Drinking Water Audit Report

County:	Tipperary	**Date of Audit:**	08/12/16
Plant(s) visited:	Fethard Regional Public Water Supply – Supply Code 2900PUB0137	**Date of issue of Audit Report:**	22/12/16
		File Reference:	DW2008/525 (Cloran) DW2008/526 (Gortnapisha)
		Auditors:	Ms. Criona Doyle Mr. Niall Dunne
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. **The construction of the new Fethard Water Treatment Plant has greatly improved the level of water treatment being provided. The new plant includes the provision of raw water blending, coagulation, flocculation, clarification, filtration, disinfection (UV and chlorination) and fluoridation. The automated treatment process has been designed to cope with changes in raw water quality and provide a safer and more secure water supply.**

ii. **The EPA will consider the removal of Cloran Regional water supply and Gortnapisha water supply from the Remedial Action List when Irish Water provides two months satisfactory plant performance data.**

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. Cloran Regional Water Supply and Gortnapisha Water Supply have been on the EPA's Remedial Action List (RAL) since 2008 due to inadequate treatment for *Cryptosporidium*. These supplies have now been decommissioned and water is supplied to these areas from the Fethard Regional Public Water Supply. The Boil Water Notice on the Cloran Regional Water Supply (RWS) and the Gortnapisha Water Supply (WS) was lifted on the 13/10/16.

This audit was carried out to assess the performance of Irish Water in providing clean and wholesome drinking water following the construction of the new Fethard Water Treatment Plant, and to assess whether Cloran RWS and Gortnapisha WS can be removed from the RAL.

Construction of the new Fethard Water Treatment Plant (WTP) was completed in June 2016. The water supply is provided from 4 no. separate water sources (i) Walshbog stream (ii) Gortnapisha stream (iii) Cloran springs (iv) Anner River. The Fethard WTP produces 6,500m^3/d and serves a population of

12,174. Treatment at the plant consists of coagulation, flocculation, clarification, rapid gravity filtration, disinfection (UV and chlorination) and fluoridation.

Photographs taken by Niall Dunne during the audit are attached to this report and are referred to in the text where relevant.

The opening meeting commenced at 10:45am at the Fethard 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:

Deirdre O'Loughlin, Compliance Monitoring Liaison Specialist, Irish Water.
Caoimhin Curran, Compliance Monitoring Liaison Analyst, Irish Water.
Colette Moloney, Executive Chemist, Tipperary County Council.
Flan Real, Assistant Scientist, Tipperary County Council.
John Fox, Operations Contracts Manager, Glan Agua.
Joe O'Meara, Operator Glan Agua.

Representing the Environmental Protection Agency:

Criona Doyle, Inspector.
Niall Dunne, 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 supply is obtained from 4 no. sources: Anner River; Gortnapisha Stream, Cloran Springs and Walsh's Bog Stream. Blending of the raw water takes place in the twin cell raw water tank (1,300m^3). b. Tipperary County Council Environment Section plan to write to the farmers in the buffer zones in the Anner Catchement by the end of 2016. TCC Environment Section are satisfied that the landowners are meeting the obligations of the Good Agricultural Practice (GAP) Regulations regarding setback distances from the abstraction points. c. There are areas of Coillte Foresty in the catchment. d. The intake at the Cloran Springs was inspected. The source was securely fenced off. e. All intakes are fitted with 1 no. coarse screen and 2 no. fine screens (3mm). An alarm is in place to notify the operator when screens need to be cleaned. f. Wastewater from the on-site toilet facilities is collected in an 11m^3 holding tank and removed off site for subsequent treatment and disposal.
2.	**Management and Control** a. The WTP is operated by Glan Aqua under a Design Build Operate (DBO) contract. Detailed Monthly Status Reports are provided to Irish Water by the DBO contractor. The report includes records of operation process changes; alarm call outs and equipment service records. b. The design capacity of the plant is 6,500m^3/d. The plant operates at a 325m^3/hour production rate for 20 hours per day. c. The information on EDEN for the Fethard Water Supply is out of date arising from the construction of the new WTP and the extension of the supply to serve Cloran and Gortnapisha. d. There is a central HMI for overview of all processes and alarm levels. A SCADA system

	is in place with alarm set points which is available to view on site and is also accessible to Tipperary County Council and Irish Water. e. Monthly calibration of equipment is undertaken with details included in the Monthly Status Report to Irish Water.
3.	**Coagulation, Flocculation and Clarification** a. The raw water undergoes blending, coagulation, flocculation and clarification (DAF). b. Continuous raw water monitoring of colour, turbidity, pH, dissolved oxygen and electrical conductivity is undertaken. High or low level warning alarms are set for each parameter as well as alarm set points to trigger plant shutdown. c. The raw water is dosed inline with Poly Aluminium Chloride (PAC). A static mixer has been installed to ensure good mixing. d. Since the plant was commissioned dosing with sodium hydroxide, for pH correction, has not been required. At present the Anner (natural alkalinity) supplies 10-15% of the raw water demand and therefore no alkalinity boost is required. The target pH is 6.4 pH units. e. An automated control process, using stepped control, has been developed for coagulation. The dosing rate is based on the measured flow rate and UVT. The set points for each flow and UVT band were developed during the commissioning phase. Manual fine tuning by the operational staff is also permitted within the specified bands. All process adjustments are documented and reported in the Monthly Status Report to Irish Water. f. Each flocculation tank is made up of two cells each providing 10 minutes retention time (20 minutes total). g. 12 minutes retention time is provided in the DAF unit. The flocculation and DAF treatment process is operated on a twin stream system which facilitates cleaning and maintenance without the need for full plant shutdown. h. The target turbidity level at the end of the DAF unit is 1 NTU. There is a high level alarm after the DAF unit and when the turbidity is > 1 NTU the operator is notified. The process water is run to waste where turbidity is > 1.5 NTU and is not discharged to the rapid gravity filters.
4.	**Filtration** a. The clarified water is filtered via 4 no. rapid gravity filters. b. A dual media filter bed is provided composed of 550m of silica sand over 450mm of anthracite. A core test is undertaken every 6 months to check the filter depth. c. Automatic backwashing is triggered based on pressure differential, turbidity or time period (24 hour). Backwashing can also be manually triggered by the operator. d. A backwash of Filter No. 2 was observed during the audit. The backwash process is as follows: drain; air scour; combined air and water scour, and run-to-waste. Turbidity is checked before the filter is returned to service. If the turbidity set point of 0.2 NTU is not achieved a 2nd backwash cycle is then run and if turbidity set point is not achieved after the 2nd cycle an alarm is triggered for plant shutdown e. Water for backwashing is obtained directly from the reservoir. The backwash waste water is discharged to the backwash settlement tank. The settled contents are discharged to the sludge holding tank and the waste water is discharged to the attenuation pond on site. f. Continuous aluminium monitoring is undertaken post the rapid gravity filters.
5.	**Disinfection** a. UV disinfection is provided in a single low pressure unit with log 3 reduction. The target dose is 14.4 mj/cm^2. A low level warning alarm is set at a dose of 13.2 mj/cm^2 with a low low level alarm of 12 mj/cm^2 which triggers automatic shutdown of the supply. On the date of the audit the dose was 43.07mj/cm^2. b. The UV validation sticker on the side of the unit was inspected and indicated the following: min flow rate 277m^3/hr; design flow 325m^3/hr; max flow 2,536m^3/hr; min UVT 69% ; design UVT 73.5% and max UVT 93%. c. Continuous UVT monitoring takes place prior to the UV treatment. The UVT is alarmed at 80% low level warning with a low low level at 73.5% (at flow rate of 325m^3/hr) linked to high priority alarm with plant shut down undertaken by plant personnel. The UVI sensor is calibrated monthly. The bulbs have a lifespan of 12,000 hours.

	d. Lamp coffins are stored on site for disposal of used lamps. e. Power failure triggers automatic shutdown of water going into supply. f. Sodium hypochlorite (12-14%) is used for chlorination. Duty and standby chlorine dosing pumps are present which operate on a flow proportional system with trim chasing. g. 60 days sodium hypochlorite storage is provided with 30 days rotation. h. A certificate (with delivery date and grade of chemical) is provided for each delivery by Chemifloc but no expiry date is provided. The invoice and certificate were not available on site as they are kept at Glan Agua Main office. i. A bunded day tank is provided with 3-4 days storage. j. There is no booster chlorination taking place in the network. Monitoring of the residual chlorine level is undertaken at the Ballinard Pumping Station and the Killenaule Reservoir with the chlorine dosing levels adjusted at the Fethard WTP as required.
6.	**Fluoridation** a. Fluoride dosing is undertaken using hydroflurosilicic acid. b. Duty, assist and standby pumps are provided with pump changeover every few days.
7.	**Treated Water Storage and Distribution Network** a. The distribution network extends over 280km with a 40km distance to the furthest point. b. Monitoring of residual chlorine levels in the network is undertaken weekly by Tipperary County Council. End of the network monitoring is undertaken at Gortnahoe. **c.** THM levels were previously an issue in the Gortnapisha network. The results of 4 no. samples from the network from 2016 were available onsite and indicated satisfactory levels. Monthly monitoring of THMs and TOC is undertaken at the WTP and reported in the Monthly Report.
8.	**Chemical Storage and Bunds** a. All chemical deliveries are supervised by the operator. SOPs have been developed. All fill points are located outside and are colour coded. All of the storage tanks are internally bunded. Prior to delivery of chemicals bolted down drip trays are installed at the fill point. Spill kits are kept on site. b. PAC (10%) is stored in an internally bunded bulk storage tank (capacity 20,000 litres). c. Sodium hydroxide is stored in internally bunded tank (capacity 25,000 litres). d. The hydroflurosilic acid storage tank (capacity 5,000 litres) provides 60 days storage.
9.	**Sludge Management** a. Sludge from the DAF tanks is discharged to the sludge balancing tank and dewatered onsite in the sludge dewatering centrifuge. Sludge is collected by Indaver for disposal.
10.	**Treated Water Storage and Distribution Network** a. A twin cell reservoir with a capacity of 6,900m^3 provides 30 hours treated water storage (15 hours per cell). b. All hatches were locked. c. The vents were fitted with suitably sized mesh to prevent ingress of insects or vermin. d. The planned reservoir maintenance includes an annual drain down and inspection. e. There are two flow metres with isolation vales on the outlet from the reservoir to separately supply the Cloran and Gortnapisha networks.
11.	**Hygiene and Housekeeping** a. Raw water from the 4 no. sources is mixed in the twin cell raw water tank which is fitted with a baffle wall to ensure good mixing. Each individual cell provides two hours storage and the cells can be isolated to facilitate cleaning. Typically cleaning takes place every 2 to 3 months. A build up of algae was visible on the inside of the walls of the raw water storage tank (Photograph No. 1). Glan Agua outlined that cleaning of the walls is scheduled

	to take place during December 2016.

3. AUDITORS COMMENTS

The new Fethard Water Treatment Plant provides a multi-barrier treatment system for the removal/inactivation of *Cryptosporidium*. The audit found that the treatment process is robust and the treatment plant is being well managed and operated. Automatic coagulant dosing is in operation, with stepped dosing rate bands developed during the design and commissioning phases. A multi parameter warning system with automatic plant shutdown is in place for both the raw and treated water.

A few minor issues were identified during the audit process where action is required by Irish Water to address the issues raised. The EPA will consider the removal of Cloran Regional Water Supply and Gortnapisha Water Supply from the RAL when Irish Water provides two months satisfactory plant performance data.

4. RECOMMENDATIONS

Source Protection

1. Irish Water should liaise with Tipperary County Council to ensure that all landowners are written to and made aware of the required setback distances, as per Article 17 of the *European Union (Good Agricultural Practice for the Protection of Waters) Regulations 2014 (SI No.31 of 2014),* in relation to the landspreading of organic fertiliser and storage of farmyard manure.

Management and Control

2. Irish Water should update the scheme details for Fethard Regional Water Supply Scheme in the EDEN Drinking Water Returns information.

3. Irish Water should provide two months of plant operational performance data to the EPA (including raw water & final water turbidity, UV dose, UVT, residual chlorine leaving the plant and flow rate) in order to support the removal of Cloran Regional water supply and Gortnapisha water supply from the Remedial Action List.

Disinfection

4. Irish should provide the EPA with a copy of the validation certificate for the UV disinfection system.
5. Irish Water should examine the feasibility of installing an automatic shutdown on the UV system when the operating conditions drop below the validated range.

Treated Water Storage and Distribution Network

6. Irish Water should provide the EPA with the results of all THM monitoring for the Fethard Regional Water Supply for 2016 in order to support the removal of Gortnapisha Water Supply from the Remedial Action List.

Chemical Storage and Bunds

7. Irish Water should put a system in place so that stocks of reagents and chemicals kept on-site are regularly checked to see if they are in date. Sodium hypochlorite stored on site should be

labelled with the expiry date identified by the manufacturer.

Hygiene and Housekeeping

8. Irish Water should ensure that regular cleaning of the walls of the raw water storage tanks is undertaken.

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 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: Fiona Doyle **Date:** 22/12/16

Photograph No. 1: Raw Water Storage Tank Showing Staining on Walls