Drinking Water Audit Report

County:	Monaghan	**Date of Audit:**	18/07/18
Plant(s) visited:	Kilkitt Water Treatment Plant (WTP) and source at Lough Bawn Scheme Code: 2400PUB1001	**Date of issue of Audit Report:**	30/07/18
		File Reference:	DW2010/7
		Auditors:	Ms Pauline Gillard
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. **The purpose of the audit was to assess the suitability of Lough Egish Public Water Supply for removal from the EPA's Remedial Action List (RAL). This supply is on the RAL due to elevated levels of Trihalomethanes (THMs).**
ii. **The upgraded Kilkitt Water Treatment Plant was commissioned and operating well on the day of the audit. No operational issues were found during the audit.**
iii. **THM monitoring results taken since the plant was upgraded were compliant with the *European Union (Drinking Water) Regulations 2014, as amended*.**

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 the suitability of Lough Egish Public Water Supply for removal from the EPA's Remedial Action List (RAL). This supply is on the RAL since 2008 due to elevated levels of Trihalomethanes (THMs) above the standards in the Drinking Water Regulations.

The Lough Egish public water supply is sourced from Lough Bawn. The treatment plant at Kilkitt, Co. Monaghan serves a population of 10,474 people and operates at plant capacity of 4049 m^3/day in the Lough Egish area. The plant was upgraded with the main aim to limit THM formation potential. Treatment includes chemical dosing with aluminium sulphate and polyelectrolyte dosing, clarification, rapid gravity filtration, disinfection using sodium hypochlorite and UV Unit, pH correction and fluoridation.

The opening meeting commenced at 10.30 am at Kilkitt 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 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:
Pat O'Sullivan – Drinking Water Compliance Specialist
Yvonne Mc Monagle – Drinking Water Compliance
Padraig Hanly – Regional Lead
Representing Coffey Group
Danny Flynn – Operations Compliance Manager
Shane Perry – Project Manager
Representing Ryan Hanley
Anita Layden – Senior Resident Engineer
Representing Monaghan County Council
Claire Hughes – Executive Engineer
Representing the Environmental Protection Agency:
Pauline Gillard - 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 & Lake Intake** a. The source of the raw water is 5 interlinked lakes at Lough Bawn. b. Land use in the immediate vicinity around Lough Bawn and the raw water intake is agricultural. c. The Lake intake facility has a screening chamber, storage tanks and pumps that pump the water to Kilkitt WTP. The screening chamber is lifted and cleaned quarterly. Turbidity is monitored at the intake and it alerts the operator of changes to the raw water. d. There are two new raw water intake pumps at the lake intake facility. e. There is fencing around the lake intake facility perimeter and the site is secure. There is a public walkway beside the intake but the facility is fenced and secure. f. Kilkitt WTP has fencing around it and the site is secure. g. Lough Egish supply has a partially completed drinking water safety plan in place.
2.	**Coagulation, Flocculation and Clarification** a. The Kilkitt plant upgrade included enhanced coagulation and flocculation processes and controls which have improved the quality of water produced at the WTP. b. The new coagulant dosing management contributes to the increased removal of natural organic matter prior to disinfection. c. There are two clarifiers and the clarified water gravitates towards the filtration stage. d. The sludge bleeds in the clarifiers are automated every 9 minutes for 90 seconds and the sludge blanket level is monitored by a sensor. e. The decanting channels in the clarifiers were not level and there was a preferential flow in

	some of the channels. f. There are turbidity monitors on both clarifiers which are connected to the SCADA system.
3.	**Filtration** a. There are four rapid gravity sand filters at the plant. b. A backwash of one filter was manually triggered during the audit. There was an even air scour and backwash across the filter bed. c. Before the upgrade, the backwash was triggered based on a pre-set time basis but now a backwash is triggered based on turbidity, headloss or time. d. There is a run to waste facility after the backwash finishes. e. There are alarmed turbidity monitors on each filter and a turbidity monitor on the combined filtered water. The filtered water from each filter is analysed by a turbidity, UVT and TOC analyser. At the time of the audit the monitors on Filter 1 had a reading of Turbidity 0.02 NTU, TOC 2.6mg/l, and UVT 87.89%. f. The filter media was changed in two of the filters in December 2017 and in the other two filters in October 2017.
4.	**Disinfection Chlorination** a. Disinfection at Kilkitt WTP consists of chlorination using sodium hypochlorite and UV treatment. b. The chlorine dosing is flow proportional and the duty and standby chlorine dosing pumps are monitored and alarmed. The chlorine level is continuously monitored. c. The target chlorine residual for final water leaving the plant is 2.2 mg/l - 2.7 mg/l. The low chlorine alarm set point is 1.5 mg/l and high level alarm is 3.2 mg/l. d. When the chlorine alarm is triggered there is a system in place for responding to the alarm. There is a person on rostered duty to react to the alarm 24 hours a day.
5.	**Disinfection Ultra Violet Treatment** a. The UV unit is validated under the USEPA protocols, comprising of a range of 48.10% to 96.63% UVT (at 254nm) and flow rates between 23.4 and 774.4 m^3/hour, and 30% to 100% nominal lamp input power. The resulting coliphage Reduction Equivalent Dose (RED) ranged from 19.8 to 138.2 mJ/cm2 for MS2 and 4.8 to 26.5 mJ/cm2 for T1UV. During the audit the plant was operating within the validation range at 26.3 mJ/cm2. There is a validation certificate for the UV unit. b. The dose rate is maintained within the validated range and the plant is alarmed when the treated water is outside its validated range. Once an alarm set point level is reached the UV unit will be shut-down and an alarm will be triggered and the plant will shut down automatically. There are high priority alarm signals which could be triggered by a lamp failure, and low priority alarm signal which would signal a reduction of the performance of the unit. c. The UV unit is linked to a continuous UVT and UVI monitor. d. The UV unit cannot be bypassed and there is no standby unit in place. The UV unit will shut down if it operates outside the validated range. e. The UV unit provides 3 log protozoal inactivation for the Kilkitt plant. The operator trends the data to make sure that the UV dosing is operating efficiently. f. There is a schedule for maintenance and calibration for the UV unit by a private company.

6.	**Treated Water Storage** a. The WTP is connected to two single cell reservoirs with approximately 36 hours' storage of treated water and there is a chlorine monitor at the reservoir. The reservoir was not visited during the audit. b. The reservoirs were cleaned in April 2017.
7.	**Chemical storage and bunds** a. There is a new chemical storage building and all chemicals were adequately bunded in locked chemical stores. There are spill kits and chemical showers in each building. There is a procedure for stock control in place. b. Flow proportional dosing of all the chemical dosing is implemented. c. The monitor on the bulk hydrofluosilicic acid tank was overdue a calibration service since September 2017.
8.	**Exceedance of the Parametric Values** a. In the past, THMs persistently failed to comply with the parametric value of 100 µg/l as set out in the *European Union (Drinking Water) Regulations 2014, as amended*. b. THMs are monitored monthly and the monitoring results submitted in advance of the audit show adequate chlorine residuals and all THM monitoring results were compliant from January to May 2018. The five months of compliant THM results show how the plant is operating effectively. c. Monaghan County Council carries out daily monitoring of residual chlorine in the distribution network.
9.	**Management and Control** a. There is a SCADA system at the plant which also allows for online monitoring of plant performance and data trends by the operator. The SCADA system can be accessed remotely. b. Information pertaining to the operation of the treatment plant was displayed clearly at locations throughout the plant. All health and safety signage was in place. c. The following parameters are monitored continuously in the treated water; pH, Temperature, Colour, Free residual chlorine.

3. AUDITORS COMMENTS

Kilkitt Water Treatment Plant was found to be very well managed by a dedicated team of staff. The audit found that the coagulation and flocculation process enhancements has improved the operational performance and the quality of treated water leaving the plant. There were no operational issues identified during the audit and the enhanced controls, instrumentation and online monitoring ensure that the plant is operating effectively.

The audit findings outlined above, along with compliant monitoring results submitted to the EPA, will be considered when publishing the next RAL update at the end of July 2018, with a view to removing the Lough Egish public supply from the RAL.

4. RECOMMENDATIONS

Coagulation, Flocculation and Clarification

1. Irish Water should ensure that the decanting channels in the clarifiers are level to prevent preferential flow of settled water into the outlet channels.

Chemical Storage and Bunds

2. Irish Water should ensure that all monitors and equipment are regularly calibrated and maintained in accordance with the manufacturer's instructions. Service/calibration labels should be clearly displayed on equipment.

FOLLOW-UP ACTIONS REQUIRED BY IRISH WATER

During the audit Irish Water representatives were advised of the audit findings. This report has been reviewed and approved by Aoife Loughnane, Drinking Water Team Leader.

Irish Water is recommended to put such measures in place as are necessary to implement the recommendations listed in this report. The actions by Irish Water to address the recommendations taken will be verified by the Agency during any future audits.

Please quote the File Reference Number in any future correspondence in relation to this Report.

Report prepared by: **Date:**

Pauline Gillard 26/07/18

Inspector