Drinking Water Audit Report

County:	Co. Cavan	**Date of Audit:**	26th May 2016
Plant(s) visited:	Bailieborough WTP Scheme Code 0200PUB0102	**Date of issue of Audit Report:**	24th May 2016
		File Reference:	DW2016/99
		Auditors:	Ms Ruth Barrington
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 Nos. 1 to 15.		

MAIN FINDINGS

i. **Bailieborough water treatment plant appears to be well operated and maintained.**
ii. **Further optimisation should be investigated following several changes to the pH adjustment and coagulant dosing regime at the plant.**
iii. **The upgrade of rapid gravity filtration should include several specific actions as listed in the Recommendations below.**

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 Bailieborough public water supply serves a population of approx. 4,400, with 2,950 m^3/day treated water produced at the plant. The treatment provided at the plant comprises pH adjustment, coagulation, flocculation, dissolved air flotation (DAF), rapid gravity filtration and chlorination. The raw water abstraction is from Skeagh Lough, a spring fed lake with neighbouring land use in mainly agricultural and woodland land use.

The opening meeting commenced at 10.00a.m. at Bailieborough Water Treatment Plant (WTP). 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 audit observations and recommendations are listed in Section 2 and 4 of this report. The following were in attendance during the audit.

Representing Irish Water:

Mr Pat O'Sullivan – Drinking Water Compliance, Irish Water
Ms Yvonne McMonagle – Compliance Analyst, Irish Water
Mr Brian Boylan – Compliance Analyst, Irish Water

Representing Cavan County Council: Mr Peter Crosby – Caretaker, Cavan County Council Mr Adrian Burke – Assistant Chemist, Cavan County Council Mr John Denning – Senior Executive Engineer, Cavan County Council Mr Tom Lyons – Operations Engineer, Cavan County Council Representing the Environmental Protection Agency: Ms Ruth Barrington – Inspector, Office of Environmental Enforcement

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.	**Coagulation, Flocculation and Clarification** a. A number of changes have been made in recent months to the treatment provided at the plant, two of which may impact on the coagulation/flocculation/clarification processes- a switch from kibble aluminium to aluminium sulphate, and a switch from soda ash to caustic soda. b. While final water results were good in recent months, there are further plans to optimise the coagulant dosing and control at the plant. Exceedances in aluminium and pH in early 2016 have been rectified and the relevant EPA enforcement files had been closed prior to the audit. c. Chemical dosing is manually controlled at the Bailieborough WTP and jar tests are undertaken regularly to support dose changes. d. A static mixer was installed around four years ago post coagulant dosing to support the formation of a more stable floc for the DAF process. Adjustments have also been made over the same time period to paddle mixers pre- DAF and for DAF pressure reduction to contribute to a more efficient DAF process and reduced floc carry over onto the filters.
2.	**Filtration** a. Filter No. 1 (of three rapid gravity filters) was put into backwash during the audit. Some scum was noted on the water surface in the filters pre-backwash and substantial amounts of material were visible on the walls and weir of Filter No. 1 when it was drained down. b. Staff stated that the filter walls are hosed down as routine during backwashes and cleaned more thoroughly every six months. c. Staff reported that there had been a filter upgrade in 2012 which included new nozzles and media. Further upgrading is planned for the plant to provide further control over the filtration process. d. There is no run to waste or slow start facility on the filters at present. e. Staff were of the opinion that freeboard depth in the filters is insufficient to prevent media loss. There are no media depth indicators on the filters to enable a ready assessment of this observation over time.
3.	**Disinfection** a. Disinfection is achieved using sodium hypochlorite following a recent switch from chlorine gas. b. Duty and standby chorine dosing is provided but on the day of the audit Pump No. 1 was not in operation. A maintenance visit was being scheduled to re-set this pump to reinstate the disinfection criteria standard of duty and standby pumps.

	c. There is an automatic plant shut down on the basis of low chlorine residual, to prevent entry of undisinfected water into the network following a dosing failure. d. Chlorine dosing is residual linked with a flow proportional trim element. The residual is based on a sample taken after 30 minutes contact time.
4.	**Monitoring and Sampling Programme for Plant Operations** a. There are two programmes of sampling on the raw water, a routine annual sample normally taken in the last quarter of the year, and the Water Framework Directive surveillance monitoring programme which was started this year. b. Irish Water reported plans for the installation of a treated water UVT monitor on combined filtered water- a date for this installation was not yet available. c. Staff reported occasional algal growth on the lake at times and as part of the WFD monitoring phytoplankton will be monitored during the summer months. d. There does not appear to have been an overall assessment of the plant in terms of the organics load from the raw water and its potential to impact on the treatment system or on the potential formation of disinfection byproducts.
5.	**Management and Control** a. Access to turbidity and chlorine residual results and trends was limited at the time of the audit. These have not been incorporated on the county wide SCADA system so cannot be accessed remotely by operators. b. The daily/weekly plant and network monitoring is very comprehensive and well recorded in the plant log books. However it is information that is not searchable or plotted to look at trends or seasonal changes in water quality.

3. AUDITOR'S COMMENTS

Bailieborough water treatment plant appeared well run and maintained and it was evident that the operator takes a keen interest in the optimisation of the treatment processes. The recommendations below should assist Irish Water to build continuous improvement in the Bailieborough supply.

4. RECOMMENDATIONS

Coagulation, Flocculation and Clarification

1. Irish Water should carry out an investigation to identify the cause of floc carryover from the DAF process into the filters which is depositing on the filter walls and weirs. Recent changes to the pH adjustment and coagulant process may need to be further optimised. In carrying out this investigation and any follow up actions Irish Water should have regard to the EPA Water Treatment Manual: Coagulation, Flocculation and Clarification and EPA Advice Note No. 15: Optimisation of Chemical Coagulant Dosing.

Filtration

2. Irish Water should follow the guidance as specified in the EPA publication "*Water Treatment Manual on Filtration*" in assessing the scope of upgrade to be specified for the filtration process. A timeframe for this upgrade should be provided and the following points should be addressed in this review.
   i. The depth of filter media (excluding the gravel layer) should be a minimum of 800 mm ;
   ii. The filtration rate in the rapid gravity filters should not exceed 7.5 m^3/ m^2/hour ;
   iii. The filter backwash water flow rate should not exceed 20 m^3/ m^2/hour ;
   iv. The provision of a filter run to waste or slow start facility after backwashing.
   v. Freeboard depth should be sufficient to prevent media loss over the weir, also taking point (iii) into account.

Disinfection

3. Irish Water should ensure that the duty and standby pumps for sodium hypochlorite dosing are maintained in working order.

Management and Control

4. Irish Water should ensure that the available information on raw water quality and seasonality is used to assess changes in organics load and the potential impact on the plant.. The data from the proposed filtered water UVT monitor should be used in this regard as well as the WFD monitoring records and data gained from the daily/weekly monitoring at the plant.

5. Irish Water should ensure that suitable trended data is available for use by plant operators (e.g. through the county wide SCADA) to assess and respond to water quality trends by adjusting plant operations.

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:** 24/06/2016

Ruth Barrington

Inspector