



Drinking Water Quality Regulator  
for Scotland

**DRINKING WATER QUALITY REGULATOR  
FOR SCOTLAND**



# Drinking Water Quality in Scotland 2019

**Private Water Supplies**



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## EXECUTIVE SUMMARY

The Drinking Water Quality Regulator for Scotland (DWQR) ensures that local authorities are meeting their regulatory duties in regard to the quality of private water supplies. DWQR also regulates the quality of water supplied by Scottish Water. The role of DWQR was created by the Water Industry (Scotland) Act 2002 ("the Act"), which gives the Regulator powers to obtain information. This report fulfils the requirement under the Act that the DWQR publishes a report on the exercise of the Regulator's functions during the previous year. This report relates to the calendar year 2019 and is for private water supplies. A similar report on the quality of water supplied by Scottish Water was published on Monday 10 August 2020.

Private water supplies (PWS) are drinking water supplies that are not the responsibility of Scottish Water but of their owners and users. PWS regulations are enforced by local authorities. The regulations were revised in October 2017, bringing into force The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017 ("the 2017 regulations"). These cover large domestic or commercial supplies. Smaller household PWS (referred to as Type B supplies) continue to be governed by The Private Water Supplies (Scotland) Regulations 2006 ("the 2006 regulations").

Water sources for PWS are many and varied, and a large number of householders and businesses depend on them for their drinking water supplies. In 2019 local authorities reported to DWQR that there are 22,453 private supplies in Scotland, supplying 182,516 people. Of these 3,837 are Regulated (former "Type A") supplies and 18,616 are Type B. Regulated supplies are large domestic supplies and any PWS which is used in a commercial or public activity, a definition which includes privately rented accommodation. The Type B classification relates to smaller, domestic supplies. Around 3.3% of Scotland's population relies on PWS for their drinking water, but a significant number of others will also use these supplies, including visitors and tourists. This is an increase from previous years, as the 2017 Regulations have brought a range of supplies into the regulated category where previously they were not regarded as commercial. This includes let accommodation. As a result, the monitoring work within some local authorities has increased significantly.

Environmental Health teams from local authorities sample Regulated supplies annually, and undertake a full risk assessment every five years. In 2019, only 68% of those supplies registered with local authorities were sampled. This is partly due to the reclassification of privately rented properties from "Type B" to "Regulated", which increased the number of Regulated supplies significantly for some local authorities.

Risk assessment is an important way of ensuring that a continuous supply of safe drinking water is provided. Every Regulated PWS is required to be fully risk assessed every five years, and recorded on the DWQR's web-based risk assessment tool. In 2019, local authorities reported that 58% of Regulated supplies received a risk assessment, however far fewer than this have as yet been recorded on the DWQR tool.

48,384 tests were carried out on samples taken from Regulated PWS to check for a range of contaminants. In total, 90.2% of tests complied with the standards. The smaller Type B supplies fall outside the prescribed monitoring regime but some are sampled at the request of users, prior to grant applications or as part of public health investigations. Of those that were sampled, 10,739 tests were undertaken and 84.3% of these met the required standards.

*E. coli* provides an indication that faecal contamination of the supply has occurred, and has the potential to cause illness. It was detected in 12.9% of Regulated supply samples taken across Scotland during 2019. This is a deterioration compared to 2018 when *E. coli* was detected in 11% of Regulated supply samples. The presence of *E. coli* indicates that the supplies are either not receiving the appropriate amount of treatment before use, or that the existing treatment is not being satisfactorily managed and maintained. Given the potential risks to public health, all failures are thoroughly investigated by the local authority. Where there is a need for immediate action to safeguard their health in the short term, users are advised to boil water before consumption or to use an alternative supply, such as bottled water. Users will also be informed of any required improvement works and the timescales in which these works must be carried out. Enforcement action may be initiated by local authorities on owners/users, where necessary, to ensure improvements to a supply.

In 2019, eight Enforcement Notices were served by local authorities across Scotland. Although responsibility for private supplies rests with owners and users, local authorities are urged to continue to provide appropriate advice and DWQR expects them to make full use of the enforcement powers available to tackle and deliver improvements.

At a national level, the quality of Regulated PWS has not improved since 2010 in spite of ongoing efforts by local authorities and the availability of a Scottish Government-funded grant to encourage improvements. Overall compliance is the lowest since 2010, however a number of factors such as the inclusion of private rented accommodation and a slight change this year in the samples that are included may have influenced this. In addition to *E. coli*, other parameters with significant numbers of failures on PWS included coliforms, colour, hydrogen ion (pH), iron and lead.

The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017 address a number of issues identified from previous annual reports and also incorporates some of the recommendations of the STEC Action Plan for Scotland and have brought many supplies within the Regulated status. This has required local authorities to review processes, to review and reclassify supplies, and in some cases to secure additional resources to provide capacity to undertake these new duties. The expectation is that there will be improvements to monitoring work and public health protection as a result, and this will be monitored through discussion with local authorities and in future Annual Reports.

The Scottish Government provides financial support for owners and users of PWS to support improvements through the provision of a non-means tested grant of up to £800 per property. Properties belonging to the same supply system can each receive a grant, therefore increasing the total available amount that can be provided to improve the system. This may be increased

where local authorities are satisfied that the cost of the improvements would cause undue hardship. These are available from local authorities to all who own or use a PWS. In 2019/20, £466,092 was awarded for PWS improvements. According to the data provided by local authorities this funding improved 373 supplies, resulting in improvements to drinking water quality and a greater level of public health protection to those using the supply.

## 1. REGULATORY FRAMEWORK

The regulatory standards for drinking water quality in Scotland stem from European Directives. These standards are based on guidelines developed by the World Health Organisation to protect public health. Water quality legislation relating to Private Water Supplies includes:

### **The Water (Scotland) Act 1980 (as amended)**

This Act requires local authorities to secure improvements to private water supplies if they consider them necessary.

### **The Water Industry (Scotland) Act 2002**

This Act created the role of the Drinking Water Quality Regulator for Scotland (DWQR) who is independent of the Scottish Ministers. In relation to Private Water Supplies, the DWQR is required to supervise the enforcement by local authorities of their drinking water quality duties. Local authorities are required to provide the DWQR with any information necessary to undertake that supervisory role. The DWQR is required to submit and publish an annual report to the Scottish Ministers on her activities.

### **The Private Water Supplies (Scotland) Regulations 2006**

These Regulations define wholesomeness of drinking water by reference to the European Drinking Water Directive which came into force in 1998 (98/83/EC). These transpose the recommendations made by the World Health Organisation on the appropriate standards for drinking water to protect human health.

These regulations have been amended substantially over the years but retain the provisions for exempt ("Type B") supplies relating to monitoring and the provision of advice, as well as the provisions for local authorities to pay a non-means tested grant of up to £800 to eligible persons (on both Regulated and Type B supplies) to enable them to improve their private water supply

### **The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017**

These regulations came into force on 27 October 2017 replacing (and partly re-enacting with modifications) the provisions of The Private Water Supplies (Scotland) Regulations 2006 with respect to Regulated supplies, formerly defined as "Type A" supplies.

They apply to:

- Any supply which supplies 50 or more persons or more than 10m<sup>3</sup> of water per day;
- Any supply which forms part of a commercial or public activity, or where the water is used in a commercial or public activity or where water is supplied to the public; and

Guidance on the regulations issued by DWQR clarifies that domestic rented premises fall into the scope of commercial activity.

## 2. TYPES OF PRIVATE WATER SUPPLIES IN SCOTLAND

Private water supplies (PWS) are drinking water supplies which are not provided by Scottish Water and are the responsibility of the owners and users of the supplies.

In 2019, the data provided to the Drinking Water Quality Regulator for Scotland (DWQR) by local authorities showed that there are 22,453 private supplies in Scotland. This data confirms that 182,516 people (3.3% of Scotland’s population) live or work in premises that rely daily on a PWS. This figure, however, does not take into account the large numbers of people such as visitors and tourists who may use premises with a private water supply.

In Scotland, PWS fall into one of two categories. Those which supply 50 or more people, provide 10m<sup>3</sup> or more of water per day or, regardless of the number of people served or the volume supplied, are supplying premises that are part of a commercial or public activity are Regulated supplies (formerly known as Type A supplies). These supplies serve a variety of premises e.g. holiday lets, B&Bs, hotels, caravan parks/campsites, schools, community halls and a range of other facilities. Type B supplies are all other domestic PWS, many of which serve single properties. Figure 1 illustrates the data reported to DWQR for 2019 for the two different categories of supply.

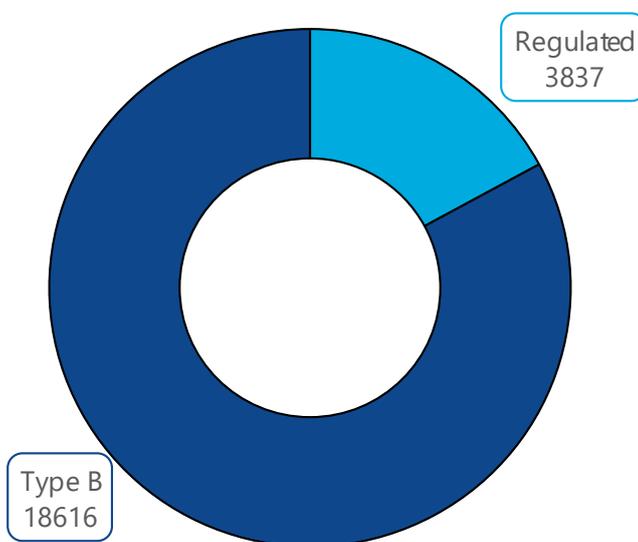


Figure 1 Private Water Supplies by Type

Water sources for private supplies vary greatly in their size and nature. These range from springs and boreholes serving single dwellings to larger boreholes or surface water supplies supplying a community.

The majority of PWS are located in rural areas, though some are located in areas where there is a public supply of water available. Table 1 provides a summary of PWS in each local authority area, and the population reliant upon them.

Table 1 Summary of Private Water Supplies by Local Authority Area

Local Authority	Regulated Supplies	Type B Supplies	Total Supplies	Total Population
Aberdeen City	8	46	54	258
Aberdeenshire	301	7,666	7,967	31,153
Angus	40	343	383	1,556
Argyll and Bute	512	2,849	3,361	26,829
City of Edinburgh	6	8	14	147
Clackmannanshire	6	22	28	311
Comhairle nan Eilean Siar	15	47	62	343
Dumfries and Galloway	552	927	1,479	19,504
Dundee City	0	1	1	24
East Ayrshire	25	200	225	1,142
East Dunbartonshire	1	16	17	153
East Lothian	21	20	41	590
East Renfrewshire	7	129	136	1,353
Falkirk	1	7	8	22
Fife	72	257	329	3,831
Glasgow City	0	0	0	0
Highland	854	1,698	2,552	31,153
Inverclyde	11	49	60	1,097
Midlothian	37	26	63	377
Moray	265	589	854	4,910
North Ayrshire	23	252	275	1,762
North Lanarkshire	8	14	22	102
Orkney	33	208	241	1,400
Perth and Kinross	602	1,044	1,646	29,936
Renfrewshire	4	11	15	45
Scottish Borders	244	1,222	1,466	15,496
Shetland	1	56	57	97
South Ayrshire	58	190	248	1,357
South Lanarkshire	41	268	309	945
Stirling	74	394	468	5,910
West Dunbartonshire	7	13	20	193
West Lothian	8	44	52	520
<b>Total</b>	<b>3,837</b>	<b>18,616</b>	<b>22,453</b>	<b>182,516</b>

Whilst on average 3.3% of the population in Scotland use a PWS, this can vary significantly between local authority areas, for example, a very small proportion of the population in Aberdeen City (0.1%) are reliant on a PWS, compared to over 31% in Argyll and Bute.

The chart shown in Figure 2 sets out those local authority areas with the greatest numbers of PWS. Just over 84% of the population served by PWS in Scotland are contained in six local authority areas.

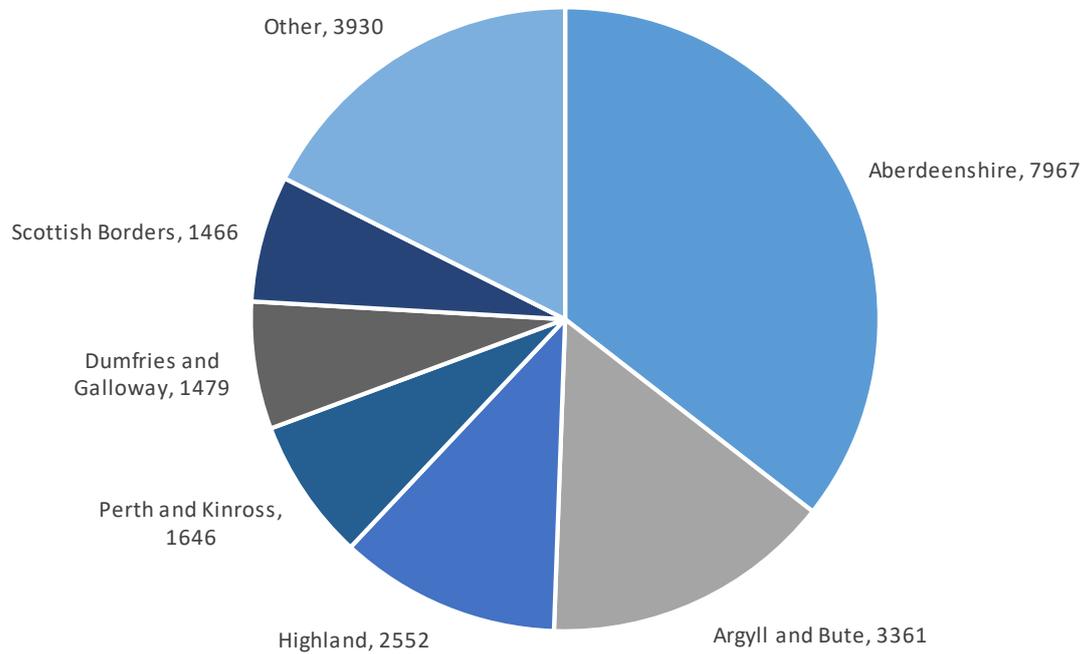


Figure 2: Numbers of Private Water Supplies by local authority

### 3. RISK ASSESSMENT

Risk assessment plays a vital role in assuring the safety of PWS and identifying any improvements that are required. This is because risk assessments consider all possible factors that could affect the safety of the supply under all conditions, whereas sampling only verifies water quality at the time and location of sampling.

Regulations place a duty on local authorities to carry out risk assessments on all Regulated supplies. Each supply must be risk assessed once every five years. Additionally, local authorities must provide, on request, advice and assistance on risk assessments to those responsible for Type B supplies. These risk assessments should determine whether the supply poses a potential risk to health and, if so, the action required to safeguard health in the short term and improve the supply in the longer term.

DWQR has provided local authorities with an online tool to manage and store risk assessments (Figure 3). A risk assessment has to be carried out in accordance with a method approved by DWQR. Currently, only the online tool meets this criterion. A clear expectation has been communicated that all regulated supply risk assessments are to be stored on the tool, to ensure that all risk assessments are undertaken to a minimum standard and to enable DWQR to monitor progress. Local authorities are transitioning to use this reporting tool.

Table 2 below shows that in 2019, 58% of regulated supplies had a risk assessment. This number is not based on the supplies that have had a risk assessment undertaken using the online tool. Instead, it is based on the supplies that were reported by the local authorities as having had a risk assessment undertaken or reviewed in 2019. Therefore, the numbers of complete risk assessments submitted on the tool are, in many cases, far below those reported in Table 2. This is indicative of the transition from the previous risk assessment methodology to the online tool and is something that DWQR will be taking up with local authorities to better understand the issue.

The change in the guidance which accompanies the 2017 regulations brings privately rented accommodation under the regulations for the first time. This increased the number of Regulated supplies requiring risk assessment in each local authority area. The extent to which risk assessments have been completed varies significantly. In order to have risk assessed every Regulated PWS within the five year limit, it might be expected that at least 20% of a local authority's supplies would have been risk assessed during the year. Table 2 shows that this is generally the case, although there are a number of exceptions. Most of these involve local authorities with a relatively small number of supplies, where shortfalls are easily caught up prior to the five year deadline. Perth and Kinross Council, however, is a clear outlier with only 18 risk assessments completed despite having in excess of 600 Regulated PWS. DWQR will be exploring this matter further with Perth and Kinross in the coming months.

From analysis of data from the risk assessment tool, the highest scoring risks across all supplies are from microbial contamination of the source and inadequate management.

dwqr Private Water Supply Risk Assessment Matthew.Bowen@gov.scot

Test Local Authority

## Mingulay [Edit supply]

Supply number (SRN) 25    Sources 1    Tanks 2    Properties 3

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**Risk assessments**

[Start risk assessment](#)

	Submitted	Submitted by	Due	
Submitted	14/04/2020	Gemma Mcken	-	<a href="#">View</a>
Submitted	30/01/2019		-	<a href="#">View</a>

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**Risk scores**

	Centralised Treatment	Distribution and Management	Property	Source	Tank
Highest Unmitigated Risk Score	15	20	20	25	25
Highest Mitigated Risk Score	15	10	15	20	30

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**Map**

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**Images**

Centralised UV treatment

Treated water tank

St Columba Burn

Centralised cartridge filter and UV treatment

Figure 3: DWQR Risk Assessment Tool for Private Water Supplies

Table 2: Risk Assessment of Regulated Supplies (2019 data)

Local Authority	Regulated Supplies	Risk Assessed Supplies	Percentage of Risk Assessed Supplies	Population on Regulated Supplies	Population on Reg Risk Assessed Supplies	Pop. on Reg Supplies with no Risk Assessment
<b>Aberdeen City</b>	8	8	100%	55	55	0
<b>Aberdeenshire</b>	301	288	96%	4,160	4,090	70
<b>Angus</b>	40	38	95%	1,556	1,550	6
<b>Argyll and Bute</b>	512	492	96%	15,653	15,600	54
<b>City of Edinburgh</b>	6	1	17%	93	45	48
<b>Clackmannanshire</b>	6	6	100%	147	147	
<b>Comhairle nan Eilean Siar</b>	15	10	67%	236	223	13
<b>Dumfries and Galloway</b>	552	219	40%	18,528	18,082	446
<b>Dundee City</b>	No Regulated Supplies					
<b>East Ayrshire</b>	25	24	96%	340	190	150
<b>East Dunbartonshire</b>	1	1	100%	34	34	0
<b>East Lothian</b>	21	9	43%	483	110	373
<b>East Renfrewshire</b>	7	7	100%	858	858	0
<b>Falkirk</b>	1					
<b>Fife</b>	72	60	83%	2,471	2,357	114
<b>Glasgow City</b>	No Regulated Supplies					
<b>Highlands</b>	854	760	89%	26,040	25,654	386
<b>Inverclyde</b>	11	5	45%	818	592	226
<b>Midlothian</b>	37	2	5%	288	16	272
<b>Moray</b>	265	50	19%	2,903	352	2,551
<b>North Ayrshire</b>	23	3	13%	1,721	25	1,696
<b>North Lanarkshire</b>	8	2	25%	65	4	61

Local Authority	Regulated Supplies	Risk Assessed Supplies	Percentage of Risk Assessed Supplies	Population on Regulated Supplies	Population on Reg Risk Assessed Supplies	Pop. on Reg Supplies with no Risk Assessment
Orkney	33	25	76%	845	703	142
Perth and Kinross	602	18	3%	22,220	468	21,752
Renfrewshire	4	4	100%	4	4	0
Scottish Borders	244	50	20%	7,966	1,663	6,303
Shetland	1	1	100%	4	4	0
South Ayrshire	58	45	78%	702	620	82
South Lanarkshire	41	35	85%	495	490	5
Stirling	74	49	66%	4,212	3,531	682
West Dunbartonshire	7	7	100%	150	150	0
West Lothian	8	8	100%	333	333	0
<b>Total</b>	<b>3,837</b>	<b>2,227</b>	<b>58%</b>	<b>113,379</b>	<b>77,948</b>	<b>35,431</b>

Figure 4 shows the local authorities with the largest population of PWS users on supplies that haven't been risk assessed in 2019 based on the information reported by local authorities in the annual return. These results are being discussed with each local authority.

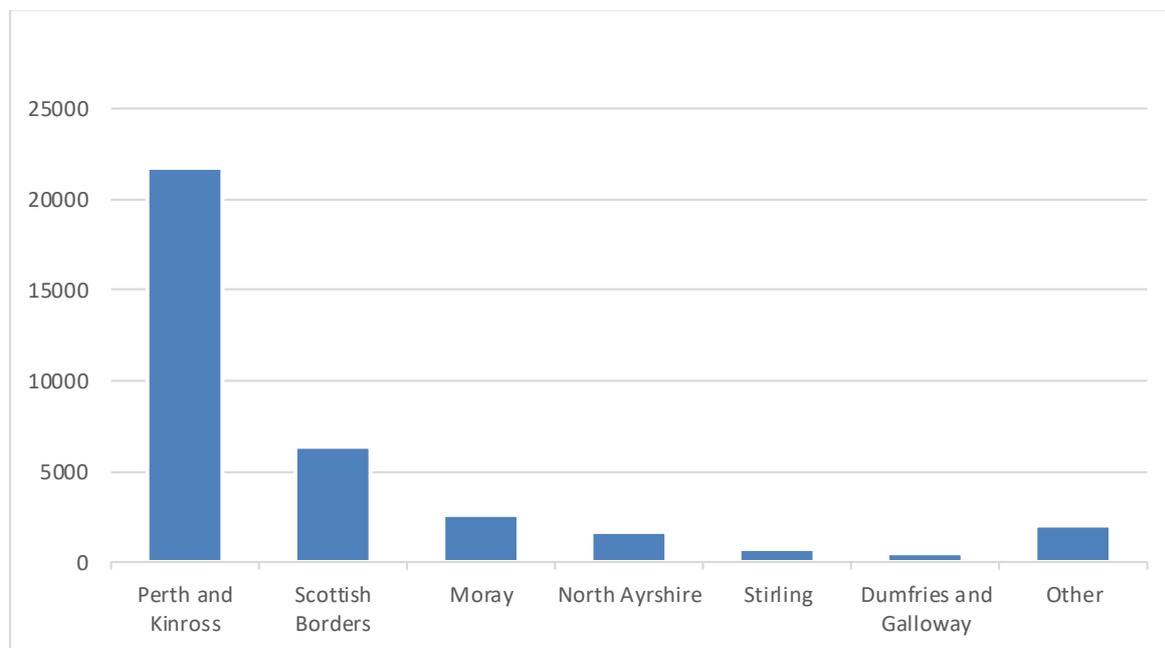


Figure 4: Population on not Risk Assessed Supplies per Local Authority

## 4. THE QUALITY OF PRIVATE WATER SUPPLIES

### 4.1 Regulated Private Water Supplies

#### 4.1.1 Sampling and overall performance

Local authorities are required by the 2017 regulations to sample all Regulated supplies in their area at least once a year.

All supplies must be tested individually for certain parameters that are especially important or that vary significantly from supply to supply. Other parameters are sampled using a “supply zone” approach that enables a sample to be taken at one supply to broadly represent the quality across the whole area or zone. Zonal sampling is only done for parameters that are found at a reasonably constant concentration in water supplies across the area. This approach greatly reduces the number of tests that need to be carried out on individual supplies.

Table 3 provides a breakdown of the number of Regulated supplies per local authority, as well as the number of Regulated supplies that were sampled for at least one parameter for the past three years.

In 2019, across Scotland, 68% of Regulated supplies were sampled, down from 75% in 2018 and 87% in 2017. Sampling rates has shown a steady decline since 2015, when 94% of supplies were sampled. Resource and capacity limitations have been cited by local authorities as being amongst the reasons for this decline. This report identified that 11 local authorities sampled in excess of 95% of their Regulated supplies, with intermittent performance in others.

Fifteen local authorities sampled more than 90% of their Regulated supplies and eleven achieved 100% compliance.

Of the local authorities that achieved 100% compliance, all of them had a small number of Regulated supplies under their jurisdiction (21 or less). Of the local authorities with large numbers of supplies, only Aberdeenshire and Argyll and Bute councils were able to sample 95% or more of their Regulated supplies.

Sampling compliance for several councils fell well short of that required, with five councils (Perth & Kinross, Dumfries & Galloway, North Lanarkshire, City of Edinburgh and East Ayrshire) only sampling half of their Regulated supplies or less.

It is worth noting that:

- **City of Edinburgh** did sample more than the reported 17% of its Regulated supplies but, did so in the first quarter of 2020. Unfortunately, due to the reporting of private water supply quality on a calendar year basis, the additional samples could not be included. City of Edinburgh had achieved 67% sampling compliance in 2018 and 100% sampling compliance in 2017. Though the declining trend is unsatisfactory, it is not considered that the 17% sampling compliance of 2019 constitutes a representative figure and it has been attributed due to a misunderstanding of the reporting calendar.
- **East Ayrshire** only reported back to the DWQR the samples that failed Regulatory standards (also called ‘Prescribed Concentrations or Values’ (PCVs)). This was due to resource limitations due to the Covid-19 pandemic. East Ayrshire had achieved 100% sampling compliance in both 2018 and 2017. It is therefore considered that the reported 44% sampling compliance of 2019 does not constitute a representative figure.

- **Perth and Kinross** is the second largest local authority with Regulated PWS, with 602 Regulated supplies serving more than 22,000 people in 2019. Perth and Kinross had achieved 86% sampling compliance in 2017, 45% sampling compliance in 2018 and 43% sampling compliance in 2019.
- **Dumfries and Galloway** is the third largest local authority with Regulated private water supplies, with 552 Regulated supplies serving more than 18,000 people in 2019. Dumfries and Galloway had achieved 84% sampling compliance in 2017, 77% sampling compliance in 2018 and only 30% sampling compliance in 2019.

The DWQR will be contacting local authorities with very low sampling compliance to discuss what measures can be put in place to improve performance.

It is worth noting that, under the 2017 regulations and associated guidance, PWS serving privately rented properties are now considered to be Regulated supplies. This has led to an increase in the number of Regulated supplies per local authority and therefore an increase in sampling requirements, which requires some time to appropriately resource.

Local authorities had to review their arrangements and charging regimes, and for many rural authorities, seek approval for recruitment of additional resources to provide capacity to undertake the new statutory duties for Regulated supplies.

In this reporting period, the level of Regulated supplies sampling (percent of supplies sampled) improved or remained the same in 21 of the 32 local authorities, while the remaining 9 local authorities saw a reduction. The aforementioned reasons may explain these figures, but it is expected that as the local authorities adjust to the new regulations, continued improvement will be demonstrated.

Table 3: Regulated Supplies Sampling Compliance

Local Authority	Supply Nr 2019	Supplies sampled 2019	% Supplies sampled 2019	% Supplies sampled 2018	% Supplies sampled 2017
Aberdeen City	8	8	100%	100%	0%
Aberdeenshire	301	293	97%	96%	95%
Angus	40	26	65%	86%	72%
Argyll and Bute	512	502	98%	95%	95%
City of Edinburgh*	6	1	17%	67%	100%
Clackmannanshire	6	6	100%	67%	100%
Comhairle nan Eilean Siar	15	11	73%	57%	69%
Dumfries and Galloway	552	165	30%	77%	84%
Dundee City	0	0	N/A	N/A	N/A
East Ayrshire*	25	11	44%	100%	100%
East Dunbartonshire	1	1	100%	100%	0%
East Lothian	21	21	100%	50%	83%
East Renfrewshire	7	7	100%	100%	80%
Falkirk	1	1	100%	No data	No data
Fife	72	66	92%	82%	97%
Glasgow City	0	0	N/A	N/A	N/A
Highland	854	606	71%	78%	88%
Inverclyde	11	11	100%	100%	100%
Midlothian	37	36	97%	71%	100%
Moray	265	207	78%	90%	98%
North Ayrshire	23	20	87%	96%	100%
North Lanarkshire	8	2	25%	0%	0%
Orkney	33	24	73%	78%	81%
Perth and Kinross	602	257	43%	45%	86%

Local Authority	Supply Nr 2019	Supplies sampled 2019	% Supplies sampled 2019	% Supplies sampled 2018	% Supplies sampled 2017
Renfrewshire	4	4	100%	100%	100%
Scottish Borders	244	194	80%	46%	52%
Shetland	1	1	100%	0%	100%
South Ayrshire	58	43	74%	67%	88%
South Lanarkshire	41	32	78%	66%	83%
Stirling	74	52	70%	76%	80%
West Dunbartonshire	7	7	100%	100%	100%
West Lothian	8	8	100%	100%	100%
<b>Total</b>	<b>3,837</b>	<b>2,623</b>	<b>68%</b>	<b>75%</b>	<b>87%</b>

\*East Ayrshire only reported on supplies with failing samples. City of Edinburgh sampled most of its supplies in the first months of 2020 and therefore these samples were not included in the 2019 return.

Table 4 shows some of the key parameters that Regulated supplies are monitored for and how supplies are complying with the relevant standards.

A total of 48,384 individual key parameter tests were recorded in 2019 on Regulated supplies, 4,720 of which failed their regulatory standard, representing a 90.2% water quality compliance (down from 93.5% in 2018).

Table 4: Regulated Private Water Supply Compliance for Key Parameters

Parameter	Nr Failures	Nr Sample Results	Compliance 2019	Compliance 2018
<b>Turbidity*</b>	50	3,041	98.4%	98.3%
<b>Nickel (Total)</b>	64	2,973	97.8%	98.3%
<b>Nitrate (Total)</b>	42	1,859	97.7%	
<b>Colony Count 22C*</b>	163	4,096	96.0%	
<b>Copper (Total)</b>	158	3,227	95.1%	93.8%
<b>Manganese (Total)</b>	159	2,983	94.7%	94.8%
<b><i>Clostridium perfringens</i></b>	294	4,133	92.9%	93.8%
<b>Lead (Total)</b>	343	3,710	90.8%	94.5%
<b><i>Enterococci</i></b>	415	4,314	90.4%	78.7%
<b>Iron (Total)</b>	360	3,089	88.3%	91.0%
<b><i>E. coli</i></b>	568	4,395	87.1%	89.0%
<b>Colour</b>	461	3,007	84.7%	87.3%
<b>Hydrogen ion (pH)</b>	558	3,144	82.3%	84.2%
<b>Coliform bacteria</b>	1,085	4,413	75.4%	78.2%
<b>Total</b>	<b>4,720</b>	<b>48,384</b>	<b>90.2%</b>	<b>93.5%</b>

\* Under the 2017 regulations, turbidity and colony counts do not have a numerical standard (Prescribed Concentration or Value (PCV)). The turbidity should be acceptable to consumers with no abnormal change and the colony counts should have no abnormal change. The samples that have been considered as failing for these parameters are the ones declared by local authorities as such.

The most commonly failing parameters are coliforms, pH, colour and *E. coli*. The compliance on all four deteriorated in 2019 compared to 2018.

Figure 5 illustrates the overall national Regulated PWS compliance for key parameters for both 2018 and 2019.

It is worth noting that the 2019 analysis is based on all the compliance point samples taken in 2019, whereas the 2018 analysis was based only on the Scheduled Regulatory samples for 2018.

A point of compliance is a point where water normally emerges for human consumption (typically a tap in a premise). Samples can be taken from points of compliance for a variety of reasons, such as investigations, to support applications for grants, or to satisfy regulatory requirements. The samples that are scheduled in order to fulfil regulatory requirements are called Scheduled Regulatory samples.

For the 2019 annual report, it was considered that reporting on the full compliance point dataset could help paint a better picture of PWS performance. This difference between the 2019 and 2018 results should be kept in mind if the two reports are compared.

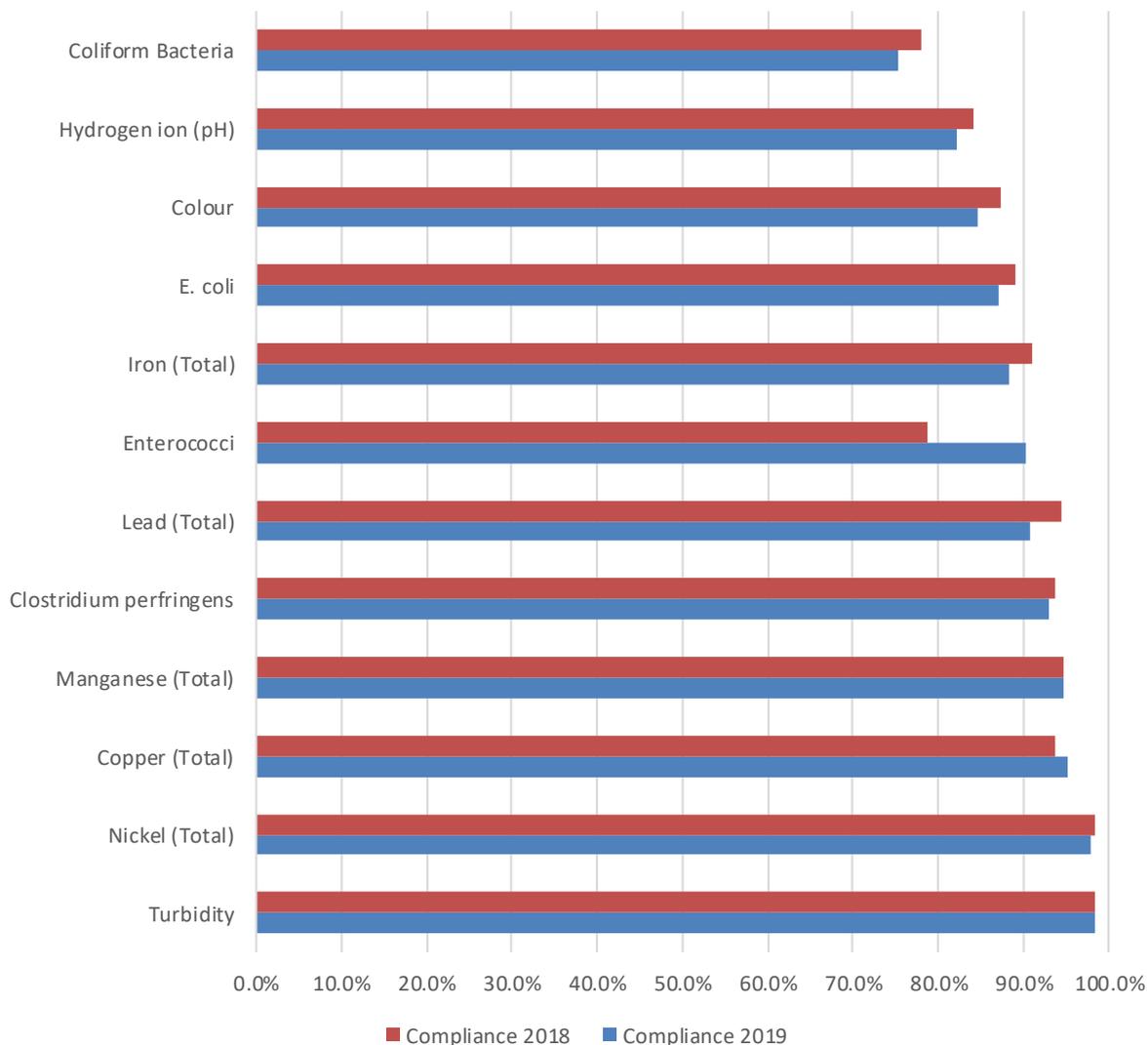


Figure 5: Regulated Supplies Key Parameters Compliance 2018 vs 2019

Figure 6 illustrates the year on year water quality compliance of Regulated private water supplies since 2010.

These results suggest that at a national level, the quality compliance of Regulated supplies has been within the range of 90% to 95%, with no improvement, despite of ongoing efforts by local authorities and the availability of a Scottish Government-funded grant. The 2019 compliance figure represents the worst compliance within this time period. There is a need to better understand the reasons for this, which could be due to the random nature of the sampling requirements, the monitoring of unsatisfactory supplies as part of the grant application process, or the lack of treatment systems maintenance from the users of private water supplies.

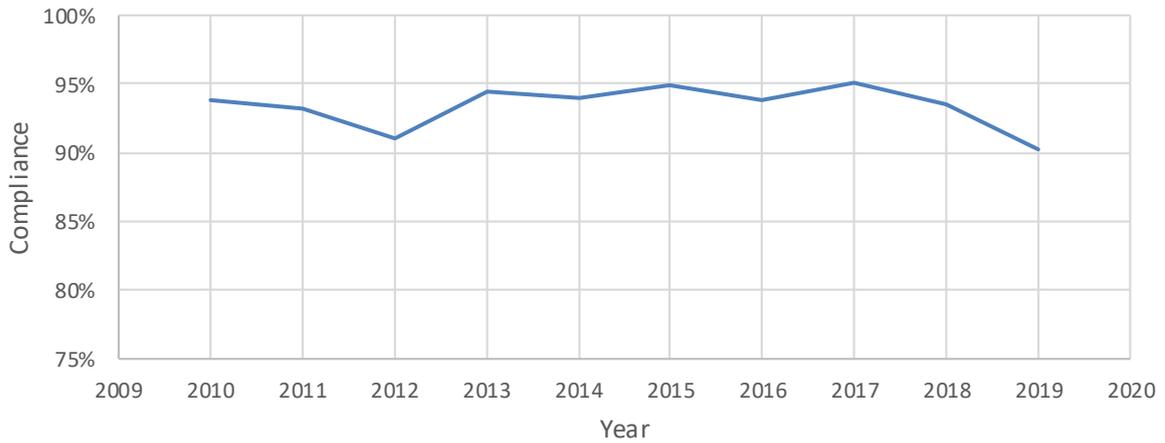


Figure 6: Regulated Private Water Supplies Year on Year quality compliance

### Zonal Sampling

In addition to the normal regulatory sampling (at least annually for all Regulated supplies), the 2017 regulations also require that local authorities undertake zonal sampling.

Scotland is separated into 10 supply zones and 32 local authorities. Each local authority can span multiple supply zones. Figure 7 illustrates the supply zone segments belonging to each local authority area. More detail is available in the following link: [Supply zones in Scotland](#)

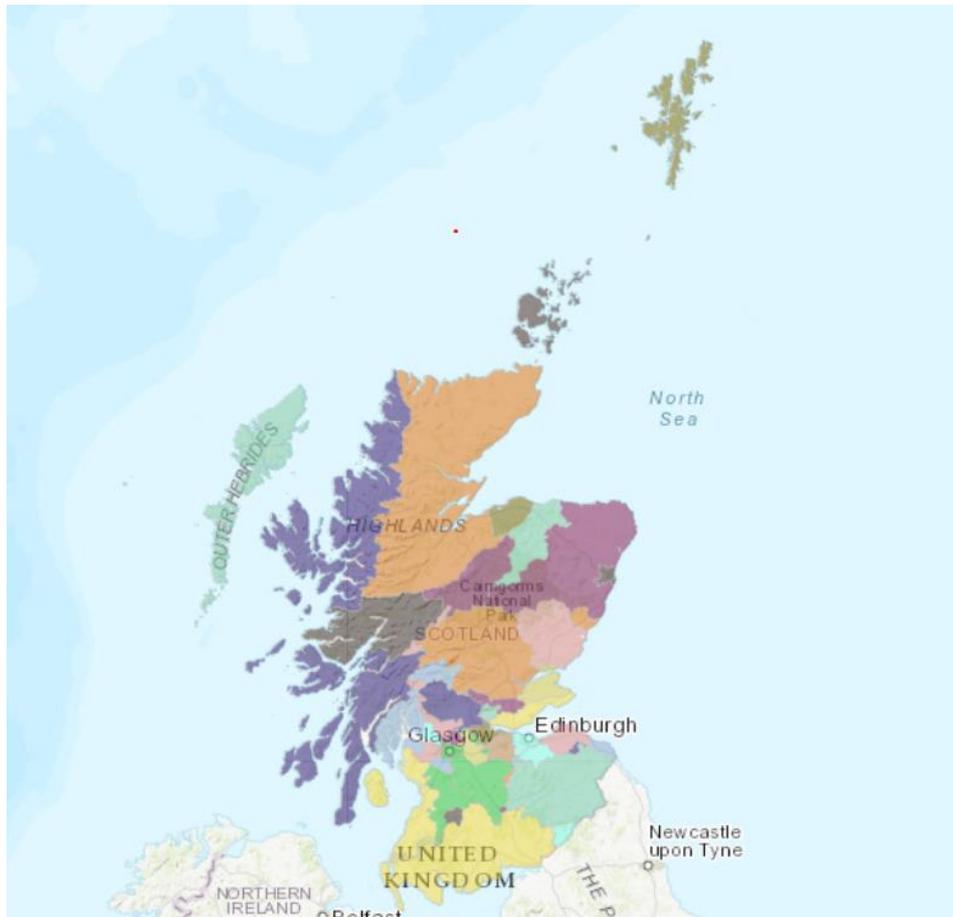


Figure 7: Private water supply zone boundaries within local authorities in Scotland

The principle of zonal sampling is that water quality within a zone is considered to be relatively uniform. Therefore, though it is necessary for key parameters to be sampled at least annually for all Regulated private water supplies, the wider suite of regulated parameters is considered sufficient to only be sampled on a zonal level.

The exact frequency of sampling is dependent on the average daily volume provided by Regulated supplies within each zone.

Due to the fact that each zone can include supplies from multiple local authorities, local authorities can pool their efforts in zonal sampling. If each local authority calculated its required zonal sampling individually, this results in a higher than the minimum required zonal samples being taken.

Table 5 illustrates the calculated required sampling frequency on a zonal level based on the reported volumetric outputs of Regulated PWS's in 2019. It also shows the number of Regulated supplies that were actually sampled per zone for zonal samples for at least one parameter.

Table 5 shows that the Tweed zone reported a significantly higher number of zonal samples than required. The Tweed zone includes areas in East Lothian, Scottish Borders and South Lanarkshire councils. Scottish Borders provided 173 out of the total 176 reported zonal samples. However, it has been noted that most of these samples were not zonal samples but normal Regulated supply samples, as they were only analysed for the core parameters that are analysed on a normal supply sample and not for the full suite of parameters. The DWQR plans to undertake work to more clearly communicate the principle of zonal sampling to avoid similar issues in the future.

As can be seen, compliance with sampling requirements is varied, with North East Scotland, North Highland, West Highland and Orkney & Shetland having taken fewer than the required zonal samples.

It should be noted that, though the remaining zones have had an adequate number of zonal samples taken, the samples were not necessarily analysed for the full suite of required parameters. It appears that there is room for improvement on zonal sampling.

*Table 5: Required zonal sampling vs number of supplies sampled on a zonal level for at least one parameter*

<b>Zone</b>	<b>Supplies Sampled</b>	<b>Sampling Requirement*</b>
<b>Argyll</b>	13	16
<b>Clyde</b>	21	7
<b>Forth</b>	22	16
<b>North East Scotland</b>	4	7
<b>North Highland</b>	3	7
<b>Orkney and Shetland</b>	2	4
<b>Solway</b>	35	25
<b>Tay</b>	12	7
<b>Tweed</b>	176	7
<b>West Highland</b>	1	7

\* The noted requirement is for Group A samples (samples analysed for a specific list of parameters). Group B samples will have a less frequent requirement

The zonal level compliance is illustrated in Table 6 for both 2018 and 2019. Zonal compliance varies with North East Scotland, Orkney & Shetland and Tay presenting compliance levels of less than 90%. 23 of the 41 total failures in these zones were for microbiological parameters. Due to the small number of supplies sampled for zonal purposes, the representativeness of the compliance figures for each relevant zone should be interpreted with caution.

Table 6: Zonal Compliance

<b>Zone</b>	<b>Nr Samples</b>	<b>Nr Failures</b>	<b>Compliance 2019</b>	<b>Compliance 2018</b>
<b>Argyll</b>	405	12	97.0%	90%
<b>Clyde</b>	681	44	93.5%	91%
<b>Forth</b>	727	68	90.6%	99%
<b>North East Scotland</b>	84	9	89.3%	100%
<b>North Highland</b>	66	0	100.0%	100%
<b>Orkney and Shetland</b>	40	6	85.0%	n/a
<b>Solway</b>	578	33	94.3%	98%
<b>Tay</b>	225	26	88.4%	99%
<b>Tweed</b>	4,442	402	91.0%	99%
<b>West Highland</b>	23	0	100.0%	100%

### Conclusion

Based on the above analysis it becomes apparent that a number of local authorities do not comply with the minimum zonal sampling requirements. Additionally, the samples that are taken are not always analysed for the full required suite of parameters. The DWQR will make efforts to provide additional guidance to clearly communicate the zonal sampling requirements to local authorities.

### 4.1.2 Microbiology

Local authorities are required to test for several microbiological contaminants in PWS, to check that the treatment and management of the supply is effective so as to minimise the risk of contamination which may cause illness. The standard is for none of these parameters to be present in 100ml of the sample.

Coliforms are a group of bacteria widely found in the environment, of which *E. coli* is one. Presence of coliforms in a water sample can be an indication of a failure of the disinfection process (or of the lack of one), or an indication of contamination of the water once it has been disinfected.

In 2019, over 75% of samples taken from Regulated private water supplies across Scotland did not contain any coliforms. This leaves approximately 25% of the coliform samples having failed the standard (1,085 individual tests failed in 2019 vs. 502 in 2018). This is a deterioration from 2018 when over 78% of samples taken from Regulated private water supplies across Scotland did not contain any coliforms.

Local authorities are required to sample each Regulated supply at least annually to demonstrate compliance with the regulations. The samples are taken from the point of compliance (such as a kitchen tap) and are classed as Scheduled Regulatory- SR samples. Local authorities regularly take point of compliance samples for reasons other than demonstrating compliance with regulations (i.e. investigations or samples to support an application for grant). Those samples, despite not being Scheduled Regulatory ones, can provide a more encompassing picture of a supply's performance. It is worth noting that the significant difference in the number of failing samples between 2019 and 2018 is due to the fact that, as noted in section 4.1.1, the 2019 analysis is based on all the point of compliance samples taken in 2019, when the 2018 analysis was based only on the Scheduled Regulatory samples for 2018.

Of the local authorities with greatest number of Regulated supplies, the worst performance was registered by Perth and Kinross council, where only 60% of the samples contained no coliforms.

In addition to coliform compliance, the percentage of water supplies failing for *E. coli* has also deteriorated. In 2019 87.1% of samples did not contain *E. coli*, compared to approximately 88.5% in 2018. *E. coli* is found in the gut of warm-blooded animals and so indicates that faecal contamination has occurred. It can cause illness in humans, and it is of particular concern that compliance for this parameter is deteriorating.

Another faecal indicator organism group, *Enterococci*, was not present in 90.4% of Regulated water supplies in 2019. This represents an improvement on a compliance figure of approximately 78% in 2018.

The levels of microbiological compliance outlined above are of great concern, particularly given that Regulated supplies are likely to be consumed by members of the public including tourists and visitors as they supply businesses such as cafes, hotels, tourist accommodation.

To safeguard public health, local authorities have a duty to inform users on unsatisfactory supplies where *E. coli* or *Enterococci* has been identified. They are also required to implement appropriate controls to minimise any risk to health. These measures could include a notice to

boil water or to use an alternative supply. As part of investigations on failures, consideration is given to additional monitoring and sampling; discussion on the availability of grant; and potential enforcement action to secure improvements.

*Clostridium perfringens* is also tested in private water supplies and is used as an indicator of historic faecal contamination. Detections of this organism should serve as a trigger for a thorough investigation of the supply and any treatment process. Low levels of *Clostridium* spores, in themselves, are unlikely to present a significant risk to healthy individuals directly from consuming contaminated drinking water. The main risk from this organism is where spores from contaminated drinking water are able to multiply in incorrectly cooked or stored food.

Table 7, Figure 8 and Figure 9 illustrate the 2019 microbiological compliance by local authority.

Table 7: Microbiological Compliance 2019 by Local Authority

Local Authority	<i>E. coli</i>	<i>Enterococci</i>	<i>Clostridium perfringens</i>	Coliform Bacteria
Aberdeen City	0%	100%	100%	0%
Aberdeenshire	95%	95%	99%	85%
Angus	N/A	N/A	N/A	0%
Argyll and Bute	90%	90%	93%	75%
City of Edinburgh	0%	100%	100%	0%
Clackmannanshire	100%	100%	88%	63%
Comhairle nan Eilean Siar	78%	0%	82%	61%
Dumfries and Galloway	89%	93%	91%	78%
Dundee City	No Regulated supplies			
East Ayrshire*	N/A	N/A	N/A	N/A
East Dunbartonshire	100%	100%	100%	N/A
East Lothian	75%	73%	93%	65%
East Renfrewshire	89%	89%	100%	89%
Falkirk	100%	100%	100%	100%
Fife	90%	89%	92%	74%
Glasgow City	No Regulated supplies			
Highland	89%	94%	92%	80%
Inverclyde	76%	92%	92%	68%
Midlothian	86%	86%	92%	70%
Moray	87%	87%	95%	72%
North Ayrshire	85%	85%	92%	82%
North Lanarkshire	50%	50%	100%	50%
Orkney	92%	89%	89%	79%
Perth and Kinross	70%	76%	89%	60%
Renfrewshire	100%	100%	100%	100%
Scottish Borders	81%	88%	92%	70%
Shetland	100%	100%	100%	100%
South Ayrshire	98%	98%	98%	84%
South Lanarkshire	88%	88%	83%	81%
Stirling	92%	99%	90%	84%
West Dunbartonshire	100%	100%	100%	86%
West Lothian	100%	100%	100%	100%
<b>Total</b>	<b>87.1%</b>	<b>90.4%</b>	<b>92.90%</b>	<b>75.4%</b>

\* N/A denotes that the local authority provided no samples for the specific parameters. East Ayrshire only reported failing samples and therefore was treated as not having provided any samples for compliance calculation purposes.

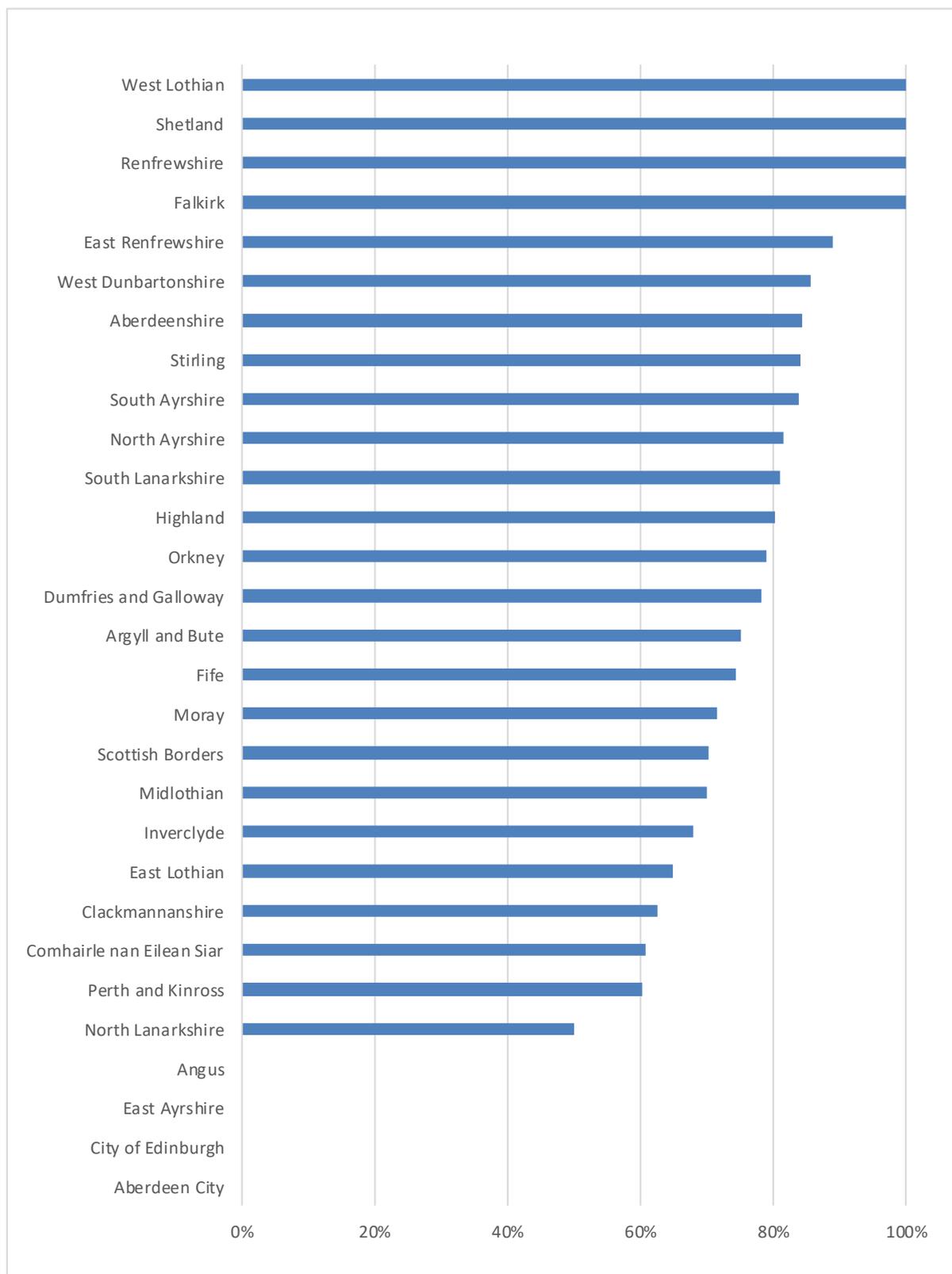


Figure 8: Coliform Compliance 2019

\* (East Ayrshire clarified that they only reported on their failing samples and did not include samples that passed due to issues accessing their data during the Covid-19 pandemic. East Dunbartonshire provided no data. All Regulated supplies coliforms samples from Angus, Fife, City of Edinburgh and Aberdeen City were failures)

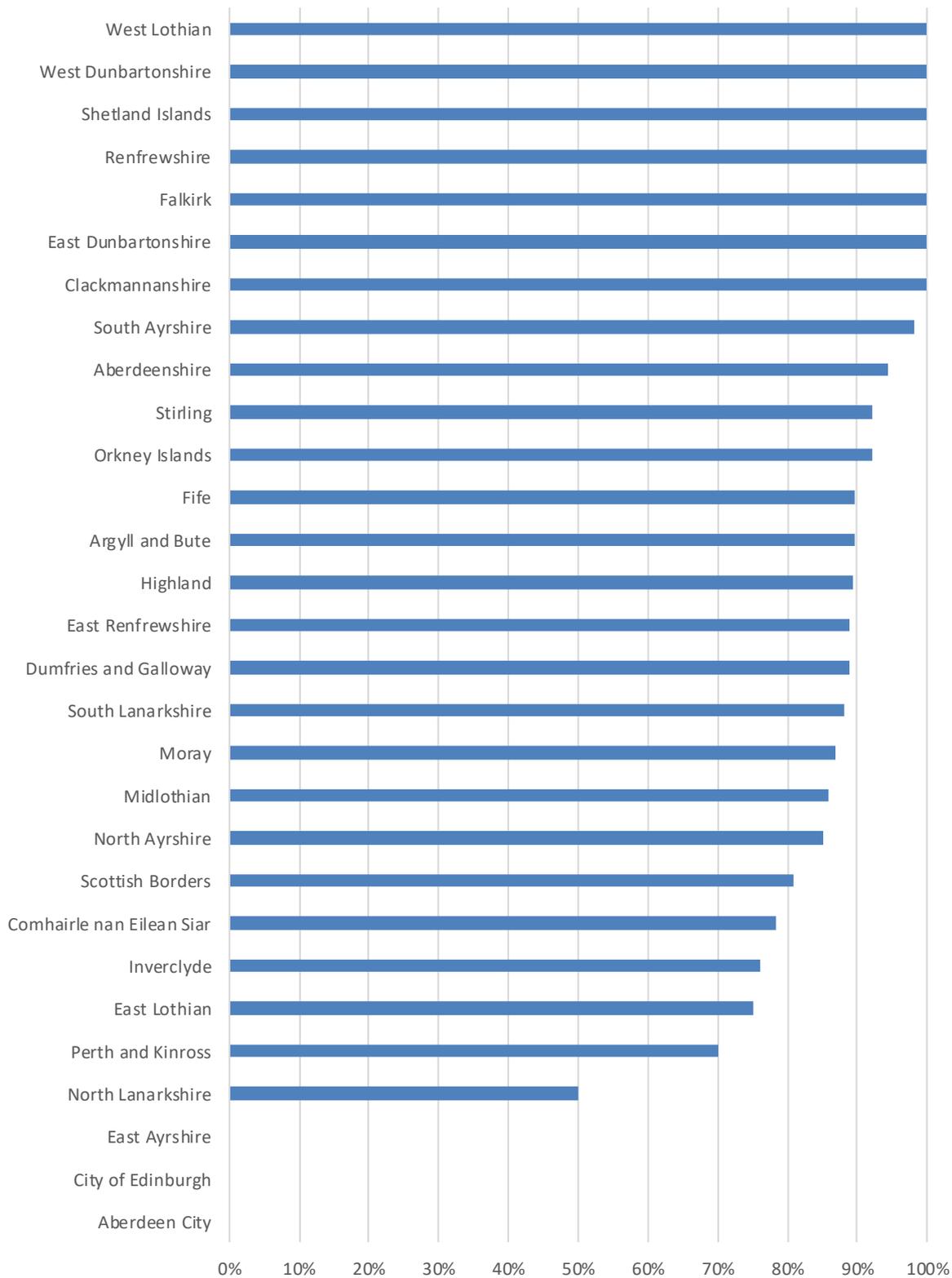


Figure 9: E. Coli Compliance 2019

\* (East Ayrshire clarified that they only reported on their failing samples and did not include samples that passed due to issues accessing their data during the Covid-19 pandemic. Angus provided no data. All Regulated supplies E. Coli samples from Fife, City of Edinburgh and Aberdeen City were failures)

For those local authorities with a significant number of supplies, it can be seen in Figure 9 that compliance for *E. coli* is generally around 90%, with the exception of Perth and Kinross when 2019 *E. coli* compliance was around 70% (down from 88% in 2018).

A number of factors are responsible, including fluctuating raw water quality; inadequate or inconsistent treatment processes; and poor or no maintenance of treatment systems. The Met Office has confirmed that 2019 was the wettest summer on record in Scotland after 1985. This may provide an explanation for the poor results and reinforces the need to have resilient systems that perform in all weather conditions.

Regulated supply systems can serve multiple properties, but the regulations only require for a minimum of one sample to be taken annually from each Regulated supply system. This introduces the risk that regulatory samples may not be representative of a whole system, as each property within a system may have treatment to a different standard.

The inclusion of privately rented accommodation within the definition of a commercial activity (and therefore their reclassification as Regulated supplies) in the guidance to the 2017 regulations has also introduced a large number of previous Type B PWS into these statistics, meaning compliance may fall in the coming years until lasting improvements are made.

Figure 10 illustrates the microbiological compliance of Regulated supplies by source. As can be seen, supplies served from surface water sources (loch, watercourse, rainwater) are much more likely to have lower compliance. This is to be expected, as surface water is more prone to microbiological contamination. This could also indicate the poor treatment of PWS to compensate for the source water quality. As expected, borehole sources are the least prone to microbiological contamination and therefore exhibit the highest compliance.

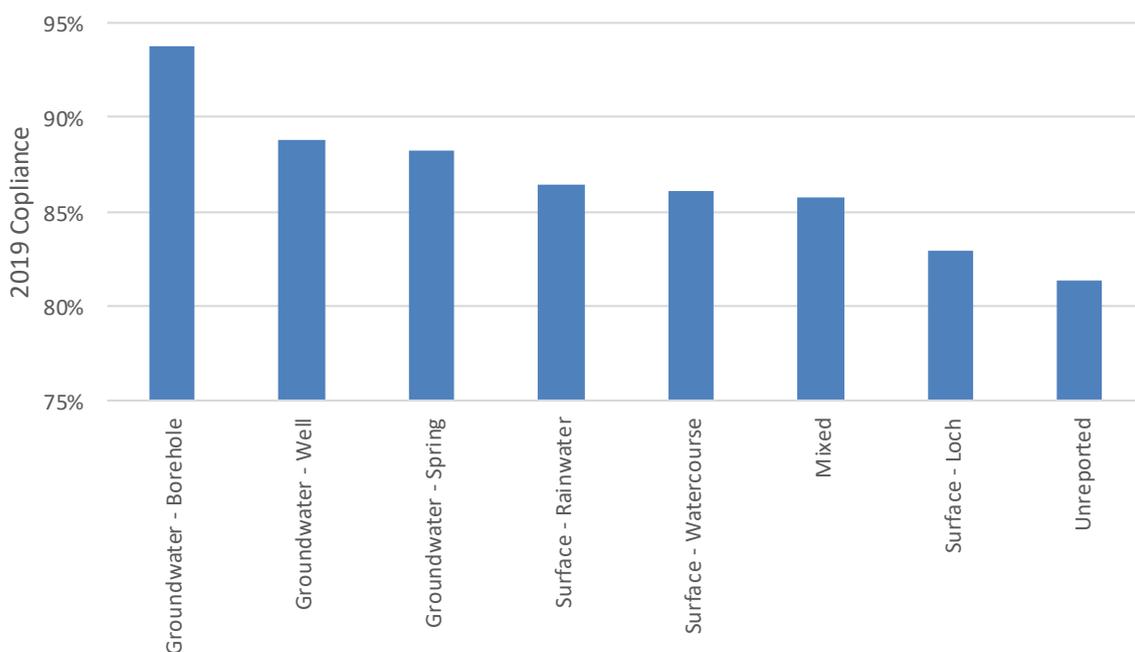


Figure 10: Regulated Supplies Microbiological Compliance by Source

Although the quality of private supplies is a complex area and improvements are not always easy to achieve or maintain, DWQR and local authorities believe that owners and users must

take greater responsibility for the quality of their private supplies, especially where the parameters failing are of significance for health, such as *E. coli*.

### 4.1.3 Metals

Metals such as iron, manganese and lead, can dissolve into water where the water is corrosive.

Generally soft (low mineral content) waters outside the normal pH range (too acidic or alkaline) tend to be more corrosive and therefore dissolve metals from the pipework they are transferred through. Almost 17.8% of the Regulated supplies samples taken in 2019 failed their pH standard (up from 15.9% in 2018). This suggests that pH adjustment and conditioning could be improved.

Many Scottish waters are naturally soft and therefore require conditioning before entering a distribution system. This can be achieved simply and at low cost through the use of a filter containing a suitably alkaline medium such as limestone chips, although its success is dependent on the specific supply and raw water quality.

#### **Lead**

There is some naturally occurring lead in some areas of Scotland, however the major source of failures of the standard is the leaching of lead from lead pipes and storage cisterns in the supply route to consumers.

Exposure to lead, either through long exposure to low levels or through high concentration may result in the development of signs and symptoms of lead toxicity. Whilst exposure has consequences for all, the impact is more acute in the early stages of life. The main concern is that even relatively low levels of lead can adversely affect brain and intellectual development. Consequently, those most at risk are women in pregnancy, fetuses, infants and young children.

In 2019, approximately 9.2% of the lead samples from Regulated supplies failed the standard (up from 5.5% in 2018). There has been a continuous deterioration since 2017, suggesting minimal progress is being made.

#### **Iron, Manganese, Aluminium**

Iron and manganese are typically naturally occurring in water sources. Iron can also be derived from corroding iron pipework and fittings within the private water supply itself. Aluminium can be naturally occurring, but it can also be introduced into the treatment process. If this is the case, it needs to be carefully monitored so that it is removed before water enters the supply network.

If there is no treatment process to remove these metals (which is the case for most water supplies), no water conditioning to control dissolution in the network, or inadequate control of the treatment process, failures of the standards can arise. In many cases, simple filtration is all that is required, although in some cases a pre-oxidation stage is also needed to bring these metals out of solution so that they can be filtered out.

11.7% of the Regulated supplies samples failed for iron (up from 9.0% in 2018), 5.3% failed for manganese (steady compared to 5.2% in 2018) and 1.4% failed for aluminium (same as 2018).

#### **Copper and Nickel**

Nickel is not usually found in Scottish water sources. Man-made sources of nickel are mainly focussed on smelting, refining and steel production. It is often used to make alloys with other metals and in plating. Kettles, and nickel or chromium plated plumbing fittings may all

contribute significant quantities of nickel into water where corrosive conditions exist. The major source of copper in drinking water is due to the corrosion of household plumbing and fixtures.

Copper and nickel performance has been variable and likely to be related to plumbing. Compliance for copper has improved slightly since 2018, with approximately 4.9% of the samples failing their PCV (compared to 6.2% in 2018). 2.2% of Regulated supply samples failed their PCV for Nickel in 2019, slightly more than, 1.7% in 2018.

Table 8, Figure 11, and Figure 12 illustrate the metals compliance per local authority for 2019.

Table 8: Metals compliance 2019 by Local Authority

Local Authority	Iron (Total)	Manganese (Total)	Lead (Total)	Copper (Total)	Nickel (Total)
Aberdeen City	100%	100%	100%	100%	100%
Aberdeenshire	96%	95%	98%	100%	100%
Angus	N/A	N/A	N/A	N/A	83%
Argyll and Bute	82%	94%	95%	95%	99%
City of Edinburgh	100%	100%	100%	N/A	N/A
Clackmannanshire	86%	83%	100%	100%	100%
Comhairle nan Eilean Siar	71%	100%	82%	N/A	N/A
Dumfries and Galloway	90%	94%	91%	96%	99%
Dundee City	No Regulated supplies				
East Ayrshire*	N/A	N/A	N/A	N/A	N/A
East Dunbartonshire	100%	100%	100%	100%	100%
East Lothian	96%	96%	100%	96%	100%
East Renfrewshire	100%	78%	100%	89%	100%
Falkirk	100%	100%	100%	100%	0%
Fife	99%	97%	90%	97%	99%
Glasgow City	No Regulated supplies				
Highland	83%	94%	90%	95%	97%
Inverclyde	86%	100%	85%	77%	100%
Midlothian	95%	97%	88%	100%	100%
Moray	96%	97%	87%	87%	95%
North Ayrshire	96%	100%	96%	100%	100%
North Lanarkshire	100%	100%	N/A	100%	100%
Orkney	94%	85%	97%	91%	97%
Perth and Kinross	89%	95%	93%	98%	100%
Renfrewshire	100%	100%	100%	100%	100%
Scottish Borders	95%	98%	81%	95%	97%
Shetland	100%	0%	100%	100%	100%

Local Authority	Iron (Total)	Manganese (Total)	Lead (Total)	Copper (Total)	Nickel (Total)
South Ayrshire	92%	94%	99%	97%	100%
South Lanarkshire	96%	N/A	90%	86%	90%
Stirling	84%	96%	98%	98%	100%
West Dunbartonshire	100%	100%	100%	100%	100%
West Lothian	100%	100%	100%	100%	100%
<b>Total</b>	<b>88.3%</b>	<b>94.7%</b>	<b>90.8%</b>	<b>95.1%</b>	<b>97.8%</b>

\* (East Ayrshire clarified that they only reported on their failing samples and did not include samples that passed due to issues accessing their data during the Covid-19 pandemic. Therefore East Ayrshire was treated as not having provided any samples for compliance calculation purposes. N/A's denote that the local authority provided no samples for the specific parameters)

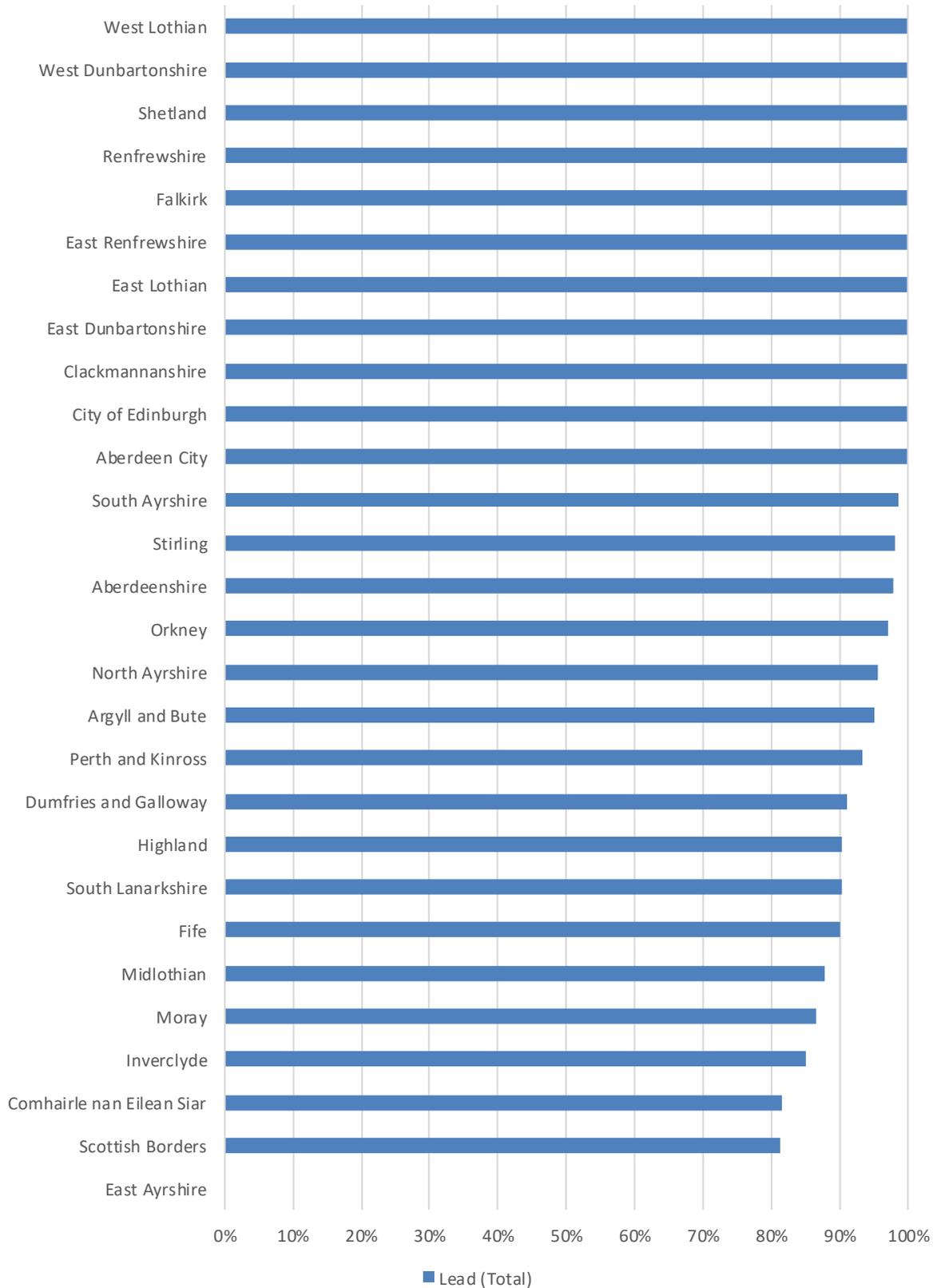


Figure 11: Lead Compliance 2019

\* (East Ayrshire clarified that they only reported on their failing samples and did not include samples that passed due to issues accessing their data during the Covid-19 pandemic. Angus and North Lanarkshire provided no data.)

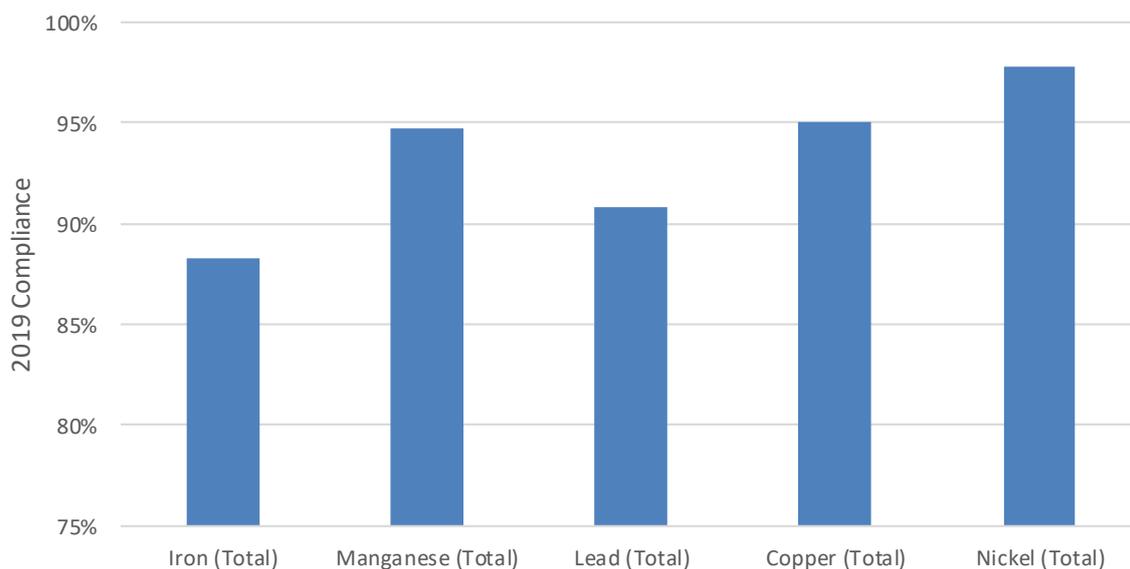


Figure 12: Metals Compliance 2019

#### 4.1.4 Enforcements and Outcomes

Once a local authority has identified that a supply has quality or quantity issues and poses a risk to health, action is taken by the local authority to ensure that all users are informed and given appropriate advice to safeguard their health in the short term (e.g. boil water). Owners and users are informed of any required improvement works and the timescales in which these works must be carried out. Local authorities will provide advice in relation to cleaning and disinfecting storage tanks, replacing UV (ultraviolet) tubes or filter cartridges or cleaning out the supply intake. Local authorities work with owners and users of the supply to achieve improvement and only where this is unsuccessful is a formal Enforcement Notice issued.

DWQR is of the opinion that when local authorities' efforts to bring about improvements through the provision of advice and support for owners and users have failed, then lasting improvements must be achieved by putting in place a notice setting out formally the requirements. The benefit of a notice compared to informal advice is that, if there is any disagreement about the need for a supply to be improved or who is responsible for carrying out the work, there is a formal legal process in place and the relevant person(s) is under a legal duty to carry out the necessary improvements. It also ensures any required works are carried out in a suitable timescale, as this is determined by the local authority based on the risk to health and the extent of the improvement works required.

In 2019, eight Notices were served on failing Regulated PWS and two on failing Type B supplies. The breakdown and a brief description of the properties are illustrated in Table 9.

It is worth noting that there were 4,917 failures of the standards recorded on key parameters for Regulated supplies in 2019, 3,292 of which on samples marked by the local authorities as 'Scheduled Regulatory' ones. However, only 290 investigations were recorded as having been carried out.

From discussions with local authorities it is clear that enforcement action is initiated as a last resort. However, Notices are an important tool that should be used in circumstances where other approaches have been attempted and a supply continues to fail water quality standards,

potentially with health consequences for those drinking the water. DWQR hopes that local authorities will consider more often the need for enforcement action to bring lasting improvements. This will form the basis of discussions between DWQR and local authorities where there are persistently failing supplies.

Table 9: Investigations and Enforcement Notices 2019

Local Authority	Investigations 2019	Enforcement Notices 2019
Argyll and Bute	4	<b>3 (Regulated)</b> - 1 x Domestic & Self catering - 1 x Holiday Let - 1 x Hotel <b>1 (Type B)</b>
City of Edinburgh	1	<b>2 (Regulated)</b> - 2 x Restaurant, Commercial and rented accommodation (both notices on the same system)
Dumfries and Galloway	41	
East Ayrshire	42	
East Dunbartonshire	1	
East Lothian	7	
Falkirk	1	
Midlothian	79	
North Ayrshire	5	
North Lanarkshire	4	
Shetland	1	
South Ayrshire		<b>3 (Regulated)</b> - 1 x Commercial Estate, - 1 x Dairy - 1 x Estate, Office & Dairy
South Lanarkshire	53	<b>1 (Type B)</b>
Stirling	44	
West Dunbartonshire	7	
<b>Total</b>	<b>290</b>	<b>8 (Regulated)</b> <b>2 (Type B)</b>

## **Enforcement Notice Case Study**

The case study below refers to an enforcement notice served by City of Edinburgh Council in 2019:

In August 2019 the City of Edinburgh Council was contacted by Lothian Health Protection Team regarding the diagnosis of a child with confirmed *E. coli* O157, phage type 57. The child lived in a property which used a Private Water Supply (PWS) and therefore the local authority was asked to investigate the PWS as a possible source of the infection.

The PWS is located in a rural location on the outskirts of Edinburgh. The source is a borehole located near a collection of three cottages, farm outbuildings and other outbuilding occupied by businesses including a seasonal restaurant business. The water is pumped several hundred meters up the hill to a storage tank. The supply serves 16 domestic properties and five business premises in total. Only the restaurant had treatment in the form of a UV unit.

Visits were subsequently carried out to take water samples from the PWS. The laboratory results confirmed that coliforms and *E. coli* were present in most samples. Once the results were received a boil water notice leaflet was issued to users of the PWS apart from the food business, as its laboratory results were satisfactory. The landowner also communicated with all tenants to reinforce this message.

The Health Protection Team set up a Problem Assessment Group (PAG) and a meeting was held to discuss the issue. One of the actions was for additional visits to provide advice / deliver a further letter. This included a reminder of the boil water notice and information about possible infection from the water (including *E. coli*) and advice to contact their GP if any illness developed. It was planned that the Group would meet up again if a positive *E. coli* O157 result was obtained .

Initial inspection of the PWS had identified a number of possible routes that could have contaminated the water. However, a further visit to carry out a full risk assessment was carried out with the assistance of the DWQR. At the visit it was identified that the most likely source of contamination was the cattle grazing the land surrounding the storage tank and the condition of the tank. Recently, a log pile had been created immediately next to the tank. This appeared to attract the cattle who congregated next to the log pile and the tank, causing the ground nearby to be turned to mud with small puddles of standing water and increased amount of faecal matter in the immediate vicinity of the tank. Although fenced off from the surrounding field, there was a minimal gap from the tank to the fence. The drainage around the tank was right next to the tank and was blocked. There was some standing water next to the tank.



*Figure 13: Log pile in the vicinity of the tank*

The tank was old and of brick built construction. It had an overflow which had inadequate pest proofing (a stuffed plastic bag) and air vents in the side of the tank which could also allow pests access. At this visit frogs were found inside the tank. There was overgrown vegetation on top of and at the side of the tank. The borehole headworks was identified to be a poor design and another possible source of contamination.



*Figure 14: Inside view of the tank showing the presence of frogs*



Figure 15: Borehole headworks

The landowner had submitted a grant application earlier in the year to upgrade the PWS. However, the information and quotes provided were not satisfactory, and the requested information had not been forthcoming. Following a provisional positive *E. coli* O157 result, an Incident Management Team (IMT) was held. (The *E. coli* sample was sent to the Scottish *E. coli* Reference Lab for typing.) There were concerns raised that due to the timescale involved in upgrading and making the PWS safe, that residents would, after a while, revert back to consuming the water without boiling. Therefore, following discussions with the DWQR it was decided that it was appropriate to serve a Regulation 32 Emergency Notice which required the landowner to provide a supply of bottled drinking water to all households and businesses. The Notice cannot be appealed and City of Edinburgh Council required bottled water to be provided within three days of the Notice being served. All tenants were notified of the bottled water requirement and asked to contact the council if there were any issues.

With the information from the risk assessment and in order to ensure a resolution as quickly as possible, it was decided to serve a Regulation 30 Remediation Notice on the landowner. The Notice required remediation works on the tank, headworks as well as providing a treatment to ensure the water met the relevant standards and was safe to consume. It was decided to give a short period of time for compliance of two months.

Another IMT meeting was held to review the case and it was decided that another meeting would only be held if there were further cases of gastrointestinal illness.

To date, the Regulation 30 Remediation Notice had to be extended several times as the works were not complete. The principal delay was that the works were tied in with the grant application. The landowner had issues getting contractors to provide a quote for the works that were specified in the Notice. Often the quotes were extremely vague and as the grant application wasn't approved until satisfactory information was provided, this delayed progress significantly. The grant application wasn't approved until January 2020, with works starting in March 2020. Unfortunately the remedial works were not fully completed before lockdown due to Covid-19 on 23 March 2020..

Lessons Learned: The main issue in resolving this case related to the PWS remedial works not commencing until the grant application was approved. As it is now understood that the terms of any grant approval can be altered at any stage, in future, for a similar case, City of Edinburgh Council will provide approval far earlier, with the appropriate conditions attached.

## 4.2 Type B Private Water Supplies

Type B supplies must be sampled by local authorities within 28 days of being requested by the owner or user of the supply and are not subject to routine annual monitoring.

Table 10 and Figure 16 illustrate the compliance of Type B PWS for a group of key parameters in 2019 and 2018.

Table 10: Type B Supplies Key Parameters Compliance

Name	Nr Sample Results 2019	Nr Failures 2019	Compliance 2019	Compliance 2018
Coliform Bacteria	1,236	456	63.10%	65.20%
Hydrogen ion (pH)	1,051	262	75.10%	79.16%
<i>E. coli</i>	1,220	226	81.50%	83.74%
<i>Enterococci</i>	1,207	206	82.90%	
Iron (Total)	835	138	83.50%	83.38%
Colour	482	70	85.50%	82.95%
Manganese (Total)	793	114	85.60%	
Lead (Total)	1,193	158	86.80%	94.02%
Aluminium (Total)	187	15	92.00%	90.97%
Nitrate (Total)	821	40	95.10%	
Conductivity	625		100.00%	
Qualitative Odour*	66		100.00%	
Qualitative Taste*	43		100.00%	
Turbidity	980		100.00%	93.77%
<b>Total</b>	<b>10,739</b>	<b>1,685</b>	<b>84.31%</b>	<b>89.59%</b>

\* Qualitative Odour and Qualitative Taste do not have a numerical standard. Therefore a failure would have only been assigned if a Local Authority marked a sample as failing for these parameters in their return. No samples for these parameters were marked as failing in the 2019 return.

Due to the fact that Type B supplies are sampled on request, the supply systems from which samples are taken are different each year and a direct comparison of the data is difficult.

For most of the main parameters, Type B supplies show a similar trend to Regulated supplies, although compliance is worse, reflecting a tendency for there to be minimal treatment and management of the supply.

This is especially true with microbiological compliance where just over 18% of samples contained *E. coli* and approximately 37% contained coliforms in 2019. These are similar to last year's figures. It appears that disinfection on Type B supplies is only present/effective in a small

subset, and a significant proportion of users may be placing themselves at risk by consuming the water.

Overall compliance against the regulatory standards for the key parameters decreased slightly in 2019 (84.3%, down from 89.6% in 2018).

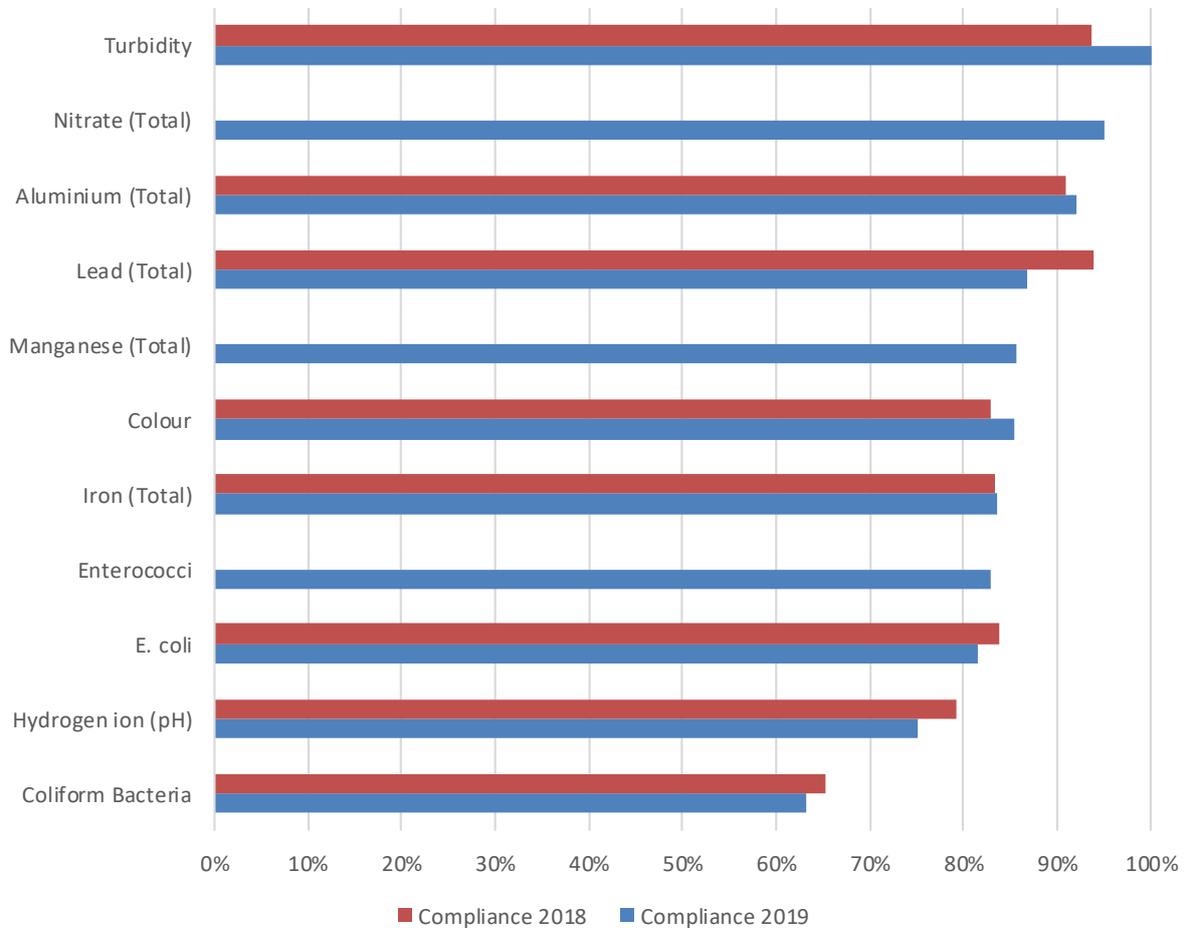


Figure 16: Type B Key Parameter Compliance 2018 vs. 2019

Table 11 and Figure 17 illustrate the compliance by source type for Type B supplies. In both 2018 and 2019, Type B supplies served from surface sources overall had lower compliance compared to Type B supplies served by groundwater sources. Indicating the higher vulnerability of surface sources to contamination and the lack of barriers to protect against it

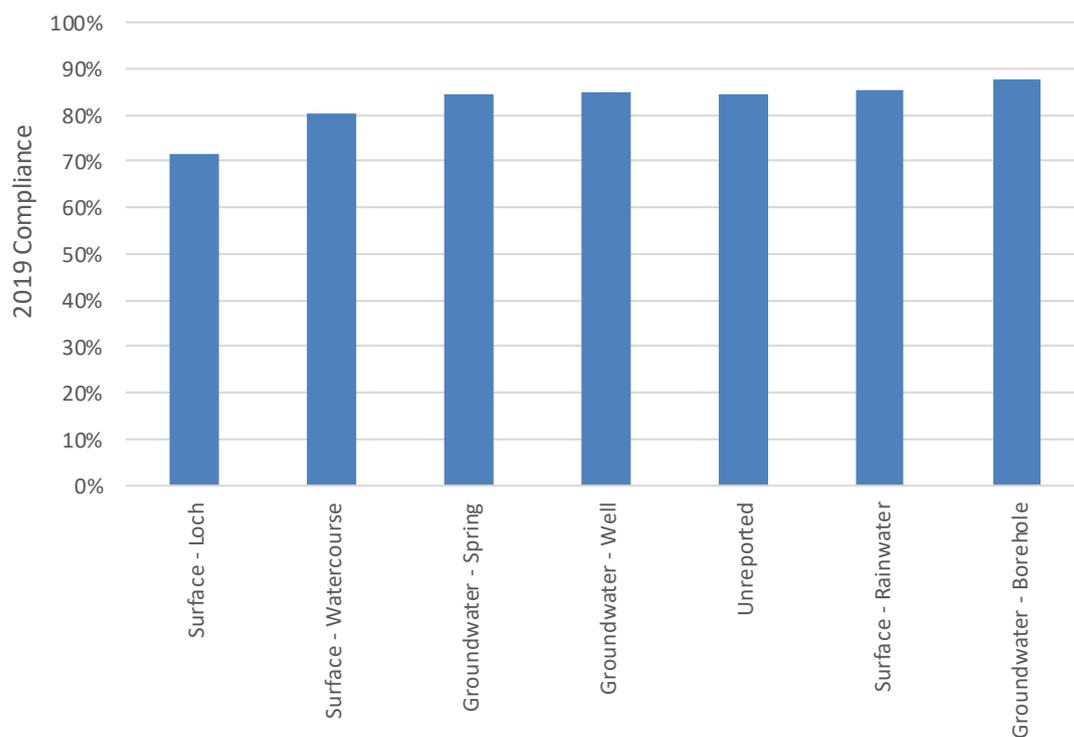


Figure 17: Type B Supplies Compliance by Source

Table 11: Type B Compliance by Source

Source Type	Nr Sample Results 2019	Nr Failures 2019	Compliance 2019	Compliance 2018
Surface - Loch	84	24	71.4%	74.0%
Surface - Watercourse	1,415	277	80.4%	68.0%
Groundwater - Spring	3,694	575	84.4%	76.0%
Groundwater - Well	1,199	183	84.7%	74.0%
Unreported	2,700	422	84.4%	-
Surface - Rainwater	41	6	85.4%	55.0%
Groundwater - Borehole	1,556	190	87.8%	84.0%
Mixed	15	0	100.0%	-

## 5. PRIVATE WATER SUPPLY GRANT

The Scottish Government introduced a grant scheme in 2006 to assist owners and users of private supplies to bring their supplies up to modern standards. The scheme is non-means tested and available to domestic households and businesses. The maximum grant which may be awarded is £800 per property. However the local authority may pay more where they are satisfied that the eligible person could not, without undue hardship, finance the expense of the approved works without such a grant.

The scheme is intended to assist with the one-off capital cost of installing treatment or other measures such as fencing or pipework to help ensure the provision of safe drinking water. It does not cover the ongoing maintenance and disinfection of a private supply which is the responsibility of the owner or user.

During the 2019-2020 financial year £466,092 was awarded directly for PWS improvements which improved 373 supplies. An example of where PWS grant funding has helped towards the upgrade of a supply during 2019 is to a small business in South Ayrshire, where the source and catchment areas are on land belonging to a large estate, some distance away from the business. An application for a windfarm came in to Environmental Health, with part of the site being within the South Ayrshire Council boundary area. Within the boundary and situated directly above the source uptake, and within the catchment area for the small business PWS, there were plans for borrow pits, a turbine, and associated new access roads.

The small business which consists of kennels and a cattery are totally reliant on the private water supply as there is no public water mains supply in the locality, and so the private supply is crucial.

As the estate own the land on which the planned wind farm was to be built, they were keen to get the application moving. The owners of the business were worried in case their private water supply was affected, as this could ruin their business. They contacted Environmental Health for advice.

An officer carried out a risk assessment of the private supply and source areas, and recommended that the business make a PWS grant application. The officer recommended that a larger collection tank could be installed, and that the source area would benefit from renewing the collection chamber and protection barriers. During the onsite risk assessment it became very obvious due to the lie of the land, the steep gradient of the hillside above the spring source uptake, and the possibility of a large catchment area, that should construction go ahead here, then the private water supply could indeed be damaged, perhaps irreparably. A grant application was processed, and the small business engaged a local water engineer, who installed a new collection tank at the source, and a new protection boundary barrier on the hillside. The £800 grant went some way, but not fully, towards the cost of installation. The bottom holding tank at the foot of the hill was also upgraded through thorough cleaning out, followed by a new lockable roof and lid, and screened outlets. New supply pipes were also installed from source to holding tank.

Meetings and discussions commenced initiated by South Ayrshire Council Environmental Health officer with the energy firm representatives, the estate representatives, and SEPA representatives. It was discovered that a proportion of one of the borrow pits was hydrologically connected to the small business source, and therefore there was a risk from

quarrying activities. Due to the proposed depth of the borrow pit and the ground water depth, it was also realised that water would flow out as overland flow, which would then have the potential to pollute the supply further. To prevent pollution the source – pathway – receptor connection would need to be broken. Mitigation measures would be expensive and perhaps in perpetuity for pollution control, and the cost would later lie with the business owner. After lengthy discussion it was agreed that the borrow pit and the turbine should be removed, as this was the only effective and sure way to protect the private supply.

The enquiry as to grant assistance was the key factor in this application, as the Environmental Officer was able to clarify many points raised as questions, when they carried out the on-site risk assessment for the grant application.

Rural land use in Scotland is changing and it is imperative that private water supply sources and catchments are safeguarded to ensure the viability of rural life and business.

## 6. DWQR ACTIVITY AND RESEARCH

DWQR works with other professionals, including environmental health colleagues, to review and identify areas for action to improve drinking water quality in private water supplies. During 2019 DWQR staff were involved in a number of activities and strands of work involving private supplies. This includes:

### **Local Authority Risk Assessment Training and Support**

The 2017 regulations require that all risk assessments are conducted to a specific standard. DWQR has developed an online risk assessment tool to address this. Following a series of workshops held across Scotland in 2018 to introduce local authority colleagues to the tool, further tailored training sessions were held with individual local authorities to assist with the practical application of the tool and to address any practical issues.

All the information from the training workshops is available on our website at the following link: [PWS risk assessment](#)

### **Lead Research**

Lead in drinking water arises mostly from plumbing in buildings: from lead pipes, lead tanks, lead solder on copper pipes or inferior quality brass fittings and taps. The World Health Organisation advises that there is no safe limit for lead particularly for children. The Scottish Government, with support from DWQR, has established a project to review policy to drive achievement of a reduction of exposure to lead in drinking water, both in private and public supplies. Projects are progressing in relation to schools and nurseries and to quantify the levels lead in housing. The schools and nurseries project is checking for any incidence of lead and to ensure remedial action is taken.

Further information can be found on our website at the following link: [Lead in drinking water](#)

### **Climate Change**

In our 2018 report we noted that the prolonged dry summer had resulted in a large number of private water supplies running dry and, as a consequence, households needing alternative water supplies. The Scottish Government, with the support from DWQR, commissioned a project to understand the likely impacts of climate change on private water supplies. This has concluded that private water supplies are very vulnerable to the impacts of water scarcity arising from climate change with those in the North East of Scotland being at greatest risk.

The report can be found at the following link: [Private water supplies and the potential implications of climate change](#)



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