

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	East Waterford Water Supply Scheme
Organisation	Irish Water
Scheme Code	3800PUB1110
County	Waterford
Site Visit Reference No.	SV22811

Report Detail	
Issue Date	27/10/2021
Prepared By	Regina Campbell

Site Visit Detail			
Date Of Inspection	28/09/2021	Announced	Yes
Time In	11:00	Time Out	14:45
EPA Inspector(s)	Regina Campbell		
Additional Visitors			
Company Personnel	Irish Water: Pat Duggan, Ronan Walsh Waterford City and County Council (acting under service level agreement to Irish Water): Michael Maher, Colin Kehoe		

> Summary of Key Findings

1. The audit found that the East Waterford Water Supply Scheme Water Treatment Plant is well operated and managed. There are a number of recommendations in the audit report that when progressed will ensure that the plant continues to operate effectively.
2. The operation of the plant would benefit by documenting the alarm response procedures so that it is clear to all staff what actions should be taken in response to each type of alarm.

> Introduction

The East Waterford Water Supply Scheme (EWWSS) serves a population of 66,046 including Waterford City, Tramore, Dunmore East and surrounding areas. The supply volume is between 27,000 and 28,000 m³/day.

The sources of the supply are Ballyshunnock Impoundment, River Clodiagh and River Mahon with relative proportions of each source varying throughout the year.

The raw water is treated at the plant as follows: coagulation using aluminium sulphate and poly, clarification, rapid gravity filtration, fluoridation, chlorination using sodium hypochlorite and final pH correction using lime. Irish Water said there is a project due to commence at the end of the year at which will include installation of raw water pH correction treatment and installation of orthophosphate dosing at the plant.

The plant is manned 24 hours a day and 7 days a week.

The audit was undertaken to assess the general operation and management of the plant.

> Supply Zones Areas Inspected

The water treatment plant processes were inspected including the raw water balancing tanks, coagulation areas, flocculation chamber, clarifiers, rapid gravity filters, chlorination, fluoride and lime dosing areas.



1. Source Protection

	Answer
1.1	Is the abstraction source(s) adequately protected against contamination?
	Yes
Comment	
<p>Raw water is supplied from three sources: Ballyshunnock Impoundment, River Clodiagh and River Mahon. Waterford City and County Council (WCCC) said that water from Ballyshunnock is not being used at the moment due to issues with algae and manganese. On the day of the audit the raw water being used was a 50:50 mix of the River Clodiagh and River Mahon. WCCC said that the preferred source for the plant is a mix of the Ballyshunnock and River Clodiagh.</p> <p>There are alarms on pH, turbidity, dissolved oxygen and ammonia on the combined raw water at the plant. On the day of the audit the ammonia monitor on the combined raw water intake was not working and WCCC said that it was waiting on parts to repair it.</p> <p>There are also ammonia monitors and alarms and shutdown at the Portlaw Raw Water Pumping station (River Clodiagh intake) and River Mahon intake.</p> <p>There are a lot of agricultural activities in the catchments of the sources and Kilmacthomas WWTP is upstream of the Mahon River intake. Irish Water said that there is a procedure in place to notify the drinking water treatment plant of any incidents relating to the wastewater treatment plant that may impact on the quality of the raw water at the intake.</p>	



2. Coagulation Clarification Flocculation (CFC) Stage

	Answer
2.1 Are the CFC processes appropriately controlled?	Yes
Comment	
<p>8% aluminium sulphate is dosed into the raw water line followed by polyelectrolyte (concentration 0.2 mg/l). Coagulant dosing is controlled using a Streaming Current Monitor and duty/standby alum pumps are alarmed. Poly is dosed about 3 - 4 minutes after addition of alum and there is a floc pH probe. There are duty & standby poly dosing pumps which are alarmed.</p> <p>Water flows from the flocculation tank to the splitter chamber and into 8 clarifiers. There is an online turbidity monitor on the settled water but this is currently not alarmed.</p> <p>Currently there is no pH adjustment of the raw water prior to addition of coagulation chemicals. Irish Water and WCCC said that there is a project due to commence at the plant which will include installation of pH adjustment of raw water. The raw water mix can have low alkalinity sometimes and the installation of pH adjustment will provide an alkalinity boost to the raw water and will enable the aluminium sulphate to work within its optimal range during all raw water conditions. The project is due to commence by the end of 2021 and should be completed by the end of 2022.</p>	

	Answer
2.2 Were the CFC tanks, channels and weirs observed to be clean, level and well maintained during the audit?	Yes
Comment	
<p>CFC tanks, channels and weirs were clean, level and well maintained with no algal growth visible or obvious rust or corrosion.</p>	

> 3. Filtration

		Answer
3.1	Are the filters designed and managed in accordance with EPA guidance?	No
Comment		
<p>There are 8 no. rapid gravity filters at the plant. Filters 5 - 8 were upgraded to the Leopold floor system in 2019. Filters 1-2 are out of service and there are no immediate plans to put back into use as the plant can operate effectively without them. Filters 3 - 4 were not upgraded in 2019 and there are no plans to upgrade them currently.</p> <p>WCCC said that the depth of media in Filters 3 and 4 is 800mm and the depth of media in Filters 5 to 8 is 700mm. These depths are less than the minimum filter media depth of 1000mm recommended in the EPA Water Treatment Manual: Filtration. There are no media depth gauges on the filters.</p> <p>Backwash is triggered based on headloss or every 48 hours or if the turbidity alarm on a filter is generated. Generally each filter is backwashed every 48 hours. After backwashing the filter is run to waste for 5 minutes.</p>		

		Answer
3.2	Does monitoring indicate that the filters are operating effectively?	Yes
Comment		
<p>There is an online turbidity monitor on each filter with an alarm of 0.2 NTU. All filters had turbidity readings of <0.2 NTU at the audit. There is also an online turbidity monitor on the combined filtered water which is alarmed at 0.2 NTU and triggers shutdown at 0.5 NTU (time delay 900s). The combined filtered turbidity monitor was reading 0.034 NTU at the audit. Trends submitted prior to the audit showed satisfactory turbidity trends for each filter and for the combined filtered water. Irish Water are rolling out guidance to WCCC on what actions to take in the event that filter turbidity rises above alarm setpoints.</p> <p>There is no online turbidity monitor on the final water but samples are tested in the on-site laboratory 4 times a day. The daily log sheets show that turbidity in the final water is often higher than the turbidity in the combined filtered water. WCCC said that this is likely due to the addition of lime for final water pH correction.</p> <p>WCCC said that the lime and chlorine dosing points are adjacent to each other and that dosing of both chemicals takes place on the line between the clear water tank and the reservoir.</p> <p>Daily log sheets reviewed showed that on 27/08/21 the laboratory turbidity test for a sample taken at 8.00am had a result of 1.37 NTU whereas the other 3 no. turbidity laboratory tests for the same day had results less than < 1 NTU (range 0.6 - 0.749). WCCC were not able to explain the high turbidity reading in that particular sample. The combined filtered water turbidity trend for the same date was < 0.2 NTU which indicates that the protozoal barrier was working effectively. It is considered that Irish Water and WCCC should install an online turbidity monitor with alarm on the final water and ensure that final water turbidity remains below the regulatory limit of 1 NTU at all times.</p>		



4. Disinfection

		Answer
4.1	Is the disinfection system verified using monitors and alarms, with trended data recorded and accessible?	Yes
Comment		
<p>Disinfection takes place using 10 -12% sodium hypochlorite. The plant was upgraded under the Irish Water Disinfection Programme (works completed in 2020). Dosing is flow proportional with residual trim and takes place between the clear water tank and the reservoir.</p> <p>There are duty and standby chlorine pumps with automatic changeover in the event of a failure. The pumps automatically changeover every 6 hours.</p> <p>Chlorine is dosed at a rate that maintains a minimum target of 1.1/1.2 mg/l at the inlet to the reservoir (monitored by CL001) and a minimum of 0.7 mg/l at the outlet of the reservoir. Dual validation monitors (CL002 and CL003) record chlorine levels at the outlet of the reservoir which is the validation point for chlorine contact time.</p> <p>Trended data is recorded and accessible.</p> <p>High and low chlorine alarms and shutdowns are in place on chlorine monitors CL001, CL002 and CL003.</p> <p>CL002 and CL003 monitors (chlorine contact time validation point) have a low alarm at 0.6 mg/l with shutdown at 0.5 mg/l (in line with chlorine contact time calculation submitted). High alarms and shutdowns of 1 mg/l and 1.2 mg/l respectively are in place.</p> <p>CL001 (monitors dosing) has a low alarm of 0.55 mg/l and a shutdown of 0.2 mg/l. The low alarm and shutdown settings should be reviewed so that any issues with chlorine dosing are escalated promptly. High alarms and shutdowns of 2.2 mg/l and 2 mg/l are in place. The settings of the high alarm and shutdown setpoints should be reviewed as the high alarm is greater than the shutdown setpoint.</p> <p>There are also alarms and shutdowns based on Effective Contact Time.</p>		

		Answer
4.2	Does the trend in chlorine residual at the treatment plant indicate adequate and stable levels of disinfection?	Yes
Comment		
<p>Trends submitted of the chlorine monitors at the outlet of the reservoir (CL001 and CL002) showed stable and adequate chlorine levels in the final water with residual chlorine levels averaging 0.75 mg/l.</p>		

		Answer
4.3	Is the residual chlorine monitored at a suitable sample location after contact time has been completed?	Yes
Comment		

Monitors CL002 and CL003 provide dual validation monitoring of residual chlorine (chlorine contact time validation point) at the outlet of the reservoir. The target chlorine contact time for the site is 43.68 mg.min/l and at a minimum residual chlorine of 0.5 mg/l post contact time a total effective contact time is 66.15 mg.min/l which is greater than the target required.

On the day of the audit, the chlorine level post contact time was 0.7 - 0.72 mg/l which shows that the target contact time was being achieved.

	Answer
4.4 Is there adequate chlorine contact time before the first connection?	Yes
Comment	
The target contact chlorine contact time calculation for the site is 43.68 mg.min/l which is being achieved.	

	Answer
4.5 Is there a suitable monitoring frequency for residual chlorine in the network with records available?	No
Comment	
<p>Monitoring of residual monitoring takes place in the network. Irish Water submitted information to show that there are some locations where network monitoring has only been undertaken approximately once per month. Irish Water said that WCCC had been requested to increase monitoring frequencies in those areas.</p> <p>There are a number of secondary (or booster) chlorination booster stations on the network and Irish Water confirmed that there are chlorine monitors and alarms at all booster chlorination stations.</p> <p>The records submitted showed that a chlorine residual > 0.1 mg/l is maintained throughout the network.</p>	



5. Treatment Process Chemicals

	Answer
5.1 Are treatment process chemicals appropriately managed and stored?	No
Comment	
<p>The lime dosing room was observed to be in a very poor condition with large amounts of lime covering the floor and machinery in the room. Lime dosing is currently manually adjusted by the operator. WCCC said that a review of lime dosing arrangements at the plant would be undertaken as part of the wider project on chemical dosing which is due to commence soon.</p>	



6. Management and Control

		Answer
6.1	Has the protozoal compliance log treatment requirement been identified for the water treatment plant?	Yes
Comment		
Irish Water said that the protozoal log treatment requirement has been identified for the plant as Log 3. Sanitary surveys have been undertaken and the protozoal requirement for the plant is awaiting final sign off.		

		Answer
6.2	Is there a documented alarm response procedure?	No
Comment		
All staff are qualified to run the plant and there is an eight week raining programme for new staff and all staff attend the FETAC Drinking Water Treatment Plant Operators Training course. Staff are trained on what alarms are to be escalated to the supervisor.		
The operation of the plant would benefit by documenting the alarm response procedures so that it is clear to all staff what actions should be taken in response to each type of alarm.		
Irish Water said that all relevant WCCC staff are currently undergoing further training on Incident Notification Guidance which sets out protocols for the escalation of incidents to Irish Water, the EPA and the HSE.		

		Answer
6.3	Are relevant alarms dialled out via a cascade system to allow a timely response by plant operators?	Yes
Comment		
There are a large number of alarms in operation at the plant. All alarms are logged and date stamped on SCADA and are ranked into low, medium, high and critical. The plant is manned 24 hours a day and 7 days a week. The shift operator(s) on duty responds to the alarm. Alarms are escalated to the supervisor where necessary.		



7. Drinking Water Quality

	Answer
7.1 Is <i>Cryptosporidium</i> monitoring being carried out in accordance with Irish Water's 'Rationale for Determining the Frequency of <i>Cryptosporidium</i> Monitoring in Public Water Supplies'?	Yes
Comment	
Monthly <i>Cryptosporidium</i> monitoring is undertaken on the supply. No detections have been reported to the EPA.	



8. Fluoridation

		Answer
8.1	Is the fluoridation dosing system appropriately controlled?	Yes
Comment		
Flow proportional dosing of fluoride is in place with duty and standby pumps with negative suction. Fluoridation takes place prior to the clear water tank.		

		Answer
8.2	Are fluoride dosage calculations and monitoring records satisfactory?	No
Comment		
Weight/usage calculations and fluoride colorimetric results are recorded daily. On inspection of the daily records, a discrepancy was noted between the weight/usage calculation and the colorimeter test on the 18th September (0.71 mg/l versus 0.41 mg/l). It was also noted that the fluoride colorimeter monitor in the laboratory did not have a calibration date sticker. Fluoride results on other dates checked were satisfactory.		

Recommendations

Subject	East Waterford Audit Recommendations	Due Date	27/11/2021
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 confirm the log treatment requirement for the plant and address how any treatment log deficit will be addressed. 2. Irish Water should ensure that monitoring of residual chlorine takes place in the extremities of the network several times a week. 3. Irish Water should review the low and high alarms and shutdown setpoints for chlorine monitor CL001. 4. Irish Water and Waterford City and County Council should develop documented procedures for responding to and escalating all alarms generated at the plant. The procedure should set out the actions to take in response to each alarm and the delegation of responsibilities. It should be ensured that all staff are trained in these procedures and records kept of training. 5. Irish Water should confirm that the combined raw water ammonia monitor has been repaired and is operational. 6. Irish Water should install an alarm on the settled water turbidity monitor. 7. Irish Water should: <ul style="list-style-type: none"> • install depth marker posts in each filter. • increase the depth of media in the filters to a minimum of 1000mm in accordance with the EPA Water Treatment Manual: Filtration. • install an online turbidity monitor on the final water with alarm and ensure that the turbidity in the final water remains below the parametric limit of 1 NTU at all times. 8. Irish Water should: <ul style="list-style-type: none"> • confirm that the fluoride colorimeter instrument has been calibrated. • investigate the cause of the discrepancy between the fluoride colorimetric result and the weight/volume result and undertake appropriate corrective action. 9. Irish Water should review chemical storage arrangements in the lime dosing room. Chemicals must be stored in bunded areas capable of containing at least 110% of the volume of chemicals stored therein. Fill points for storage tanks inside the bunds should be within the bunded area. Refer to EPA guidance document –“<i>IPC Guidance Note on Storage and Transfer of Materials for Scheduled Activities</i>”. 10. Irish Water should submit the programme of works (including timeframe) for the raw water pH adjustment and orthophosphate dosing projects due to commence at the plant in 2021. The programme of works should include a review of the optimal locations for fluoride, lime and chlorine dosing points. <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.</p> <p>This report has been reviewed and approved by Dr. Michelle Minihan, Senior Inspector, Drinking Water Team Leader.</p> <p>Irish Water should submit a report to the Agency on or before 27/11/2021 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.</p> <p>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 Compliance Plan DW20210146 in any future correspondence in relation to this Report.</p>		