


**DRINKING WATER QUALITY REGULATOR
FOR SCOTLAND**



**Drinking Water Quality in
Scotland 2018
Private Water Supplies**

CONTENTS

EXECUTIVE SUMMARY	1
1 TYPES OF PRIVATE WATER SUPPLIES IN SCOTLAND	3
2 RISK ASSESSMENT AND SAMPLING	6
3 THE QUALITY OF PRIVATE WATER SUPPLIES	11
4 PRIVATE WATER SUPPLY GRANT	20
5 DWQR ACTIVITY AND RESEARCH	22
ANNEXES	25
Annex A – The Regulatory Framework	25
Annex B – Index of Information Letters issued during 2018	27

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 2018 and is for private water supplies. A similar report on the quality of water supplied by Scottish Water was published on 30 July 2019.

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. 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.

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 2018 local authorities reported to DWQR that there are 21,980 private supplies in Scotland, supplying around 196,536 people. Of these, 3,106 are Regulated (former “Type A”) supplies and 18,874 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 3.6% 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.

Environmental Health teams from local authorities sample Regulated supplies annually, and undertake a full risk assessment every five years. In 2018, only 75% of those supplies registered with local authorities were sampled. This, in part, reflects the additional time local authorities have had to take to review systems, resourcing and arrangements to meet additional responsibilities, which included reclassification of privately rented properties from “Type B” to “Regulated”. This increased the number of Regulated supplies by 612 in 2018 and the number is likely to increase further in 2019 as more rented properties are included. DWQR will be reviewing sampling performance with those local authorities with the lowest sampling rates. A new, web-based tool was introduced by DWQR in early 2019 to ensure risk assessments are undertaken in a consistent way. In 2018, local authorities reported that 68% of Regulated supplies received a risk assessment or had their risk assessment reviewed, reflecting the transition to the new Regulations requiring a risk assessment to be carried out every five years.

42,440 tests were carried out on samples taken from Regulated PWS to check for a range of contaminants. In total, 93.5% of tests complied with the standards. The smaller Type B

supplies fall out with 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, 12,213 tests were undertaken and 89.6% 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 11% of Regulated supply samples taken across Scotland during 2018. This is almost unchanged from the previous year. 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 2018, 16 Enforcement Notices were served by local authorities across Scotland. This an encouraging upturn on previous years, but more needs to be done given the number of failing supplies. 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.

Results confirm that at a national level, the quality of Regulated PWS is broadly constant and 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. In addition to *E. coli*, other parameters with significant numbers of failures on PWS included coliforms, colour, hydrogen ion (pH), iron, manganese and lead.

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. These are available from local authorities to all who own or use a PWS. In 2018/19, £511,241 was awarded for PWS improvements. According to the data provided by local authorities this funding improved 385 supplies.

The prolonged dry weather in 2018 resulted in many PWS running dry. In response, the Scottish Government provided funding to support the provision of emergency supplies of drinking water to affected households which allowed local authorities to put appropriate arrangements in place to provide alternative drinking water supplies to those which had dried-up. The event in 2018 has highlighted the vulnerability of PWS to a changing climate and the need for the resilience of supplies to be taken into consideration when undertaking risk assessments and/or delivering improvements.

1 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 2018, the data provided to the Drinking Water Quality Regulator for Scotland (DWQR) by local authorities showed that there are 21,980 private supplies in Scotland. This data confirms that around 196,536 people (3.6% 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 including 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 10 m³ of water a day or more, 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, rented property 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 2018 for the two different categories of supply.

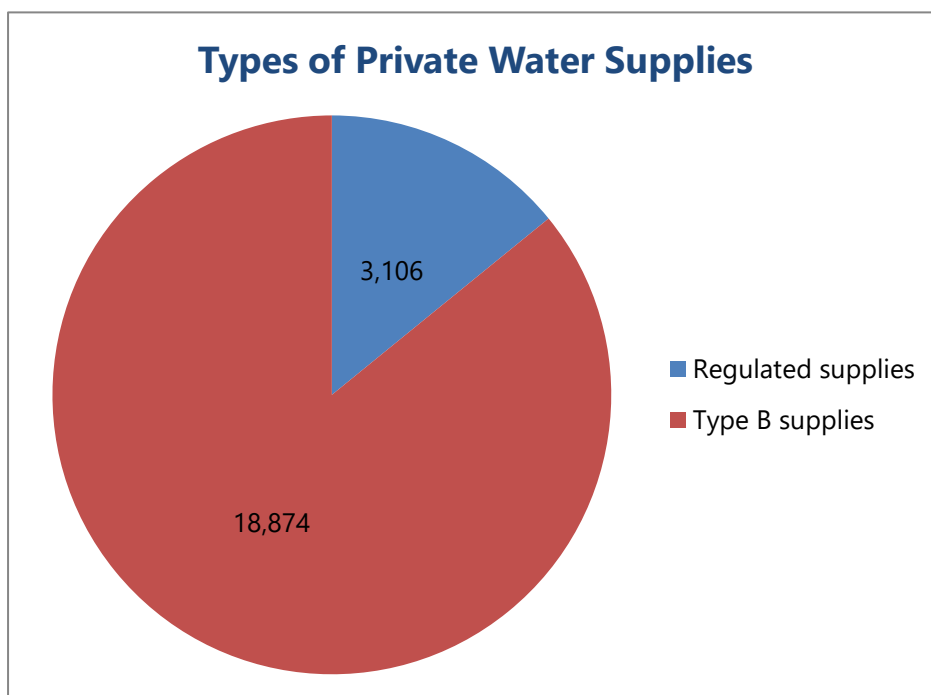


Figure 1 Private Water Supplies by Type

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	Number of Regulated Supplies	Number of Type B Supplies	Total	Population on PWS
Aberdeen City	8	46	54	263
Aberdeenshire	279	7,635	7,914	31,100
Angus	43	370	413	3,279
Argyll and Bute	511	2,840	3,351	27,284
Clackmannanshire	6	22	28	276
Dumfries and	219	1,252	1,471	22,040
Dundee City	0	1	1	27
East Ayrshire	16	200	216	926
East Dunbartonshire	1	18	19	159
East Lothian	16	24	40	555
East Renfrewshire	7	130	137	1,355
City of Edinburgh	6	9	15	157
nan Eilean Siar	14	39	53	480
Falkirk	No data provided			
Fife	71	261	332	3,880
Glasgow City	0	0	0	0
Highland	767	1,729	2,496	39,771
Inverclyde	9	55	64	1,117
Midlothian	34	31	65	411
Moray	101	748	849	4,862
North Ayrshire	25	251	276	2,385
North Lanarkshire	0	15	15	44
Orkney Islands	32	207	239	2,301
Perth and Kinross	578	1,055	1,633	30,392
Renfrewshire	4	3	7	25
Scottish Borders	199	1,262	1,461	15,451
Shetland Islands	1	56	57	177
South Ayrshire	45	186	231	1,047
South Lanarkshire	29	8	37	527
Stirling	70	363	433	5,530
West Dunbartonshire	7	13	20	198
West Lothian	8	45	53	523
Scotland	3,106	18,874	21,980	196,536

Whilst on average 3.6% 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 pie chart shown in **Figure 2** sets out those local authority areas with the greatest proportion of PWS. Just over 83% of the population served by PWS in Scotland are contained in six local authority areas.

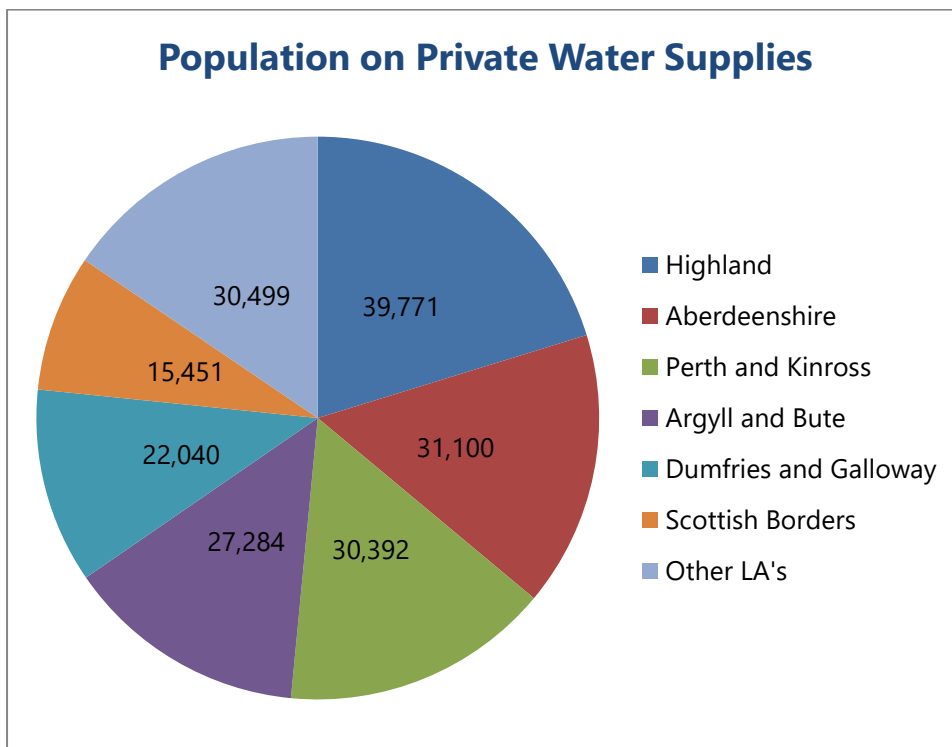


Figure 2 Distribution of Population on Private Supplies across Scotland

2 RISK ASSESSMENT AND SAMPLING

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 supplies serving more than fifty people or which supply a commercial or public activity. 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.

Table 2 below shows that in 2018, 68% of Regulated supplies had a completed or reviewed risk assessment. This is a reduction on the position in 2018 which is due to the shift from annual risk assessment reviews to comprehensive five yearly full risk assessments introduced in October 2017 by The Water Intended for Human Consumption (Private Supplies) (Scotland) Regulations 2017. A number of local authorities continued their practice of reviewing all risk assessments despite this not being a regulatory requirement and this, in part, explains the variation in this metric. Additionally, a change in the guidance which accompanies the new 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. It is, however, of some concern that for some councils, the numbers of risk assessments completed is very low. In particular, Perth and Kinross Council reported that no risk assessments were completed during 2018. DWQR will discuss this with the council.

Table 2 Risk Assessment of Regulated Supplies

Local Authority	Number of Reg. supplies	Reg. Risk Assessment or Review	% Regulated Supplies Risk Assessed
Aberdeen City	8	8	100
Aberdeenshire	279	279	100
Angus	43	43	100
Argyll and Bute	511	492	96
Clackmannanshire	6	6	100
Comhairle nan Eilean Siar	14	11	79
Dumfries and Galloway	219	199	91
Dundee City	0	-	-
East Ayrshire	16	16	100
East Dunbartonshire	1	1	100
East Lothian	16	7	44
East Renfrewshire	7	7	100
City of Edinburgh	6	1	17
Falkirk	No Data Provided		
Fife	71	61	86
Glasgow City	0	-	-
Highland	767	736	96
Inverclyde	9	0	0
Midlothian	34	1	3
Moray	101	46	46
North Ayrshire	25	2	8
North Lanarkshire	0	-	-
Orkney Islands	32	29	91
Perth and Kinross	578	0	0
Renfrewshire	4	4	100
Scottish Borders	199	28	14
Shetland Islands	1	1	100
South Ayrshire	45	35	78
South Lanarkshire	29	25	86
Stirling	70	47	67
West Dunbartonshire	7	7	100
West Lothian	8	8	100
Scotland	3,106	2,100	68

At the start of 2019, DWQR launched a new web-based risk assessment tool for local authorities to use (**Figure 3**). This was introduced to ensure that all local authorities were risk assessing to the same standard and were meeting new requirements for risk assessment under the EU Drinking Water Directive. The tool was also an opportunity to assist local authorities by providing mapping and photograph storage as well as bringing improvements to DWQR’s ability to report on PWS risks.

Six two-day training sessions were delivered to local authorities in autumn 2018, and these have been followed up with individual visits. It is expected that all Regulated supplies will be assessed using the new tool, and it can also be used for Type B supplies.

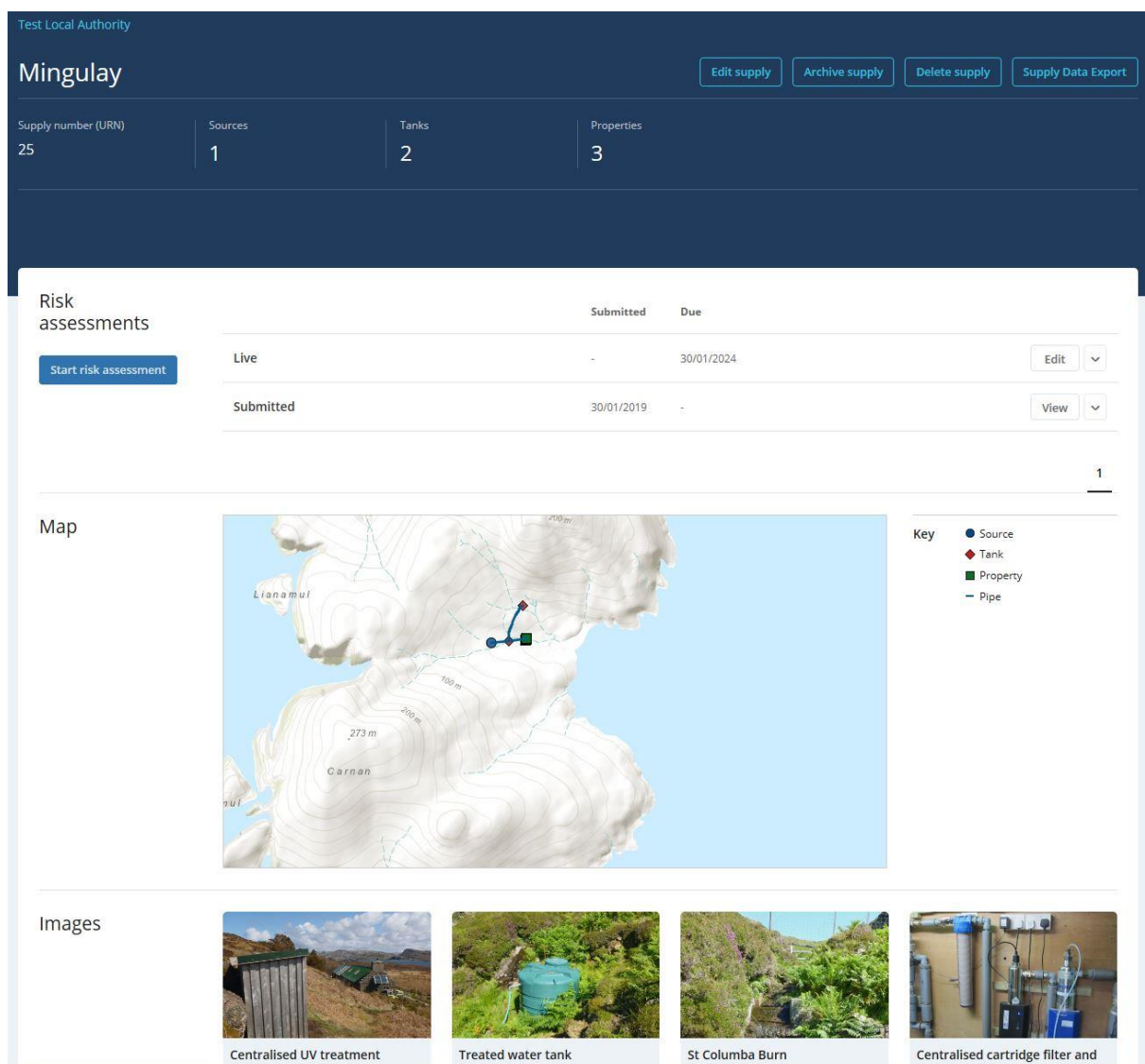


Figure 3 DWQR Risk Assessment Tool -- Example

Sampling

Local authorities are required by Regulations to sample all supplies which serve more than fifty people or where commercial or public activity is undertaken in premises in their area at least once a year. 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.

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 rarely fail and are found at a reasonably constant concentration in water supplies across the area. This approach is intended to reduce the number of tests that need to be carried out on individual supplies.

Table 3 shows the number of Regulated supplies that were tested for at least one parameter during the year, broken down by local authority. In 2018, across Scotland, 75% of Regulated supplies were sampled. Sampling rates has shown a steady decline since 2015, when 94% of supplies were sampled. Eleven local authorities sampled more than 90% of their Regulated supplies and eight achieved 100% compliance. 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 four councils only sampling half of their Regulated supplies or less. This may be due to resources being redirected to risk assessments or to considering and developing a strategy to implement the additional requirements associated with rented properties. Differences in the approach taken to identifying and registering PWS serving privately rented properties that are now classified as Regulated supplies, also accounts for some of the differences between councils.

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

In 2018 a total of 54,653 tests were carried out on PWS: 42,440 on Regulated supplies; and 12,213 on Type B supplies.

Table 3 Regulated Supply Sampling Compliance

Local Authority	Number of Regulated Supplies	Supplies Sampled	% 2018 Compliance	% 2017 Compliance
Aberdeen City	8	8	100	0
Aberdeenshire	279	268	96	95
Angus	43	37	86	72
Argyll and Bute	511	488	95	95
Clackmannanshire	6	4	67	100
Comhairle nan Eilean Siar	14	8	57	69
Dumfries and Galloway	219	169	77	84
Dundee City	0	0	0	0
East Ayrshire	16	16	100	100
East Dunbartonshire	1	1	100	0
East Lothian	16	8	50	83
East Renfrewshire	7	7	100	80
Edinburgh City of	6	4	67	100
Falkirk	No Data Provided			
Fife	71	58	82	97
Glasgow City	0	0	0	0
Highland	767	602	78	88
Inverclyde	9	9	100	100
Midlothian	34	24	71	100
Moray	101	91	90	98
North Ayrshire	25	24	96	100
North Lanarkshire	0	0	0	0
Orkney Islands	32	25	78	81
Perth & Kinross	578	261	45	86
Renfrewshire	4	4	100	100
Scottish Borders	199	92	46	52
Shetland Islands	1	0	0	100
South Ayrshire	45	30	67	88
South Lanarkshire	29	19	66	83
Stirling	70	53	76	80
West Dunbartonshire	7	7	100	100
West Lothian	8	8	100	100
Scotland	3,106	2,325	75	87

3 THE QUALITY OF PRIVATE WATER SUPPLIES

Many private water supplies (PWS) suffer from inadequate treatment and poor or variable raw water quality. Consequently, compliance with the standards for drinking water quality is much lower than for Scottish Water’s public supplies where the company is responsible for treatment of drinking water and ensuring compliance with quality standards. With private water supplies the responsibility rests with users, although local authorities have enforcement responsibilities to secure compliance. Some PWS may present a risk to health unless users initiate appropriate action to improve water treatment systems.

Regulated Private Water Supplies

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

Table 4 Regulated Private Water Supply Compliance for Key Parameters

Parameter	No. Regulated Samples	No. Regulated Samples Failed	% Regulated Samples Failed	Regulated PWS Compliance %
All Parameters	42,440	2,766	6.52	93.48
Coliform Bacteria	2,298	502	21.85	78.15
E. coli	2,283	251	10.99	89.01
Clostridium perfringens	2,223	137	6.16	93.84
Colony Counts @22°C	1,375	n/a	n/a	n/a
Enterococci	2,271	483	21.27	78.73
Colour	2,236	285	12.75	87.25
Copper	2,125	132	6.21	93.79
Hydrogen ion (pH)	2,233	354	15.85	84.15
Iron	2,195	197	8.97	91.03
Lead	2,220	123	5.54	94.46
Manganese	2,180	114	5.23	94.77
Nickel	2,122	36	1.70	98.30
Turbidity	2,238	38	1.70	98.30
Zinc	2,115	3	0.14	99.86

Overall, based on the number of samples taken, Regulated PWS compliance decreased from 95.09% last year to 93.48% this year. **Figure 4** shows percentage compliance for Regulated supplies over the past eight years.

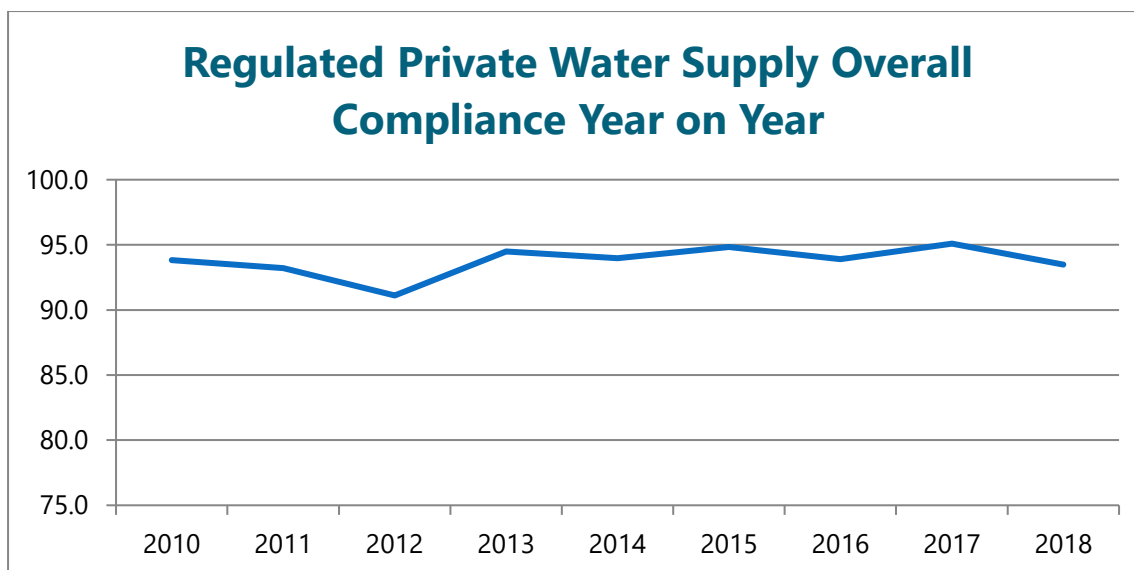


Figure 4 Type A Private Water Supply Overall Compliance Year on Year

These results suggest that at a national level at least, the quality of Regulated supplies is broadly constant and has not improved overall since 2010, in spite of ongoing efforts by local authorities and the availability of a Scottish Government-funded grant to incentivise improvements.

It is not possible to relate the fall in compliance to any particular parameter.

Table 5 Regulated Private Water Supplies Zonal Sample Compliance

	No. of Tests Failed	% Tests Failed
Argyll	172	10.1
Clyde	76	9.3
Forth	8	1.4
North East Scotland	0	0.0
Solway	32	2.4
Tay	1	0.7
Tweed	4	1.0
North Highland	0	0.0
West Highland	0	0.0

Table 5 shows the number and percentage of failing tests on zonal samples in 2018. The parameters failing most frequently are colour, hydrogen ion (pH), iron and the microbiological parameters. These are also parameters that are tested annually on each PWS. The Argyll zone has the greatest number of failing samples. This zone also recorded a high number of tests in 2018, but the percentage failing was also higher than for other zones. Further work is required to better understand these statistics.

Metals

Compliance for lead and other metals found in plumbing systems, such as copper, is poor. These metals can dissolve into water where the water is corrosive. 5.5% of samples from Regulated supplies failed the standard for lead, which is a slight deterioration on last year, suggesting minimal progress is being made. Lead is a very important parameter and the standard is set for health based reasons because exposure to lead can have serious implications, particularly for young children. Compliance for copper has deteriorated compared to 2017, with 6.2% of samples taken from Regulated supplies in 2018 not meeting the standard, just under twice the failure rate of the previous year. This parameter in particular does seem very variable, probably reflecting its dependence on specific plumbing situations. On a similar theme, 1.7% of nickel samples failed to meet the standard - actually an improvement on 2017- but also likely to be related to plumbing.

Many Scottish waters are naturally soft which is corrosive to metals without further treatment and conditioning. This is an essential but often neglected part of the treatment process, and many supplies do not have any adequate water conditioning stage to reduce the corrosive nature of the water. The compliance data for hydrogen ion (pH) shows that 15.9% of samples were outside the permitted range for this parameter, although compliance for this parameter continues to improve on previous years.

In order to prevent dissolution of plumbing metals, soft waters need to have their alkalinity increased, which in simple terms means the pH and the concentration of dissolved minerals needs to be increased so that the water no longer has a tendency to corrode metals. 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.

Many Regulated PWS in Scotland do not comply with the standards for a number of other metals. Iron (9.0% of samples failing), manganese (5.2% of samples failing) and aluminium (1.4% of samples failing) are mainly naturally occurring, and many PWS have no treatment process capable of removing them. In many cases, simple filtration is all that is required, although in some cases a pre-oxidation stage is also needed. Iron can also be derived from corroding iron pipework and fittings within the PWS itself.

The effect of these metals is mostly aesthetic, although they can clog filters and coat ultra-violet disinfection lamps, rendering these ineffective and potentially exposing the users to invisible microbiological hazards.

Additionally, careful design of the plumbing system and use of the appropriate approved materials will help to limit corrosion. Knowledge and control of the materials used in the distribution of PWS is often poor, and a thorough water safety plan for a supply should aim to document all materials used in the system and assess any potential impact they might have on water quality. It is worth noting that even some metal alloy fittings that are approved for water use may contain quantities of lead, so care should be taken in product selection.



A Private Water Supply Storage Tank in the Cairngorms with Dubious Construction

The improvement in hydrogen ion (pH) compliance suggests that local authorities may be starting to have some success at improving this aspect of PWS, although this hasn't translated into a corresponding consistent improvement in compliance for the plumbing metals copper and lead, perhaps suggesting the impact of plumbing materials is hindering any progress with water conditioning.

Microbiology

In 2018, over 78% of samples taken from Regulated PWS across Scotland did not contain any coliforms. Although it is a slight improvement on 2017, this leaves nearly 22% (502 samples) that contained at least one coliform, indicating that the disinfection process may not be operating effectively or that water was being contaminated after disinfection.

The percentage of water supplies failing for *E. coli* has marginally improved. In 2018, 11.5% of samples contained *E. coli*. *E. coli* can cause illness in humans, and it is concerning that compliance for this parameter is not really improving. Another faecal indicator organism, *Enterococci*, was present in 21.3% of Regulated water supplies, well over double the failure rate for the preceding year. There is no obvious reason for this and it is concerning, given that Regulated supplies are those most likely to be consumed by members

of the public visiting a commercial enterprise or staying in tourist accommodation. To ensure public health, it is standard practice for local authorities to inform users on unsatisfactory supplies where *E. coli* or *Enterococci* is isolated as a precaution and 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 these investigations, consideration is given to additional monitoring and sampling; discussion on the availability of grant; and potential enforcement action to secure improvements.



A Dustbin Used as a Crude Collection Device

Table 6 shows compliance for *E. coli* by local authority. It is difficult to compare compliance results between local authorities due to the wide disparity in the numbers of supplies between local authorities and the number of different factors which may influence sample results.

Table 6 Compliance for *E. coli* – Regulated Supplies

Local Authority	Number of Tests	Number of Fails	Compliance (%)
Aberdeen City	8	0	100
Aberdeenshire	268	15	94
Angus	0	0	-
Argyll and Bute	484	78	84
Clackmannanshire	5	2	60
Comhairle nan Eilean Siar	8	0	100
Dumfries and Galloway	167	22	87
Dundee City	0	0	-
East Ayrshire	16	3	81
East Dunbartonshire	1	0	100
East Lothian	8	0	100
East Renfrewshire	6	0	100
City of Edinburgh	4	0	100
Falkirk	No Data Provided		
Fife	58	6	90
Glasgow City	0	0	-
Highland	596	47	92
Inverclyde	8	1	88
Midlothian	24	4	83
Moray	88	7	92
North Ayrshire	24	3	88
North Lanarkshire	0	0	-
Orkney Islands	30	5	83
Perth and Kinross	259	30	88
Renfrewshire	4	0	100
Scottish Borders	101	14	86
Shetland Islands	0	0	-
South Ayrshire	29	3	90
South Lanarkshire	19	5	74
Stirling	53	6	89
West Dunbartonshire	7	0	100
West Lothian	8	0	100
Scotland	2,283	251	89

For those councils with a significant number of supplies, it can be seen that compliance for *E. coli* is generally around 90%. A number of factors are responsible, including fluctuating raw water quality; inadequate or inconsistent treatment processes; and poor or no maintenance of treatment systems. With Regulated supplies serving multiple properties, the requirement to take a representative sample of the supply invariably results in some samples being taken from properties where the water may be untreated or treated to a lower quality than the

standard of treatment in the commercial properties on the supply. In the coming years, the inclusion of privately rented accommodation within the definition of a commercial activity will introduce a large number of previously unregulated PWS into these statistics, meaning compliance may fall in the coming years until lasting improvements can be made.

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*.

Enforcement 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). Users must also be 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 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 formally setting out 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 2018, 16 Notices were served on failing PWS of both categories across the whole of Scotland. These include two dairies; one community with a sizeable hotel; and a caravan park with a potential population of 220. Six different councils served Notices. This is very encouraging based on an apparent reluctance to enforce in previous years, but more needs to be done given the number of failing supplies and the length of time most have had in which to make improvements. 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. The 2017 Regulations enhance the enforcement options open to local authorities, as opposed to solely Improvement Notices, and are intended to increase the level of formal enforcement. 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.

Type B Private Water Supplies

Table 7 shows some of the key parameters that Type B supplies are monitored for and how supplies are complying with the relevant standards.

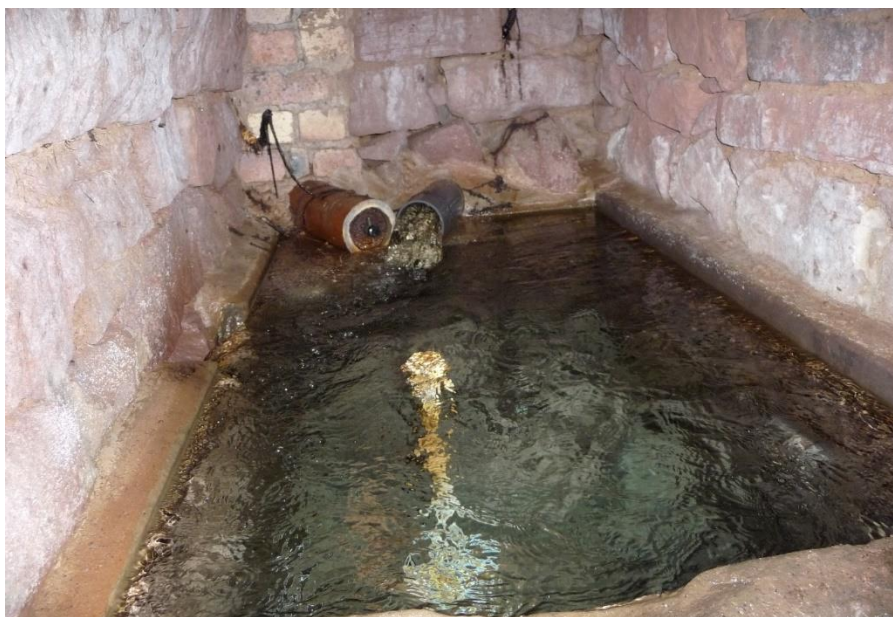
Table 7 Type B Private Water Supply Compliance for Key Parameters

Parameter	No. Type B samples	No. Type B Samples Failed	Type B % Samples Failed	Type B % Compliance
Total	12,213	1,271	10.41	89.59
Coliform Bacteria	865	301	34.80	65.20
<i>E. coli</i>	855	139	16.26	83.74
Colour	305	52	17.05	82.95
Turbidity	802	50	6.23	93.77
Hydrogen ion (pH)	830	173	20.84	79.16
Aluminium	155	14	9.03	90.97
Iron	650	108	16.62	83.38
Manganese	612	87	14.22	85.78
Lead	803	48	5.98	94.02

Type B PWS are monitored mainly at the request of the owner or user of the supply. Consequently, the supplies from which samples are taken are different each year and a direct comparison of the data is difficult. For most of the main parameters, the smaller Type B supplies show a similar trend to the 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 16% of samples contained *E. coli* and 34% contained coliforms. Although these are a significant improvement on the preceding years, there is limited confidence that such an improvement will be sustained. This suggests that disinfection of these supplies is only present and consistently effective in less than two thirds of supplies, and a significant proportion of users may be placing themselves at risk by consuming the water.

Overall compliance against the regulatory standards increased slightly in 2018.

As in previous years, source type appears to have a significant bearing on microbiological quality of both Regulated and Type B supplies. **Table 8** shows compliance of scheduled



An underground Private Water Supply source in the South of Scotland

samples for microbiological parameters (in this instance, comprising coliforms, *E. coli*, *Clostridium perfringens*, *Enterococci* by water source type), regardless of any treatment present on the supply. This clearly shows that groundwater sources, especially boreholes, are less likely to suffer from

microbiological contamination than surface water sources, although the difference is less stark than in previous years.

Although preferable to surface waters, it cannot be assumed that underground waters are immune from contamination. In Scotland many groundwater supplies are heavily influenced by surface water, so are vulnerable to faecal contamination and consequently require robust treatment. Further contamination may also occur between the point of abstraction and the point at which the water is consumed.

Table 8 Microbiological Compliance by Source Type

Source Type	Compliance %	
	Regulated	Type B
Groundwater Borehole	88	84
Groundwater Spring	83	76
Groundwater Well	85	74
Surface Water Loch	76	74
Surface Water Rainwater	79	55
Surface Water	75	68

4 PRIVATE WATER SUPPLY GRANT

Water Scarcity and Additional Funding

2018 was one of warmest and driest years on record. Some parts of Scotland received only 75% of normal rainfall with the numbers of sunshine hours exceeding 120% of normal values.¹ The reduced rain and warmer temperatures resulted in a scarcity of water in the environment leading to the drying up of PWS across Scotland.

Many PWS are sourced from small catchments including burns and small lochs which will dry out during prolonged periods of dry weather. In 2018, some 500 PWS were reported to local authorities as having run dry and, as a result, provisions of emergency assistance were required. It is expected that many more ran dry, but that households chose to make their own arrangements to secure alternative supplies. The north east of Scotland was particularly badly affected. One hundred and sixty five supplies were reported to the Aberdeenshire Council as failing including a large supply which provides drinking water to 50 properties.

As the water scarcity developed at the beginning of July and increasing numbers of households reported their supplies drying up, the Scottish Government agreed to provide additional grant funding to local authorities and Scottish Water to enable emergency assistance to be provided to these households free of charge. Emergency assistance took the form of bottled water which was delivered to each local authority for onward distribution. £475,432 was paid in grant. Local authorities responded by developing local arrangements to store and distribute bottled water to those supplies where water had dried out. This was successful and utilised by many users of private water supplies across Scotland.

The prolonged dry weather in 2018 has highlighted the vulnerability of PWS to a changing climate. Given the changes forecasted to Scotland's climate in the coming years, it is essential that users, owners and local authorities give consideration to the resilience of PWS when undertaking risk assessments and/or delivering improvements.

Private Water Supply Grant

The Scottish Government introduced a grant scheme in the 2006 Regulations 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

¹ https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/summaries/uk_monthly_climate_summary_annual_2018.pdf

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.

In the 2018-2019 financial year £511,241 was awarded directly for PWS improvements which improved 385 supplies.

One case study of where grant funding has made a significant difference to the consumers of a private supply during 2018 is from Aberdeenshire:

In June 2018 Aberdeenshire was beginning to feel the real impact of the water scarcity problem with increasing numbers of people contacting the Council to enquire about assistance in solving the problem of a failing water supply.

This was a particular problem for a large family on the outskirts of one of the more remote villages near Huntly as their old and deep stone built well (see attached picture) could not supply enough water to meet their already restricted demands.



The Council were able to assist, first of all, by arranging deliveries of bottled water and subsequently the installation and regular refilling of two large bowsers.

At that point it was hoped that scarcity problems would be short lived but their supply showed no signs of significant improvement as summer moved to winter and it was recognised that an alternative supply would be needed. The first option was to contact Scottish Water to determine the feasibility of a mains connection but when that proved impracticable due to the distance from the connection point and the difficulties in obtaining appropriate wayleaves, a site for a borehole was found and drilling commenced.

Grant aid was provided to help with the cost and the Council has now been able to remove the bowsers as the family have an adequate and fully treated supply.

5 DWQR ACTIVITY AND RESEARCH

DWQR Activity

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 2018 DWQR staff were involved in a number of activities and strands of work involving private supplies.

This includes:

Verotoxigenic *E.coli* (VTEC) Action Group

Following *E. coli* outbreaks in Scotland a multi-agency group was formed to consider ways to disrupt the transmission of VTEC/ *E. coli* O157 from source to humans. The resulting Action Plan comprises 86 recommendations designed to tackle VTEC/ *E. coli* O157 infection in Scotland. An Implementation Group oversaw the progress on implementation of the recommendations, some of which relate to PWS Progress with the Action Plan was formally reported on earlier this year.

Local Authority Risk Assessment Training

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 and during 2018 we held a series of workshops across Scotland to introduce local authority colleagues to the tool, and to train them in water treatments they are likely to find whilst risk assessing. This work is ongoing with DWQR visiting individual local authorities to assist with the practical application of the tool.

All the information from the training workshops is available on our website.

<http://dwqr.scot/private-supply/private-water-supplies-risk-assessment/>

Lead

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 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. The project is looking to identify enablers and to strengthen or introduce mechanisms with a range of stakeholders and influencers for the removal of lead services pipes and plumbing. The project update can be found at <http://dwqr.scot/media/14148/research-current-dwqr-lead-in-drinking-water-project-briefing.pdf>.

Current and Completed Research

During 2018 DWQR contributed to and supported a number of research projects commissioned either by the Scottish Government or other agencies, which relate to PWS. Completed research papers are available either on our website: <http://dwqr.scot/information/research/previous-research-projects/> or on the Centre of Expertise for Waters (CREW) website: <http://www.crew.ac.uk/publications>.

Epidemiological Impact of Private Water Supplies

This project started in 2015 and aims to assess the health risks from exposure to a range of microbiological contaminants commonly found in PWS source waters. The study will also examine existing water quality data and reported cases of illness in order to quantify the potential disease burden from untreated PWS. This project is due to report during 2019.

Impact of Private Water Supplies on Growth and the Rural Economy

This project started in 2018 and aims to investigate the potential and actual impact of PWS on growth and the rural economy and consequently population distribution. This project is due to be completed in 2019.

Pollution Risk in Catchments

We contributed to a NERC-funded project with the universities of Stirling, Lancaster and Durham to develop a user-friendly tool for predicting the amount of faecal pollution in catchments and the runoff to water courses.

<http://www.scimap.org.uk/>

Private Water Supply Risk Areas

We commissioned CREW to review available data and develop risk mapping for the sources of two groups of industrial chemicals.

<https://www.crew.ac.uk/publication/risks-private-water-supplies-presence-and-polyfluoroalkyl-substances-pfas>

Assessing Information on Private Water Supplies

DWQR and the Consumer Futures Unit of Citizens Advice Scotland commissioned research to find out how accessible information is to consumers on their rights and responsibilities for private water and sewerage services.

<https://www.cas.org.uk/publications/testing-waters-assessing-information-private-water-supplies-and-sewerage-facilities>

Water Scarcity

We contributed to research undertaken by ClimateXChange on the water scarcity issues experienced across Scotland during the exceptional weather of summer 2018.

<https://www.climateexchange.org.uk/media/3676/cxc-private-water-supplies-in-a-changing-climate-insights-from-2018.pdf>

ANNEX A THE REGULATORY FRAMEWORK

The regulatory standards for drinking water quality in Scotland largely stem from European Directives. These standards are based on guidelines developed by the World Health Organisation to protect public health.

Our key domestic water quality legislation includes:

Water (Scotland) Act 1980 (as amended)

- Scottish Water must supply wholesome water for domestic purposes. It is a criminal offence to supply water unfit for human consumption;
- Scottish Ministers must take enforcement action against Scottish Water if it fails in its duty to supply wholesome water (as defined in the relevant regulations) unless the failure is trivial or Scottish Water is complying with a legally binding undertaking to remedy the matter;
- Local authorities must take appropriate steps to keep themselves informed about the wholesomeness of public water supplies in their area and notify Scottish Water if not satisfied; and
- Local authorities are required to secure improvements to private water supplies if they consider them necessary.

Water Industry (Scotland) Act 2002

- Created the post of Drinking Water Quality Regulator for Scotland (DWQR);
- Set out responsibility for enforcing The Water Supply (Water Quality) (Scotland) Regulations 2001;
- Defines DWQR's independent status;
- Defines DWQR's power to obtain information, power of entry or inspection and power of enforcement; and
- DWQR also has emergency power to require a water supplier to carry out works to ensure quality of water supplied is safe for public consumption.

The Private Water Supplies (Scotland) Regulations 2006

- Define wholesomeness in accordance with the EC Drinking Water Directive 98/83/EC;
- Contain provisions for Exempt supplies relating to monitoring and the provision of advice

The Private Water Supplies (Grants) (Scotland) Regulations 2006

- Provide for grants to be paid to eligible persons to enable them to improve their private water supply; and
- Are administered by local authorities and provide for non-means tested grants of up to £800 per property.

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 the formerly defined Regulated supplies. They apply to:

- Any supply which supplies 50 or more persons or more than 10m³ 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
- They clarify that domestic rented premises fall into the scope of commercial activity.

ANNEX B PWS INFORMATION LETTERS ISSUED DURING 2018

There were no Information Letters issued during 2018 in relation to private water supplies.

Copies of letters issued are available on the DWQR website:

www.dwqr.scot



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