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	Enniscorthy
Organisation	Irish Water
Scheme Code	3300PUB1491
County	Wexford
Site Visit Reference No.	SV25655

Report Detail

Issue Date	14/07/2022
Prepared By	Criona Doyle

Site Visit Detail

Date Of Inspection	22/06/2022	**Announced**	Yes
Time In	11:35	**Time Out**	15:30
EPA Inspector(s)	Criona Doyle Lisa Noone		
Additional Visitors	Cormac MacGearailt		
Company Personnel	Irish Water: Pat Duggan Wexford County Council (acting under service level agreement to Irish Water): Tadhg O'Corcora, Gary Duggan, Enda Flynn, Anthony Nolan, Eamonn Doyle		

Summary of Key Findings

1. A Boil Water Notice was placed on the Enniscorthy Public Water Supply (PWS) from 23/05/22 to 03/06/22 due to an increase in turbidity levels and the detection of *Cryptosporidium* in the final treated water. The audit found that the incident was responded to and suitably escalated to protect human health.

2. A number of the recommendations from the previous audit (25/03/2021) have not been fully completed to date including the installation of automatic plant shutdown linked to the turbidity alarms. A list of upgrade works is currently being finalised by Irish Water to form part of a planned major upgrade of the Vinegar Hill Water Treatment Plant (WTP) with an expected completion date of Q4 2024 subject to planning. A number of improvement works have been completed since the last audit including the replacement of the filter media and modifications to the filter backwashing process.

3. The plant was operating satisfactorily on the day of the audit.

Introduction

The Enniscorthy Public Water Supply (PWS) supplies on average 3,250m3/d of treated water serving a population of 11,995. The supply is composed of a surface water abstraction from the River Slaney which is treated at the Vinegar Hill Water Treatment Plant supplemented by 2 no. groundwater sources (Kilagoley and Edermine Boreholes).

Treatment at Vinegar Hill WTP includes coagulation, flocculation and clarification (CFC), rapid gravity filtration (RGF), pH correction, chlorination and fluoridation.

Groundwater from the Kilagoley Borehole (600m3/d) undergoes pH correction and chlorination prior to being pumped to the high level reservoir at Vinegar Hill WTP.

Groundwater from the Edermine Borehole (620m3/d) undergoes pH correction, chlorination and UV disinfection and the treated water is distributed to the network with a portion also being pumped to the high level reservoir at Vinegar Hill.

The audit was carried out in response to the detection of *Cryptosporidium* in the final water at the Vinegar Hill WTP on 22/05/22 and the placing of a Boil Water Notice on the supply from 23/05/22 to 03/06/22.

Supply Zones Areas Inspected

The auditors examined the treatment processes at Vinegar Hill WTP, Kilagoley Borehole and Edermine Borehole. The raw water abstraction at Clonhasten and the treated water reservoirs were not visited.

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

1. Trends submitted prior to the audit indicate the raw water turbidity at the River Slaney Clonhasten intake started to rise on 18/05/22 due to rainfall.

2. Wexford County Council outlined that on the afternoon of Friday 20/05/22 the filtered water turbidity at Vinegar Hill WTP began to increase from approximately 17:00 hours. The turbidity rose above the turbidity high level critical alarm setpoint of 0.30 NTU at 18:05 hours and a high level critical alarm was generated. This was followed by a further high level critical turbidity alarm at 18:57 hours. There is no automatic plant shutdown linked to the high level critical turbidity alarm setpoints on the individual filters or the combined final filtered water. In response to the critical alarms the Caretaker went to the WTP. The HSE were consulted on Friday 20/05/22 in relation to the elevated turbidity. The plant was shutdown for a period of 4 hours and filter backwashing was undertaken. At 00:37 hours on 21/05/22 the plant was brought back online as the turbidity had reduced below the critical high level alarm level of 0.3 NTU. Subsequently at 04:23 hours on 21/05/22 the plant automatically shutdown in response to the chlorine level dropping below the chlorine low level critical alarm setpoint of 0.70mg/l. The plant remained shutdown overnight.

3. On Saturday morning 21/05/22 the caretaker restarted the WTP and increased the chlorine levels. There continued to be an issue with the turbidity being above the high level critical alarm set point of 0.3 NTU in both the final water and in the individual filters. Wexford County Council contacted Irish Water and commenced monitoring for *Cryptosporidium*.

4. The sample from the *Cryptosporidium* rig was taken off on Sunday morning 22/05/22. The sample was taken on the outlet from the high level reservoir and is therefore a mix of treated water from all 3 no. sources.

5. The turbidity remained above the 0.3 NTU high level alarm setpoint into Monday 23/05/22. On Monday 23/05/22 Wexford County Council received confirmation of the detection of *Cryptosporidium* in the sample from 21-22/05/22. Wexford County Council and Irish Water consulted with the HSE and a Boil Water Notice (BWN) was placed on the Enniscorthy PWS on 23/05/22.

6. On Monday 23/05/22 Irish Water notified the EPA that a BWN had been issued on the Enniscorthy PWS in response to elevated turbidity and the detection of *Cryptosporidium* in the final treated water. On 25/05/22 the EPA was notified of 2 no. further *Cryptosporidium* detections.

7. The criteria agreed with the HSE for the lifting of the BWN were the return to normal turbidity levels in the final filtered water and the receipt of 3 no. clear samples for *Cryptosporidium* from the final filtered water. The BWN was lifted on 03/06/22. The boil water notice was kept in place until the filter media had been replaced in Filter No.1.

8. The audit found that the incident had been appropriately escalated and public health was protected by the placing of a BWN on the supply.

2. Source Protection

		Answer
2.1	Is the abstraction source(s) adequately protected against contamination?	No

Comment

The Enniscorthy PWS is fed by two groundwater sources (Kilagoley and Edermine) and a surface water abstraction from the River Slaney at Clonhasten. The groundwater sources at Kilagolgey and Edermine were inspected. The surface water abstraction intake at Clonhasten was not inspected.

The Kilagoly Borehole is located in a residential area of Enniscorthy Town. There are two boreholes located below ground level in secure chambers within the fenced compound with one borehole in use on the day of the audit. The Edermine Borehole is located in an above ground chamber, within a secure pump house, located on the edge of agricultural land adjacent to the River Slaney and a railwayline.

No borehole logs are available to confirm the construction details of the boreholes. Based on the visual inspection on the day of the audit the boreholes are not grouted or adequately capped. The boreholes do not meet the criteria specified in *EPA Advice Note 14: Borehole Construction and Wellhead Protection*.

3. Coagulation Flocculation and Clarification (CFC) Stage

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

Comment

1. Automatic coagulant dosing (aluminium sulphate) was in operation at the Vinegar Hill WTP on the day of the audit. Automatic coagulant dosing is controlled by the streaming current monitor. Manual dosing of aluminium sulphate is undertaken as required during periods of poor weather and in response to incidents. Polyelectrolyte is used as a coagulant aid.

2. There is currently no pH correction prior to the coagulation stage. There are pH alarm setpoints at 6.3 pH units (low level alarm) and 6 pH units (low low level alarm). The installation of acid dosing for pH optimisation and the provision of a flocculation tank is being examined as part of upgrade works currently at design stage.

3. Jar testing is not carried out on a regular basis however it was reported that jar testing is undertaken in response to incidents. The results of jar testing in response to the recent incident that lead to the placing of the BWN on the supply on 23/06/22 were not available on the day of the audit. Wexford County Council stated at the audit that they were planning on introducing routine jar testing on a weekly basis.

4. Four tanks are provided on site for the mixing of polyelectrolyte (2 no. tanks) and storage of aluminium sulphate (2 no. tanks). The standby day tanks for both aluminium sulphate and polyelectrolyte have been taken out of service as they are leaking. As a result there is a 1 hour period every 2 days during which there is no polyelectrolyte dosing taking place while a new batch of polyelectrolyte is being made up.

		Answer
3.2	Were the CFC tanks, channels and weirs observed to be clean, level and well maintained during the audit?	No

Comment

1. A build up of material was visible on several of the V notch weirs on the settled water channels. Wexford County Council stated the channels are cleaned down on a weekly basis.

2. A build up of material was visible on the walls of the contact tank for the coagulation stage Wexford County Council outlined that it is not possible to drain down this tank for cleaning.

4. Filtration

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

Comment

1. Filter backwashing is triggered by head loss, turbidity and on a time basis (every 72 hours) as per *EPA Water Treatment Manual: Filtration*.

2. As outlined in the previous EPA audit (25/03/21) there is no run to waste following backwashing and no automatic plant shutdown linked to turbidity alarm setpoints. These works are to be included under the major upgrade works planned for the Vinegar Hill WTP.

3. Improvement works have been implemented since the previous audit (25/03/2021) including (i) the resanding of filter media in the 3 no. rapid gravity filters (ii) an increase in the time delay following backwashing from 20 minutes to 1 hour and (iii) an increase of the backwash run times to 5 minutes for air scour followed by 15 minutes backwashing.

4. The filter media in the 3 no. rapid gravity filters was replaced during May and June 2022. The filter media is composed of 460mm of graded gravel support media and 660m of sand. This is less than the 1m minimum depth of sand recommended in the *EPA Water Treatment Manual: Filtration*. In response to the previous audit on 25/03/21 a filter assessment was undertaken and it was determined that the hydraulic design of the plant and filters does not allow for the sand depth to be increased to between 1000mm-1200mm.

5. There are continuous turbidity monitors on each of the individual filters and on the the combined final filtered water from the Vinegar Hill WTP. In response to the previous audit on 25/03/21 Irish Water had relocated the final water turbidity monitor at the Vinegar Hill WTP to before the reservoirs. However this monitor is not currently in operation due to periods when there is no water in the sample line causing spurious alarm generation. The final water turbidity from the Vinegar Hill WTP is currently being monitored on the outlet from the low level reservoir.

		Answer
4.2	Does monitoring indicate that the filters are operating effectively?	Yes

Comment

Satisfactory turbidities were observed at the audit: Filter 1 0.059 NTU; Filter 2 0.076 NTU; Filter 3 0.070 NTU and Final Water 0.067 NTU.

5. Disinfection

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

Comment

There were satisfactory high and low chlorine alarms and shutdown setpoints at all 3 no. water treatment plants (Vinegar Hill WTP, Kilagoley Borehole and Edermine Borehole) and satisfactory alarms and shutdowns on the UV disinfection at the Edermine Borehole.

		Answer
5.2	Is the chlorine dosed appropriately?	Yes

Comment

Chlorine dosing at Vinegar Hill WTP and Edermine Borehole is flow proportional and linked to the residual chlorine monitor to provide a residual trim while dosing at Kilagoley Borehole is flow proportional.

		Answer
5.3	Is there a suitable monitoring frequency for residual chlorine in the network with records available?	No

Comment

The residual chlorine monitoring records indicate monitoring of network residual chlorine levels is being monitored weekly in the network. The records inspected indicated the levels were satisfactory.

6. Management and Control

		Answer
6.1	Have the recommendations from the previous EPA audit been satisfactorily addressed?	No

Comment

Previous audit recommendations No. 2, No. 5, No. 7 and No. 8 have been addressed.

The following recommendations from the previous audit undertaken on 25/03/2021 are ongoing and future progress with these recommendations will be tracked under this audit report:

No.1 Irish Water should carry out a risk based source characterisation assessment on all sources for the Enniscorthy PWS and identify the protozoal compliance log requirement for the Vinegar Hill water treatment plant, providing a timeframe and report to the EPA without delay.

Status: The protozoal log treatment requirement for the groundwater sources (Edermine Borehole & KIlagoley Borehole) could not be confirmed as a new methodology for the assessment of groundwater sources is currently under development by Irish Water. The protozoal log treatment requirement for the surface water source (River Slaney at Clonhasten) has been calculated as a 3 log requirement. The coagulation and filtration stages at the Vinegar Hill WTP should provide 3 log removal when operated within the performance criteria specified in the *EPA Water Treatment Manual: Filtration*. *Cryptosporidium* monitoring is being undertaken as per the *Irish Water Rationale for Determining the Frequency of Cryptosporidium Monitoring in Public Water Supplies*. Wexford County Council and Irish Water confirmed *Cryptosporidium* monitoring is being undertaken on a monthly frequency.

No. 3 Irish Water should investigate the feasibility of implementing automatic shutdowns and run-to-waste procedures to ensure inadequately disinfected water does not enter the network in the event of any failure of the disinfection system or failure of the *Cryptosporidium* barrier.

Status: Automatic plant shutdown is provided in response to the critical high and low chlorine alarms. There is no automatic plant shutdown linked to the critical turbidity alarms for the *Cryptosporidium* barrier. A run to waste facility has not been installed to date. Upgrade works are currently at design stage to address these issues.

No. 4 Irish Water should relocate the final water turbidity monitor to before the reservoirs and review the final water alarm setpoints to ensure staff are alerted to any failure of the disinfection system or failure of the *Cryptosporidium* barrier, in the most efficient and effective manner possible.

Status: A new final water turbidity monitor was installed before the reservoirs. However this monitor is not currently in operation as it was causing the generation of spurious alarms. The final water turbidity is currently being monitored on the outlet from the low level reservoir.

No. 6 Irish Water should ensure that all filters at the Vinegar Hill water treatment plant have the minimum sand media depth of 1000-1200 mm as per the requirements of the EPA filtration manual.

Status: The filter media has been replaced in all 3 filters to 660mm, however the hydraulic design of the plant and filters does not allow for the sand depth to be increased to between 1000mm-1200mm. The walls of the filters have been marked with the 660mm sand depth. The freeboard height has been increased.

No. 9 Irish Water should ensure that the high and low level reservoirs are cleaned in 2021.

Status: Cleaning of the low level reservoir is complete. An access road has been installed to allow for cleaning of the high level reservoir. Wexford County Council indicated that the cleaning of the reservoir is expected to be completed within a month of the date of the audit.

Recommendations

Subject	Enniscorthy Audit	Due Date	14/08/2022

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 provide details of the proposed upgrade works at the Vinegar Hill WTP and associated timeframes for completion.
2. Irish Water should ensure that all filters at the Vinegar Hill WTP have the minimum sand media depth of 1000-1200 mm as per the requirements of the *EPA Water Treatment Manual: Filtration* (outstanding since previous audit).
3. Irish Water should complete the installation of automatic shutdown linked to the turbidity alarm setpoints (outstanding since previous audit).
4. Irish Water should complete the installation of a run to waste following backwashing (outstanding since previous audit).
5. Irish Water should carry out a risk based source characterisation assessment on all sources for the Enniscorthy PWS and (a) provide details of the protozoal log treatment requirement for the groundwater sources (Kilagoley Borehole and Edermine Borehole) and (b) provide details on how any protozoal log deficit will be addressed (outstanding since previous audit).
6. Irish Water should ensure the issue with the final combined turbidity monitor before the reservoir is resolved (outstanding since previous audit).
7. Irish Water should confirm that the cleaning of the high level reservoir has been completed (outstanding since previous audit).
8. Irish Water should (i) ensure that the settled water outlet channels, clarifiers and coagulant contact tank are cleaned on a regular basis to prevent build-up of algae on the weirs and walls of the clarifiers and coagulant contact tank; (ii) carry out jar testing as outlined in Section 3.3.1 and Appendix C of the EPA publication "*Water Treatment Manual: Coagulation, Flocculation and Clarification*" to determine the optimum chemical coagulant dose and pH for the treatment of the water. The frequency of checks should be appropriate to the nature of supply and changing conditions. Results should be recorded at the treatment works and used for control of the treatment plant and (iii) ensure that the leaks in the standby aluminium sulphate and polyelectrolyte day tanks are repaired.
9. Irish Water should ensure (i) monitoring of residual chlorine is undertaken several times per week at different points of the network to include the network extremities and (ii) should relocate the residual chlorine monitoring point for the Kilagoley Borehole to a location after contact time has been achieved.
10. Irish Water should ensure that all borehole linings and seals are maintained in accordance with *EPA Advice Note No. 14: Borehole Construction and Wellhead Protection*.

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 Regina Campbell, Drinking Water Team Leader.

Irish Water should submit a report to the Agency on or before 14/08/22 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.

Please quote Compliance Plan DW20210024 in any future correspondence in relation to this Report.