

# 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	
<b>Name of Installation</b>	Gowna
<b>Organisation</b>	Irish Water
<b>Scheme Code</b>	2000PUB1011
<b>County</b>	Longford
<b>Site Visit Reference No.</b>	SV22334

Report Detail	
<b>Issue Date</b>	19/05/2021
<b>Prepared By</b>	Michelle Roche

Site Visit Detail			
<b>Date Of Inspection</b>	21/04/2021	<b>Announced</b>	Yes
<b>Time In</b>	11:00	<b>Time Out</b>	13:00
<b>EPA Inspector(s)</b>	Michelle Roche Derval Devaney		
<b>Additional Visitors</b>			

**Company Personnel**

Irish Water:  
Andrew Boylan  
Emily Mulqueen  
Barry Leonard  
Ian Walsh  
Paraic Joyce  
Sean Healy  
John Hand  
Martin Temple

Longford County Council:  
Kieran Gaffney  
Angela Brady  
Barry Lennon  
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Damian Gilna  
Karina O'Grady  
Tom Murtagh

Jennings O'Donovan:  
Gavin Harte  
John Dolan

## > Summary of Key Findings

1. Irish Water upgraded a number of treatment processes at Gowna (Smear) water treatment plant in March 2021, in line with the Remedial Action List action programme. The upgrades which include a new static mixer and flocculation tank to aid coagulation, replacement of rapid gravity filter infrastructure and media, and improved disinfection controls were assessed by the EPA during the audit using final water quality data trends and THM results in the distribution network.

2. The audit found that the upgrades were effective in ensuring that THM levels remain below the water quality limit and the Gowna public water supply was subsequently removed from the EPA's Remedial Action List in the Q1 2021 update published to the EPA website on 30/04/21.

## > Introduction

The Gowna public water supply serves approximately 4,359 people in County Longford. The raw water is abstracted from Lough Gowna and receives the following treatment at Smear water treatment plant;

- raw water alkalinity boosting using sodium carbonate (soda ash),
- coagulation with ferric aluminium sulphate coagulant,
- clarification in a hopper bottomed clarifier,
- filtration across two rapid gravity filters,
- disinfection with sodium hypochlorite, and
- final water pH correction with soda ash.

The water treatment plant has a design capacity of 2230m<sup>3</sup>/day and is currently treating an approximate volume of 2000m<sup>3</sup>/day. The supply was added to the EPA's Remedial Action List (RAL) in October 2015 due to 'Elevated Levels of Trihalomethanes (THMs) above the standard in the Drinking Water Regulations'. The purpose of the audit was to assess the treatment upgrade works and improved process controls that had been implemented under the RAL action programme and verify if the Gowna public water supply could be removed from the RAL. Aspects of the treatment process outside of treatment to minimise THM formation were also assessed.

## > Supply Zones Areas Inspected

The audit consisted of a video conference with Irish Water and Longford County Council staff on 21/04/21. The water treatment plant was not visited during the audit due to Covid-19 travel restrictions. The audit assessed each step of the water treatment process including associated alarm and automatic shutdown set-points and process verification data from continuous online monitors. Final water quality data and THM results from the network were also assessed.



## 1. Source Protection

		Answer
1.1	Is the abstraction source(s) adequately protected against contamination?	Yes
<b>Comment</b>		
<p>Raw water is abstracted from Lough Gowna and pumped to Smear water treatment plant. There are continuous online monitors in place for raw water turbidity, pH and UVT. Daily manual samples are also taken for colour and temperature and a weekly sample is taken for alkalinity. Alkalinity is generally stable at between 35-40 mg/l CaCO<sub>3</sub>.</p>		



## 2. Coagulation Clarification Flocculation (CFC) Stage

		Answer
2.1	Is the pH within a suitable range for the coagulant used?	Yes
<b>Comment</b>		
<p>The raw water is dosed with sodium carbonate (soda ash) at the inlet to the static mixer to increase the alkalinity of the raw water before the ferric aluminium sulphate coagulant is dosed. Although the soda ash dose has the effect of temporarily increasing the pH, the high alkalinity is required for the coagulant dose to work effectively. The coagulant itself then decreases the water pH to 6.0. A post coagulation pH of 6.0 has been found to be most effective through extensive jar testing carried out during the upgrade works.</p> <p>In order to control this coagulation pH process a continuous online pH monitor has been installed at the outlet of the static mixer. This pH monitor feeds back to the soda ash dosing pumps to maintain the required post coagulation pH of 6.0.</p>		

		Answer
2.2	Are the CFC processes appropriately controlled?	Yes
<b>Comment</b>		
<p>The ferric aluminium sulphate coagulant dose is fixed by the caretaker based on daily raw water monitoring and an approved dosing chart. Raw water conditions are generally stable from the lake source therefore the dose is rarely adjusted. There is a flow proportional adjustment to the dose.</p> <p>The coagulant is dosed into a new static mixer, to ensure rapid distribution of the coagulant, before the treated water is directed through a new mixing channel and flocculation tank. Polyelectrolyte is dosed at the inlet to the flocculation tank to aid floc formation.</p> <p>Flocculated water is then directed to a refurbished hopper bottomed clarifier. The clarifier has been fitted with new tube settlers and a sludge collection cone with sludge draw off occurring every 30 minutes. The sludge is directed to a sludge holding tank and tankered off site.</p> <p>A continuous online turbidity monitor has been installed on the outlet of the clarifier to measure the turbidity of the clarified water. The monitor is set to alarm at 1.2 NTU and shutdown the water treatment plant at 1.5 NTU.</p> <p>Duty standby dosing pumps are installed on both the pH dose and the coagulant dose, however there is no automatic switchover between the pumps in the event of pump failure. Irish Water stated that the clarified water turbidity alarm and shutdown acts as a failsafe against the loss of either dose.</p>		



### 3. Filtration

3.1

	Answer
Are the filters designed and managed in accordance with EPA guidance?	Yes
<b>Comment</b> <p>There are two rapid gravity filters at Smear water treatment plant which have been upgraded under the RAL action programme. The underdrain system in both filters has been replaced and filter media has also been replaced and filled to a depth of 1200mm to comply with the minimum depth of between 1000mm-1200mm outlined in the EPA Filtration Manual.</p> <p>Filter backwash is triggered based on time, headloss and a filter water turbidity of 0.3 NTU on each filter. New backwash pumps were installed on each filter to allow a higher backwash rate. There is a run to waste on each filter following a backwash and this is based on time and filter turbidity. The run to waste is directed to an onsite sludge and washwater tank where settlement occurs before the decant water discharges to Lough Gowna.</p> <p>The performance of the filters is assessed with continuous online turbidity monitors on the outlet of each individual filter and an online turbidity monitor on the combined filtered water coming from the filters. The monitors on each filter are set to alarm at 0.3 NTU and the combined filtered water monitor is set to alarm and shutdown the water treatment plant at a turbidity of 0.5 NTU. Combined filtered water turbidity results from 10/03/21 to 14/04/21 were assessed as part of the audit and all results were typically below 0.15 NTU. All individual filter turbidity results were also below the alarm set-point of 0.3 NTU.</p>	



## 4. Disinfection

4.1

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

**Answer**

Yes

**Comment**

The disinfection system at Smear water treatment plant has been upgraded in accordance with the Irish Water disinfection specification. The system is verified using a CL17 online chlorine residual monitor downstream of the chlorine dosing point. The chlorine residual monitor is set to alarm and shutdown the plant at 0.45mg/l, and residuals leaving the plant are generally above 2mg/l. An upper alarm limit and plant shutdown of 3.5mg/l is also set on this chlorine residual monitor.

10-12% sodium hypochlorite is dosed by a duty standby dosing pump arrangement with automatic switchover, prior to final water pH correction with soda ash. The chlorine dose is flow proportional and also has an automatic dose trim to maintain a minimum effective chlorine contact time of 18mg.min/l at the outlet of both the Smear Lower and Smear Upper reservoirs respectively. Each reservoir outlet has been upgraded with two additional CL17 chlorine residual monitors to facilitate the contact time trim on the water treatment plant chlorine dose.

There are two chlorine booster stations on the network with dosing points located at the outlet of the Edenmore Upper reservoir and the outlet of the Cloonelly reservoir. Both booster stations have been fitted with CL17 online chlorine residual monitors with upper and lower alarm set-points. The monitors have also been connected to the countywide SCADA system.



## 5. Reservoirs and Distribution Networks

	Answer
5.1 Is the distribution network adequately maintained to protect drinking water quality?	Yes
<b>Comment</b>	
<p>There are six reservoirs on the Gowna public water supply,</p> <ul style="list-style-type: none"><li>• Smear Upper and Smear Lower are served directly from the water treatment plant,</li><li>• Smear Upper then feeds Edenmore Lower, Edenmore Upper and Cairn Hill reservoirs, and</li><li>• Smear Lower feeds Cloonelly reservoir.</li></ul> <p>All reservoirs with the exception of Smear Lower were inspected and fully cleaned on dates between 2019 and 2021. Smear Lower reservoir is to be cleaned later this year.</p> <p>Irish Water have established a programme of increased uni-directional flushing across the distribution network which will occur three times a year, with aim of reducing THM formation in the network.</p> <p>THM results from four network sampling events on dates between 12/03/21 and 29/03/21 were examined during the audit. All results were below the drinking water limit of 100µg/l and ranged from 11.88µg/l to 70.79µg/l.</p>	



## 6. Management and Control

		Answer
6.1	Has the protozoal compliance log treatment requirement been identified for the water treatment plant?	No
<b>Comment</b>		
<p>Irish Water are still in the process of identifying the final protozoal compliance log treatment requirement for the water treatment plant. A preliminary log treatment requirement of Log 3 has been assigned to the Lough Gowna source, however a full sanitation survey had not been included in that log removal determination at the time of the audit. Irish Water are carrying out monthly Cryptosporidium monitoring on the supply in the meantime, until the log treatment requirement is finalised.</p>		



## 7. Supply on the Remedial Action List

7.1

	Answer
Do the audit findings support progress made with the Remedial Action List upgrades?	Yes
<p><b>Comment</b></p> <p>1. Irish Water has upgraded Smear water treatment plant as follows:</p> <ul style="list-style-type: none"> <li>• pH correction with sodium carbonate (soda ash) on the raw water prior to coagulation.</li> <li>• New contact channel following coagulant dose and new flocculation tank.</li> <li>• Tube settlers and sludge collection cone installed in the existing hopper bottomed clarifier.</li> <li>• Online clarified turbidity monitor with alarm and plant shutdown.</li> <li>• New underdrain system fitted in both rapid gravity filters.</li> <li>• New rapid gravity filter media to a depth of 1200mm.</li> <li>• Backwash of rapid gravity filters initiated on time, headloss and filter turbidity.</li> <li>• Run to waste facility on rapid gravity filters following backwash based on time and filter turbidity.</li> <li>• Disinfection system upgraded to Irish Water disinfection specifications.</li> <li>• Final water pH correction with soda ash.</li> <li>• Online final water UVT monitor with alarm set-point below 85% UVT.</li> </ul> <p>2. Irish Water has improved the operational management and control of the treatment processes as follows:</p> <ul style="list-style-type: none"> <li>• Alarm and plant shutdown based on clarified water turbidity.</li> <li>• Alarm and plant shutdown based on combined filtered water turbidity.</li> <li>• Alarm and investigation of plant processes triggered if final water UVT drops below 85%.</li> <li>• Daily water quality checks at the plant recorded in an Excel spreadsheet. Checks include raw water pH, turbidity, colour, alkalinity and UVT, final water pH, turbidity, residual iron, residual aluminium, colour and UVT and chlorine residual.</li> <li>• Daily checks on online chlorine residual and UVT monitor performance against handheld monitors.</li> </ul> <p>The audit noted that there was a discrepancy of up to 10% UVT when comparing the handheld UVT readings with those on the UVT online monitor. Irish Water stated that they were aware of this issue and had ordered a cleaning element to be installed on the online UVT monitor to ensure readings remained accurate.</p> <p>3. Irish Water has improved the management of the distribution network as follows:</p> <ul style="list-style-type: none"> <li>• Increased frequency of planned uni-directional flushing across the network.</li> <li>• Both chlorine booster station dosing points were moved from the inlet of the Edenmore Upper and Cloonelly reservoirs to outlet of the respective reservoirs.</li> </ul> <p>Four rounds of network verification sampling have shown that these improvements have been successful in reducing THM formation in the network and therefore improving THM compliance on the Gowna public water supply. The supply was removed from the EPA Remedial Action List in the Q1 2021 update published on the EPA website on 30/04/21.</p>	

## Recommendations

<b>Subject</b>	Gowna Audit Recommendations	<b>Due Date</b>	19/06/2021
<b>Action Text</b>	<p><b>Recommendation(s)</b></p> <ol style="list-style-type: none"><li>1. Irish Water should install automatic switchover on the raw water pH dosing pumps.</li><li>2. Irish Water should install automatic switchover on the coagulant dosing pumps.</li><li>3. Irish Water should confirm the protozoal compliance log treatment requirement for Smear water treatment plant, and submit it to the EPA when finalised.</li><li>4. Irish Water should ensure that readings from the continuous online UVT monitor remain accurate.</li><li>5. Irish Water should ensure that Smear Lower Reservoir is inspected and cleaned in 2021.</li></ol> <p><b>Follow-Up Actions required by Irish Water</b></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 Aoife Loughnane, Drinking Water Team Leader.</p> <p>Irish Water should submit a report to the Agency on or before 19th June 2021 detailing how it has dealt with the issues of concern identified during this audit.</p> <p>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.</p> <p>Please quote the Action Reference Number DW20130059 in any future correspondence in relation to this Report.</p>		