Drinking Water Quality in Northern Ireland, 2021

A Report by the Drinking Water Inspectorate for Northern Ireland

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Foreword

I am pleased to present the 26th annual report on the quality of drinking water in Northern Ireland. The Drinking Water Inspectorate's (DWI's) primary role is to protect public health through effective drinking water regulation. This report provides an independent assessment of drinking water quality of both public and private supplies for the calendar year 2021 and meets the publication requirements of The Water (Amendment) (Northern Ireland) (EU Exit) Regulations 2019.

In Northern Ireland over 99% of the population receive their drinking water from Northern Ireland Water Limited (NI Water). The remainder is served by private water supplies.

Overall public drinking water quality for 2021 remained high with 99.88% compliance, a decrease from 2020 (99.94%) and the same as 2017. Compliance at private water supplies, at 99.19%, slightly decreased from 2020 (99.24%) and 2019 (99.29%).

Safe, clean drinking water is critical for our health and wellbeing, to support business and grow the economy. In 2021, with varying levels of COVID-19 restrictions, the flexibilities approved by DWI in 2020 continued. A return to full consumer tap sampling occurred in June 2021.

Lead was the parameter with the lowest compliance in 2021, at 98.08%. Although compliance varies due to the random nature of sampling, this is a decrease on recent years. NI Water continues to implement its lead strategy and proactive replacement programme. A wider issue exists however, within internal lead pipework in properties constructed before 1970.

NI Water's new Price Control (PC21) capital investment programme commenced, with publication of the Utility Regulator's Final Determination in May 2021. DWI continues to work with all stakeholders to ensure the effective prioritisation of investment in drinking water quality in areas where there is greatest need.

Enforcement action is taken where necessary, and in 2021, one new Notice was issued against NI Water to implement effective treatment for recurring aluminium contraventions at a water treatment works. NI Water commenced construction on a major capital investment programme (£12m) to improve water quality at Derg WTW as required by DWI, to comply with regulatory limits for the herbicide MCPA. The first prosecution of NI Water for a drinking water quality offence was also completed in 2021 in relation to the supply of water unfit for human consumption in the Meigh area of Newry in 2018.

As well as domestic properties, commercial businesses, and public buildings such as food producers, hospitals and health care premises use private drinking water supplies. Notwithstanding some rescheduling of samples due to COVID-19 restrictions, private water supply monitoring returned to normal in 2021, and I am pleased to report that the 99.99% of scheduled sampling was completed to meet DWI's regulatory duty. I take this opportunity to recognise and thank council staff, for their contribution in achieving this target and for their ongoing work in the completion of risk assessments on behalf of DWI.

We launched a Single Well Application in 2021 providing bespoke guidance to owners and users of private water supplies on areas such as source protection and treatment options.

Looking ahead, challenges continue as we strive to tackle climate change and work towards net zero. We will continue to work with stakeholders and engage with NI Water on innovative, low carbon treatment solutions to ensure continued, high quality drinking water for Northern Ireland.

I trust you will find this report a useful reference.

Catriona Davis
Chief Inspector of Drinking Water
September 2022

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Executive Summary

This is the 26th report in a series published by the Drinking Water Inspectorate (DWI) in Northern Ireland, acting in our role as the drinking water quality regulator for both public and private water supplies.

The report provides an independent assessment of the quality of drinking water provided by NI Water Limited (NI Water). It also presents details of the quality of private water supplies for which we have a regulatory responsibility and undertake a monitoring programme.

COVID-19

COVID-19 continued to have an impact, albeit less significant, on the monitoring of the quality of drinking water supplies across Northern Ireland in 2021. The flexibility provided to NI Water by DWI in March 2020, in relation to consumer tap sampling remains in place where challenges are presented as a result of the COVID-19 pandemic. In 2021, the impact of periods of restricted access to domestic properties resulted in a reduced number of samples being collected for specific parameters that are only monitored at consumers' taps. This shortfall in regulatory sampling by NI Water was approved by DWI in advance, and hence no enforcement action was taken as it was beyond the company's control. Private water supplies monitoring was completed for 99.99% of scheduled parameters in 2021.

Public Water Supplies

In 2021 the overall public drinking water compliance remained high at 99.88%, a decrease from 2020 (99.94%). The 0.12% non-compliance relates to 111 tests that failed to meet the required standard. Compliance at consumers' taps, measured either directly or through surrogate zonal sampling, depending on COVID-19 restrictions, also remained high at 99.82%, again, lower than 2020 (99.91%). However, of the 43 regulatory parameters tested, 15 did not achieve full compliance. Those parameters failing to meet full compliance were: Lead, Total Trihalomethanes, Odour, Nickel, Iron, Taste, *Clostridium perfringens*, Aluminium, Coliform bacteria, Enterococci, Manganese, Turbidity, Hydrogen ion (pH), *E.coli* and Other Pesticides – individual (MCPA).

The parameter with the lowest reported compliance in 2021 was Lead at 98.08%. Compliance with the lead standard remains an issue in properties built before 1970 as even when NI Water replace pipework to the property boundary, failures can result due to lead pipework within the property. NI Water continues to implement its lead strategy to effectively manage the risk to public health.

Contraventions of microbiological parameters may indicate a failure in the treatment process or a breach in the integrity of the water supply system. An overall microbiological compliance figure at consumers' taps of 99.92% was reported in 2021 compared to 99.94% in 2020. Coliform bacteria were detected in four samples, with *Clostridium perfringens* and Enterococci both detected in one sample each. It is considered that the improved compliance recorded for 2020 may be partly due to the reduced consumer tap sampling. The reintroduction of the consumer tap sampling in 2021, may have resulted in the decrease in compliance, which is more reflective of the actual water being consumed. Several of the metal parameters must be sampled at the consumer tap (copper, nickel and lead), and due to the periods of restrictions, it

was mainly these parameters that constituted the shortfall in 2021. A full return to consumer tap sampling was implemented by NI Water in June 2021.

All contraventions must be investigated by NI Water and may in some cases be traced to distribution systems in domestic dwellings or within public buildings. In 2021, five such reports related to internal plumbing systems in domestic properties, all of which were due to lead. NI Water investigated the cause of the contraventions and issued letters to consumers offering appropriate advice to protect public health. 22 of the 851 samples collected from public buildings (schools, hospitals, restaurants etc) contravened standards, including Aluminium, Iron, Lead, Nickel, Odour, Taste, Total Trihalomethanes, Coliform bacteria and Turbidity standards. We issue letters of advice to owners of public buildings as the first step in achieving compliance. Where required, follow up action may be taken to ensure compliance is achieved in public buildings.

The total number of water quality events (Annex 2) that occurred in 2021 was slightly higher than in 2020, with 40 events reported to us by NI Water. Of these, we categorised one as Major, two as Serious, 19 as Significant, seven as Minor and 11 as Not Significant.

The Major event related to a high number of consumer contacts regarding the taste and odour of their mains water supply and contraventions of the taste and odour parameters in the final water from Carmoney WTW. Of the two Serious events, one related to contraventions of taste and odour parameters and associated consumer complaints following operational work on a water main in the Armagh area. The second related to the high demand in the network due to the prolonged period of warm, dry weather which was exacerbated by the COVID-19 pandemic. NI Water declared a Category 1 incident, with alternative supplies and tankering required to maintain supply following a major trunk main burst in the Antrim area. Fifteen of the 19 Significant events reported related to 11 water treatment works and were primarily related to difficulties with the treatment process or a lack of effective treatment. The other four Significant events occurred in the distribution network.

To enable us to evaluate consumer confidence in the quality of drinking water, we receive information relating to consumer concerns and complaints from NI Water. The total number of consumer contacts reported in 2021 was 7,305 compared to 5,993 in 2020, an increase of 21.9%. Of the complaints received by NI Water, 64.8% related to the visual appearance of the water, a slight decrease from 2020 (65.1%).

Where necessary, we take enforcement action (Annex 4), to secure remedial action within specified timeframes. One of the Notices issued by DWI led to the commencement by NI Water of a major capital investment at Derg WTW in July 2021.The planned work, costing over £12 million, will also improve the removal of organics and improve the quality of the water supplied to over 40,000 people in the Tyrone area. NI Water also continued to work to develop the most appropriate treatment solution to comply with the two Notices which we issued in 2020 in relation to the individual pesticide MCPA contraventions and taste and odour contraventions at Ballinrees WTWs.

One new Notice was issued by us in 2021 in relation to ongoing contraventions of the regulatory standard for Aluminium at Drumaroad WTW. A treatment system must be installed and operational to ensure compliance with the Aluminium standard by 30 April 2025.

DWI completed the first prosecution of NI Water for the supply of water which was unfit for human consumption. The offence related to an incident in the Meigh area of Newry in July-August 2018, when the mains supply was contaminated with oil, resulting in 43 properties being affected, giving rise to taste and odour complaints. The Regulations require that there is 'no abnormal change' and that the water is 'acceptable to the consumer'. NI Water pleaded guilty to the offence on 19 July 2021 and received a conditional discharge for a period of twelve months.

Private Water Supplies

The same drinking water quality standards apply for private water supplies as for the public water supply. Although less than 1% of the population receives water from a private supply, many more are exposed to them through their use in both commercial activities and public buildings. A number of premises in Northern Ireland that have a private supply also have a mains supply. Private supplies are used as an alternative to, or in conjunction with the public supply for a range of activities including food processing, holiday accommodation, and public buildings, including hospitals and care homes. Over 80% of the private waters supplies registered with DWI are classified as commercial or public supplies, a number of which are used for economic reasons.

During 2021 our private water supply sampling programme monitored 171 sites, with six new sites being registered during that period. A total of ten sites were removed as they were taken out of supply or no longer met the criteria for registration. Samples at private water supplies are collected by local councils' Environmental Health staff, acting on our behalf.

Overall compliance for 2021 is reported as 99.19%, a slight decrease from 99.24% reported for 2020. The regulatory requirements were not met on 97 occasions for 17 parameters, namely: Coliform bacteria, Enterococci, *E. coli*, *Clostridium perfringens*, Arsenic, Manganese, Hydrogen ion (pH), Copper, Sulphate, Nickel, Iron, Sodium, Turbidity, Nitrate, Nitrite, Individual pesticides (Clopyralid and Metribuzin) and Radon.

Full compliance was achieved for 71% (121 sites) of the private water supplies tested in 2021. Of the 50 sites which did not comply with the regulatory standards, 32% (16 sites) contravened microbiological standards; 54% (27 sites) chemical standards; and 14% (seven sites) failed to comply with both microbiological and chemical standards.

The presence of micro-organisms in a private water supply is indicative of contamination of the water either at source or at some point within the distribution system. In particular, the detection of *E. coli* or enterococci bacteria specifically indicates faecal contamination of a water supply and can be a risk to public health. These faecal indicators were found to be present in 24 supplies during 2021; 13 small shared domestic supplies with no disinfection treatment and 11 commercial / public supplies, six of which had disinfection treatment in place at the time of sampling.

Iron and manganese continue to be chemical parameters with a high incidence of non-compliance at private supplies. In 2021, 16 sites were found to have contraventions for either iron or manganese or both. There was also one nickel and one copper contravention detected at separate sites in 2021. Two individual pesticide contraventions, for Clopyralid and Metribuzin, were also identified at private water supplies in 2021.

All contraventions at private water supply sites are investigated and action taken dependent on the severity of the failure. In 2021, of the 97 contraventions identified, 71 (29 microbiological; 42 chemical) were notified to the PHA for health advice; resulting in new restrictions on water usage at two sites to protect public health.

We continue to work with owners and users of private water supplies and Environmental Health staff in local councils to ensure the risk assessment of private water supply sites is progressed to bring the remaining supplies into compliance. Priority is given to advancing improvements in water quality through provision of advice and guidance, agreeing action plans (particularly at the larger commercial / public sites) and promotion of drinking water safety plans for the ongoing management of these supplies. However, where necessary we may take formal action to secure compliance to ensure a safe, clean supply of drinking water from private supplies.

In October 2021, a new Single Well Application was published on the DAERA website. This provides bespoke advice and guidance to owners / users of private water supplies based on completion of a questionnaire on topics such as source protection and treatment. It also provides a report on the recommendations for each supply.

Looking Forward

The Department and NIEA's key priorities are Green Growth and Climate Change. The effects of human activity on the environment and the fresh water sources that are abstracted to produce our drinking water are becoming more evident. There are increasing pressures on the security of small private drinking water supplies with more extreme temperatures and the impacts of climate change. The need to secure the provision of a resilient public water supply into the future as well as the need to achieve net zero is driving the need for more innovative, lower carbon treatment solutions to be identified by NI Water.

As the drinking water quality regulator, we are committed to collaborating with all stakeholders in the development and implementation of policies and strategies to secure the future of a high quality, safe and sustainable supply of drinking water for all of Northern Ireland for future generations.

Section 1
Public Water Supplies

Part 1
Drinking Water Quality

Image: NIEA

Public Water Supplies

Key Facts

% Compliance

Overall compliance 99.88%

Overall micro compliance 99.92%

Consumer tap compliance 99.82%

Copper 100%

E. coli 99.98%

Manganese 99.80%

Enterococci 99.77%

Aluminium 99.65%

Iron 98.35%

Nickel 99.23%

Lead 98.08%

Supply System

24 water treatment works

289 Service Reservoirs

55 water supply zones

24 Supply Points

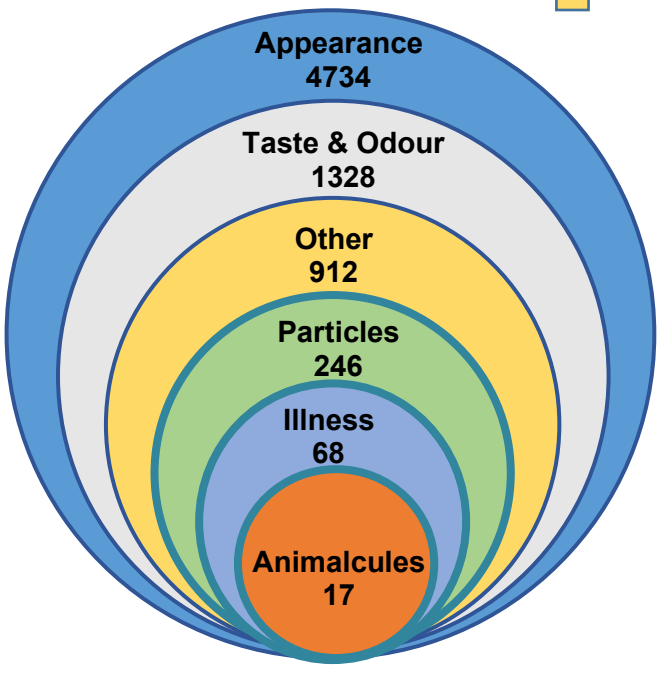
15 Parameters <100% compliance

22 Public building failures

Discoloured water main issue of concern

Consumer Complaints

21.9%



Drinking Water Quality

NI Water is a government-owned company with sole responsibility for supplying and distributing public drinking water throughout Northern Ireland.

Drinking Water Quality Testing

During 2021, NI Water sampled drinking water across Northern Ireland to test for compliance with the standards in The Water Supply (Water Quality) Regulations (Northern Ireland) 2017. The regulations require sampling programmes to be in place to ensure that water quality is monitored at: water treatment works (WTWs); service reservoirs (SRs); supply points[1]; and consumers' taps in water supply zones (WSZs). A summary of the number of sites that were in service in 2021 is shown in Table 1.1.

In 2021, 95,661 tests were carried out for a range of different parameters. A description of each parameter and its regulatory limit (or prescribed concentration or value [PCV]) is available on our website.

Table 1.1: Number of sites in service in 2021

Sites	No. in service
Water treatment works	24
Service reservoirs	289
Supply points[1]	24
Water supply zones	55

Sampling and Analyses Frequencies

NI Water is required to meet specified sampling frequencies in demonstrating the wholesomeness of drinking water supplies. We undertake an assessment of these requirements throughout the water supply chain: at WTWs; SRs; and WSZs.

During 2021, we identified a shortfall of 524 individual tests. The shortfall mainly occurred at Consumer Taps in WSZs due to the COVID-19 sampling restrictions. This represents a significant sampling and analyses shortfall for 2021. However, this was an improvement on 2020 and it was approved in advance by DWI, hence no action will be taken in relation to this shortfall.

Overall Drinking Water Quality

Compliance with the quality standards is important as contraventions may indicate a failure in the treatment process or a breach in the integrity of the water supply system which could pose a potential risk to human health. It also ensures that water meets aesthetic standards and is acceptable to consumers.

Of the 95,661 tests we used to assess overall compliance, 111 (0.12%) contravened the regulatory standards compared to 59 (0.06%) from 91,581 tests in 2020. Table 1.2 provides further information on these contraventions. It should be noted that the sampling programme continued to be disrupted by the COVID-19 pandemic during 2021, but much less so than for 2020.

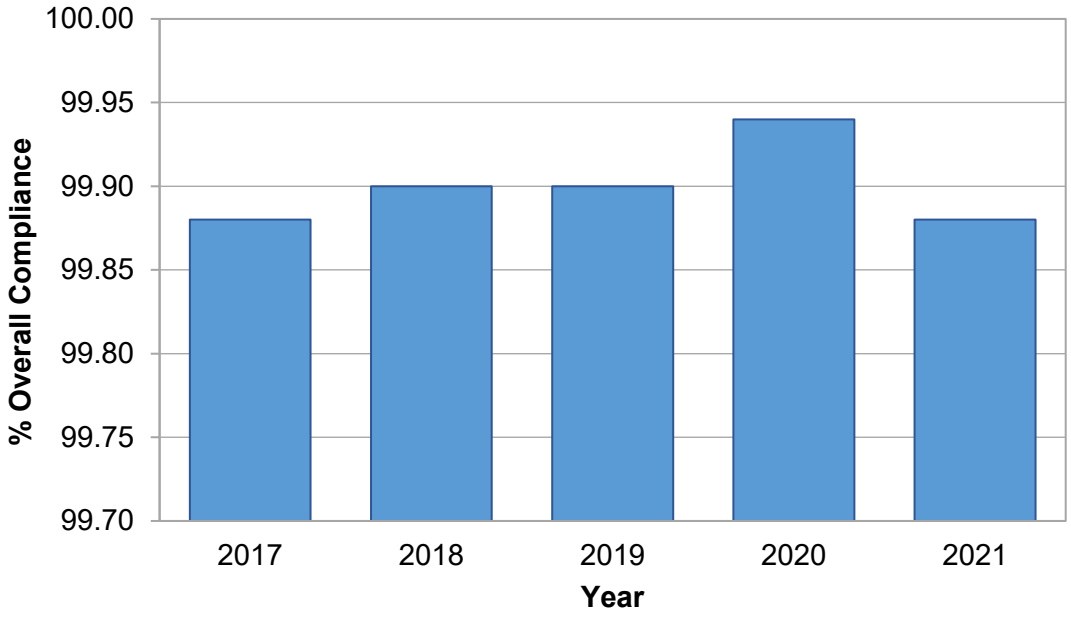
[1] a point, other than a consumer's tap, authorised for the taking of samples for compliance with the Regulations

Table 1.2: Overall Drinking Water Quality in 2021

	No. of Tests	No. of Tests not Meeting the Standards	% Compliance
Water Leaving Water Treatment Works (WTWs)			
E. coli	6252	0	
Coliform bacteria	6252	2	
Microbiological Total	**12504**	**2**	**99.98**
Nitrite	236	0	
Turbidity	6252	5	
Chemical Total	**6488**	**5**	**99.92**
Total (Microbiological and Chemical)	**18992**	**7**	**99.96**
Water in Service Reservoirs (SRs)			
E. coli	13972	1	
Coliform bacteria	13972	16	
Total (Microbiological)	**27944**	**17**	**99.94**
Water at Consumers' Taps or Supply Points (WSZs)			
E. coli	5520	1	
Coliform bacteria	5520	18	
Enterococci	432	1	
Clostridium perfringens	236	1	
Microbiological Total	**11708**	**21**	**99.82**
Zone Chemical Analysis	26586	64	
Supply Point Chemical Analysis	10431	2	
Chemical Total	**37017**	**66**	**99.82**
Total (Microbiological and Chemical)	**48725**	**87**	**99.82**
Overall Water Quality			
Overall Microbiological Quality	**52156**	**40**	**99.92**
Overall Chemical Quality	**43505**	**71**	**99.84**
Overall Drinking Water Quality	**95661**	**111**	**99.88**

The results confirm that overall drinking water quality in 2021, for the key parameters monitored at water treatment works, service reservoirs and consumers' taps remains high at 99.88%. Although this is a lower overall compliance than last year (99.94%), the figure for 2020 was higher than anticipated due to the changes in the sampling programme because of the COVID-19 pandemic. Figure 1.1 illustrates the percentage compliance over the last five years.

Figure 1.1: Overall Drinking Water Quality, 2017 – 2021



Water Quality at Consumers' Taps

To assess the quality of water that is being supplied to consumers, we assess results of regulatory samples taken by NI Water from consumers' taps. Table 1.3 shows the percentage compliance for 34 of the Schedule 1 (directive and national) parameters and nine of the Schedule 2 (indicator) parameters. Drinking water quality compliance at consumers' taps was 99.82% in 2021, representing a lower level of compliance than in 2020 (99.91%). However, the figure for 2020 was higher than anticipated due to the changes in the sampling programme because of the COVID-19 pandemic.

Fifteen parameters did not achieve full compliance at consumers' taps in 2021: Lead, Total Trihalomethanes, Odour, Nickel, Iron, Taste, *Clostridium perfringens*, Aluminium, Coliform bacteria, Enterococci, Manganese, Turbidity, Hydrogen ion (pH), *E. coli* and Other Pesticides.

Table 1.3: Consumer Tap Compliance 2021

Parameter	No. of Samples	No. of Tests not Meeting the Standards	% Compliance
Schedule 1 (Directive and National parameters)			
Lead	**261**	**5**	**98.08**
Total Trihalomethanes	**432**	**4**	**99.07**
Odour	**2004**	**17**	**99.15**
Nickel	**259**	**2**	**99.23**
Iron	**2004**	**13**	**99.35**
Taste	**2004**	**10**	**99.50**
Aluminium	**2004**	**7**	**99.65**
Enterococci	**432**	**1**	**99.77**
Manganese	**2004**	**4**	**99.80**
Turbidity	**2004**	**1**	**99.95**
E. coli	**5520**	**1**	**99.98**
Other Pesticides	**8967**	**2**	**99.98**
1,2 dichloroethane	236	0	**100.00**
Antimony	432	0	**100.00**
Arsenic	432	0	**100.00**
Benzene	236	0	**100.00**
Benzo(a)pyrene	432	0	**100.00**
Boron	432	0	**100.00**
Bromate	432	0	**100.00**
Cadmium	432	0	**100.00**
Chromium	432	0	**100.00**
Colour	2003	0	**100.00**
Copper	260	0	**100.00**
Cyanide	236	0	**100.00**
Fluoride	431	0	**100.00**
Mercury	432	0	**100.00**
Nitrate	431	0	**100.00**
Nitrite	431	0	**100.00**
PAH - Sum of four substances	432	0	**100.00**
Pesticides - Total Substances	236	0	**100.00**
Selenium	432	0	**100.00**
Sodium	432	0	**100.00**
Tetrachloroethene & Trichloroethene Sum	236	0	**100.00**
Tetrachloromethane	236	0	**100.00**
Total (Schedule 1)	**37619**	**67**	**99.82**
Schedule 2 (Indicator parameters)			
Clostridium perfringens	**236**	**1**	**99.58**
Coliform bacteria	**5520**	**18**	**99.67**
Hydrogen Ion (pH)	**2004**	**1**	**99.95**
Ammonium	432	0	**100.00**
Chloride	431	0	**100.00**
Conductivity	2004	0	**100.00**
Sulphate	431	0	**100.00**
Indicative Dose	24	0	**100.00**
Tritium	24	0	**100.00**
Total (Schedule 2)	**11106**	**20**	**99.82**
Overall Total	**48725**	**87**	**99.82**

Chemical/Physical Quality

COVID-19 Restrictions

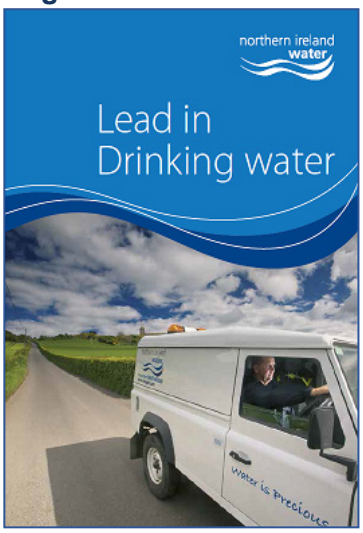
Due to the ongoing limitations in accessing domestic properties in 2021 there was a significant reduction in samples taken for copper, lead and nickel as these are samples that must be taken at consumer taps. Approximately 60% of the scheduled samples were taken for these parameters. Lead was the parameter with the lowest level of compliance in 2021.

Lead

In 2021, the Lead compliance was 98.08% compared to full compliance in 2020. However, less than 30% of the scheduled lead samples were taken in 2020 due to the COVID-19 pandemic as these samples must be taken at consumer taps. Compliance with the lead standard is still an issue in properties built before 1970 so it is important that NI Water continue to implement its lead strategy to effectively manage the risk to public health.

When a sample has contravened the standard and NI Water's investigation finds the property's service pipe contains lead, it notifies the consumer. It is the owner's decision whether or not to replace their supply pipe and any other lead pipes within the property. A customer advice leaflet "Lead in Drinking Water" (Figure 1.2) can also be found on NI Water's website.

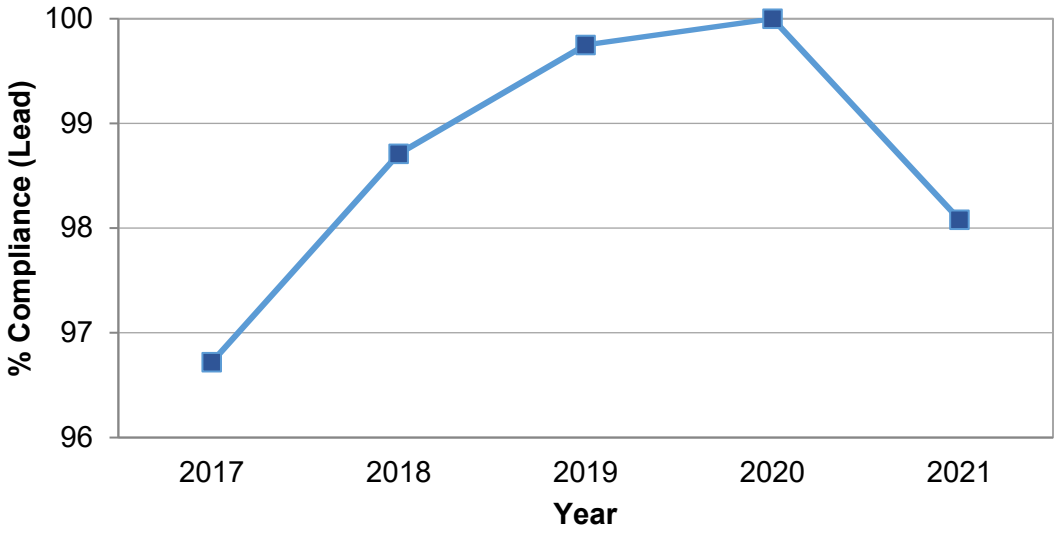
Figure 1.2 Lead Leaflet



The Regulations require NI Water to treat the water to reduce the risk of the concentration of lead being greater than 10 µg/l. NI Water has a Lead Strategy in place to deliver improved compliance for lead.

Looking at the overall trend in lead compliance in Figure 1.3, there has been a gradual trend upwards since 2017. Notwithstanding the increased compliance, potentially due to reduced sampling in 2020, the decrease experienced in 2021 indicates that a significant amount of work is still required to ensure compliance improves in the future.

Figure 1.3: Percentage of Regulatory Tests Meeting the Lead Standard, 2017 – 2021



Trihalomethanes (THMs)

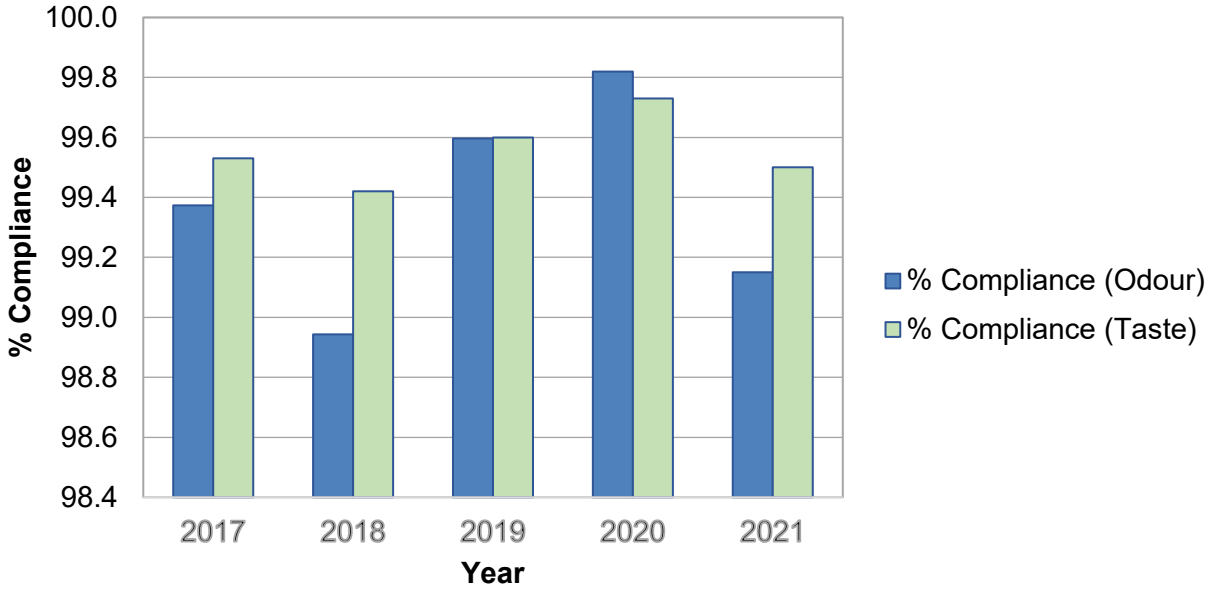
In 2021, the THMs compliance was 99.07% compared to full compliance in 2020. Further discussion on THMs is contained in Part 2 of this section.

Odour & Taste

The regulatory requirement for odour and taste is “Acceptable to consumers and no abnormal change”. DWI has issued guidance to NI Water on the interpretation of this regulatory requirement.

In 2021, odour compliance was 99.15% and taste compliance 99.50%, a decrease on the 2020 compliance (odour compliance 99.82% and taste compliance 99.73%). Odour and taste compliance over the last five years is shown in Figure 1.4. There is further information on odour and taste in the “Consumer Contacts” section later in this part of the report.

Figure 1.4: Percentage of Regulatory Tests Meeting the Odour & Taste Standards, 2017 – 2021



Nickel

In 2021, there was an increase in Nickel compliance to 99.23% compared to the 97.50% achieved in 2020. However due to the reduced number of samples taken for nickel in 2020 and 2021, this only reflects a difference between three contraventions in 2020 and two contraventions in 2021. Nickel may occur naturally in some ground waters but is rarely found in the mains water supply. Contraventions of the standard (20 µg/l) do occur occasionally, and the main source of nickel in drinking water is leaching from modern taps and other plumbing fittings.

Iron

The regulatory standard for iron is set for aesthetic reasons as levels above this can give rise to discoloured water. Corrosion of iron water mains is the most common reason for contraventions.

In 2021, there was a slight decrease in iron compliance to 99.35% from the 99.56% achieved in 2020.

The contraventions of the standard were mostly due to the build-up, and subsequent disturbance, of deposits found within water mains. Where this is identified, there are a number of remedial measures which NI Water carry out. Figure 2.6 in Part 2 provides iron compliance figures for the last five years.

Aluminium

In 2021, the aluminium compliance improved to 99.65% compared to the 2020 figure of 99.29%. Further discussion on aluminium is contained in Part 2 of this section.

Other pesticides – MCPA

The pesticide 2-methyl-4-chlorophenoxyacetic acid (MCPA) is a powerful, selective, widely used herbicide. MCPA is used in agriculture to control broad-leaf weeds and rushes. There was 99.98% compliance in 2021, a higher figure than for 2020 (99.94%). Further discussion on pesticides including MCPA is contained in Part 2 of this section.

Microbiological Quality

The overall safety of drinking water at consumers' taps in 2021 is confirmed with a 99.82% microbiological compliance (Table 1.2 refers). This is a decrease in compliance from the 99.94% reported in 2020. However, the figure for 2020 was higher than anticipated due to the changes in the sampling programme because of the COVID-19 pandemic.

Clostridium perfringens were found in one sample taken in 2021 (99.58% compliance), the same as for 2020. After investigation by NI Water, the cause was not determined.

Enterococci were detected in one of the 432 samples taken at consumers' taps by NI Water. The presence of bacterium such as enterococci is indicative of faecal contamination and should not be found in any drinking water sample. *E. coli* were also detected in this sample requiring a "Do Not Use" notice to be issued by NI Water on the advice of the Public Health Agency (PHA). It is likely that contamination of an outside tap caused these bacteriological contraventions.

Domestic Dwellings Distribution Systems

NI Water's investigation into contraventions must determine if they are due to the internal distribution systems within domestic dwellings. Where this is identified it must inform the owner with details of the failure and provide appropriate advice in relation to actions the owner may take to rectify the contravention and protect public health. The investigations, where appropriate, should also ensure consumers' internal plumbing is compliant with The Water Supply (Water Fittings) Regulations (Northern Ireland) 2009.

NI Water reported five contraventions for 2021, due to the internal plumbing within domestic properties. All five contraventions were for the lead parameter. These contraventions were investigated by NI Water and letters sent to consumers advising them of the contraventions and offering appropriate advice to protect public health.

Public Buildings Distribution Systems

At premises where water is made available to members of the public (such as schools, hospitals or restaurants) there were 851 samples taken during 2021. Of these, 22 samples contravened the Aluminium, Iron, Lead, Nickel, Odour, Taste, Total Trihalomethanes, Coliform bacteria and Turbidity standards.

NI Water must take appropriate action to rectify the failure where it is attributable to either the water supplied by it or is a contravention of the Water Fittings Regulations. For any other failures within such premises, we are required to follow-up with the owners under The Water Supply (Domestic Distribution Systems) Regulations (Northern Ireland) 2010. In line with our enforcement policy, an advisory letter is initially issued. If we assess the failure as likely to recur, or if it constitutes a potential risk to human health, a notice may be served on the owner to undertake the necessary actions to protect public health and bring the supply back into compliance.

Consumer Contacts

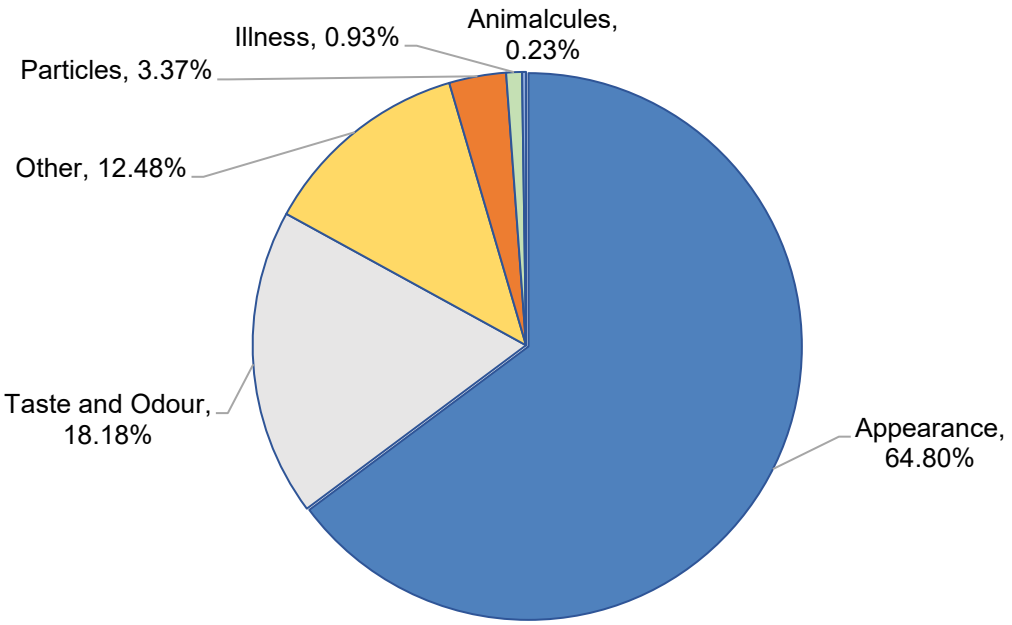
NI Water provides us with consumer contact information to help us assess consumers' satisfaction of their drinking water quality (Table 1.4 refers). The total number of consumer contacts reported in 2021 was 7,305 compared to 5,993 in 2020, an increase of 1,312 (21.9%). We will continue to monitor the trends in consumer concerns.

Table 1.4: Water Quality Contacts received by NI Water in 2021

Contact Category	Contact Sub-Category	Number of Contacts
Appearance	Colour	3220
	General	76
	Hardness	7
	Stained Washing	6
	White - Air	866
	White - Chalk	559
Taste and Odour	Chlorinous	730
	Earthy/Musty	187
	Other	306
	Petrol/Diesel	58
	TCP	47
Illness		68
Particles		246
Animalcules		17
Boil Water Notice		0
Other	Water Quality Concern - Campaigns	1
	Water Quality Concern - Incident Related	8
	Water Quality Concern - Lifestyle	0
	Water Quality Concern - Pets/Animals	6
	Water Quality Concern - Sample	473
	Water Quality Concern - Lead	400
	Water Quality (No Concern) Fluoride	0
	Water Quality (No Concern) Other Information	7
	Water Quality (No Concern) Water Hardness	8
	Water Quality (No Concern) Water Quality Report	9
TOTAL		**7305**

The highest percentage of contacts and concerns continued to relate to the appearance of drinking water, with 64.8% in 2021 (65.1% in 2020). This is illustrated in Figure 1.5.

Figure 1.5: Consumer Contacts and Concerns received by NI Water in 2021



Appearance

Within the overall appearance categories there are a number of different sub-categories that are a cause of concern for consumers.

Colour

In 2021, as in every year, the majority of appearance concerns (68%) related to discoloured water. The most common cause of discoloured water concerns is an orange, brown or black discoloration caused by suspended particles of iron (orange/brown) and manganese (black).

Iron discolouration may occur through natural iron present in the raw water passing through inadequate treatment, from the treatment process, or from corrosion of cast-iron distribution mains. Manganese is naturally present in some raw waters and may not be fully removed if treatment is inadequate.

White Water

'White water' is mainly caused by air dissolved in the water, making it appear cloudy or milky white. It can be caused by internal plumbing, burst water mains or when NI Water has been carrying out maintenance work on pipes. Where air is the cause, the cloudy appearance will clear in a glass of water from the bottom up.

Another cause of white water may be chalk. Chalk has a white powdery appearance and is made up of natural minerals found in water which forms what is known as 'hardness'. A glass of water containing chalk will take up to an hour to clear from the top downwards, leaving fine white sediment in the bottom of the glass.

‘White water’ accounted for 30.1% of appearance concerns in 2021.

Taste and Odour

All water sources contain naturally occurring minerals. Water also contains dissolved gases, such as oxygen and carbon dioxide, which give tap water a characteristic taste. One substance, which is added to drinking water for disinfection, is chlorine, and this can give rise to consumer complaints (see next section on Chlorinous).

Other taste and odours should not be present in drinking water for aesthetic reasons e.g. TCP or earthy/musty, or for health reasons e.g. petrol/diesel.

Taste and odour complaints accounted for 18.2% of the total consumer contacts in 2021 which was similar to 2020 (18.9%).

Chlorinous

Some individuals are more sensitive than others to the taste and odour of chlorine which is used to maintain hygienic conditions within the water supply network. 55% of taste and odour consumer contacts in 2021 were related to a chlorinous taste and odour in the water (49% in 2020). This marks a further increase in chlorinous taste and odour complaints. NI Water should investigate the reasons why more than half of all taste and odour complaints are related to a chlorinous taste and odour and the continuing upward trend.

Consumer Advice

Figure 1.6: Looking after Water Your Home Guide

A useful consumer guide, (Figure 1.6) 'Looking after water in your home', was produced by the water industry to help you maintain and enjoy the quality of tap water once it enters your home.

It contains a number of household tips, from how to reduce unwanted taste and odours and address appearance issues, to advice on water filters and storage tanks.

Section 1
Public Water Supplies

Part 2
The Drinking Water Cycle

Part 2

The Drinking Water Cycle

- Catchment: There were 11 MCPA detections in 2021 compared to 18 in 2020
- Events: There was one Major, two Serious and 19 Significant Events reported in 2021
- The monitoring of the effectiveness of disinfection at Water Treatment Works demonstrated a high level of compliance in 2021.
- Regarding Process Control Parameters, Trihalomethanes (THMs) had a lower level of compliance than aluminium in 2021

This part of the report details our assessment of how NI Water manages the drinking water cycle, from the **catchment** to the **treatment** processes at Water Treatment Works (WTWs), through Service Reservoirs (SRs) and into the **distribution network** to supply **consumers**. It also summarises the risk management approach adopted by NI Water in ensuring that water supplies remain safe and wholesome throughout their journey to homes and businesses.

Catchments

NI Water mainly abstracts its raw water from 38 sources including rivers and loughs (55.5%), impounding reservoirs (44.4%), and one borehole which supplies a small population on Rathlin Island (0.1%).

A risk assessment of the catchment must be completed as part of the overall ‘source to tap’ approach. NI Water liaises with the Northern Ireland Environment Agency (NIEA) and a range of other stakeholders through Water Catchment Partnerships to identify and put mitigations in place to manage risks within the catchment. The Catchment Management Plans developed by NI Water throughout PC15 are due to be implemented in PC21. Where catchment solutions alone are unable to reduce the risks sufficiently, NI Water must ensure that it has appropriate treatment processes in place.

As the potential list of contaminants within catchments is diverse, it must risk assess each catchment individually to determine the specific risks and identify appropriate mitigations to reduce or adequately control the risks. Where a risk is identified, NI Water must consider if water quality monitoring is required within the catchment and at its abstraction points.

This monitoring plays an important role in providing information on the risks within the catchment and for the operational management of WTWs to ensure treatment processes provide an effective barrier against the identified levels of contaminants.

Pesticides

During 2021, 38 individual pesticides were monitored by NI Water under its sampling programmes. There are two separate sampling programmes in place. The compliance programme is based on the set regulatory frequencies required to be monitored by NI Water for

assessing compliance. There is also the operational programme to identify potential risks and assist in the operation of its treatment processes.

Within the compliance programme there were 236 samples taken for pesticides giving a total of 8,967 individual determinations (shortfall of one sample for Fenpropimorph). In 2021, two regulatory samples contravened the standard for MCPA – one at Clay Lake WTW and one at Derg WTW.

Where contraventions arise, DWI may require NI Water to implement enhanced operational sampling to monitor an ongoing risk. During 2021, within the operational programme, NI Water reported nine MCPA contraventions. Five of these were at Derg WTW, where enhanced monitoring is ongoing and DWI has a Notice in place requiring NI Water to install treatment to achieve compliance with the regulatory limit for MCPA in the final water. Two of the nine contraventions were recorded at Clay Lake WTW, one at Carmoney WTW, and one at Glenhordial WTW. A Notice previously in place relating to remedial works at Glenhordial WTW was completed in February 2019 and results from this works is being be closely monitored, with further action taken if deemed necessary. Although there were no contraventions at Ballinrees WTW in 2021, a Notice is in place following the 12 contraventions for MCPA in 2017 which requires remedial works to be completed within a timeframe agreed with DWI.

WTWs with contraventions for pesticides, both regulatory and operational, from 2017 to 2021 are summarised within Table 2.1.

There was a total of 11 MCPA contraventions reported from both compliance and operational sampling in 2021, a decrease on the 18 contraventions in 2020. There was also one Mecoprop (MCPP) contravention reported.

Table 2.1: Pesticides Detected above the Regulatory Limit, 2017 – 2021

Water Treatment Works		2021	2021	2020	2019	2018	2017
		MCPA	MCPP	MCPA	MCPA	MCPA	MCPA
W1701P	Ballinrees						12
W2308P	Castor Bay						
W2509	Clay Lake	3		2			
W2802	Carran Hill						
W4301	Carmoney	1		2			
W4501	Derg	6	1	12	12	5	6
W4541	Glenhordial	1		1	1		4
W4701	Killyhevlin			1			
All WTWs		**11**	**1**	**18**	**13**	**5**	**22**

Water Treatment

Water treatment processes normally include the physical removal of potential contaminants by using chemical coagulation/flocculation, clarification (Figure 2.1), and filtration. Filters require periodic backwashing to operate effectively (Figure 2.2). Additional treatments such as ozone dosing and GAC (Granular Activated Carbon) filtration or PAC (Powdered Activated Carbon)

dosing can also be required to remove unpleasant tastes and odours, and for pesticide reduction. The final stage of treatment is disinfection.

An important measure of the effectiveness of treatment is the assessment of the water quality throughout the treatment process and the quality of the final water leaving the works.

Figure 2.1: Clarification Stage

Figure 2.2: Backwashing a Filter

In Table 2.2, results are outlined for two sets of parameters that are used to assess the effectiveness of water treatment processes: process control parameters; and disinfection parameters.

Table 2.2: Water Quality at Water Treatment Works, 2021

Parameters	Place of Sampling	Total No. of Tests in 2021	No. of Tests not Meeting the Standards in 2021	% of Tests Meeting the Standards	
				2021	2020
Process Control Parameters					
Aluminium	WSZ	2004	7	99.65	99.29
Trihalomethanes	WSZ	432	4	99.07	100.00
Disinfection Parameters					
Coliform bacteria	WTW	6252	2	99.97	99.97
E. coli	WTW	6252	0	100.00	100.00
Turbidity	WTW	6252	5	99.92	99.94
Indicator Parameter					
Clostridium perfringens	WTW	236	1	99.58	99.58

WSZ = Water Supply Zone (consumer tap sample)

Process Control Parameters

Process control parameters are used to measure the effectiveness of treatment and are based on a selection of chemical parameters relevant to the processes in place at the WTWs.

In 2021, results from the compliance monitoring programme, shown in Table 2.2, reported non-compliances for both of the process control parameters, aluminium and trihalomethanes (THMs).

Aluminium

Aluminium compliance, which is measured at consumers' taps, was higher in 2021 with seven regulatory contraventions (0.35%) reported compared to 13 (0.71%) in 2020. Figure 2.3 displays the levels of aluminium compliance over the last five years.

Operational sample results and outputs from on-line monitors often highlight elevated aluminium levels at WTW before they become apparent in distribution. In many cases the remedial measures taken by NI Water in response to these early detections prevent, or limit the impact of, water quality events.

Overall, there were five Significant events at four WTWs in 2021 relating to elevated levels of aluminium – see Annex 2 for details. This is an improving picture compared to the nine Significant events at five WTWs in 2020. Although these events do not always directly correlate with regulatory contraventions at consumers' taps at the time of the event, they can lead to the accumulation of aluminium in the distribution system and contribute to contraventions at a later date.

It is pleasing to note the improved compliance for aluminium in 2021 following the previous downward trend over a number of years. NI Water must continue to review its operational practices at its treatment works and take whatever measures are necessary to ensure this level of compliance is maintained or enhanced. Improvements to the treatment processes at WTWs which have been identified for funding in the PC21 Price Control Process should result in an improving level of aluminium compliance over the next five years.

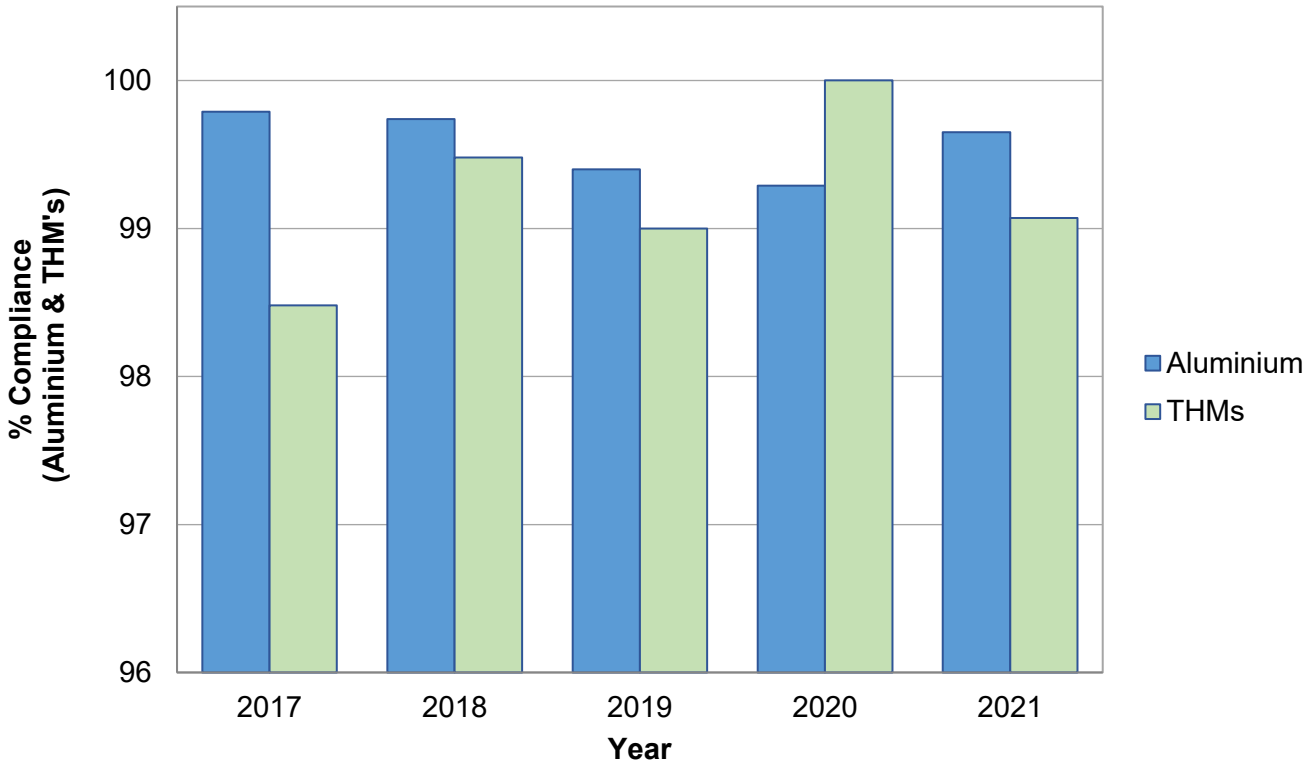
Trihalomethanes (THMs)

THMs are a group of disinfection by-products that form when naturally occurring organic substances combine with chlorine, which is added to disinfect the water and make it safe to drink. There are a number of reasons for THM non-compliance including: the quality of the raw water; the performance of the WTWs; the condition of the networks; and the length of time water spends in the distribution system (residence time). Effective and well managed treatment processes reduce the levels of these organics, which are directly related to the level of THMs that occur in the final water.

THM compliance was 99.07% in 2021 compared to the full compliance achieved in 2020. However, as THM levels are known to increase in the distribution system, and contraventions often occur at or near the end of distribution systems, the decreased sampling at consumer taps due to the COVID-19 pandemic in 2020 is likely to have contributed to the 100% compliance. Figure 2.3 displays the levels of THM compliance over the last five years.

NI Water must ensure that good operational practices prevail within the catchments and at WTWs. It is also important that there is careful management of the storage levels in service reservoirs and the distribution network is adequately maintained to control the formation of THMs.

Figure 2.3: Percentage Compliance for Aluminium & THMs at Consumers' Taps, 2017 – 2021



Disinfection Parameters

The parameters, coliform bacteria, *E. coli* and turbidity (Table 2.2 refers) demonstrate the effectiveness of disinfection and pathogen removal. Effective disinfection is fundamental to the treatment process in order to safeguard consumers from the risk of microbiological organisms being present in drinking water. Testing for *E. coli* and coliform bacteria at WTWs provides assurance of adequate treatment and the provision of safe, clean drinking water. In 2021, NI Water reported 100% compliance for *E. coli* and 99.97% compliance for coliform bacteria at its WTWs (consistent with 2020).

Turbidity is caused by finely suspended particles in the water which must be reduced to below 1 NTU to enable adequate disinfection to take place. There was a slight decrease in compliance with the turbidity standard in 2021 (99.92% compared to 99.94% in 2020). Five turbidity contraventions occurred at four WTWs in 2021. Of these, the two contraventions at Castor Bay WTW were assessed as being a Significant event. This event also involved an aluminium contravention following treatment difficulties.

Indicator Parameter

Clostridium perfringens

Clostridium perfringens can be used in association with other parameters to assess the effectiveness of the water treatment processes. This organism is a spore-forming bacterium that is exceptionally resistant to unfavourable conditions in the water environment such as extremes of temperature and pH; and disinfection by chlorination.

In 2021, of the 236 tests carried out for *Clostridium perfringens*, one contravened the standard. NI Water investigated but was unable to determine a cause for this contravention.

Distribution

The water distribution network in Northern Ireland is extensive, consisting of 289 service reservoirs (SRs) and 26,958 km of mains pipe. Water mains transfer drinking water from the WTWs to service reservoirs and onwards to the consumer. Service reservoirs provide storage close to the point of distribution to help ensure that sufficient water is available to meet the varying demands of consumers.

In Table 2.3, two measures are used to assess the water quality within a distribution system: reservoir integrity and distribution networks.

Table 2.3: Water Quality Indicators within the Distribution System, 2021

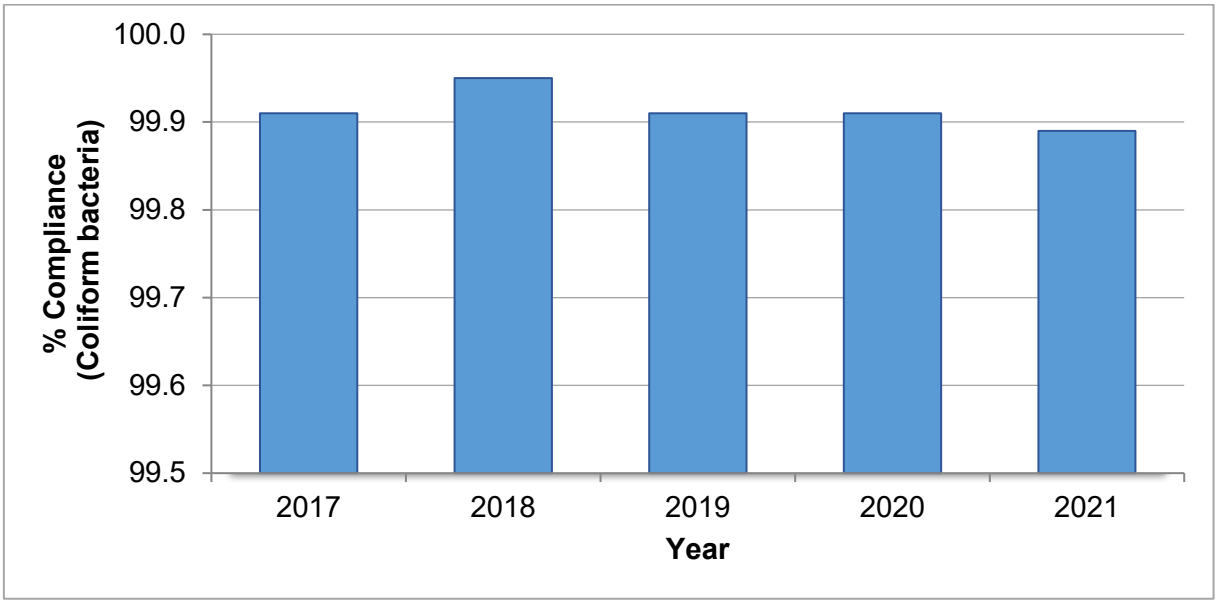
Parameters	Place of Sampling	No. of Tests in 2021	No. of Tests not Meeting the Standards in 2021	% of Tests Meeting the Standards in 2021	% of Tests Meeting the Standards in 2020
Reservoir Integrity					
Coliform bacteria	SR	13972	16	99.89	99.91
E. coli	SR	13972	1	99.99	100.00
Distribution Networks					
Turbidity	WSZ	2004	1	99.95	100.00
Iron	WSZ	2004	13	99.35	99.56
Manganese	WSZ	2004	4	99.80	100.00

Service Reservoirs

Samples are collected weekly at every service reservoir in Northern Ireland. One such Service Reservoir is shown in Figure 2.4. It is a regulatory requirement that at least 95% of samples collected annually from each reservoir are free from coliform bacteria. The 289 reservoirs sampled in 2021 all met this requirement. Figure 2.5 shows coliform bacteria compliance was 99.89% in 2021, a slight decrease compared to 2020 (99.91%). Coliform bacteria were detected on 16 occasions at 15 different service reservoirs.
E. coli was detected at one service reservoir on one occasion in 2021 compared to full compliance in 2020.

Figure 2.4: Service Reservoir

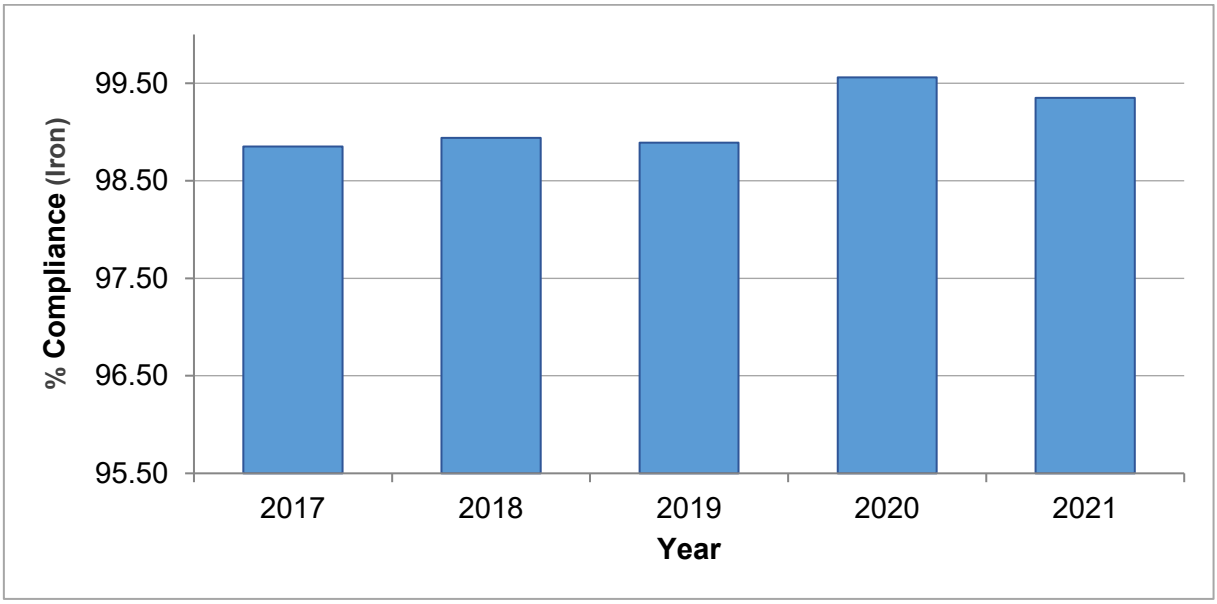
Figure 2.5: Percentage Compliance of Coliform Bacteria at Service Reservoirs, 2017 – 2021



Water Mains

In 2021 a total of 2,004 samples taken from consumers' taps were tested for iron, manganese and turbidity. Of these, 13 (0.65%) contravened the regulatory standard for iron of 200 µg/l. This reflects a slight decrease in compliance from 2020 when there were eight (0.44%) contraventions reported as illustrated in Figure 2.6. Four (0.20%) contravened the regulatory standard for manganese of 50 µg/l compared to full compliance in 2020. There was one (0.05%) sample which contravened the turbidity standard compared to no contraventions in 2020. As contraventions of these three parameters are closely related to the mains network, it is likely that the decreased sampling at consumer taps in 2020 and 2021 due to the COVID-19 pandemic contributed to these higher than normal compliance figures.

Figure 2.6: Percentage Compliance of Iron in Distribution, 2017 – 2021



Many of the mains delivering water to consumers' taps are made of cast iron and the deterioration of older mains may result in consumers receiving discoloured drinking water due to the presence of iron and manganese. NI Water has an ongoing Water Mains Rehabilitation Programme and this enables corrective action to be taken on a priority basis to improve the water quality being supplied to consumers. New mains are also installed or upgraded as required for new developments. A typical new mains installation is shown in Figure 2.7.

Figure 2.7: New mains installation

Photo courtesy of NI Water

Events and Risk Management

Drinking Water Quality Events

NI Water inform us of events that have affected, or are likely to affect, drinking water quality or sufficiency, and subsequently where there may be a risk to consumers' health. Each event is assessed into one of five categories based on increasing severity: Not Significant, Minor, Significant, Serious or Major. It is important that lessons are learnt from events and any necessary remedial action is undertaken. For events categorised as Significant or above the risk assessments in place for each water supply system are required to be reviewed.

40 events were reported to us in 2021. Of these, we categorised one as Major; two as Serious; 19 as Significant; seven as Minor; and eleven as Not Significant.

The Major event involved a high level of consumer contacts regarding the taste and odour of their mains water supply and contraventions of the taste and odour parameters in the final water from Carmoney WTW. DWI issued questionnaires to consumers in relation to this event. The investigation is ongoing.

The first Serious event involved a number of consumer contacts regarding the taste and odour or the mains water supply in the Drumbreda and St Brigids Hill area of Armagh. Contraventions of the taste and odour parameters occurred. DWI issued questionnaires to consumers in relation to this event. The investigation is ongoing.

The other Serious event was the high water demand in the network due to a period of particularly warm and dry conditions and exacerbated by the COVID-19 pandemic. A NI Water Category 1 Incident was declared. Alternative water supplies including asset to asset tankering was required to maintain supply.

There were 15 Significant events at 11 WTWs (Altnahinch; Ballinrees; Carmoney; Castor Bay; Clay Lake; Derg; Dorisland; Drumaroad; Dungonnell; Forked Bridge; and Glenhordial) in 2021. The majority of these events were due to treatment difficulties or lack of adequate treatment. Two events involved disinfection issues. The others related to aluminium; individual pesticides (MCPA and MCPP); iron; manganese; odour & taste; THMs and turbidity contraventions.

The other four Significant events occurred in the distribution network: high levels of iron affecting five properties in Dromore; recurring coliform bacteria contraventions which led to “Boil Water before Use until Further Notice” advice being issued to four properties in Douglas Bridge; recurring coliform bacteria contraventions which led to “Boil Water before Use until Further Notice” advice being issued to two properties in Lurgan; and recurring coliform bacteria contraventions which led to “Boil Water before Use until Further Notice” advice being issued to six properties in Cookstown.

Annex 2 provides further information on the one Major, two Serious and nineteen Significant events in 2021.

Risk Management

As part of the drinking water safety plan (DWSP) approach, NI Water is required to carry out a risk assessment of each water supply system. Informed by the information generated from the catchment risk assessment, this supports the ‘source to tap’ approach in the management and control of the potential risks. The assessments must be kept under review, to ensure ongoing risks are adequately controlled and any new or emerging risks are properly identified. We monitor these plans to ensure, where risks are identified, there are control measures in place to ensure the protection of public health. There are 23 risk assessments in place covering all of NI Water’s drinking water supplies.

Regulatory Control

The Technical Audit Process

DWI normally conducts a risk based technical audit programme to check NI Water’s compliance with statutory obligations and best practice. However, in 2021, due to COVID-19 restrictions, site visits were suspended to protect critical NI Water staff and ensure continued operation of WTWs. An audit of the Laboratory Information Management System was carried out remotely. This is detailed in Annex 3.

Enforcement Action

In order to protect, maintain and improve drinking water supplies, NI Water’s large capital investment needs are prioritised through the Price Control Process (PC). The PC15 (2015 - 2021) investment programme completed in March 2021 and the PC21 (2021 - 2027) capital investment programme commenced in April 2021.

Although it is better to be able to plan investment through the PC process, there are occasions when it is necessary for DWI to take enforcement action against NI Water to secure compliance and protect public health.

During 2021, three Regulation 31(4) Notices issued under The Water Supply (Water Quality) Regulations (Northern Ireland) 2017 (the Regulations) were ongoing; and one new Regulation 31(4) Notice was issued.

Figure 2.8: Derg WTW Construction Works

Photo courtesy of NI Water

The details of these enforcements are contained in Annex 4. One of the Notices issued by DWI, as included in the Pesticides section of this report (page 19), led to the commencement by NI Water of a major capital investment at Derg WTW (circa £12m) in July 2021. This is primarily required to upgrade the works and ensure future compliance with the regulatory limits for the pesticide MCPA. DWI monitors the progress of this project through site visits to gain assurance that the Statutory Notice will be complied with. Figure 2.8 shows the construction work at the Derg WTW.

Also 2021, DWI completed the first prosecution of NI Water for the supply of water which was unfit for human consumption. The offence related to an incident in the Meigh area of Newry in July-August 2018, when the mains supply was contaminated with oil, resulting in 43 properties being affected, giving rise to taste and odour complaints. The Regulations require that there is 'no abnormal change' and that the water is 'acceptable to the consumer'. NI Water pleaded guilty to the offence in July 2021 and received a conditional discharge for a period of twelve months.

Future Investment in Drinking Water Quality

In identifying the capital investment needs for the PC21 business plan, NI Water submitted nine applications to DWI requesting independent support for the need for investment to improve water quality at WTWs. The approval of the nine requests by DWI provided the Utility Regulator with independent verification that this investment was required for the protection of public health. This enabled it to allocate the funding to NI Water within the PC21 Final Determination which was published in May 2021.

In identifying the capital investment needs for the PC21 business plan, NI Water adopted a new approach to assessing the required treatment solutions, with the procurement of a number of mobile pilot plants. These are capable of running a range of large scale, on site trials on innovative treatment solutions to identify the effectiveness of proposed treatment processes prior to large capital investment projects commencing. It provides confidence that the selected option will work at each specific site whilst identifying more carbon neutral solutions for water treatment, thereby contributing to the company's net zero targets. We fully support this approach and will continue to work closely with NI Water in working to contribute to climate change targets.

We acknowledge the financial constraints within NI Water's funding model and support the need for sufficient long-term funding to ensure public health protection and economic development. We must ensure that the provision of safe, clean drinking water remains a key priority for NI Water.

Section 2
Private Water Supplies

Image: NIEA

Private Water Supplies

Key Facts

Monitoring Programme

11,976 tests

71% Fully Compliant

29% Not Fully Compliant

32% Micro

54% Chemcial

14% Both

Site Status

171 registered PWS sites

- 81% commercial / public
- 19% small shared domestic
- 6 new sites
- 10 sites removed

% Compliance

Overall compliance 99.19%

Micro compliance 95.07%

Chemical compliance 99.54%

Actions

- Restrictions removed at 5 sites
- Restrictions applied at 2 sites
- Advice provided on 390 queries
- 24 local council Environmental Health staff trained
- 65 site risk assessments completed / progressed
- 99.99 % of scheduled samples collected

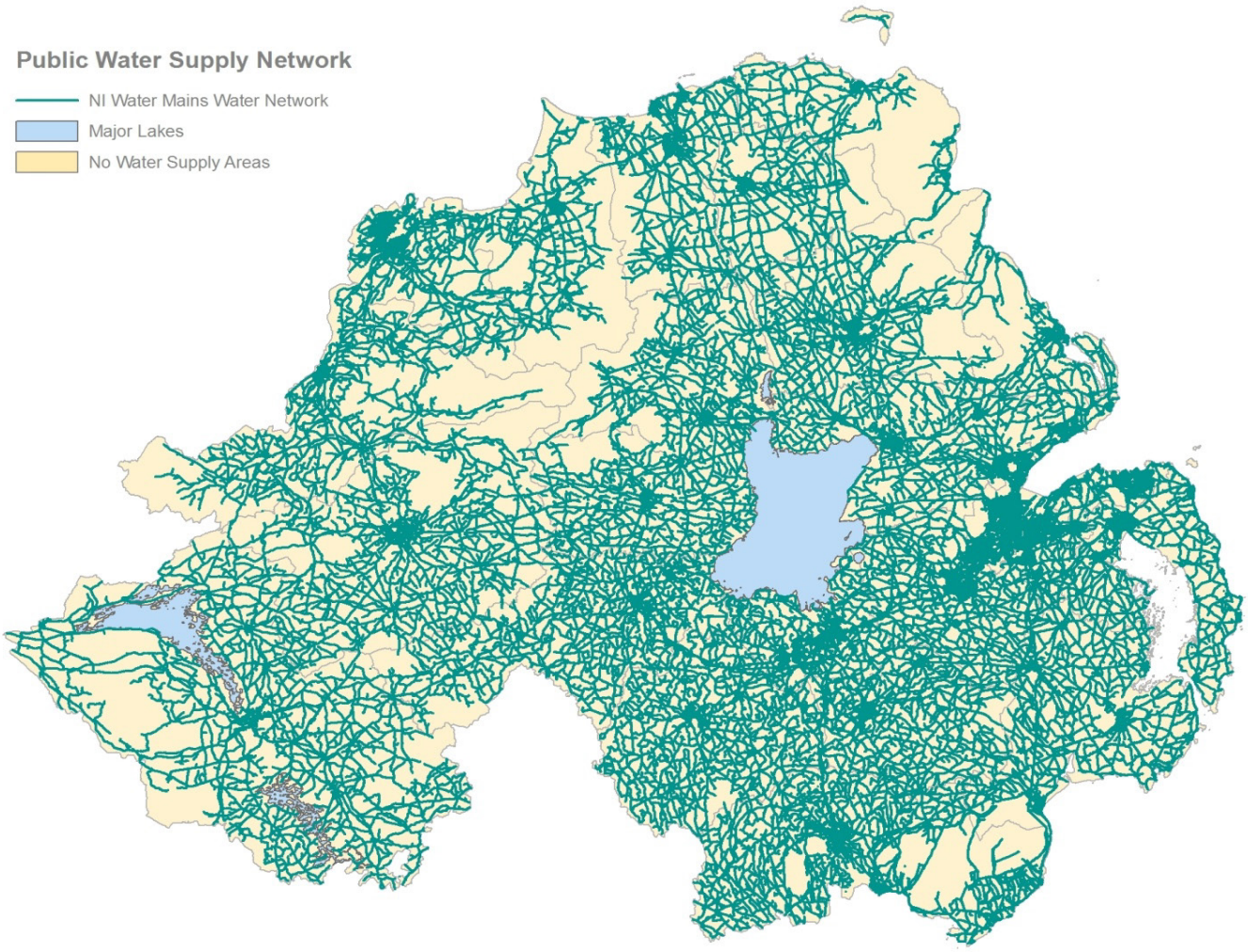
Section 2

Private Drinking Water Supplies

NI Water supplies drinking water to over 99% of the Northern Ireland population; the remainder is served by private water supplies. The spatial distribution of the NI Water mains water network is shown in Figure 1.1. The premises in areas beyond the extent of the NI Water network and therefore with no mains water supply are typically domestic properties. The properties in these areas are served by private water supplies.

Consumers often assume the water they are drinking is from the public water supply. However, although the number of people directly served by a private supply may be small, many more people are exposed to them through their use in both commercial activities and public buildings. Despite a mains water network being available, some businesses utilise groundwater as a sustainable and more economically viable option.

Figure 1.1: NI Water Mains Network (and no water supply areas)



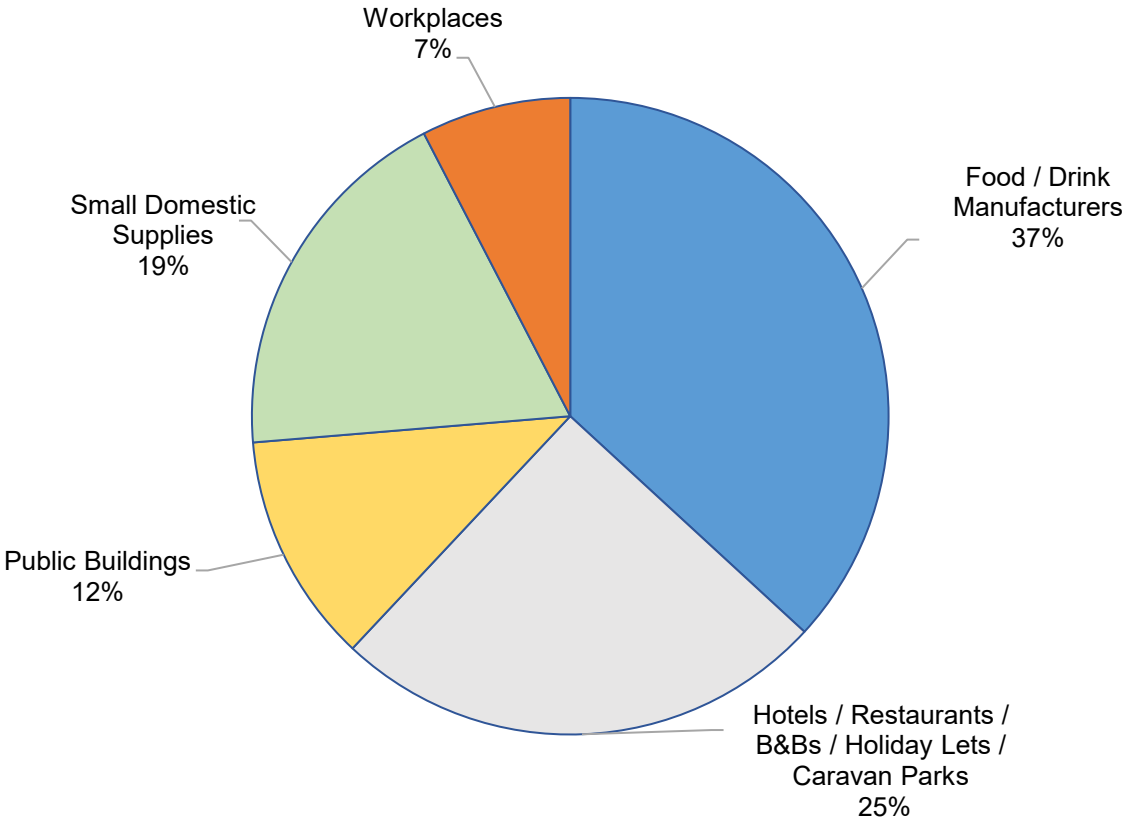
Private water supplies are often used as an alternative to, or in conjunction, with the public water supply depending on the nature of the site. In some circumstances, a particular composition of water is required as an ingredient for a food product or perhaps a significant volume is required which is beyond the capacity of the existing mains water network. Private water supplies are found at a range of sites such as:

- food and drink manufacturers;
- public buildings including hospitals, workplaces and universities; and
- within the hospitality industry such as hotels, restaurants and tourist accommodation.

Register of Supplies

There was a total of 171 private water supplies on our register in 2021 which required monitoring under The Private Water Supplies Regulations (Northern Ireland) 2017. The categories of these supplies are presented in Figure 1.2. In addition to those summarised below, it is estimated there are approximately a further 1,200 supplies to single private dwellings which are not required to be monitored under the Regulations. These supplies are sampled by the Environmental Health Departments of local councils on request.

Figure 1.2: Categories of Private Water Supplies in Northern Ireland in 2021



Private water supplies may be drawn from either surface or groundwater sources. Surface sources can include streams, rivers and reservoirs while groundwater sources include wells, boreholes and springs. In 2021, 99.4% of registered private supplies in Northern Ireland were from groundwater sources, most commonly, boreholes. A properly installed and tested borehole typically provides a greater sustainable yield of groundwater.

Monitoring of Supplies

An annual sampling programme is in place for all registered supplies. The frequency of the sampling and the range of parameters tested for are determined by the volume of water used and the type of the supply, i.e., commercial, public or domestic. Samples at private water supplies are collected by Environmental Health Departments of local councils, acting on our behalf. Each sampling officer can only collect samples once they have completed the relevant training by the DWI. The 2021 sampling programme included premises using private water supplies in all eleven council areas.

Of the 171 private water supplies on our monitoring schedule for 2021, 81% were commercial or public supplies and 19% were small domestic supplies (groupings of two or more houses). A breakdown of the numbers and sizes of private water supplies in 2021 is shown in Table 1.1.

Table 1.1: Numbers and Types of Private Water Supplies in 2021

Types of Private Water Supplies Volume (m^3/day)	Number of Supplies	Frequency of Sampling (per annum)
(i) Commercial / Public Supplies		
>1000 ≤2000	2	10
>100 ≤1000	22	4
>10 ≤100	51	2
≤10	64	1
(ii) Small Domestic Supplies (two or more dwellings)		
≤10	32	1
TOTAL	**171**	

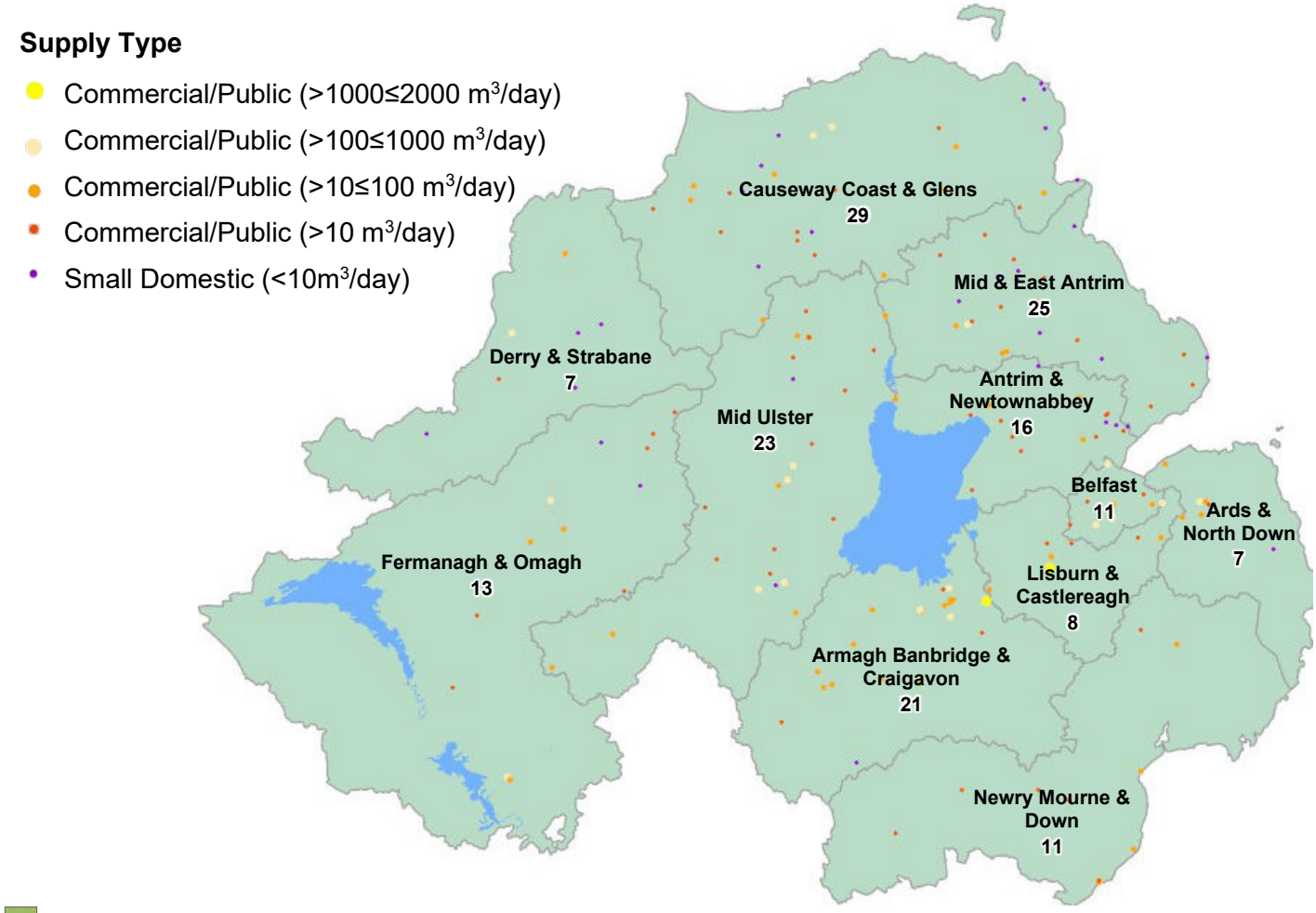
During 2021, ten sites were removed from the sampling programme as they no longer met the criteria to be registered (i.e. no longer used for human consumption or supply no longer used in production). Sites were reclassified as necessary throughout the year if the use, volume, or distribution was altered (and subsequently the analytical requirements and sampling frequency were altered as required). In addition, a total of six new supplies registered with us, these were:

- four food / drink manufacturers; and
- two small domestic supplies serving two or more properties.

Although the sampling frequency for compliance sampling is set within the Regulations, many supplementary samples are taken throughout the year during follow-up investigations. If the circumstances warrant additional sampling, the DWI assist site owners through additional testing to either help in identifying the location of a water quality issue or to confirm the water quality issue has been remediated. In addition, where necessary, sites can be put on an increased sampling frequency for a set period of time to monitor any parameters identified as a risk in the supply. During 2021, a total of 104 such samples were collected. The results of the individual tests of these samples are not included in the calculation of the overall compliance for private water supplies as they are not a regulatory duty.

A breakdown of registered supplies in Northern Ireland in 2021, categorised by size, is shown in Figure 1.3. All registered supplies can be found on the DAERA iHub viewer.

Figure 1.3: Distribution of Registered Private Water Supplies by Council Area in 2021



The number of private water supplies in each council area (due to the small scale of the map all sites are not distinguishable)

Risk Assessment

The Regulations require a risk assessment to be carried out for each registered supply to identify areas where there may be potential risks to the water quality. This assessment includes the whole private water supply system, from its source to the most representative point where the water is used. These assessments are required to follow the same standard (BS:EN 15975-2:2013[1]) as is used for the risk assessment of the public water supply.

The risk assessments of private water supplies are undertaken by Environmental Health Departments of local councils, acting on our behalf. Following the roll out of a web-based application in 2019, Environmental Health staff continue to complete risk assessments of private water supplies using this tool. This ensures consistency of approach by all staff across all types of sites. Each officer can only risk assess a private water supply once they have completed the relevant training by the DWI. Annual formal training sessions and ad hoc guidance is provided to councils. In 2021, approximately 65 risk assessments were progressed or completed on the new web application.

[1] BS:EN 15975-2: Concerning security of drinking water supply, guidelines for risk and crisis management

The information gathered through the risk assessment process is used to provide sites with an action plan to mitigate identified risks and to assist sites with the ongoing management of their water supplies. It can also be used to fine-tune the monitoring programme for each site as it can identify additional analysis required.

Overall Drinking Water Quality

Drinking water regulations in Northern Ireland apply equivalent water quality standards to private water supplies as to public water supplies. The regulations provide flexibility and enable reduced monitoring of some parameters where certain criteria are met and a risk assessment confirms there is no risk to human health. In 2021 this flexibility was used and although the number of private water supplies registered with us in 2021 is broadly consistent with that in 2020, the overall number of parameters analysed was lower than in the previous year.

The results in Table 1.2 show that, out of a total of 11,976 tests carried out in 2021, 99.19% met the regulatory standards. The regulatory requirements were not met on 97 occasions for 17 parameters, namely: Coliform bacteria, Enterococci, *E. coli*, *Clostridium perfringens*, Arsenic, Manganese, Hydrogen ion (pH), Copper, Sulphate, Nickel, Iron, Sodium, Turbidity, Nitrate, Nitrite, Individual pesticides (Clopyralid and Metribuzin) and Radon.

Table 1.2: Overall Water Quality in Private Water Supplies in 2021

Parameters	Determinations in 2021		
	Total Number of Tests	Number of Tests not Meeting the Standards	% Compliance
Coliform bacteria	302	21	93.05
Enterococci	173	11	93.64
E. coli	302	11	96.36
Clostridium perfringens	135	2	98.52
Microbiological Total	**912**	**45**	**95.07**
Arsenic*	27	2	92.59
Manganese	264	19	92.80
Sodium*	59	4	93.22
Copper*	33	1	96.97
Hydrogen ion (pH)	302	9	97.02
Sulphate*	36	1	97.22
Nickel*	36	1	97.22
Iron	265	6	97.74
Turbidity	302	3	99.01
Nitrate	135	1	99.26
Nitrite	136	1	99.26
Individual pesticides	7289	2	99.97
Other parameters	1971	0	100.00
Chemical Total	**10855**	**50**	**99.54**
Radon	105	2	98.10
Radioactivity	104	0	100.00
Radiochemical	**209**	**2**	**99.04**
Overall Total	**11976**	**97**	**99.19**

* Parameters on reduced monitoring frequency

Under the Regulations, the sampling frequency and suites of parameters analysed at a private water supply may be adjusted based on previous test results and any identified risks. Consequently, many commercial / public supplies were analysed for a reduced suite of chemical parameters from 2012 to 2017. A review was implemented in 2018 to verify the reduced analysis and all supplies were returned to their full monitoring requirements for a three-year period, to re-evaluate the potential risk. Following a review of the monitoring data, a reduction in parameters was reintroduced for 2021 using a risk-based approach to determine the required analysis on a site-by-site basis. Where a parameter has historically failed or is greater than 30% of the parametric concentration value, it is retained and its inclusion in the monitoring programme will be reviewed again on an annual basis.

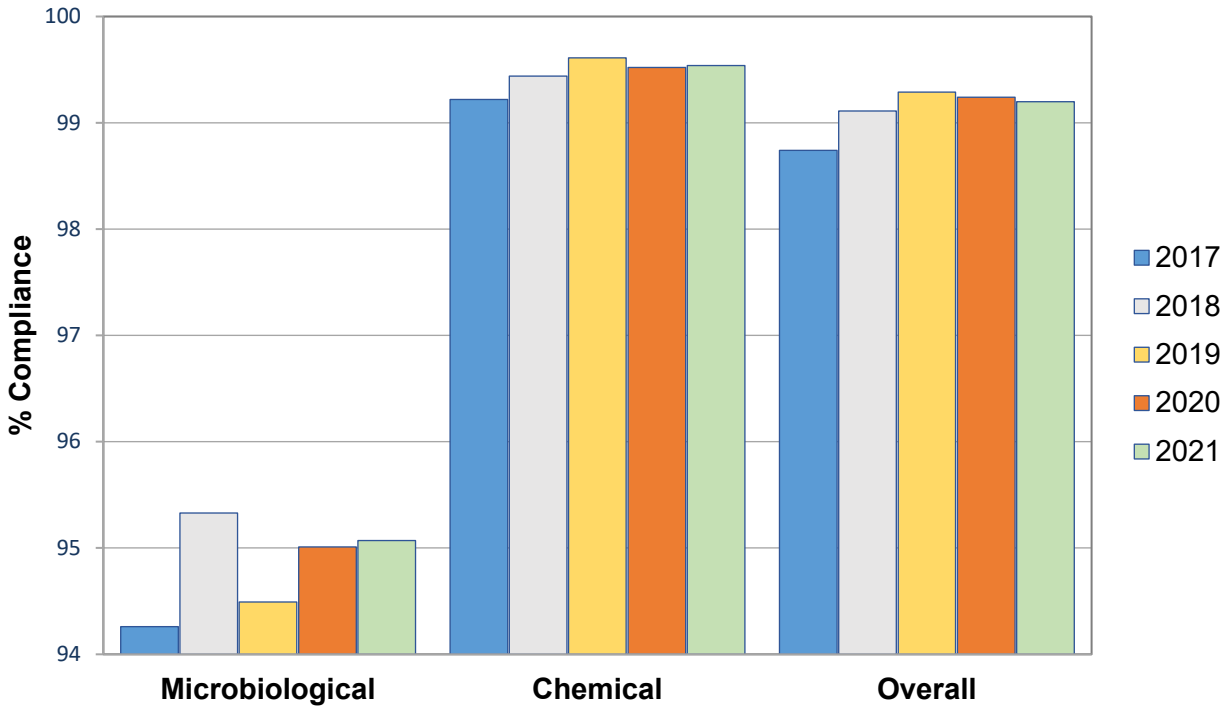
A different approach was adopted for radon as its risk has been determined independently via Public Health England and the British Geological Survey in support of our monitoring results. Where no risk was identified and results were historically stable, monitoring for radon was removed with a review to be conducted through a check sample after five years.

Microbiological contraventions account for 45 (46.4%) of the 97 contraventions at private water supplies in 2021. There has been an increase in the level of overall microbiological compliance which is reported as 95.07% in 2021 compared to 95.01% in 2020 though it remains below the peak of 95.33% reported in 2018, as illustrated in Figure 1.4.

Contraventions of the chemical standards have been reported for a range of parameters listed in Table 1.2. Overall, the number of chemical contraventions decreased from 65 in 2020 to 50 in 2021. Consequently, there was a marginal increase in chemical compliance for 2021, 99.54% compared with 99.52% in 2020, also illustrated in Figure 1.4.

As with previous years, where the chemical standards have not been met, they relate mainly to contraventions for hydrogen ion, iron, manganese and sodium.

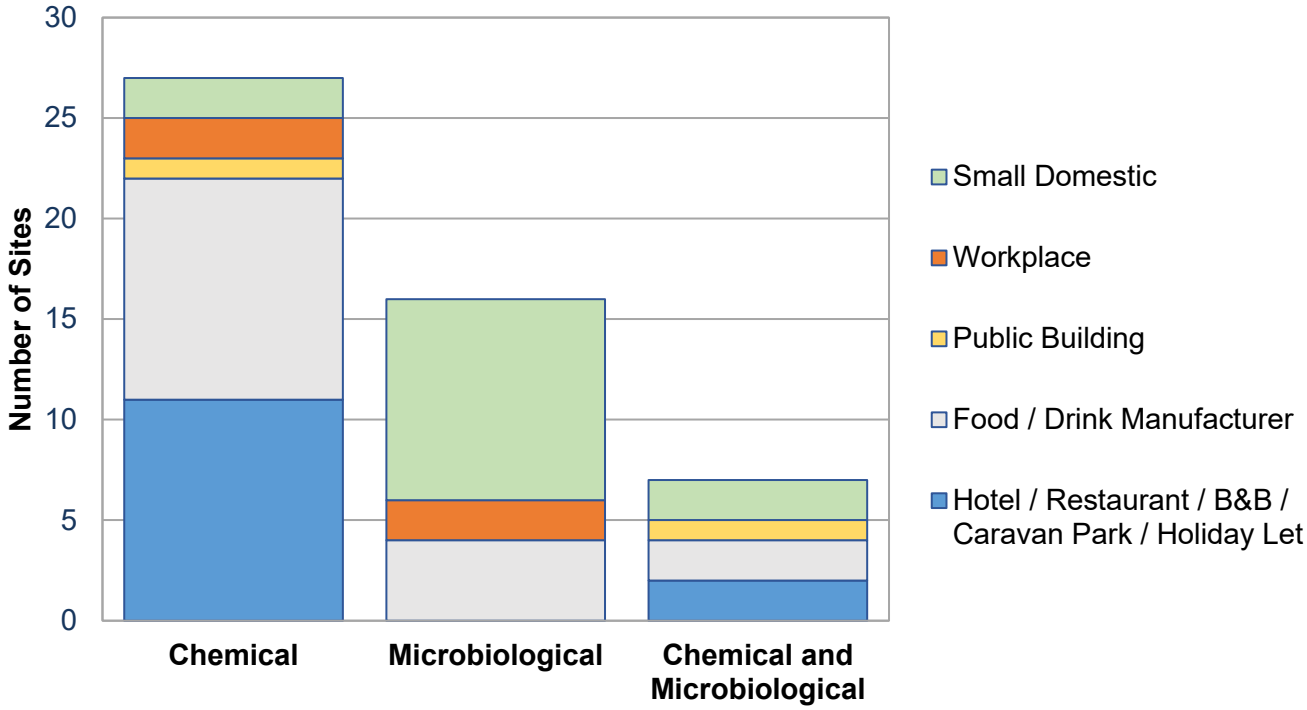
Figure 1.4: Comparison of Compliance in Private Water Supplies, 2017 – 2021



Full compliance was achieved for 71% (121 sites) of the private water supplies tested in 2021. Of the 50 sites which did not comply with the regulatory standards, 32% (16 sites) contravened microbiological standards; 54% (27 sites) chemical standards; and 14% (seven sites) failed to comply with both microbiological and chemical standards.

The categories of these non-compliant sites, presented in Figure 1.5, show that 85% chemical only contraventions occurred at commercial / public sites such as food / drink manufacturers, hotels, or holiday lets whereas for the microbiological only contraventions 38% were at small shared domestic supplies and 62% were at commercial/public sites.

Figure 1.5: Categories of Non-Compliant Private Water Supply Sites in 2021



The significance of each contravention not only depends on the category or size of the sites but often, more importantly, on the purpose for which the water is used at the sites. In summary, for the 50 sites which did not comply with all the drinking water quality standards in 2021:

- 35 use the private water supply as the primary source of drinking water;
- four use the private water supply as an ingredient in food or drink;
- nine use the private water supply for the washing of equipment and surfaces in contact with food or drink; and,
- two use the private water supply for personal hygiene.

Factors Affecting Drinking Water Quality

Different aspects of the water supply chain contributed to the microbiological and chemical water quality contraventions reported in 2021 such as: catchment (including source protection); treatment; distribution; and sampling point (tap) issues. Until mid-2021, many premises remained temporarily closed or operated reduced hours due to varying degrees of COVID-19

restrictions. To assist sites, we published Guidance to help ensure water quality was maintained when the water supply within the buildings was returned to its normal use. Monitoring of private water supplies was kept constantly under review and adapted to account for any operational changes within businesses or access restrictions at domestic dwellings. Communication with supply owners focused on risk management and ensuring effective controls were in place, especially with a lower turnover of supply, or in some cases an increase in usage to meet the increasing demand on production. Although some restrictions continued to apply into 2021, the more consistent operation of businesses compared to 2020, meant there were no water quality issues identified as a result of temporary closures.

Micro-Organisms

The presence of micro-organisms in a private water supply is indicative of contamination of the water either at source or at some point within the distribution system. In particular, the detection of *E. coli* or enterococci bacteria specifically indicates faecal contamination of a water supply and can be a risk to public health. These faecal indicators were found to be present in 24 supplies during 2021, 13 small shared domestic supplies with no disinfection treatment and 11 commercial / public supplies, six of which had disinfection treatment in place at the time of sampling.

Rural water supplies in the vicinity of where animals graze or manure is spread are most at risk. This is particularly prevalent at times of heavy rainfall when water may run directly off farmland and carry micro-organisms into unprotected private supplies. Guidance on source protection is available in the Private Water Supplies Technical Manual.

Poor microbiological quality also highlights where there is a lack of suitable treatment, or the treatment installed is not being operated and maintained appropriately. The quality of the raw water is a key element in selecting the correct treatment for a private water supply which may require pre-treatment prior to disinfection.

Metals

Although some brackish groundwaters contain sodium, elevated levels in water supplies are usually related to water softening processes. The regulatory standard is set for aesthetic reasons as elevated levels may give rise to taste problems. In 2021, four sites reported contraventions for sodium, all of which had water softening treatment processes.

Some groundwaters may contain elevated levels of naturally occurring iron and manganese. Iron levels can also be raised due to deterioration of cast iron pipe work and / or storage tanks within the distribution system. High levels of iron and manganese may affect the appearance, taste or smell of the water resulting in turbidity, colour, taste, and odour contraventions and discoloration or staining of water fittings. It can also affect treatment systems, such as ultra-violet lamps due to metal deposits causing a reduction in their effectiveness for disinfection. Sites are advised to routinely purge wells / boreholes, clean out storage tanks and flush through pipe work or, where required, replace parts of their distribution network to reduce the levels of iron in their supplies. In 2021, 16 sites reported contraventions for one or both of these metals.

Lead, and other heavy metals such as nickel and copper, are usually detected at elevated levels due to corrosion of pipe work or fittings, especially if the source water is naturally acidic, and / or due to the use of inappropriate fixtures and fittings. The Regulations specify that only

products and substances approved for use with drinking water supplies should be used. The Drinking Water Inspectorate for England and Wales has published a list of approved products which are tested and approved under Regulation 5.

There were no lead contraventions in 2021; however, one site had a copper contravention and one site had a nickel contravention.

Pesticides

There were two individual pesticide contraventions in 2021: Clopyralid, a herbicide used for controlling broad-leaved weeds such as docks and creeping thistle in grassland; and Metribuzin, a herbicide used to control weeds in crops. These contraventions were likely due to the inappropriate storage or use of pesticides in the vicinity of the sources. In addition to these contraventions, trace levels of a range of individual pesticides, below the regulatory limit of 0.10 µg/l, were also detected at 33 sites.

Actions in the Event of Failure

Contraventions are investigated through site visits conducted by Environmental Health staff and the collection of follow up samples. Depending on the nature and significance of the contraventions, it may also be necessary for us to conduct a site inspection. Site inspections ensure owners / users of the supply are provided with practical advice on source protection and treatment options and best practice for the management of their water supply to reduce the potential risks of contamination.

Any contraventions at supplies, where the water is used as an ingredient in food production or as drinking water, and that are considered as a potential risk to human health, are reported to the Public Health Agency (PHA) for appropriate health advice. Where necessary, the Regulations contain a provision to issue Notices which can be used to restrict or prohibit the use of a supply.

Out of the 97 contraventions identified in 2021, 71 were notified to PHA for advice: 29 microbiological and 42 chemical. As a consequence, new restrictions on the use of the private water supply were put in place at one site to protect public health. In addition, restrictions on use were initiated at two sites as a result of unacceptable odour and elevated iron.

These restrictions of private water supplies can include switching to, or blending with, the public water supply (where this is available), ‘Boil Water Before Use’ notifications, and ‘Do Not Use’ instructions.

Removal of these restrictions requires investigation into the cause of the water quality contravention, completion of work to remedy any issues identified and the achievement of two consecutive satisfactory resamples. Accordingly, the restrictions were removed at five sites.

We continue to work with the owners and users of private water supplies and Environmental Health staff to bring the remaining supplies into compliance. Priority is given to advancing improvements to the water quality through provision of advice and guidance; agreeing action plans (particularly at the larger commercial / public sites); and promotion of Drinking Water Safety Plans (DWSP) for the ongoing management of these supplies.

We have a duty to ensure compliance with the water quality standards in The Private Water Supplies Regulations (Northern Ireland) 2017. Our approach, where there is no known health risk, is initially through informal negotiations. However, where necessary, we may take formal enforcement action to secure compliance and ensure a safe, clean supply of drinking water from private water supplies.

Single Private Well Web Application

The DWI routinely provides advice and guidance to the owners / users of all private water supplies across Northern Ireland. However, currently limited information is available on the estimated 1,200 single dwellings in Northern Ireland, mainly in rural and remote areas, served by a private water supply.

In October 2021, a new Single Well Application was published on the DAERA website. Owners of single private wells (private water supply to a single private dwelling) can now complete a short online assessment to find out more about potential risks to their water supply and to help identify measures to reduce the risks and improve the quality of water.

Through the application, single private well owners answer a series of questions specific to their private water supply related to common issues including the appearance and odour of the water, the sufficiency of the water supply, the protection surrounding the well and the location of the well in relation to activities which can pose a risk of contamination to the water supply such as animal grazing, septic tanks and storage of fuel and pesticides. Once the assessment has been completed and submitted the owner will be provided with guidance and recommendations on how to improve and protect the quality of their water based on their inputs.

The application has been developed principally to raise awareness of the risks of using a single private well and provide bespoke advice and guidance to owners / users with recommendations to improve water quality and therefore public health protection. However, it is hoped that it will also provide a greater insight into the current status of single private wells in Northern Ireland.

Annexes

Annex 1

Glossary and Definition of Terms

Abstraction Point	The point at which water is abstracted from a lake, river or groundwater source for the purposes of drinking water production.
Aesthetic	Associated with the senses of taste, smell and sight.
Animalcule	A tiny or microscopic life form.
Atrazine (total)	A man-made compound used as a herbicide in agriculture. 'Total' includes the relevant metabolites, degradation and reaction products.
Catchment	The area of land that drains into a watercourse.
Clarification	A process employed during drinking water treatment to assist in the removal of suspended solids and particulate matter.
Clopyralid	An herbicide used for controlling broad-leaved weeds such as docks and creeping thistle in grassland.
Clostridium perfringens	A spore-forming bacterium which is exceptionally resistant to unfavourable conditions in the water environment.
Coagulation	A process employed during drinking water treatment to assist in the removal of particulate matter.
Coliform bacteria	A group of bacteria which may be faecal or environmental in origin.
Contravention	A breach of the regulatory requirement.
Cryptosporidium oocyst	A protozoan parasite.
Determination	An analysis for a specific parameter.
Distribution Network	The system of mains water pipes bringing water from a water treatment works to service reservoirs and onwards to the consumer.
Drinking Water Protected Areas	Raw water sources from which water is abstracted for the production of drinking water.
Drinking Water Quality Standards	The prescribed concentrations or values listed in the Regulations.
Drinking Water Safety Plan (DWSP)	A comprehensive risk assessment and risk management approach that encompasses all steps in water supply from catchment to consumer.

Enterococci	A sub-group of faecal streptococci commonly found in the faeces of humans and warm-blooded animals.
Escherichia coli (*E. coli*)	A type of faecal coliform bacteria commonly found in the intestines of animals and humans. The presence of E. coli in water is a strong indication of recent sewage or animal waste contamination.
Event	A situation affecting, or with the potential to affect, drinking water quality.
Faecal Coliform	A sub-group of coliforms, almost exclusively faecal in origin.
Faecal Indicators	A group of organisms that indicate the presence of faecal contamination of a water supply eg *E.coli*.
Fenpropimorph	A fungicide used to control various fungal pathogens.
Filtration	The separation of suspended particulate matter from a fluid.
Flocculation	A process where colloids come out of suspension in the form of a floc.
Granular Activated Carbon (GAC)	An absorbent filtration media used to remove trace organic compounds from water.
Groundwater	Water from aquifers or other underground sources.
Hydrogen ion (pH)	The degree of acidity of the water. A pH of 7 is neutral; values below 7 are acidic and above 7 are alkaline. A low pH water may result in pipe corrosion. This is corrected by adding alkali during water treatment.
Impounding reservoir	A raw water source from which water is abstracted for the purposes of drinking water production.
Incident	An event where there has been a demonstrable deterioration in the quality of drinking water.
Indicator Parameter	Something that is measured to check that the control measures, such as water treatment, are working effectively.
Leaching	To lose, or cause to lose, soluble substances by the action of a percolating liquid.
MCPA	An herbicide used for controlling broad-leaved weeds in grass or cereal crops.
Mecoprop (MCPP)	A herbicide used for controlling broad-leaved weeds in grass or cereal crops.
Metribuzin	A broad-spectrum herbicide for control of certain grasses and broadleaf weeds.

Microbiological	Associated with the study of microbes.
m^3/d	Cubic metres per day.
Ml/D	Megalitres per day (one million litres per day).
µg/l	Micrograms per litre (one millionth of a gram per litre).
Parameters	The substances, organisms and properties listed in Schedules 1 and 2, and regulation 2 of the Regulations.
Pathogen	An organism which causes disease.
PC15	The third price control process whereby funding was allocated to NI Water by the Utility Regulator for the 2015 to 2021 period.
PC21	The fourth price control process whereby funding was allocated to NI Water by the Utility Regulator for the 2021 to 2027 period.
Pesticides	Any fungicide, herbicide, insecticide or related product (excluding medicines) used for the control of pests or diseases.
Phenanthrene	A polycyclic aromatic hydrocarbon (PAH) which may be used in the production of pesticides.
Powder Activated Carbon (PAC)	An adsorbent media typically used to remove taste and odour compounds during a water treatment process.
Price Control Process (PC)	The process for the funding of NI Water by the Utility Regulator for a set period.
Prescribed Concentration or Value (PCV)	The numerical value assigned to drinking water standards, defining the maximal or minimal legal concentration or value of a parameter.
Raw Water	Water prior to receiving treatment abstracted for the purpose of drinking water provision.
Remedial Action	The action taken to improve a situation.
Residence Time	The period of time treated water spends in clear water tank, service reservoir or other storage facility.
Service Reservoir	A water tower, tank or other reservoir used for the storage of treated water within the distribution system.
Supply Point	A point, other than a consumer's tap, authorised for the taking of samples for compliance with the Regulations.

Trihalomethanes (THMs)	A group of organic substances comprising, for the purposes of the Regulations, four substances: trichloromethane (also known as chloroform), tribromomethane (also known as bromoform), dibromochloromethane and bromodichloromethane.
Turbidity	Turbidity is the measure of relative clarity of a liquid.
Water Catchment Partnership	The Water Catchment Partnership (WCP) was established in 2013 to help address significant water quality issues in Northern Ireland related to pesticides.
Water Supply Zone	A pre-defined area of supply used for establishing sampling frequencies, compliance with standards and information to be made publicly available.
Water Treatment Works	A facility that produces drinking water from a raw water source.
Wholesome/ Wholesomeness	A concept of water quality which is defined by reference to standards and other requirements set out in the Regulations.

Annex 2 – Events

Major Drinking Water Quality Events in 2021

Date of Major Event	Area and Estimate of Population/ Properties Potentially Affected	Nature and Cause of Serious Event	Associated Council Area(s)
03/02/21 – 17/02/21	Carmoney WTW (56,781 population)	A high level of consumer contacts regarding the taste and odour or their mains water supply and contraventions of the taste and odour parameters in the final water from Carmoney WTW. DWI issued questionnaires to consumers in relation to this event. The investigation is ongoing.	Derry City and Strabane District

Serious Drinking Water Quality Events in 2021

Date of Serious Event	Area and Estimate of Population/ Properties Potentially Affected	Nature and Cause of Serious Event	Associated Council Area(s)
31/01/21 – 16/02/21	Drumbreda and St Brigids Hill area, Armagh (152 properties)	Following operational work on the main, there were consumer contacts regarding the taste and odour or their mains water supply. Contraventions of the taste and odour parameters occurred. DWI issued questionnaires to consumers in relation to this event. The investigation is ongoing.	Armagh City Banbridge and Craigavon District
15/07/21 – 28/07/21	Northern Ireland (1.9 million)	High water demand in the network due to a period of particularly warm and dry conditions and exacerbated by the COVID-19 pandemic. A NI Water Category 1 Incident was declared. Alternative water supplies including asset to asset tankering was required.	All

Significant Drinking Water Quality Events in 2021

Date of Significant Event	Area and Estimate of Population/ Properties Potentially Affected	Nature and Cause of Significant Event	Associated Council Area(s)
11/01/21 – 19/01/21	Dorisland WTW (137,083 population)	Elevated levels of aluminium occurred in the works final water due to a level probe fault following a plant shutdown which led to treatment difficulties.	Antrim & Newtownabbey Borough; Belfast City; and Mid & East Antrim Borough.
02/03/21 – 03/03/21	Drumaroad WTW (446,519 population)	A contravention of the aluminium parameter occurred in the works final water. Following an investigation, NI Water was unable to identify the cause of the contravention. A Regulation 31(4) Notice was issued by DWI on 8 July 2021 in respect of aluminium contraventions at Drumaroad WTW.	Belfast City; Lisburn & Castlereagh City; Newry, Mourne & Down District; and North Down & Ards Borough.
23/03/21 - Present	Lower Quilly Road, Dromore (5 properties)	Samples taken in response to consumer complaints contravened the iron standard (including results above the Health Notification Value) due to the condition of the iron mains. Mains replacement scheduled for January 2023.	Newry, Mourne & Down District
27/03/21 – 28/03/21	Castor Bay WTW (367,276 population)	Contraventions of the aluminium and turbidity parameters occurred following a plant shutdown which caused a fault in the Programmable Logic Controller (PLC) which led to treatment difficulties.	Armagh City Banbridge and Craigavon District; Belfast City; Lisburn & Castlereagh City; Mid-Ulster District; and Newry, Mourne & Down District
28/04/21 – 28/04/21	Drumaroad WTW (446,519 population)	The works was manually shutdown for approximately two hours following a failure of the disinfection system. A faulty component was replaced and the works successfully restarted. Disinfection was maintained in the distribution system.	Belfast City; Lisburn & Castlereagh City; Newry, Mourne & Down District; and North Down & Ards Borough.

Significant Drinking Water Quality Events in 2021

Date of Significant Event	Area and Estimate of Population/ Properties Potentially Affected	Nature and Cause of Significant Event	Associated Council Area(s)
29/04/21 – 05/05/21	Glenhordial WTW (12,030 population)	A contravention of the individual pesticide standard for MCPA (2-methyl-4-chlorophenoxyacetic acid) occurred in the works final water. The pesticide removal treatment was not in operation at the time of this event.	Fermanagh & Omagh District.
03/05/21 – 05/05/21	Derg WTW (41,638 population)	A contravention of the individual pesticide standard for MCPP (Mecoprop - methylchlorophenoxypropionic acid) occurred in the works final water due to insufficient treatment. A Regulation 31(4) Notice has been issued by DWI in respect of pesticide contraventions and as a result NI Water is currently carrying out a major upgrade to this water treatment works.	Derry City & Strabane District and Fermanagh & Omagh District.
10/05/21 – 12/05/21	Forked Bridge WTW (91,353 population)	There was a loss of chlorine residual and contravention of the manganese standard following a loading valve fault which caused over dosing of a de-chlorinating agent at Castor Bay WTW which supplies the final water to Forked Bridge WTW.	Armagh City Banbridge and Craigavon District; Belfast City; Lisburn & Castlereagh City; Mid-Ulster District; and Newry, Mourne & Down District
11/05/21 – 06/10/21	Derg WTW (41,638 population)	Contraventions of the individual pesticide standard for MCPA occurred in the works final water due to insufficient treatment. A Regulation 31(4) Notice has been issued by DWI in respect of pesticide contraventions and as a result NI Water is currently carrying out a major upgrade to this water treatment works.	Derry City & Strabane District and Fermanagh & Omagh District.
26/05/21 – 15/06/21	Clay lake WTW (9,881 population)	Contraventions of the individual pesticide standard for MCPA occurred in the works final water. Clay Lake WTW has pesticide removal treatment in place which is normally effective at reducing MCPA levels to below the regulatory limit. The filter media for pesticide reduction has been replaced.	Armagh City Banbridge and Craigavon District

Significant Drinking Water Quality Events in 2021

Date of Significant Event	Area and Estimate of Population/ Properties Potentially Affected	Nature and Cause of Significant Event	Associated Council Area(s)
08/06/21 – 19/09/21	Ballinrees WTW (119,579 population)	Contraventions of the taste and odour parameters occurred in the works final water and related distribution due to insufficient treatment. Consumer complaints regarding Taste & Odour in the Ballinrees WTW supply area were received by NI Water. A Regulation 31(4) Notice has been issued by DWI in relation to taste and odour contraventions at Ballinrees WTW.	Causeway Coast & Glens Borough & Derry City & Strabane District
06/07/21 – 15/07/21	Carmoney WTW (56,781 population)	A contravention of the individual pesticide standard for MCPA occurred in the works final water. Carmoney WTW has pesticide removal treatment in place which is normally effective at reducing MCPA levels to below the regulatory limit. However the level of the pesticide in the raw water was very high on this occasion and the treatment was insufficient to reduce the level to the required standard.	Derry City & Strabane District
24/07/21 – 02/08/21	Clay lake WTW (9,881 population)	Contraventions of the aluminium, iron, manganese and turbidity parameters occurred in the works final water. The aluminium and manganese results were above the relevant Health Notification Values. These contraventions occurred when the works was operating at an increased capacity and following tankering into the Clear Water Tank during the Serious high network demand event.	Armagh City Banbridge and Craigavon District

Significant Drinking Water Quality Events in 2021

Date of Significant Event	Area and Estimate of Population/ Properties Potentially Affected	Nature and Cause of Significant Event	Associated Council Area(s)
18/08/21 – 26/08/21	Beagh Road, Douglas Bridge (4 properties)	Recurring coliform bacteria contraventions led to “Boil Water before Use until Further Notice” advice being issued to four properties. The contraventions occurred following a burst main and operational activity to install a valve to help locate the burst. It is probable that contamination of the main was due to the burst or occurred during the operational work. A number of contraventions of the Water Fittings Regulations were identified requiring action by the consumers.	Derry City & Strabane District
24/08/21-01/09/21	Brett Avenue, Lurgan (3 properties)	Recurring coliform bacteria contraventions led to “Boil Water before Use until Further Notice” advice being issued to two properties. The initial sample was taken in response to a consumer complaint of odour. Water Fittings inspections identified internal issues at the two properties which may have caused the recurring contraventions.	Armagh City Banbridge and Craigavon District
31/08/21 – 19/10/21	Dungonnell WTW (28,345 population)	Contraventions of the Total Trihalomethanes (THMs) parameter occurred in the works final water and the related distribution system. The treatment process was not optimised for organics removal at the time of this event. Improvement work in relation to THMs at Dungonnell WTW is included in the PC21 work plan.	Mid & East Antrim Borough

Significant Drinking Water Quality Events in 2021

Date of Significant Event	Area and Estimate of Population/ Properties Potentially Affected	Nature and Cause of Significant Event	Associated Council Area(s)
10/09/21 – 18/09/21	Ballynakilly Road, Cookstown (6 properties)	Recurring coliform bacteria contraventions led to “Boil Water before Use until Further Notice” advice being issued to six properties. The contraventions occurred after operational activity to repair a valve. It is probable that the main was contaminated during the operational work. DWI notes in response to the contraventions that chlorine was boosted and the main was flushed. A number of contraventions of the Water Fittings Regulations were identified requiring action by the consumers.	Mid-Ulster District
20/09/21 – 21/09/21	Altnahinch WTW (33,400 population)	A contravention of the Total Trihalomethanes (THMs) parameter occurred in the works final water. The treatment process was not optimised for organics removal at the time of this event due to issues with pH control. Improvement work in relation to THMs at Altnahinch WTW is included in the PC21 work plan.	Causeway Coast & Glens Borough
28/10/21 – 12/11/21	Drumaroad WTW (446,519 population)	Contraventions of the aluminium parameter occurred in the works final water due to difficulties with the treatment process. A Regulation 31(4) Notice was issued by DWI on 8 July 2021 in respect of aluminium contraventions at Drumaroad WTW.	Belfast City; Lisburn & Castlereagh City; Newry, Mourne & Down District; and North Down & Ards Borough.

Annex 3

Technical Audit Programme

In 2021, the on-site technical audit inspection programme had to be suspended due to the COVID-19 pandemic. One audit was completed virtually:

- An audit of the Laboratory Information Management System (LIMS)

Table 3.1: Summary of the 2021 Inspection Programme

Date of Audit	Location	Audit Activity	Number of Recommendations [1]	Number of Suggestions[2]
02/12/21	Laboratory Information Management System	To check that data is adequately managed by the 'Laboratory Information Management System'.	4	3

[1] Recommendations are made where, in our opinion, action is required to avoid a foreseeable risk or a breach of a regulatory duty. If such a breach occurs, then we may consider 'enforcement action'. A formal written response from NI Water is required.
[2] Suggestions are made in relation to matters which relate to best practice.

Annex 4

Enforcement Action

The DWI Section of the DAERA website publishes details of all Enforcement actions.

Table 4.1: Summary of Enforcement Actions 2021

Type of Enforcement	Water Treatment Works (WTW)	Reason for Notice	Summary
Regulation 31(4) Notice 2020/001	Derg WTW	Contravention of the regulatory standard for the herbicide, MCPA	Requires NI water to install and have operational, a treatment system at Derg WTW that is effective in the removal or reduction of MCPA to achieve a final water result that meets the maximum regulatory limit of MCPA of 0.10µg/l by 31 March 2022. An amendment was issued in February 2022 to provide NI Water with an additional 12 months to complete the required treatment upgrade by 31 March 2023.
Regulation 31(4) Notice 2020/002	Ballinrees WTW	Contravention of the regulatory standard for the herbicide, MCPA	Requires NI Water to install and have operational, a treatment system at Ballinrees WTW that is effective in the removal or reduction of MCPA to achieve a final water result that meets the maximum regulatory limit of MCPA of 0.10µg/l 2020 by 22 December 2023. This was issued on 17 December 2020 following the revocation of Regulation 31(4) Notice 03/19 on the same date.
Regulation 31(4) Notice 2020/003	Ballinrees WTW	Contravention of the regulatory standards for Taste and Odour	Requires NI Water to install and have operational, a treatment system at Ballinrees WTW that is proven to be effective in the treatment of taste and odour parameters to achieve a final water and consumer tap result that is acceptable to the consumer and there is no abnormal change by 22 December 2023. This was issued on 17 December 2020.
Regulation 31(4) Notice 2021/001	Drumaroad WTW	Contravention of the regulatory standard for Aluminium	Regulation 31(4) Notice 2021/001 issued on 8 July 2021 requires NI Water to install and have operational, a treatment system at Drumaroad WTW that is proven to be effective in the removal or reduction of Aluminium to achieve a final water result that meets the maximum regulatory limit of Aluminium of 200 µg/l by 30 April 2025.

Table 4.2: Summary of Prosecution Action 2021

Type of Enforcement	Detail of Offence	Reason for Action	Summary
Prosecution: Article 110 - The Water and Sewerage Services (Northern Ireland) Order 2006 -	Supply of water that was unfit for human consumption	In July – August 2018 a section of the mains water supply in the Meigh area of Newry was contaminated with oil. This affected 43 properties and resulted in complaints relating to taste and odour	The Regulations require that there is 'no abnormal change' and that the water is 'acceptable to the consumer'. NI Water pleaded guilty to the offence on 19 July 2021 and received a conditional discharge for a period of 12 months.

Useful Information

(To access the information click on the links below)

Regulatory Framework – provides details and links to current legislation relating to drinking water quality.

Drinking Water Quality Tables – provides details of drinking water compliance within individual water supply zones and council areas.

Drinking Water Advice and Guidance for Public and Private Supplies – provides a list of links for consumers and professionals requiring further information on drinking water quality.

Useful Contacts – provides a list of organisations and contact details related to drinking water.

Request for Feedback on this Report

Did you find what you were looking for?

The Drinking Water Inspectorate is constantly aiming to improve the standard of information provided in this report.

Any views or opinions you may have would be highly valued by us and we would greatly appreciate your feedback.

Any feedback can be provided by either

Email: **dwi@daera-ni.gov.uk**

or

Post: **Drinking Water Inspectorate**
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