6.2 SUMMARY OF EVENTS AND INCIDENTS 2020

Scottish Water is required to tell the Drinking Water Quality Regulator for Scotland (DWQR) about events that could affect water quality. DWQR assesses all events and categorises them in consideration of their impact on public confidence in the water supply. There are five categories used with the three most severe declared by DWQR to be incidents.

Category	Not Significant	Minor	Significant	Serious	Major
No. of Events	**489**	**132**	**18**	**11**	**0**

The following tables detail the significant, serious and major events declared as incidents. Each individual incident assessment can be viewed on the DWQR website: **http://dwqr.scot/regulator-activity/water-quality-incidents/2020-incidents/**

Published for the Drinking Water Quality Regulator for Scotland, August 2021.

Event Date, Duration & Classification	Area	Estimate of pop. affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
13 January 2020 **For 2 days** Classification: Serious	North Hoy, Orkney Islands	46	pH failures	**DWQR comments and findings:** • Alarms for low pH and high turbidity were triggered after cleaning the membranes at the works. There were subsequent failures of the iron and lead standards at consumers' taps. • Chemical cleaning of the membranes was carried out with a much greater amount of citric acid powder than the procedure required, having a knock-on effect to other processes. • With no pH meter on site, operators had to take a 90 minute round trip to get one from South Hoy. This has since been addressed. **Scottish Water actions:** • Complete full review of clean in place (CIP) process and procedures including chemical batching. • Review CIP set points. • Provide portable pH meter for site. • Provide adequate training to local team on WTW operation.
20 January 2020 **For 1 day** Classification: Significant	East Renfrewshire	35,258	Disinfection failures	**DWQR comments and findings:** • After maintenance on the chlorinators, SW staff told the ICC to ignore low chlorine alarms which masked a blockage in the chlorine dosing line. • As there is no Clear Water Tank (CWT) at Picketlaw WTW undisinfected water could not be run to waste before entering supply. • There was one failure of the coliform bacteria standard in the distribution system. • Scottish Water were slow to escalate the event and failed to take chlorine samples when microbiological samples were taken. • DWQR made four additional recommendations.

Event Date, Duration & Classification	Area	Estimate of pop. affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
				Scottish Water actions: • Replace chlorine booster pump 1 and increase frequency of chlorinator duty rotation. • Create lookup table for CCT spiking volumes following low chlorine shutdown. • Create formal procedure in collaboration with Ops, E&M, TOMS and ICC on chlorine servicing. • Review task schedule chlorinator duty/standby changeover frequency pan-Scotland. • Replace and test both dosed chlorine sample pumps. • Update shutdown procedure for Picketlaw WTW to include actions to be taken prior to removal of stop logs, including bench testing. • Install a CCT scour valve which will prevent a future occurrence of this issue. • Arrange for replacement of seal on stop logs. • Review escalation communications procedures and ensure it is clearly understood. • Review the alignment between treatment control procedures and auto to manual procedures in regards to auto shutdown suppression.
25 February 2020 **For 1 day** Classification: Significant	Fife	131,077	Coagulation failure	**DWQR comments and findings:** • The standby operator was called out for a turbidity alarm and increased aluminium sulphate dosing. • A blocking in the dosing line was cleared and proceeded to overdose the coagulant. • An investigation into raw water conditions should have been carried out and earlier escalation could have reduced the duration of the incident. • DWQR required SW provide a quarterly report to DWQR on progress with the provision of the raw water chemical dosing changes, raw water quality monitoring and relocation of alum dosing pumps. **Scottish Water actions:** • Carry out Glendevon Operator training session.

Event Date, Duration & Classification	Area	Estimate of pop. affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
28 April 2020 **For 5 days** Classification: Serious	Lothian & Borders	69,936	Turbidity and manganese failures and significant consumer concern	**DWQR comments and findings:** • Scottish Water closed and cleaned a service reservoir (SR) downstream of Castle Moffat WTW. • High flow and turbidity alarms were triggered but operators did not escalate their findings as they believed staff were on-site at the SR. • A sample taken at the WTW failed for manganese. Although Covid-19 restrictions meant consumer taps could not be sampled, samples from hydrants and SRs in the network had 28 failures for manganese and six failures for aluminium. • 174 consumer contacts were received. • The root cause was a malfunctioning valve at the SR allowing higher than normal flows, disturbing sediment in the water main (pipes). • DWQR made three additional recommendations. **Scottish Water actions:** • Carry out an ROV investigation for the Castle Moffat CWT to determine the appropriate frequency of cleans for this tank. • Investigate FCV at Traprain Law SR and carry out remedial work on findings. This includes altering control philosophy to prevent the inlet FCV opening fully and only to a maximum required flow against normal demand. • Further targeted sampling around localised issues to determine extent/severity of issue and consider localised cleaning. • Investigate the need for future maintenance schedule task on affected Traprain Law SR FCV.

Event Date, Duration & Classification	Area	Estimate of pop. affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
18 May 2020 **For 2 days** Classification: Significant	South Lanarkshire and Central Belt	14,095	Network discolouration	**DWQR comments and findings:** • Scottish Water investigated reports of rising water in the Greenhill Water Supply Zone. • The root cause was a flow disturbance generated in a main (pipe) during the operation to isolate a disused main. • 129 consumer contacts were made to Scottish Water reporting discolouration. • After a flushing programme there were failures for iron, manganese, aluminium, turbidity, *Clostridia* bacteria and hydrocarbons (benzo(a)pyrene and total PAHs). **Scottish Water actions:** • Update GIS to reflect the status of the WSZ BV as an opposite-handed valve. • Cut and cap feed from 24" main into 15" main downstream of WSZ BV. • Carry out an investigation based on the discolouration policy and previous data to better understand the risk across the whole zone.
29 May 2020 **For 8 days** Classification: Serious	Glendevon, Glenfarg & Lomond Hills supply zones, Central and East Fife	165,707	Discoloured water	**DWQR comments and findings:** • This incident reflects a series of events in this distribution network. • With increased demand on the water network, Scottish Water implemented elements of their drought plan to increase supplies by transferring water from Glenfarg to Glendevon supply. • Over 1,200 consumer contacts for discoloured water and SW supplied bottled water. • There were 42 failures of the manganese standard, seven for aluminium and six for iron. • DWQR also made one further recommendation. **Scottish Water actions:** • Complete a Network Risk Assessment (NRA) for the Fife network. • Further investigation into Fife network to determine discolouration risk from the trunk main. • Further targeted sampling around localised issues to determine extent/severity of issue and consider localised cleaning. • The network control process to be updated in include a review of historic and proposed peak flows to assess discolouration risk.

Event Date, Duration & Classification	Area	Estimate of pop. affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
31 May 2020 **For 3 days** Classification: Significant	Scottish Borders	10,683	Discoloured water	**DWQR comments and findings:** • Increased water demand on Sandyknowe SR led to rezoning 140 properties to allow the SR to recover. Further increases in demand led to pumps being installed. • 80 consumer contacts were received for discoloured water and one sample failure for iron was recorded at Camieston SR. • Increased flow disturbed sediment in the mains leading to failures of the metals standards. • Scottish Water acted appropriately to maintain water supply across the zone. • DWQR made no additional recommendations. **Scottish Water actions:** • Review Roberton WSZ network for future high demand response mitigations. • Review Roberton RSZ network model to assess impact of flow changes (including regular use of pumping) to trunk mains to Sandyknowe SR. • Complete a Network Risk Assessment (NRA) for the Roberton network. • Further targeted sampling around localised issues to determine extent/severity of issue and consider localised cleaning. • Promote needs to the TWS mission for any SRs that are unable to be cleaned.

Event Date, Duration & Classification	Area	Estimate of pop. affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
5 June 2020 **For 3 days** Classification: Significant	Fort William	14,934	Turbidity and manganese failures	**DWQR comments and findings:** • After a CWT was taken out of service for scheduled cleaning a high final water pH alarm was triggered but assumed to be a nuisance alarm. • A consumer contact received for milky/cloudy water and the Network Service Operator (NSO) noted a white residue. A further consumer contact was received later. • High turbidity and pH measurements were noted at the works. There was one failure for manganese in the distribution network. • A number of factors contributed to this incident including problems with the lime batching and dosing system, variable treated water flow, faulty or inappropriate equipment, a delay in the ICC alerting operators after the alarm was received, and rushed operation for bringing the tank back into service. • Scottish Water failed to follow their own procedure for dealing with the tank switchover correctly. **Scottish Water actions:** • Review need to raise outlets within Camisky CWTs above floor to prevent lime deposits being washed into the outlet sumps. • Review cleaning frequency for Camisky CWT. • Review process to minimise disturbance when bringing Camisky offline cells back online (ensure cleaned cell is lower tank). • Reinforce CALM valve operations needs across North Treatment Team Leaders. • Complete refurbishment of NRVs and line valves and thereafter complete the cleaning of mixing tank and wet wells. • Instigate changes to process logic controller (PLC) to allow single cell operation (as per option 3 of capital liaison report). • Clean lime slurry tanks. • Review Network Cleanliness Risk and instigate investigation into need for networks cleaning/flushing. • Investigate inlet flow control to the main SRs to minimise flow variation in the trunk mains and reduce network disturbance.

Event Date, Duration & Classification	Area	Estimate of pop. affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
1 July 2020 **For 1 day** Classification: Significant	Galashiels, Scottish Borders	10,041	Coagulation failure	**DWQR comments and findings:** • The ICC received a high filtered water turbidity alarm from Manse Street WTW which was suppressed. The operator was only told one filter had triggered an alarm but all four filters were activating alarms. • Coagulant dosing was below the shutdown level but the plant continued operation. An airlock blocked the duty pump loading valve. • Sampling at the final water tap and in distribution gave no failures of standards. One consumer contact was received for milky/cloudy water. • A lack of effective communication between the ICC and operators and failure to do basic scheduled maintenance on the works contributed to the event and delays in recovery. • DWQR subsequently audited Manse Street WTW both in response to this incident and to examine the general operation of the works. • DWQR recommended that standby operators be provided with remote telemetry 'tuffbooks' where SCADA is not visible. **Scottish Water actions:** • Create a site specific procedure for flushing the coagulant dosing lines at Manse Street WTW and reinforce the importance of flushing coagulant dosing lines at task schedule frequency to local operations. • Investigate the low coagulant dosing flow alarm shutdown failure and reinstate it. • Consider installation of a clarified turbidity meter. • Consider rate of change of high raw colour alarm to telemetry. • Create look-up table for coagulant dose and jar test range.

Event Date, Duration & Classification	Area	Estimate of pop. affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
8 July 2020 **For 6 weeks** Classification: Significant	Scottish Borders	18,565	Taste and Odour failures	**DWQR comments and findings:** • A scheduled raw water sample from Watch Water reservoir showed an increase in total algal cells. Rawburn WTW has no specific algae or taste and odour compounds removal stage. • This reservoir does not have a history of geosmin. Scottish Water changed the intake point from the reservoir and investigated whether PAC dosing could alleviate the geosmin. • Mitigation measures were only put in place after consumer complaints but visual inspections of the reservoir and rising geosmin levels should have led to quicker action. • 32 consumer contacts were received in July and August. **Scottish Water actions:** • Reinstate the dye water flow meter at Rawburn WTW. • Develop an operational management plan for taste and odour related issues at Rawburn WTW. • Review raw water sampling programme to include routine measurements for total algae, chlorophyll A, geosmin, phosphorus.

Event Date, Duration & Classification	Area	Estimate of pop. affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
23 July 2020 **For 3 days** Classification: Significant	Gourdon, Aberdeenshire	801	Microbiological failures and restrictions on water use	**DWQR comments and findings:** • A scheduled sample from Gourdon SR failed microbiological standards with three *E. coli* and 3 total coliforms present. • A boil water notice was issued following discussions with health stakeholders. No subsequent water quality failures were observed in the network. • Structural integrity issues in the service reservoir allowed ingress of untreated water. The tank had not been cleaned in 15 years. Remedial works have since been put in place which DWQR will monitor. **Scottish Water actions:** • Arrange for tank to be cleaned, inspected and flood tested. • Carry out repairs to Gourdon SR as outlined in 2020 cleaning report if decision is made to return tank to service otherwise remove Gourdon SR from service permanently. • Review MD08 procedure to ensure photographs of colonies that incur investigation or are atypical are taken before they are sub-cultured. • Re-enforce escalation process for failures with a significant outcome to ensure Scientific Services management team are aware.

Event Date, Duration & Classification	Area	Estimate of pop. affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
7 August 2020 **Three separate detections in 2020** Classification: Significant	Stirling, Perth & Kinross, Falkirk	178,428	Coliform failure	**DWQR comments and findings:** • This incident reflects three separate coliform bacteria failures from Turret WTW in 2020. • The root cause was likely to be inadequate control of coagulation chemistry at the site. • DWQR made two further recommendations. **Scottish Water actions:** • Organise for the CCT outlet chamber to be cleaned and inspected for any integrity issues. • Change sodium hydroxide control system to make them flow proportional. • Arrange for all CWTs at Turret WTW to be cleaned and inspected for integrity issues. • Investigate possibility of a solution to stabilise raw water flows at Turret WTW.
14 August 2020 **For 1 day** Classification: Significant	Dumfries & Galloway, East & North Ayrshire	40,710	Aluminium failures	**DWQR comments and findings:** • A polyelectrolyte pump failed and the turbidity rose sharply. Later both pumps were in operation. Coagulant was being dosed from the pressure release valve suggesting a blockage in the dosing line. • Aluminium levels at the works exceeded the PCV (standard). Chlorine demand in the water increased, allowing effectively undisinfected water to pass into the clear water tank. • Inadequate communication between operators and the ICC significantly increased the duration and severity of the incident. • Scottish Water failed to take timely samples. No samples failed in the distribution network. • Inadequate alarms or shutdown procedures were in place to mitigate the effects. • DWQR made 16 additional recommendations and this incident was part of the reason why DWQR served an Enforcement Notice on Scottish Water in 2021. **Scottish Water actions:** • Investigated connecting shutdown valve to SCADA and auto shutdown on high filtered turbidity and installing actuated valve post-CCT to allow filter washing whilst shutdown. • Changed software to inhibit secondary filter washing until enabled following start-up. • Rolled out ICC 'toolbox talk' training to ICC and West Operations teams.

Event Date, Duration & Classification	Area	Estimate of pop. affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
17 August 2020 **For 10 days** Classification: Serious	East Ayrshire	997	Prolonged loss of control of treatment process	**DWQR comments and findings:** • This incident occurred after torrential rainfall caused a landslide into the raw water source, severe electrical storms and a power outage. • Both coagulant pumps were run in manual to cope with increased raw water turbidity and colour. This led to a loss of control of the treatment process and inability to optimise the works to rapidly changing raw water conditions. • Bench tests showed aluminium levels of 1.6mg/l where the standard is 0.2mg/l. Two samples in the distribution network failed for aluminium and one for manganese. **Scottish Water actions:** • Reinforced Scottish Water procedures to operators covering Finlas WTW. • Procedure for running site to waste to be reviewed with any changes implemented and rolled out to all site operators covering Finlas WTW. • Update emergency actions levels (EAL) sheet and review Finlas WTW telemetry tag list to ensure terminology is correct and all signals are pointed to the correct instrument. • Catchment inspection to be carried out at Finlas WTW.

Event Date, Duration & Classification	Area	Estimate of pop. affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
22 August 2020 **For 20 days** Classification: Serious	Islay, Argyll & Bute		Manganese failures	**DWQR comments and findings:** • All three filters at Port Charlotte WTW had faults and allowed manganese to pass into the network. Failures of the manganese standard were found at the works and in the distribution network (at all of the SRs supplied by the works). • It is likely that the final water at Port Charlotte WTW breached the PCV for manganese for 16 days and in the network for 20 days. • One consumer contact was received for taste and odour. • The root cause was a blockage of soda lines giving poor pH levels for optimal treatment. **Scottish Water actions:** • Investigate installing an auto shutdown on low interstage pH. • Install an online manganese monitor. • Carry out targeted cleanliness index sampling to understand manganese concentrations in the Port Charlotte network.

Event Date, Duration & Classification	Area	Estimate of pop. affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
16 September 2020 **For 2 days** Classification: Significant	Argyll & Bute	14,000	Coagulation failure	**DWQR comments and findings:** • The ICC received a 'combined high iron' alarm from the filter monitor at Tullich WTW. • A thick layer of sludge at the bottom of the bulk tank and choked dosing lines impeded delivery of the ferric coagulant. • Failing samples were recorded across the network for two days. Two consumer contacts were received during the incident timeframe. • Operators failed to follow the proper Scottish Water procedure and jumped to conclusions over the cause of the incident. • Proper cleaning and maintenance of the tanks should have been conducted and could have avoided this incident. • DWQR made one additional recommendation. **Scottish Water actions:** • Review and agree appropriate cleaning schedule for the ferric bulk tanks at Tullich WTW. • Present and discuss this enhanced outcome report with operators to highlight the importance of following treatment operation and maintenance strategy (TOMS) procedures. • Review options to reduce risk of ferric deposits settling out in the storage tanks including mixing and changes to the inlet and outlet pipework. • Add cleaning ferric pumps to the Tullich WTW task schedule. • Roll out Water Operations Team Leader standby training, which will include elements of managing confirmation bias during water quality incidents.

Event Date, Duration & Classification	Area	Estimate of pop. affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
17 September 2020 **For 2 days** Classification: Serious	South Uist, Western Isles	1,600	Loss of supply causing consumer concern	**DWQR comments and findings:** • The raw water inlet flow was swabbed but failed to allow sufficient water in after this procedure was complete. • Various attempts to restore raw water sufficiency including overland pipes and pumps failed to remedy the problem. Tankering was used to augment supply. • 600 direct fed properties were affected first. An island-wide power cut shut down the works shortly after the raw water supply was restored. • 44 consumer contacts were made to Scottish Water and one sample failure for aluminium, iron, manganese and turbidity was recorded from Eriskay SR after it ran dry during the incident. • DWQR made one additional recommendation. **Scottish Water actions:** • Install a spool piece in the raw water collection chamber to allow the raw water main to be swabbed in one stage. • Review need for additional temporary works during raw water swabbing (i.e. overland or pumping options). • Review topography and required associated equipment for effective management of the raw water pipeline.

Event Date, Duration & Classification	Area	Estimate of pop. affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
20 September 2020 **For 3 days** Classification: Significant	Dunfermline and Dalgety Bay areas, Fife	9,000	Loss of supply and discoloured water	**DWQR comments and findings:** • A burst on the inlet to a service reservoir caused a loss of supply to properties fed by the SR. • Alternative supplies were siphoned from other zones and tankering injected water into the system to alleviate loss of supply. • One sample at Redcraigs SR failed the standards for aluminium, iron and manganese. All subsequent resamples were satisfactory. • The sample failure may have been caused by the alternative supplies creating back feed from adjacent supply zones and changes in flow from the direct injection points. • Scottish Water should have kept better records of tankering inject points as tankering and injection has potential for contamination. • DWQR made three additional recommendations. **Scottish Water actions:** • Share enhanced outcome report with relevant management team.
29 September 2020 **For 1 day** Classification: Significant	Fife	7,574	Discoloured water	**DWQR comments and findings:** • Field staff operated valves in the network to provide greater and more stable water pressure to a new housing development. Consumer contacts later reported discoloured water. • Flushing did not improve the issue so the network was restored to its original configuration. • Due to unfamiliarity with the local area the sampler initially took samples from outside of the affected zone. A subsequent sample from the affected area failed the standard for iron. • 53 consumer contacts were received for discoloured water over the 20 hour period. • DWQR made two additional recommendations. **Scottish Water actions:** • Promote 8" replacement low pressure solution. • Training delivered to relevant field teams focussing on the downstream impact of flow increases.

Event Date, Duration & Classification	Area	Estimate of pop. affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
3 October 2020 **For 2 days** Classification: Significant	Orkney Islands	13,990	Coagulation failure	**DWQR comments and findings:** • Poor weather caused a deterioration in raw water quality causing the filtration process to become overloaded. • Blockage of the poly dosing line and changing raw water quality caused high turbidity. Some alarms had been set to higher set points than normal to maintain production. • One sample of the final water at the works failed for aluminium. • The inappropriate strength of the poly solution for the temperature conditions allowed (partial) blockages in the dosing system, leading to the coagulation process failure. • If alarms had been restored to their correct set points and escalation had been quicker the impact of this incident could have been less. • Samples were not properly taken in the network to assess the impact on consumers. **Scottish Water actions:** • Investigate installation of alarm disabled warning message and a combined filtered turbidity monitor. • Review poly system cleaning task scheduling frequency and adjust if necessary and review poly make-up strength. • Review failure to arrange zonal reactive sampling.

Event Date, Duration & Classification	Area	Estimate of pop. affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
5 October 2020 **For 4 days** Classification: Serious	Tiree, Western Isles	626	Bacteria failures and boil water notice	**DWQR comments and findings:** • Two samples at Hynish and Caolis in Tiree failed for coliform bacteria. A boil water notice was issued. • Eight consumer contacts were received during the incident. All resamples passed. • A choked septic tank near the SR sample tap with matching bacteria strains suggests the effluent contaminated the Hynish sample which transferred to Caolis. • Scottish Water were hindered in their ability to make repairs and inspections on the SRs by landowners. • DWQR made two further recommendations. **Scottish Water actions:** • Investigate and temporarily relocate the Hynish SR sample tap and renew Caolis SR sample tap. • Install temporary covers to both SRs and Tiree CWT.
14 October 2020 **For 1 day** Classification: Serious	Aberdeenshire and Moray	74,570	Loss of control of final water pH	**DWQR comments and findings:** • Turriff WTW was shut down to allow generator maintenance to be carried out. When the works was restarted it suffered a loss of control of final water pH dosing. • The ICC initially suppressed an alarm from the site believing operators to be on site. • There were failures of the pH limit in the water leaving the main Service Reservoir. • There was a subsequent and similar failure of lime dosing plant at the works with over-strength solution being prepared. • DWQR are monitoring investigations into potential investment at the site to ensure the works is running effectively. **Scottish Water actions:** • A case study of lessons learned to be shared with ICC and Water Operations. • SCSP will identify solutions for final pH correction system and discuss with DWQR. • Review treatment control Impact Assessment Form (IAF) and include check on dosing equipment as part of a planned WTW shutdown if required.

Event Date, Duration & Classification	Area	Estimate of pop. affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
14 October 2020 **For 3 days** Classification: Serious	Central Scotland	5,138	Discolouration	**DWQR comments and findings:** • Routine servicing of a pressure reducing valve (PRV) along a trunk main caused a loss of water for consumers downstream. • Changes in network flows caused discolouration leading 184 consumer contacts over the following three days. • A valve was missed in the initial assessment of the works, an incorrectly labelled valve on GIS and Network Control process failing to pick up the inadequate completion of the Impact Assessment Form contributed to the cause of this incident. • DWQR made one additional recommendation. **Scottish Water actions:** • Ensure distribution operation and maintenance strategy (DOMS) IAF specifies the arrangements in place at the Critical Monitoring Point for approval. • Promote WSZ for further investigation to determine whether mains conditioning or flushing is required.

Event Date, Duration & Classification	Area	Estimate of pop. affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
2 November 2020 **For 1 month** Classification: Significant	Kinlochleven, Highlands	907	Multiple *Cryptosporidium* detections	**DWQR comments and findings:** • Two *Cryptosporidium* samples taken in response to an identified catchment risk contained oocysts. • After shutting down the works to investigate Scottish Water found issues in the CWT. The tank had to be isolated and repaired before being returned to service. • Scottish Water took appropriate action following the initial detections. Further remedial work is necessary to manage the risk. **Scottish Water actions:** • Temporary repairs to be carried out on the Kinlochleven CWT. • Deliver solution to effectively bypass the CWT. • Promote the need for a new CWT at Kinlochleven WTW.
6 November 2020 **For 1 day** Classification: Significant	Aberdeenshire and Moray	5,760	Loss of treatment control	**DWQR comments and findings:** • A fault occurred on a raw water PLC, resulting in raw water pumps failing to operate. This caused the dissolved air flotation (DAF) clarifiers, chemical dosing pumps and sample pumps to fail. • Under gravity water continued flowing through the works without adequate treatment. • Undisinfected water passed into supply but there were no failures of water quality standards in the distribution network. • Errors in the PLC meant alarms were not triggered earlier. **Scottish Water actions:** • Investigate installation of a PLC communication watchdog and telemetry alarm. • Investigate what failsafe is required to enable works automatic shutdown if raw water PLC faults. • Identify what other WTW have linear PLCs and no watchdogs.

Event Date, Duration & Classification	Area	Estimate of pop. affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
17 November 2020 **For 1 day** Classification: Significant	Hoy, Orkney Islands	31,856	Disinfection failure	**DWQR comments and findings:** • A power failure affected several assets in the works so operators had to restart the works. The chlorine pumps did not restart with the rest of the works due to an airlock. • The wrong de-gassing heads had been installed on the new skid. No alarms triggered as the related flow switches were set to the incorrect setting. • A lack of personnel available made escalating the issue and seeking appropriate guidance in a timely fashion difficult. This led to a lost opportunity to do shock dosing to prevent undisinfected water passing into supply. • DWQR made two additional recommendations. **Scottish Water actions:** • Issue site specific guidance on shock dosing of Loch Calder CWT to local operations. • Implement interim measures to provide additional de-gassing through calibration tube. • Capital project to carry out investigation into the chlorine dosing skid and issue a report to relevant teams. • Following capital project report, capital project to complete modifications to dosing skid. • North Team Leaders to discuss with their teams need to keep escalating within Ops team during events and to urgently shock dose a CCT/CWT if non-compliant water is going into supply. • Carry out investigation into why the flow switches and chlorine setting issues were not picked up during commissioning.

Event Date, Duration & Classification	Area	Estimate of pop. affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
14 December 2020 **For 8 days** Classification:	Dumfries & Galloway	1,237	Turbidity failure	**DWQR comments and findings:** • Turbidity alarms were received by the ICC and relayed to the standby operator. The operator surmised it was a nuisance alarm caused by the duty borehole pump starting up and did not attend site. • Final water turbidity was above the PCV value and above the alarm value for 38 hours. ICC believed the monitor was faulty and ignored further alarms. • A sampling response in the network showed manganese failures between 21 December and 13 January. • Multiple failures in communication prolonged the incident – between ICC and operators, catchment management teams, capital maintenance and operations, public health team and process science. • DWQR issued four further recommendations. **Scottish Water actions:** • Review significant events over past two years where interactions with ICC and Operations have contributed to the event duration. Further action to implement appropriate measures. • Deliver training to operators on importance of following correct TOMS procedures and responding to alarms. • Include catchment management as a key consultation stakeholder on capital projects within drinking water catchments. • Undertake a review of nuisance alarms for Ringford WTW. • Reinforce to staff the importance of clear communication and escalation to ensure correct response. • Undertake a quality review of the approach to the capital works planning at Ringford WTW to understand lessons learned. • Investigate site work instructions and review need for site contractor and project manager escalation when there is a risk to water quality from construction work even outwith curtilage of the WTW.

Event Date, Duration & Classification	Area	Estimate of pop. affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
22 December 2020 **For 3 days** Classification: Serious	Dundee and Angus	4,481	Taste and odour complaints	**DWQR comments and findings:** • A valve operation to install a new branch connection for a housing development was followed by consumer contacts for no water. • Opening a valve from partially to fully open had the effect of taking water that had lain dormant in an old cast iron pipe into the supply. This caused taste and odour complaints. • 107 consumer contacts were received over the period of the incident. • There were no failures of water quality standards. • DWQR made one further recommendation. **Scottish Water actions:** • Carry out an incident replay with the DOMS working group to consider any lessons learned and disseminate to DOMS champions. • Carry out a Network Risk Assessment within Panmure WSZ.

Event Date, Duration & Classification	Area	Estimate of pop. affected	Nature and cause of the event	Main actions and findings from the DWQR investigation
29 December 2020 **For** Classification: Significant	Dumfries & Galloway, East & North Ayshire	39,701	Ortho dosing failure	**DWQR comments and findings:** • Scottish Water switched off a pressure switch to facilitate repairs to the orthophosphoric acid dosing system. A subsequent power failure caused the system to revert to manual. • A bench test of phosphate showed no phosphate in the treated water. Phosphate dosing had been off for 16 days. • The root causes included the faulty pressure switch, inadequate alarming of the system and a failure to regularly monitor phosphate levels on site or in the network. • Scottish Water's own procedures for carrying out regular testing and DWQR's Information Letter 5/2006 were ignored. • DWQR made seven further recommendations and this incident formed part of why DWQR served an Enforcement Notice on Scottish Water in 2021. **Scottish Water actions:** • Update Afton WTW's task scheduling to include a full set of final water quality tests 3 times per week and orthophosphoric acid dosing flow rate recordings. • Replace the level sensor within the orthophosphoric acid day tank and ensure low alarm function is operational. • Change dosing pump failing condition to flow meter rather than pressure switch. • Install phosphate monitor on final water at Afton WTW. • Implement software change on Afton WTW's SCADA to make low orthophosphoric acid flow alarm visible. • Add orthophosphoric acid low flow alarm to telemetry as a priority 2 alarm. • Carry out required modifications to the orthophosphoric acid transfer system to ensure it resets automatically following a power outage.

Published for the Drinking Water Quality Regulator for Scotland, August 2021.