Site Visit Report

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 performance of Irish Water in providing clean and wholesome water to the visited public supply.

The audit process is a sample on a given date of the facility's operation. Where a finding against a particular issue has been reported this should not be construed to mean that this issue is fully addressed.

Water Supply Zone

Name of Installation	Longford Central
Organisation	Irish Water
Scheme Code	2000PUB1010
County	Longford
Site Visit Reference No.	SV22987

Report Detail

Issue Date	10/12/2021
Prepared By	Aoife Loughnane

Site Visit Detail

Date Of Inspection	25/11/2021	**Announced**	Yes
Time In	10:30	**Time Out**	13:10
EPA Inspector(s) **Additional Visitors**	Aoife Loughnane Daryl Gunning*		
Company Personnel	Irish Water: Andrew Boylan, Ian Walsh, John Gavin, Emily Mulqueen*, Barry Leonard* Longford County Council (operating under service level agreement to Irish Water): Barry Lennon, Karina O'Grady, Tom Murtagh*, Kieran Gaffney, Martin McDonnell Veolia: Padraig Costello** * attended pre audit meeting only ** attended site visit only		

Summary of Key Findings

1. Irish Water issued a Boil Water Notice on 03/11/21 for Longford Central public water supply, to protect public health following operational difficulties at Lough Forbes water treatment plant which resulted in inadequately treated water. High turbidity levels meant that the plant's *Cryptosporidium* removal barrier was compromised and the water supply was potentially unsafe to drink. Irish Water lifted the Boil Water Notice on 06/12/21 following the completion of remedial works at the plant and the receipt of satisfactory monitoring results.

2. Lough Forbes water treatment plant was producing safe drinking water during the audit. However, further controls are needed on filter operations to ensure that the plant consistently meets the level of performance required to ensure safe water at all times. Irish Water and Longford County Council are undertaking further measures to improve filter operations at the plant.

3. Upgrade works are currently well advanced at Lough Forbes water treatment plant to increase production capacity and to improve drinking water quality. Certain elements of the works will be delivered in Q1 and Q2 2022, however the timeframe for full completion and handover of the upgraded plant is Q3 2022.

Introduction

Lough Forbes water treatment plant provides drinking water to 17,500 people in Longford Central public water supply. Water is abstracted from Lough Forbes and undergoes treatment by screening, pH correction with soda ash (if needed), coagulation, flocculation, clarification in two dissolved air flotation (DAF) units, filtration in 8 rapid gravity filters, followed by disinfection using sodium hypochlorite and final water pH correction using soda ash. Treated water is pumped to Prucklish Reservoir, from where it is supplied into the distribution network.

Upgrade works are currently well advanced at Lough Forbes water treatment plant to increase production capacity from approximately 330 to 425 m3/hour and to improve drinking water quality. The works commenced on site in March 2021 and are due for completion and handover in Q3 2022. The scope of the upgrade includes the following:

- New raw water pumps;
- Installation of raw water pH correction using sulphuric acid (to be operational in Q1 2022);
- New pH correction and coagulant dosing points with improved mixing;
- Installation of a new (third) DAF unit (155 m3/hour capacity) to increase overall CFC capacity (to be operational in Q1 2022);
- Filter upgrade works to include new blowers and backwash pumps and installation of a run-to-waste cycle post backwash;
- Installation of flow monitors on each filter;
- Upgrade of final water pH correction facility using liquid caustic dosing rather than soda ash;
- New clear water tank and pump house with new treated water pumps;
- Relocation of chlorine dosing point; and
- Upgrade of sludge management facilities at the plant.

Longford Central public water supply is currently on the EPA's Remedial Action List due to persistent exceedances of THMs and pesticides in drinking water.

This audit was carried out in response to elevated turbidity levels at the plant which resulted in the issuing of a Boil Water Notice by Irish Water on 03/11/21 to all consumers of Longford Central public water supply.

Supply Zones Areas Inspected

This audit comprised of a pre-audit virtual meeting on 23/11/21 and a site visit to Lough Forbes water treatment plant on 25/11/21 to inspect the water treatment processes, equipment and controls.

1. Incident Management

		Answer
1.1	Was the incident suitably alerted to the plant operators, escalated and managed in order to maintain water quality and protect public health?	Yes

Comment

Boil Water Notice Incident:

1. Irish Water issued a Boil Water Notice on 03/11/21 for Longford Central public water supply, following operational difficulties at Lough Forbes water treatment plant which resulted in inadequately treated water. High turbidity levels in the two DAF units caused floc carryover onto the filters which resulted in an increase in filtered water turbidity levels above 0.3 NTU for over an hour at four out of eight filters on 02/11/21. This meant that the plant's Cryptosporidium removal barrier was compromised during that time.

2. Irish Water and Longford County Council's investigations into the incident found three contributing factors:

- Supply/demand issues where increased network demand put pressure on the plant;
- The DAF units needed to be cleaned;
- The deterioration of raw water quality in the days before the incident.

3. Irish Water and Longford County Council took the following immediate actions:

- Filters were manually backwashed and the time between backwashes was reduced;
- Alum dose rates were checked and verified;
- Turbidity monitors were checked and verified as reading accurately;
- *Cryptosporidium* sampling rig was installed on the final water and a *Cryptosporidium* monitoring programme was put in place;
- On 05/11/21 Lough Forbes WTP was shut down for essential maintenance. The two DAF units were emptied and cleaned.

4. Irish Water and Longford County Council confirmed that the plant has rebalanced since cleaning the DAFs, and better management of filter backwashes has resulted in improved filter performance.

5. Filter backwashing is currently triggered at 4 NTU which is well above the EPA filter turbidity performance criteria of 0.3 NTU to demonstrate an effective *Cryptosporidium* barrier. Irish Water and Longford County Council explained that it is not possible to immediately re-set the backwash to 0.3 NTU because this would result in constant backwashing. An upgrade of the plant's PLC system is needed to link the turbidity setpoint and time, e.g. turbidity > 0.3 NTU for 15 minutes. During the audit, Irish Water could not confirm a timeframe for implementing this control on filter operations at the plant.

Power disruption incident:

On 22/11/21 turbidity levels on Filters No. 4, 5, 6 & 7 exceeded 0.3 NTU for over 15 minutes when a power cut followed by a power surge caused a raw water pumping imbalance at the plant. The operators responded to the filter turbidity alarms and shutdown the plant, backwashed all filters and drained the water in the rising main to ensure no compromised water could enter Prucklish reservoir. The Boil Water Notice remained in place at the time of this incident.

Backwashing incident:

On 23/11/21 turbidity levels on Filters No. 4, 5 & 6 exceeded 0.3 NTU for over 15 minutes while other filters were backwashing. The operators reviewed the backwash timings to improve the management of backwashes. Filter No. 6 now backwashes every 7 hours and Filters No. 4 and 5 backwash every 12 hours. The Boil Water Notice remained in place at the time of this incident.

Irish Water lifted the Boil Water Notice on 06/12/21 following the completion of remedial works at the plant and the receipt of satisfactory monitoring results.

2. Coagulation Clarification Flocculation (CFC) Stage

		Answer
2.1	Is the CFC process optimised to respond to changes in raw water quality?	No

Comment

1. Longford County Council representatives confirmed that the lake source is generally stable in terms of raw water quality. Turbidity and colour both increase when the lake gets choppy during strong winds. Alkalinity drops during winter and temperature can also impact on raw water conditions.

2. There is currently no pH correction prior to water entering the DAF units. The upgrade works include the installation of raw water pH correction using sulphuric acid and caustic dosing in the event of low alkalinity (to be operational in Q1 2022). The new sulphuric acid storage tanks and dosing pumps were in place on the day of the audit. The acid dose will be flow proportional with feedback trim to achieve a target coagulation pH of 6.2.

3. There will also be new coagulant dosing points with improved mixing prior to water entering the DAF units.

4. During the audit, a visual assessment of the DAF processes found large floc particles in the water coming off the EPS DAF unit. This indicates that the DAF process is not fully optimised and floc is carrying over onto the filters.

5. The pH monitor on the EPS DAF unit was reading 5.42 during the audit. Longford County Council representatives confirmed that this monitor is reading too low, compared to the 6.3 pH level recorded on a handheld instrument.

6. The new (third) DAF unit is a Veolia Spidflow rapid DAF process with turbomix reactor. It will increase the overall CFC capacity at the plant by 155 m3/hr and will allow a reduction of flow through the other two DAF units which will alleviate some pressure on the plant. The new DAF was in place on the day of the audit but is yet to be commissioned. It is expected to begin operating in Q1 2022.

3. Filtration

		Answer
3.1	Are the filters designed and managed in accordance with EPA guidance?	No

Comment

1. There are 8 rapid gravity filters at the plant. Filters No. 1 & 2 were refurbished in 2019. Filters No. 3, 4 & 5 had sand topped-up in 2020. Filter No. 6 was refurbished in 2020. Filters No. 7 & 8 were built in 2012/2013 and have not been refurbished since.

2. There are currently no flow meters or run-to waste facility on the filters. The planned upgrade works include the installation of flow meters on individual filters, new run-to waste facility to ensure filters are < 0.2 NTU before being brought back into service, new air blowers and new backwash pumps. The expected timeframe for this filter upgrade work is the end Q1/early Q2 2022.

3. The turbidity monitors on Filters No. 1 & 2 were damaged and not reading accurately at the time of the BWN incident on 03/11/21. The problem with the monitors had been reported by Longford County Council on 01/10/21. An instrument technician attended the site and repairs were attempted, however both instruments were beyond repair and new instrument were being procured and expected to arrive in December (delay due to supply chain issues). After the BWN incident, new turbidity monitors were urgently sourced and installed on Filter No. 1 on 22/11/21 and Filter No. 2 on 18/11/21.

4. The turbidity setpoint on the filters is currently 4 NTU which triggers a backwash. This level is well above the EPA recommended filter turbidity performance criteria of 0.3 NTU to demonstrate and verify an effective *Cryptosporidium* barrier. Irish Water and Longford County Council explained that it is not possible to immediately re-set it to 0.3 NTU because this would result in constant filter backwashing. An upgrade of the plant's PLC system is needed to link the turbidity setpoint and time, e.g. turbidity > 0.3 NTU for 15 minutes. During the audit, Irish Water could not confirm a timeframe for implementing this control on filter operations at the plant.

5. Longford County Council identified an issue with possible electrical interference between the turbidity monitors and the SCADA system which could lead to SCADA data being unreliable. They are investigating this matter further.

6. During the audit the turbidity readings were as follows:

- Raw water: 0.657 NTU
- Filter No. 1: 0.039 NTU
- Filter No. 2: 0.13 NTU
- Filter No. 3: in backwash
- Filter No. 4: 0.12 NTU
- Filter No. 5: 0.07 NTU
- Filter No. 6: 0.16 NTU
- Filter No. 7: 0.12 NTU
- Filter No. 8: 0.15 NTU
- Final water: 0.09 NTU

These turbidity levels demonstrate that the plant was producing safe water during the audit.

7. Filter No. 6 was refurbished in 2020, however following investigations into the poor performance of this filter compared to the other filters, Longford County Council discovered that incorrect sand was installed in the filter. The sand particle size is smaller than required for a rapid gravity filter. As a result, Filter No. 6 is not able to treat the desired volumes and so smaller quantities are going through this filter. This is putting pressure on the adjacent Filter No. 5 & 7, increasing their volume loading. Irish Water and Longford County Council are awaiting a timeframe from the contractor for when the sand in Filter No. 6 will be replaced. This is being followed up as a matter of urgency.

8. There are no sand depth level markers in the filters to allow the sand depth to be easily read by operational teams and to ensure a minimum of 1000 mm sand is being maintained in the filters at all times.

4. Disinfection

		Answer
4.1	Is the disinfection system verified using monitors and alarms, with trended data recorded and accessible?	Yes

Comment

1. The disinfection system at Lough Forbes WTP was upgraded in 2019 under Irish Water's National Disinfection Programme.

2. The water supply is disinfected using sodium hypochlorite (10/11% concentration). There are duty and standby dosing pumps with automatic switchover between the pumps.

3. The target chlorine concentration in final water leaving the plant is 1.95 mg/l. During the audit the final water chlorine monitor was reading 1.96 mg/l.

4. Chlorine contact time (Ct) of 112.28 mg.min/l is provided in the rising main to Prucklish Reservoir. This satisfies the target Ct of 23.4 mg.min/l for the current maximum flow rate of 370 m3 and the proposed maximum flow of 425 m3/hr post upgrade works at the plant. There is a chlorine monitor with double validation at Prucklish Reservoir inlet and a further chlorine monitor at Prucklish Reservoir outlet. There are no connections served before the reservoir.

5. The chlorine alarms on final water leaving the plant are as follows:

- Low alarm: 1.3 mg/l for 300 seconds – alarm text message sent to caretakers
- Low low alarm: 1.0 mg/l for 300 seconds – plant shutdown
- High alarm: 3.2 mg/l for 300 seconds – alarm text message sent to caretakers
- High high alarm: 3.5 mg/l for 300 seconds - plant shutdown

5. Management and Control

		Answer
5.1	Is the plant suitably managed and controlled to maintain the designed log credit on each treatment stage?	No

Comment

1. Irish Water has calculated the protozoal log removal requirement for Lough Forbes WTP as 3 log, pending confirmation following completion of a source and sanitary survey. The log treatment credit provided by the clarification and filtration processes is 3 log.

2. The filter turbidity backwash setpoint is not currently set at an appropriate level to verify the log credit performance of the clarification and filtration processes.

		Answer
5.2	Are suitable alarm settings in place to alert operators to deteriorating water quality and/or the failure of a critical treatment process?	Yes

Comment

1. There are suitable alarms in place to alert operators to a failure of a critical treatment process.

2. The setpoint for filter backwash needs to be reduced from 4 NTU, as identified earlier in the Filtration section of this report.

6. Drinking Water Quality

		Answer
6.1	Have relevant failures to comply with the requirements of the European Union (Drinking Water) Regulations 2014, as amended, been notified to the EPA?	Yes

Comment

1. Irish Water has notified the EPA of 40 exceedances of the THM parametric value of 100 ug/l in Longford Central PWS in network samples taken since June 2021. In Q3 2021, the EPA re-added this supply to its Remedial Action List (RAL) for persistent THM failures. The supply had previously been removed from the RAL in Q1 2020 based on Irish Water's demonstration of THM compliance following optimisation of the DAF processes and optimisation of network configuration to reduce water age. However, these works failed to provide an enduring solution and THM non-compliances re-emerged in this supply in the summer of 2021.

2. The upgrade works underway at Lough Forbes WTP will assist in removing THM precursors in the water supply. Once the upgrade works are complete, Irish Water will need to undertake a verification monitoring programme across the distribution network to verify if the upgrade works have restored THM compliance. The optimisation of network configuration may also be necessary to reduce water age, to minimise THM formation.

		Answer
6.2	Is Cryptosporidium monitoring being carried out in accordance with Irish Water's 'Rationale for Determining the Frequency of Cryptosporidium Monitoring in Public Water Supplies'?	Yes

Comment

1. A *Cryptosporidium* sampling rig has been installed on the final water at Lough Forbes WTP to facilitate the weekly *Cryptosporidium/Giardia* sampling programme and reactive sampling if filter turbidity levels rise above 0.3 NTU.

2. There has been no detections of *Cryptosporidium/ Giardia* in the final water samples taken on 19/10/21, 11/11/21, 18/11/21 and 25/11/21.

7. Site Specific Issues

		Answer
7.1	Is there automatic switchover between the duty and standby dosing pumps for all water treatment chemicals used at Lough Forbes water treatment plant?	No

Comment

There is automatic switchover between the duty and standby dosing pumps at the disinfection system. However, there is no automatic switchover between the duty and standby dosing pumps for alum, poly and soda ash at the plant.

		Answer
7.2	Having regard to the Drinking Water Safety Plan for Longford Central PWS, has Irish Water provided details of the “very high” and “high” risks for the supply?	No

Comment

Irish Water confirmed that the hazard identification stage of the Drinking Water Safety Plan was completed for Longford Central PWS in 2020. However the Asset Improvement Plan (AIP) is not yet complete so the details of the 6 “very high” and 16 “high” risks has not be provided to the EPA.

Recommendations

Subject	Longford Central PWS Audit Recommendations	Due Date	14/01/2022
Action Text	**Recommendations** **Irish Water is responsible for ensuring a safe and secure supply of drinking water. To address these issues, Irish Water should implement the following recommendations without delay.** 1. Irish Water should inform the EPA when the third DAF unit commences operation and when installation of pH correction on the raw water has been completed. 2. Irish Water should optimise the performance of the DAF processes, in particular the EPS DAF unit, to minimise the carryover of floc onto the filters. 3. Irish Water should ensure that the pH monitor on the EPS DAF unit is reading accurately. 4. Irish Water should maintain an operational performance level of < 0.3 NTU for the filtered water turbidity levels, to ensure the performance of the *Cryptosporidium* treatment barrier can be verified at all times. 5. Irish Water should ensure that turbidity alarms and backwash setpoints on individual filters are not above 0.3 NTU turbidity performance criteria for rapid gravity filters. 6. Irish Water should complete the investigation into the possible electrical interference between the filter turbidity monitors and the SCADA system, and confirm that the SCADA data is reliable and a true representation of filtered water quality. 7. Irish Water should complete the remedial works to replace the sand in Filter No. 6 as soon as possible, to improve filter operations at the plant. 8. Irish Water should install a sand level depth marker in the filters, to allow the sand depth to be easily read by operational teams and to ensure a minimum of 1000 mm sand is being maintained in the filters at all times. 9. Irish Water should ensure there is automatic switchover between the duty and standby dosing pumps for all water treatment chemicals used at Lough Forbes water treatment plant. 10. Irish Water should provide details of the Drinking Water Safety Plan “very high” and “high” risks identified for the supply and plans in place to address these risks. **Follow-Up Actions required by Irish Water** During the audit, Irish Water and Longford County Council representatives were advised of the findings and that action must be taken as a priority to address the issues raised. This report has been reviewed and approved by Dr. Michelle Minihan, Senior Inspector, Drinking Water Team. Irish Water should submit a report to the Agency on or before 14/01/22 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 time frame 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.		