

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	Carrick-On-Suir (Lingaun River)
Organisation	Irish Water
Scheme Code	2900PUB0108
County	Tipperary
Site Visit Reference No.	SV23086

Report Detail

Issue Date	11/01/2022
Prepared By	Criona Doyle

Site Visit Detail

Date Of Inspection	17/12/2021	Announced	Yes
Time In	11:00	Time Out	14:20
EPA Inspector(s)	Criona Doyle		
Additional Visitors			
Company Personnel	Irish Water: Pat Duggan and Colin Cunningham. Tipperary County Council (acting under service level agreement to Irish Water): Sharon O'Dwyer; Brid O'Hehir and Martin Ryan.		

> Summary of Key Findings

(1) A BWN (Boil Water Notice) was placed on the Carrick On Suir (Lingaun River) Public Water Supply (PWS) on 02/11/21 in response to elevated turbidity and the detection of *Cryptosporidium*. The BWN was lifted on 06/11/21 following the receipt of 3 no. consecutive clear *Cryptosporidium* samples. Since the lifting of the BWN on 06/11/21 there have been further detections of *Cryptosporidium* (09/11/21 & 17/11/21) interspersed with clear samples. Irish Water and Tipperary County Council have consulted with the HSE in relation to these detections. A further BWN was placed on the supply on 26/12/21 in response to elevated turbidity followed by sampling on 27/12/21 and 28/12/21 which indicated further *Cryptosporidium* detections. The BWN remains in place at this time. The incidents have been escalated and managed satisfactorily. Irish Water should continue to investigate the reasons for the *Cryptosporidium* detections at the plant and undertake corrective actions where necessary.

(2) The automatic plant shutdown linked to the chlorine and turbidity alarm setpoints had not been operational for a number of weeks prior to the audit and manual shutdown is required in response to turbidity and chlorine alarms. This issue should be resolved without delay.

(3) The outcome of the recent assessment of the condition of the filters was not available at the audit however, the reported filter media depth of 600mm is less than the recommended 1m minimum in the EPA Water Treatment Manual: Filtration and needs to be increased.

> Introduction

The Carrick On Suir (Lingaun River) Public Water Supply serves a population of 3,954 and produces on average 1,474m³/d of treated water. Treatment includes coagulation, flocculation, clarification, filtration, disinfection and fluoridation. The supply was subject to a Boil Water Notice from 02/11/21 to 06/11/21 following elevated turbidity and the detection of *Cryptosporidium*. This audit was carried out to assess Irish Water's response to the incident which lead to the Boil Water Notice and to assess the operation and management of the water treatment plant. A further BWN was placed on the PWS on 26/12/21. At the time of the issue of this audit report this BWN remains in place.

> Supply Zones Areas Inspected

The audit consisted of an on site inspection of the Carrick On Suir (Lingaun River) WTP on 17/12/21. The treatment processes were inspected.



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
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Comment

Incident: The sequence of events surrounding the incidents are as follows:

On Thursday 28/10/21 the raw water colour increased at the WTP in response to heavy rainfall. Automatic coagulant dosing takes place at the WTP based on the site specific dose rates that have been developed for different colour bands. A turbidity incident occurred as the dose rate for the colour band did not work sufficiently. The final water turbidity entering the clear water tank exceeded 0.3 NTU and as a result it was not possible to verify that the *Cryptosporidium* barrier was maintained.

In response to the turbidity incident investigative monitoring samples were taken on 28th, 29th, 30th and 31st of October and tested for *Cryptosporidium*. On Tuesday 02/11/21 the following *Cryptosporidium* results were received from the laboratory: 0.0009 / 10L (sample 28-29/10/21), 0.016 / 10L (29-30/10/21) and 0.026 /10L (31/10/21 – 01/11/21). *Cryptosporidium* was not detected in the sample taken from 30-31/10/21.

On 02/11/21 Irish Water and Tipperary County Council consulted with the Health Service Executive (HSE) and a Boil Water Notice (BWN) was placed on the supply. The EPA were notified of the 3 no. detections of *Cryptosporidium* and the placing of the BWN on 02/11/21.

The criteria for lifting of the BWN agreed with the HSE was the receipt of 3 no. clear *Cryptosporidium* samples. Tipperary County Council undertook jar tests and made adjustments to the dose rates in response to the incident. Further sampling for *Cryptosporidium* was undertaken on 03-04/11/21; 04-05/11/21 and 05-06/11/21. Consultation took place between Irish Water, Tipperary County Council and the HSE on Friday 05/11/21 and it was agreed that the notice would be lifted in the event the third consecutive test result for *Cryptosporidium* was clear. On Saturday 06/11/21 the third clear sample was received from the lab and the Boil Water Notice was lifted.

On the advice of the HSE sampling for *Cryptosporidium* continued on a twice per week frequency following the lifting of the BWN. On 12/11/21 Tipperary County Council received the results of a further *Cryptosporidium* detection 0.04/10 L (sample date 09/11/21) and the HSE were consulted again. It was agreed to await the result of a further sample (10-11/11/21) which was being processed at the lab. This result and a further sample on 13/11/21 were clear.

On the 22/11/21 the HSE were consulted following a further *Cryptosporidium* detection from a sample taken on 17/11/21. The HSE advised monitoring should continue on a weekly frequency for 2 further weeks. A further sample on 25/11/21 was also clear for *Cryptosporidium*.

On the day of the audit Irish Water and Tipperary County Council outlined that further consultation was to take place with the HSE during the week of 20/12/21 to assess the monitoring frequency going forward. Subsequent to the audit a BWN was placed on the supply on 26/12/21 following consultation with the Irish Water, Tipperary County Council and the HSE in response to elevated turbidity in the final water. Sampling took place and *Cryptosporidium* was detected in the samples taken on 27/12/21 and 28/12/21. On the day of the issue of this audit report the BWN remains in place.



2. Source Protection

2.1

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

Answer

No

Comment

Monitors are installed at the raw water intake on the Lingaun River to continuously measure ammonia, dissolved oxygen, pH, turbidity, conductivity and colour. The raw water alarm set points for automatic shutdown of the intake are ammonia 0.5mg/l, dissolved oxygen 5.25 mg/l and conductivity 525 us/cm. Automatic shutdown of the raw water intake requires all 3 alarm setpoints to be triggered simultaneously. On the day of the audit the ammonia and dissolved oxygen raw water monitors were not working therefore the facility for automatic shutdown of the intake was not operational.

No information was available on the date when landowners were last contacted to inform them of their obligations under the European Union (*Good Agricultural Practice for the Protection of Waters*) Regulations 2014 (SI No. 31 of 2014) and the required setback distances from the source. Tipperary County Council outlined that due to resource issues a date could not be confirmed at present as to when this work would be undertaken.



3. Coagulation Clarification Flocculation (CFC) Stage

3.1

Are the CFC processes appropriately controlled?

Answer

No

Comment

Duty, standby and boost coagulant dosing pumps are provided. Coagulant dosing (8% aluminium sulphate) is automatically controlled by the PLC. Dosing is flow proportional with the boost dose being controlled by the colour monitor. There is no automatic switchover between duty and standby dosing pumps. Manual switch over is required between the duty / standby dosing pumps and is routinely undertaken once a week. Servicing of the coagulant dosing pumps was overdue with a service due date of November 2021 indicated on the pumps. Jar testing is undertaken in response to changing raw water conditions as required to check that the dose rate is appropriate.

Duty and standby polyelectrolyte dosing pumps (coagulant aid) are provided. Only the duty pump is in use. There is no routine switch over between the duty and standby polyelectrolyte dosing pumps. Servicing of the coagulant aid dosing pumps was overdue with a service due date of November 2021 indicated on the pumps.

3.2

Were the CFC tanks, channels and weirs observed to be clean, level and well maintained during the audit?

Answer

No

Comment

A build-up of material was observed on the walls of the sedimentation tanks and on the lamellae plates. Tipperary County Council outlined that it is not possible to undertake a deep clean of the sides of the tanks due to issues with the integrity of sedimentation tank walls. The lamellae plates and decanting channels are regularly cleaned down.



4. Filtration

Answer

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

There are 2 no. rapid gravity filters on site. In response to detections of *Cryptosporidium* in the treated water an assessment of the filters was undertaken on 01/12/2021. The findings of the assessment were not available on the day of the audit. The filter media was last replaced in 2017 and the current average media depth is reported to be approximately 600mm. The filters were originally designed to have a maximum media depth of 700mm. This is less than the 1m minimum recommended in the EPA Water Treatment Manual: Filtration.

Backwashing is normally automatically triggered on a timed basis every 24 hours. Backwashing can also be triggered automatically on head loss. There is no automatic backwashing triggered by turbidity setpoints. On the day of the audit there was an issue with the air valve on Filter No. 2 which required manual backwashing as the air valve was not opening automatically. There is no run to waste following backwashing. The filters are returned to service after a 2 to 3 minute delay. A backwash of Filter No. 2 was observed during the audit.

There are turbidity monitors on each of the individual Filters No.1 and Filter No.2 and a combined final water turbidity monitor at the clear water tank (CWT). The automatic plant shutdown linked to the turbidity alarm setpoints was not in operation on the day of the audit. Tipperary County Council indicated it had been out of operation for the previous 3.5 weeks due to an issue with the automatic shutdown valve. Both the high high turbidity alarm setpoint of 0.5 NTU (10 minutes delay) and the high turbidity alarm setpoint of 0.295 NTU (10 minutes delay) on the INTS system should trigger automatic plant shutdown however, the shutdown is not currently working and manual plant shutdown by site staff is required in response to alarms. The valve issue is also preventing automatic plant shutdown in response to a high or low chlorine alarm. There are also PMAC alarm setpoints that generate text alerts 0.25 NTU alarms setpoint (10 minutes delay) for both individual filters and the final water turbidity at the CWT.

Answer

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

There are continuous online turbidity monitors on each individual filter and on the combined final filtered water (CWT). The trend data submitted by Irish Water prior to the audit for the period 07/11/21 to 14/12/21 indicated spikes on Filter No.1, Filter No.2 and the combined turbidity trend which are reported to be related to air in the sample line which creates short duration spikes in the turbidity readings. Spikes were also observed as a result of draining down of the filters for the filter assessment works. The trend for Filter No. 1 and Filter No. 2 indicated a spike on 08/12/21 but the plant was running to waste at this time in response to the elevated turbidity. Outside of these spikes for which explanations have been provided by Tipperary County Council the turbidity was observed to be < 0.3 NTU.

On the day of the audit the following turbidities were observed Filter No. 1 0.04 NTU, Filter No. 2 0.03 NTU and combined filtered water 0.036 NTU at CWT. All turbidity alarms are received by the Caretaker, General Services Supervisor and Process Control Technician and a cascade system is in place for responding to alarms.

5. Disinfection

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

Comment

The residual chlorine trend data for the period 18/11/21 to 15/12/21, from the inlet to clear water tank (CL001) and the two validation monitors on the outlet from the CWT (CL002 & CL003), was submitted in advance of the audit. The data indicated a stable trend overall. Lower residual chlorine levels were observed on the 08/12/21 however the WTP was running to waste on this date.

The INTS alarm setpoints are as follows: shutdown alarm setpoints on the control analyser located on the inlet to the CWT (CL001) 1.20mg/l low alarm and 2.85 mg/l high alarm. There are low and high alarm setpoints on the validation monitors (CL002 & CL003) on the outlet from the CWT with 0.90mg/l low alarm and 1.90mg/l high alarm. These alarms trigger automatic plant shutdown. On the day of the audit automatic plant shutdown in response to alarms had not been operational for a period of 3.5 weeks due to an issue with the automatic shutdown valve.

There are also warning alarms on the INTS system that generate a text alert. The warning alarm setpoints are 1.35 mg/l low alarm and 2.50mg/l high alarm on inlet to CWT (CL001) and 1.10 mg/l low alarm and 1.75mg/l high alarm on the validation monitors (CL002 & CL003).

There is also a residual chlorine monitor on the outlet from the reservoir. This monitor is linked to the Tipperary County Council PMAC system and is not linked to the automatic plant shutdown facility. The alarm generates a text alert. The alarm setpoints are 0.7 mg/l low alarm and 1.5 mg/l high alarm. The residual chlorine trend from the outlet of the reservoir is available to view on the chart recorder on site. A SCADA print out of this trend was also provided in advance of the audit for the period 07/11/21 to 14/12/21 prior to the audit. The trend indicated generally stable levels on the outlet from the reservoir. The levels did however drop on 08/11/21 when the WTP was running to waste.

On the day of the audit the residual chlorine level at the inlet to the CWT was 2.0mg/l and at the outlet from the CWT was 0.35 mg/l (CL002) and CL0003 (0.34 mg/l) following plant shutdown between 7am and 10:30am on the morning of the audit and running to waste. The chlorine level on the outlet from the reservoir (CL17) was 1.09 mg/l.

5.2	Is the chlorine dosed appropriately?	Answer
		Yes

Comment

The disinfection system at the WTP has been upgraded under the Irish Water Disinfection Programme. Primary disinfection is via chlorination using 10-12% sodium hypochlorite. Dosing is flow proportional and linked to the chlorine monitor on the inlet to the clear water tank. Duty and standby dosing pumps are provided. There is automatic switchover between the duty and standby pumps every 3 hours or in the event of breakdown of one of the pumps.

There is no bulk storage tank provided on site. 25L drums of sodium hypochlorite are stored on site on a bunded tray and used to fill the day tank. On the day of the audit a stock of 10 drums were on site providing approximately one weeks supply.

	Answer
5.3	Is the residual chlorine monitored at a suitable sample location after contact time has been completed?
Comment	
<p>The chlorine contact time calculation provided in advance of the audit indicated a target contact time of 37.44mg.min/l with a total effective contact time of 97.36mg.min/l being achieved. The contact time calculation is based on a minimum free chlorine concentration of 0.5 mg/l at the contact time validation point.</p> <p>The contact time calculation provided in advance of the audit includes the clear water tank (CWT) and the reservoir in the calculation however, the validation monitors at the WTP are located after the CWT but before the reservoir. Based on the contact time calculation provided in advance of the audit the residual chlorine is not monitored at a suitable location after contact time has been achieved. However, Irish Water and Tipperary County Council stated at the audit that the required contact time can be achieved in just the CWT. An updated contact time calculation should be provided by Irish Water to confirm this in order to demonstrate that the alarmed validation monitors are located after contact time has been achieved.</p>	

	Answer
5.4	Is there a suitable monitoring frequency for residual chlorine in the network with records available?
Comment	
<p>The records submitted prior to the audit indicated monitoring is taking place weekly and not at the extremities of the network.</p>	



6. Reservoirs and Distribution Networks

Answer

6.1	Are reservoirs adequately inspected and maintained?	No
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Comment

The date when the reservoir was last cleaned could not be confirmed.



7. Treatment Process Chemicals

Answer

7.1	Are treatment process chemicals appropriately managed and stored?	No
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Comment

There are two aluminium sulphate bulk storage bays at the WTP. The lining of the storage bays were observed to be lifting away from the walls. One of the bays was out of use due to the damaged lining. The storage area is not secure.



8. Management and Control

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

Comment

Irish Water confirmed that the protozoal log treatment requirement requirement for the Carrick On Suir (Lingaun River) WTP source is log 3. Irish Water stated that it was not possible to confirm if there was a log deficit at the WTP until a review of the alarms and inhibits has been completed under the Drinking Water Safety Plan (DWSP) review. The expected date for the completion of the DWSP review could not be confirmed.

	Answer
8.2 Are suitable plant shutdowns/inhibits in place to prevent the entry of inadequately treated water entering the distribution network?	No

Comment

On the day of the audit the automatic plant shutdown linked to turbidity and chlorine alarms was not operational.

	Answer
8.3 Are instrument calibrations within date?	No

Comment

Servicing of the coagulant and coagulant aid dosing pumps and raw water monitors was overdue with a service due date of November 2021.

Recommendations

Subject	Carrick On Suir (Lingaun River) - Audit Report	Due Date	11/02/2022
Action Text	<p>Recommendations</p> <p>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.</p> <ol style="list-style-type: none"> 1. Irish Water should (i) continue to investigate the reasons for the <i>Cryptosporidium</i> detections and take remedial actions where necessary; (ii) advise the EPA of the date of rescindment of the BWN. 2. Irish Water should ensure the automatic plant shutdown linked to the chlorine and turbidity alarm setpoints is repaired and reinstated without delay. 3. Irish Water should ensure the guidance in the EPA Water Treatment Manual: Filtration is followed including (i) assess the feasibility of increasing the depth of the sand layer to meet the EPA recommended specified depth of 1,000mm; (ii) review the option of installing automatic backwashing linked to turbidity (iii) review the option of installing a run to waste or a slow start after backwashing;(iv) provide details on outcome of investigation into filters and any proposed remedial works arising from the assessment (v) undertake an assessment of the turbidity monitors to ensure they are installed at a suitable location to provide accurate and reliable results and complete any required remedial works to address the air bubble issues. 4. Irish Water should provide an updated contact time calculation to demonstrate that the alarmed validation monitors are located after contact time has been achieved. 5. Irish Water should ensure monitoring of the residual chlorine levels is undertaken several times per week at the extremities of the network. 6. Irish Water should confirm if there is a log treatment deficit at the WTP. 7. Irish Water should liaise with Tipperary County Council to ensure that all landowners are made aware of the required setback distances under the European Union (<i>Good Agricultural Practice for the Protection of Waters</i>) Regulations 2014 (SI No. 31 of 2014) for the supply. Irish Water should confirm that the landowners have been informed of their obligations. 8. Irish Water should ensure (i) the raw water monitors for ammonia and dissolved oxygen are operational and the associated alarm setpoints and shutdown linked to the alarms are reinstated; (ii) that all dosing and monitoring equipment is serviced by the due date. 9. Irish Water should (i) install automatic switchover on all chemical dosing pumps; (ii) ensure deep cleaning of the settlement tanks is regularly carried out and (iii) repair the alum bulk storage tanks and ensure they are securely locked. 10. Irish Water should confirm if the reservoir is on the Irish Water Reservoir Cleaning programme and confirm the scheduled date for cleaning. <p>Follow-Up Actions required by Irish Water</p> <p>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 11/02/2022 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 DW20210194 in any future correspondence in relation to this Report.</p>		