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	Adare PWS
Organisation	Irish Water
Scheme Code	1900PUB1002
County	Limerick
Site Visit Reference No.	SV22792

Report Detail

Issue Date	22/10/2021
Prepared By	Orla Harrington

Site Visit Detail

Date Of Inspection	24/09/2021	**Announced**	Yes
Time In	11:00	**Time Out**	13:15
EPA Inspector(s) **Additional Visitors**	Orla Harrington		
Company Personnel	Irish Water: Tommy Roche**, Deirdre O'Loughlin* and Paul O'Leary**. Limerick City and County Council (acting under service level agreement to Irish Water): Peter Fee**, Natasha McGarry**, Shaun Mcloughlin**, Tom Carmody**, John O Halloran**, Peter McEvoy*, Liam Fanning***. * attended pre-site meeting 23/09/21 ** attended pre-site meeting 23/09/21 and site visit 24/09/21 *** attended site visit only 24/09/21		

Summary of Key Findings

1. The filters at Adare water treatment plant (WTP) are not currently being operated in accordance with the log credit approach as set out in the EPA's Water Treatment Manual: Filtration, therefore the performance of the plant's *Cryptosporidium* barrier cannot be verified.

2. The management of sludge from the treatment processes at the Adare WTP is unsatisfactory. Irish Water should put in place measures to eliminate sludge discharge to the river without delay.

3. The supply has two main raw water sources, a surface water source from the Maigue river and a groundwater source referred to as PW03. Irish Water intend to replace the river source with a groundwater well. Irish Water were unable to provide a timeframe for when the necessary verification monitoring will be complete and and the new borehole fully commissioned.

Introduction

The Adare public water supply (PWS) serves approximately 2,300 people and is treating an approximate volume of 900m3/day. The design capacity of the plant is between 1,300 and 1,400m3/day. The water treatment plant is located in the townland of Derryvinnane, approximately 3km south of Adare town and 170m from the Maigue River. The supply has two raw water sources, the Maigue River and one groundwater borehole (PW03), serving 40m3/hr and 26m3/hr respectively. There are two other groundwater sources at the plant, referred to as PW01 and PW02, which are currently not serving the supply.

Treatment of the surface water source consists of coagulation, flocculation, hopper-bottomed tank settlement, rapid gravity filtration (RGF) and chlorination. The groundwater source PW03 is subject to a containerised filtration process (a Forsta 10 micron screening filter that can be backwashed) prior to chlorination. Water from the river (approximately 40m3/hr.) and borehole (26m3/hr.) are mixed in a clear water tank where it is disinfected with 14% sodium hypochlorite. The final water is then pumped to the reservoir for distribution. The plant operates 24/7 and is manned 39 hours/week.

Supply Zones Areas Inspected

The audit included a walk through of the WTP from the raw water intake points (surface water and groundwater) to the final stage of chlorination.

1. Source Protection

		Answer
1.1	Is the abstraction source(s) adequately protected against contamination?	Yes

Comment

The supply has two main raw water sources, a surface water source from the Maigue River and one groundwater borehole (PW03). There are two further production wells (PW02 & PW01) at the plant, but they are not going into supply.

Surface water source

Access to the surface water abstraction point was secure and restricted with a locked gate. There are screens at the intake which are cleaned monthly. Online monitoring of the raw water includes pH, turbidity and ammonia. On the day of the audit the monitors read a pH of 9.12, turbidity of 2.63 NTU and ammonia of <0.05mg/l. When the raw water ammonia level reaches 0.3mg/l the abstraction pumps run to waste. The pumps resume operation when the ammonia level reaches 0.2mg/l. There is a wastewater discharge at Croom, 3.8km upstream of the Adare WTP abstraction point. Limerick City and County Council advised that there is verbal communication between the Environment Section of Limerick City and County Council and the drinking water treatment plant staff in the event of an incident upstream.

Groundwater Boreholes

All three production wells at the Adare WTP were inspected on the day of the audit. The original borehole (PW01) was drilled in 2005 and prior to the drilling of PW02 and PW03 served the supply, with the majority of the demand being met by the Maigue River. Irish Water advised that it will be used as a backup supply in the future.

PW03 (140m) was drilled in May 2019 and fully commissioned in April 2021. PW02 (81m) was drilled in August 2018, however raw water monitoring showed elevated levels of turbidity, metals and the presence of coliforms. Irish Water advised that this was due to sediment ingress at the base of PW02 from a large fissure at 80m. This sediment is mobilised at a pumping rate of over 20m3, or following intense rain events. Irish Water advised that further well development and testing is required before it can be fully commissioned and brought into supply, to replace the surface water source. All 3 boreholes at the plant are located in secure kiosks with concrete plinths and are well protected in accordance with EPA guidance. Flow rates and turbidity are continuously monitored and linked to SCADA, there is also a manual run to waste system on all three boreholes.

2. Coagulation Clarification Flocculation (CFC) Stage

		Answer
2.1	Are the CFC processes appropriately controlled?	No

Comment

There is no pH correction at the plant, before the raw water is flow proportionally injected with aluminum sulphate for coagulation. The raw water contact time with the coagulant is 6 minutes, from where it is injected to the time it takes to travel to the settlement tank. Limerick City and County Council stated that the required dose is generally 5.5 litres/hr but can increase to 14 litres/hr if required based on jar tests. This adjustment is also influenced by raw water quality and operator experience. The requirement for manual changes to the dose rates means that the operators must be vigilant and respond quickly to what can be rapidly changing source water in the River Maigue.

Coagulant aid is added (approximately 10 litres/hr) just prior to entering the settlement tank where there is a static mixer in place. The settlement tank has a capacity of 44m3 and is cleaned twice a year.

There is no automatic switchover between duty and standby alum and poly dosing pumps in the event of a pump malfunction. The switchover requires manual intervention and there is no alarm on the pumps in the event of a blockage. Limerick City and County Council advised that blockage of the dosing pumps rarely occurs and flow to the settlement tanks is more or less consistent at 40m3/hr.

3. Filtration

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

Comment

Following settlement the water enters a splitter chamber where it enters 4 circular rapid gravity filters. The filter media is silica sand and is replaced every two years. Limerick City and County Council confirmed that the media was last replaced in all four filters three months prior to the audit. There are two filters backwashed every 48 hours, irrespective of turbidity. There is a turbidity monitor on each filter with an alarm set point of 0.5 NTU. The rapid gravity filters are not being operated in accordance with the log credit approach as per the EPA's Water Treatment Manual: Filtration and means that the performance of the *Cryptosporidium* barrier cannot be verified. In the event that the turbidity reaches 0.5 NTU, the water automatically runs to waste. Limerick City and County Council advised that a backwash will be instigated manually if turbidity is persistently >0.5 NTU.

A run to waste or delayed start is not in place following backwashing to allow for filter ripening as the water automatically runs to waste at a turbidity of 0.5 NTU. Backwashing involves 8-10 minutes air scour followed by 10 -15 minutes of water flow. All filter backwash and run to waste water goes to a sludge holding tank onsite. On the day of the audit the monitors indicated the following turbidity readings: Filter No. 1 0.059 NTU; Filter No. 2 0.068 NTU; Filter No. 3 0.106 NTU and Filter No. 4 0.073 NTU.

The first process encountered by the raw water at borehole PW03 is two Forsta 10 micron screening filters, operating in series. The Forsta filters are housed in kiosks close to the borehole. The control criteria on the filters is differential pressure, typically operating at 2.8 bar. Irish Water stated that the filters have a backwash facility which is initiated on the development of pre- and post- filter pressure differential >1 bar. There is a turbidity monitor on the combined filters with a high alarm of 0.8 NTU and 'run to waste' is triggered at 0.95 NTU until the issue is resolved. Backwash and run to waste from these filters is discharged to a sludge holding tank onsite. On the day of the audit the turbidity monitor on PW03 read 0.029 NTU.

4. Disinfection

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

Comment

A residual chlorine monitor is located at the clear water tank to verify contact time has been achieved. Irish Water's chlorine contact calculation shows that at a minimum residual chlorine concentration of 0.71mg/l, a total effective contact time of 52.94 mg.min/l is achieved. This is greater than the target contact time for the plant of 24 mg.min/l. On the day of the audit the chlorine monitor read 0.6mg/l. A low level alarm was triggered and staff were alerted. A cascade system is also in place for responding to alarms when issued. Limerick City and County Council advised that a maintenance visit was being scheduled for that day.

The chlorine alarms at the clear water tank are as follows: (i) high: 1.5mg/l; (ii) low:0.6mg/l and (iii) low low: 0.5mg/l. There is a 60 second delay on the alarms being activated.

		Answer
4.2	Are duty and standby chlorine pumps/ UV units in operation?	Yes

Comment

Primary disinfection is provided by chlorination using 14% sodium hypochlorite. Duty and standby chlorine dosing pumps are in place, with automatic switchover. Dosing is linked to chlorine residual only.

		Answer
4.3	Is there a chlorine residual ≥0.1 mg/l throughout the network?	Yes

Comment

There is daily residual chlorine monitoring on the network and results provided indicate that levels are >0.1mg/l.

5. Treatment Process Chemicals

		Answer
5.1	Are treatment process chemicals appropriately managed and stored?	No

Comment

It was noted on the day of the audit that the aluminum sulphate and poly tanks are not adequately bunded. All chemicals must be stored in bunded areas capable of containing at least 110% of the volume of the chemicals stored therein.

6. Management and Control

		Answer
6.1	Has the protozoal compliance log treatment requirement been identified for the water treatment plant?	No

Comment

Irish Water stated that the surface water and ground water raw water sources most likely default to a 3 log protozoal treatment requirement. This has been conservatively rated at 3 log, rounded up from 2.89 log (surface water) and 2.2 log (borehole) as the sanitary and source surveys have yet to be completed. Irish Water state that if the source and sanitary survey fail there would be a 4 log protozoal treatment requirement at the plant. On the day of the audit Irish Water could not confirm what log credits can be claimed through operation of the Forsta filters.

7. Drinking Water Quality

		Answer
7.1	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

Irish Water stated that there is a monthly monitoring programme in place at the plant since July 2021 for *Cryptosporidium* in the final treated water. There have been no detections of *Cryptosporidium* to date.

8. Sludge Management

		Answer
8.1	Is sludge arising from the treatment processes adequately managed?	No

Comment

The Adare water treatment plant has inadequate sludge management and containment facilities within the water treatment plant site. The sludge generated from the on-site treatment processes within the settlement tank, washwater and 'run to waste' from boreholes and filters is directed via a pipeline to a sludge holding tank from where it discharges into the Maigue River, 10m downstream of the WTP abstraction point.

Limerick City and County Council advised that the sludge holding tank is cleaned 4/5 times per year and all sludge is sent off site for disposal to Bunlicky waste water treatment plant, Co. Limerick. However, there was evidence at the audit of elevated sludge and sludge overflow from the holding tank.

The planned connection of the new borehole (PW02) and the discontinuation of the surface water source will enable the decommissioning of the surface water treatment process and according to Irish Water the elimination of the sludge discharge. However, it is unacceptable that this waste material is discharged to the river and should be discontinued without delay. Limerick City and County Council said that there is no monitoring of the discharge to assess the impacts of the discharge on the Maigue River.

Recommendations

Subject	Adare Audit Recommendation [24/09/21]	Due Date	22/11/2021

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 ensure that the turbidity alarm and shutdown setpoints at the plant are reviewed and operated in accordance with turbidity performance criteria as per the EPA Treatment Manual: Filtration, in order to demonstrate an effective *Cryptosporidium* barrier at the water treatment plant.

2. Irish Water should consult with the HSE in relation to the plants inability to verify the *Cryptosporidium* barrier until such time as the filter turbidity alarm setpoints are reviewed.

3. The discharge of water treatment sludge to receiving water, where practiced, should cease immediately. Irish Water should review current methods of handling and disposal of water treatment sludge to ensure that the practice is not in contravention of the Waste Management Act 1996, as amended and submit a report on this review to the EPA for assessment.

4. Irish Water should carry out a full ecological assessment of the impact of the discharge from the Adare water treatment plant on the Maigue River, in consultation with Inland Fisheries Ireland. Records should be maintained on site of visual checks and monitoring carried out at the discharge point.

5. Irish Water should confirm the protozoal log treatment requirement for the plant, address any log deficits and demonstrate how the plant meets the relevant criteria to claim the log credits.

6. Irish Water should continue to undertake *Cryptosporidium* monitoring in Adare public water supply in accordance with *Irish Water's Rationale for Determining the Frequency of Cryptosporidium in Public Water Supplies.*

7. Irish Water should install automatic switchover between alum and poly dosing pumps and investigate the feasibility of installing an alarm to warn of pump failure.

8. Irish Water should ensure that the chlorine alarm set points are set at an appropriate level to ensure that the target residual concentration in the final water leaving the plant is met.

9. Irish Water should review chemical storage arrangements at the plant. Chemicals must be stored in bunded areas capable of containing at least 110% of the volume of chemicals stored therein.

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 22/11/2021 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 the Action Reference Number DW20200208 in any future correspondence in relation to this Report.