Drinking Water Audit Report

County:	Dun Laoghaire	**Date of Audit:**	16/11/2018
Plant visited:	DLR Zone 4 PWS - Glencullen water treatment plant and reservoir	**Date of issue of Audit Report:**	07/12/2018
		File Reference:	DW2018/188
		Auditor:	Aoife Loughnane
Audit Criteria:	• The *European Union (Drinking Water) Regulations 2014 (S.I. 122 of 2014), as amended*. • *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.		

MAIN FINDINGS

i. ***Giardia* (1 oocyst in 10 litres) was detected in DLR Zone 4 public water supply on 25/10/2018. This is the first detection in 10 years of sampling this groundwater supply. Investigations have failed to identify the likely source or cause, and all follow up samples have been clear. The audit found that adequate source protection measures are in place, and there was no evidence of surface water ingress into the Glencullen boreholes.**

ii. **The type of sample in which *Giardia* was detected was a 10 litre grab sample of treated water. Irish Water will undertake follow up investigative monitoring over a 4 week period using the EPA recommended 24 hour continuous sampling method, to verify that the Glencullen boreholes are at low risk of contamination.**

iii. **During the audit, it emerged that the chlorine contact time may have been inadequate to ensure proper disinfection of the water supply to the first consumers. Following investigations and confirmation of the chlorine contact time calculations, Irish Water and Dun Laoghaire Rathdown County Council acted swiftly to increase the chlorine dose at Glencullen water treatment plant on 19/11/2018 to ensure adequate disinfection.**

1. INTRODUCTION

Under the *European Union (Drinking Water) Regulations 2014, as amended*, 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 in response to the notification by Irish Water of the detection of *Giardia* (1 oocyst in 10 litres) in the DLR Zone 4 public water supply on 25/10/2018.

The source of DLR Zone 4 public water supply is two groundwater boreholes at Glencullen water treatment plant. The raw water is treated by disinfection and fluoridation. The volume of water produced at the plant is approximately 160 m^3/day to serve 500 consumers, including a food business operator.

The opening meeting commenced at 10 am at Glencullen 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:

Andrew Boylan, Drinking Water Compliance Specialist
Michael Reilly, Drinking Water Compliance Analyst
John Hand, Engineer, Asset Operations

Representing Dun Laoghaire Rathdown County Council:

Gerry Concannon, Senior Executive Engineer
Hugo van Wyk, Senior Executive Engineer
Ben O'Regan, Area Engineer

Representing Dublin Council

Aileen O'Connell, Senior Executive Scientist, Central Laboratory

Representing the Health Service Executive

Dr. Helena Murray, Specialist in Public Health Medicine
Dr. Ruth McDermott, Specialist Registrar in Public Health Medicine
Dr. Coilín OhAiseadha, Specialist Registrar in Public Health Medicine
Kieran Carberry, Principal Environmental Health Officer
Padraig Gorby, Senior Environmental Health Officer

Representing the Environmental Protection Agency:

Aoife Loughnane, 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.	**Investigation into Giardia detection** a. *Giardia* (1 oocyst per 10 L) was detected in a treated water sample taken at Glencullen sampling kiosk on 25/10/2018. b. This is the first *Giardia* detection in 10 years of sampling this groundwater supply. *Cryptosporidium* (1 oocyst per 10 litre) was detected on 10/11/2008, however the source or cause could not be identified. c. Irish Water considers this supply to be at low risk of contamination. The *Cryptosporidium* risk assessment score is 32 (low risk). The raw and treated water is monitored weekly for a range of parameters including *E.coli*, total coliforms, free residual chlorine, ammonium, nitrate, nitrite, iron, manganese, fluoride, pH and turbidity. Monthly monitoring is undertaken for *Cryptosporidium* and *Giardia*. d. Investigations have failed to identify the likely source or cause of contamination. DLRCC has inspected the small catchment area and found no unusual activity. Some cattle were observed in the field adjacent to the wells, however the Source Protection Plan considers this area to have low vulnerability due to the thick till deposits. Potential ingress into the network has been discounted. e. The results of resampling on 01/11/2018, 07/11/2018, 09/11/2018 and 12/11/2018 were clear of microbiological and protozoa contamination. f. The HSE confirmed that to date, there has been no evidence of *Cryptosporidiosis* or *Giardiasis* illness in the community served by this supply. g. The type of sample in which *Giardia* was detected was a 10 litre grab sample of treated water. During the audit, Irish Water agreed to continue the investigative monitoring over a 4 week period, using the EPA recommended continuous sampling method over 24 hours, to verify that the Glencullen boreholes are at low risk of contamination.

2.	**Source Protection** a. Raw water is abstracted from two boreholes at Glencullen water treatment plant (WTP). The boreholes were drilled in the 1960s and are approximately 20 m deep. The wellheads are raised above ground level and are located within locked manhole chambers (see photo 1). There is security fencing around the WTP site. b. There was no evidence of surface water ingress into the borehole chambers. c. The zone of contribution to the boreholes has been delineated in a Source Protection Plan prepared by Eugene Daly Associates, Groundwater Consultants in 2005. The lands immediately adjacent to the boreholes are considered to have very low vulnerability due to the underlying 6m of subsoils. d. The high and extreme source protection areas are located greater than 200m north of the boreholes. These lands are used for low intensity agriculture and houses served by septic tanks. It could not be confirmed if any septic tanks in this area are included on the National Inspection Plan for Domestic Wastewater Treatment Systems.
3.	**Disinfection** a. The raw water is disinfected by an on-site electrolytic chlorination (OSEC) system. b. The chlorine dosing system meets the requirements of EPA Advice Note 3. c. Chlorine is dosed into a 2.7 m^3 mixing/contact tank. d. Following the *Giardia* detection, the chlorine dose was increased from 0.3 to 0.4 mg/l as an immediate corrective action. However, the recommended chlorine contact time for 99% (2-log) *Giardia* inactivation is 100 mg.min/l (EPA Disinfection Manual). This extended contact time is not being achieved at Glencullen WTP, nor is it possible to achieve it with the current WTP and network configuration. e. During the audit, it emerged that there may have been less than 15 mg.min/l chlorine contact time before water is supplied to the first consumers in 13 houses fed directly from the WTP, which is insufficient to ensure adequate disinfection. This was not identified under the Disinfection Programme assessment of Glencullen WTP. f. Following further investigations and confirmation of the chlorine contact time, Irish Water and DLRCC acted swiftly to increase the chlorine dose to 0.6 mg/l on 19/11/2018 to ensure adequate disinfection. g. The contact time calculations were not presented using Irish Water's Contact Time Excel template which takes pH, temperature and turbidity factors into account.
4.	**Fluoridation** a. The water supply is fluoridated using hydrofluosilicic acid (10.9%). The fluoridation system is in accordance with the *Code of Practice on the Fluoridation of Drinking Water*. b. Background fluoride levels in raw water can vary significantly and quickly from <0.05 to 0.22 mg/l. This was a contributory factor to previous fluoride exceedances in this supply. The fluoridation system is now closely monitored by the plant operators and a new fluoride analyser and alarm was installed in August 2017.
5.	**Treated Water Storage and Distribution Network** a. Treated water is pumped to a 280 m^3 reservoir located approx. 700m north of the WTP. The pumping regime is 20–24 hours per day, until the reservoir set-point level is reached. b. The pipeline from the WTP to the reservoir is both a rising main and a distribution main. There are some water supply connections to consumers before the water reaches the reservoir. DLRCC representatives confirmed that it is currently not possible to reconfigure the system so that all water is firstly pumped directly to the reservoir, prior to being supplied to consumers. c. The reservoir is a covered glass lined steel tank, built in the 2000's. d. It could not be confirmed when the reservoir was last cleaned, or if it is on Irish Water's reservoir inspection & cleaning programme. DLRCC representatives stated that any visual inspections have always found the reservoir to be very clean, and there is a low chlorine demand in this supply.

6.	**Monitoring and Sampling Programme for treated water** a. Treated water is sampled at Glencullen sampling kiosk, approx. 200m north west of the WTP. Depending on the pumping regime at the WTP, the water at the kiosk could be either going towards the reservoir (if pumps are on), or else coming back from the reservoir into distribution (if pumps are off). b. An inspection of the sampling kiosk during the audit found no evidence of contamination of the sampling point.
7	**Management and Control** a. DLR Zone 4 PWS is currently being considered for decommissioning, by the connection to DLR Zone 8 PWS (Ballymore Eustace water). The pipework connection to Glencullen Reservoir is already in place. b. There is no formal cascade system for responding to chlorine & fluoride alarms at Glencullen WTP. DLRCC's Area Engineer is currently the only receiver of alarm texts via mobile phone.

3. AUDITORS COMMENTS

Investigations have failed to identify the likely source or cause of *Giardia* contamination of the DLR Zone 4 PWS. The audit found that adequate source protection measures are in place and there was no evidence of surface water ingress into the Glencullen boreholes. Irish Water should continue the follow up investigative monitoring programme to verify that the Glencullen boreholes are at low risk of contamination.

4. RECOMMENDATIONS

1. Investigative Monitoring Programme

   (i) Irish Water should continue the investigative monitoring programme for *Cryptosporidium* and *Giardia* in the DLR Zone 4 PWS to verify that the Glencullen boreholes are at low risk of contamination. Testing for *Cryptosporidium* and *Giardia* should be carried out on a weekly basis for 4 weeks, unless an alternative frequency is determined to be appropriate following consultation with the HSE.

   (ii) When testing for *Cryptosporidium* and *Giardia*, a minimum of 40 litres per hour of water should be collected continuously for the water leaving the treatment works over 24 hours in a special sampling device, in accordance with the *EPA Handbook for Public Water Supplies, Section 4: Guidance on Sampling*.

   (iii) If any oocysts are detected during the investigative monitoring programme, Irish Water should immediately notify the HSE and EPA.

2. Disinfection

   (i) Irish Water should ensure that the DLR Zone 4 public water supply is adequately disinfected at all times.

   (ii) Irish Water should submit a calculation of the effective contact time to the EPA, using Irish Water's Contact Time Excel template which takes pH, temperature and turbidity factors into account.

3. Irish Water should liaise with Dun Laoghaire Rathdown County Council to ensure that the septic tanks located in the extreme and high source protection zones are identified and prioritised for inspection under the National Inspection Plan for Domestic Waste Water Treatment Systems.

4. Irish Water should ensure there are at least 3 people in the cascade system for responding to alarms generated at Glencullen water treatment plant.

5. Irish Water should ensure that Glencullen reservoir is inspected and cleaned out on a regular basis and any maintenance and repairs completed as soon as possible after the need has been identified.

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 Dr. Michelle Minihan, Senior Inspector, Drinking Water Team.

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: Aoife Laighnare **Date:** 07/12/2018

Inspector

Photo 1: Borehole chamber at Glencullen water treatment plant