Drinking Water Audit Report

County:	Dublin	**Date of Audit:**	19th July 2018
Plant visited:	Ballyboden Water Treatment Plant and Reservoir Scheme Code 0700PUB1002	**Date of issue of Audit Report:**	8th August 2018
		File Reference:	DW2010/127
		Auditors:	Aoife Loughnane Michelle Minihan
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. • The recommendations in any previous audit reports.		

MAIN FINDINGS

i. **A new covered reservoir has been built at Ballyboden water treatment plant, as required by EPA Direction. The reservoir is fully commissioned and a proportion of the drinking water supply to the Greater Dublin Area has been delivered through covered storage since early July 2018.**
ii. **It has not yet been possible to completely cease the open storage of treated drinking water at Ballyboden due to operational issues with pumping arrangements in the downstream network, and to mitigate the risk of loss of supply to consumers. Irish Water expects to cease the open storage of treated water in the coming days, once the operational issues are resolved.**
iii. **Ballyboden public water supply remains on the EPA's Remedial Action List until the open storage of treated drinking water has ceased.**

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 to assess compliance with the EPA Direction requiring the cessation of open storage of treated water at Ballyboden water treatment plant, and to assess if the Ballyboden water supply can be removed from the EPA's Remedial Action List (RAL). This supply was included on the original RAL in 2008 due to '*EPA Audit Observations – Treatment & Management Issues'*. The action programme required the improvement of operations at the plant and covering of the reservoir.

Ballyboden water treatment plant treats raw water from Bohernabreena Reservoir. The plant was built in 1952 and treatment consists of coagulation, flocculation, clarification, rapid gravity filtration, pH adjustment, disinfection by chlorination, and fluoridation. The treated water is blended with water

from Ballymore Eustace water treatment plant in the open storage reservoir at Ballyboden, after which it is re-chlorinated before entering distribution. A new covered reservoir has been built at Ballyboden, as required by EPA Direction. The reservoir is fully commissioned and a proportion of the drinking water supply to the Greater Dublin Area has been delivered through covered storage since early July 2018.

The opening meeting commenced at 10 am at Ballyboden 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. Photographs taken by Aoife Loughnane during the audit are attached to this report and are referred to in the text where relevant. 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 Compliant Specialist

William McKnight – Asset Delivery

Trevor Hennessy – Water Lead

John Hand – Water Engineer

Representing Dublin City Council:

Niall Armstrong – Capital Delivery

Stephen Burke – Senior Executive Engineer, Operations

Eoin Walsh – Engineer, Operations

Ger Goodwin – Assistant Inspector, Bohernabreena

Representing the Environmental Protection Agency:

Aoife Loughnane – Inspector

Michelle Minihan – Senior 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.	**Treated Water Storage** a. On 5th June 2015, the EPA issued a Direction to Irish Water under Regulation 16 of the Drinking Water Regulations, to cease the uncovered storage of treated drinking water at Ballyboden water treatment plant no later than 31st December 2017, and to submit progress reports to the EPA every six months. b. The progress reports identified at an early stage that the project encountered delays due to a planning appeal and the need to relocate ESB power lines. However as of early July 2018, a new 16 million litre capacity covered reservoir has been fully commissioned and a proportion of the drinking water supply to the Greater Dublin Area has been delivered through covered storage (see photo 1). c. On the day of the audit, the open storage pond was still in use (see photo 2). Irish Water confirmed that it has not yet been possible to completely cease the open storage of treated drinking water due to operational issues with pumping arrangements in the downstream network. To mitigate the risk of loss of supply to consumers, Irish Water is not yet able to fully cease the use of open storage, but expects to do so in the coming days when operational issues are resolved satisfactorily. d. The new covered reservoir should address the intermittent microbiological water quality failures detected at the treated water open storage outlet. This will significantly improve the safety and security of the drinking water supply to the areas served by Ballyboden Reservoir; DCC Zone 2, DLR Zone 2 and South Dublin Zone 1 public water supplies.

2.	**Coagulation, Flocculation and Clarification** a. The raw water is dosed with alum and poly in the coagulation and flocculation stages. The chemical dose rate is manually controlled. b. The coagulated water enters two clarifiers where the settlement process occurs. c. The sludge blanket in the clarifiers was observed to be low and no pin floc was visible. d. There was significant algal growth on the walls of the clarifier outlet channels (see photo 3). The clarifiers are drained and cleaned once a year. The right side clarifier is due to be cleaned in early August. e. Sludge bleeds from the clarifiers are timed at regular intervals. The drawn-off sludge and filter backwash water is directed to a new on-site holding tank, prior to discharge to sewer.
3.	**Filtration** a. There are five rapid gravity sand filters at the plant. b. The filters are backwashed based on time (every 48 hours) or head loss (160 set-point). The backwash sequence is manually controlled. Following a backwash, there is a slow start when the filter is brought back into use. c. The operation of Filter No. 5 was observed during the audit: • The filter sand was replaced 2 years ago. • Cracks were evident in the filter media (see photo 4). Filter media cracks were also observed during two previous audits by the EPA. • There was no sand depth level indicator in the filter. • No issues were observed with the filter backwash. d. There are turbidity monitors and alarms on each filter. The readings during the audit were extremely low (0.044 – 0.053 NTU) and showed the filters were performing very well.
4.	**Disinfection** a. Disinfection is currently carried out using chlorine gas, however Irish Water plans to switch to a new liquid chlorine dosing system by early August. b. A contact tank is in place to achieve adequate chlorine contact time prior to water entering the new covered reservoir. c. The current arrangement of re-chlorination of final water following open storage will no longer apply once the open storage of treated water has ceased.
5.	**Monitoring and Sampling Programme for treated water** a. The final water is monitored 5 days per week for microbiological water quality. *Cryptosporidium*, *Giardia* and *Clostridium Perfringens* have been detected intermittently, attributed to the open storage of treated water at the plant. There have been 35 microbiological exceedances at the outlet of Ballyboden storage pond notified to the EPA since 2011. Bird faecal matter is the main risk factor, and a flock of birds was present on the surface of the open storage pond during the audit (see photo 2). b. A monitoring programme is in place for geosmin at the outlet of Ballyboden pond following complaints of an earthy/musty odour and taste of the water supply in Summer 2017. The monthly monitoring results show geosmin levels at or below 0.001 μg/l since November 2017. This is well below the odour threshold concentration of 0.015 μg/l for the general population and 0.005 μg/l for more sensitive consumers. c. Irish Water intends to continue the monitoring programme for *Cryptosporidium* and *Giardia* in the final water for at least two months following the cessation of open storage, in order to verify the microbiological quality of water entering the distribution network.
6.	**Management and Control** a. Ballyboden water treatment plant is manned 24 hours a day, 7 days a week by a team of plant operators. The treatment processes are manually controlled. b. There is a SCADA system in place at the plant.

3. AUDITORS COMMENTS

A new covered reservoir has been built at Ballyboden water treatment plant, as required by EPA Direction, to address the intermittent microbiological water quality failures detected at the treated water open storage outlet. The new reservoir is fully commissioned and a proportion of the drinking water supply to the Greater Dublin Area has been delivered through covered storage since early July 2018. This will significantly improve the safety and security of the drinking water supply to the areas served by Ballyboden Reservoir; DCC Zone 2, DLR Zone 2 and South Dublin Zone 1 public water supplies.

However, on the day of the audit the open storage pond was still in use for treated water storage, and Irish Water confirmed it has not yet been possible to completely cease this arrangement due to operational issues with pumping arrangements in the downstream network. To mitigate the risk of loss of supply to consumers, Irish Water is not yet able to fully cease the use of open storage of treated water, but expects to do so in the coming days. Ballyboden public water supply will remain on the EPA's Remedial Action List until the open storage of treated drinking water has ceased.

The audit of the coagulation and filtration processes found that despite reliance on manual control by the team of plant operators, the treatment plant is performing very well and the quality of water produced at the plant is of a very high standard.

4. RECOMMENDATIONS

1. Irish Water should ensure the remaining works to enable the cessation of open storage of treated water at Ballyboden water treatment plant are completed as soon as possible. Irish Water should notify the EPA as soon as the open storage arrangement has ceased.

2. Irish Water should continue the monitoring programme for *Cryptosporidium* and *Giardia* in the final blended water for at least two months following the cessation of open storage, to verify the microbiological quality of water entering the distribution network.

3. Irish Water should ensure that the settled water outlet channels and the clarifier are cleaned on a regular basis to prevent build-up of algae on the weirs and on the walls of the clarifier.

4. Irish Water should investigate the cause of the cracks in the filter media and should take appropriate action to optimise the operation of the filters. A sand depth level indicator should be installed in the filters.

5. Irish Water should ensure that the new chlorination system meets the requirements of section 2 of *EPA Drinking Water Advice Note No. 3: E.coli in Drinking Water*.

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 to address the issues raised. This report has been reviewed and approved by 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 Laghnane **Date:** 8th August 2018

Inspector

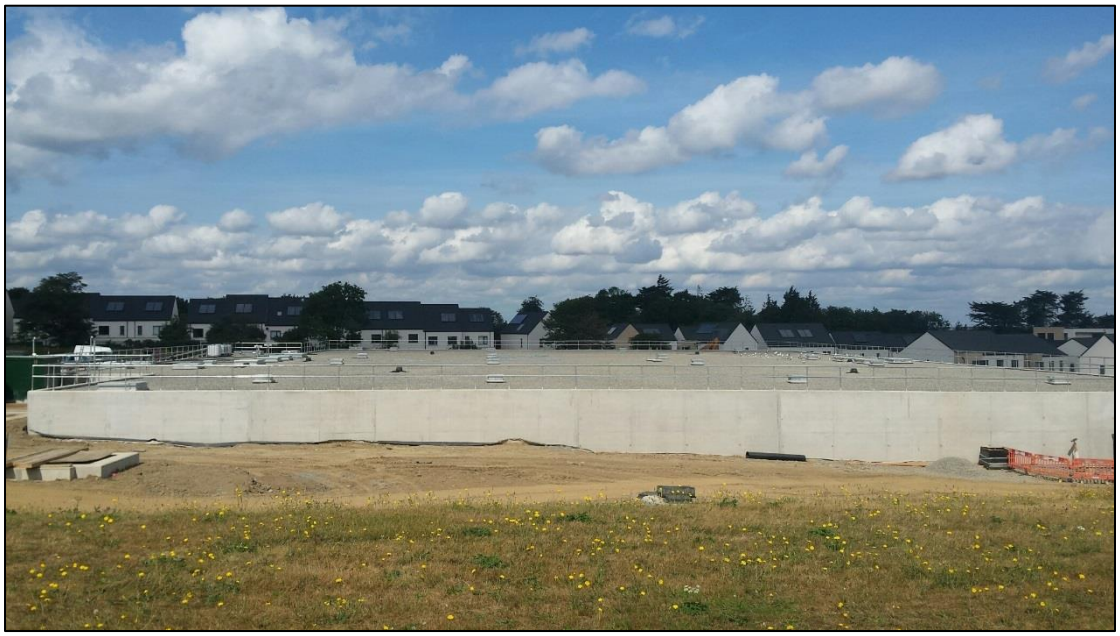

Photo 1: New covered storage reservoir at Ballyboden water treatment plant

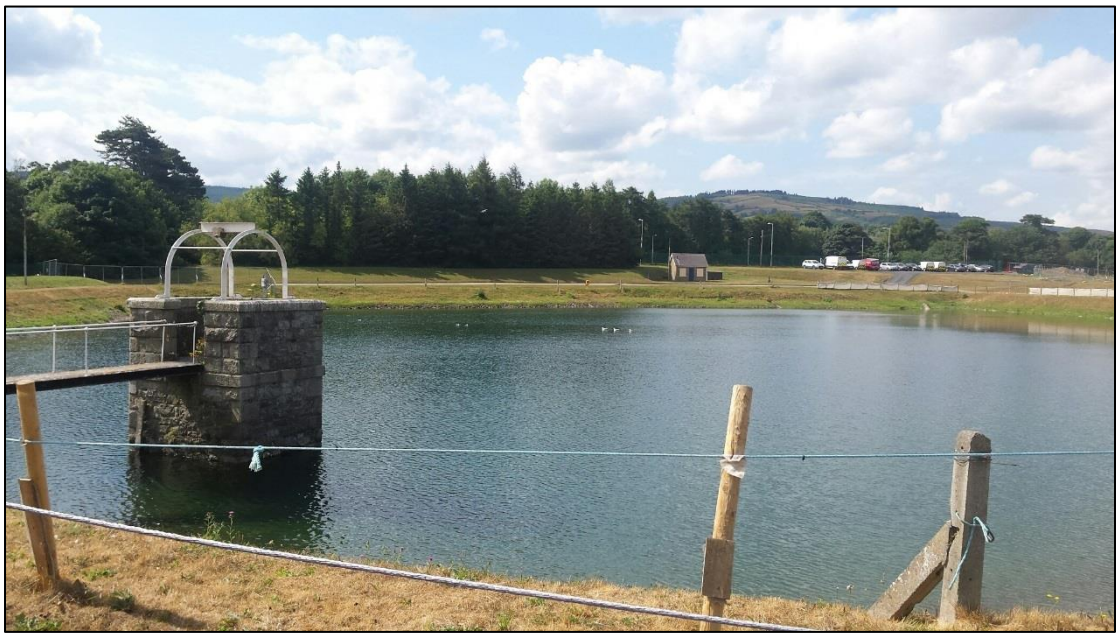

Photo 2: Open storage of treated water still in use on the day of the audit (note birds present on water surface)

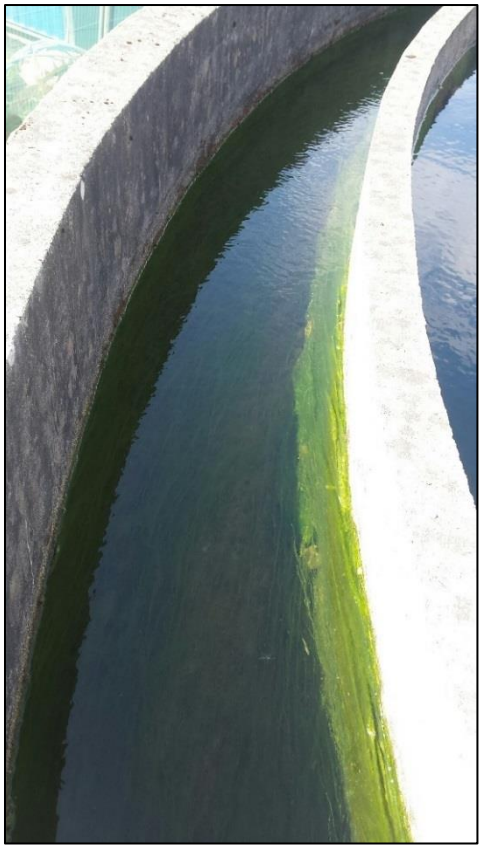

Photo 3: Algal growth on outlet channel in clarifier

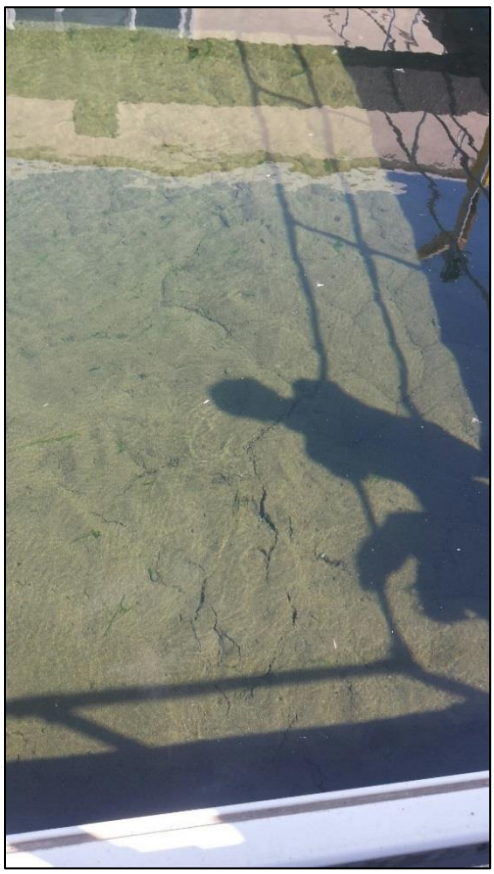

Photo 4: Cracks in filter media (Filter No. 5)