



# Drinking Water Quality in Northern Ireland, 2011

A Report by the Drinking Water Inspectorate for Northern Ireland



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Northern Ireland Environment Agency

# **Drinking Water Quality in Northern Ireland, 2011**

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## Foreword

The Drinking Water Inspectorate's primary role is to safeguard drinking water quality through effective regulation. I am, therefore, pleased to present our annual report, in which we provide a regulatory assessment of the quality of both public and private water supplies here, in Northern Ireland, for the 2011 calendar year.

Overall public drinking water quality, which includes results of key tests carried out at water treatment works, service reservoirs and consumers' taps, remains high. However, notwithstanding this, I am disappointed to report that for this year the previously reported upward trend has not been maintained, with a reduced level of overall compliance in 2011: 99.83%, compared with 99.86% in 2010. This decline was due to significant increases in the numbers of aluminium and odour tests not complying with the standards from samples taken at consumers' taps; and also elevated numbers of microbiological contraventions in the water being supplied from service reservoirs and at consumers' taps.

As with previous reports, we look at other data that provides information to help us assess how well NI Water carries out its responsibilities to supply safe, clean drinking water. This includes the reporting of events, and the number of reported consumer contacts for those who have had problems with their drinking water quality. Once again, I highlight the number of events that have arisen, particularly, due to operational issues, including ineffective treatment, and sampling errors which have given rise to unrepresentative sampling. While we welcome the co-operation given to us by NI Water, it is imperative that lessons learnt from events are used to ensure that water treatment works are operated effectively; distribution systems are adequately managed; and samples taken are representative, thereby fulfilling the regulatory requirements. These issues are all within NI Water's control.

NI Water must continue to be vigilant as it goes about its daily operational business of providing safe, clean drinking water. It must also exercise proactive risk management of its water supply systems. This is now a fundamental element of our regulatory framework and will be used as part of the prioritization process to meet the challenges of delivering high quality drinking water.

Consumers expect safe, clean drinking water supplies to be available at all times. Across Northern Ireland, consumers contacted NI Water regarding a range of quality issues associated with their drinking water. I am pleased to report there was a significant decrease in the number of contacts received in 2011: 6,207, compared with 7,008 in 2010; a substantial improvement of 11 per cent. These contacts vary across Northern Ireland, and in this year's report we have included maps to show the areas where these were most commonly made regarding two notification categories: discoloured water, and taste and odour concerns.

Not everyone in Northern Ireland receives their drinking water from the public water supplier, NI Water. A small percentage (less than one per cent) receives water from private water supplies. Water from these supplies is used for a range of purposes (from domestic dwellings to those supplying large commercial and public premises), and the quality of some of these supplies is highly variable. Overall compliance with the regulatory standards in 2011 for private supplies is 98.08%; a level notably lower than that for public supplies. The introduction of 'risk assessment' into the 2009 Private Water Supplies Regulations assists us in identifying where improvements should be made to address the contamination risks (in particular, iron, manganese and microbiological) which can persist in some of these small supplies.

I embrace the opportunities for us to continue to work constructively with other stakeholders as we aim to maintain our high quality of public drinking water and further improve the quality for the users of private water supplies across Northern Ireland, ensuring safe, clean drinking water for all.

I hope you find that this report is both an interesting and useful reference source on drinking water quality in Northern Ireland.



**Margaret Herron**  
**Chief Inspector of Drinking Water**  
**September 2012**

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## Executive Summary

**This is the 16th report in a series published by the Drinking Water Inspectorate, acting in our regulatory role in matters relating to drinking water quality. We act on behalf of the Department for Regional Development (DRD) in respect of public water supplies, and on behalf of the Department of the Environment (DoE) in relation to private water supplies.**

Our report gives an independent commentary on our assessment of, and our checks on, the quality of drinking water provided by Northern Ireland Water Ltd (NI Water). It also presents details of the quality of the private water supplies for which we have regulatory responsibility.

### Public Supplies

Overall public drinking water quality, which includes results of key tests carried out at water treatment works, service reservoirs and consumers' taps, is of a high quality. There has, however, been a reduced level of overall compliance reported in 2011: 99.83%, compared with 99.86% in 2010. While high levels of compliance have been achieved for many parameters, there have been significant increases in the numbers of aluminium and odour tests not complying with the standards from samples taken at consumers' taps during this calendar year. Increased numbers of microbiological contraventions in the water being supplied from service reservoirs and consumers' taps have also been reported.

Compliance with microbiological standards is important as contraventions may indicate a breach in the integrity of the water supply system or a failure in the treatment process. Results confirm that the general safety of drinking water supplies is good, with overall microbiological quality at 99.91%. However, there has been a reduced level of compliance from the 99.95% achieved in the previous reporting year, and this is mainly attributed to increased numbers of service reservoirs and consumers' taps failing to meet the microbiological standard for coliform bacteria.

Looking at the quality of water that consumers receive, we assess compliance with the regulatory standards for 39 different tests over a range of microbiological and chemical parameters. The standards are being met for the majority of these parameters (26). Compliance was not achieved in 2011 for the following 13 parameters: iron, odour, aluminium, trihalomethanes (THMs), taste,

bromate, enterococci, lead, polycyclic aromatic hydrocarbons (PAHs), manganese, turbidity, *E. coli*, and the individual pesticide, MCPA.

Some of these parameters, such as iron and lead, are failures which are common across not only Northern Ireland, but also across the United Kingdom water industry, and relate to water quality problems arising in some distribution systems. Other parameters, such as pesticides, may affect more localized areas. Each failure of a standard is investigated by NI Water to identify the cause and to put the necessary corrective action in place to prevent recurrence. The scale of this work varies: it may be that planned investment in the water infrastructure is necessary; or that changes to operational practices are required. Where necessary, particularly for persistent failures, we may take enforcement action to ensure delivery of the required corrective action in a shorter timescale. In 2011, enforcement action was in place for THMs, iron, aluminium, taste and odour, and MCPA.

For comparative purposes in considering the overall drinking water quality at consumers' taps, we have been using an index referred to as percentage mean zonal compliance (% MZC). This is not a regulatory requirement; it is a calculation that was introduced in 2004 to allow a more statistical assessment of NI Water's performance to be made. It is calculated using the 39 parameters from the regulatory sampling programme. From 2004 to date, overall % MZC has improved by 1.18%: 98.65% in 2004; 99.83% in 2011. While we recognize the improvement which is notably due to increased numbers of tests meeting the iron and THMs standards, there are, however, significantly elevated numbers of tests not meeting the standards for aluminium and odour.

The reporting of 'key' statistics, using data from the regulatory monitoring programmes, can be useful in providing information on trends or used as indicators from which comparisons can be made.

However, high levels of compliance do not guarantee that events that have the potential to affect water quality will not happen. In 2011, 69 events were reported to us, with 44 (64 per cent) categorized as incidents which were determined to have affected drinking water quality. Of these incidents, 64 per cent were related to ineffective treatment at 18 water treatment works. Mitigation of the risks of incidents occurring at water treatment works or within the distribution network is within NI Water's control. It is, therefore, essential that NI Water continues to put learning and appropriate mitigation measures in place as part of its drinking water safety plan approach, and works to prevent the recurrence of drinking water quality incidents.

To secure the continuous provision of safe, clean drinking water, effective operational and maintenance practices need to be applied at every stage of water supply. It is imperative that effective operational performance is achieved to ensure that the risks to public health are being robustly managed by reducing the potential for contamination of drinking water supplies. This is especially the case when normal operating conditions do not prevail, such as in incident situations.

Consumers expect safe, clean, drinking water supplies. To enable us to evaluate consumers' confidence in the quality of drinking water at their taps, we receive information from NI Water on the complaints and concerns expressed by its consumers. In assessing the overall number of contacts made, there was a significant decrease in the number received by NI Water in 2011: 6,207, compared with 7,008 in 2010; a substantial improvement of 11 per cent. As with previous years, the highest number of contacts (59 per cent) made by consumers in 2011 related to the appearance of their drinking water, of which 64 per cent were regarding discoloured water. NI Water has a planned long-term programme of work to rehabilitate its network of water mains, which, as it completes, should assist in addressing many of these consumers' concerns.

### **Private Supplies**

Monitoring for private water supplies has been in operation since 1999. An updated regulatory framework was put in place with the introduction of new regulations in 2009. This is our second year of reporting under this new monitoring regime. As with previous reports, we continue to identify the persistent nature of recurring failures, in particular

for iron, manganese and microbiological contraventions of the regulatory standards. For the 116 private water supplies that we monitored in 2011, overall compliance is reported as 98.08%. Where compliance with the regulatory standards has not been achieved, these contraventions have occurred at a range of supplies: from the small domestic types to the larger commercial supplies, where there is often no treatment in operation. We continue to work with private water supply owners and the local councils to make improvements to these supplies. As the necessary remedial action identified through risk assessments at individual private supplies is undertaken throughout 2012, compliance should improve.

### **Regulatory Framework**

At the end of 2010, the regulations covering both public and private water supplies were changed to address deficiencies that had been identified through the European Commission infraction case regarding the transposition of the Drinking Water Directive, into national law. The purpose of the changes was twofold: to make it mandatory for failures in samples collected from public buildings to be remedied; and to make clearer the duty to minimize disinfection by-products.

Firstly, in dealing with failures reported from public buildings, it was necessary for new regulations to be made, and accordingly, 'The Water Supply (Domestic Distribution Systems) Regulations (Northern Ireland) 2010' came into operation (in April 2010). In 2011, of the 4,764 samples taken at consumers' taps as part of the regulatory sampling programme, 66 (1.39 per cent) were taken from public buildings. Of these, five failed to meet the regulatory standards. When a sample fails a regulatory standard, NI Water must investigate the cause. Where NI Water determines the reason for the failure to be due to the internal domestic distribution systems of a public building, we are notified under these regulations. We acknowledge the assistance and co-operation afforded to us by both NI Water and local council staff in investigating and resolving these failures.

Secondly, amendments were made to both the public and private water supply regulations to make clearer the duties to minimize disinfection by-products. The regulatory standard for total trihalomethanes ([THMs], a group of disinfection by-products) is 100µg/l, and it is satisfying to report that this year the significant investment to upgrade and enhance many of NI Water's



treatment works, together with improved operational control, has resulted in a high level of compliance (99.28%) for our public supplies. To further evaluate how NI Water is controlling the level of these disinfection by-products, we report that in 2011 the average concentration of THMs was 45.3µg/l, with 30 per cent of zones (16 out of a total of 53) identified where the annual average exceeds 50µg/l. I welcome the ongoing work that is being undertaken by NI Water to enable it to demonstrate any necessary additional control measures to further minimize the production of these disinfection by-products.

In relation to private water supplies, we will continue to assess progress with minimization of disinfection by-products, in particular, the evaluation of chlorate and chlorite levels at those sites where chlorine dioxide disinfection is used in the treatment process.

### Risk Assessments

Legislative changes in 2009 embedded risk assessment in both public and private water supplies regulation through adoption of the World Health Organization (WHO) drinking water safety plan approach to safeguarding our drinking water supplies. This is an effective way of protecting human health and ensuring good water supply practice through: minimization of contamination of source waters; reduction or removal of contamination through effective treatment processes; and prevention of contamination of the distribution systems.

For public water supplies, work commenced in 2010 for NI Water to undertake risk assessments at all stages in the water supply chain: from catchment, through water treatment facilities, and onwards through distribution networks to consumers. To ensure effective controls are in place to safeguard drinking water quality, our work continues with NI Water in monitoring the risks and mitigation measures identified in these assessments.

With the assistance of Environmental Health Officers in the district councils, a similar process was completed in 2011 for our private water supplies. Risk assessments undertaken for private supplies have highlighted a range of issues: poor source protection, lack of treatment, or failure to maintain treatment. For larger supplies, where the water is used as drinking water for the public, we have endeavoured to drive forward the need for

water safety or management plans to be integral at these sites.

### Looking Forwards

Looking forwards we have a specific challenge in meeting the stricter European drinking water standard for lead (10µg/l) which comes into force at the end of 2013. NI Water has been working towards this for several years since the introduction of orthophosphate treatment, which is used to build a protective layer inside pipe work to minimize the release of lead into drinking water. While there has been an improving trend in overall compliance with the current 25µg/l standard since orthophosphate treatment began in 2004 (99.75% in 2011; 94.92% in 2004), we note that there is still a significant amount of work required to comply with the 10µg/l standard: 96.80% achieved in 2011.

The most common sources of lead in drinking water are from pipe work installed in buildings before the 1970's, or from the use of non-approved plumbing solder. While effective water treatment is an important factor in controlling lead levels within pipe work, it alone cannot secure compliance with the new standard. We welcome the work that is ongoing with NI Water, the district councils, health professionals and other interested stakeholders such as the Department of Education and the Housing Executive, to reduce consumer exposure to lead in drinking water, particularly, where lead pipe work and fittings remain in older buildings. NI Water is currently updating its lead strategy in its approach to improving lead compliance.

To sustain the delivery of high quality public drinking water supplies, we uphold a 'Partnership Agreement'<sup>1</sup> to achieve this commonly shared goal. We will continue to engage with NI Water, the Northern Ireland Authority for Utility Regulation (Utility Regulator), the Department for Regional Development, the Consumer Council for Northern Ireland, and the Northern Ireland Environment Agency as part of the investment planning process to identify funding priorities. We recognize that competing priorities exist, and our primary objective is to progress programmes of work that are necessary to secure compliance with drinking water quality standards across Northern Ireland, thereby ensuring safe, clean drinking water.

In relation to private water supplies, we will carry on working with supply owners and the local councils, with the aim of reducing the contamination risks at these sites and improving

<sup>1</sup>[www.drdni.gov.uk/water\\_stakeholders\\_partnership\\_agreement\\_2012.pdf](http://www.drdni.gov.uk/water_stakeholders_partnership_agreement_2012.pdf)

their water quality. To assist in the prioritization of required remedial actions, we will continue to work towards standardizing our risk assessment approach across the varied range of private supplies.

During 2011, we continued to work with a variety of stakeholders regarding a range of water quality issues for both public and private supplies. Towards the end of last year, through this collaboration, a document entitled, "Drinking Water and Health; a guide for public and environmental health professionals and for those in the water industry in Northern Ireland"<sup>1</sup> was published. Through a series of workshops, we were involved in helping professional staff better understand their roles and responsibilities in relation to the safety of our drinking water. We are committed to maintaining close liaison with those who have an interest or responsibility for drinking water safety.

<sup>1</sup>[www.doeni.gov.uk/niea/water-home/drinking\\_water/public\\_water/regulations\\_guidance/technical\\_guidance.htm](http://www.doeni.gov.uk/niea/water-home/drinking_water/public_water/regulations_guidance/technical_guidance.htm)

**Section 1**  
Public Water Supplies





## Part 1

### Drinking Water Quality

In this part of the report we give an overview of the quality of drinking water supplied by Northern Ireland Water Ltd (NI Water).

We look at the results from the regulatory compliance sampling programme, the events notified to us and the consumer contacts made about drinking water quality.

Where the regulatory requirements have not been met, we provide detail on what corrective action has been taken.

NI Water is a government-owned company with responsibility for supplying and distributing public drinking water throughout Northern Ireland. Figure 1.1 below provides some details about the company.

#### Drinking Water Quality Testing

Throughout 2011, NI Water sampled drinking water across Northern Ireland to test for compliance with the standards in The Water Supply (Water Quality) Regulations (Northern Ireland) 2007 (as amended). The Regulations require sampling programmes to be in place to ensure that water quality is monitored at water treatment works (WTWs), service reservoirs (SRs), water supply points, and consumers' taps in water supply zones (WSZs).

Tests are carried out for 39 different substances or organisms known as parameters. A description of each and the regulatory limits (or prescribed concentration or value [PCV]) is available on our website.<sup>1</sup>

Figure 1.1: NI Water Supply Details, 2011



<sup>1</sup>[www.doeni.gov.uk/niea/water-home/drinking\\_water/public\\_water/regulations\\_guidance.htm](http://www.doeni.gov.uk/niea/water-home/drinking_water/public_water/regulations_guidance.htm)

## Overall Drinking Water Quality

Overall drinking water quality for the key parameters monitored at water treatment works, service reservoirs and consumers' taps remains high, with significant improvements reported in previous years. However, for 2011, there has been a reversal in this upward trend: of the 100,072 tests we used to assess overall compliance, 177

(0.17%) failed to meet the standards (Table 1.1 refers); a significant increase in the number of tests failing compared with the 149 (0.14%) tests which failed in 2010 (Figure 1.2 refers). This was mainly due to a higher number of tests failing to meet the regulatory standards for aluminium and odour in samples taken from consumers' taps, and also for a lower microbiological compliance reported at service reservoirs and consumers' taps.

**Table 1.1: Overall Drinking Water Quality in 2011**

|   | No. of Tests   | No. of Tests not Meeting the Standards |
|---|----------------|--|
| <b>Water Leaving Water Treatment Works</b>                  |                |  |
| <i>E. coli</i>  | 6,927          | 0                                      |
| Coliform Bacteria   | 6,927          | 0                                      |
| <b>Microbiological Total</b>                                | <b>13,854</b>  | <b>0</b>                               |
| Nitrite   | 242            | 0                                      |
| Turbidity**   | 6,927          | 28                                     |
| <b>Chemical Total</b>                                       | <b>7,169</b>   | <b>28</b>                              |
| <b>Total (Microbiological and Chemical)</b>                 | <b>21,023</b>  | <b>28</b>                              |
| <b>Water in Service Reservoirs</b>                          |                |  |
| <i>E. coli</i>  | 16,862         | 4                                      |
| Coliform Bacteria***  | 16,862         | 22                                     |
| <b>Total</b>  | <b>33,724</b>  | <b>26</b>                              |
| <b>Water at Consumers' Taps or Authorised Supply Points</b> |                |  |
| <i>E. coli</i>  | 4,764          | 2                                      |
| Coliform Bacteria**   | 4,764          | 27                                     |
| Enterococci   | 408            | 1                                      |
| <i>Clostridium perfringens</i> **                           | 2,753          | 0                                      |
| <b>Microbiological Total</b>                                | <b>12,689</b>  | <b>30</b>                              |
| Zone Chemical Analysis                                      | 20,686         | 89                                     |
| Supply Point Chemical Analysis                              | 11,950         | 2                                      |
| Hydrogen Ion**  | 1,732          | 2                                      |
| <b>Chemical Total</b>                                       | <b>34,368</b>  | <b>93</b>                              |
| <b>Total (Microbiological and Chemical)</b>                 | <b>47,057</b>  | <b>123</b>                             |
| <b>Overall Microbiological Quality</b>                      | <b>60,267</b>  | <b>56 (0.09%)</b>                      |
| <b>Overall Drinking Water Quality*</b>                      | <b>101,804</b> | <b>177 (0.17%)</b>                     |

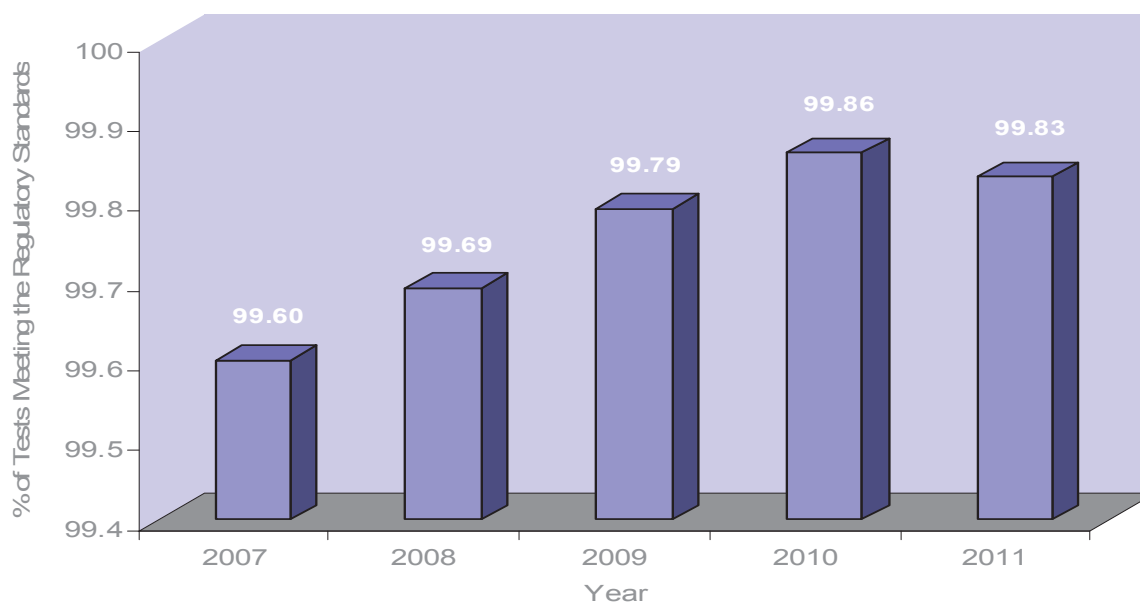
\*Calculated from the mandatory parameters and the four key indicator parameters.

\*\*The four key Indicator parameters.

\*\*\*All 326 SRs met the 95% compliance rule.



**Figure 1.2: Overall Drinking Water Quality, 2007 - 2011**



Compliance with microbiological standards is important as contraventions may indicate a breach in the integrity of the water supply system or a failure in the treatment process. Results confirm that the general safety of drinking water supplies is good, with an overall microbiological quality of 99.91% in 2011. There has, however, been a reduced level of compliance from the 99.95% achieved in 2010, and this is mainly attributed to an increased number of service reservoirs and consumers' taps failing to meet the microbiological standard for coliform bacteria in 2011.

#### Water Quality at Consumers' Taps

Looking more closely at the drinking water quality at consumers' taps, we also report on a comparative index called 'percentage mean zonal compliance' (% MZC); Table 1.2 refers. This is not a regulatory requirement but is a statistical calculation that is based on the 39 parameters contained within Schedule 1 of The Regulations. The calculation reflects the significance of the number of contraventions of a specific parameter in relation to the number of samples taken, which is based on the population size of the water supply zone being monitored. For further details on the % MZC for the parameters for which this indicator is calculated, refer to Part 5 of this report. Thirteen parameters did not achieve full compliance in 2011: iron, odour, aluminium, trihalomethanes (THMs), taste, bromate, enterococci, lead, polycyclic aromatic hydrocarbons (PAHs), manganese, turbidity,

*Escherichia coli* (*E. coli*), and the individual pesticide, MCPA. The parameter for which the lowest % MZC reported is iron at 98.15%.

**Table 1.2: Parameters not Meeting Full Compliance at Consumers' Taps in 2011**

| Parameter                         | % MZC        |
|-----------------------------------|--------------|
| Iron                              | 98.15        |
| Odour                             | 98.47        |
| Aluminium                         | 98.77        |
| Trihalomethanes                   | 99.29        |
| Taste                             | 99.75        |
| Bromate                           | 99.76        |
| Enterococci                       | 99.76        |
| Lead                              | 99.76        |
| Polycyclic aromatic hydrocarbons* | 99.76        |
| Manganese                         | 99.87        |
| Turbidity                         | 99.92        |
| <i>E. coli</i>                    | 99.96        |
| Pesticides - other substances**   | 99.98        |
| <b>% Mean Zonal Compliance</b>    | <b>99.83</b> |

\*(PAHs) - sum of four substances.

\*\*All pesticides other than aldrin, dieldrin, heptachlor and heptachlor epoxide.

Substantial investment has been made to improve drinking water quality, particularly, to upgrade water treatment facilities across Northern Ireland. While this is to be welcomed, it is imperative that drinking water quality improvements that have been identified, such as the need to maintain a prioritized programme of water mains rehabilitation across the distribution network, and the ongoing work to optimize water treatment processes, are in place. This should ensure the continued delivery of the necessary measures to enable the provision of safe, clean drinking water supplies across Northern Ireland.

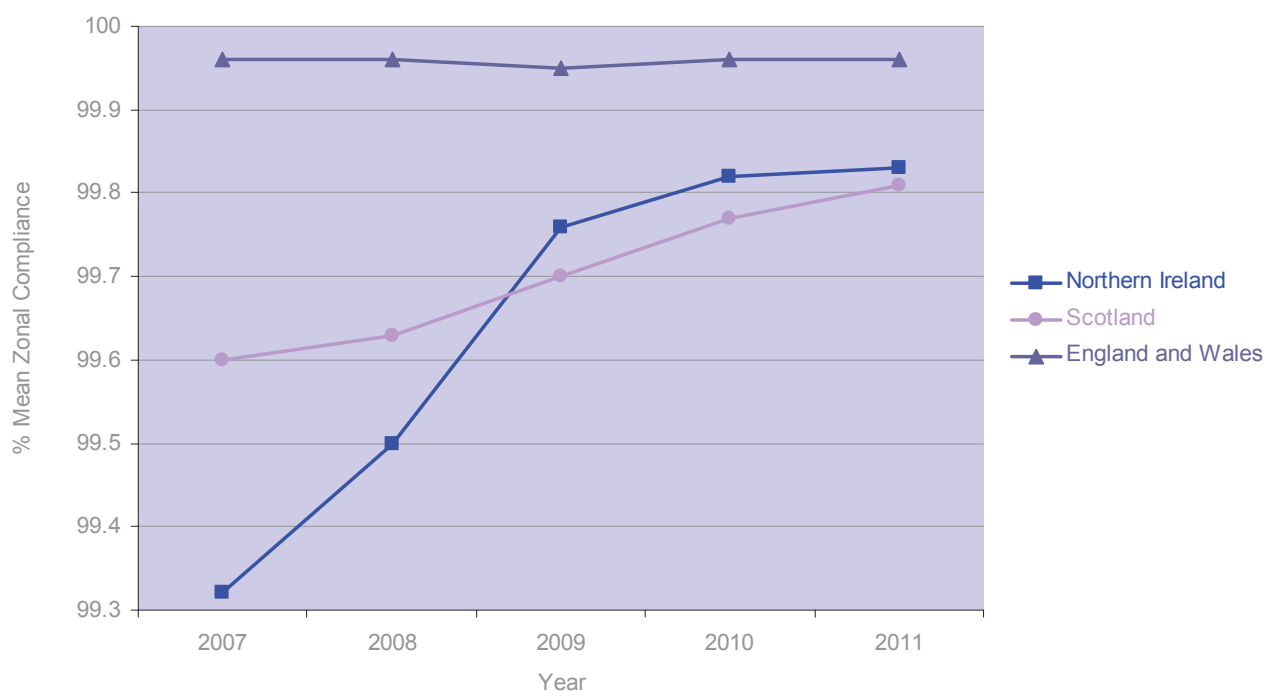
We have previously assessed the quality of water at consumers' taps using % MZC and as improvements, particularly, to water treatment works completed in the last five years, there was significant progress made in improving the overall quality of water received by consumers. Using the % MZC index, Figure 1.3 further illustrates the improvement that has been achieved in Northern Ireland, in the context of the UK, over the last five years in terms of increasing numbers of compliances with drinking water standards at consumers' taps. The overall trend for % MZC continues to improve, with 99.83% reported in 2011.

## Water Quality Related to Domestic Distribution Systems

NI Water is required to investigate all failures of drinking water quality standards, including those caused by the internal distribution system within buildings. Where these failures are within domestic dwellings, NI Water must inform the owner of the failure and its assessment of the breach, and give appropriate advice. NI Water does not have any responsibility to put remedial measures in place to deal with such failures relating to the pipe work and distribution systems which fall within the boundary of a property (unless the failure is related to a breach of The Water Fittings Regulations).<sup>1</sup> There were 22 such failures reported to us in 2011 which NI Water determined to be due to the internal plumbing within the domestic property.

However, where NI Water's investigation into the cause of the failure indicates that it is attributable to the internal domestic distribution system in premises where water is supplied to the public (such as schools, hospitals or restaurants), the company is required to notify us under regulation 2(1) of The Domestic Distribution Systems Regulations.<sup>2</sup>

**Figure 1.3: Comparing Drinking Water Quality at Consumers' Taps across the UK, 2007 - 2011\***



\*% MZC figures reported for Northern Ireland from 2007 to 2010 have been adjusted from those previously reported to standardize the reporting of the % MZC value for the individual pesticide parameter, to enable more accurate year-on-year comparisons to be made.

<sup>1</sup>[The Water Supply \(Water Fittings\) Regulations \(Northern Ireland\) 2009](#)

<sup>2</sup>[The Water Supply \(Domestic Distributions Systems\) Regulations \(Northern Ireland\) 2010](#)

If the failure is assessed as likely to recur or constitutes a potential danger to human health, we may serve a Notice in writing to the owner of the premises or establishment, outlining the actions required to remedy the failure within a specified period. Where the premises' owner fails to comply with the Notice, we may then undertake to complete the remedial actions specified and recover any costs incurred.

In 2011, NI Water reported five notifications to us under these regulations: three for lead; one for pH; and one for both turbidity and iron. To date, we have not served any Notices under these regulations as full and timely co-operation has been received from the owners in putting the remedial actions in place to bring the water supplies into compliance. We acknowledge the assistance and co-operation afforded to us by both NI Water and local council staff in investigating and resolving these failures.

### Events Affecting Drinking Water Quality

We require NI Water to inform us of all events that have affected, or are likely to affect, drinking water quality or sufficiency of supplies, and, where as a result, there may be a risk to consumers' health. This information must be provided according to agreed guidance and reporting procedures. We also encourage NI Water to notify us of events that may fall outside the criteria, but which could, nonetheless, impact on water quality or cause concern to consumers.

When notified of an event, we assess NI Water's provisional information to determine whether an incident or a non-incident has occurred. We define an incident as a situation where there has been a demonstrable deterioration in the quality of drinking water, giving rise to a significant potential risk to the health of consumers or a significant adverse aesthetic water quality change. Where no such deterioration has taken place, we classify the situation as a non-incident.

There is always the potential for incidents and non-incidents to happen. What matters is how well NI Water minimizes both the risks of occurrence and the consequences of incidents as it acts to protect public health at all times.

We assess all the information available to determine:

- what caused the problem and whether or not it was avoidable;
- what NI Water did in response and how it handled the situation;
- what lessons can be learned to prevent similar incidents in the future; and
- if there were any breaches of The Regulations.

In 2011, 69 events were reported to us compared with 36 reported in 2010. While the total number of events has limited use as a meaningful indicator, what is important is the significance of each event. Of the 69 events reported, 44 were categorized as incidents (64%) and 25 as non-incidents (Annex 5 provides more details).

Of the 44 incidents:

- 28 (64%) were related to difficulties with the performance of the coagulation processes, or deficiencies at the water treatment works which led to aluminium, hydrogen ion, iron, the individual pesticide (MCPA), THMs and turbidity contraventions;
- two involved *Cryptosporidium* oocysts breaking through the treatment processes which should have acted as barriers; and
- 14 were caused by issues in the distribution system: six bacteriological failures, three of which required "Boil Water Notices" (precautionary measures for public health protection); four due to the condition of the mains; two relating to media interest (one for loss of supply, the second because of significantly elevated chlorine levels); one relating to hydrogen ion arising because of a cement-lined main; and one odour contravention for which the cause was not determined.

Of the 25 events categorized as non-incidents, 14 (56%) were due to unrepresentative sampling; five were due to short-term treatment difficulties; three were related to both odours and tastes (one was caused by internal plumbing, the others were not determined); two were related to the potential for oil pollution of raw sources; and one was caused by short-term loss of disinfection.

### Overview of Consumer Complaints

We asked NI Water to provide us with data on the contacts and concerns of its customers during 2011 as we are interested in consumer confidence in drinking water quality.

The data we received for 2011 is presented in Figure 1.4 and shows that, like previous years, the highest percentage of contacts and concerns (59.2%) continues to relate to the appearance of drinking water.

We have been collecting data from NI Water for several years to better understand consumers' concerns (Table 1.3 refers). The information illustrates the high percentage of consumer contacts made relating to the appearance of water, particularly, colour. Concerns about colour can arise when the water can appear orange or brown due to suspended particles of iron, or black due to suspended particles of manganese. Iron and manganese may be present in the raw water passing through inadequate treatment or from corrosion of cast-iron distribution mains.

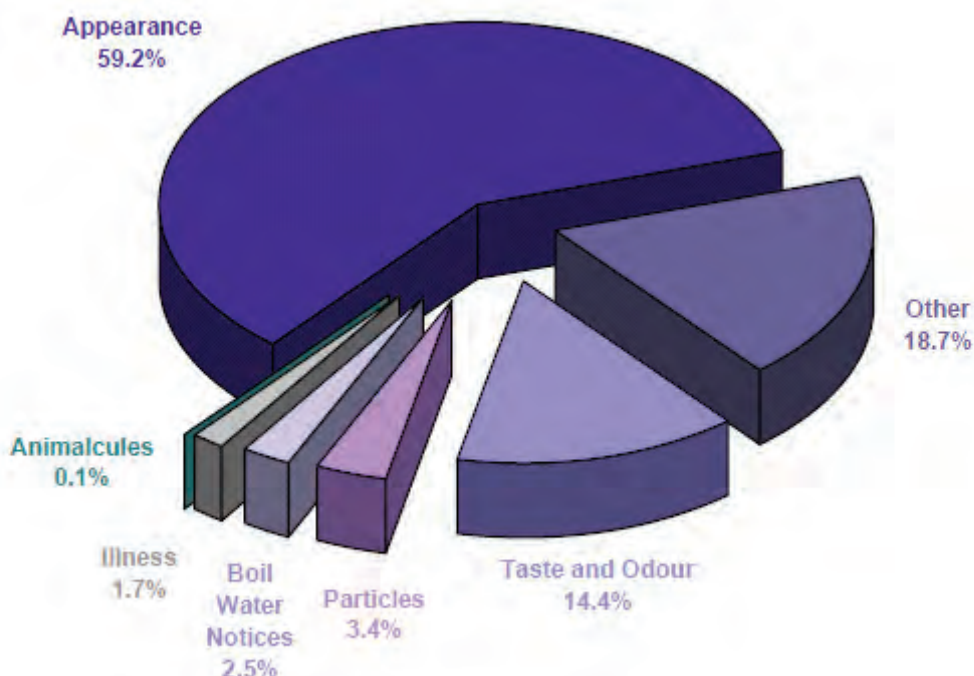
Ongoing and planned long-term mains rehabilitation programmes need to target these consumer concerns. More detail on consumer concerns is provided in Part 5.

**Table 1.3: Consumer Contacts Relating to Appearance, 2007 - 2011**

|      | Overall Number of Contacts | % of all Contacts Relating to Appearance | % of Appearance Category Relating to Colour |
|------|----------------------------|--|---|
| 2011 | 6,207                      | 59.2                                     | 63.8  |
| 2010 | 7,008*                     | 67.3                                     | 63.9  |
| 2009 | 9,396                      | 65.6                                     | 62.3  |
| 2008 | 9,971                      | 63.1                                     | 65.0  |
| 2007 | 8,818                      | 66.0                                     | 74.1  |

*\*This figure does not include the additional number of consumer contacts (approx. 33,350) related to the major 'freeze/thaw' incident that occurred in December 2010/January 2011.*

**Figure 1.4: Consumer Contacts and Concerns Received by NI Water in 2011**



### The Technical Audit Process

Technical audit process is the term used for the process by which the Inspectorate checks that NI Water is complying with its statutory obligations. The audit process allows us to observe whether good practice is being followed. We operate a risk-based approach to technical audit which allows us to take into consideration factors such as water quality monitoring, incidents and previous audits, and enables us to prioritize and focus the technical audit work to have the most benefit. Any corrective action that follows on from our recommendations and suggestions following the audit process is monitored by us to ensure satisfactory completion. A summary of the 2011 Technical Audit Programme is detailed in Annex 6.

### Drinking Water Quality Contraventions

Where NI Water supplies water that does not meet the drinking water standards, it must investigate the cause of the problem and notify us of its findings. It is incumbent upon NI Water to promptly provide substantive details and comments in its investigation reports. We assess each notification and determine if the failure is likely to recur. If we consider this to be the case, NI Water is required to put a programme of remedial work in place to improve drinking water quality. We may also implement the appropriate statutory mechanism to secure or facilitate compliance, where appropriate.

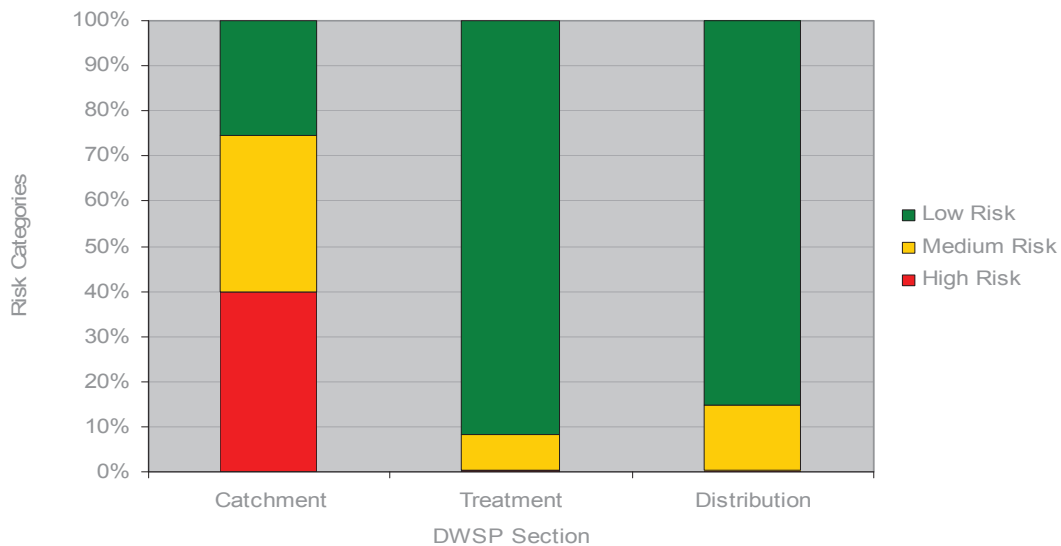
### Risk Management

As part of the regulatory requirements, NI Water must carry out a risk assessment, commonly referred to as a drinking water safety plan (DWSP), at every treatment works, associated catchment and supply system. This is a process which is required to be kept under review in relation to NI Water’s ongoing assessment of risk.

As well as the ongoing assessment of risk, NI Water has put in place an annual review of risk assessment scores. As part of this annual review we were provided with 24 summary risk assessment reports to cover all catchments, works and distribution systems which were in service at December 2011. These assessments identify and quantify the inherent risks throughout individual water supply systems and detail mitigation measures through adopting effective controls to protect drinking water quality. These control measures may involve actions relating to: minimizing the potential contamination of source waters; reducing or removing contaminants through appropriate treatment processes; and measures preventing contamination of the distribution network and domestic water systems within buildings.

In the graph below (Figure 1.5) we show the number of risks in each of the three categories as a percentage of the overall number of risks identified in each of the three individual sections of the drinking water safety plan: the catchment, water treatment works, and the distribution system.

Figure 1.5: Risk Assessment Categories in 2011





NI Water's risk assessment scores are based on calculations associated with the significance of results obtained from its sampling programme, along with a factor to take account of the significance of any water quality events within the water supply area. The risk assessment scores are then categorized into low, medium, and high risks, with associated actions required dependent on the risk score banding. The actions required can range from 'no action required' or 'keep under review' for low scores/low risk, to 'probable or possible capital investment' for medium scores/medium risks, through to 'urgent action' required for high scores/high risks. At the beginning of the supply chain, NI Water must continue to be vigilant in its management of its water sources to fully implement a risk-based approach with well informed catchment management plans. This should include close liaison with all those involved in the management of the catchments to assist in the process of preventing potential contaminants entering the water source and impacting on drinking water quality.

NI Water must also take account of how water quality can vary considerably between different sources but can also be affected seasonally as well as during severe weather events. NI Water must make certain that the treatment and controls it has in place at water treatment works are sufficiently robust to satisfactorily treat the variability in raw water quality encountered at each works and ensure water leaving water treatment works is safe and clean.

### Regulatory Processes - Enforcement Orders

Where NI Water has failed to comply with its regulatory duties, The Regulations make provision for us to use a range of statutory processes to ensure that compliance is achieved. Details of our Enforcement and Prosecution Policy are available on our website.<sup>1</sup> As part of the enforcement process we may commence with the issue of a 'Consideration of Provisional Enforcement Order' (CPEO) to NI Water, whereby, the company is required to submit an Undertaking to demonstrate what steps it has taken, or is going to take, to ensure compliance with the requirements of The Regulations. Such requirements cover a range of regulatory issues from sample scheduling to remedial measures to bring about compliance with water quality standards.

During 2011, nine CPEOs were in place:

- four of these, relating to non-compliance with the regulatory standard for aluminium, THMs and MCPA, were completed;
- three, relating to non-compliance with the regulatory standard for iron, remained ongoing; and
- two new CPEOs were issued: one related to deficiencies in the sampling schedule; and one addressed significant taste and odour failures within a water supply zone.

For further details on these CPEOs, refer to Annex 7.

### Partnership Working

We continue to be part of a partnership agreement,<sup>2</sup> whereby, all statutory stakeholders are committed to a shared common objective. The aim of the agreement is to facilitate our roles through co-operation and understanding of stakeholders' responsibilities, creating the right working environment and relationships, whilst not overriding our individual responsibilities.

The statutory water stakeholders are:

- Consumer Council for Northern Ireland;
- Department for Regional Development;
- Drinking Water Inspectorate;
- Northern Ireland Authority for Utility Regulation;
- Northern Ireland Environment Agency; and
- NI Water.

### The Price Control Process

The price control (PC) process is a mechanism by which NI Water secures its funding and investment priorities for the coming years. Through our involvement in this process we recognize that competing priorities exist and our primary objective is to identify programmes of work that are necessary to secure compliance with drinking water quality standards. This work is carried out as part of the investment planning process and assists in identifying and targeting infrastructure and operational improvements required by NI Water to maintain and enhance its operations in delivering safe, clean water supplies.

<sup>1</sup> [www.doeni.gov.uk/niea/dwi\\_prosecution\\_policy\\_-\\_march\\_2012.pdf](http://www.doeni.gov.uk/niea/dwi_prosecution_policy_-_march_2012.pdf)

<sup>2</sup> [www.drndni.gov.uk/water\\_stakeholders\\_partnership\\_agreement\\_2012.pdf](http://www.drndni.gov.uk/water_stakeholders_partnership_agreement_2012.pdf)



**Part 2**  
**Catchment**



Image: Althahinch Water Treatment Works - NI Water



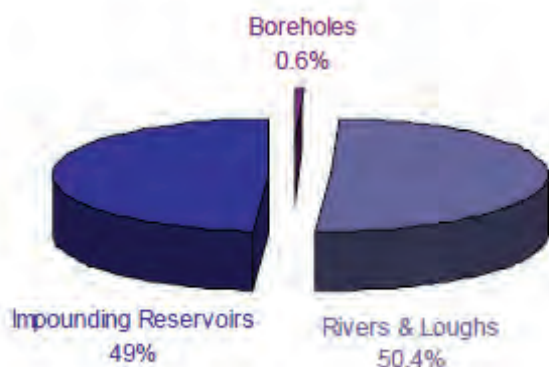
## Part 2

### Catchment

This section of the report looks at the catchment: the start of the 'water supply chain' from which NI Water abstracts water before it is treated and distributed onwards to consumers' taps. It examines how catchments are managed as part of the drinking water safety plan approach to provide safe, clean drinking water.

In Northern Ireland, public water supplies are mostly obtained from surface water sources (approximately 99.4 per cent), with only 0.6 per cent obtained from boreholes. Historically the nature and structure of the landscape, together with well distributed rainfall, have led to the development of upland and lowland reservoirs and direct river abstractions to meet both urban and rural centres of water demand. Rationalization of water sources has seen a significant reduction in the use of boreholes, from eight per cent in 1996 to 0.6 per cent in 2011.

**Figure 2.1: Sources of Drinking Water Used by NI Water**



Water sources contain naturally occurring organic materials as well as other potential contaminants which need to be removed by suitable water treatment processes.

Water quality can vary between sources due to many factors such as the nature and structure of the rock types, soil, vegetation, land use and local weather. These are important factors that may have an impact on the properties of a drinking

water supply, such as taste, hardness, acidity (pH), organic and mineral content.

#### Water Abstraction

In Northern Ireland the abstraction of raw water from rivers, reservoirs and loughs is controlled by Abstraction Licensing Regulations<sup>1</sup> which require major water abstractors to obtain a licence from Northern Ireland Environment Agency (NIEA). NI Water is authorised to abstract up to 1,075 MI/d under license from NIEA<sup>2</sup> and, in 2011, water for drinking water purposes was abstracted from 24 catchments across NI.

NI Water has developed a strategy to plan ahead to ensure that a suitable resource to maintain drinking water supplies is in place for predicted usage up to the year 2035. This is detailed in the Water Resource Management Plan (WRMP)<sup>3</sup> and takes account of population changes, housing and water usage, as well as predicted changes to our climate.

#### Catchment Risk Assessment

As part of managing the risk of contamination through the water supply chain from 'source to tap', NI Water is required to ensure that it has assessed all current and potential risks within the catchments and keep its drinking water safety plans (DWSPs) under review, as necessary. The DWSPs must then detail the arrangements NI Water is putting in place to mitigate these risks to protect the catchment and preserve the quality of its source waters.

In the management of the risks within these catchments, NI Water is required to undertake a monitoring programme of the raw water quality. The frequency and range of parameters to be tested for in this programme should be in line with the level of risk as identified in undertaking its regulatory risk assessments. NI Water must ensure that, as a minimum, its surface waters monitoring programme meets the minimum sampling frequencies in The Regulations,<sup>4</sup> which are based on the population served by the water treatment works. These monitoring programmes are also necessary for the management of NI Water's water treatment works as changes in raw water quality can entail adjustments being made to

<sup>1</sup>Water Abstraction and Impoundment (Licensing) Regulations (Northern Ireland) 2006

<sup>2</sup>Northern Ireland Environment Agency - Abstraction and Impoundment Licensing Team

<sup>3</sup>NI Water's Water Resource Management Plan 2012

<sup>4</sup>The Water Supply (Water Quality) (Amendment) Regulations (Northern Ireland) 2009 No. 246

the treatment processes to ensure the ongoing provision of safe drinking water supplies. This is particularly important in relation to establishing baseline information on raw water quality to evaluate changes such as increased natural organic matter which can be prevalent in upland peaty surface water sources.

To protect catchments and to keep itself informed of potential contamination and risks, NI Water must liaise closely with other stakeholders such as the NIEA, the Department of Agriculture and Rural Development, and Forestry Service to ensure appropriate lines of communication are in place.

**Potential Contaminants**

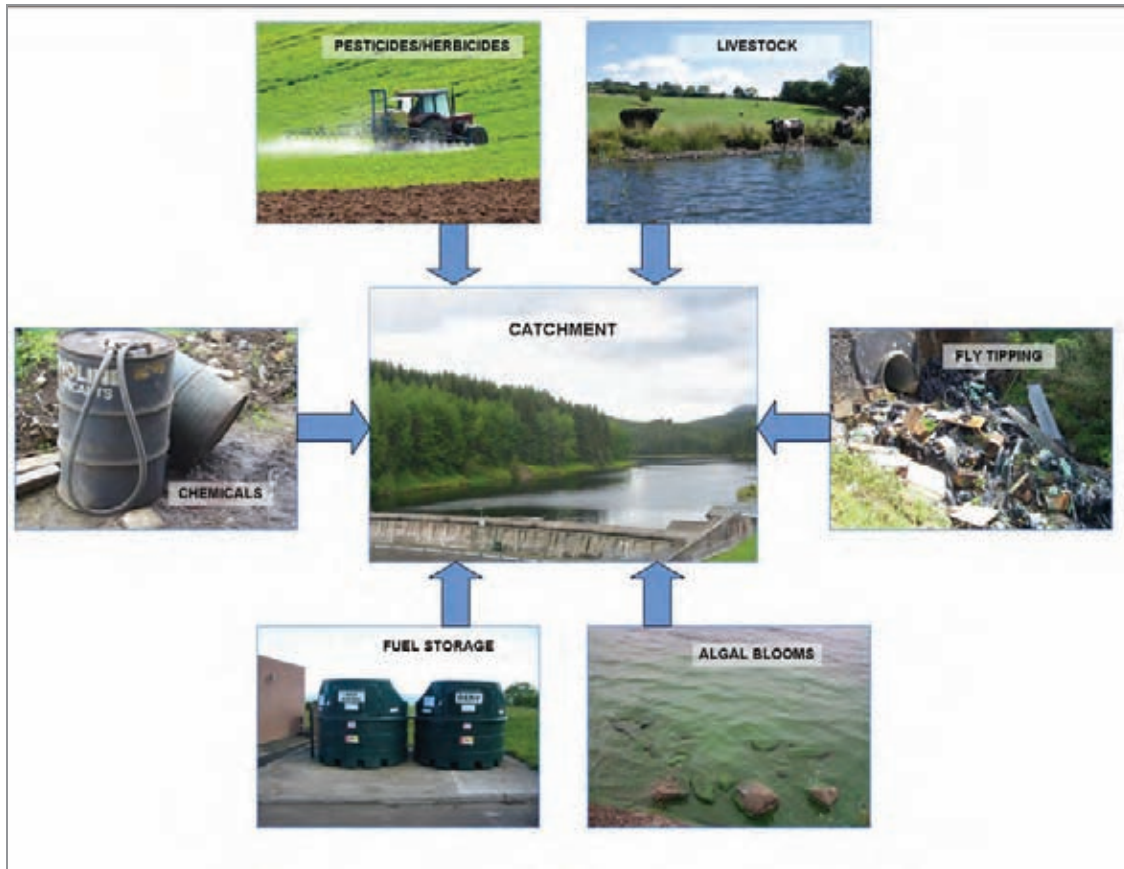
Many factors in catchments have the potential to influence the raw water quality. In general, raw water quality is influenced by both natural and human elements. Important natural factors include wildlife, climate, topography, geology and vegetation; human use factors include point sources (e.g. waste water discharges) and non-point sources (e.g. surface run-off). Many sources contain significant numbers of bacteria, hence, the

importance of having adequate treatment, especially disinfection, to make the water safe to drink. As part of the drinking water safety plan approach, drinking water sources are also risk assessed for the other potential pathogens, such as *Cryptosporidium*. In some catchments the presence of undesirable biologically derived contaminants arising from aquatic micro-organisms such as algae may have the potential to cause taste and odour issues within the water leaving the water treatment works.

NI Water must also consider the deterioration in raw water resulting from increased run-off from the surrounding catchment as a result of heavy rain. In tackling such risks identified within the catchment, NI Water is required to have robust treatment processes in place. Having suitable controls in place to enhance source protection provides the first barrier in the provision of safe, clean drinking water.

Some of the sources of potential contaminants which could find their way into the rivers, loughs and reservoirs within our drinking water catchments are detailed in Figure 2.2.

**Figure 2.2: Potential Sources of Pollution within Catchments**



## Pesticides

Pesticides are a group of substances that include insecticides, herbicides, fungicides and algicides that are commonly used as part of land use management practices in catchments. The Regulations set standards for individual pesticides as well as a standard for the sum of all pesticides, 'the total pesticide' standard. Sampling and analysis should be undertaken for those pesticides used in significant amounts on catchments and those most likely to reach water supplies as identified through NI Water's risk assessments. Water sources may contain traces of pesticide residues as a result of agricultural use (pest control on crops) and non-agricultural use (herbicide for weed control on roads, etc). NI Water is required to assess the risk to drinking water from pesticides in use in its catchments and then develop an appropriate pesticide monitoring programme.

During 2011, 47 individual pesticides were monitored. Of the 11,233 determinations, two regulatory samples failed the standard of 0.1µg/l for MCPA in the Dorisland and Killyhevlin water supply areas. In addition to the regulatory compliance sampling programme, NI Water carries out operational monitoring for pesticides. From these operational samples, a failure was reported for MCPA at both Belleek WTWs and Derg WTWs.

MCPA is a herbicide used for controlling broad-leaved weeds in grass and cereal crops. Insufficient pesticide removal at the associated water treatment works was the cause for the MCPA failures. Table 2.1 provides a summary of the locations where pesticides have been detected above the regulatory standard during the last three years. These failures have all related to the presence of MCPA within the final water from each of the identified works.

NI Water must investigate all pesticide failures. This will include liaison with the NIEA's Pollution Control Team to carry out investigations regarding pesticide usage and control within the relevant catchments. The outcomes of such investigations are then used to review the risk categorization for pesticides in NI Water's DWSPs. It is through this process that NI Water must identify appropriate remedial measures to be put in place to mitigate against the risk of pesticides making their way into the drinking water supply.

Both the MCPA contraventions at Belleek WTWs and Derg WTWs were caused by not maintaining

adequate treatment within the water treatment process. In the case of Belleek WTWs, the powdered activated carbon (PAC) dosing was not operational at the time the sample was lifted; and for Derg WTWs, the five granular activated carbon (GAC) filters were in operation, but were in poor condition and required regeneration. NI Water has now put remediation measures in place at both these works.

**Table 2.1: Pesticide Detections above the Regulatory Standards**

|                                       | 2011     | 2010     | 2009             |          |
|---------------------------------------|----------|----------|------------------|----------|
| Water Treatment Works                 | MCPA     | MCPA     | Total Pesticides | MCPA     |
| W2501, Altmore*                       |          | 1        | 1                |          |
| W1701P, Ballinrees                    |          | 1        |                  |          |
| W4722, Belleek                        | 1        |          |                  |          |
| W2802, Carran Hill                    |          |          |                  | 2        |
| W4501, Derg                           | 1        |          |                  | 1        |
| W3317, Dorisland                      | 1        |          |                  |          |
| W4701, Killyhevlin                    | 1        |          |                  |          |
| <b>Total Number of Contraventions</b> | <b>4</b> | <b>2</b> | <b>1</b>         | <b>3</b> |

\*Altmore WTWs was taken out of service in April 2011.

Dorisland WTWs has no specific treatment in place for removal of pesticides, and following the MCPA contravention in 2011, we issued a Consideration of Provisional Enforcement Order (CPEO) to NI Water in May 2012 (refer to Annex 7 for further details).

Killyhevlin WTWs also has no specific treatment in place to reduce the pesticide concentration below the regulatory limit. However, following a CPEO issued in October 2011 for taste and odour contraventions, NI Water is to undertake a feasibility study for the introduction of GAC treatment. The risk posed by MCPA within the Killyhevlin catchment will also be addressed through this work.

There are regulations and guidance<sup>1</sup> in place to ensure pesticides are used with care in the vicinity of water ways. NI Water has also been proactive by participating in workshops and in educating stakeholders within catchments on the potential for the misuse of pesticides near water ways and the

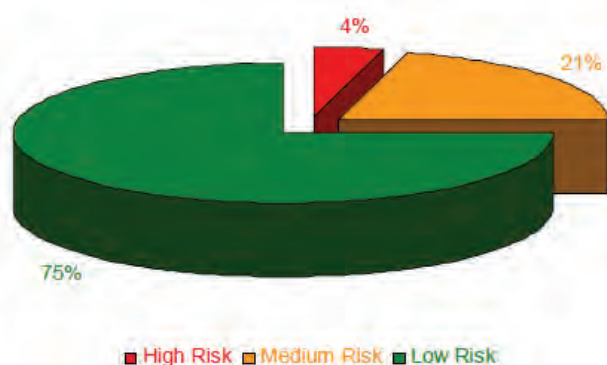
<sup>1</sup>[www.dardni.gov.uk/ppp-code](http://www.dardni.gov.uk/ppp-code)



subsequent impact such activities may have on drinking water quality.

Through carrying out its risk assessments, NI Water has identified a potential risk of the herbicide MCPA being present at elevated levels within 25% (six out of 24) of its catchments (see Figure 2.3). The catchments range from loughs and impounding reservoirs fed from upland and lowland sources, to direct river abstractions.

**Figure 2.3: Percentage of Catchments and Associated Risk Categorization for Presence of MCPA**



The level of risk identified requires NI Water to have in place, or be working towards, remedial measures to ensure levels of MCPA remain below the regulatory standard.

These can include a combination of:

- measures to influence the usage/application and disposal of MCPA within the catchment (e.g. catchment management, liaison with stakeholders);
- balancing flows and abstraction points to reduce the risks of increased MCPA levels during periods of high risk (e.g. following heavy rainfall);
- maintaining and optimizing its treatment for removal of MCPA (e.g. GAC); and
- undertaking feasibility studies for additional treatment options for the reduction of MCPA levels at high risk WTWs.

Surface waters which are abstracted for the production of drinking water for both public and private drinking water supplies are required to be identified and mapped within NIEA's river basin management plans<sup>1</sup>

Under Article 8 of the Water Framework Directive (WFD), there is a requirement to put in place an appropriate sampling programme to monitor substances discharged within Drinking Water Protected Areas (DWPAs) that may cause deterioration in the status of the water body.

We are committed to working with NI Water and NIEA in continuing to implement the requirements of the WFD in relation to DWPAs. It is important that NI Water's drinking water safety plans, associated catchment management plans, and raw water sampling programmes are closely aligned with the requirements in the WFD to have clearly defined DWPAs for all of NI Water's drinking water abstractions.

### Sustainable Catchment Area Management Planning (SCAMP)

In managing its catchments and its water treatment processes, NI Water has been adopting the principles of SCAMP, within a number of its catchments. During 2011, this SCAMP NI project has involved the company collaborating with a number of organizations, including The Royal Society for the Protection of Birds (RSPB), The Mourne Heritage Trust, The Woodlands Trust, and the Ulster Wildlife Trust, on a number of projects. For 2011/2012, these projects will initially cover the catchments for Dungonnell WTWs, Killylane WTWs, and Moyola WTWs. This work will look at mainly long-term sustainable solutions to improving land management practices within these catchments, with the objective of improving the quality of raw water being used for abstraction purposes. Such improvements should provide more cost-effective treatment options, with the potential cost savings and environmental benefits associated with a reduction in energy and chemical usage.

<sup>1</sup>[www.doeni.gov.uk/niea/water-home/wfd.htm](http://www.doeni.gov.uk/niea/water-home/wfd.htm)



## Part 3 Water Treatment



Image: Carran Hill Water Treatment Works - NI Water



## Part 3 Water Treatment

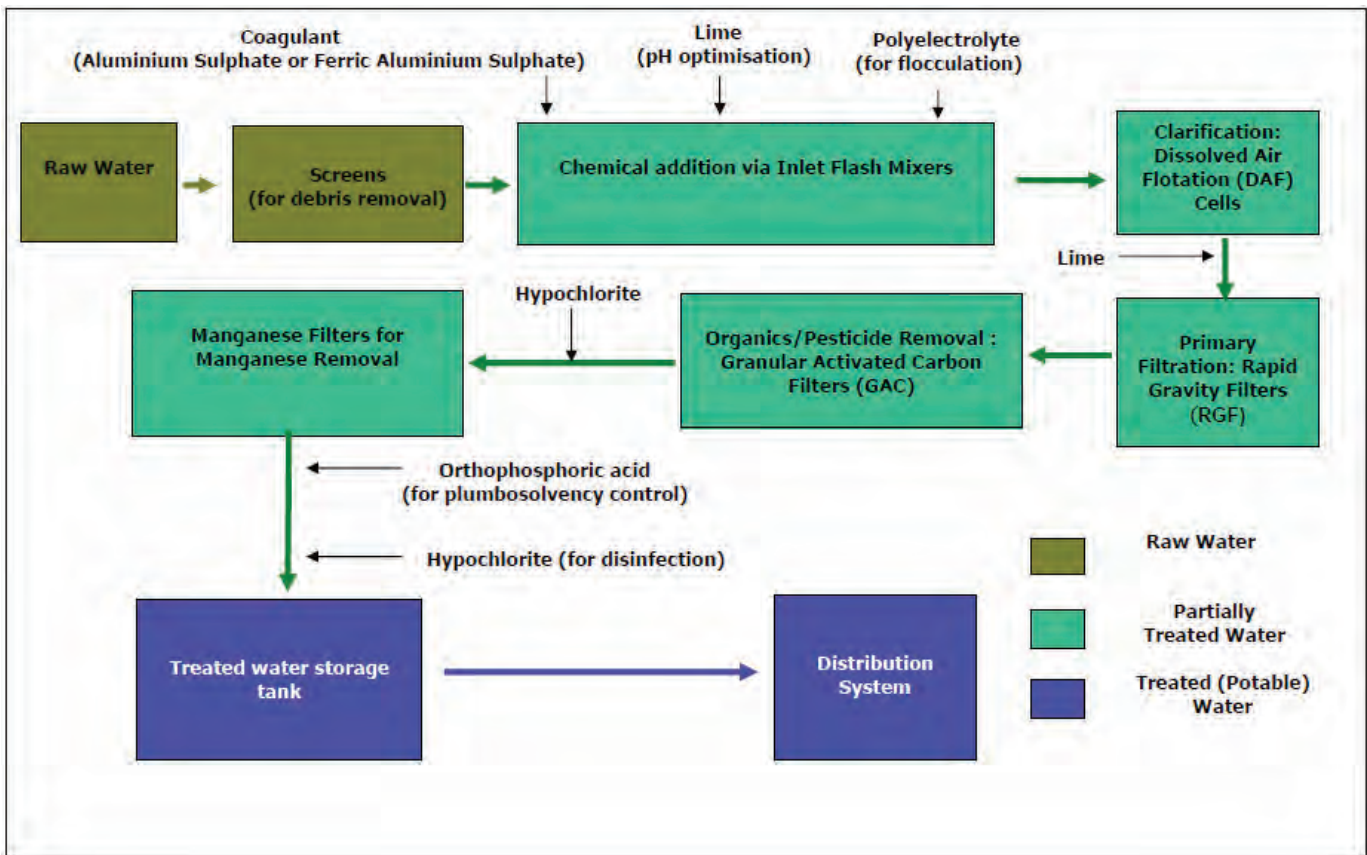
After source protection, the control measures to remove contaminants are treatment processes. In this part of the report we have provided details of the key parameters such as trihalomethanes, turbidity, and aluminium, which are used to monitor the effectiveness of the treatment processes.

NI Water must ensure that the treatment processes it has in place at each water treatment works are robust and designed to deal with the range of raw water quality which could occur within the water source.

In Northern Ireland, surface waters provide the main source for drinking water supplies. Water treatment processes are used as barriers to control the risk of contaminants entering water supplies.

Water treatment processes include the physical removal of potential contaminants by using chemical coagulation/flocculation, sedimentation, or flotation, and filtration to prepare the water for disinfection. The primary aim in water treatment is to eliminate any pathogenic micro-organisms and provide a safe, clean drinking water supply. A typical water treatment process is shown in Figure 3.1.

Figure 3.1: Generic Water Treatment Process



The drinking water safety plan (DWSP) approach requires an assessment to be made between the source water and the type of water treatment in place at water treatment works. This assessment should identify and quantify the risks within the source water and ensure that appropriate remediation measures are in place to remove these risks at each water treatment works. These measures would take the form of suitable water treatment processes being in place to deal with the specific risks within each source. They should take into account the wide variations in the quality of the source water caused by seasonal change and

adverse weather. The risk assessment should also take account of the risks which may be encountered within the treatment processes and proper controls should be in place to mitigate these. One important measure of the effectiveness of treatment is the assessment of the water quality throughout the treatment process and the quality of the final water leaving the works into distribution. In Table 3.1, groupings of two sets of parameters are used to describe the effectiveness of water treatment processes: process control parameters, and disinfection parameters.

**Table 3.1: Water Quality at Water Treatment Works, 2011**

| Parameters                                      | Place of Sampling | Total No. of Tests in 2011 | No. of Tests not Meeting the Standards in 2011     | % of Tests not Meeting the Standards |             |
|---|-------------------|----------------------------|--|--------------------------------------|-------------|
|   |                   |                            |  | 2011                                 | 2010        |
| <b>Process Control Parameters</b>               |                   |                            |  |                                      |             |
| Colour  | WSZ               | 1,732                      | 0  | 0.00                                 | 0.00        |
| <b>Aluminium</b>                                | <b>WSZ</b>        | <b>1,732</b>               | <b>20</b>  | <b>1.15</b>                          | <b>0.58</b> |
| <b>Trihalomethanes</b>                          | <b>WSZ</b>        | <b>408</b>                 | <b>3</b>   | <b>0.74</b>                          | <b>1.85</b> |
| <b>Bromate</b>                                  | <b>WSZ</b>        | <b>408</b>                 | <b>1</b>   | <b>0.25</b>                          | <b>0.00</b> |
| <b>Disinfection Parameters</b>                  |                   |                            |  |                                      |             |
| Coliform bacteria                               | WTWs              | 6,927                      | 0  | 0.00                                 | 0.01        |
| <i>E. coli</i>                                  | WTWs              | 6,927                      | 0  | 0.00                                 | 0.00        |
| <b>Turbidity</b>                                | <b>WTWs</b>       | <b>6,927</b>               | <b>28</b>  | <b>0.40</b>                          | <b>0.38</b> |
| <b>Number of Water Supply Zones (WSZs) - 53</b> |                   |                            | <b>Number of Water Treatment Works (WTWs) - 29</b> |                                      |             |

### Process Control Parameters

Process control parameters are used to measure the effectiveness of water treatment, and are based on a selection of chemical parameters which are influenced, in general terms, by the processes in place at the water treatment works. In 2011, results from the regulatory monitoring programme shown in Table 3.1 report non-compliance occurred for three of the process control parameters, notably, aluminium and THMs.

The implementation of good operational practice at water treatment works during both regular operation and when normal operating circumstances do not prevail, is critical in ensuring a continuation in the supply of high quality drinking water and improvement in compliance with the process control standards, particularly, the aluminium standard.

The implementation of DWSPs highlights that good operational monitoring is fundamental to assess whether the control measures in a treatment works are operating properly. NI Water monitors critical parameters at stages of the water treatment process to ensure effective process control.

### Aluminium

The number of aluminium non-compliances increased significantly in 2011: 20 failures compared with the 10 which occurred in 2010. Eleven of these failures (55%) were directly attributed to issues at water treatment works which led to loss of effective treatment:

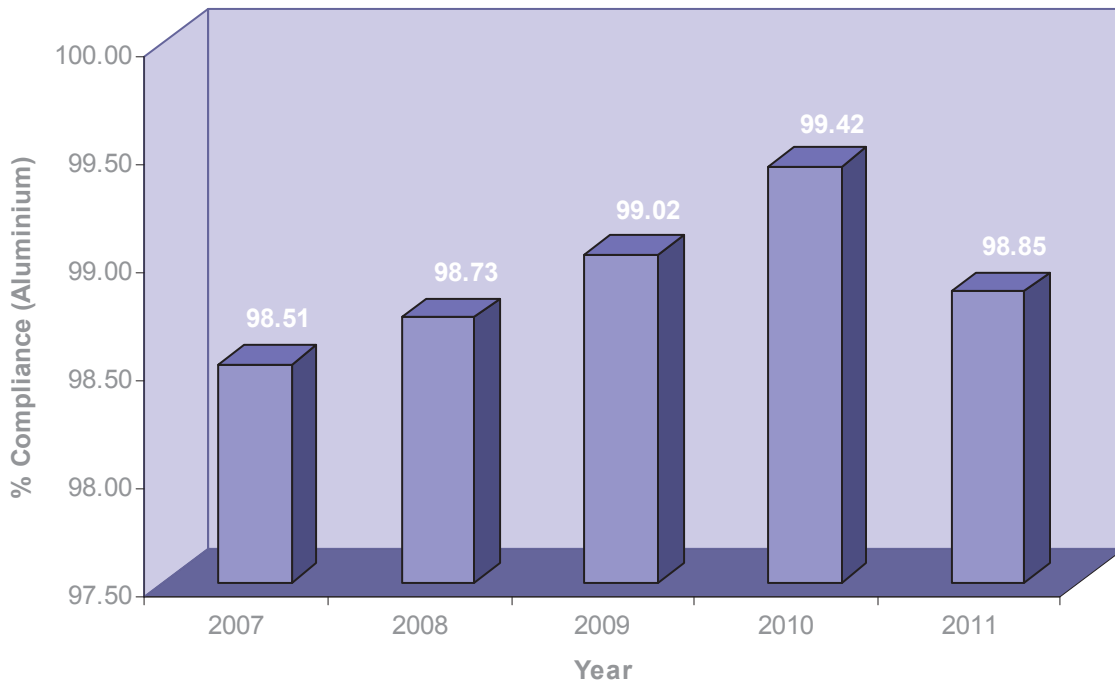
- five were caused by problems with pH adjustment (three at Drumaroad, one at Carmoney and one at Dorisland WTWs);
- four were caused by freeze/thaw damage within Dunore Point WTWs;
- one was caused by a control system instrumentation fault at Lough Macrory WTWs; and
- one was caused by operational work on site at Lough Fea WTWs when a clarifier was taken out of service to be cleaned.

In each case, remedial action was identified by NI Water and the necessary corrective action has been taken, or is scheduled.

No cause was determined for the other nine failures but “localized mains disturbance” was given by NI Water as the most likely reason for the majority of these additional failures. Although these aluminium contraventions were not attributed to any recent issues at water treatment works, it is likely that they were caused by a history of previous treatment issues which resulted in elevated levels of aluminium being present in water leaving the treatment works.

As can be seen in the graph below (Figure 3.2), the increase in aluminium contraventions has resulted in a significant change in the trend of overall improving compliance. For 2011, the percentage number of tests complying with the regulatory standard has decreased to 98.85%, from 99.42% in 2010.

**Figure 3.2: Percentage of Tests Meeting the Regulatory Standard for Aluminium, 2007 - 2011**





## Trihalomethanes (THMs)

THMs are disinfection by-products that arise when chlorine, which is used to disinfect the water and make it microbiologically safe to drink, is added to water containing naturally occurring organic substances. Improved treatment processes introduced over recent years and good operational practice in removing organic substances at water treatment works have resulted in the highest ever THM compliance (99.26%) being recorded in 2011. Only three samples failed to meet the standard (100µg/l). NI Water must fully consider the formation of THMs and other disinfection by-products as part of its overall disinfection policy. Where possible, without compromising disinfection, NI Water must continue to keep all disinfection by-products, including THMs, to as low a level as possible. More details on THMs can be found in Part 5 of this report.

## Disinfection Parameters

The disinfection parameters (Table 3.1 refers) look at the effectiveness of disinfection and pathogen removal. To safeguard drinking water from the risk of microbiological organisms being present, the process of effective disinfection is fundamental to treatment works' operation. It is, therefore, paramount that NI Water achieves its primary duty of disinfecting drinking water before it is supplied to consumers and that appropriate critical control measures are in place.

In 2011, NI Water reported full compliance for coliform bacteria and *E. coli* at water treatment works. There was, however, a slight decrease in compliance with the turbidity standard (0.4% in 2011; 0.38% in 2010). Through the ongoing review and implementation of its disinfection policy, NI Water should continue to ensure that the high level of compliance noted for the disinfection parameters is maintained and improved. The policies and procedures relating to disinfection should also inform and be linked into NI Water's risk-based approach within its DWSPs and to its regulation 28 risk assessment reports. This will provide an assurance that the disinfection process is appropriately managed and, where it is not, risk factors will be identified through individual DWSPs and the necessary mitigation measures put in place.

### *E. coli* and Coliform Bacteria

Testing for *E. coli* and coliform bacteria at water treatment works provides assurance that water is

being treated adequately to remove bacterial and viral pathogens. In 2011, *E. coli* and coliform bacteria were not detected in any of the 29 water treatment works that supply water across Northern Ireland.

## Turbidity

The regulatory standard for turbidity leaving a water treatment works is 1 NTU. The finely suspended particles which cause turbidity in water must be removed by effective water treatment in preparation for the disinfection process. Where treatment is inadequate or there is disturbance during onward storage, these particles may increase turbidity levels in the water going into supply. As well as being a regulatory requirement, it is also considered good operational practice to ensure that a turbidity value below 1 NTU is achieved post treatment to ensure effective disinfection.

Turbidity contraventions occurred at 14 (48%) water treatment works in 2011. Of the 6,927 samples taken for turbidity analysis from water treatment works, 28 (0.40%) failed to meet the standard. Of these failures, 15 (54%) were due to unrepresentative sampling; six (21%) were related to treatment problems; six were due to inadequate treatment in place to remove high levels of iron and manganese which are naturally present in the ground water at Gortlenaghan Borewell; and one was due to disturbance in a tank caused by difficult operating conditions during the 'freeze/thaw' incident. Gortlenaghan Borewell was removed from service in April 2011 as part of the planned infrastructure investment programme.

## Indicator Parameter

### *Clostridium perfringens*

The Regulations require monitoring for *Clostridium perfringens* as an indicator parameter, and it can be used in association with other parameters to assess the efficiency of water treatment processes. This organism is a spore-forming bacterium that is exceptionally resistant to unfavourable conditions in the water environment: extremes of temperature and pH; and disinfection processes such as chlorination and ultraviolet light.

In 2011, 2,753 tests were carried out for *Clostridium perfringens* on samples collected from water leaving treatment works. Full compliance with the regulatory standard of 0/100ml was achieved.

## **Drinking Water Quality Improvements at Water Treatment Works**

In order to protect, maintain and improve drinking water supplies, NI Water continues to complete infrastructure, treatment and distribution projects. These programmes of work may be driven by remedial actions relating to Authorised Departures (ADs), Enforcement Orders, Notices and other regulatory processes.

### **Enforcement Action - Consideration of Provisional Enforcement Orders (CPEOs)**

During 2011, NI Water completed the remedial actions associated with the CPEO for aluminium contraventions at Carmoney WTWs; and a CPEO in relation to improving the treatment process to address taste and odour contraventions in the Killyhevlin water supply area was put in place (Annex 7 provides further details).



## Part 4 Water Distribution Systems



Image: Ballymageogh Service Reservoir - NIEA



## Part 4

### Water Distribution Systems

In this part of the report we provide details of the quality of treated water which is supplied through the distribution system. The protection of the distribution system, which is an extensive network of storage reservoirs and pipes, is essential for providing safe drinking water.

The water distribution system in Northern Ireland is an extensive and complex network, consisting of 326 service reservoirs and approximately 26,500 kilometres of mains pipe, which facilitate the delivery of treated water from the water treatment works to the point of supply to the consumer. Service reservoirs provide storage close to the point of distribution to help ensure that sufficient water is available to meet the varying demands of consumers.

As water travels through the distribution system, the quality of the water may deteriorate depending on the structural integrity of the distribution system, the nature of the water and the materials it comes into contact with. For example, service reservoirs whose structural integrity has not been maintained are at risk from ingress of contaminants and old cast-iron pipes which have corroded over time may result in sediment being deposited under low flow conditions. An increase in flow rate can cause disturbance to the mains network, which may result in particles being re-suspended and transported through the system, resulting in discoloured water at the tap.

Monitoring the quality of the water using indicator parameters is important for identifying potential deficiencies with the integrity of the service reservoirs, and within the distribution system. In Table 4.1, two measures are used which describe the water quality within a distribution system: reservoir integrity, and distribution maintenance. The selection of these distribution parameters is to reflect the age, condition and maintenance status both of the reservoirs and the pipes (water mains) which comprise the distribution networks.

#### Microbiological Quality in Distribution Systems

Water entering the distribution systems must be microbiologically safe. The distribution system itself must have sufficient controls in place to prevent contamination of drinking water supplies, as the water is delivered to the user.

Service reservoirs should be fully enclosed and securely roofed with external drainage to prevent contamination. The prevention of stagnation in both storage reservoirs and distribution is also a way of controlling potential contamination. Control measures may also include maintaining a disinfectant residual throughout the distribution network to provide ongoing protection against recontamination and limit the potential for microbial growth problems.

Within certain parts of the distribution system, NI Water carries out additional disinfection (often referred to as 'secondary disinfection') through chlorine boosting at selected service reservoirs, particularly those with long distribution networks. This additional disinfection is necessary to maintain the good water quality achieved at the water treatment works, thus ensuring that a 'disinfection residual' is achieved at the end of the distribution network.

It is imperative that this 'secondary disinfection' does not disguise a more fundamental problem such as compromised reservoir integrity because of the structural condition of the reservoir or the hydraulic flow of water through the system. In the process of implementing the DWSP approach, NI Water must review its control measures to ensure that an adequate disinfection residual is effectively maintained throughout the distribution network by assessing all relevant information.

#### *E. coli* at Service Reservoirs

In 2011 a total of 16,862 samples for *E. coli* testing were collected at service reservoirs across Northern Ireland. *E. coli* was detected in four of these samples. On detecting *E. coli*, NI Water must act promptly to protect public health and ensure that the water being received by consumers is safe. Investigations are carried out to identify the cause of all failures. One failure at Springhill SR was caused by inadequate disinfection and this was notified by NI Water as a water quality event.

The reason for a failure at Culnafey SR was not determined. NI Water attributed the other two *E. coli* failures to unrepresentative sampling.



Table 4.1: Water Quality Indicators within the Distribution System

| Parameters                      | Place of Sampling | No. of Tests in 2011 | No. of Tests not Meeting the Standards in 2011 | % of Tests not Meeting the Standards in 2011 | % of Tests not Meeting the Standards in 2010 |
|---------------------------------|-------------------|----------------------|--|--|--|
| <b>Reservoir Integrity</b>      |                   |                      |  |  |  |
| Coliform bacteria               | SR                | 16,862               | 22   | 0.13   | 0.05   |
| <i>E. coli</i>                  | SR                | 16,862               | 4  | 0.02   | 0.01   |
| <b>Distribution Maintenance</b> |                   |                      |  |  |  |
| Turbidity                       | WSZ               | 1732                 | 1  | 0.06   | 0.06   |
| Iron                            | WSZ               | 1732                 | 30   | 1.73   | 2.02   |
| Manganese                       | WSZ               | 1732                 | 2  | 0.12   | 0.35   |

#### Coliform Bacteria at Service Reservoirs

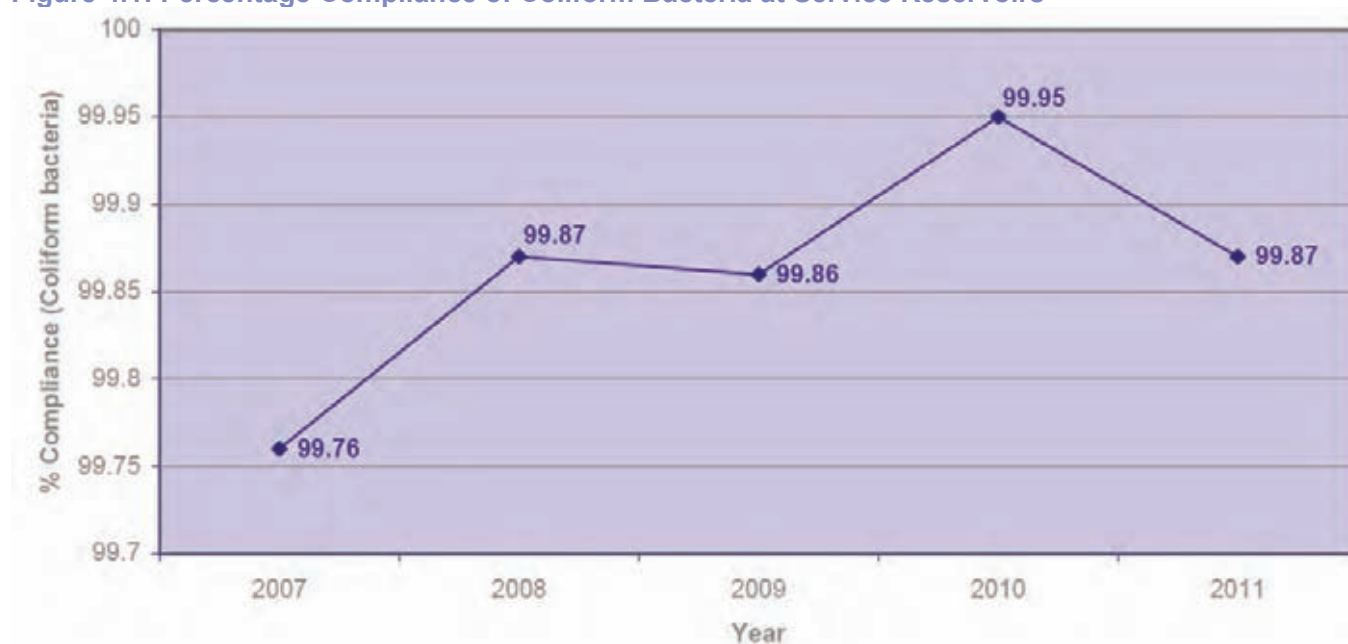
The Regulations require that at least 95 per cent of samples collected weekly from each service reservoir throughout the year are free from all coliform bacteria. Of the 326 service reservoirs sampled in 2011, all met this regulatory standard. However, coliform bacteria were detected on 22 occasions at 20 (6.1%) service reservoirs. Compared with last year, this is a significant increase, as in 2010, coliform bacteria were only detected on eight occasions at eight (2.4%) service reservoirs (see Fig 4.1).

Of the 22 occasions coliform bacteria were detected in 2011, *E. coli* was also detected on four

occasions (see previous section on *E. coli*). Of the other 18 samples which failed the coliform bacteria standard, four were related to inadequate disinfection; no cause could be determined on eight occasions; and six failures were attributed by NI Water to unrepresentative sampling. NI Water must have robust control measures in place to ensure the integrity of sample collection.

An event was reported for one service reservoir (Rathkeel) following the detection of coliform bacteria and associated resample failures in the distribution system. No obvious defects were found during an internal inspection of the reservoir later in the year.

Figure 4.1: Percentage Compliance of Coliform Bacteria at Service Reservoirs



### Assessment of Reservoir Integrity

The assessment of reservoir integrity is based on the microbiological quality of the water, where the detection of microbial pathogens may suggest that the structure of the reservoir has been breached. There was a significant deterioration in the bacteriological quality of water from service reservoirs in 2011 (detailed above). NI Water must have a programme in place to ensure all service reservoirs are cleaned and checked for integrity on a regular basis. The company must also have a disinfection policy in place that ensures a residual disinfection is maintained throughout the distribution system for the protection of human health.

### Assessment of Distribution Maintenance

We use a distribution maintenance index to assess the overall water quality of the distribution system. It is calculated using the percentage mean zonal compliance (% MZC) of samples taken at consumers' taps for three parameters: turbidity; iron, and manganese. These parameters are used to reflect the causes of discoloured water in distribution systems. This distribution maintenance index is also referred to as the Operational Performance Index (OPI [TIM]). Figure 4.2 shows a marginal improvement in OPI (TIM) for 2011. This is further illustrated in Table 4.2 for each of the parameters. As with previous years, iron continues to be the parameter which contributes the highest non-compliance in the OPI (TIM) calculation. Comparing this index across the UK for 2011, Northern Ireland reports 99.31%;

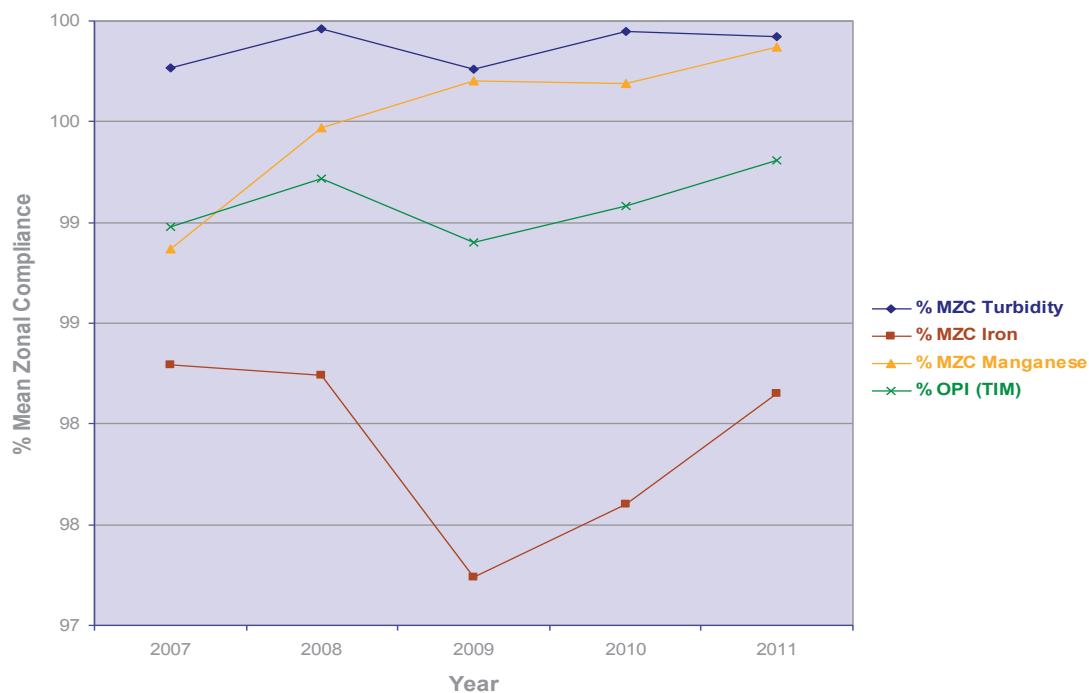
Scotland reported 99.60%; and England and Wales, 99.88%.

OPI (TIM) is calculated for each of the water supply zones to measure the overall water quality in distribution using the results of the regulatory compliance sampling programme. Failure to achieve 100 per cent across the region varies and tends to reflect where the distribution network contains a large proportion of cast-iron mains. For 2011, 47 per cent of water supply zones across Northern Ireland have OPI (TIM) values of less than 100 per cent. While using the OPI (TIM) index can help to show those areas where more work is required to raise the quality of water at consumers' taps, NI Water also uses information obtained from: zonal studies; samples taken as part of operational activities; and consumer complaints information, to identify and prioritize where specific work is required at a more detailed level within the distribution systems.

**Table 4.2: Operational Performance Index**

| Parameter | 2011 (% MZC) | 2010 (% MZC) |
|-----------|--------------|--------------|
| Turbidity | 99.92        | 99.95        |
| Iron      | 98.15        | 97.60        |
| Manganese | 99.87        | 99.69        |
| OPI (TIM) | 99.31        | 99.08        |

**Figure 4.2: OPI (TIM) and % MZC for Turbidity, Iron and Manganese, 2007 - 2011**



## Distribution Networks' Mains Rehabilitation Programme

NI Water has an ongoing mains rehabilitation programme to restore or replace the existing water mains pipe work which takes into consideration many factors, including water quality, water pressure, leakage, bursts, and sufficiency of supply.

In Northern Ireland, there are over 26,000 kilometres of water mains that deliver water to consumers' taps, and many of these mains are made of cast iron. The condition of the water mains may result in consumers receiving discoloured drinking water due to the presence of iron or manganese.

The ongoing delivery of new and upgraded treatment works throughout recent years has, in many instances, reduced the levels of iron and manganese being carried over from ineffective treatment into the distribution system as the treatment process is now more robust. However, the accumulation of these deposits over many years within the distribution network needs to be controlled as part of ongoing distribution maintenance. NI Water has operated a continuous scouring and cleaning programme to minimize water quality problems associated with these accumulations.

Water quality issues do occur which may cause localized concerns to consumers. In 2011, one such event occurred in the Ballymoney area. Bacteriological samples taken to check water quality following a mains replacement were unsatisfactory. Further samples were also found to be unsatisfactory and on the advice of the Public Health Agency (PHA), NI Water issued "Boil Water Before Use Notices" to approximately 3,500 properties. Notices remained in place for nine days. The event caused significant customer concern evidenced by over 5,000 customer contacts, and also attracted significant media and political interest.

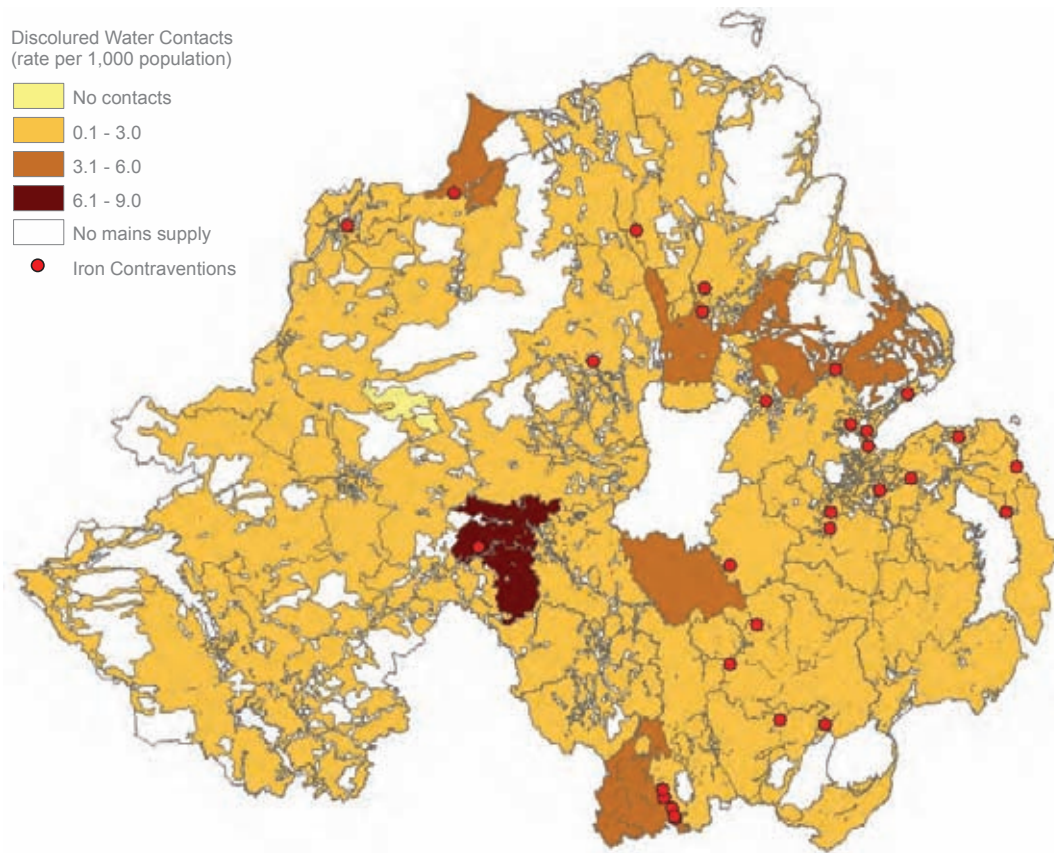
We continue to monitor NI Water's progress with the work associated with the corrective actions required to ensure, as far as is reasonably practicable, that the same problem does not happen again.

NI Water has recently implemented a new Watermains Rehabilitation Framework to undertake work across Northern Ireland as identified by the programmes of work from the zonal studies. The drivers for this programme of work are maintenance of the system, pressure improvement, reduction in interruption to supplies, water quality issues, reduction in levels of leakage and allowance for growth in demand.

To assist in the process of prioritizing its mains rehabilitation programme, NI Water uses water quality information from: the regulatory compliance monitoring programme, operational monitoring, customer contacts, and zonal studies.

Discoloration of tap water often prompts consumers to contact NI Water. The number of people making contact is reported annually to us. In 2011, there were over 2,300 contacts regarding discoloration. This represents 64 per cent of the total contacts regarding appearance. This is a lower figure than for 2010 when there were over 3,000 contacts regarding discoloration (also 64 per cent of the total contacts regarding appearance). Figure 4.3 graphically demonstrates the rate of customer contacts per 1,000 population in water supply zones throughout Northern Ireland. Also included on the map is a plot of regulatory contraventions of the iron standard (200µg/l) throughout Northern Ireland in 2011. The presence of excessive iron may make the appearance of the water unacceptable to consumers. The mains rehabilitation referred to earlier in this section should have a positive impact on iron compliance, and therefore address many of the consumers' concerns about the appearance of their water.

**Figure 4.3: Rate of Consumer Contacts per 1,000 Population Reporting Discoloured Water in 2011**





**Part 5**  
**Consumers' Taps**



Image: NIEA

## Part 5

### Consumers' Taps

In this part of the report we look at the quality of water at the end of the water supply chain, where after it has been treated, it is distributed and made available at consumers' taps.

Once water has passed through NI Water's distribution network, it will then come into contact with water systems within buildings. These systems can be those in individual domestic properties or in larger commercial or public premises. In the development of its drinking water safety plans (DWSPs), NI Water must take account of the potential for the water it supplies to become contaminated by these systems through, for example, the condition and maintenance of the pipe work or storage facilities. NI Water's sampling programme within water supply zones is randomly generated to take samples from consumers' properties. NI Water must keep a record of the type of property the sample was taken from (e.g. a residential property or a public building).

The Regulations require that sampling must take place at consumers' drinking water taps. Some of the parameters that are monitored for at consumers' taps may not be totally within NI Water's control. Certain parameters such as lead, copper, and nickel are influenced by the nature and condition of water distribution systems in buildings.

In instances where water quality issues have been identified as being caused by the distribution system within a building, NI Water is required to investigate to determine the cause. Following the introduction in 2010 of new Domestic Distribution Systems Regulations,<sup>1</sup> where this water quality issue is within a public building (such as a school, hospital or restaurant), we have a responsibility to ensure that the necessary remedial action is taken by the owners to ensure that the water supply is safe and clean.

#### Drinking Water Quality at Consumers' Taps

Looking more closely at drinking water quality at consumers' taps, we report on an index referred to as percentage 'mean zonal compliance' (% MZC). This is not a regulatory requirement; it is an index which is calculated using 39 parameters from the regulatory sampling programme. Table 5.1 summarizes the percentage zonal compliance for each of the 39 parameters as well as providing the overall % MZC. The 13 parameters which did not

achieve full regulatory compliance are listed at the top of the table. Iron continues to report the lowest % MZC.

Iron compliance, although showing an improvement from last year (97.60% in 2010; 98.15% in 2011), has the greatest number of tests failing to comply with the regulatory standard. The mains rehabilitation programme of work, together with distribution maintenance programmes, is fundamental to improving both compliance and the quality of water supplied to consumers.

The problems reflected by these parameters which have not achieved full compliance do not apply everywhere in Northern Ireland. Of the 53 water supply zones monitored, eight zones achieved full compliance. Full details of the water supply zone areas where each parameter standard has not been met are given in Annex 3. Annex 4 of this year's report presents the water supply zones where compliance has not been achieved at the local district council level. Variations in water quality compliance performance continue across Northern Ireland, reflecting the need for the completion of current and future planned improvement work.

Overall % MZC continues to improve, with 99.83% being reported in 2011. This improving trend in the quality of water at consumers' taps reflects a significant increase of 1.18% since this index was first used in 2004, when MZC was reported as 98.65%. Substantial investment made by NI Water to improve drinking water quality, particularly, to upgrade water treatment facilities is reflected in the overall significant increase indicating the high quality of water that is available to consumers.

Comparing the overall % MZC across the UK for 2011,

- Northern Ireland reports 99.83%;
- England and Wales, 99.96%; and
- Scotland, 99.81%.

NI Water has continued to improve compliance through sustained investment, particularly, on water treatment and water mains rehabilitation. It is essential that this investment continues to maintain high levels of safe, clean drinking water and to comply with regulatory obligations.

<sup>1</sup>[\*The Water Supply \(Domestic Distribution Systems\) Regulations \(Northern Ireland\) 2010\*](#)

Table 5.1: % Mean Zonal Compliance of Samples Taken at Consumers' Taps in 2011

| Parameter                               | Number of Samples | Number of Samples not Meeting the Standards | % Zonal Compliance |
|---|-------------------|---|--------------------|
| Iron                                    | 1,732             | 30  | 98.15              |
| Odour                                   | 1,729             | 24  | 98.47              |
| Aluminium                               | 1,732             | 20  | 98.77              |
| Total trihalomethanes                   | 408               | 3   | 99.29              |
| Taste                                   | 1,729             | 6   | 99.75              |
| Bromate                                 | 408               | 1   | 99.76              |
| Enterococci                             | 408               | 1   | 99.76              |
| Lead                                    | 408               | 1   | 99.76              |
| PAH - sum of four substances            | 408               | 1   | 99.76              |
| Manganese                               | 1,732             | 2   | 99.87              |
| Turbidity                               | 1,732             | 1   | 99.92              |
| <i>E. coli</i>                          | 4,764             | 2   | 99.96              |
| Pesticides - other substances*          | 10,277            | 2   | 99.98              |
| Colour                                  | 1,732             | 0   | 100.00             |
| Sodium                                  | 408               | 0   | 100.00             |
| Nitrate                                 | 408               | 0   | 100.00             |
| Nitrite                                 | 408               | 0   | 100.00             |
| Nitrite/nitrate formula                 | 408               | 0   | 100.00             |
| Copper                                  | 408               | 0   | 100.00             |
| Fluoride                                | 240               | 0   | 100.00             |
| Arsenic                                 | 408               | 0   | 100.00             |
| Cadmium                                 | 408               | 0   | 100.00             |
| Cyanide                                 | 238               | 0   | 100.00             |
| Chromium                                | 408               | 0   | 100.00             |
| Mercury                                 | 408               | 0   | 100.00             |
| Nickel                                  | 408               | 0   | 100.00             |
| Antimony                                | 408               | 0   | 100.00             |
| Selenium                                | 408               | 0   | 100.00             |
| Total pesticides                        | 239               | 0   | 100.00             |
| Boron                                   | 408               | 0   | 100.00             |
| Benzo(a)pyrene                          | 408               | 0   | 100.00             |
| Tetrachloromethane                      | 408               | 0   | 100.00             |
| Tetrachloroethene/trichloroethene - sum | 408               | 0   | 100.00             |
| 1,2-dichloroethane                      | 408               | 0   | 100.00             |
| Benzene                                 | 408               | 0   | 100.00             |
| Aldrin                                  | 239               | 0   | 100.00             |
| Dieldrin                                | 239               | 0   | 100.00             |
| Heptachlor                              | 239               | 0   | 100.00             |
| Heptachlor epoxide                      | 239               | 0   | 100.00             |
| <b>Total Number of Samples</b>          | <b>38,216</b>     | <b>94</b>                                   |                    |
| <b>% Mean Zonal Compliance</b>          |                   |   | <b>99.83</b>       |

\*All pesticides other than aldrin, dieldrin, heptachlor and heptachlor epoxide.



## Chemical/Physical Quality

### Iron

The regulatory standard for iron has been set for aesthetic reasons because levels persistently above the standard can give rise to discoloured water. The presence of excessive iron may make the appearance and taste of the water unacceptable to consumers. There are various reasons why iron might be present in the water: it may be present in the raw water; iron compounds may be added as part of water treatment; or it can be released as a consequence of the corrosion of iron water mains.

In 2011, iron was the parameter for which there was the greatest number of tests failing to comply with the regulatory standard. Of the 1,732 samples taken, 30 (1.73%) failed to meet the 200µg/l standard. These contraventions were mainly due to the condition of the distribution network. Three Consideration of Provisional Enforcement Orders are ongoing in the Dorisland Carrick/Whiteabbey, Altnahinch Bushmills, and Altnore Cabragh Water Supply Zones (Annex 7 provides more detail).

### Odour

Naturally occurring substances which have odour properties are present in many water sources. In the purification of water supplies, the treatment process may remove or introduce odour to the water supply. In addition, odour may develop during storage and in distribution due to microbiological activity.

In 2011, of the 1,729 samples taken for odour, 24 (1.39%) failed to comply with the Regulations. Eleven (46%) of these failures occurred in the Killyhevlin Enniskillen Water Supply Zone due to ineffective treatment at Killyhevlin WTWs and were notified by NI Water as a water quality event. In regard to this issue, we have commenced enforcement action against NI Water to enhance the treatment process at Killyhevlin WTWs.

Of the other 13 failures, one was related to local contamination from diesel saturated ground; one was due to unrepresentative sampling and no cause was determined for the remaining 11.

### Aluminium

Aluminium can occur naturally in many water sources, particularly those derived from upland areas. Aluminium compounds are also used as an important part of the processes used in the treatment and purification of water, including the

removal of harmful organisms. In addition to this primary role, aluminium-based water treatment removes naturally occurring aluminium from water. The regulatory standard for aluminium is based on aesthetic considerations because high concentrations in water may cause discoloration.

In 2011, a total of 1,732 samples were tested for aluminium: 20 (1.15%) exceeded the regulatory standard of 200µg/l. Six water quality events were notified in relation to these failures. Inadequate treatment or poor control of the coagulation process may lead to aluminium passing through the treatment works and into the supply where it can accumulate in the distribution network. NI Water must ensure that good operational performance is achieved at its water treatment works to ensure a continuous provision of safe, clean drinking water.

### Trihalomethanes

Trihalomethanes arise when chlorine, which is used to disinfect the water and make it microbiologically safe to drink, is added to water containing naturally occurring organic substances. Drinking water in Northern Ireland is predominantly obtained from surface waters, which contain naturally occurring organic materials. The leaching of this organic content into water supplies is affected by seasonal variations. Water treatment is necessary to remove the organic material prior to disinfection, and optimization of these processes minimizes the production of THMs. Water treatment processes must be robust enough to remove the organic matter which may result from any change in raw water quality.

We note that with improvements substantially complete at water treatment works across Northern Ireland, THM compliance has further increased from 98.33% in 2010, to 99.29% in 2011. Of the 408 tests carried out, three (0.74%) exceeded the regulatory standard of 100µg/l. NI Water continues to take remedial action to further increase this compliance.

NI Water must fully consider the formation of THMs and other disinfection by-products as part of its overall disinfection policy. Where possible, without compromising disinfection, it should continue to keep disinfection by-products, including THMs, to as low a level as possible. NI Water must also continue to assess the performance of its water treatment works and the quality of the water in the associated distribution systems as part of its ongoing work to review and update its risk assessments using the drinking water safety plan approach.

In relation to the requirement to keep the disinfection by-products as low as possible, the average total THM values are presented in Figure 5.1. Across Northern Ireland, the average concentration of THMs was 45.3µg/l in 2011, with 30 per cent of zones (16 out of a total of 53) identified where the annual average exceed 50 per cent of the standard. NI Water is required to demonstrate by risk assessment that disinfection by-products are minimized, ensuring any additional control measures considered necessary are documented.

### Taste

Taste can occur naturally in water, particularly in surface sources during the summer due to increased biological activity of micro-organisms. Water treatment aims to remove the organic material that may cause taste problems to arise.

Of the 1,729 samples taken in 2011, six failed to comply with The Regulations. Two (33%) of these failures occurred in the Killyhevlin Enniskillen Water Supply Zone and were notified by NI Water as a water quality event (see odour section above). Another event was notified regarding a single property because of the level detected. All resamples were satisfactory and no cause could be determined. One taste contravention was related to local contamination from diesel saturated ground (again, see odour section above). No reason could be identified for the remaining two failures.

### Bromate

Bromate may be generated in the manufacture of sodium hypochlorite disinfectant. It may also be formed during disinfection of drinking water through a reaction between naturally occurring bromide with strong oxidants (usually ozone).

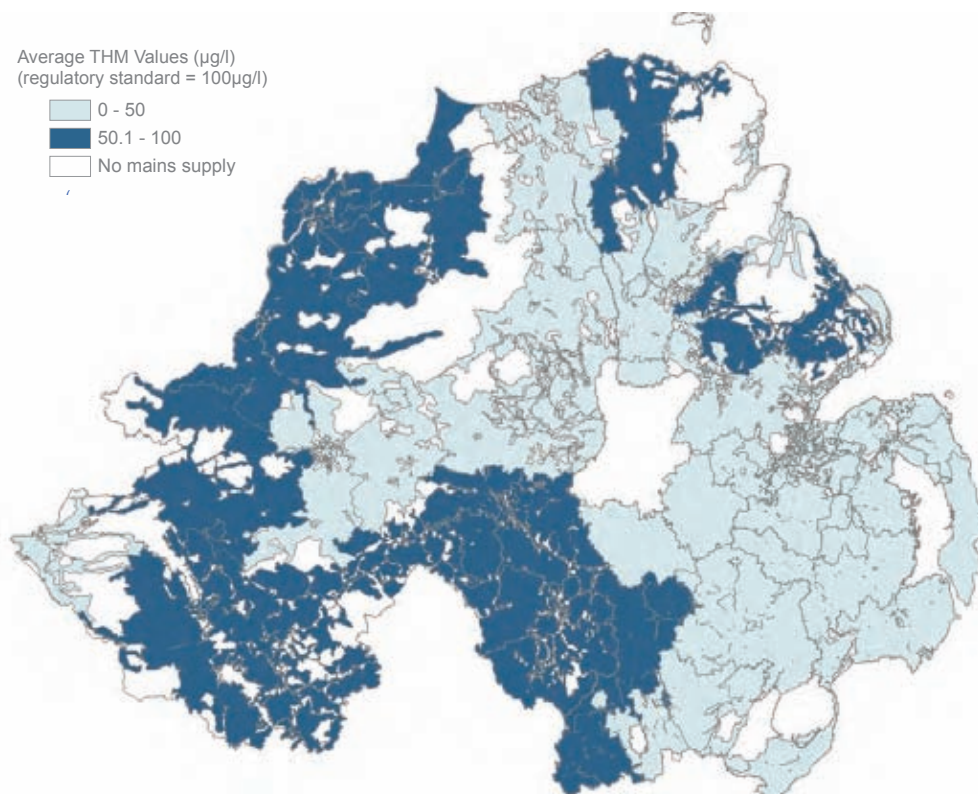
During 2011, of the 408 samples tested for bromate, one (0.25%) failed to meet the standard of 10µg/l. Ozonation is not used at the water treatment works supplying the area where this failure occurred, and the salt used to make the sodium hypochlorite solution was low in bromide. The resamples taken in response to this failure were all significantly below the regulatory limit.

### Lead

The regulatory requirements are set as an interim lead standard of 25µg/ which was to be met by 25 December 2003, with a final standard of 10µg/l to be met by 25 December 2013.

Meeting the lead standard is a complex matter because although some lead pipes are owned by NI Water, most belong to consumers, i.e. building owners. Many older properties still have service pipes and internal plumbing, wholly or partly, comprised of lead (the use of lead pipes has been banned since the early seventies).

**Figure 5.1: Average THM Values in Water Supply Zones across Northern Ireland in 2011**



Some lead in drinking water may be due to the use of lead solder on copper pipes not owned by NI Water (the use of lead solder on copper pipes has been banned since the eighties). Whether or not the lead standard is exceeded at a particular tap depends on a number of factors, an important one being the plumbosolvency of the water (the tendency for lead to dissolve in water).

NI Water has an ongoing programme of replacement of its part of lead service pipes, which is carried out during mains rehabilitation. NI Water will also replace, free of charge, any of its pipes which may be made of lead in the supply to a property, but only when a request is received from a consumer who has replaced the portion of lead service pipe for which the householder is responsible.

In 2011, of the 408 tests carried out for lead, one (0.25%) exceeded the standard. The cause for this contravention was not determined. It occurred in a water supply zone which has an associated orthophosphate treatment programme in place, and following further investigation, it was found that both the service main to the property and the internal pipes were lead free. Normally when a sample has exceeded the standard, investigations show the property's service pipe contains lead and NI Water notifies the consumer, offering advice on what action they may take, and also notifies the local Environmental Health Officer. The responsibility and cost for replacing lead pipes within the owner's building is not a drinking water quality regulatory requirement: rather, it is a choice that the owner has to make.

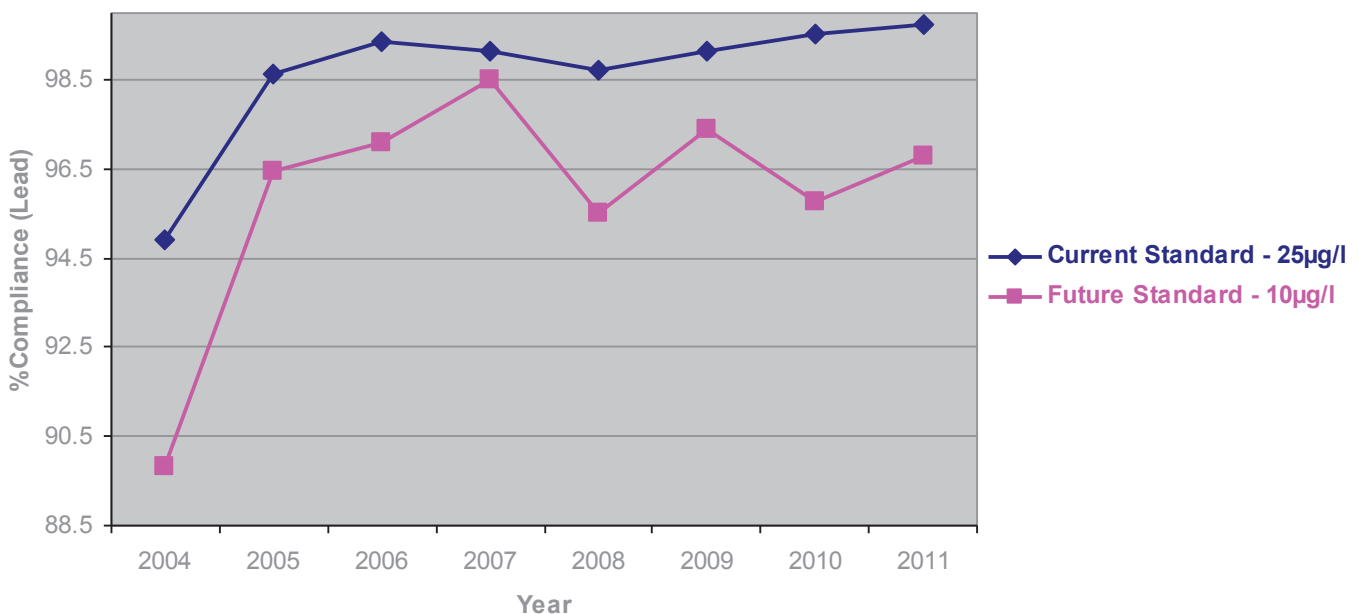
### Improving Compliance with Current and Future Lead Standards

The Regulations require NI Water to carry out a programme of measures (water treatment) to reduce the tendency of water supplies to pick up lead from pipes and fittings. A plumbosolvency strategy to deliver improved compliance for the interim lead standard of 25µg/l introduced orthophosphate treatment at all the major water treatment works and this has been ongoing since 2004. Through the use of treatment and lead pipe replacement, the strategy aims to:

- optimize orthophosphate treatment throughout distribution networks to achieve compliance with the 10µg/l lead standard by December 2013;
- continue opportunistic replacement of lead service pipes;
- replace lead pipe work at the request of the consumer or due to a regulatory requirement; and
- replace lead pipe work as part of the mains rehabilitation programme.

Looking at the overall trend in lead compliance, it is encouraging to see how compliance with the interim 25µg/l standard has continued to improve since 2004 (Figure 5.2 refers). The graph shows that there has been improved compliance with the 10µg/l standard: 96.81% in 2011 compared with 95.77% in 2010. A significant amount of work is required to further improve compliance with the final lead standard of 10µg/l by December 2013.

**Figure 5.2: Percentage of Tests Meeting the Current and Future Standards for Lead, 2004 - 2011**





In addition to the compliance sampling requirements, NI Water undertakes a more extensive operational sampling programme for lead. Results from this sampling programme highlight those water supply areas which have not achieved a compliance target of 98 per cent for 10µg/l (Figure 5.3 refers). Following the introduction of new water treatment processes and the rezoning of water supply zones over recent years, NI Water need to keep its lead reduction strategy under review to ensure that it is able to demonstrate that treatment processes including orthophosphate dosing and pH control have been optimised.

### Polycyclic Aromatic Hydrocarbons (PAHs)

PAHs are a group name for several substances found in petroleum-based products such as coal tar. They can be found in water sources due to urban runoff and industrial activities or may be present in distribution systems where coal-tar linings that were used in the past to protect water mains may still be in place.

In 2011, of the 408 tests for PAHs, one failed to meet the standard of 0.10µg/l. The property was supplied by a PVC main. The main was flushed and there were no PAHs detected in the resamples taken in response to this failure.

### Manganese

The regulatory standard for manganese has been set for aesthetic reasons. Manganese occurs naturally in many of Northern Ireland's water sources and is removed by effective water treatment. Where treatment is inadequate, manganese and iron can accumulate in distribution pipes.

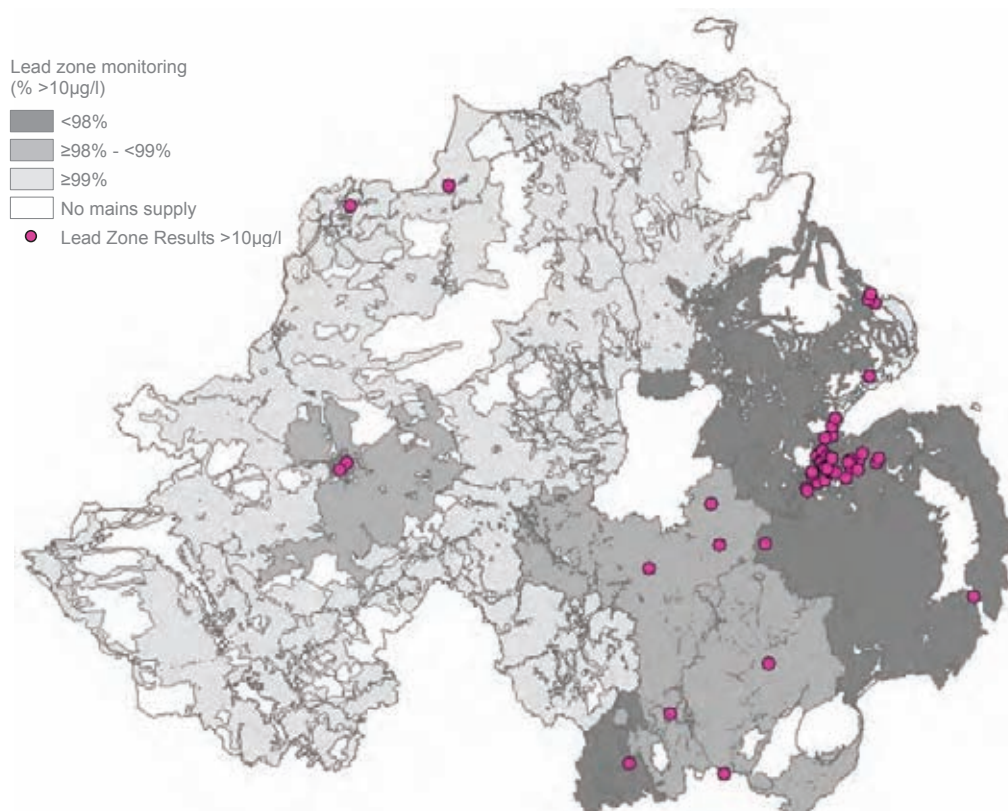
Of the 1,732 samples taken for manganese in 2011, the regulatory standard of 50µg/l was not met on two (0.12%) occasions. Follow-up investigations were unable to determine the cause of these contraventions and all resamples were satisfactory.

### Turbidity

Turbidity measurements provide an assessment of the fine particles suspended in water. This parameter is often, but not always associated with discoloration, which in turn, can be caused by corrosion within the distribution system. Excessive turbidity can make the appearance of the water unacceptable to consumers.

Of the 1,732 samples taken in 2011, one failed to meet the turbidity standard of 4NTU for consumers' taps, and was probably caused by disturbance of the mains.

**Figure 5.3: Lead Zone Monitoring, 2011 - Results >10µg/l**



## Pesticides

Pesticides are a large group of chemicals used to control plant and animal infestations. There are several different types of pesticide: these include insecticides, herbicides, fungicides and algicides. The Regulations set standards for individual pesticides as well as a standard for the sum of all pesticides, ‘the total pesticide’ standard.

During 2011, 47 individual pesticides were monitored. Of the 11,233 determinations, two failed to meet the regulatory standard of 0.1µg/l for the individual pesticide, MCPA (a herbicide used for controlling broad-leaved weeds in grass and cereal crops). These occurred in the Dorisland and Killyhevlin water supply areas.

The enforcement action being taken by us regarding odour contraventions from Killyhevlin WTWs should have a positive impact on pesticide reduction. In addition, specific enforcement action is being taken by us regarding pesticide contraventions from Dorisland WTWs.

## Microbiological Quality

To protect public health, microbiological standards have to be met at consumers’ taps. The significance of the individual test results for each microbiological parameter cannot be fully interpreted without other information. Results confirm the general safety of drinking water supplies, with a high level of microbiological quality compliance (99.70%) being achieved in 2011 as is shown in Table 5.2 below.

## Enterococci and *E. coli* at Consumers’ Taps

The presence of bacterium such as enterococci, and *E. coli*, is indicative of faecal contamination and neither should be found in any drinking water sample. In 2011, one enterococci was detected in one of the 408 samples taken at consumers’ taps by NI Water. The cause of this was not determined and all checks were satisfactory.

In 2011, a total of 4,764 samples were tested for the presence of *E. coli* and two tested positive. Investigation by NI Water concluded that both failures were attributable to customers’ taps or contamination at the time of sampling. There was no indication of a faecal contamination event affecting other properties and all checks were satisfactory.

## Coliform Bacteria at Consumers’ Taps

In 2011 there has been a decrease in the number of samples complying with the coliform bacteria standard for samples taken from consumers’ taps: 99.43% in 2011 compared with 99.58% in 2010. Of these samples, follow-up investigations reported the condition of consumers’ taps or contamination at the time of sampling as the reasons for 21 (78%) of the contraventions. NI Water advises the consumer where the contravention has been attributed to the domestic plumbing and what action, if any, they may take. Samplers used by NI Water are trained to collect samples from consumers’ taps. We continue to stress the importance to NI Water of collecting representative samples so as to prevent the integrity of the sample being compromised.

**Table 5.2 Microbiological Quality at Consumers’ Taps**

| Parameter         | Number of Tests | Number of Tests not Meeting the Standards | % of Tests not Meeting the Standards in 2011 | % of Tests not Meeting the Standards in 2010 |
|-------------------|-----------------|---|--|--|
| Enterococci       | 408             | 1   | 0.25   | 0.00   |
| <i>E. coli</i>    | 4,764           | 2   | 0.04   | 0.04   |
| Coliform bacteria | 4,764           | 27  | 0.57   | 0.42   |
| <b>Total</b>      | <b>9,936</b>    | <b>30</b>                                 | <b>0.30</b>                                  | <b>0.22</b>                                  |

## Sampling at Public Buildings

Of the 66 samples taken at taps in public buildings during 2011 as part of NI Water's compliance monitoring programme, one sample failed for odour. In carrying out its investigations, it was determined that the failure was due to the quality of the water within distribution and was not related to the internal distribution system in the building.

For samples taken by NI Water at public buildings, outside of those taken as part of its compliance monitoring, these are reported on in Part 1 of this report under 'Water Quality Related to Domestic Distribution Systems'.

## NI Water Consumer Contacts

To enable us to make an assessment of consumer confidence in the quality of drinking water at consumers' taps, NI Water provided us with information on the complaints and concerns of its customers during 2011 (Table 5.3 below refers). The information we received showed that while the overall number reported has reduced in 2011, 59.2 per cent of all complaints and concerns were related to appearance (see Figure 5.4), a similar trend to that of 2010, when 67.3 per cent were related to appearance.

**Table 5.3: Categories of Water Quality Contacts Received by NI Water in 2011**

| Contact Category  |  | Number of Contacts |
|-------------------|--|--------------------|
| Appearance        | Colour   | 2,344              |
|                   | General  | 136                |
|                   | Hardness   | 38                 |
|                   | Stained Washing                                    | 19                 |
|                   | White - Air  | 795                |
|                   | White - Chalk                                      | 342                |
| Taste and Odour   | Chlorinous   | 441                |
|                   | Earthy/Musty                                       | 117                |
|                   | Other  | 289                |
|                   | Petrol/Diesel                                      | 41                 |
|                   | TCP  | 8                  |
| Illness           |  | 104                |
| Particles         |  | 211                |
| Animalcules       |  | 4                  |
| Boil Water Notice |  | 158                |
| Other             | Water Quality Concern - Campaigns                  | 19                 |
|                   | Water Quality Concern - Incident Related - General | 75                 |
|                   | Water Quality Concern - Lifestyle                  | 15                 |
|                   | Water Quality Concern - Pets/Animals               | 19                 |
|                   | Water Quality Concern - Sample                     | 774                |
|                   | Water Quality Concern - Lead                       | 96                 |
|                   | Water Quality (No Concern) Fluoride                | 1                  |
|                   | Water Quality (No Concern) Other Information       | 42                 |
|                   | Water Quality (No Concern) Water Hardness          | 76                 |
|                   | Water Quality (No Concern) Water Quality Report    | 43                 |
|                   | Miscellaneous                                      | 0                  |
| <b>TOTAL</b>      |  | <b>6,207</b>       |



## Appearance

### Colour

Within the appearance category, the main concern (63.8 per cent) relates to discoloured water (see Figure 5.4). The most common cause of coloured water concerns is an orange, brown or black discoloration caused by suspended particles of iron (orange/brown) and manganese (black). Iron discoloration may occur through natural iron present in the raw water passing through, inadequate treatment or from corrosion of cast-iron distribution mains. Manganese is present in some raw waters and may not be removed if treatment is inadequate. It is expected that the long-term mains rehabilitation programme of the distribution system will improve the appearance of water.

### White Water - Air

Another appearance concern is 'white water'. The most common cause of 'white water' concerns is air dissolved in water. This causes a cloudy or milky white appearance because air is a gas and so it appears as a haze of tiny bubbles. These make the

water appear white or grey and misty. A number of possible causes include burst mains, malfunctioning pumps and consumer stop taps. If air is the cause of white water, the cloudy appearance will clear in a glass of water from the bottom up.

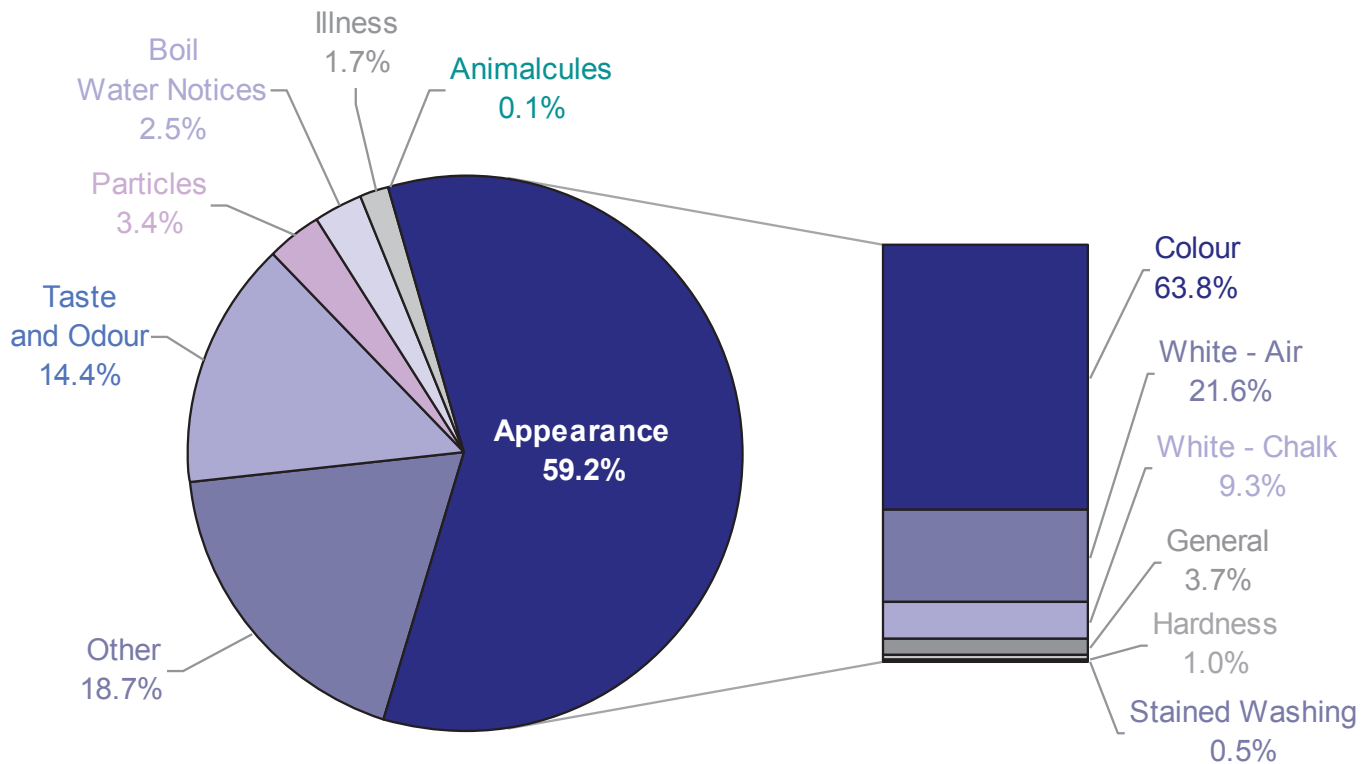
### White Water - Chalk

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

### Hardness

Temporary water hardness, usually caused by dissolved calcium carbonate, can give rise to complaints as it causes scale to form in kettles and other household appliances.

Figure 5.4: Consumer Contacts, 2011 - Breakdown of Appearance Issues



### Stained Washing

Brown or black staining of clothes can occur in clothes inadvertently washed in discoloured water. If clothes are kept damp, the staining can often be removed by gently acidifying with a suitable substance such as citric acid. However, staining may also arise from faults with washing machines.

### Taste and Odour

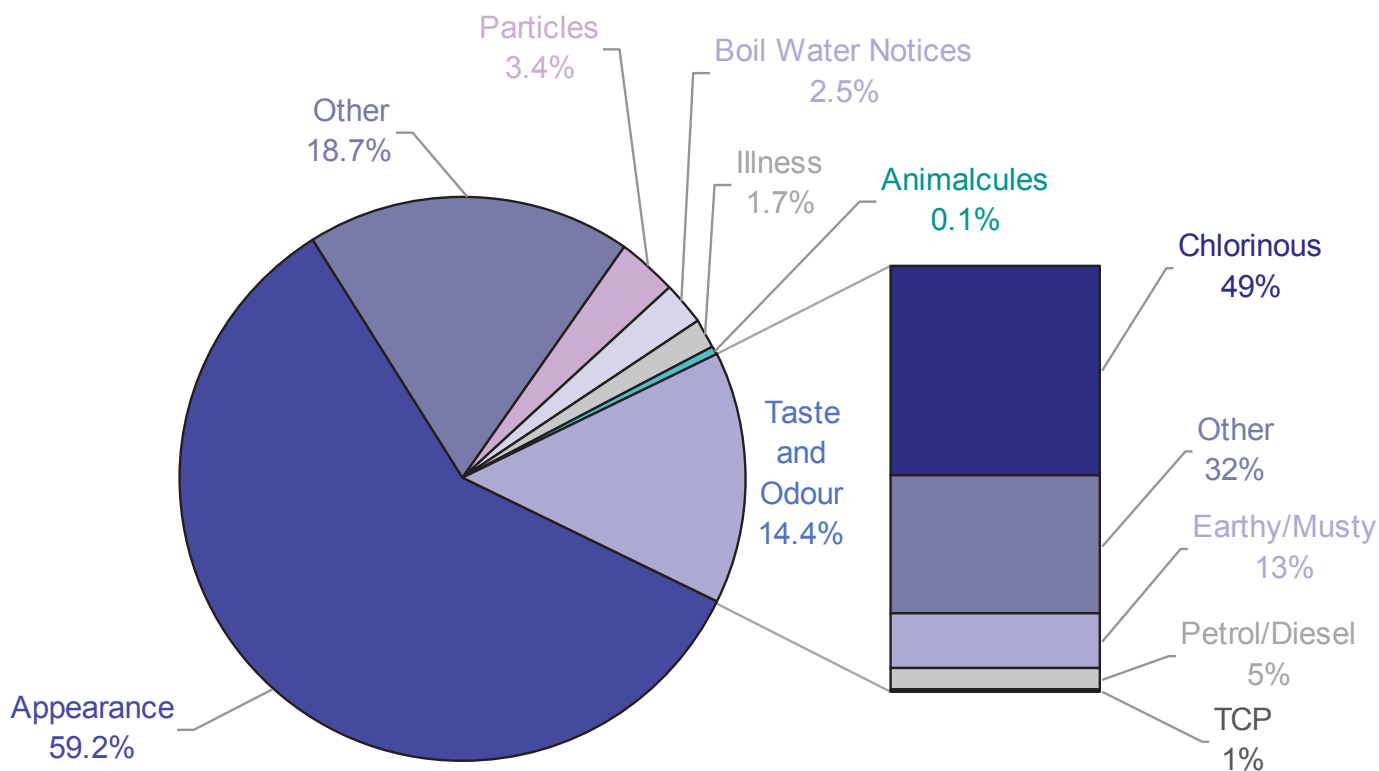
All water sources contain naturally occurring minerals. The varying concentrations of these minerals can give rise to slightly different tastes that may be detected by people, especially when travelling or moving to different areas. Water also contains dissolved gases, such as oxygen and carbon dioxide, which give tap water a characteristic taste. Without these elements, water would taste flat and unappetizing. There may be other substances present in the water which can also cause consumer complaints. One such substance, which is intentionally added to drinking water, is chlorine. Other taste and odours should not be present in drinking water for aesthetic reasons (TCP or earthy/musty) or health reasons (petrol/diesel). Figure 5.5 below provides a breakdown of consumer concerns related to taste and odour.

Thirty-two per cent of these concerns fall under the sub-category 'other' which covers a range of complaints from grassy and fruity to rotten eggs. However, the main single concern, with 49 per cent of all consumer contacts, was related to a chlorinous taste and odour in the water. Figure 5.6 illustrates the number of customer complaints regarding taste and odour per 1,000 population. Also included on the map is a plot of all positive taste and odour detections reported throughout Northern Ireland in 2011.

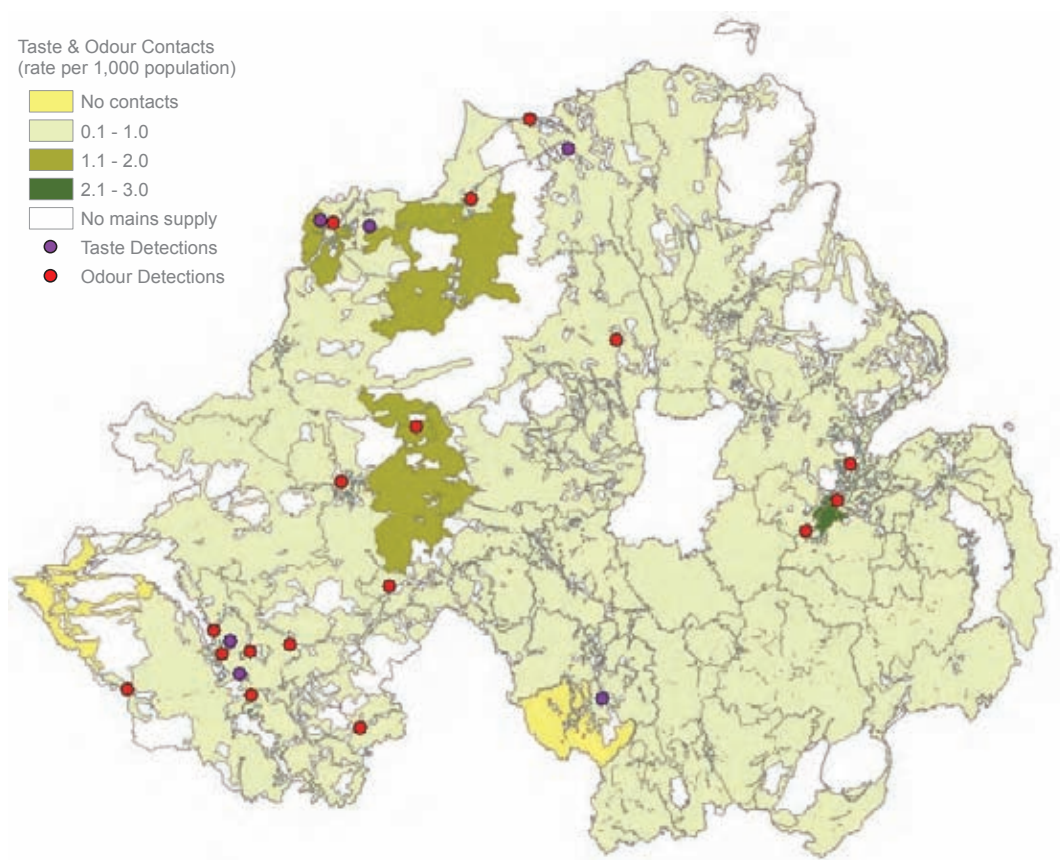
### Chlorinous

Some people are more sensitive to the taste and odour of chlorine which is used to maintain hygienic conditions within the water supply network. Chlorine taste and odours should dissipate if the water is left to stand in the fridge for a few hours. Boiling the water will also remove the chlorine.

**Figure 5.5: Consumer Contacts, 2011 - Breakdown of Taste and Odour Issues**



**Figure 5.6: Rate of Consumer Contacts per 1,000 Population Reporting Taste and Odour in 2011**



### Earthy/Musty

Earthy and musty tastes can arise due to naturally occurring compounds present in raw waters that have not been removed by the treatment process. Geosmin is one such compound commonly associated with earthy/musty tastes. Complaints are more common in the summer months when biological activity is highest; algal blooms in raw water sources are common causes of widespread musty tastes.

### Petrol/Diesel

This is not a common problem and should be investigated immediately. Spillages of petrol, diesel or paraffin can percolate through the soil and penetrate plastic water mains.

### TCP

Phenolic tastes can occur when chlorine reacts with components in household appliances or plumbing and can be more persistent. Descriptions used by consumers may include TCP, medicinal, swimming pool, bitter and chemical. Common sources of phenol include washing machine hoses,

tap washers and kettles. British Standard approved plumbing products, which do not contain phenol, should be used in all plumbing installations.

### Particles

The presence of visible particulate matter in water which is otherwise not discoloured can be caused by corrosion of iron mains or deposits of sand, grit or other material present in the main. These may be re-suspended following a change in the flow of the main.

### Animalcules

A small proportion of contacts received concern animalcules. This category includes complaints of insects or other animals in the water supply. Most complaints arise where an insect has crawled up a tap or is present in the sink. Very occasionally, water systems can contain animals which may arise from the raw water, treatment works or within the mains themselves.



## Risk Management

The overall drinking water safety plan approach adopted by NI Water is to protect its drinking water supplies by identifying any potential risks of contamination and having appropriate control measures in place, to best ensure that water is safe and clean to be used by consumers. Some of these control measures are the responsibility of NI Water; others such as internal plumbing at domestic households are the responsibility of the owner.

Where there is a potential risk to the drinking water supplies from internal pipe work within domestic, industrial or other properties, NI Water offers advice as to what steps the property owner can take to safeguard their supply of drinking water.

To prevent potential contamination, the Water Fittings Regulations<sup>1</sup> ensure that all plumbing systems, water fittings and equipment connected to the public water supply are of an appropriate quality and standard. These regulations apply from the point where water leaves the water main and enters the property's service pipe. Owners and occupiers of premises and anyone who installs plumbing systems or water fittings must comply with these regulations. More information on the

Water Fittings Regulations is available from NI Water's website:

[www.niwater.com/informationleaflets.asp](http://www.niwater.com/informationleaflets.asp).

## Information on Drinking Water Quality Issues

If you want to find out about the quality of drinking water supplied to your home or workplace, or if you have a drinking water quality concern or complaint, then you should first contact NI Water at its Customer Service Unit on 08457 440088 (further details can be found in Annex 8).

If you have discussed your concerns with NI Water and feel that the issue has not been satisfactorily resolved, you may contact the Consumer Council for Northern Ireland on (028) 9031 1575 (see Annex 8 for further details). For advice on how to maintain the quality of tap water in your home, a guide called 'Looking after WATER in your home' is available from NI Water's website:

[www.niwater.com/informationleaflets.asp](http://www.niwater.com/informationleaflets.asp)

General information on drinking water quality matters is also available on our website:

[www.doeni.gov.uk/niea/water-home/drinking\\_water/consumer.htm](http://www.doeni.gov.uk/niea/water-home/drinking_water/consumer.htm)

**Figure 5.7: Typical Water Supply Arrangements**



Source of picture: Water UK - 'Looking after WATER in your home' guidance document.

<sup>1</sup>[The Water Supply \(Water Fittings\) Regulations \(Northern Ireland\) 2009](#)



## Section 2 Private Water Supplies



Image: Borehole - NIEA



## Section 2

### Private Drinking Water Supplies

In this section of the report we give details of the private water supplies which we are required to regulate. We look at their water quality and the use of a risk-based approach to safeguard the quality of these supplies.

Private water supplies are defined in The Water and Sewerage Services (Northern Ireland) Order 2006 as any supplies of water provided otherwise than by Northern Ireland Water Ltd (NI Water). Private water supplies are diverse in nature and range from those which serve single domestic dwellings through to those supplying large commercial and public premises.

NI Water supplies water to over 99 per cent of the Northern Ireland population; the remainder of the population is served by private water supplies. Although the percentage of people directly served by a private supply may be small, many more people are exposed to them through holiday accommodation (e.g. hotels, Bed & Breakfast facilities), public buildings (e.g. hospitals, universities), and from the manufacture of foodstuffs and drinks, using private supplies (see Figure 1.1).

#### Private Water Supplies Regulations

The Private Water Supplies Regulations (Northern Ireland) 2009<sup>1</sup> (as amended in 2010) transpose the 1998 European Drinking Water Directive in respect of private supplies. Accordingly, the same drinking water quality standards are applied to private water supplies as for the public water supply.

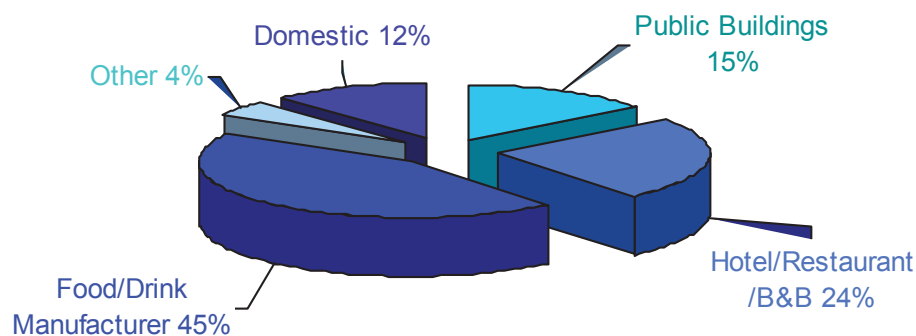
Private supplies to single domestic dwellings are not required to be monitored under the 2009 Regulations. We do, however, continue to offer appropriate advice to all private water supply owners and users. The regulations also exclude bottled water suppliers, who are regulated under The Natural Mineral Water, Spring Water and Bottled Water Regulations (Northern Ireland) 2007.<sup>2</sup>

As well as establishing a monitoring programme for all registered private water supplies, the regulations require that a risk assessment is carried out for each supply to identify areas where there may be potential risks of contamination. This assessment includes the whole private water supply system, from source to tap. These assessments are similar to the drinking water safety plans in place for the public water supply.

In the event of a failure, any breaches of the wholesomeness standards in the regulations must be investigated and followed up to ensure compliance. If compliance cannot be achieved through informal agreement, we can apply more formal mechanisms to secure the required improvement (e.g. Authorised Departures or Notices).

The regulations allow the owners/users to apply for Authorised Departures, whereby, for certain parameters a breach of the wholesomeness standards is permitted for a fixed period of time while corrective action is being undertaken. Authorised Departures will not be granted in circumstances where there could be a risk to human health.

**Figure 1.1: Categories of Private Water Supplies in Northern Ireland**



<sup>1</sup>[www.legislation.gov.uk/nisr/2009/413/contents/made](http://www.legislation.gov.uk/nisr/2009/413/contents/made)

<sup>2</sup>[www.legislation.gov.uk/nisr/2007/420/contents/made](http://www.legislation.gov.uk/nisr/2007/420/contents/made)



The regulations also contain provision for the issuing of Notices which could be used to restrict the use of a supply in circumstances where there is a risk to health from consuming or using the water.

There is a further requirement in the regulations for any newly installed products or substances, used in the provision of a private supply, to be approved for use with drinking water.

## Roles and Responsibilities

The Drinking Water Inspectorate, acting on behalf of the Department of the Environment, has a regulatory responsibility for private supplies which are used for drinking, cooking, food preparation or other domestic purposes (including personal hygiene); or those used in commercial food production: the manufacture, processing, preservation, or marketing of food or drink for human consumption.

We implement these regulations with the support of staff from the Environmental Health Department of local councils who collect samples, assist in follow-up investigations and carry out risk assessments at private water supplies.

The regulations require that the sampling and risk assessments of private water supplies are undertaken by a competent person. We have a training programme in place for Environmental Health officers carrying out these duties on our behalf. The 'Private Water Supplies Sampling Manual - A Field Guide', published by us in December 2009, provides details of our standardized sampling methods which have been adopted as guidance throughout the UK.<sup>1</sup>

During 2011, we collaborated on the development of a document, "Drinking Water and Health; a guide for public and environmental health professionals and for those in the water industry in Northern Ireland".<sup>2</sup> This document was launched through a series of workshops to help professional staff better understand their roles and responsibilities in relation to the safety of our drinking water, including those supplied through private water supplies.

Persons involved in supplying water from a private water source to others, either as a shared domestic supply or through a supply to public premises or a food business, have a duty of care for the safety of the water being provided.

They also have a responsibility to take any appropriate remedial actions identified by risk assessment or following an investigation into a failure of the supply to meet the drinking water quality standards.

In addition, we offer advice to owners/users of all private supplies, including those to single domestic dwellings, on action that can be taken to protect human health from the potential adverse effects of a contaminated water supply. An advice leaflet, 'Is your private water supply safe?' (published by us in December 2010) is available on our website<sup>3</sup> or by contacting us. This leaflet highlights the risks associated with private supplies and how to protect against them.

## Register of Supplies

We are required to hold a register of private supplies to which the regulations apply. The owners/users of private water supplies for commercial or domestic purposes, other than to single domestic dwellings, must register their supply with us by completing a Private Water Supplies Registration Form.<sup>4</sup>

There were a total of 116 supplies on our register in 2011. It is estimated that there are approximately a further 4,000 private supplies to single private dwellings, which are not required to be registered under the regulations. As in 2010, private water supplies in use on dairy farms (i.e. within milking parlours) were again not included in the register of private supplies reported on by us. The quality of water required within primary production (including dairy farms) is currently under consideration by the Foods Standards Agency.

The information held on registered supplies is required to be reviewed on an annual basis. During 2011, a number of supplies were removed because (a) they switched over to the public water supply, or (b) they were no longer being used for purposes that required a wholesome supply of water. Also, the categories of some existing supplies were updated, and a number of new supplies were notified to us. Despite these changes, the overall number of supplies remained the same as in 2010.

<sup>1</sup>[www.doeni.gov.uk/niea/private\\_water\\_supplies\\_sampling\\_manual\\_-\\_december\\_2009.pdf](http://www.doeni.gov.uk/niea/private_water_supplies_sampling_manual_-_december_2009.pdf)

<sup>2</sup>[www.doeni.gov.uk/niea/water-home/drinking\\_water/public\\_water/regulations\\_guidance/technical\\_guidance.htm](http://www.doeni.gov.uk/niea/water-home/drinking_water/public_water/regulations_guidance/technical_guidance.htm)

<sup>3</sup>[www.doeni.gov.uk/niea/privatewatersuppliesleaflet.pdf](http://www.doeni.gov.uk/niea/privatewatersuppliesleaflet.pdf)

<sup>4</sup>[www.doeni.gov.uk/niea/pws\\_registration\\_form.pdf](http://www.doeni.gov.uk/niea/pws_registration_form.pdf)

**Figure 1.2: Sources of Private Water Supplies**



(a) Borehole



(b) Well



(c) Spring



(d) Surface

Although there are some (mainly commercial) private supplies in urban areas, the majority are situated in the more remote, rural parts of Northern Ireland. Private water supplies may be drawn from a variety of surface and groundwater sources. Surface sources include streams, rivers and reservoirs; groundwater sources include wells, boreholes and springs. The majority (98 per cent) of private supplies in Northern Ireland are from groundwater sources, most commonly, boreholes (see Figure 1.2).

### Monitoring of Supplies

Private supplies are split into two main types for the purposes of monitoring under the regulations:

- (i) large supplies ( $\geq 10$  cubic metres or  $\geq 50$  persons per day) or any commercial/public supplies (irrespective of volume used); and
- (ii) small domestic supplies to two or more private dwellings ( $< 10$  cubic metres or  $< 50$  persons per day).

An annual sampling programme is put in place for each registered private supply. The frequency of the sampling and the range of parameters tested for are determined by the type of the supply and the volume of water used or population served. Currently the costs for the sampling and testing of private water supplies are covered by the Department of the Environment.

To meet the requirements of the regulations, we have a contract in place for the collection of samples from the council offices and subsequent analysis and reporting of the results by laboratories accredited for the testing of drinking water samples.

Of the 116 private water supplies on our monitoring schedule for 2011, 84 per cent are large or commercial/public supplies; and 16 per cent are small domestic premises (groupings of two or more houses only). A breakdown of the numbers and types of private water supplies, together with the monitoring frequencies, is shown below in Table 1.1.

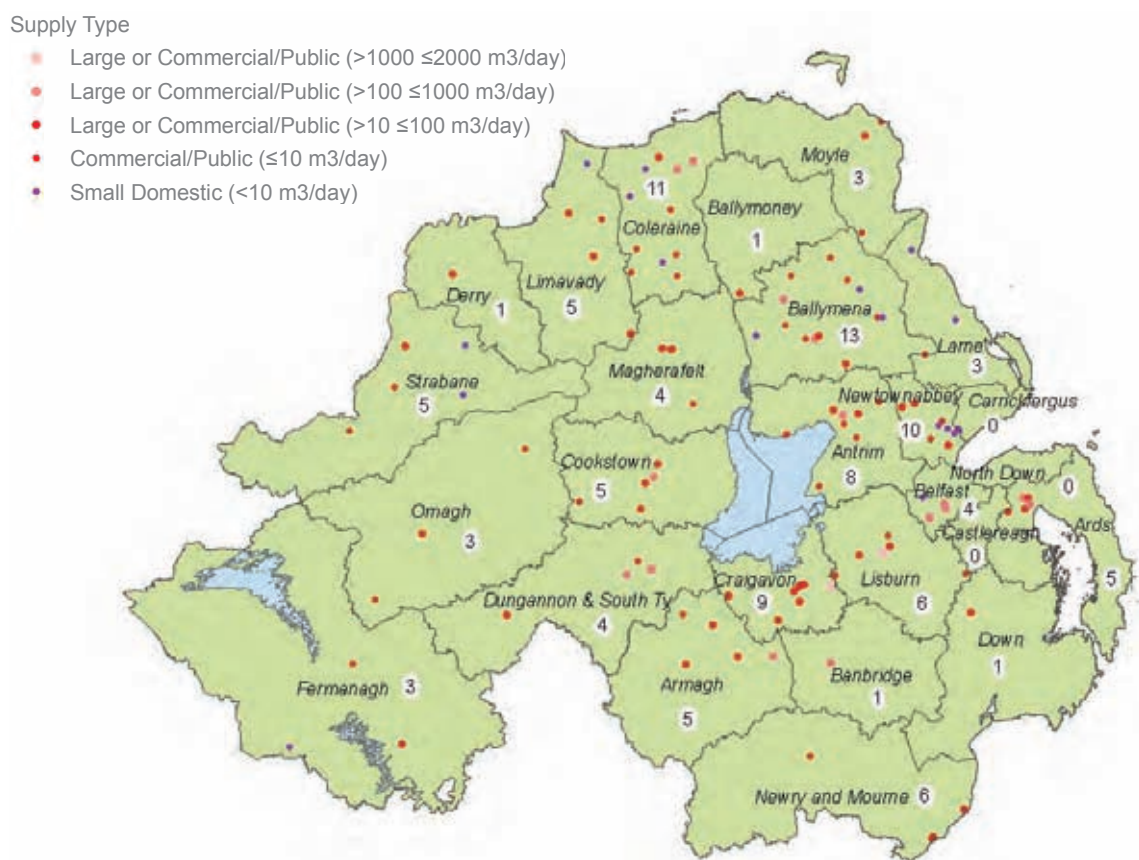
**Table 1.1: Number of Private Water Supplies by Type and Size in 2011**

| Types of Private Water Supplies - Volume (m <sup>3</sup> /day) | Monitoring Frequency (per Annum) | Parameters Analysed                     | Number of Supplies | % of Supplies |
|--|----------------------------------|---|--------------------|---------------|
| <b>(i) Large or Commercial/Public Supplies</b>                 |                                  |   |                    |               |
| >1000 ≤2000  | 10                               | Full suite of all regulatory parameters | 2                  | 1.7           |
| >100 ≤1000   | 4                                |   | 15                 | 12.9          |
| >10 ≤100   | 2                                |   | 43                 | 37.1          |
| ≤10  | 1                                |   | 38                 | 32.8          |
| <b>(ii) Small Domestic Supplies (two or more dwellings)</b>    |                                  |   |                    |               |
| ≤10  | 1                                | Limited suite of regulatory parameters  | 18                 | 15.5          |
|  |                                  |   | 116                |               |

Note: There are no registered private water supplies in Northern Ireland with a volume of usage greater than 2,000 m<sup>3</sup> per day.

A breakdown of private water supplies by district council area is shown below in Figure 1.3.

**Figure 1.3: Distribution of Registered Private Water Supplies by Council Area in 2011**



Number of private water supplies in each council area. Due to scale, not all sites are distinguishable on the map.

Note: Carrickfergus, Castlereagh, and North Down Councils do not have private water supplies included in our 2011 sampling programme.



## Overall Drinking Water Quality

We have been monitoring private water supplies since 1999, and 2011 provides the second year of monitoring data under the 2009 Regulations. While a similar number of private water supplies are registered with us as in previous years, there were changes within the 2009 Regulations resulting in a reduction in both the number of samples lifted and the number of tests performed.

The results of analysis are held by us within a database and the owners/users of the private water supplies are informed of their results following the completion of tests. Table 1.2 provides an overview of the quality of water in private supplies in 2011.

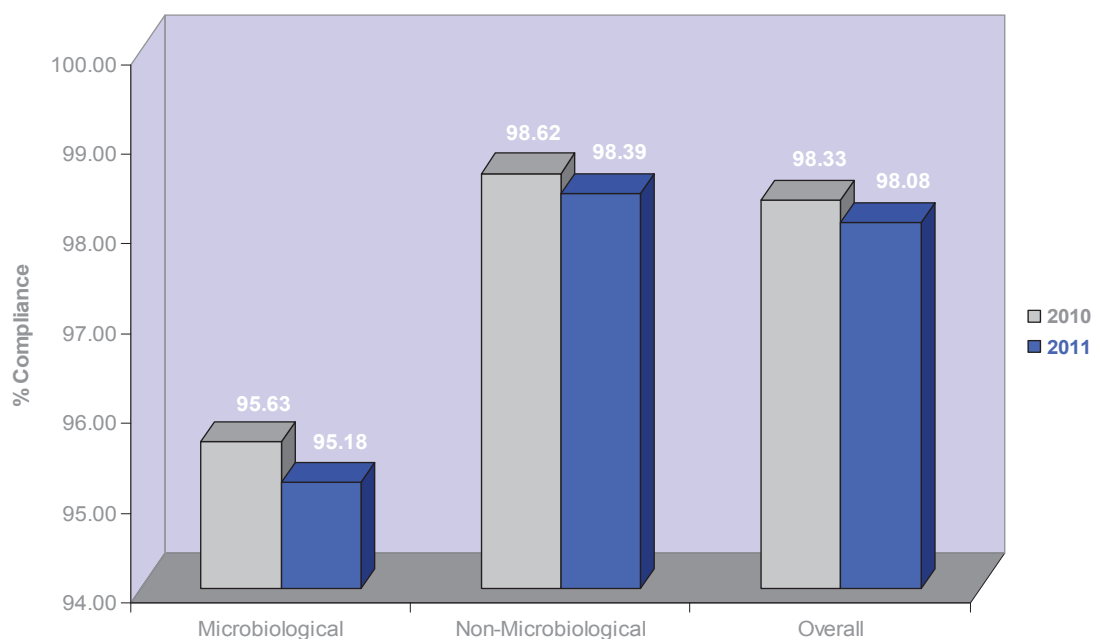
The results show that out of a total of 7,867 tests carried out in 2011, 98.08% met the regulatory standards. The regulatory requirements were not met on 151 occasions; 37 of these occasions related to microbiological failures.

Previous reports contained summary water quality data that included follow-up operational samples. This year we have adjusted our reporting assessment to reflect only those samples taken from the compliance sampling programme. A comparison of this data shows a drop in the overall compliance: 98.33% in 2010; 98.08% in 2011 (Figure 1.4 refers). Trends in the levels of compliance will continue to be monitored in subsequent years.

**Table 1.2: Overall Water Quality in Private Water Supplies in 2011**

| Parameters                       | Determinations in 2011 |                |             |              |
|----------------------------------|------------------------|----------------|-------------|--------------|
|                                  | Total No.              | Contraventions |             | % Compliance |
|                                  |                        | No.            | %           |              |
| Coliform bacteria                | 223                    | 17             | 7.62        | 92.38        |
| Enterococci                      | 119                    | 9              | 7.56        | 92.44        |
| <i>E. coli</i>                   | 223                    | 10             | 4.48        | 95.52        |
| <i>Clostridium perfringens</i>   | 203                    | 1              | 0.49        | 99.51        |
| <b>Microbiological Total</b>     | <b>768</b>             | <b>37</b>      | <b>4.82</b> | <b>95.18</b> |
| Iron                             | 203                    | 24             | 11.82       | 88.18        |
| Manganese                        | 203                    | 23             | 11.33       | 88.67        |
| Hydrogen ion (pH)                | 222                    | 23             | 10.36       | 89.64        |
| Odour (quantitative)             | 201                    | 10             | 4.98        | 95.02        |
| Arsenic                          | 99                     | 3              | 3.03        | 96.97        |
| Colour                           | 203                    | 5              | 2.46        | 97.54        |
| Trihalomethanes                  | 99                     | 2              | 2.02        | 97.98        |
| Nickel                           | 99                     | 2              | 2.02        | 97.98        |
| Aluminium                        | 203                    | 4              | 1.97        | 98.03        |
| Turbidity                        | 222                    | 4              | 1.80        | 98.20        |
| Ammonium                         | 167                    | 3              | 1.80        | 98.20        |
| Taste (quantitative)             | 189                    | 1              | 0.53        | 99.47        |
| Nitrate                          | 192                    | 1              | 0.52        | 99.48        |
| Individual pesticides            | 1,283                  | 1              | 0.08        | 99.92        |
| Nitrite                          | 203                    | 0              | 0.00        | 100.00       |
| Total pesticides                 | 99                     | 0              | 0.00        | 100.00       |
| Other parameters                 | 3,212                  | 8              | 0.34        | 99.66        |
| <b>Non-microbiological Total</b> | <b>7,099</b>           | <b>114</b>     | <b>1.61</b> | <b>98.39</b> |
| <b>Overall Total</b>             | <b>7,867</b>           | <b>151</b>     | <b>1.92</b> | <b>98.08</b> |

**Figure 1.4: Comparison of Compliance in 2010 and 2011**



### Microbiological Quality

Microbiological failures of private water supplies, 37 out of 151 overall failures, continue to be a major concern in addressing non-compliances of these supplies. The presence of *E. coli* or enterococci is indicative of faecal contamination of a supply, and can also highlight that there is a route for other microbiological pathogens to enter the supply. The results in Table 1.2 above show that 25 per cent of the recorded non-compliances in 2011 were due to supplies failing to meet the microbiological standards of the regulations.

From a total of 116 supplies monitored during 2011, 16 per cent of sites failed to be microbiologically satisfactory. Not surprisingly, 42 per cent of these unsatisfactory supplies were from small untreated domestic supplies in rural areas. Water supplies in the vicinity of farmed land, where animals graze or manure is spread, are most at risk and this is particularly high at times of heavy rainfall, when water may run directly off farmland and carry micro-organisms into unprotected private supplies.

The remaining 58 per cent of the supplies showing microbiological non-compliances were from commercial supplies. A small proportion of these failures, 18 per cent, were from large commercial supplies where disinfection treatment was in use. These failures highlight an ongoing area of concern for private supplies serving larger premises where treatment is not being operated

correctly, routinely checked nor maintained as needed. We continue to work with the owners/users of these supplies to put procedures in place to address these issues.

In 2011, a larger proportion of the microbiological failures at commercial sites, namely 82 per cent, were from supplies to small business operators where no disinfection treatment was present. In these instances, adequate source protection is crucial. However, where there continues to be a known risk of microbial contamination, the installation of appropriate disinfection treatment is recommended.

### Non-microbiological Quality

Contraventions of the physical/chemical standards have been reported for a range of parameters. As with previous years where the standards have not been met, they relate mainly to non-compliance for iron (11.82%) and manganese (11.33%).

Both iron and manganese can occur naturally in the water supply but may also enter the supply through old pipe work. High levels of these metals may affect the appearance, taste or smell of the water and could interfere with the disinfection process. There are effective treatments which can be installed to reduce the levels of these metals in private supplies. Further information on these treatment options is available in the technical manual on private water supplies.<sup>1</sup>

<sup>1</sup>[www.privatewatersupplies.gov.uk](http://www.privatewatersupplies.gov.uk)

Hydrogen ion (pH), an indicator parameter in the 2009 Regulations, is also reported with a high level of non-compliance (10.36%) for 2011. These all relate to hydrogen ion values less than the regulatory limit of 6.5. Over 50 per cent of these are due to the treatment processes in place at sites for the manufacture of soft drinks. The remainder are largely as a result of the peaty nature of the land in the catchment of the source water for some rural supplies. Levels of this parameter will continue to be monitored in these supplies.

As in 2010, only one pesticide contravention was noted for private supplies in 2011. This was a failure for MCPA in a surface water supply to a food manufacturer where the supply was being used for the washing down of surfaces and equipment within the site. Pesticides should not be stored or sprayed within the vicinity of drinking water sources. Where pesticides are of concern in the vicinity of a private supply, appropriate measures should be put in place to reduce the risk of them entering the water supply through better management of the catchment area, improved source protection or treatment for their removal.<sup>1</sup>

### Follow-up Actions on Regulatory Contraventions

Contraventions of the regulatory standards at private supplies are reported to the relevant district councils who inform the owners/users. All contraventions are followed up in conjunction with the appropriate Environmental Health Department to establish the cause, resample the supply and identify any remedial actions needed.

The owners/users of the supply are provided with practical advice on source protection and treatment options to reduce the potential risks of contamination, and depending on the nature and level of the failures, it may be necessary for us to carry out a site visit.

We have protocols in place to inform the Public Health Agency (PHA) in instances where it is considered that a failure at a private supply could be a risk to human health. The PHA provides appropriate health advice in such cases. Where necessary, the regulations contain a provision to issue Notices which could be used to restrict or prohibit the use of a supply.

During 2011, a total of 19 microbiological and eight chemical failures were reported to the Public Health Agency. The chemical parameters notified

included health exceedences for arsenic, turbidity, odour, nitrate, and tetrachloromethane. The notifications resulted in 12 supplies which had ongoing microbiological contraventions being advised to boil their water before use. A further eight supplies were recommended to switch to the public supply. The remaining sites took timely action to address their non-compliances.

In conjunction with Environmental Health staff, we have worked with the relevant persons responsible for these supplies to, where possible, improve their water quality and bring about compliance. A varied range of actions were required by the owners/users of these supplies to achieve this, including: improvements to source protection; installation of disinfection; installation of specialist treatment; and introduction of both record keeping and maintenance procedures.

Levels of arsenic above the regulatory limit were found in three private supplies during 2011. Using groundwater monitoring data obtained from within the Northern Ireland Environment Agency, and geochemical maps held by Geological Survey for Northern Ireland<sup>2</sup>, the location of these supplies were identified as having naturally occurring arsenic present. Corrective action taken at two of these sites involved the installation of specialist arsenic removal filters (see Figure 1.5). The third site, which had access to the public water supply, opted to blend their private and public water supplies at a set ratio so that the levels of arsenic, at point of use within the site, were compliant with the drinking water quality standards.

**Figure 1.5 Specialist Arsenic Removal Filters**



<sup>1</sup>[www.dardni.gov.uk/index/publications/pubs-dard-environment/content-codeofgoodagripractice.htm](http://www.dardni.gov.uk/index/publications/pubs-dard-environment/content-codeofgoodagripractice.htm)

<sup>2</sup>[www.bgs.ac.uk/gsni/tellus/overview/index.html](http://www.bgs.ac.uk/gsni/tellus/overview/index.html)



Many private supplies also have a connection to the public water supply, that is, they have a dual water supply. Under The Water Supply (Water Fittings) Regulations 2009,<sup>1</sup> NI Water is responsible for ensuring that the design of plumbing systems and the fittings used do not result in contamination of the public water supply. In particular, there should be no direct connection between a private and public water supply.

If a risk of contamination of the public water supply is identified during the investigation of contraventions at private supplies, we further notify NI Water to allow a plumbing inspection to be undertaken. The owners/users of private supplies are required to carry out any work identified as a result of this inspection in order to safeguard the public water supply and minimize any health risk to the wider public (Figure 1.6 refers).

**Figure 1.6 Removal of Cross-connection Between Public and Private Water Supply**



Restrictions placed on the use of the private supply remain at 12 sites as the necessary remedial actions have not yet been completed. Seven of these serve small domestic supplies to two or more dwellings; five serve small commercial businesses. We will continue to work with the owners/users of these supplies in providing advice and guidance and discussing an agreed action plan to obtain a safe supply of water.

### **Risk Assessments**

The 2009 Regulations introduced the requirement for a risk assessment to be carried out on all private water supplies to which the regulations apply. The World Health Organization (WHO)

recommends that the most effective means of consistently ensuring the safety of a drinking water supply is through a comprehensive risk assessment and risk management approach.

With the assistance of Environmental Health Officers in the district councils, the risk assessment of registered private water supplies was completed by June 2011. The assessments highlighted a range of issues, including: poor source protection, lack of treatment and lack of maintenance of treatment.

In some cases, owners/users have a poor knowledge of their private water supply system and are unaware of the need to check and maintain the integrity of their supply. This risk assessment process provided the opportunity for owners/users to build a better understanding of their private supplies and highlight the importance of safeguarding them.

The information gathered through this process has been hugely beneficial in identifying appropriate actions required when investigating non-compliances which occur at private supply sites. We are continuing to engage with all owners/users on the issues raised in the risk assessment of their supplies to realize any actions identified and help bring about improved compliance for private supplies.

For larger supplies, where the water is used as drinking water for the public, we have endeavoured to drive forward the need for water safety or management plans to be integral at these sites. We will continue to offer advice and guidance to all owners/users of these supplies to increase awareness of the potential risks posed and of suitable controls that can be put in place to manage these risks.

This process of risk-based management is now also being used to inform and optimise our current monitoring programme for private water supplies.

### **Technical Guidance**

A technical manual on private supplies is available on line and provides comprehensive guidance for owners/users. It is a useful tool for those required to assess or work with these supplies. A copy of the manual and other general information relating to private supplies can be downloaded from the website.<sup>2</sup>

<sup>1</sup>[www.legislation.gov.uk/nisr/2009/255/contents/made](http://www.legislation.gov.uk/nisr/2009/255/contents/made)

<sup>2</sup>[www.privatewatersupplies.gov.uk](http://www.privatewatersupplies.gov.uk)

Further advice on private water supplies in Northern Ireland and general information on drinking water quality can be found on the DWI web pages.<sup>1</sup>

The World Health Organization has published a fourth edition of 'Guidelines for drinking-water quality' which provides detail on the occurrence and removal of microbial and chemical hazards in drinking water, and the preventive risk management approach for ensuring drinking water quality.<sup>2</sup>

A new document on 'Water Safety in Buildings', published by WHO, is also available and provides guidance for managing water supplies in buildings.<sup>3</sup>

### Acknowledgements

We acknowledge the ongoing co-operation and assistance of staff from the Environmental Health Departments of district councils in helping us meet the requirements of The Private Water Supplies Regulations (Northern Ireland) 2009. We also recognize the Public Health Agency for the guidance it provided on the health significance of failures of private water supplies.

<sup>1</sup>[www.doeni.gov.uk/niea/water-home/drinking\\_water/private\\_water.htm](http://www.doeni.gov.uk/niea/water-home/drinking_water/private_water.htm)

<sup>2</sup>[www.who.int/water\\_sanitation\\_health/publications/2011/dwg\\_guidelines/en/index.html](http://www.who.int/water_sanitation_health/publications/2011/dwg_guidelines/en/index.html)

<sup>3</sup>[www.who.int/water\\_sanitation\\_health/publications/2011/9789241548106/en/](http://www.who.int/water_sanitation_health/publications/2011/9789241548106/en/)

## **Annexes**

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## Annex 1

### Glossary and Definition of Terms

|                                  |   |  |  |
|----------------------------------|---|--|--|
| <b>Aesthetic</b>                 | associated with the senses of taste, smell and sight.   | <b>Colour</b>  | occurs naturally in some upland water sources. It is removed by conventional water treatment.  |
| <b>Aluminium</b>                 | occurs naturally in some water sources. It is removed by conventional water treatment (coagulation and filtration). Aluminium sulphate and polyaluminium chloride may be used as water treatment chemicals at some water treatment works.   | <b>Communication Pipe</b>                                    | the connection from the water main to the consumer property boundary (normally at the outside stop tap).   |
| <b>Animalcule</b>                | a tiny or microscopic life form.  | <b>Compliance Assessment</b>                                 | a comparison made by the Inspectorate of data (gathered by NI Water) against standards and other regulatory requirements.  |
| <b>Aquifer</b>                   | underground strata containing water.  | <b>Compound</b>  | a compound consists of two or more elements in chemical combination.   |
| <b>Authorised Departure (AD)</b> | authorisation granted by the Inspectorate, in consultation with the health authorities, for NI Water to temporarily supply water exceeding a drinking water standard, provided that there is a planned programme of work at the water treatment works to improve the water quality and that there are no adverse health implications. | <b>Consideration of Provisional Enforcement Order (CPEO)</b> | the means, as set out in The Water and Sewerage Services (Northern Ireland) Order 2006, by which the Department for Regional Development requires NI Water to comply with certain regulatory requirements. |
| <b>Authorised Supply Point</b>   | a sampling point within the distribution system authorised for certain parameters by the Inspectorate because the results of the analysis of such samples are unlikely to differ in any material respect from the results of the analysis of samples taken from consumers' taps.  | <b>Contravention</b>   | a breach of the regulatory requirement.  |
| <b>Catchment</b>                 | the area of land that drains into a watercourse.  | <b>Cryptosporidiosis</b>                                     | the illness produced by infection with <i>Cryptosporidium</i> .  |
| <b>Chlorine Residual</b>         | the small amount of chlorine present in drinking water to maintain its quality as it passes through NI Water's network of pipes and consumers' household plumbing.  | <b><i>Cryptosporidium</i></b>                                | a protozoan parasite.  |
| <b>Coagulation</b>               | a process employed during drinking water treatment to assist in the removal of particulate matter.  | <b>DEFRA</b>   | Department of the Environment, Food and Rural Affairs.   |
| <b>Coliforms</b>                 | a group of bacteria which may be faecal or environmental in origin.   | <b>Determination</b>   | an analysis for a specific parameter.  |
|                                  |   | <b>Distribution Systems</b>                                  | NI Water's network of mains, pipes, pumping stations and service reservoirs through which treated water is delivered to consumers.   |
|                                  |   | <b>Drinking Water Directive</b>                              | European Council Directive (98/83/EC), relating to the quality of water intended for human consumption - setting out drinking water standards to be applied to member states.                              |
|                                  |   | <b>Drinking Water Standards</b>                              | the prescribed concentrations or values listed in the Regulations.   |

|  |  |                           |  |
|--|--|---------------------------|--|
| Enterococci                                | a sub-group of faecal streptococci commonly found in the faeces of humans and warm-blooded animals.  | Iron                      | is naturally present in many water sources, and is removed by treatment. Some iron compounds are used as water treatment chemicals. However, the greatest source of iron in drinking water is corrosion of iron water mains. |
| <i>Escherichia coli</i> ( <i>E. coli</i> ) | a type of faecal coliform bacteria commonly found in the intestines of animals and humans. The presence of <i>E. coli</i> in water is a strong indication of recent sewage or animal waste contamination.                                    | Leaching                  | to lose, or cause to lose, soluble substances by the action of a percolating liquid.   |
| Event                                      | a situation affecting, or threatening to affect, drinking water quality.   | Lead                      | its presence tends to reflect the existence of lead plumbing in older properties. If the water being supplied has a tendency to dissolve lead, then it is treated to reduce consumer exposure.                               |
| Exceedence                                 | relates to a contravention or breach of regulatory standards.  | Mains Rehabilitation      | restoration of water mains pipe work to a proper condition.  |
| Faecal Coliforms                           | a sub-group of coliforms, almost exclusively faecal in origin.   | Manganese                 | is naturally present in many water sources and is removed during water treatment.  |
| Filtration                                 | the separation of suspended particulate matter from a fluid.   | MCPA                      | (4-chloro-2-methylphenoxy) acetic acid: an aryloxyalkanoic acid herbicide used for controlling broad-leaved weeds in grass or cereal crops.  |
| Flocculation                               | a process where colloids come out of suspension in the form of floc or flakes.   | Mean Zonal Compliance (%) | a measure of compliance with drinking water standards - see zonal percentage compliance.   |
| Granular Activated Carbon (GAC)            | an absorbent filtration media used to remove trace organic compounds from water.   | Mecoprop (MCP)            | 2-(4-chloro-2-methylphenoxy) propanoic acid: an aryloxyalkanoic acid herbicide used for controlling broad-leaved weeds in grass or cereal crops.   |
| Groundwater                                | water from aquifers or other underground sources.  | Microbiological           | associated with the study of microbes.   |
| Hydrogen ion (pH)                          | gives an indication of the degree of acidity of the water. A pH of 7 is neutral; values below 7 are acidic and above 7 are alkaline. A low pH water may result in pipe corrosion. This is corrected by adding alkali during water treatment. | m <sup>3</sup> /d         | cubic metres per day.  |
| Incident                                   | an event where there has been a demonstrable deterioration in the quality of drinking water.   | mg/l                      | milligrammes per litre (one thousandth of a gramme per litre).   |
| Indicator Parameter                        | something that is measured to check that the control measures, such as water treatment, are working effectively.   | ml                        | millilitre.  |
| Investment Programme                       | investment in improvement works to water treatment works and distribution systems.   | MI/d                      | megalitres per day (one MI/d is equivalent to 1,000 m <sup>3</sup> /d or 220,000 gallon/d).  |
|  |  | µg/l                      | microgrammes per litre (one millionth of a gramme per litre).  |

|  |  |                               |   |
|--|--|-------------------------------|---|
| <b>Non-Incident</b>                            | an event where there has been no demonstrable deterioration in the quality of drinking water.  | <b>Service Pipe</b>           | pipe that connects the consumer's property to NI Water's main. It comprises two parts: the communication pipe which is the connection from the water main to the consumer's property boundary (normally at the outside stop tap); and the supply pipe which runs from the boundary of the property to the consumer's inside stop tap. |
| <b>Oocyst</b>                                  | the resistant form in which <i>Cryptosporidium</i> occurs in the environment, and which is capable of causing infection.   |                               |   |
| <b>Orthophosphoric Acid</b>                    | a chemical which is added in low concentrations at water treatment works to minimize the uptake of lead from old pipework.   | <b>Service Reservoir</b>      | a water tower, tank or other reservoir used for the storage of treated water within the distribution system.  |
| <b>Parameters</b>                              | the substances, organisms and properties listed in Schedules 1 and 2, and regulation 2 of the Regulations.   | <b>Supply Pipe</b>            | pipe connecting between the boundary of a consumer's property and the inside stop tap.  |
| <b>Pathogen</b>                                | an organism which causes disease.  | <b>Supply Point</b>           | a point, other than a consumer's tap, authorised for the taking of samples for compliance with the Regulations.   |
| <b>Pesticides</b>                              | any fungicide, herbicide, insecticide or related product (excluding medicines) used for the control of pests or diseases.  | <b>Surface Water</b>          | untreated water from rivers, impounding reservoirs or other surface water sources.  |
| <b>Plumbosolvency</b>                          | the tendency for lead to dissolve in water.  | <b>Technical Audit</b>        | the means of checking that NI Water is complying with its statutory obligations.  |
| <b>Prescribed Concentration or Value (PCV)</b> | the numerical value assigned to drinking water standards, defining the maximal or minimal legal concentration or value of a parameter.                             | <b>Time of Supply</b>         | the moment when water passes from NI Water's pipework into a consumer's pipework.   |
| <b>Private Water Supplies</b>                  | any supplies of water provided otherwise than by the public supplier, NI Water.  | <b>Treated Water</b>          | water treated for domestic use as defined in the Regulations.   |
| <b>Protozoan Parasite</b>                      | a single-celled organism that can only survive by infecting a host.  | <b>Trihalomethanes (THMs)</b> | a group of organic substances comprising, for the purposes of the Regulations, four substances: trichloromethane (also known as chloroform), tribromomethane (also known as bromoform), dibromochloromethane and dichlorobromomethane.  |
| <b>Public Supplies</b>                         | water supplied by NI Water.  |                               |   |
| <b>Raw Water</b>                               | water prior to receiving treatment for the purpose of drinking.  |                               |   |
| <b>Remedial Action</b>                         | action taken to improve a situation.   |                               |   |
| <b>Residual Disinfectant</b>                   | the small amount of chlorine present in drinking water to maintain its quality as it passes through NI Water's network of pipes and consumers' household plumbing. | <b>Water Supply Zone</b>      | a pre-defined area of supply for establishing sampling frequencies, compliance with standards and information to be made publicly available.  |
| <b>Sedimentation</b>                           | the tendency for particles in suspension to settle out of the water under the influence of gravity.  | <b>WHO</b>                    | World Health Organization.  |



|                             |  |
|-----------------------------|--|
| Wholesome/<br>Wholesomeness | a concept of water quality which is defined by reference to standards and other requirements set out in the Regulations.   |
| WRAS                        | Water Regulations Advisory Scheme.   |
| WRc                         | Water Research Centre (1989) plc and/or, as the context may require, its predecessor body.   |
| Zonal Percentage Compliance | the percentage of results for a specific parameter which complied with the PCV. The mean zonal percentage compliance is the average of the zonal percentage compliances of all water supply zones in a region. |

## Annex 2

### The Regulatory Framework

In Northern Ireland, the primary legislative powers for transposition of the Council Directive (98/83/EC) ([the Drinking Water Directive](#)) relating to the quality of water intended for human consumption are contained in [The Water and Sewerage Services \(Northern Ireland\) Order 2006](#).

The Drinking Water Inspectorate is a statutory appointee, acting on behalf of the Department for Regional Development in respect of public water supplies, and on behalf of the Department of the Environment in relation to private water supplies. The Order confers enforcement powers on us in matters arising from both public and private water supplies.

#### Public Water Supplies

Northern Ireland Water Ltd (NI Water) began to operate as a government-owned company from 1 April 2007, and is the sole supplier of public drinking water in Northern Ireland. [The Water Supply \(Water Quality\) Regulations \(Northern Ireland\) 2007](#) have been in operation since that date and implement the requirements of the Drinking Water Directive. They define wholesomeness by setting standards for 39 parameters and a further 11 indicator parameters; and they specify sampling requirements for samples taken at taps, within water supply zones, at service reservoirs and water treatment works.

Regulation 30 controls the application and introduction of products and substances. The Drinking Water Inspectorate for England and Wales provides a technical resource to facilitate this approval in the United Kingdom. The current "[List of Approved Products for use in Public Water Supply in the United Kingdom](#)" can be obtained from the Drinking Water Inspectorate for England and Wales.

The 2007 Regulations were amended by the [Water Supply \(Water Quality\) \(Amendment\) Regulations \(Northern Ireland\) 2009](#), which came into operation on 15 July 2009 and included new requirements in relation to disinfection, risk assessment and monitoring of drinking water abstraction points. In addition to implementing the Drinking Water Directive (DWD), they implement parts of Council Directive 2000/60/EC ("the Water Framework Directive") and

Council Directive 2008/99/EC ("the Environmental Crime Directive").

They were further amended by [The Water Supply \(Water Quality\) \(Amendment\) Regulations \(Northern Ireland\) 2010](#), which came into operation on 20 April 2010, and include clarification of the Department's responsibilities and powers of enforcement in respect of implementation of the Regulations.

[The Water Supply \(Domestic Distribution Systems\) Regulations \(Northern Ireland\) 2010](#), which came into operation on 20 April 2010, require NI Water to report [to us] instances of water quality failures caused by the internal distribution system occurring within public buildings. It would then be our responsibility to assess the significance of these failures and, where required, ensure remedial action is undertaken by the person responsible for the building.

[The Water Supply \(Water Fittings\) Regulations \(Northern Ireland\) 2009](#) came into operation on 3 August 2009. These regulations make provisions for preventing contamination of drinking water by ensuring that all plumbing systems, water fittings and equipment connected to the public water supply are of an appropriate quality and standard. These regulations apply from the point where water leaves the water main and enters the property's service pipe. Owners and occupiers of premises and anyone who installs plumbing systems or water fittings must comply with these regulations.

[The EU Water Framework Directive](#) (WFD 2000/60/EC) came into force on 22 December 2000. Its aim is to protect all surface waters and ground waters and prevent any deterioration in quality. In the protection of drinking water sources, the WFD sets out a requirement to identify points for drinking water abstraction to be included in river basin management plans.

## Private Water Supplies

[The Private Water Supplies Regulations \(Northern Ireland\) 2009](#) came into operation on 18 January 2010 and implement Council Directive 98/83/EC on the quality of water intended for human consumption in relation to private water supplies.

They were amended by [The Private Water Supplies \(Amendment\) Regulations \(Northern Ireland\) 2010](#), which came into operation on 20 April 2010 and provide clarification of some aspects of the 2009 Regulations, including the requirement to use only specified products or substances for private water supplies and to limit disinfection by-products to residual levels. They complete the transposition of Council Directive 98/83/EC.



## Annex 3

### Drinking Water Quality Look-up Tables

The following tables provide more detail of where the standards have not been met in the individual water supply zones. The tables present, by parameter, all the contraventions and the ‘% zonal compliance’ that occurred in water supply zones and at supply points at water treatment works during 2011.

#### Water Quality in Water Supply Zones in 2011

The ‘% zonal compliance’ is calculated using the mean zonal compliance index. For further detail on how this is calculated, the reader should refer to Annex 4 of our 2007 report.<sup>1</sup>

**Table 3.1: % Mean Zonal Compliance - Aluminium**

| Sampling Location - Zones          | Number of Zones | Number of Samples | Number of Tests >PCV per Zone | % Zonal Compliance |
|------------------------------------|-----------------|-------------------|-------------------------------|--------------------|
| Number of compliant zones          | 35              | 1,116             | 0                             | 100.00             |
| ZN0502, Lough Fea Cookstown        | 1               | 24                | 1                             | 95.83              |
| ZN0604, Caugh Hill Dungiven        | 1               | 36                | 1                             | 97.22              |
| ZN0605, Creggan Derry              | 1               | 24                | 1                             | 95.83              |
| ZN0705, Lough Macrory Beragh       | 1               | 12                | 1                             | 91.67              |
| ZS0101, Dunore Ballygomartin North | 1               | 36                | 1                             | 97.22              |
| ZS0102, Dunore Ballygomartin South | 1               | 36                | 1                             | 97.22              |
| ZS0103, Belfast Ballyhanwood       | 1               | 52                | 2                             | 96.15              |
| ZS0106, Dunore Belfast North       | 1               | 36                | 1                             | 97.22              |
| ZS0107, Belfast Oldpark            | 1               | 36                | 1                             | 97.22              |
| ZS0109, Dorisland Whiteabbey       | 1               | 36                | 2                             | 94.44              |
| ZS0401, Drumaroad Bangor           | 1               | 52                | 1                             | 98.08              |
| ZS0403, Drumaroad Peninsula        | 1               | 24                | 1                             | 95.83              |
| ZS0502, Forked Bridge Dunmurry     | 1               | 52                | 1                             | 98.08              |
| ZS0503, Forked Bridge Stoneyford   | 1               | 24                | 1                             | 95.83              |
| ZS0601, Drumaroad Ballynahinch     | 1               | 24                | 1                             | 95.83              |
| ZS0602, Drumaroad Downpatrick      | 1               | 36                | 1                             | 97.22              |
| ZS0802, Castor Bay Lurgan          | 1               | 24                | 1                             | 95.83              |
| ZS0807, Castor Bay Loughall        | 1               | 52                | 1                             | 98.08              |
| Total number of zones              | 53              | 1,732             | 20                            |                    |
| <b>Mean Zonal Compliance</b>       |                 |                   |                               | <b>98.77</b>       |

<sup>1</sup>[www.doeni.gov.uk/niea/drinking\\_water\\_quality\\_in\\_northern\\_ireland\\_2007.pdf](http://www.doeni.gov.uk/niea/drinking_water_quality_in_northern_ireland_2007.pdf)

**Table 3.2: % Mean Zonal Compliance - Bromate**

| Sampling Location - Zones    | Number of Zones | Number of Samples | Number of Tests >PCV per Zone | % Zonal Compliance |
|------------------------------|-----------------|-------------------|-------------------------------|--------------------|
| Number of compliant zones    | 52              | 400               | 0                             | 100.00             |
| ZS0201, Dorisland Carrick    | 1               | 8                 | 1                             | 87.50              |
| Total number of zones        | 53              | 408               | 1                             |                    |
| <b>Mean Zonal Compliance</b> |                 |                   |                               | <b>99.76</b>       |

**Table 3.3: % Mean Zonal Compliance - *E. coli***

| Sampling Location - Zones    | Number of Zones | Number of Samples | Number of Tests >PCV per Zone | % Zonal Compliance |
|------------------------------|-----------------|-------------------|-------------------------------|--------------------|
| Number of compliant zones    | 51              | 4,536             | 0                             | 100.00             |
| ZN0401, Dunore Point Antrim  | 1               | 144               | 1                             | 99.31              |
| ZS0902, Fofanny Dromore      | 1               | 84                | 1                             | 98.81              |
| Total number of zones        | 53              | 4,764             | 2                             |                    |
| <b>Mean Zonal Compliance</b> |                 |                   |                               | <b>99.96</b>       |

**Table 3.4: % Mean Zonal Compliance - Enterococci**

| Sampling Location - Zones    | Number of Zones | Number of Samples | Number of Tests >PCV per Zone | % Zonal Compliance |
|------------------------------|-----------------|-------------------|-------------------------------|--------------------|
| Number of compliant zones    | 52              | 400               | 0                             | 100.00             |
| ZS0109, Dorisland Whiteabbey | 1               | 8                 | 1                             | 87.50              |
| Total number of zones        | 53              | 408               | 1                             |                    |
| <b>Mean Zonal Compliance</b> |                 |                   |                               | <b>99.76</b>       |

Table 3.5: % Mean Zonal Compliance - Iron

| Sampling Location - Zones        | Number of Zones | Number of Samples | Number of Tests >PCV per Zone | % Zonal Compliance |
|----------------------------------|-----------------|-------------------|-------------------------------|--------------------|
| Number of compliant zones        | 28              | 808               | 0                             | 100.00             |
| ZN0202, Altnahinch Bushmills     | 1               | 24                | 1                             | 95.83              |
| ZN0302, Dungonnell Glarryford    | 1               | 24                | 1                             | 95.83              |
| ZN0305, Dungonnell Ahoghill      | 1               | 24                | 1                             | 95.83              |
| ZN0401, Dunore Point Antrim      | 1               | 52                | 1                             | 98.08              |
| ZN0402, Killylane Ballynure      | 1               | 36                | 1                             | 97.22              |
| ZN0501, Moyola Magherafelt       | 1               | 36                | 1                             | 97.22              |
| ZN0601, Ballinrees Limavady      | 1               | 24                | 1                             | 95.83              |
| ZN0604, Caugh Hill Dungiven      | 1               | 36                | 1                             | 97.22              |
| ZN0902, Altmore Donaghmore       | 1               | 12                | 1                             | 91.67              |
| ZS0103, Belfast Ballyhanwood     | 1               | 52                | 1                             | 98.08              |
| ZS0105, Dunore Breda South       | 1               | 52                | 1                             | 98.08              |
| ZS0107, Belfast Oldpark          | 1               | 36                | 1                             | 97.22              |
| ZS0109, Dorisland Whiteabbey     | 1               | 36                | 1                             | 97.22              |
| ZS0110, Dunore Point Glengormley | 1               | 24                | 1                             | 95.83              |
| ZS0201, Dorisland Carrick        | 1               | 36                | 1                             | 97.22              |
| ZS0401, Drumaroad Bangor         | 1               | 52                | 1                             | 98.08              |
| ZS0402, Drumaroad Comber         | 1               | 52                | 1                             | 98.08              |
| ZS0403, Drumaroad Peninsula      | 1               | 24                | 1                             | 95.83              |
| ZS0501, Drumaroad Lisburn        | 1               | 52                | 1                             | 98.08              |
| ZS0502, Forked Bridge Dunmurry   | 1               | 52                | 1                             | 98.08              |
| ZS0802, Castor Bay Lurgan        | 1               | 24                | 1                             | 95.83              |
| ZS0807, Castor Bay Loughgall     | 1               | 52                | 1                             | 98.08              |
| ZS0902, Fofanny Dromore          | 1               | 36                | 2                             | 94.44              |
| ZS0904, Fofanny Mourne           | 1               | 52                | 1                             | 98.08              |
| ZS1001, Carran Hill Crossmaglen  | 1               | 24                | 5                             | 79.17              |
| Total number of zones            | 53              | 1,732             | 30                            |                    |
| <b>Mean Zonal Compliance</b>     |                 |                   |                               | <b>98.15</b>       |

**Table 3.6: % Mean Zonal Compliance - Lead**

| Sampling Location - Zones    | Number of Zones | Number of Samples | Number of Tests >PCV per Zone | % Zonal Compliance |
|------------------------------|-----------------|-------------------|-------------------------------|--------------------|
| Number of compliant zones    | 52              | 400               | 0                             | 100.00             |
| ZN0702, Glenhordial Omagh    | 1               | 8                 | 1                             | 87.50              |
| Total number of zones        | 53              | 408               | 1                             |                    |
| <b>Mean Zonal Compliance</b> |                 |                   |                               | <b>99.76</b>       |

**Table 3.7: % Mean Zonal Compliance - Manganese**

| Sampling Location - Zones    | Number of Zones | Number of Samples | Number of Tests >PCV per Zone | % Zonal Compliance |
|------------------------------|-----------------|-------------------|-------------------------------|--------------------|
| Number of compliant zones    | 51              | 1,672             | 0                             | 100.00             |
| ZN0604, Caugh Hill Dungiven  | 1               | 36                | 1                             | 97.22              |
| ZS0802, Castor Bay Lurgan    | 1               | 24                | 1                             | 95.83              |
| Total number of zones        | 53              | 1,732             | 2                             |                    |
| <b>Mean Zonal Compliance</b> |                 |                   |                               | <b>99.87</b>       |

**Table 3.8: % Mean Zonal Compliance - Odour**

| Sampling Location - Zones          | Number of Zones | Number of Samples | Number of Tests >PCV per Zone | % Zonal Compliance |
|------------------------------------|-----------------|-------------------|-------------------------------|--------------------|
| Number of compliant zones          | 41              | 1,305             | 0                             | 100.00             |
| ZN0101, Ballinrees Coleraine       | 1               | 76                | 2                             | 97.37              |
| ZN0501, Moyola Magherafelt         | 1               | 36                | 1                             | 97.22              |
| ZN0601, Ballinrees Limavady        | 1               | 24                | 1                             | 95.83              |
| ZN0604, Caugh Hill Dungiven        | 1               | 36                | 2                             | 94.44              |
| ZN0605, Creggan Derry              | 1               | 24                | 1                             | 95.83              |
| ZN0703, Lenamore Greencastle       | 1               | 4                 | 1                             | 75.00              |
| ZN0706, Lough Macroy Killyclogher  | 1               | 24                | 1                             | 95.83              |
| ZN0802, Killyhevlin Enniskillen    | 1               | 52                | 11                            | 78.85              |
| ZN1102, Seagahan Armagh            | 1               | 36                | 1                             | 97.22              |
| ZS0102, Dunore Ballygomartin South | 1               | 36                | 1                             | 97.22              |
| ZS0503, Forked Bridge Stoneyford   | 1               | 24                | 1                             | 95.83              |
| ZS0904, Fofanny Mourne             | 1               | 52                | 1                             | 98.08              |
| Total number of zones              | 53              | 1,729             | 24                            |                    |
| <b>Mean Zonal Compliance</b>       |                 |                   |                               | <b>98.47</b>       |



**Table 3.9: % Mean Zonal Compliance - PAH - Sum of Four Substances**

| Sampling Location - Zones         | Number of Zones | Number of Samples | Number of Tests >PCV per Zone | % Zonal Compliance |
|-----------------------------------|-----------------|-------------------|-------------------------------|--------------------|
| Number of compliant supply points | 52              | 400               | 0                             | 100.00             |
| ZS0802, Castor Bay Lurgan         | 1               | 8                 | 1                             | 87.50              |
| Total number of zones             | 53              | 408               | 1                             |                    |
| <b>Mean Zonal Compliance</b>      |                 |                   |                               | <b>99.76</b>       |

**Table 3.10: % Mean Zonal Compliance - Pesticides - Other Substances**

| Sampling Location - Supply Points | Number of Supply Points | Number of Samples | Number of Tests >PCV per Supply Point | % Zonal Compliance |
|-----------------------------------|-------------------------|-------------------|---------------------------------------|--------------------|
| Number of compliant supply points | 26                      | 10,261            | 0                                     | 100.00             |
| W3317, Dorisland                  | 1                       | 344               | 1                                     | 99.71              |
| W4701, Killyhevlin                | 1                       | 344               | 1                                     | 99.71              |
| Total number of supply points     | 28                      | 10,277            | 2                                     |                    |
| <b>Mean Zonal Compliance</b>      |                         |                   |                                       | <b>99.98</b>       |

**Table 3.11: % Mean Zonal Compliance - Taste**

| Sampling Location - Zones       | Number of Zones | Number of Samples | Number of Tests >PCV per Zone | % Zonal Compliance |
|---------------------------------|-----------------|-------------------|-------------------------------|--------------------|
| Number of compliant zones       | 49              | 1,529             | 0                             | 100.00             |
| ZN0101, Ballinrees Coleraine    | 1               | 76                | 1                             | 98.68              |
| ZN0604, Caugh Hill Dungiven     | 1               | 36                | 2                             | 94.44              |
| ZN0802, Killyhevlin Enniskillen | 1               | 52                | 2                             | 96.15              |
| ZN1102, Seagahan Armagh         | 1               | 36                | 1                             | 97.22              |
| Total number of zones           | 53              | 1,729             | 6                             |                    |
| <b>Mean Zonal Compliance</b>    |                 |                   |                               | <b>99.75</b>       |

**Table 3.12: % Mean Zonal Compliance - Total Trihalomethanes**

| Sampling Location - Zones    | Number of Zones | Number of Samples | Number of Tests >PCV per Zone | % Zonal Compliance |
|------------------------------|-----------------|-------------------|-------------------------------|--------------------|
| Number of compliant zones    | 50              | 384               | 0                             | 100.00             |
| ZN0603, Carmoney Eglinton    | 1               | 8                 | 1                             | 87.50              |
| ZN0604, Caugh Hill Dungiven  | 1               | 8                 | 1                             | 87.50              |
| ZN0605, Creggan Hill         | 1               | 8                 | 1                             | 87.50              |
| Total number of zones        | 53              | 408               | 3                             |                    |
| <b>Mean Zonal Compliance</b> |                 |                   |                               | <b>99.29</b>       |

**Table 3.13: % Mean Zonal Compliance - Turbidity**

| Sampling Location - Zones    | Number of Zones | Number of Samples | Number of Tests >PCV per Zone | % Zonal Compliance |
|------------------------------|-----------------|-------------------|-------------------------------|--------------------|
| Number of compliant zones    | 52              | 1,708             | 0                             | 100.00             |
| ZS0802, Castor Bay Lurgan    | 1               | 24                | 1                             | 95.83              |
| Total number of zones        | 53              | 1,732             | 1                             |                    |
| <b>Mean Zonal Compliance</b> |                 |                   |                               | <b>99.92</b>       |

## Annex 4

### Drinking Water Quality in District Council Areas

The following tables provide a summary of public drinking water quality data for each local district council area.

**Table 4.1: Antrim Borough Council Area**

| Sampling Location - Zones        | Parameter      | % Zonal Compliance |
|----------------------------------|----------------|--------------------|
| ZN0305, Dungonnell Ahoghill      | Iron           | 95.83              |
| ZN0401, Dunore Point Antrim      | <i>E. coli</i> | 99.31              |
|                                  | Iron           | 98.08              |
| ZN0402, Killylane Ballynure      | Iron           | 97.22              |
| ZN0501, Moyola Magherafelt       | Iron           | 97.22              |
|                                  | Odour          | 97.22              |
| ZS0503, Forked Bridge Stoneyford | Aluminium      | 95.83              |
|                                  | Odour          | 95.83              |

**Table 4.2: Ards Borough Council Area**

| Sampling Location - Zones      | Parameter | % Zonal Compliance |
|--------------------------------|-----------|--------------------|
| ZS0103, Belfast Ballyhanwood   | Aluminium | 96.15              |
|                                | Iron      | 98.08              |
| ZS0401, Drumaroad Bangor       | Aluminium | 98.08              |
|                                | Iron      | 98.08              |
| ZS0402, Drumaroad Comber       | Iron      | 98.08              |
| ZS0403, Drumaroad Peninsula    | Aluminium | 95.83              |
|                                | Iron      | 95.83              |
| ZS0501, Drumaroad Lisburn      | Iron      | 98.08              |
| ZS0601, Drumaroad Ballynahinch | Aluminium | 95.83              |

**Table 4.3: Armagh City and District Council Area**

| Sampling Location - Zones       | Parameter              | % Zonal Compliance |
|---------------------------------|------------------------|--------------------|
| ZN1101, Clay Lake Keady         | <b>Full Compliance</b> |                    |
| ZN1102, Seagahan Armagh         | Odour                  | 97.22              |
|                                 | Taste                  | 97.22              |
| ZS0807, Castor Bay Loughgall    | Aluminium              | 98.08              |
|                                 | Iron                   | 98.08              |
| ZS0808, Castor Bay Craigavon    | <b>Full Compliance</b> |                    |
| ZS1001, Carran Hill Crossmaglen | Iron                   | 79.17              |

**Table 4.4 Ballymena Borough Council Area**

| Sampling Location - Zones      | Parameter              | % Zonal Compliance |
|--------------------------------|------------------------|--------------------|
| ZN0202, Altnahinch Bushmills   | Iron                   | 95.83              |
| ZN0302, Dungonnell Glarryford  | Iron                   | 95.83              |
| ZN0303, Dunore Point Ballymena | <b>Full Compliance</b> |                    |
| ZN0305, Dungonnell Ahoghill    | Iron                   | 95.83              |
| ZN0401 Dunore Point Antrim     | <i>E. coli</i>         | 99.31              |
|                                | Iron                   | 98.08              |
| ZN0402, Killylane Ballynure    | Iron                   | 97.22              |

**Table 4.5: Ballymoney Borough Council Area**

| Sampling Location - Zones     | Parameter | % Zonal Compliance |
|-------------------------------|-----------|--------------------|
| ZN0101, Ballinrees Coleraine  | Odour     | 97.37              |
|                               | Taste     | 98.68              |
| ZN0202, Altnahinch Bushmills  | Iron      | 95.83              |
| ZN0302, Dungonnell Glarryford | Iron      | 95.83              |
| ZN0305, Dungonnell Ahoghill   | Iron      | 95.83              |

**Table 4.6: Banbridge District Council Area**

| Sampling Location – Zones      | Parameter              | % Zonal Compliance |
|--------------------------------|------------------------|--------------------|
| ZS0601, Drumaroad Ballynahinch | Aluminium              | 95.83              |
|                                | Iron                   | 95.83              |
| ZS0802, Castor Bay Lurgan      | Aluminium              | 95.83              |
|                                | Iron                   | 95.83              |
|                                | Manganese              | 95.83              |
|                                | PAHs                   | 87.50              |
|                                | Turbidity              | 95.83              |
| ZS0807, Castor Bay Loughgall   | Aluminium              | 98.08              |
|                                | Iron                   | 98.08              |
| ZS0808, Castor Bay Craigavon   | <b>Full Compliance</b> |                    |
| ZS0902, Fofanny Dromore        | <i>E. coli</i>         | 98.81              |
|                                | Iron                   | 94.44              |
| ZS0904, Fofanny Mourne         | Iron                   | 98.08              |
|                                | Odour                  | 98.08              |



Table 4.7: Belfast City Council Area

| Sampling Location - Zones          | Parameter              | % Zonal Compliance |
|------------------------------------|------------------------|--------------------|
| ZN0401, Dunore Point Antrim        | <i>E. coli</i>         | 99.31              |
|                                    | Iron                   | 98.08              |
| ZS0101, Dunore Ballygomartin North | Aluminium              | 97.22              |
| ZS0102, Dunore Ballygomartin South | Aluminium              | 97.22              |
|                                    | Iron                   | 97.22              |
|                                    | Odour                  | 97.22              |
| ZS0103, Belfast Ballyhanwood       | Aluminium              | 96.15              |
|                                    | Iron                   | 98.08              |
| ZS0104, Dunore Breda North         | <b>Full Compliance</b> |                    |
| ZS0105, Dunore Breda South         | Iron                   | 98.08              |
| ZS0106, Dunore Belfast North       | Aluminium              | 97.22              |
| ZS0107, Belfast Oldpark            | Aluminium              | 97.22              |
|                                    | Iron                   | 97.22              |
|                                    | MCPA                   | 99.71              |
| ZS0108, Belfast Purdysburn         | <b>Full Compliance</b> |                    |
| ZS0109, Dorisland Whiteabbey       | Aluminium              | 94.44              |
|                                    | Enterococci            | 87.50              |
|                                    | Iron                   | 97.22              |
|                                    | MCPA                   | 99.71              |
| ZS0110, Dunore Point Glengormley   | Iron                   | 95.83              |
| ZS0402, Drumaroad Comber           | Iron                   | 98.08              |
| ZS0502, Forked Bridge Dunmurry     | Aluminium              | 98.08              |
|                                    | Iron                   | 98.08              |
| ZS0501, Drumaroad Lisburn          | Iron                   | 98.08              |
| ZS0503, Forked Bridge Stoneyford   | Aluminium              | 95.83              |
|                                    | Odour                  | 95.83              |

Table 4.8: Carrickfergus Borough Council Area

| Sampling Location - Zones    | Parameter   | % Zonal Compliance |
|------------------------------|-------------|--------------------|
| ZN0402, Killylane Ballynure  | Iron        | 97.22              |
| ZS0109, Dorisland Whiteabbey | Aluminium   | 94.44              |
|                              | Enterococci | 87.50              |
|                              | Iron        | 97.22              |
|                              | MCPA        | 99.71              |
| ZS0201, Dorisland Carrick    | Bromate     | 87.50              |
|                              | Iron        | 97.22              |
|                              | MCPA        | 99.71              |

**Table 4.9: Castlereagh Borough Council Area**

| Sampling Location - Zones    | Parameter              | % Zonal Compliance |
|------------------------------|------------------------|--------------------|
| ZS0103, Belfast Ballyhanwood | Aluminium              | 96.15              |
|                              | Iron                   | 98.08              |
| ZS0104, Dunore Breda North   | <b>Full Compliance</b> |                    |
| ZS0105, Dunore Breda South   | Iron                   | 98.08              |
| ZS0108, Belfast Purdysburn   | <b>Full Compliance</b> |                    |
| ZS0402, Drumaroad Comber     | Iron                   | 98.08              |
| ZS0501, Drumaroad Lisburn    | Iron                   | 98.08              |

**Table 4.10: Coleraine Borough Council Area**

| Sampling Location - Zones    | Parameter | % Zonal Compliance |
|------------------------------|-----------|--------------------|
| ZN0101, Ballinrees Coleraine | Odour     | 97.37              |
|                              | Taste     | 98.68              |
| ZN0202, Altnahinch Bushmills | Iron      | 95.83              |
| ZN0501, Moyola Magherafelt   | Aluminium | 91.67              |
|                              | Iron      | 97.22              |
|                              | Odour     | 97.22              |

**Table 4.11: Cookstown District Council Area**

| Sampling Location - Zones    | Parameter              | % Zonal Compliance |
|------------------------------|------------------------|--------------------|
| ZN0501, Moyola Magherafelt   | Aluminium              | 91.67              |
|                              | Iron                   | 97.22              |
|                              | Odour                  | 97.22              |
| ZN0502, Lough Fea Cookstown  | Aluminium              | 95.83              |
| ZN0503, Unagh Cookstown      | <b>Full Compliance</b> |                    |
| ZN0705, Lough Macrory Beragh | Aluminium              | 91.67              |
| ZN0902, Altnore Donaghmore   | Iron                   | 91.67              |
| ZS0807, Castor Bay Loughgall | Aluminium              | 98.08              |
|                              | Iron                   | 98.08              |

**Table 4.12: Craigavon Borough Council Area**

| Sampling Location - Zones    | Parameter              | % Zonal Compliance |
|------------------------------|------------------------|--------------------|
| ZS0802, Castor Bay Lurgan    | Aluminium              | 95.83              |
|                              | Iron                   | 95.83              |
|                              | Manganese              | 95.83              |
|                              | PAHs                   | 87.50              |
|                              | Turbidity              | 95.83              |
| ZS0807, Castor Bay Loughgall | Aluminium              | 98.08              |
|                              | Iron                   | 98.08              |
| ZS0808, Castor Bay Craigavon | <b>Full Compliance</b> |                    |
| ZS0902, Fofanny Dromore      | <i>E. coli</i>         | 98.81              |
|                              | Iron                   | 94.44              |

**Table 4.13: Derry City Council Area**

| Sampling Location - Zones   | Parameter       | % Zonal Compliance |
|-----------------------------|-----------------|--------------------|
| ZN0603, Carmoney Eglinton   | Trihalomethanes | 87.50              |
| ZN0604, Caugh Hill Dungiven | Aluminium       | 97.22              |
|                             | Iron            | 97.22              |
|                             | Manganese       | 97.22              |
|                             | Odour           | 94.44              |
|                             | Taste           | 94.44              |
|                             | Trihalomethanes | 87.50              |
| ZN0605, Creggan Derry       | Aluminium       | 95.83              |
|                             | Odour           | 95.83              |
|                             | Trihalomethanes | 87.50              |

**Table 4.14: Down District Council Area**

| Sampling Location - Zones      | Parameter      | % Zonal Compliance |
|--------------------------------|----------------|--------------------|
| ZS0402, Drumaroad Comber       | Iron           | 98.08              |
| ZS0501, Drumaroad Lisburn      | Iron           | 98.08              |
| ZS0601, Drumaroad Ballynahinch | Aluminium      | 95.83              |
| ZS0602, Drumaroad Downpatrick  | Aluminium      | 97.22              |
| ZS0902, Fofanny Dromore        | <i>E. coli</i> | 98.81              |
|                                | Iron           | 94.44              |
| ZS0904, Fofanny Mourne         | Iron           | 98.08              |
|                                | Odour          | 98.08              |

**Table 4.15: Dungannon and South Tyrone Borough Council Area**

| Sampling Location - Zones          | Parameter              | % Zonal Compliance |
|------------------------------------|------------------------|--------------------|
| ZN0502, Lough Fea Cookstown        | Aluminium              | 95.83              |
| ZN0705, Lough Macrory Beragh       | Aluminium              | 91.67              |
| ZN0706, Lough Macrory Killyclogher | Odour                  | 95.83              |
| ZN0802, Killyhevlin Enniskillen    | MCPA                   | 99.71              |
|                                    | Odour                  | 78.85              |
|                                    | Taste                  | 96.15              |
| ZN0901, Altmore Cabragh            | <b>Full Compliance</b> |                    |
| ZN0305, Dungonnell Ahoghill        | Iron                   | 95.83              |
| ZN1102, Seagahan Armagh            | Odour                  | 97.22              |
|                                    | Taste                  | 97.22              |
| ZS0807, Castor Bay Loughgall       | Aluminium              | 98.08              |
|                                    | Iron                   | 98.08              |

**Table 4.16: Fermanagh District Council Area**

| Sampling Location - Zones          | Parameter              | % Zonal Compliance |
|------------------------------------|------------------------|--------------------|
| ZN0704, Lough Bradan Drumquin      | <b>Full Compliance</b> |                    |
| ZN0706, Lough Macrory Killyclogher | Odour                  | 95.83              |
| ZN0801, Belleek Garrison           | <b>Full Compliance</b> |                    |
| ZN0802, Killyhevlin Enniskillen    | MCPA                   | 99.71              |
|                                    | Odour                  | 78.85              |
|                                    | Taste                  | 96.15              |

**Table 4.17: Larne Borough Council Area**

| Sampling Location - Zones      | Parameter              | % Zonal Compliance |
|--------------------------------|------------------------|--------------------|
| ZN0303, Dunore Point Ballymena | <b>Full Compliance</b> |                    |
| ZN0402, Killylane Ballynure    | Iron                   | 97.22              |
| ZS0201, Dorisland Carrick      | Bromate                | 87.50              |
|                                | Iron                   | 97.22              |
|                                | MCPA                   | 99.71              |



**Table 4.18: Limavady Borough Council Area**

| Sampling Location - Zones    | Parameter       | % Zonal Compliance |
|------------------------------|-----------------|--------------------|
| ZN0101, Ballinrees Coleraine | Odour           | 97.37              |
|                              | Taste           | 98.68              |
| ZN0601, Ballinrees Limavady  | Iron            | 95.83              |
|                              | Odour           | 95.83              |
| ZN0603, Carmoney Eglinton    | Trihalomethanes | 87.50              |
| ZN0604, Caugh Hill Dungiven  | Aluminium       | 97.22              |
|                              | Iron            | 97.22              |
|                              | Manganese       | 97.22              |
|                              | Odour           | 94.44              |
|                              | Taste           | 94.44              |
|                              | Trihalomethanes | 87.50              |

**Table 4.19 Lisburn City Council Area**

| Sampling Location - Zones        | Parameter      | % Zonal Compliance |
|----------------------------------|----------------|--------------------|
| ZN0401, Dunore Point Antrim      | <i>E. coli</i> | 99.31              |
|                                  | Iron           | 98.08              |
| ZS0501, Drumaroad Lisburn        | Iron           | 98.08              |
| ZS0502, Forked Bridge Dunmurry   | Aluminium      | 98.08              |
|                                  | Iron           | 98.08              |
| ZS0503, Forked Bridge Stoneyford | Aluminium      | 95.83              |
|                                  | Iron           | 95.83              |
|                                  | Odour          | 95.83              |
| ZS0601, Drumaroad Ballynahinch   | Aluminium      | 95.83              |
| ZS0802, Castor Bay Lurgan        | Aluminium      | 95.83              |
|                                  | Iron           | 95.83              |
|                                  | Manganese      | 95.83              |
|                                  | PAHs           | 87.50              |
|                                  | Turbidity      | 95.83              |
| ZS0902, Fofanny Dromore          | <i>E. coli</i> | 98.81              |
|                                  | Iron           | 94.44              |

**Table 4.20: Magherafelt District Council Area**

| Sampling Location - Zones    | Parameter | % Zonal Compliance |
|------------------------------|-----------|--------------------|
| ZN0101, Ballinrees Coleraine | Odour     | 97.37              |
|                              | Taste     | 98.68              |
| ZN0501, Moyola Magherafelt   | Aluminium | 91.67              |
|                              | Iron      | 97.22              |
|                              | Odour     | 97.22              |
| ZN0502, Lough Fea Cookstown  | Aluminium | 95.83              |

**Table 4.21: Moyle District Council Area**

| Sampling Location - Zones     | Parameter              | % Zonal Compliance |
|-------------------------------|------------------------|--------------------|
| ZN0101, Ballinrees Coleraine  | Odour                  | 97.37              |
|                               | Taste                  | 98.68              |
| ZN0202, Altnahinch Bushmills  | Iron                   | 95.83              |
| ZN0204, Rathlin Island        | <b>Full Compliance</b> |                    |
| ZN0302, Dungonnell Glarryford | Iron                   | 95.83              |

**Table 4.22: Newry and Mourne District Council Area**

| Sampling Location - Zones       | Parameter              | % Zonal Compliance |
|---------------------------------|------------------------|--------------------|
| ZN1101, Clay Lake Keady         | <b>Full Compliance</b> |                    |
| ZS0807, Castor Bay Loughgall    | Aluminium              | 98.08              |
|                                 | Iron                   | 98.08              |
| ZS0901, Camlough Newry West     | <b>Full Compliance</b> |                    |
| ZS0902, Fofanny Dromore         | <i>E. coli</i>         | 98.81              |
|                                 | Iron                   | 94.44              |
|                                 | Odour                  | 98.08              |
| ZS0904, Fofanny Mourne          | Iron                   | 98.08              |
|                                 | Odour                  | 98.08              |
| ZS1001, Carran Hill Crossmaglen | Iron                   | 79.17              |

**Table 4.23: Newtownabbey Borough Council Area**

| Sampling Location - Zones        | Parameter      | % Zonal Compliance |
|----------------------------------|----------------|--------------------|
| ZN0401, Dunore Point Antrim      | <i>E. coli</i> | 99.31              |
|                                  | Iron           | 98.08              |
| ZN0402, Killylane Ballynure      | Iron           | 97.22              |
| ZS0106, Dunore Belfast North     | Aluminium      | 97.22              |
| ZS0109, Dorisland Whiteabbey     | Aluminium      | 94.44              |
|                                  | Enterococci    | 87.50              |
|                                  | Iron           | 97.22              |
|                                  | MCPA           | 99.71              |
| ZS0110, Dunore Point Glengormley | Iron           | 95.83              |
| ZS0201, Dorisland Carrick        | Bromate        | 87.50              |
|                                  | Iron           | 97.22              |
|                                  | MCPA           | 99.71              |

**Table 4.24: North Down Borough Council Area**

| Sampling Location - Zones  | Parameter              | % Zonal Compliance |
|----------------------------|------------------------|--------------------|
| ZS0108, Belfast Purdysburn | <b>Full Compliance</b> |                    |
| ZS0401, Drumaroad Bangor   | Aluminium              | 98.08              |
|                            | Iron                   | 98.08              |
| ZS0402, Drumaroad Comber   | Iron                   | 98.08              |

**Table 4.25: Omagh District Council Area**

| Sampling Location - Zones          | Parameter              | % Zonal Compliance |
|------------------------------------|------------------------|--------------------|
| ZN0502, Lough Fea Cookstown        | Aluminium              | 95.83              |
| ZN0701, Derg Strabane              | <b>Full Compliance</b> |                    |
| ZN0702, Glenhordial Omagh          | Lead                   | 87.50              |
| ZN0703, Lenamore Greencastle       | Odour                  | 75.00              |
| ZN0704, Lough Bradan Drumquin      | <b>Full Compliance</b> |                    |
| ZN0705, Lough Macrory Beragh       | Aluminium              | 91.67              |
| ZN0706, Lough Macrory Killyclogher | Odour                  | 95.83              |
| ZN0802, Killyhevlin Enniskillen    | MCPA                   | 99.71              |
|                                    | Odour                  | 78.85              |
|                                    | Taste                  | 96.15              |
| ZN0902, Altmore Donaghmore         | Iron                   | 91.67              |

**Table 4.26: Strabane District Council Area**

| Sampling Location - Zones          | Parameter              | % Zonal Compliance     |
|------------------------------------|------------------------|------------------------|
| ZN0603, Carmoney Eglinton          | Trihalomethanes        | 87.50                  |
| ZN0604, Caugh Hill Dungiven        | Aluminium              | 97.22                  |
|                                    | Iron                   | 97.22                  |
|                                    | Manganese              | 97.22                  |
|                                    | Odour                  | 94.44                  |
|                                    | Taste                  | 94.44                  |
|                                    | Trihalomethanes        | 87.50                  |
|                                    | ZN0701, Derg Strabane  | <b>Full Compliance</b> |
| ZN0703, Lenamore Greencastle       | Odour                  | 75.00                  |
| ZN0704, Lough Bradan Drumquin      | <b>Full Compliance</b> |                        |
| ZN0706, Lough Macrory Killyclogher | Odour                  | 95.83                  |



## Annex 5

### Events

Tables 5.1 and 5.2 below provide a full list of incidents and non-incidents (respectively) recorded in 2011.

**Table 5.1: Drinking Water Quality Incidents in 2011**

| Date of Incident     | Area and Estimate of Population/ Properties Potentially Affected | Nature and Cause of Incident   | Associated Council Area(s)  |
|----------------------|--|--|---|
| 2 - 4 January 2011   | Dunore Point WTWs (500,000 population)                           | Treatment difficulties led to aluminium exceedences in the final water and related supply area during a period of increased demand caused by the 'freeze/thaw'.  | Antrim, Ards, Ballymena, Belfast, Castlereagh, Larne, Lisburn, Newtownabbey, and North Down |
| 4 January 2011       | Lenamore Springs WTWs (1,000 population)                         | Disturbance of particles led to a turbidity exceedence in the final water during a period of increased demand caused by the 'freeze/thaw'.   | Omagh   |
| 6 January 2011       | Killylane WTWs (47,000 population)                               | Treatment difficulties led to a turbidity exceedence in the final water and elevated aluminium levels in the supply area during a period of increased demand caused by the 'freeze/thaw'.  | Ballymena, Larne, and Newtownabbey  |
| 10 - 16 January 2011 | Lough Macrory WTWs (30,000 population)                           | Treatment difficulties led to aluminium exceedences in the final water and related supply area.  | Cookstown, Dungannon and South Tyrone, Fermanagh, Omagh, and Strabane                       |
| 25 January 2011      | Tully Road, Portglenone (1,700 population)                       | Discoloured water due to elevated levels of iron led to local media interest.  | Ballymena   |
| 2 February 2011      | Crocknafeola Trunk Main (2,600 properties)                       | Technical difficulties during a trunk main repair led to a loss of supply to properties in the Kilkeel, Annalong and Ballymartin areas. Bottled water was distributed, and there was significant local political and media interest. | Newry and Mourne  |
| 17 February 2011     | Inishmore Road, Lisbellaw (35 - 40 properties)                   | Complaints of discoloured water, and subsequent local media interest. Bottled water was supplied until mains rehabilitation was completed in April 2011.   | Enniskillen, and Omagh  |
| 8 March 2011         | Rathlin WTWs (120 population)                                    | A final water sample failed for trihalomethanes. It is likely to have been related to increased bromide in the raw water.  | Moyle   |
| 21 March 2011        | Caugh Hill WTWs (74,500 population)                              | Treatment difficulties led to an iron failure in the final water.  | Derry, Limavady, and Strabane   |
| 23 March 2011        | Dernawilt Road, Rosslea (62,500 population)                      | An odour exceedence was reported but the cause was not determined.   | Enniskillen   |

| Date of Incident   | Area and Estimate of Population/ Properties Potentially Affected | Nature and Cause of Incident  | Associated Council Area(s)                              |
|--------------------|--|---|---|
| 28 March 2011      | Upper Dromore Road, Warrenpoint (two properties)                 | A hydrogen ion exceedence was caused by a cement-lined main. Bottled water was provided to the affected properties until remedial actions were completed.   | Newry and Mourne  |
| 25 - 26 April 2011 | Castor Bay WTWs (293,000 population)                             | Treatment difficulties led to aluminium exceedences in the final water.   | Armagh, Craigavon, Dungannon, Lisburn, Newry and Mourne |
| 23 May 2011        | Caugh Hill WTWs (50,000 population)                              | Aluminium exceedences in the final water and related supply area. The cause was not determined.   | Derry, Limavady, and Strabane                           |
| 24 May 2011        | Carmony WTWs (67,000 population)                                 | Treatment difficulties led to aluminium and THM exceedences in the final water.   | Derry   |
| 1 June 2011        | Belleek WTWs (4,000 population)                                  | MCPA exceedence as there was no treatment in place for the reduction of pesticides.   | Enniskillen   |
| 3 June 2011        | Ballinrees WTWs (105,000 population)                             | Operational problems led to a turbidity exceedence in the final water.  | Ballymoney, Coleraine, and Limavady                     |
| 6 June 2011        | Killyhevlin WTWs (62,500 population)                             | MCPA exceedence as there was no treatment in place for the reduction of pesticides.   | Dungannon and South Tyrone, and Enniskillen             |
| 6 June 2011        | Derg WTWs (35,000 population)                                    | MCPA exceedence as there was insufficient treatment in place for the reduction of pesticides.   | Strabane  |
| 9 June 2011        | Altnahinch WTWs (28,000 population)                              | Operational problems led to an aluminium exceedence in the final water.   | Ballymoney, Coleraine, and Limavady                     |
| 15 June 2011       | Killyhevlin Zone (62,500 population)                             | Odour and taste exceedences due to inadequate treatment.  | Enniskillen, and Dungannon and South Tyrone             |
| 4 July 2011        | Dorisland WTWs (120,000 population)                              | MCPA exceedence as there was insufficient treatment in place for the reduction of pesticides.   | Belfast, Carrickfergus, and Newtownabbey                |
| 18 July 2011       | Caugh Hill WTWs (68,500 population)                              | Treatment difficulties led to iron, THM, turbidity and aluminium exceedences in the final water.  | Derry, Limavady, and Strabane                           |
| 20 July 2011       | Orange Hall, Hilltown (one property)                             | A significant iron exceedence was detected in a sample taken from a consumer tap. It was caused by an old iron main. Bottled water was provided to the property while remedial actions were undertaken. | Newry and Mourne  |
| 16 August 2011     | Carmony WTWs (67,000 population)                                 | Treatment difficulties led to aluminium and THM exceedences in the final water.   | Derry   |
| 19 August 2011     | Rathkeel SR (47,000 population)                                  | Coliform bacteria were found in a final water sample taken from Rathkeel SR. The cause was not determined.  | Ballymena   |
| 2 September 2011   | Glenvale Road, Newry (four properties)                           | Significant levels of aluminium, iron, manganese and turbidity were detected in a sample taken from a consumer tap.   | Newry and Mourne  |

| Date of Incident     | Area and Estimate of Population/ Properties Potentially Affected | Nature and Cause of Incident  | Associated Council Area(s)   |
|----------------------|--|---|--|
| 5 - 7 September 2011 | Drumaroad WTWs (386,000 population)                              | Treatment difficulties led to aluminium exceedences in the final water and related supply area.   | Ards, Banbridge, Belfast, Castlereagh, Lisburn, and North Down       |
| 19 September 2011    | Caugh Hill WTWs (74,500 population)                              | Treatment difficulties led to THM exceedences in the final water and related supply area.   | Derry, Limavady, and Strabane  |
| 26 September 2011    | Dungonnell WTWs (30,500 population)                              | Treatment difficulties led to a Hydrogen ion exceedence in the final water, and Hydrogen ion and iron exceedences in the related supply area.   | Antrim, and Ballymena  |
| 28 September 2011    | Glenhordial WTWs (10,000 population)                             | Aluminium and manganese exceedences occurred in final water samples. The cause was not determined.  | Omagh  |
| 30 September 2011    | Connswater Mews, Belfast (two properties)                        | Coliform bacteria were detected at two consumer taps. <b>'Boil Water Before Use'</b> * notices were issued (notices in place for six days). The cause was not determined.   | Belfast  |
| 2 October 2011       | Drumaroad WTWs (386,000 population)                              | Operational problems caused treatment difficulties which led to a turbidity and an aluminium exceedence in the final water, and an aluminium exceedence in the related supply area.   | Ards, Banbridge, Belfast, Castlereagh, Down, Lisburn, and North Down |
| 5 October 2011       | Poleglass SR (56,000 population)                                 | A technical difficulty led to increased chlorine dosing at Poleglass SR and chlorine odour and taste complaints in the related supply area. There was subsequent local media interest.  | Belfast, and Lisburn   |
| 12 October 2011      | Rathlin WTWs (120 population)                                    | <b>'Boil Water Before Use'</b> * notices were issued (notices in place for 17 days) after <i>Cryptosporidium</i> oocysts were detected. THM and turbidity exceedences were also reported.   | Moyle  |
| 17 October 2011      | Caugh Hill WTWs (74,500 population)                              | Treatment difficulties led to Hydrogen ion and aluminium exceedences in the final water.  | Derry, Limavady, and Strabane  |
| 20 October 2011      | Springhill SR (2,342 properties)                                 | <i>E. coli</i> and coliform bacteria were detected in the final water following disinfection problems.  | Derry  |
| 2 November 2011      | Ballinrees WTWs (105,000 population)                             | Technical difficulties caused problems with the treatment process and led to an aluminium exceedence in the final water.  | Ballymoney, Coleraine, and Limavady                                  |
| 4 November 2011      | Ballymoney area (3,500 population)                               | <b>'Boil Water Before Use'</b> * notices were issued (notices in place for nine days) following numerous bacteriological failures. Bottled water was provided to schools and known vulnerable consumers. The problem occurred after a new mains connection. | Ballymoney   |

\* A **'Boil Water Before Use'** notice is issued when there is a temporary deterioration in drinking water quality and boiling the water is sufficient to make it safe to drink.

| Date of Incident | Area and Estimate of Population/<br>Properties Potentially Affected | Nature and Cause of Incident   | Associated Council Area(s)                                     |
|------------------|---|--|--|
| 14 November 2011 | Lough Fea WTWs (29,500 population)                                  | Operational work led to significant aluminium exceedences in the final water and related supply area.  | Cookstown, Dungannon and South Tyrone, Magherafelt, and Omagh. |
| 27 November 2011 | Altnahinch WTWs (28,000 population)                                 | Operational problems led to significant Hydrogen ion and aluminium exceedences in the final water, and aluminium exceedences in the related supply area.   | Ballymoney, Coleraine, and Limavady                            |
| 30 November 2011 | Lenamore Springs WTWs (1,000 population)                            | <i>Cryptosporidium</i> oocysts detected in final water. Lenamore Springs now removed from service.   | Omagh  |
| 16 December 2011 | Nursery Road, Ahoghill (one property)                               | Following a number of mains bursts during operational work, a consumer complaint sample failed bacteriologically. A <b>'Boil Water Before Use'</b> * notice was issued to a single property (notice in place for three days). There was subsequent media interest. | Ballymena  |
| 28 October 2011  | Donegall Park Avenue, Belfast (nine properties)                     | After a mains replacement was carried out, bacteriological failures occurred at a number of properties.  | Belfast  |
| 29 December 2011 | Camlough WTWs (21,000 population)                                   | Technical difficulties led to aluminium exceedences in the final water.  | Newry and Mourne   |

\* A **'Boil Water Before Use'** notice is issued when there is a temporary deterioration in drinking water quality and boiling the water is sufficient to make it safe to drink.



Table 5.2: Drinking Water Quality Non-Incidents in 2011

| Date of Non-Incident | Area and Estimate of Population/ Properties Potentially Affected | Nature and Cause of Non-Incident  | Associated Council Area(s)               |
|----------------------|--|---|--|
| 10 January 2011      | Seagahan WTWs (30,000 population)                                | Treatment difficulties led to a pH below the limit in the final water, but it did not affect the related supply area.                   | Armagh                                   |
| 1 February 2011      | Seagahan WTWs (30,000 population)                                | Treatment difficulties resulted in short-term increases in final water turbidity which did not affect the related supply area.          | Armagh                                   |
| 8 February 2011      | Shanmoy at Mullaghanagh WTWs (41,000 population)                 | Turbidity exceedences due to unrepresentative sampling.   | Dungannon and South Tyrone               |
| 10 March 2011        | Altmore WTWs (9,000 population)                                  | Turbidity exceedence due to unrepresentative sampling.  | Dungannon and South Tyrone               |
| 14 March 2011        | Foyle Fold, Londonderry (one property)                           | An odour and a taste exceedence were reported from a single property. No cause was determined.  | Derry                                    |
| 31 March 2011        | Glenhordial WTWs (10,000 population)                             | Aluminium exceedences due to unrepresentative sampling.   | Omagh                                    |
| 18 April 2011        | Lough Bradan WTWs (20,000 population)                            | Turbidity exceedences due to unrepresentative sampling.   | Fermanagh, and Omagh                     |
| 22 April 2011        | Carmony WTWs (67,000 population)                                 | Turbidity exceedence due to unrepresentative sampling.  | Derry                                    |
| 3 May 2011           | Caugh Hill WTWs (50,000 population)                              | Turbidity exceedence due to unrepresentative sampling.  | Derry, Limavady, and Strabane            |
| 6 May 2011           | Coolmillish Road, Armagh (one property)                          | Odour and taste exceedences at a single property due to internal plumbing issues.   | Armagh                                   |
| 7 May 2011           | Killylane WTWs (47,000 population)                               | Turbidity exceedences due to unrepresentative sampling.   | Ballymena, Larne, and Newtownabbey       |
| 7 May 2011           | Ballinrees WTWs (105,000 population)                             | Short-term loss of disinfection resulted in reduced levels of chlorine in the final water.  | Ballymoney, Coleraine, and Limavady      |
| 25 May 2011          | Camlough WTWs (21,300 population)                                | Aluminium, iron and manganese exceedences due to unrepresentative sampling.   | Newry and Mourne                         |
| 2 June 2011          | Dorisland Carrick Zone (124,000 population)                      | Bromate exceedence reported - unrepresentative of water quality in the area.  | Belfast, Carrickfergus, and Newtownabbey |
| 3 June 2011          | Carran Hill WTWs (11,000 population)                             | There was potential for pollution from a fuel laundering plant to contaminate Lough Ross. There were no related water quality failures. | Newry and Mourne                         |
| 16 June 2011         | Dungonnell WTWs (30,500 population)                              | Technical issues led to short-term treatment problems. There were no related water quality failures.                                    | Antrim, and Ballymena                    |
| 29 June 2011         | Clay Lake WTWs (7,500 population)                                | Incorrect coagulant delivery had the potential to adversely affect the treatment process. There were no related water quality failures. | Armagh                                   |

| Date of Non-Incident | Area and Estimate of Population/ Properties Potentially Affected | Nature and Cause of Non-Incident   | Associated Council Area(s)                                     |
|----------------------|--|--|--|
| 8 July 2011          | Rathlin WTWs (120 population)                                    | Iron, manganese and turbidity exceedences due to unrepresentative sampling.  | Moyle  |
| 11 August 2011       | Killyhevlin WTWs (62,500)  | An oil spill in Lough Erne had the potential to cause problems at Killyhevlin WTWs. There were no related water quality failures.                    | Dungannon and South Tyrone, and Enniskillen                    |
| 26 August 2011       | Carmony WTWs (67,000 population)                                 | Turbidity exceedence due to unrepresentative sampling.   | Derry  |
| 3 October 2011       | Caugh Hill WTWs (74,500 population)                              | Turbidity exceedence due to unrepresentative sampling.   | Derry, Limavady, and Strabane                                  |
| 7 November 2011      | Killylane WTWs (47,000 population)                               | Aluminium exceedence reported - the cause was not determined and the related supply area was not affected.   | Ballymena, Larne, and Limavady                                 |
| 9 November 2011      | Lough Fea WTWs (29,500 population)                               | Turbidity exceedence due to unrepresentative sampling.   | Cookstown, Dungannon and South Tyrone, Magherafelt, and Omagh. |
| 5 December 2011      | Fofanny WTWs (86,500 population)                                 | Aluminium exceedences due to unrepresentative sampling.  | Cookstown, Dungannon and South Tyrone, Magherafelt, and Omagh  |
| 27 December 2011     | Ballinrees WTWs (103,000 population)                             | An odour and a taste exceedence were reported from a final water sample. No cause could be identified and it did not affect the related supply area. | Ballymoney, Coleraine, and Limavady                            |

## Annex 6

### Technical Audit and Research Programmes

#### The Technical Audit Programme

The following table provides a summary of our 2011 Inspection Programme.

**Table 6.1: Summary of the 2011 Inspection Programme**

| Location  | Audit Activity   | Number of Recommendations <sup>1</sup> | Number of Suggestions <sup>2</sup> |
|---|--|--|------------------------------------|
| Caugh Hill WTWs                                   | To check that good practice in water treatment is being operated.                              | 5                                      | 0                                  |
| Lough Macrory WTWs                                | To check that good practice in water treatment is being operated.                              | 16                                     | 7                                  |
| Rathlin WTWs                                      | To check that good practice in water treatment is being operated.                              | 16                                     | 5                                  |
| 'Laboratory Information Management System' (LIMS) | To check that good practice of the Laboratory Information Management System is being operated. | 2                                      | 1                                  |

<sup>1</sup>Recommendations are made where, in our opinion, action is required to avoid a foreseeable risk or a breach of a regulatory duty. If such a breach occurs, then we may consider 'enforcement action'. A formal written response from NI Water is required.

<sup>2</sup>Suggestions are made in relation to matters which relate to an aspect of best practice.

In 2011, the technical audit programme was satisfactorily undertaken and we acknowledge NI Water's continued co-operation. NI Water has implemented or provided substantive comment on the recommendations and suggestions we provided in our audit reports.

#### Drinking Water Quality and Health Research Programme

The Department of the Environment, Food and Rural Affairs (DEFRA) in England funds a wide range of research into drinking water quality and health. On DEFRA's behalf, the Drinking Water Inspectorate for England and Wales manages the national Drinking Water Quality and Health Research Programme (DWQH) with input from relevant stakeholders, including the drinking water quality regulators for Scotland and Northern Ireland.

The objective of the DWQH is to provide the science base for policy on drinking water quality, encompassing both health and consumer acceptability issues.

Further information on current and future research is available from the Drinking Water Inspectorate for England and Wales' website.<sup>1</sup>

<sup>1</sup><http://dwi.defra.gov.uk/research/index.htm>

## Annex 7

### Consideration of Provisional Enforcement Orders

Table 7.1 provides a summary of enforcement action taken under Section 31(3)(a) of The Water and Sewerage Services (Northern Ireland) Order 2006. On our website<sup>1</sup> you can access full details on Enforcement Notices issued in respect of each Consideration of Provisional Enforcement Order (CPEO). It details the remedial actions to be completed by NI Water in the form of an Undertaking, and any subsequent closure Notices issued by us following the completion of all the remedial actions within the Undertaking.

**Table 7.1: A Summary of CPEOs in Place in 2011**

| CPEO No.   | Water Treatment Works (WTWs) and Associated Water Supply Areas | Parameter                 | Progress with Undertaking   |
|------------|--|---------------------------|---|
| CPEO/11/02 | Killyhevlin WTWs and Associated Supply Area                    | Taste and odour           | Part of the remediation measures associated with this Undertaking includes NI Water completing a feasibility study into treatment arrangements at this works, along with the refurbishment of filters, and additional sampling. These actions are due for completion during 2012.         |
| CPEO/11/01 | Not Applicable   | Breach of regulation 9(3) | As part of the remediation measures associated with this Undertaking, NI Water now has new internal procedures and reporting arrangements to ensure an appropriate spread of samples are taken throughout the year. There is one outstanding action to be completed for this Undertaking. |
| CPEO/10/04 | Altmore WTWs and Associated Supply Area                        | MCPA                      | Altmore WTWs was permanently removed from service in April 2011 and the area is now supplied by Castor Bay WTWs. We are content that all other actions required under the Undertaking have been completed.  |
| CPEO/10/03 | Altnahinch Bushmills Water Supply Zone                         | Iron                      | The mains rehabilitation work which was to be commenced or completed during 2010/11 was completed, as required by the Undertaking.  |
| CPEO/10/02 | Altmore Cabragh Water Supply Zone                              | Iron                      | The zone is now supplied from Castor Bay WTWs from April 2011. Other work associated with this Undertaking was also completed during 2011.  |
| CPEO/10/01 | Dorisland Whiteabbey and Dorisland Carrick Water Supply Zones  | Iron                      | The mains rehabilitation work which was to be prioritized or commenced during 2011 was completed, as required by the Undertaking.   |
| CPEO/08/04 | Derg Water Supply Area   | THMs                      | All remedial measures associated with this Undertaking were completed in 2011.  |
| CPEO/08/02 | Killylane Water Supply Area                                    | THMs                      | All remedial measures associated with this Undertaking, including those relating to the operation of works and refurbishment of service reservoirs, were completed by the end of June 2011.   |
| CPEO/08/01 | Carmony Water Supply Area                                      | Aluminium                 | All remedial actions associated with this Undertaking, including work to upgrade Carmony WTWs, were completed in July 2011.   |

<sup>1</sup>[www.doeni.gov.uk/niea/water-home/drinking\\_water/public\\_water/enforcement\\_and\\_legal\\_action-2.htm](http://www.doeni.gov.uk/niea/water-home/drinking_water/public_water/enforcement_and_legal_action-2.htm)



## Annex 8

### Useful Contacts

#### Northern Ireland Water Ltd

Northern Ireland Water Ltd (NI Water) is responsible for providing all public and sewerage services in Northern Ireland.

Web address: [www.niwater.com](http://www.niwater.com)

Tel: 08457 440088

E-mail: [waterline@niwater.com](mailto:waterline@niwater.com)

Address: Northern Ireland Water Ltd  
PO Box 1026  
Belfast BT1 9DJ

#### Northern Ireland Authority for Utility Regulation

The 'Utility Regulator' has a responsibility to protect the interests of water and sewerage consumers with regard to price and quality of services, by promoting effective competition in the supply of water and the provision of sewerage services.

Web address: [www.uregni.gov.uk/water](http://www.uregni.gov.uk/water)

Tel: +44 (028) 9031 1575

E-mail: [info@uregni.gov.uk](mailto:info@uregni.gov.uk)

Address: Queens House  
14 Queen Street  
Belfast BT1 6ED

#### Consumer Council for Northern Ireland

The Consumer Council for Northern Ireland is a statutory body whose aims are to promote and safeguard the interests of all consumers in Northern Ireland.

Web address: [www.consumercouncil.org.uk](http://www.consumercouncil.org.uk)

Enquiries Tel: +44 (0) 28 9067 2488

Complaints Tel: 0800 121 6022

E-mail: [info@consumercouncil.org.uk](mailto:info@consumercouncil.org.uk) or  
[complaints@consumercouncil.org.uk](mailto:complaints@consumercouncil.org.uk)

Address: The Consumer Council  
116 Holywood Road  
Belfast BT4 1NY

#### Northern Ireland Environment Agency Water Management Unit

The Northern Ireland Environment Agency has a duty to promote the conservation of the water resources of Northern Ireland and the cleanliness of water in waterways and underground strata. Water Management Unit protects the aquatic environment.

Web address: [www.doeni.gov.uk/niea/water-home](http://www.doeni.gov.uk/niea/water-home)

Tel: +44 (028) 9262 3100

E-mail: [waterInfo@doeni.gov.uk](mailto:waterInfo@doeni.gov.uk)

#### The Public Health Agency for Northern Ireland

The Public Health Agency (PHA) has responsibility for a range of functions, including: improvement in health and social wellbeing; health protection; and supporting commissioning health and social care services.

Web address: [www.publichealth.hscni.net](http://www.publichealth.hscni.net)

Tel: +44 (028) 9032 1313

Address: Public Health Agency  
Linenhall Street Unit  
12-22 Linenhall Street  
Belfast BT2 8BS

#### Food Standards Agency Northern Ireland

The Food Standards Agency (FSA) is an independent government department set up to protect the public's health and consumer interests in relation to food, including the use of water in food production.

Web address: [www.food.gov.uk/northernireland](http://www.food.gov.uk/northernireland)

Tel: +44 (028) 9041 7700

E-mail: [infofsani@foodstandards.gsi.gov.uk](mailto:infofsani@foodstandards.gsi.gov.uk)

Address: Food Standards Agency NI  
10c Clarendon Road  
Belfast BT1 3BG

## Local District Councils

The Environmental Health Departments of district councils can be contacted if you have a private water supply serving a single domestic dwelling. They are also responsible for the administration of the regulations relating to bottled waters.

Web address: [www.nidirect.gov.uk/index/contacts/local-councils-in-northern-ireland](http://www.nidirect.gov.uk/index/contacts/local-councils-in-northern-ireland)

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## Drinking Water Inspectorate England and Wales

The Drinking Water Inspectorate (DWI) regulates public water supplies in England and Wales.

Web address: [www.dwi.gov.uk](http://www.dwi.gov.uk)  
Tel: +44 (0)30 0068 6400  
E-mail: [dwi.enquiries@defra.gsi.gov.uk](mailto:dwi.enquiries@defra.gsi.gov.uk)

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## Drinking Water Quality Regulator for Scotland (DWQR)

The role of the Drinking Water Quality Regulator (DWQR) for Scotland is to ensure that Scottish water is complying with the Drinking Water Quality Regulations.

Web address: [www.dwqr.org.uk](http://www.dwqr.org.uk)  
Tel: +44 (0)131 244 0190  
Address: DWQR  
PO Box 23598  
Edinburgh EH6 6WW

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## Environmental Protection Agency

Environmental Protection Agency (EPA) has responsibilities for a wide range of licensing, enforcement, monitoring and assessment activities associated with environmental protection.

Web address: [www.epa.ie](http://www.epa.ie)  
Tel: +353 (0) 53 916 0600  
E-mail: [info@epa.ie](mailto:info@epa.ie)

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## Water UK

Water UK is the industry association that represents all UK water and waste water service suppliers at national and European level.

Web address: [www.water.org.uk/home](http://www.water.org.uk/home)  
Tel: +44 (0)207 344 1844  
Address: Water UK head office  
1 Queen Anne's Gate  
London SW1H 9BT

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## UK Water Industry Research

UK Water Industry Research (UKWIR) facilitates collaborative research for UK water operators. The UKWIR programme generates sound science for regulation and practice.

Web address: [www.ukwir.co.uk](http://www.ukwir.co.uk)  
Tel: +44 (0)207 344 1807  
E-mail: [mail@ukwir.org.uk](mailto:mail@ukwir.org.uk)

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## Foundation for Water Research

The Foundation for Water Research (FWR) is an independent non-profit-making organization, with charitable status, that shares and disseminates knowledge about water, waste water and research into related environmental issues.

Web address: [www.fwr.org](http://www.fwr.org)  
Tel: +44 (0)162 889 1589  
E-mail: [office@fwr.org.uk](mailto:office@fwr.org.uk)

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## Water Regulations Advisory Scheme

Water Regulations Advisory Scheme (WRAS) is an advisory scheme which aims to promote knowledge of the water regulations throughout the UK, to prevent waste, undue consumption, misuse or contamination of water.

Web address: [www.wras.co.uk](http://www.wras.co.uk)  
Tel: +44 (0)1495 248454  
E-mail: [info@wras.co.uk](mailto:info@wras.co.uk)

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## World Health Organization

World Health Organization (WHO) produces international norms on water quality and human health in the form of guidelines that are used as the basis for regulation and standard setting, in developing and developed countries worldwide.

Web address:

[www.who.int/water\\_sanitation\\_health/dwq/en/](http://www.who.int/water_sanitation_health/dwq/en/)

E-mail: [info@who.int](mailto:info@who.int)

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## Annex 9

### Staffing

In organizational terms, the Inspectorate is one of four functional units within the Environmental Protection Directorate of the Northern Ireland Environment Agency (NIEA), an executive agency within the Department of the Environment.

The agency is headed by a Chief Executive and a board of Directors which spans three directorates: Natural Heritage, Built Heritage, and Environmental Protection.

A list of the Inspectorate staff is given below.

|                                      |                        |
|--------------------------------------|------------------------|
| <b>Chief Inspector</b>               | <b>Margaret Herron</b> |
| <b>Senior Inspector</b>              | <b>David O'Neill</b>   |
| <b>Senior Inspector</b>              | <b>Colin Clements</b>  |
| <b>Senior Inspector</b>              | <b>Bernadette Corr</b> |
| <b>Higher Scientific Officer</b>     | <b>Una Mailey</b>      |
| <b>Higher Scientific Officer</b>     | <b>Michael Lyons</b>   |
| <b>Scientific Officer</b>            | <b>Elaine O'Rourke</b> |
| <b>Administrative Officer</b>        | <b>Claire Shields</b>  |
| <b>Casual Administrative Officer</b> | <b>Kevin Corr</b>      |







Our aim is to protect, conserve and promote the natural environment and built heritage for the benefit of present and future generations.

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