

# Water Quality Report 2016

Sampling under The Water Supply (Water Quality) Regulations, 2016.



## FOREWORD...

### Guernsey Water's vision:

*“Customers always value the quality of our drinking water and the safe return of our waste water to the environment”*

In 2016, Guernsey Water provided 4,574 megalitres of safe and high quality drinking water (over 4 times the volume of St Saviours Reservoir) to its customers.




Protecting public health with clean, fresh wholesome drinking water is vitally important to Guernsey Water and in 2016 we conducted 6,866 laboratory analyses on compliance samples taken at water treatment works, service reservoirs and customers taps. These samples verify that the water produced at treatment works and supplied to customers complies with the standards set out in the regulations we follow as best practice.

Many more samples were analysed both in laboratories and onsite for operational reasons over and above these compliance samples, providing additional checks and monitoring of the performance of our assets.

The quality of water supplied was excellent with 99.91% of 6,866 analyses meeting the prescribed standards. The achievement of such a high compliance figure is due to the collective technical expertise of our staff that covers all aspects of the science and engineering of the public water supply.

Safe, clean drinking water is vital to public health and the wellbeing of our island. This is ever more important in the face of significant challenges to drinking water supplies from the impacts of climate change on the quality and availability of water resources. It is essential that good quality drinking water, and the investment by Guernsey Water necessary to achieve it, is maintained into the future.

### 2016 Water Quality Key Performance Indicators

- **Achieve 99.5% compliance for Maximum Admissible Concentrations at Water Treatment Works** 
- **Achieve 99% compliance for Maximum Admissible Concentrations at service reservoirs** 
- **Achieve 99% compliance for Maximum Admissible Concentrations at customer taps** 

Guernsey Water has achieved its 2016 water quality targets with 100% compliance recorded at the Service Reservoirs and Water Treatment Works for the second year running and overall compliance being higher than that of 2015. Guernsey Water continues to provide safe, high quality drinking water to the satisfaction of its customer's requirements. There are a small number of occasions where water quality does not meet the high standard we expect and our customers deserve. We must continue to investigate and strive to eliminate these to further improve the quality of Guernsey's public drinking water supplies.

**STEPHEN LANGLOIS**  
**GENERAL MANAGER WATER SERVICES**

## SUMMARY...

Tests taken from Guernsey Water's 3 operational treatment works, 3 service reservoirs, water tower and customers' taps in 2 water supply zones show that 99.91% of the 6,866 analyses met all national and European Union standards. This shows an increase compared to the 2015 overall compliance, which was 99.84%.

Guernsey Water is regulated by the Director of Environmental Health and Pollution Regulation (DEHPR), with the current standard by which water quality is measured taken from England and Wales in the form of The Water Supply (Water Quality) Regulations, 2016. The regulations set out the parameters to be analysed for (Appendix A) and the required frequency of testing.

In 2016 there were no breaches at Longue Hougue, Kings Mills or St Saviours water treatment works and measures to improve bacterial quality of the Island's service reservoirs have had a continuing positive effect, with 100% compliance also being recorded at the 3 service reservoirs and the Water Tower. 2016 is the third consecutive year on record that has seen 100% compliance from all service reservoirs and the water tower.

Supply zones (customer tap samples) had 6 failures in total; 4 were for bacteriological parameters and 2 were Trihalomethane (THM) failures. Bacteriological parameters being present does not necessarily indicate ingress of contamination but they should be absent from treated water so their presence should always be investigated. THMs are disinfection by-products formed primarily by reactions between chlorine and organic matter (measured as Total Organic Carbon). There are a number of factors which influence the formation of disinfection by-products and these include the type and concentration of disinfectant, the concentration of organic matter within the treated water, the temperature, pH and contact time/length of the distribution network.

The 4 bacteriological failures were taken from customer's taps and on further investigation and resampling it was identified that one of the failures had been due to the presence of biofilm within the tap structure and so was not related to the quality of the mains water supplied, the 3 other bacteriological failures were on investigation found to be attributable to areas of low flow in the distribution system, 2 of which were identified as being due to a closed valve in the system that was not restored following work on the system. This will be an area of focus in 2017 as we model our distribution system to minimise water age and introduce processes to manage our distribution system more effectively.

THM formation remains an area of focus and further work will be undertaken in 2017 to further reduce these by operational and capital investment. The UK Drinking Water Inspectorate (DWI) is however clear that *"at all times that actions taken to minimise disinfection by-product formation should not compromise the effectiveness of the disinfection process."* Guernsey Water follow this guidance as best practice.

Guernsey Water regularly analyses for 160 pesticides and of these only 29 were detected and no breaches of the 0.1 µg/l limit were observed. We have continued to monitor our streams regularly for the presence of glyphosate which is regularly detected but at present remains a low risk, and we will continue to monitor for this parameter in 2017 to ensure that the levels we find are of no concern to our treatment processes.

Perfluorooctane sulphonate (PFOS) has been monitored on a regular basis both in the raw water in St Saviours Reservoir and treated water leaving St Saviours water treatment works. The maximum result detected in the treated water analysis was 0.027µg/l (ppb) which is within tier 1 (<0.3µg/l) of the guidance issued by the UK DWI on PFOS ([http://dwi.defra.gov.uk/stakeholders/information-letters/2009/10\\_2009annex.pdf](http://dwi.defra.gov.uk/stakeholders/information-letters/2009/10_2009annex.pdf)). Categorisation as Tier 1 merely recognises that there may be a potential hazard which should as a minimum be considered by a risk assessment. Guernsey Water has gone much further than this to ensure the protection of drinking water quality by working closely with the DEHPR and other States of Guernsey Departments to actively reduce PFOS levels found in raw water through the treatment of stream water from affected

catchments as well as the removal and containment of contaminated soils. The affected catchments have also been closely monitored and measures put in place (such as stream divers) to minimise levels in raw waters. This has had a positive effect with a drop in the maximum detected PFOS concentration recorded in the raw water stored at St Saviours Reservoir from 0.077 $\mu\text{g/l}$  in 2015 to 0.074 $\mu\text{g/l}$  recorded in 2016. There was a decrease in the maximum PFOS concentration detected in samples collected from streams, from 14 $\mu\text{g/l}$  in 2015 to 5.6 $\mu\text{g/l}$  in 2016. This was due to a combination factors including the removal of contaminated soil from the catchment and natural variation in rainfall amounts.

There were a total of 114 water quality enquiries from customers in 2016, compared to 226 in 2015. The number of enquiries related to earthy/musty taste, which is due to seasonal algal issues at our water storage reservoirs dropped to 28 in 2016 as compared to 139 in 2015. Guernsey Water uses the same methodology for recording consumer contacts and enquiries regarding water quality as is used in England and Wales, whereby every contact is recorded and categorised and to enable comparison the contact rate per 1,000 population is calculated. This "Acceptability of Water to Consumers" category had contacts per 1,000 population rate of 1.82 in 2016. This compares favourably to the Industry Average (for England and Wales Water Companies 2015) rate of 1.64.

The implementation of Water Safety Planning in 2016, a proactive management system that aims to ensure clean, safe drinking water, will aid us in our aim of consistently supplying high quality drinking water to our customers. The development of these plans will be ongoing throughout our business plan period.

**Margaret McGuinness**  
**Water Quality Risk Manager**

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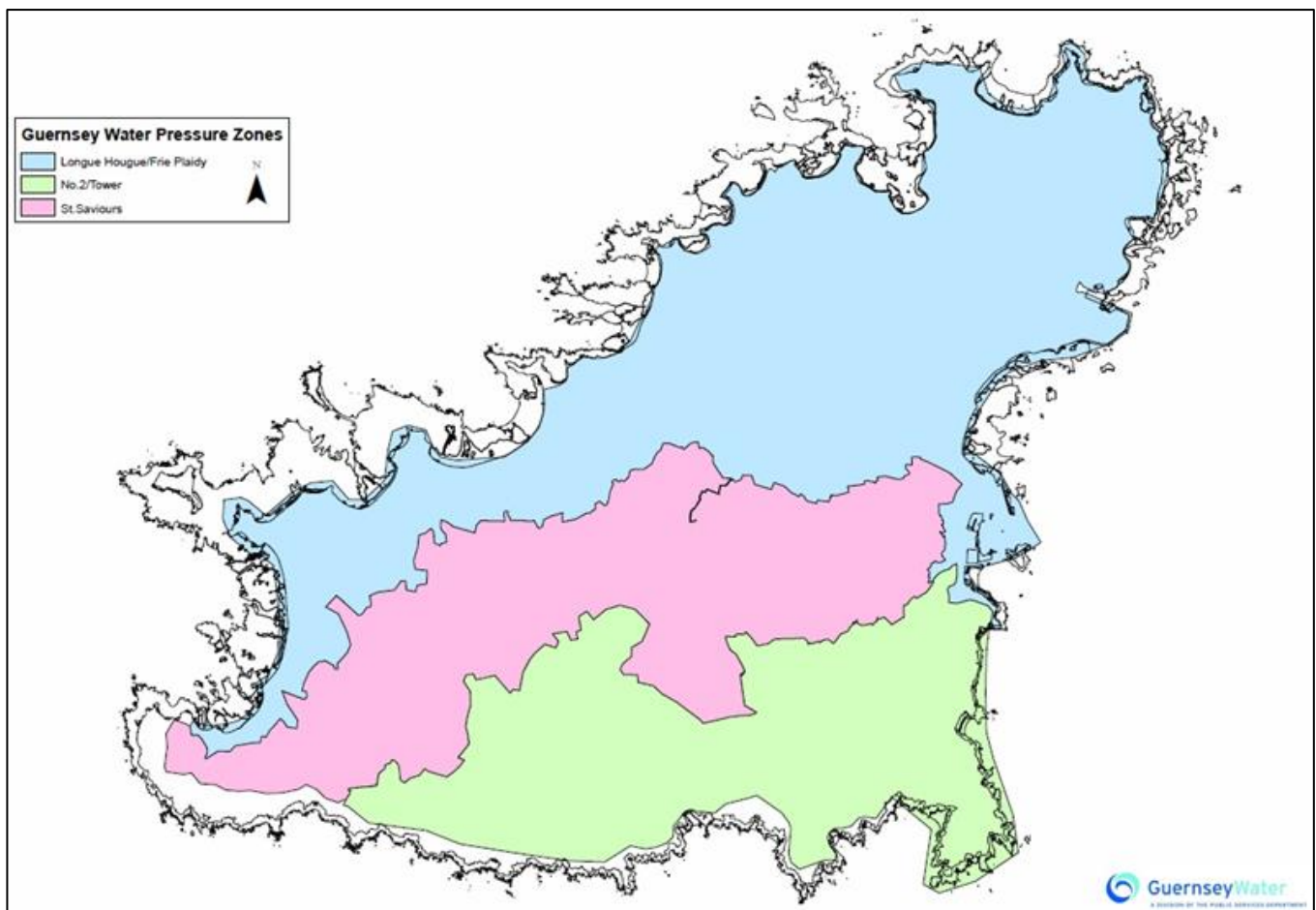


## INTRODUCTION...

### Treated Water

Guernsey Water operates using current Drinking Water Inspectorate regulations and guidance as best practice. This requires us to meet very high standards to satisfy our Regulator, the Director of Environmental Health and Pollution Regulation. Guernsey Water has 4 treatment works (3 in service and 1 mothballed plant), 3 service reservoirs, a water tower and 2 water supply zones.

The general rationale of water movement in Guernsey is: St Saviours water treatment works supplies water to No.2 East and West which then either goes into the Water Tower and onto the Tower Supply Zone (green in image below) or direct to No.2 Supply Zone (pink in image below). Longue Hougue water treatment works (or Kings Mills water treatment works when Longue Hougue is off line) supplies water direct into Longue Hougue Supply Zone (blue in image below) and into Frie Plaidy Service Reservoir.



Below is a breakdown of the compliance for 2016, as measured against The Water Supply (Water Quality) Regulations, 2016.

**Water Treatment Works**

|                     | St Saviours    | Juas | Kings Mills    | Longue Hougue  | Total          |
|---------------------|----------------|------|----------------|----------------|----------------|
| No of Breaches      | 0              | 0    | 0              | 0              | 0              |
| No of Passes        | 2022           | 0    | 1184           | 2004           | 5210           |
| No of Samples       | 2022           | 0    | 1184           | 2004           | 5210           |
| <b>% Compliance</b> | <b>100.00%</b> |      | <b>100.00%</b> | <b>100.00%</b> | <b>100.00%</b> |

**Service Reservoirs & Water Tower**

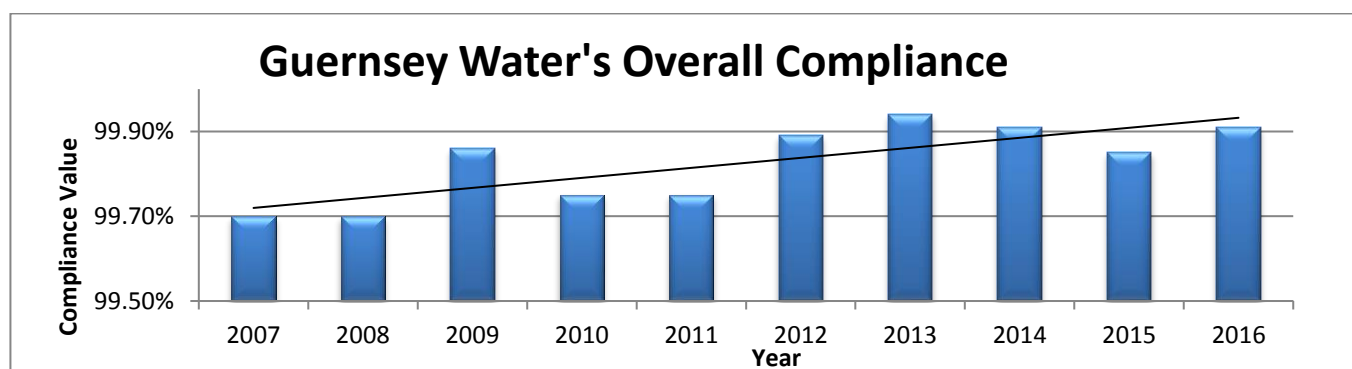
|                     | No.2 East      | No. 2 West     | Frie Plaidy    | Tower          | Total          |
|---------------------|----------------|----------------|----------------|----------------|----------------|
| No of Breaches      | 0              | 0              | 0              | 0              | 0              |
| No of Passes        | 104            | 104            | 104            | 104            | 416            |
| No of Samples       | 104            | 104            | 104            | 104            | 416            |
| <b>% Compliance</b> | <b>100.00%</b> | <b>100.00%</b> | <b>100.00%</b> | <b>100.00%</b> | <b>100.00%</b> |

|                     | North Zone    | South Zone    | Total         |
|---------------------|---------------|---------------|---------------|
| No of Breaches      | 2             | 4             | 6             |
| No of Passes        | 783           | 451           | 1234          |
| No of Samples       | 785           | 455           | 1240          |
| <b>% Compliance</b> | <b>99.75%</b> | <b>99.12%</b> | <b>99.52%</b> |

**Overall Total**

|                     | Total         |
|---------------------|---------------|
| No of Breaches      | 6             |
| No of Passes        | 6860          |
| No of Samples       | 6866          |
| <b>% Compliance</b> | <b>99.91%</b> |

The graph below shows the historic trend of total compliance since the introduction of compliance sampling in line with The Water Supply (Water Quality) Regulations 2016



Tables 1 to 11 have the breakdown of drinking water quality in the detailed format used by water companies in England and Wales and annually reported by the DWI.

### Raw Water

With regard to the Island's water catchment area, Guernsey Water has in the past managed the legislation concerning pollution of this area. This has meant water quality that could potentially have an effect on drinking water has been managed through strict limits on discharges to the environment. This responsibility has now been moved to fall under the jurisdiction of the Director of Environmental Health and Pollution Regulation, as a result of Guernsey Water now managing the Island's wastewater infrastructure and in line with the recommendations agreed by the States of Guernsey in Billet d'Etat XX1 2012 (dated 31<sup>st</sup> October 2012).

Raw water quality is closely monitored with analyses of 21 streams and stored water in 17 quarries and reservoirs. Raw water quality determines if water is collected and stored; in turn stored water is transferred to water treatment works based on water quality parameters to ensure that good quality water is supplied to our customers.

Nitrate levels in some streams are at the upper acceptable limit but through careful blending and storage, levels are reduced to ensure compliance with the prescribed limit of 50 mg/l for the provision of wholesome drinking water.

Tables 12 and 13 show the raw water quality that was observed in 2016 in the Island's various streams and storage reservoirs.



## TREATED WATER 2016 DATA SUMMARY TABLES FOR GUERNSEY WATER...

These tables contain a summary of results of treated water monitoring undertaken by Guernsey Water in 2016.

### Notes relating to the interpretation of the tables: -

Columns on the following tables that are headed '1 percentile representing a minimum' and '99 percentile representing a maximum' contain figures for the 1 percentile and 99 percentile sample results respectively except where less than 100 samples were taken, when the figures are the actual maximum and minimum results.

The symbol < indicates that the result was less than the limit of detection of the analytical method used.

The symbol > indicates that the result was above the recording range of the analytical method used.

**Table 1: Quality of water leaving treatment works – Directive requirements**

| Parameter    | Prescribed Concentration or Value | Total number of tests | Tests exceeding specification | 1 percentile (representing a minimum) | 99 percentile (representing a maximum) | No. of works with failures |
|--------------|-----------------------------------|-----------------------|-------------------------------|---------------------------------------|--|----------------------------|
| Nitrite      | 0.1 mg NO <sub>2</sub> /l         | 120                   | 0                             | <0.03                                 | <0.03                                  | 0                          |
| <b>TOTAL</b> | -                                 | <b>120</b>            | <b>0</b>                      | -                                     | -                                      | -                          |

**Table 2: Quality of water leaving treatment works – National requirements**

| Parameter         | Prescribed Concentration or Value | Total number of tests | Tests exceeding specification | 1 percentile (representing a minimum) | 99 percentile (representing a maximum) | No. of works with failures |
|-------------------|-----------------------------------|-----------------------|-------------------------------|---------------------------------------|--|----------------------------|
| Coliform Bacteria | 0 number/100ml                    | 568                   | 0                             | 0                                     | 0                                      | 0                          |
| Cryptosporidium   | oocysts >1 in 10 litres           | 16                    | 0                             | 0                                     | 0                                      | 0                          |
| <i>E. coli</i>    | 0 number/100ml                    | 568                   | 0                             | 0                                     | 0                                      | 0                          |
| <b>TOTAL</b>      | -                                 | <b>1152</b>           | <b>0</b>                      | <b>0</b>                              | <b>0</b>                               | <b>0</b>                   |

**Table 3: Quality of water leaving treatment works – Additional Monitoring Requirements**

| Indicator Parameter                  | Prescribed Concentration or Value | Total number of tests | Tests Exceeding Specification | 1 percentile (representing a minimum) | 99 percentile (representing a maximum) |
|--------------------------------------|-----------------------------------|-----------------------|-------------------------------|---------------------------------------|--|
| Colony Counts After 3 Days At 22°C   | No abnormal change                | 568                   | n/a*                          | 0                                     | 14                                     |
| Colony Counts After 48 Hours At 37°C | No abnormal change                | 565                   | n/a*                          | 0                                     | 1                                      |
| Residual Disinfectant - Free         | No abnormal change                | 641                   | n/a*                          | 0.05                                  | 0.70                                   |
| Residual Disinfectant - Total        | No abnormal change                | 642                   | n/a*                          | 0.15                                  | 0.87                                   |
| Turbidity                            | 1 NTU                             | 561                   | 0                             | 0.01                                  | 0.19                                   |
| <b>TOTAL</b>                         | -                                 | <b>2977</b>           | <b>0</b>                      | -                                     | -                                      |

**Table 4: Quality of water leaving service reservoirs – National requirements**

| Parameter         | Prescribed Concentration or Value | Total number of tests | Tests exceeding specification | 1 percentile (representing a minimum) | 99 percentile (representing a maximum) | No. of reservoirs failing standard |
|-------------------|-----------------------------------|-----------------------|-------------------------------|---------------------------------------|--|------------------------------------|
| Coliform Bacteria | 0 number/100ml                    | 208                   | 0                             | 0                                     | 0                                      | 0                                  |
| <i>E. coli</i>    | 0 number/100ml                    | 208                   | 0                             | 0                                     | 0                                      | 0                                  |
| <b>TOTAL</b>      | -                                 | <b>416</b>            | <b>0</b>                      | -                                     | -                                      | <b>0</b>                           |

**Table 5: Quality of water leaving service reservoirs – Additional Monitoring Requirements**

| Indicator Parameter                  | Prescribed Concentration or Value | Total number of tests | Tests Exceeding Specification | 1 percentile (representing a minimum) | 99 percentile (representing a maximum) |
|--------------------------------------|-----------------------------------|-----------------------|-------------------------------|---------------------------------------|--|
| Colony Counts After 3 Days At 22°C   | No abnormal change                | 208                   | n/a*                          | n/a*                                  | 300                                    |
| Colony Counts After 48 Hours At 37°C | No abnormal change                | 208                   | n/a*                          | n/a*                                  | 20                                     |
| Residual Disinfectant - Free         | No abnormal change                | 208                   | n/a*                          | n/a*                                  | 0.31                                   |
| Residual Disinfectant - Total        | No abnormal change                | 208                   | n/a*                          | n/a*                                  | 0.67                                   |
| <b>TOTAL</b>                         | -                                 | <b>832</b>            | -                             | -                                     | -                                      |

\*these are marked as n/a as they refer to changes observed and not a set numerical standard

**Table 6: Quality of water leaving bulk supply points – Directive requirements**

| Parameter                         | Prescribed Concentration or Value | Total number of tests | Tests exceeding specification | 1 percentile (representing a minimum) | 99 percentile (representing a maximum) | No. of supply points with failures |
|-----------------------------------|-----------------------------------|-----------------------|-------------------------------|---------------------------------------|--|------------------------------------|
| 1,2 Dichloroethane                | 3 µg/l                            | 21                    | 0                             | 0.07                                  | 0.12                                   | 0                                  |
| Benzene                           | 1 µg/l                            | 20                    | 0                             | 0.02                                  | 0.07                                   | 0                                  |
| Boron                             | 1 mg B/l                          | 21                    | 0                             | 0.07                                  | 0.10                                   | 0                                  |
| Bromate                           | 10 µg BrO <sub>3</sub> /l         | 21                    | 0                             | 0.10                                  | 2.50                                   | 0                                  |
| Cyanide                           | 50 µg CN/l                        | 21                    | 0                             | 0.2                                   | 0.7                                    | 0                                  |
| Fluoride                          | 1.5 mg F/l                        | 20                    | 0                             | 0.09                                  | 0.15                                   | 0                                  |
| Mercury                           | 1 µg Hg/l                         | 21                    | 0                             | 0.002                                 | 0.044                                  | 0                                  |
| Tetrachloroethene/Trichloroethene | 10 µg/l                           | 22                    | 0                             | 0.05                                  | 0.39                                   | 0                                  |
| <b>TOTAL</b>                      | -                                 | <b>167</b>            | <b>0</b>                      | -                                     | -                                      | <b>0</b>                           |

**Table 7: Quality of water leaving bulk supply points – National requirements**

| Parameter          | Prescribed Concentration or Value | Total number of tests | Tests exceeding specification | 1 percentile (representing a minimum) | 99 percentile (representing a maximum) | No. of supply point with failures |
|--------------------|-----------------------------------|-----------------------|-------------------------------|---------------------------------------|--|-----------------------------------|
| Tetrachloromethane | 3 µg/l                            | 22                    | 0                             | 0.02                                  | 0.14                                   | 0                                 |
| <b>TOTAL</b>       | -                                 | <b>22</b>             | <b>0</b>                      | -                                     | -                                      | -                                 |

**Table 8: Quality of water leaving bulk supply points – Additional Monitoring Requirements**

| Indicator Parameter            | Prescribed Concentration or Value | Total number of tests | Tests Exceeding Specification | 1 <sup>st</sup> percentile (representing a minimum) | 99 percentile (representing a maximum) |
|--------------------------------|-----------------------------------|-----------------------|-------------------------------|---|--|
| Chloride                       | 250 mg Cl/l                       | 18                    | 0                             | 83.34   | 90.83                                  |
| <i>Clostridium perfringens</i> | 0 number/100ml                    | 117                   | 0                             | 0   | 0                                      |
| Conductivity                   | 2500 µS/cm                        | 117                   | 0                             | 521   | 640                                    |
| Radioactivity - Gross Alpha    | 0.1 Bq/l                          | 21                    | 0                             | 0.02  | 0.04                                   |
| Radioactivity - Gross Beta     | 1 Bq/l                            | 21                    | 0                             | 0.1   | 0.2                                    |
| Radioactivity - Tritium        | 100 Bq/l                          | 19                    | 0                             | 5.0   | 5.6                                    |
| Sulphate                       | 250 mg SO <sub>4</sub> /l         | 20                    | 0                             | 55.2  | 89.6                                   |
| Total Organic Carbon (TOC)     | No abnormal change                | 558                   | 0                             | 2.0   | 5.3                                    |
| <b>TOTAL</b>                   | -                                 | <b>891</b>            | <b>0</b>                      | -   | -                                      |

**Table 9: Quality of water at consumer's tap (zones) – Directive requirements**

| Parameter                               | Prescribed Concentration or Value | Total number of tests | Tests exceeding specification | 1 <sup>st</sup> percentile (representing a minimum) | 99 percentile (representing a maximum) | No. of zones with failures |
|---|-----------------------------------|-----------------------|-------------------------------|---|--|----------------------------|
| Antimony                                | 5 µg Sb/l                         | 16                    | 0                             | 0.31  | 1.76                                   | 0                          |
| Arsenic                                 | 10 µg As/l                        | 16                    | 0                             | 0.17  | 1.93                                   | 0                          |
| Benzo(a)pyrene                          | 0.01 µg/l                         | 16                    | 0                             | 0.00022   | 1.20                                   | 0                          |
| Cadmium                                 | 5 µg Cd/l                         | 16                    | 0                             | 0.01  | 0.10                                   | 0                          |
| Chromium                                | 50 µg Cr/l                        | 16                    | 0                             | 0.07  | 0.70                                   | 0                          |
| Copper                                  | 2 mg Cu/l                         | 16                    | 0                             | 10.0  | 42.40                                  | 0                          |
| <i>E. coli</i>                          | 0 number/100ml                    | 156                   | 1                             | 0   | 3                                      | 1                          |
| Enterococci                             | 0 number/100ml                    | 8                     | 0                             | 0   | 0                                      | 0                          |
| Lead                                    | 10 µg Pb/l                        | 16                    | 0                             | 5.0   | 5                                      | 0                          |
| Nickel                                  | 20 µg Ni/l                        | 16                    | 0                             | 0.79  | 9.76                                   | 0                          |
| Nitrate                                 | 50 mg NO <sub>3</sub> /l          | 16                    | 0                             | 15.1  | 30.0                                   | 0                          |
| Nitrite                                 | 0.5 mg NO <sub>2</sub> /l         | 16                    | 0                             | 0.03  | 0.03                                   | 0                          |
| Nitrate/Nitrite Formula                 | 1mg NO <sub>2</sub> /l            | 16                    | 0                             | 0.3   | 0.6                                    | 0                          |
| Polycyclic aromatic hydrocarbons (PAHs) | 0.1 µg/l                          | 14                    | 0                             | 0   | 3.83                                   | 0                          |
| Selenium                                | 10 µg Se/l                        | 16                    | 0                             | 0.30  | 4.15                                   | 0                          |
| Trihalomethanes (THMs)                  | 100 µg/l                          | 16                    | 2                             | 26.24   | 119.71                                 | 1                          |
| <b>TOTAL</b>                            | -                                 | <b>386</b>            | <b>0</b>                      | -   | -                                      | <b>2</b>                   |

**Table 10: Quality of water at consumer's tap (zones) – National requirements**

| Parameter          | Prescribed Concentration or Value | Total number of tests | Tests exceeding specification | 1 percentile (representing a minimum) | 99 percentile (representing a maximum) | No. of zones with failures |
|--------------------|-----------------------------------|-----------------------|-------------------------------|---------------------------------------|--|----------------------------|
| Aluminium          | 200 µg Al/l                       | 60                    | 0                             | 13.36                                 | 64.79                                  | 0                          |
| Colour             | 20 mg/l Pt/Co scale               | 60                    | 0                             | 5.0                                   | 5.0                                    | 0                          |
| Hydrogen ion (pH)  | 6.5 – 9.50 pH value               | 60                    | 0                             | 6.86                                  | 7.51                                   | 0                          |
| Iron               | 200 µg Fe/l                       | 60                    | 0                             | 10.0                                  | 46.87                                  | 0                          |
| Manganese          | 50 µg Mn/l                        | 60                    | 0                             | 10.0                                  | 12.41                                  | 0                          |
| Organoleptic Odour | 3 at 25°C dilution number         | 60                    | 0                             | 0                                     | 1.0                                    | 0                          |
| Organoleptic Taste | 3 at 25°C dilution number         | 58                    | 0                             | 0                                     | 1.0                                    | 0                          |
| Sodium             | 200 mg Na/l                       | 16                    | 0                             | 56.15                                 | 70.55                                  | 0                          |
| Turbidity          | 4 NTU                             | 60                    | 0                             | 0.01                                  | 0.11                                   | 0                          |
| <b>TOTAL</b>       | -                                 | <b>494</b>            | <b>0</b>                      | -                                     |  | <b>0</b>                   |

**Table 11: Quality of water at consumer's tap (zones) – Additional Monitoring Requirements**

| Indicator Parameter                  | Prescribed Concentration or Value | Total number of tests | Tests Exceeding Specification | 1 percentile (representing a minimum) | 99 percentile (representing a maximum) |
|--------------------------------------|-----------------------------------|-----------------------|-------------------------------|---------------------------------------|--|
| Ammonium                             | 0.5 mg NH <sub>4</sub> /l         | 60                    | 0                             | 0.01                                  | 0.03                                   |
| Coliform Bacteria                    | 0 number/100ml                    | 156                   | 3                             | 0                                     | 8                                      |
| Colony Counts After 3 Days At 22°C   | No abnormal change                | 60                    | N/A                           | 0                                     | 115                                    |
| Colony Counts After 48 Hours At 37°C | No abnormal change                | 60                    | N/A                           | 0                                     | 7                                      |
| Conductivity                         | 2500 uS/cm                        | 60                    | 0                             | 535.6                                 | 636.4                                  |
| Residual Disinfectant - Free         | No abnormal change                | 60                    | N/A                           | 0.01                                  | 0.21                                   |
| Residual Disinfectant - Total        | No abnormal change                | 61                    | N/A                           | 0.05                                  | 0.44                                   |
| <b>TOTAL</b>                         | -                                 | <b>517</b>            | <b>3</b>                      | -                                     | -                                      |

## RAW WATER 2016 DATA SUMMARY TABLES FOR GUERNSEY WATER...

These tables contain a summary of results of raw water monitoring undertaken by Guernsey Water in 2016.

### Notes relating to the interpretation of the tables: -

Columns on the following tables that are headed '1 percentile representing a minimum' and '99 percentile representing a maximum' contains figures for the 1 percentile and 99 percentile sample results respectively except where less than 100 samples were taken, when the figures are the actual maximum and minimum results.

The symbol < indicates that the result was less than the limit of detection of the analytical method used.

The symbol > indicates that the result was above the recording range of the analytical method used.

**Table 12: Quality of water in Island streams – Monitoring**

| Indicator Parameter | Units of Measure      | Total number of tests | Minimum Result | Maximum Result |
|---------------------|-----------------------|-----------------------|----------------|----------------|
| Hydrogen ion (pH)   | pH value              | 508                   | 6.62           | 8.71           |
| Conductivity        | uS/cm                 | 699                   | 275.9          | 1127.6         |
| Potassium           | mg K/l                | 508                   | 2.3            | 16.33          |
| Nitrate             | mg NO <sub>3</sub> /l | 699                   | 1.4            | 70.92          |
| Ammonium            | mg NH <sub>4</sub> /l | 699                   | 0.01           | 2.61           |
| Nitrite             | mg NO <sub>2</sub> /l | 508                   | 0.03           | 0.26           |
| Phosphate           | mg P/l                | 699                   | 0.02           | 0.53           |
| Chloride            | mg Cl/l               | 508                   | 42.1           | 184.9          |
| TOC                 | mg C/l                | 530                   | 1.4            | 19.41          |
| Coliform Bacteria   | number/100ml          | 427                   | 0              | 95,320         |
| E.coli              | number/100ml          | 427                   | 0              | 26,740         |
| Faecal streptococci | number/100ml          | 310                   | 0              | 10,000         |
| <b>TOTAL</b>        | -                     | <b>6522</b>           | -              | -              |



**Table 13: Quality of stored water in quarries and reservoirs – Monitoring**

| Indicator Parameter | Units of Measure       | Total number of tests | Minimum Result | Maximum Result |
|---------------------|------------------------|-----------------------|----------------|----------------|
| Hydrogen ion (pH)   | pH value               | 75                    | 7.19           | 9.48           |
| Conductivity        | uS/cm                  | 75                    | 356            | 807            |
| Tot Ox Nitrogen     | Mg NO <sub>3</sub> /l  | 75                    | 0.77           | 34.36          |
| Ammonium            | mg NH <sub>4</sub> /l  | 75                    | 0.01           | 1.30           |
| Nitrite             | mg NO <sub>2</sub> /l  | 75                    | 0.03           | 0.28           |
| Phosphate           | mg P/l                 | 45                    | 0.02           | 2.5            |
| Chloride            | mg Cl/l                | 75                    | 43.74          | 145.56         |
| Potassium           | mg K/l                 | 45                    | 4.0            | 15.0           |
| Silicate            | mg SiO <sub>2</sub> /l | 45                    | 2.0            | 17.0           |
| TOC                 | mg C/l                 | 45                    | 2.2            | 14.8           |
| Coliforms           | Number/100ml           | 30                    | 3              | 22,520         |
| E. coli             | Number/ 100ml          | 30                    | 0              | 5,600          |
| Enterococci         | Number /100ml          | 30                    | 0              | 4,271          |
| <b>TOTAL</b>        | -                      | <b>720</b>            | -              | -              |

**Table 14: Quality of water in Island streams – Glyphosate \***

| Indicator Parameter | Units of Measure                                      | Total number of tests | Minimum Result | Maximum Result |
|---------------------|---|-----------------------|----------------|----------------|
| Glyphosate          | µg C <sub>3</sub> H <sub>8</sub> NO <sub>5</sub> P /l | 72                    | 3.0            | 913.0          |
| <b>TOTAL</b>        | -   | <b>72</b>             | -              | -              |

\*following a risk assessment of pesticide usage on the island Glyphosate was recognised as a compound that monitoring was required for, a quarterly monitoring programme has been initiated to monitor levels in Island streams

### PERFLUOROCTANE SULFONATE (PFOS)...

Since 2007 PFOS has been monitored in raw and treated water in accordance with guidance from DWI who set the 'wholesomeness' value as 1.0 µg/l. Guernsey Water has used its available water resources to manage the levels of PFOS in water leaving St Saviours water treatment works. The Tables below provide a breakdown of the levels of PFOS observed in 2016 in drinking water from St Saviours water treatment works, St Saviour's reservoir and affected stream systems.

**Table 15: Quality of water leaving treatment works – PFOS**

| Indicator Parameter              | Prescribed Concentration or Value                         | Total number of tests | Tests Exceeding Specification | Minimum Result | Maximum Result |
|----------------------------------|---|-----------------------|-------------------------------|----------------|----------------|
| Perfluorooctane sulfonate (PFOS) | 1.0 µg C <sub>8</sub> HF <sub>17</sub> O <sub>3</sub> S/l | 22                    | 0                             | 0.013          | 0.027          |
| <b>TOTAL</b>                     | -   | <b>22</b>             | <b>0</b>                      | -              | -              |

**Table 16: Quality of stored water in St Saviours Reservoirs – PFOS**

| Indicator Parameter              | Units of Measure                                      | Total number of tests | Minimum Result | Maximum Result |
|----------------------------------|---|-----------------------|----------------|----------------|
| Perfluorooctane sulfonate (PFOS) | µg C <sub>8</sub> HF <sub>17</sub> O <sub>3</sub> S/l | 22                    | 0.038          | 0.074          |
| <b>TOTAL</b>                     | -   | <b>22</b>             | -              | -              |

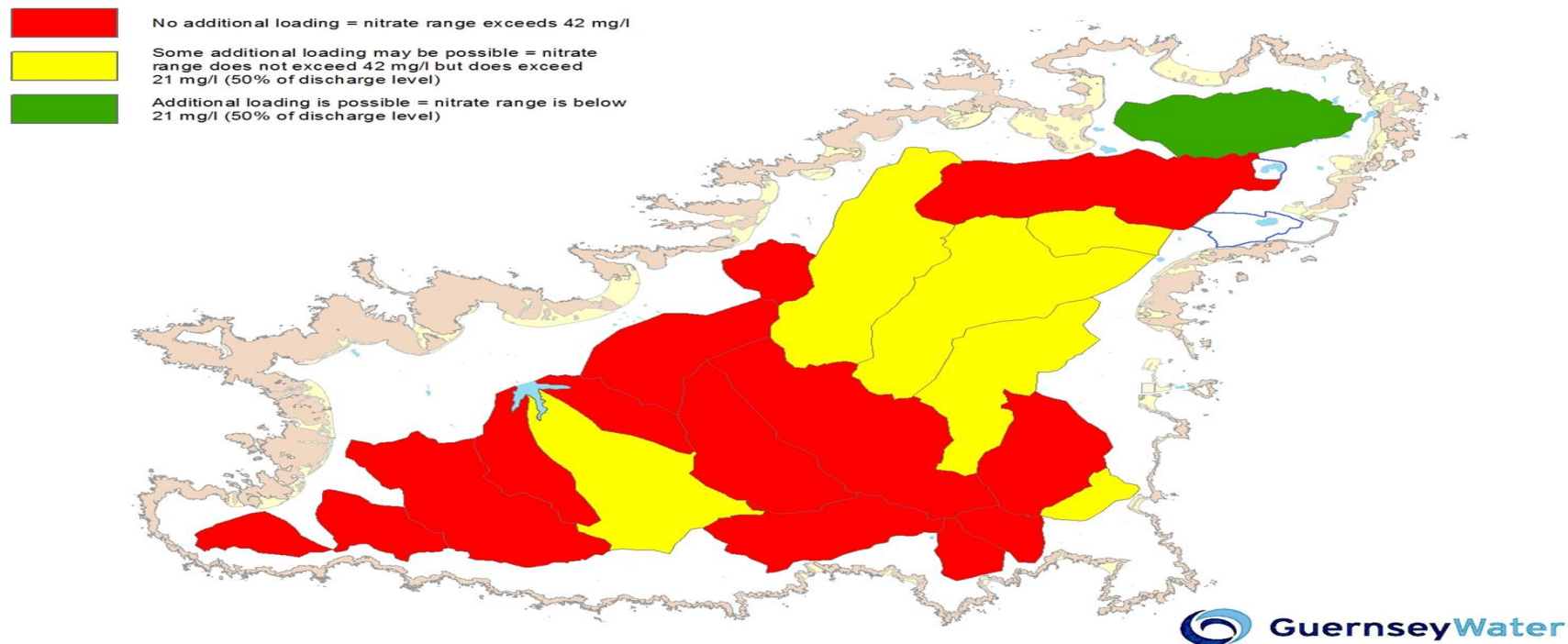
**Table 17: Quality of water in Island streams – PFOS**

| Indicator Parameter              | Units of Measure                                      | Total number of tests | Minimum Result | Maximum Result |
|----------------------------------|---|-----------------------|----------------|----------------|
| Perfluorooctane sulfonate (PFOS) | µg C <sub>8</sub> HF <sub>17</sub> O <sub>3</sub> S/l | 65                    | 0.0062         | 5.5544         |
| <b>TOTAL</b>                     | -   | -                     | -              | -              |

## 2016 WATER CATCHMENT AREA NITRATE LOADINGS...

The 2016 nitrate loadings have been evaluated to produce a nitrate map showing the level of nitrates in each catchment area.

The Director of Environmental Health and Pollution Regulation submitted discharge standards for inclusion within Part VI of The Environmental Pollution (Guernsey) Law, 2004, to the States of Guernsey in Billet d'Etat XX1 2012 (dated 31<sup>st</sup> October 2012) and the proposed nitrate discharge level is recommended at 42 mg/l\* (as NO<sub>3</sub>). The nitrate drinking water limit as prescribed in The Water Supply (Water Quality) Regulations 2000, as amended, is set at 50 mg/l.



\*this lower level has been set to ensure that nitrate loadings decrease over time

Table 18: Quality of water in Island streams – Nitrate

| <b>2016 Water Catchment Area Nitrate Loadings</b> |                     |                    |                      |
|---|---------------------|--------------------|----------------------|
| <b>CATCHMENT AREA</b>                             | <b>5%ILE (MG/L)</b> | <b>MEAN (MG/L)</b> | <b>95%ILE (MG/L)</b> |
| Beau Valet  | 14.8                | 28.7               | 34.6                 |
| Charroterie                                       | 21.3                | 30.0               | 41.4                 |
| Choffins  | 32.4                | 51.7               | 62.2                 |
| Cobo  | 30.1                | 50.5               | 67.9                 |
| Fauxquets   | 38.5                | 60.0               | 71.7                 |
| Fermain   | 11.4                | 28.7               | 35.0                 |
| Grande Mare                                       | 1.4                 | 28.0               | 64.5                 |
| Les Clercs  | 16.3                | 28.0               | 38.8                 |
| Marais Stream                                     | 3.3                 | 14.8               | 24.9                 |
| Mare de Carteret                                  | 10.7                | 23.4               | 35.3                 |
| Moulin Huet                                       | 23.3                | 33.4               | 39.6                 |
| Padins  | 17.7                | 36.5               | 48.1                 |
| Petit Bot   | 13.3                | 32.3               | 47.5                 |
| Pleinmont East                                    | 26.8                | 43.0               | 58.6                 |
| Pleinmont West                                    | 18.8                | 28.4               | 41.9                 |
| Saints  | 12.6                | 32.8               | 43.3                 |
| Talbots   | 29.0                | 41.3               | 49.4                 |
| Vale Pond   | 8.8                 | 20.4               | 41.4                 |
| Vrangue   | 15.1                | 25.2               | 34.2                 |

## APPENDIX A...

Table 19: Listed parameters Guernsey Water samples for and prescribed concentrations or values

| Parameter                            | Prescribed Concentration or Value |
|--------------------------------------|-----------------------------------|
| <b>Bacteriology</b>                  |                                   |
| <i>Clostridium perfringens</i>       | 0 number/100ml                    |
| Coliform Bacteria                    | 0 number/100ml                    |
| Colony Counts After 3 Days At 22°C   | No abnormal change                |
| Colony Counts After 48 Hours At 37°C | No abnormal change                |
| Cryptosporidium                      | ooocyst >1 in 10 litres           |
| <i>E. coli</i>                       | 0 number/100ml                    |
| Enterococci                          | 0 number/100ml                    |
| <b>Chemistry</b>                     |                                   |
| 1,2 Dichloroethane                   | 3 µg/l                            |
| 2,3,6-TBA                            | 0.1 µg/l                          |
| 2,4,5-TCA                            | 0.1 µg/l                          |
| 2,4-DB                               | 0.1 µg/l                          |
| 2-4,D                                | 0.1 µg/l                          |
| Aldrin                               | 0.03 µg/l                         |
| Aluminium                            | 200 µg Al/l                       |
| Ammonium                             | 0.5 mg NH <sub>4</sub> /l         |
| Antimony                             | 5 µg Sb/l                         |
| Arsenic                              | 10 µg As/l                        |
| Atrazine                             | 0.1 µg/l                          |
| Azinphos-methyl                      | 0.1 µg/l                          |
| Benazolin                            | 0.1 µg/l                          |
| Bentazone                            | 0.1 µg/l                          |
| Benzene                              | 1 µg/l                            |
| Benzo(a)pyrene                       | 0.01 µg/l                         |
| Boron                                | 1 mg B/l                          |
| Bromate                              | 10 µg BrO <sub>3</sub> /l         |
| Bromoxynil                           | 0.1 µg/l                          |
| Cadmium                              | 5 µg Cd/l                         |
| Carbendazim                          | 0.1 µg/l                          |
| Carbetamide                          | 0.1 µg/l                          |
| Carbophenothion                      | 0.1 µg/l                          |
| Chlordane (cis)                      | 0.1 µg/l                          |
| Chlordane (trans)                    | 0.1 µg/l                          |
| Chloride                             | 250 mg Cl/l                       |
| Chlorofenvinphos                     | 0.1 µg/l                          |
| Chloroprotham                        | 0.1 µg/l                          |
| Chloropyriphos                       | 0.1 µg/l                          |
| Chlorothalonil                       | 0.1 µg/l                          |
| Chlorotoluron                        | 0.1 µg/l                          |
| Chlorthal                            | 0.1 µg/l                          |
| Chlorthal di methyl                  | 0.1 µg/l                          |
| Chromium                             | 50 µg Cr/l                        |
| Clopyralid                           | 0.1 µg/l                          |
| Colour                               | 20 mg/l Pt/Co scale               |
| Conductivity                         | 2500 µS/cm                        |

Table 18: continued

| Parameter                   | Prescribed Concentration or Value |
|-----------------------------|-----------------------------------|
| Copper                      | 2 mg Cu/l                         |
| Cyanazine                   | 0.1 µg/l                          |
| Cyanide                     | 50 µg CN/l                        |
| Cypermethrin                | 0.1 µg/l                          |
| D.D.D. Op                   | 0.1 µg/l                          |
| D.D.D. Pp                   | 0.1 µg/l                          |
| D.D.E. Op                   | 0.1 µg/l                          |
| D.D.E. Pp                   | 0.1 µg/l                          |
| D.D.T. Op                   | 0.1 µg/l                          |
| D.D.T. Pp                   | 0.1 µg/l                          |
| Dalapon                     | 0.1 µg/l                          |
| Diazinon                    | 0.1 µg/l                          |
| Dicamba                     | 0.1 µg/l                          |
| Dichloroprop                | 0.1 µg/l                          |
| Dichlorvos                  | 0.1 µg/l                          |
| Dieldrin                    | 0.03 µg/l                         |
| Diflufenican                | 0.1 µg/l                          |
| Dimethoate                  | 0.1 µg/l                          |
| Diuron                      | 0.1 µg/l                          |
| Endrin                      | 0.1 µg/l                          |
| Fenitrothion                | 0.1 µg/l                          |
| Fluoride                    | 1.5 mg F/l                        |
| Fluroxpyr                   | 0.1 µg/l                          |
| Glyphosate                  | 0.1 µg/l                          |
| Heptachlor                  | 0.03 µg/l                         |
| Heptachlor epoxide          | 0.03 µg/l                         |
| Heptenophos                 | 0.1 µg/l                          |
| Hexachlorocyclohexane alpha | 0.1 µg/l                          |
| Hexachlorocyclohexane beta  | 0.1 µg/l                          |
| Hexachlorocyclohexane Delta | 0.1 µg/l                          |
| Hexachlorocyclohexane gamma | 0.1 µg/l                          |
| Hydrogen ion (pH)           | 6.5 - 9.5 pH value                |
| Ioxynil                     | 0.1 µg/l                          |
| Iprodione                   | 0.1 µg/l                          |
| Iron                        | 200 µg Fe/l                       |
| Isodrin                     | 0.1 µg/l                          |
| Isoproturon                 | 0.1 µg/l                          |
| Lead                        | 10 µg Pb/l                        |
| Linuron                     | 0.1 µg/l                          |
| M.C.P.A.                    | 0.1 µg/l                          |
| M.C.P.B.                    | 0.1 µg/l                          |
| Malathion                   | 0.1 µg/l                          |
| Manganese                   | 50 µg Mn/l                        |
| Mecarbam                    | 0.1 µg/l                          |
| Mecoprop                    | 0.1 µg/l                          |
| Mercury                     | 1 µg Hg/l                         |
| Metaldehyde                 | 0.1 µg/l                          |
| Methabenzthiazuron          | 0.1 µg/l                          |
| Monolinuron                 | 0.1 µg/l                          |



Table 18: continued

| Parameter                               | Prescribed Concentration or Value           |
|---|---|
| Nickel                                  | 20 µg Ni/l                                  |
| Nitrate                                 | 50 mg NO <sub>3</sub> /l                    |
| Nitrate/Nitrite Formula                 | 1mg NO <sub>2</sub> /l                      |
| Nitrite                                 | 0.1 mg NO <sub>2</sub> /l (treatment works) |
| Nitrite                                 | 0.5 mg NO <sub>2</sub> /l (consumers' tap)  |
| Organoleptic Odour                      | 3 at 25°C dilution number                   |
| Organoleptic Taste                      | 3 at 25°C dilution number                   |
| Oxamyl                                  | 0.1 µg/l                                    |
| Parathion-ethyl                         | 0.1 µg/l                                    |
| Pendimethalin                           | 0.1 µg/l                                    |
| Pentachlorophenol                       | 0.1 µg/l                                    |
| Perfluorooctane sulphonate (PFOS)       | 1 µg/l                                      |
| Perfluorooctanoic acid (PFOA)           | 10 µg/l                                     |
| Pesticides: Total                       | 0.5 µg/l                                    |
| Picloram                                | 0.1 µg/l                                    |
| Primephos-methyl                        | 0.1 µg/l                                    |
| Pirimicarb                              | 0.1 µg/l                                    |
| Polycyclic aromatic hydrocarbons (PAHs) | 0.1 µg/l                                    |
| Prometryne                              | 0.1 µg/l                                    |
| Propazine                               | 0.1 µg/l                                    |
| Propetamphos                            | 0.1 µg/l                                    |
| Propiconazole                           | 0.1 µg/l                                    |
| Propyzamide                             | 0.1 µg/l                                    |
| Radioactivity - Gross Alpha             | 0.1 Bq/l                                    |
| Radioactivity - Gross Beta              | 1 Bq/l                                      |
| Radioactivity - Tritium                 | 100 Bq/l                                    |
| Residual Disinfectant - Free            | No abnormal change                          |
| Residual Disinfectant - Total           | No abnormal change                          |
| Selenium                                | 10 µg Se/l                                  |
| Simazine                                | 0.1 µg/l                                    |
| Sodium                                  | 200 mg Na/l                                 |
| Sulphate                                | 250 mg SO <sub>4</sub> /l                   |
| Tebuconazole                            | 0.1 µg/l                                    |
| Terbutylazine                           | 0.1 µg/l                                    |
| Terbutryn                               | 0.1 µg/l                                    |
| Tetrachloroethene/Trichloroethene       | 10 µg/l                                     |
| Tetrachloromethane                      | 3 µg/l                                      |
| Total Organic Carbon (TOC)              | No abnormal change                          |
| Triadimefon                             | 0.1 µg/l                                    |
| Triallate                               | 0.1 µg/l                                    |
| Triazophos                              | 0.1 µg/l                                    |
| Trichloroacetic acid                    | 0.1 µg/l                                    |
| Trichlorophenoxyacetic acid (2,4,5)     | 0.1 µg/l                                    |
| Triclopyr                               | 0.1 µg/l                                    |
| Trietazine                              | 0.1 µg/l                                    |
| Trihalomethanes (THMs)                  | 100 µg/l                                    |
| Turbidity                               | 1 NTU (treatment works)                     |
| Turbidity                               | 4 NTU (consumers' tap)                      |