Drinking Water Audit Report

County:	Carlow	**Date of Audit:**	5th April 2016
Plant(s) visited:	Ballinkillen Water Treatment Plant	**Date of issue of Audit Report:**	21st April 2016
		File Reference:	DW2016/57
		Auditors:	Ms. Michelle Roche
Audit Criteria:	• The *European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014).* • *The EPA Handbook on the Implementation of the Regulations for Water Services Authorities for Public Water Supplies (ISBN: 978-1-84095-349-7)* • The recommendations specified in the EPA *Drinking Water Report*. • EPA Drinking Water Advice Notes No.s 1 to 15. • The recommendations in any previous audit reports.		

MAIN FINDINGS

i. **Irish Water should calculate the chlorine contact time for the Ballinkillen supply to ensure the reservoir has sufficient capacity to reach the minimum required effective contact time of 15mg.min/l.**
ii. **Irish Water should review the location of the chlorine residual sampling point for the online chlorine residual monitor. The sampling point should be located after an effective chlorine contact time has been achieved.**

1. INTRODUCTION

Under the *European Union (Drinking Water) Regulations 2014* the Environmental Protection Agency is the supervisory authority in relation to Irish Water and its role in the provision of public water supplies. This audit was carried out to assess the performance of Irish Water in providing clean and wholesome drinking water.

The Ballinkillen public water supply serves approximately 100 people in the village of Ballinkillen from a single borehole source producing up to 10m^3/day of water. Treatment consists of pH correction, nitrate removal and disinfection with sodium hypochlorite. Treated water is stored in an onsite reservoir at the water treatment plant and water levels in the reservoir control raw water demand from the borehole and operation of the water treatment plant. Photographs taken by Michelle Roche during the audit are attached to this report and are referred to in the text where relevant.

The opening meeting commenced at 11.44am at Ballinkillen Water Treatment Plant. The scope and purpose of the audit were outlined at the opening meeting. The audit process consisted of interviews with staff, review of records and observations made during an inspection of the treatment plant. The audits observations and recommendations are listed in Section 2 and 4 of this report. The following were in attendance during the audit.

Representing Irish Water:
Ms. Catherine Rice – Compliance Analyst, Irish Water

Mr. Liam Brett – Water Engineer, Irish Water
Mr. Gerard O'Brien – Senior Executive Engineer, Carlow County Council
Ms. Catherine Buggy – Environmental Technician, Carlow County Council
Mr. Niall Byrne, General Service Supervisor, Carlow County Council
Mr. Adrian Cotes – Caretaker, Carlow County Council

Representing the Environmental Protection Agency:

Ms. Michelle Roche – Inspector

2. AUDIT OBSERVATIONS

The audit process is a random sample on a particular day of a facility's operation. Where an observation or recommendation against a particular issue has not been reported, this should not be construed to mean that this issue is fully addressed.

1.	**Source Protection** a. A source protection zone has been developed for the Ballinkillen public water supply borehole and includes a single landowner who has been informed of their obligations under the *European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2014 (SI No.31 of 2014).* b. The supply borehole is located within a chamber; however there is no lock on the chamber and the borehole is not capped within the chamber (Photograph 1 and 2). c. The borehole extends to a depth of 43m below ground level and is cased to a depth of 9m below ground level.
2.	**pH Correction** a. Raw water pH is sampled on a monthly basis and is generally in the region 6.7pH units. Caustic soda is dosed on the raw water to ensure the final water pH is compliant following the nitrate removal process. The final water pH on the day of the audit was 7.2pH units. b. Caustic soda is dosed using a duty and standby dosing arrangement and the pumps are manually switched over once a week to ensure both pumps are operating effectively. c. There is a pH monitor on the final water with a high alarm of 10pH units. An alarm trigger will call out to the caretaker and to other Carlow County Council staff via a cascade system. d. The fill point for the caustic soda bulk tank was not located within the bunded area.
3.	**Nitrate Removal** a. Nitrate removal is in place at the Ballinkillen public water supply. Raw water nitrate levels are in the region of 50-60mg/l. Nitrate levels in the final water are generally below 30mg/l. b. Nitrate sludge from the removal process is stored on site in a sludge holding tank and removed on a monthly basis to Bagenalstown Waste Water Treatment Plant by Carlow County Council staff.
4.	**Disinfection** a. Raw water is treated with 10-12% sodium hypochlorite with a fixed dose. The flow rate of the water delivered to the dosing system is also fixed.

	b. Duty and standby chlorine dosing pumps are installed and there is automatic switchover in the event of pump failure. The caretaker manually switches over the pumps every 24 hours to ensure they function effectively. c. The day tank is filled once a week using 25L drums from the Borris Water Treatment Plant. No sodium hypochlorite drums are stored at the Ballinkillen Water Treatment Plant. Sodium hypochlorite storage dates and usage are recorded at the Borris Water Treatment Plant. d. The onsite reservoir is used to provide effective chlorine contact time for the supply; however no contact time calculation has been carried out to date. e. Chlorine residuals are measured using an online chlorine monitor before the reservoir and a chlorine residual of 0.25mg/l is aimed for. The monitor is alarmed with a low alarm of 0.1mg/l and a high level alarm of 0.5mg/l. f. An alarm trigger will call out to the caretaker and to other Carlow County Council staff via a cascade system.
5.	**Treated Water Storage and Distribution Network** a. Treated water is stored in an onsite reservoir which was constructed approximately 12 years ago and has 1 day storage capacity. b. The inside of the reservoir is visually inspected on a weekly basis by the caretaker. c. Chlorine residuals are measured at the end of the distribution network every 2 to 3 days. Chlorine residual measurements from the caretakers logbook were inspected during the audit and all were above 0.1mg/l.

3. AUDITORS COMMENTS

The Ballinkillen Water Treatment Plant was found to be well managed by a dedicated team of staff. Process documentation and daily records were up to date and available at the plant. Aspects of the disinfection process should be reviewed including the low level chlorine residual alarm set point of 0.1mg/l, the location of the online chlorine residual sampling point before the reservoir and the absence of an effective chlorine contact time calculation to ensure the minimum effective contact time of 15mg.min/l is achieved. The security of the groundwater source could be improved by installing a sealed cap on the borehole and ensuring the borehole chamber is locked.

4. RECOMMENDATIONS

Source Protection

1. Irish Water should ensure that the borehole is capped and all seals and linings are adequately maintained in accordance with EPA Advice Note No. 14: Borehole Construction and Wellhead Protection.

2. Irish Water should ensure that the borehole chamber is locked and secured at all times.

Disinfection

3. Irish Water should calculate the contact time for chlorine disinfection to ensure that the effective contact time achieved is a minimum of 15mg.min/l and that the first connections are receiving appropriately disinfected drinking water. Irish Water should submit a calculation of the effective contact time to the Agency.

4. Irish Water should review the location of the online chlorine residual monitor sampling point. The sampling point should be located after sufficient effective contact time is achieved.

5. Irish Water should review the low level chlorine alarm on the online chlorine residual monitor on the final water. Setting a higher set-point would provide additional time for the plant

caretaker to react to the detection of a low chlorine residual leaving the water treatment plant.

Chemical Storage and Bunds

6. Irish Water should ensure that the caustic soda bulk delivery point is located within a bunded area.

FOLLOW-UP ACTIONS REQUIRED BY IRISH WATER

During the audit Irish Water representatives were advised of the audit findings and that action must be taken as a priority by Irish Water to address the issues raised. This report has been reviewed and approved by Ms. Aoife Loughnane, Drinking Water Team Leader.

Irish Water should submit a report to the Agency within one month of the date of this audit report detailing how it has dealt with the issues of concern identified during this audit. The report should include details on the action taken and planned to address the various recommendations, including timeframe for commencement and completion of any planned work.

The EPA also advises that the findings and recommendations from this audit report should, where relevant, be addressed at all other treatment plants operated and managed by Irish Water.

Please quote the File Reference Number in any future correspondence in relation to this Report.

Report prepared by: _____ **Date:** 21st April 2016

Inspector

Photograph 1: Borehole Chamber

Photograph 2: Uncapped borehole