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	Fingal Zone 1
Organisation	Irish Water
Scheme Code	0900PUB1001
County	Dublin
Site Visit Reference No.	SV20659

Report Detail

Issue Date	06/11/2020
Prepared By	Aoife Loughnane

Site Visit Detail

Date Of Inspection	13/10/2020	**Announced**	No
Time In	14:00	**Time Out**	15:30
EPA Inspector(s) **Additional Visitors**	Aoife Loughnane Michelle Minihan Orla Harrington*		
Company Personnel	Irish Water: Andrew Boylan, Edward Haythornthwaite, Tselophile Tlou, Ivan Corcoran*, Agnieszka Wojdowska* Fingal County Council: Derek Judge, Thomas Brennan. *attended pre-site meeting only (12/10/20)		

Summary of Key Findings

1. Irish Water has completed the filter upgrade works at the old plant at Leixlip water treatment plant, in accordance with the action programe for this supply on the EPA's Remedial Action List (RAL). A review of SCADA graphs of turbidity levels demonstrates satisfactory filter performance for the two week period from 25/09/20 to 08/10/20.

2. The installation of UV disinfection at the old plant is on track for completion in Q1 2021, in accordance with the RAL action programme.

3. A visual observation of the clarifiers in the old plant found pin floc rising to the surface and carrying over into the decanting channels, which indicates that the clarification process is not operating satisfactorily. At the audit, Irish Water and Fingal County Council gave verbal assurance that the clarification process is operating optimally for the current plant configuration, in the absence of pH correction prior to coagulation. Irish Water needs to provide technical evidence to support the assertion that the clarification process is operating optimally at the plant.

4. Irish Water has still not installed pH correction prior to coagulation at Leixilip water treatment plant, despite this being identified as an audit recommendation in the EPA audit carried out in March 2019. Irish water has confirmed that pH correction will be installed as part of the overall coagulation, flocculation & clarification (CFC) upgrade works by Q2 2023. The EPA is considering escalating enforcement action on this matter.

Introduction

Leixlip water treatment plant is the second largest water treatment plant in the country, which supplies water to 590,167 people in the Greater Dublin Area. Raw water is abstracted from the River Liffey impoundment adjacent to the plant. Treatment consists of screening, coagulation, flocculation, clarification, rapid gravity filtration, chlorination and fluoridation.

On the day of the audit, the plant was producing 180 ML of treated water in the three production zones:

- Old plant: Paterson Candy International (PCI): 87 ML
- Old plant: Mahon & McPhillips (MMcP): 27 ML
- New plant: 66 ML

Leixlip water treatment plant was added to the EPA's Remedial Action List (RAL) in November 2019 following two Boil Water Notice incidents which highlighted treatment deficiencies at the plant. Irish Water's RAL action programme involves the completion of filter upgrade works by September 2020 and the installation of UV disinfection at the old plant by March 2021.

The purpose of the audit was to verify satisfactory plant performance following the completion of filter upgrade works, and to assess Irish Water’s performance in implementing the recommendations from the EPA audits in March, October & November 2019.

Supply Zones Areas Inspected

In light of Covid-19 social distancing and enhanced hygiene measures, the audit comprised of a video conference meeting on 12/10/20 followed by a site visit with essential audit participants on 13/10/20.

The clarifiers & filters at the old plant were inspected during the site visit, along with a visual observation of the construction works for the new UV disinfection system.

1. Supply on the Remedial Action List

		Answer
1.1	Is the Action Programme on track to meet the Remedial Action List completion date?	Yes

Comment

1. Filter upgrade works

The filter upgrade works at the PCI plant were completed in early October 2020. The refurbished filters are configured as follows:

- 5 dual media (sand & anthracite): Filter No.'s 1, 2, 4, 8 & 12
- 7 single media (sand): Filter No.'s: 3, 5, 6, 7, 9, 10 & 11

The SCADA graphs of filter turbidity levels at the PCI plant for the two week period from 25/09/20 to 08/10/20 were reviewed and demonstrated satisfactory performance. During that period, the filters met an operational performance level of <0.3 NTU for individual filters and <0.2 NTU for the average filtered water turbidity levels entering into supply. This demonstrates an effective barrier to *Cryptosporidium/Giardia* at the old plant.

2. Ultraviolet disinfection

The installation of UV disinfection at the old plant is on track for completion in Q1 2021, with verification data to be submitted to the EPA in Q2 2021. Construction works are well underway on a concrete chamber to house the new UV disinfection system adjacent to the clear water tanks.

Irish Water has not yet identified a timeframe for the installation of UV disinfection at the new plant. This project is currently with Irish Water's Asset Planning Team, with no confirmed delivery timeframe.

2. Site Specific Issues

		Answer
2.1	Have the recommendations from the EPA audits in March, October and November 2019 been addressed at Leixlip water treatment plant?	No

Comment

1. Irish Water has not yet installed pH correction prior to coagulation at Leixlip WTP, despite this being identified as an audit recommendation in the EPA audit carried out in March 2019. Irish Water has now confirmed that pH correction will be installed as part of the overall coagulation, flocculation & clarification (CFC) upgrade works, with a completion timeframe of Q2 2023. Irish Water's justification for the Q2 2023 completion timeframe is due to a combination of factors including time required for planning permissions and other statutory processes, availability of budgets and prioritisation against a portfolio of needs.

The scope of the works includes the following:

- Installation of new pre-treatment sulphuric acid dosing to allow a reduction in the coagulation pH at both the old and new plants.
- Installation of coagulation control systems for the old plant.
- Installation of new final water pH correction to raise the final water pH at both the old and new plants.
- Upgrade of the Mahon McPhillips clarifiers including replacement of current lamella plates with tube settlers.
- Replacement of the filter media in all single/mono media filters with dual media (10 no. filters).
- Replacement of backwash pipework including construction of new backwash rising main at the old plant.
- Replacement of valves to clarifiers & filters.
- Upgrading and enhancement of floc mixing facilities.
- Associated site telemetry and SCADA upgrades for control and alarms.
- Construction of buildings and kiosks as required.

2. The collapsed lamella plates in clarifier/settlement tank No. 21 have not been repaired or replaced despite this being identified as an audit recommendation in the EPA audit carried out in November 2019. Irish Water confirmed this will be done as part of the CFC upgrade works by Q2 2023.

3. Irish Water has installed automatic switchover of the duty and standby poly dosing pumps at the new plant. Further work is required to ensure satisfactory operation of the standby poly dosing pumps at the Mahon & McPhillips plant. After the audit, on 05/11/20 Irish Water confirmed to the EPA that this work had been completed successfully.

4. Irish Water has completed the repair works on the alum storage tanks at the old plant.

		Answer
2.2	Were the coagulation, flocculation & clarification (CFC) processes observed to be operating satisfactorily during the audit?	No

Comment

1. A visual observation of the clarifiers in the old plant found pin floc rising to the surface and carrying over into the decanting channels. This indicates that the clarification process is not operating satisfactorily.

2. Irish Water and Fingal County Council gave verbal assurance at the audit that the clarification process is operating optimally for the current plant configuration, in the absence of pH correction prior to coagulation. Irish Water agreed to provide evidence to justify this assertion.

		Answer
2.3	Were the filters observed to be operating satisfactorily during the audit?	No

Comment

1. A backwash of Filter No. 8 was observed during the audit. The backwash cycle did not go as planned because water drained from the filter before the air scour was completed. Irish Water confirmed there was no risk to final water quality, and only water that was intended to enter the drinking water channel did so.

2. Following the audit, Irish Water provided the following information in relation to the malfunction of the backwash process:

- The drain-down stage of the backwash occurred for an additional 2 minutes while the air blowers were running. As the drain-down came to an end, an outlet valve did not fully close, causing a mixture of air and filtered water to leave the filter for a period of 2 minutes.
- The highest turbidity reading was 0.13 NTU. After 2 minutes, once the valve was closed fully, no further water or air left via the outlet.
- Under normal circumstances this backwash would have been abandoned, as the air scour phase was insufficient. The operator continued with the backwash sequence so that it could be observed as part of the audit.
- This filter did not return to service following the backwash observed during the audit. After the audit, another backwash was observed by Irish Water and Fingal County Council. It followed the normal backwash sequence, and the filter was then returned to service.

		Answer
2.4	Is the final treated water being monitored for Cryptosporidium/Giardia?	Yes

Comment

Irish Water is undertaking monitoring of *Cryptosporidium/Giardia* in the final treated water twice weekly at Leixlip WTP. There have been 97 clear results since the last *Giardia* detection on 08/02/20.

		Answer
2.5	Has the protozoal compliance log deficit ben addressed at Leixlip water treatment plant?	No

Comment

In order to achieve and demonstrate protozoal compliance at Leixlip WTP, Irish Water has provided evidence to confirm the River Liffey source requires 4 log removal for protozoa. Irish Water is currently installing a UV disinfection system at the old plant to address the protozoal compliance log deficit by adopting the following operating protocol:

1. **Option 1: CFC & RGF (enhanced coagulation)** operating regime of <0.1 NTU for 95% of each individual filter run, to provide 4 log credit treatment for 110 days (30% of the year). Under this regime, there will be no requirement for UV disinfection due to zero log deficit.
2. **Option 2: CFC & RGF** operating regime of <0.3 NTU for 95% of each individual filter run, to provide 3 log credit treatment for 237 days (65% of the year). Under this regime, the UV disinfection system will operate at a reduced dose to achieve 1 log credit, to make up a total of 4 log credit treatment.
3. **Option 3: Emergency UV** operating regime of < 1 NTU, to provide 3 log credit treatment for 18 days (5% of the year). Under this regime, there will be a 1 log treatment deficit.

Option 1 will not be possible until the CFC upgrade works have been completed in Q2 2023. Until then, options 2 and 3 will be the only options available.

Irish Water has not identified a timeframe or operating protocol for the installation of UV disinfection at the new plant.

Recommendations

Subject	Leixlip WTP Audit Recommendations	Due Date	04/12/2020
Action Text	**Recommendations** 1. Irish Water should provide technical evidence to support the assertion that the clarification process is operating optimally for the current plant configuration, in the absence of pH correction prior to coagulation at Leixlip water treatment plant. 2. Irish Water should complete the upgrade of the coagulation, flocculation and clarification (CFC) processes at Leixlip water treatment plant no later than 30th June 2023. The scope of upgrade works should include: i. Installation of new pre-treatment sulphuric acid dosing to alllow a reduction in the coagulation pH at both the old and new plants; ii. Installation of coagulation control systems for the old plant; iii. Installation of new final water pH correction to raise the final water pH at both the old and new plants; iv. Upgrade of the Mahon McPhillips clarifiers including replacement of current lamella plates with tube settlers; v. Replacement of the filter media in all single/mono media filters with dual media (10 no. filters); vi. Replacement of backwash pipework including construction of new backwash rising main at the old plant; vii. Replacement of valves to clarifiers and filters; viii. Upgrading and enhancement of floc mixing facilities; ix. Associated site telemetry and SCADA upgrades for control and alarms; x. Construction of buildings and kiosks as required. 3. Irish Water should repair or replace the collapsed lamella plates in clarifier/sedimentation tank No. 21 at the old plant without further delay. 4. Irish Water should ensure that UV disinfection is installed and commissioned at the old plant by March 2021, in accordance with the RAL action programme. 5. Irish Water should identify a timeframe for the installation of UV disinfection at the new plant. 6. Irish Water should continue the monitoring programme for *Cryptosporidium/Giardia* in the final treated water at Leixlip water treatment plant. Once UV disinfection is in place. the requirement for such monitoring can be re-evaluated in consultation with the EPA and HSE. **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 Dr. Michelle Minihan, Drinking Water Senior Inspector. Irish Water should submit a report to the Agency on or before 04/12/20 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.		