roll out of revised SCO process and evidence.	Complete
			Transfer Control of Premises (TCOP) is under review. Any deviation to the SCO plan should be escalated to the site owner.	30/09/2023
			Commission and complete a full Safe Control of Operations (SCO) review to align contractor best practise.	Review will conclude on 30/07/2023
			Put in place any changes or recommendations identified from the SCO review. Initial estimate is a 20-week roll out programme.	31/12/2023
7	Otterbourne	Review arrangements for management of contractors at site to make sure the correct level of supervision is in place.	Review the site resource levels and create a plan to cover both in and out of hours.	01/07/2023
			Put in place 24/7 site plan. This may require additional resource and training. Recruitment and training typically takes between 18 months and two years.	31/03/2025
			Review the site resource levels at management level and create a plan with a clear RACI established.	Complete
			Appoint a new Final Enforcement Delivery Manager for the works to assist the Field Performance Manager with Capital Delivery work.	Complete
8	Otterbourne	A dedicated Project Manager for ongoing improvement work under the Final Enforcement Order to allow operational staff and managers to concentrate on daily operational activities and checks.	Dedicated Project Manager in place for Otterbourne that is located on site daily (Monday to Friday).	Complete
			The integrated team of Operational Manager, FPM, FEO and Project Managers to all work in the same shared office area on site.	30/07/2023
9	Otterbourne	Review of automatic shutdown of river pumps to prevent tanks from over filling.	Documented review of all signal for the river pumps to establish what signals will shutdown the pumps, enhance and then test.	30/05/2023
			End-to-end shutdown test (E2E) performed and evidenced to confirm that the river pumps shutdown when filter levels and/or Contact Tank levels reach pre-defined levels.	30/06/2023
			Perform maintenance on E2E every six months rather than current annual check.	30/06/2023
10	Otterbourne	Approve and issue procedure for maintaining site diaries and make sure adequate briefing provided to operational personnel.	Review, amend and authorise the draft procedure for competently maintaining site diaries in the Water Services Manual.	30/06/2023
			Data completion category and criteria to be added into the Site Hygiene audit framework to make sure we're checking quality of on-site forms.	30/06/2023