Drinking Water Audit Report

County:	Mayo	**Date of Audit:**	13th May 2016
Plant(s) visited:	Ballina Wherrew Water Treatment Plant	**Date of issue of Audit Report:**	23rd May 2016
		File Reference:	DW2015/231
		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.		

MAIN FINDINGS

i. **Controls on the coagulation process should be improved to ensure the plant responds effectively to changes in raw water quality.**
ii. **Controls on the backwashing procedure for the filters should be optimised to ensure filters are given adequate run to waste time before being brought back in to use.**
iii. **The final water turbidity alarm set point of 1 NTU should be reviewed to allow the caretaker sufficient time to react should final water with high turbidity be found to be leaving the plant.**

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 in response to the notification by Irish Water dated 10/05/16 of four cases of cryptosporidiosis in the Ballina community. This had increased to 6 cases at the time of the audit.

The Ballina Wherrew water treatment plant serves a population of 2,500 people at a volume of 3,000m^3/day and operates for 11hours/day. A portion of the Ballina area is served by the Ballina Lisglennon water treatment plant which was also audited on 13/05/16. The Wherrew plant was constructed in 1970's and includes the following treatment; coagulation with aluminium sulphate, clarification in 3 clarifiers, rapid gravity filtration in 3 filters, disinfection with chlorine gas and fluoridation. Treated water from the Ballina Wherrew plant is occasionally mixed with treated water from the Ballina Lisglennon plant when there is a need to need increased demand.

The opening meeting commenced at 09:30 am at the Ballina Wherrew water treatment plant. The scope and purpose of the audit were outlined at the opening meeting. The purpose of the audit was to observe the effectiveness of the plant at providing treatment for *Cryptosporidium.* 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:

Mr. Anthony Skeffington – SLA Lead Engineer, IW
Mr. Thomas Gibbons – Compliance Analyst, IW
Mr. Iarla Moran – Senior Engineer, Mayo CC
Mr. Eddie Munnelly – Senior Executive Engineer, Mayo CC
Mr. Mark O'Donnell – Executive Engineer, Mayo CC
Ms. Eileen Cavanagh – Executive Scientist, Mayo CC
Mr. Eddie Walsh – General Service Supervisor, Mayo CC
Mr. Gerard Shally – Electrician, Mayo CC
Mr. Sean Kean - Caretaker, Mayo CC

Observers:
Ms. Emer O'Connell – Public Heath Consultant, HSE
Ms. Regina Kiernan – Public Health Consultant, HSE
Ms. Mary Heery – Senior Environmental Health Officer, HSE

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. The Wherrew PWS is sourced from Lough Conn and the abstraction point is located adjacent to the treatment plant. The abstraction point is fitted with a coarse and fine screen and raw water is then pumped a short distance to the treatment plant. b. There is an online turbidity monitor on the raw water and the caretaker takes a manual colour and pH sample daily. Raw water turbidity at the time of the audit was 1.2 NTU and can be as high as 4 NTU. Raw water colour is generally between 80 and 100 Hazen but can go up to 150 Hazen and raw water pH is generally 8.1. c. The caretaker stated that the raw water is relatively stable however wind direction can impact raw water colour, particularly if wind directs water from the River Deel into the lake as the River Deel flows through agricultural land. d. Irish Water stated online UVT and *Cryptosporidium* monitors will be installed on the raw water in June 2016, under the Irish Water Disinfection Programme.
2.	**Coagulation, Flocculation and Clarification** a. A fixed dose of 153.7 mg/l of 8% aluminium sulphate is applied to the raw water and the dosed water then enters a baffled contact tank. b. The coagulant dose is adjusted from time to time by the caretaker based on daily colour samples of the raw water and Chemifloc have tested the raw water and provided dosing charts to the caretaker. c. The coagulant dose is delivered by duty and standby dosing pumps however there is no automatic switchover between the pumps.

	d. Polyacrylamide is dosed at a rate of 0.158mg/l at a single point in the delivery line to the clarifiers. e. There are three clarifiers at the treatment plant which are not fitted with lamellae plates. f. The walls of the clarifiers and settled water channels were observed to be clean and in good condition. The clarifiers are fully cleaned once a year and clarifiers 2 and 3 were recently cleaned. g. Sludge bleeds from the clarifiers are timed for 2 minutes every 18 minutes.
3.	**Filtration** a. The three on-site filters were refurbished in 2008, filter walls were refinished and filter media was replaced. The depth of filter media is 800mm and a metal strip has been attached to the filter walls as a minimum filter depth measurement point. b. Filters are backwashed on a daily basis as part of the caretaker's routine. The filter programme is manually started by the caretaker. A backwash of Filter 2 was observed. c. Following backwash the filters are brought back into service after a 5 minute settlement period which is timed by the caretaker. The caretaker will also use his own judgement in observing the filter after the backwash before resuming service.
4.	**Disinfection** a. The Wherrew plant has chlorine gas disinfection which has a fixed dose and duty and standby dosing pumps with automatic switch over. b. Effective chlorine contact time is achieved in either one of the two clear water tanks located on-site and treated water is then directed to either one of two reservoirs, the Knockanillaun Tower and Knockmore Reservoir. c. Chlorine residuals are generally 1mg/l at the outlet to the reservoirs. d. Chlorine residuals in the network were examined on the day of the audit and all residuals were above 0.1mg/l. A chlorine residual of 0.41mg/l was measured in the network on the day of the audit.
5.	**Monitoring and Sampling Programme for treated water** a. Final water is tested for *Cryptosporidium* once every month for six months of the year. Testing of final water in January, February and March of 2016 did not detect any *Cryptosporidium*. b. Following the discovery of cryptosporidiosis in the Ballina community, daily testing of the final water for *Cryptosporidium* has been carried out since 06/05/16. No *Cryptosporidium* oocysts had been detected in the final water up to the day of the audit.
6.	**Chemical storage and bunds** a. The fill point for the aluminium sulphate bulk tank is not located within the bund wall.

3. AUDITORS COMMENTS

Final water turbidity readings at the Wherrew plant were below 0.2 NTU and *Cryptosporidium* had not been detected in the final water up to the 13th May 2016 however; improvements could be made to the treatment controls in place at the plant to provide greater security of supply and further reduce the risk of *Cryptosporidium* entering the final water. The improvements include automating the coagulant dose to ensure that changes in raw water quality are dealt with effectively, initiating filter backwash based on filter turbidity readings and bringing filters back into operation based on filter turbidity readings.

4. RECOMMENDATIONS

Source Protection

1. Irish Water should install the following continuous automatic monitors to alert plant operators of any changes in raw water quality; colour or UVT monitor and pH monitor.

Coagulation, Flocculation and Clarification

2. Irish Water should automate the coagulant dose at the treatment plant in order to allow the plant to react to changes in raw water quality when the caretaker is off duty.

3. Irish Water should install automatic changeover between the duty and standby coagulant dosing pumps.

Filtration (General)

4. Irish Water should optimise the current filter backwash procedure. Filter backwash should be initiated based on filter turbidity readings rather than time and backwashed filters should be brought back into service based on filter turbidity readings rather than time.

Disinfection

5. Irish Water should ensure that dosing of chlorine is flow proportional or is linked to the residual chlorine monitor. Where the dosing pump is fixed Irish Water should replace the pump(s) with flow proportional pumps or pumps capable of dosing based on the residual chlorine monitor.

Chemical Storage and Bunds

6. Irish Water should ensure that the aluminium sulphate bulk tank fill 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 Darragh Page, Drinking Water Senior Inspector.

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:** 23rd May 2016

Michelle Roche

Inspector