

# Site Visit Report

Under the *European Union (Drinking Water) Regulations 2023*, the Environmental Protection Agency (EPA) is the supervisory authority in relation to Uisce Éireann and its role in the provision of public drinking water supplies. This audit was carried out to assess the performance of Uisce Éireann in providing clean and wholesome water to the public water supply named below.

The audit process is a sample of the performance of a water treatment plant and public water supply on a given date.

Water Supply Zone	
<b>Name of Installation</b>	Cranford
<b>Organisation</b>	Uisce Éireann
<b>Scheme Code</b>	0600PUB1045
<b>County</b>	Donegal
<b>Site Visit Reference No.</b>	SV29758

Report Detail	
<b>Issue Date</b>	24/05/2024
<b>Prepared By</b>	Veronica Boland

Site Visit Detail			
<b>Date Of Inspection</b>	23/04/2024	<b>Announced</b>	Yes
<b>Time In</b>	10:45	<b>Time Out</b>	13:30
<b>EPA Inspector(s)</b>	Veronica Boland		
<b>Additional Visitors</b>			
<b>Company Personnel</b>	Uisce Éireann: Fionnuala Bonner. Donegal County Council (working in partnership with Uisce Éireann): Danny Rogers, Daniel Duffy, John Gallagher, James McHugh, Stephen McGlynn, Hugh Whoriskey.		

## > Summary of Key Findings

1. Cranford water treatment plant (WTP) operates at its full design capacity during the summer tourist period when holiday homes and caravans in the area are occupied and there is increased demand. Uisce Éireann should progress further operational improvements to the coagulation process to ensure that the plant is optimised to respond to changes in raw water quality and increased demand in the network.
2. There is no treatment of sludge at Cranford WTP prior to discharge to Big Burn River. The discharge of water treatment sludge to the Big Burn river should cease immediately.
3. The time delays in place for high and low chlorine alarm and shutdowns do not meet the 5 minute time delay recommended in the *EPA Water Treatment Manual: Disinfection*.

## > Introduction

The Cranford water treatment plant (Cranford WTP) serves a population of approximately 765 people (EDEN figure). The WTP design capacity is 47m<sup>3</sup>/hour, with 31.5 m<sup>3</sup>/hour (off season) and 47 m<sup>3</sup>/hour (peak tourist season) of treated water produced at the Cranford water treatment plant. The raw water abstraction is from Lough Nacreaght located approximately 3km from Cranford WTP. The treatment comprises pH adjustment pre-treatment, coagulation using (aluminium sulphate solution), flocculation, clarification, rapid gravity filtration, post pH adjustment, chlorination and fluoridation. A source and sanitary survey was carried out in 2023 and the log treatment for the WTP is 3.

The audit was undertaken to assess Uisce Éireann's performance in producing clean and wholesome water with a focus on the protozoal barriers in place at the water treatment plant (WTP). The audit also included a review of sludge management at the WTP, following an EPA Catchment Science and Management Unit review of a local catchment assessment undertaken by Donegal County Council for the Big Burn river that indicated elevated levels of aluminium downstream from the Cranford WTP discharge point into the river.

## > Supply Zones Areas Inspected

The audit included a site visit of the treatment processes at Cranford water treatment plant. The Big Burn river upstream and downstream of Cranford WTP discharge point was inspected. The abstraction source and treated water reservoir were not visited as part of the audit.



## 1. Coagulation Flocculation and Clarification (CFC) Stage

		Answer
1.1	Is the CFC process optimised to respond to changes in raw water quality?	No
<b>Comment</b>		
<p>1. Coagulation process chemicals used at Cranford WTP include soda ash (pH correction), aluminium sulphate solution 10% (coagulant), and polyelectrolyte (coagulant aid).</p> <p>2. Jar testing is not carried out to determine the optimum coagulant dose and pH when the raw water quality changes.</p> <p>3. Automation of the coagulant dosing system would allow for greater control over the process in response to changes in water quality or rainfall events.</p> <p>4. The dosing pumps operate on a duty and standby basis and are switched over manually on a scheduled monthly basis.</p> <p>5. A new static mixer, turbidity monitor and pH monitor on the clarified water pre-filters were installed earlier this year (readings at time of audit were turbidity 0.2 NTU and 6.34 pH).</p>		



## 2. Treatment Process Chemicals

2.1

	Answer
Are treatment process chemicals appropriately managed and stored?	No
<b>Comment</b>  1. The bulk aluminium sulphate tank delivery fill-point is not not properly protected from overspill during filling and the bulk aluminium tank is not bunded.  2. The bulk fluorosilicic acid tank located outside is not bunded.  3. Small containers of sodium hypochlorite in the chlorine dosing room were not stored in a bunded area.  4. A build up of liquid residue was observed in the chemical storage bund of the aluminium sulphate day tank.	



### 3. Sludge Management

		Answer
3.1	Is sludge arising from the treatment processes adequately managed?	No
<b>Comment</b>		
<p>1. The Cranford water treatment plant has no sludge treatment. The sludge generated by on-site treatment processes within the clarifier system, and the washwater from backwashes of the filters, is directed to two open concrete lined sumps on site and from these sumps discharged directly to Big Burn river. The staff stated that they have tried to source a decanting arm for the sludge sumps but they have not been able to source one small enough for the sludge pit size.</p> <p>2. On inspection of the Big Burn river, the water discharging from the discharge point appeared to be light brown in colour, there was an orange discolouration in the water downstream from the discharge point, it was not possible to determine the cause of this discolouration (there were visible signs of naturally occurring iron in the surrounding soil as soil profile was visible due to soil erosion) and algae growth on rocks on the river bed in the Big Burn river downstream from the discharge point.</p> <p>3. Uisce Éireann commenced water quality monitoring in the Big Burn river in February 2024, monitoring results for February and March indicate elevated levels of aluminium downstream of the WTP compared to upstream of the WTP in the Burncourt River.</p>		



## 4. Protozoal Barriers Audits 2024

		Answer
4.1	Is there a documented site specific incident response and incident escalation process?	No
<b>Comment</b>		
<p>1. The Uisce Éireann Incident Communication Response Guidance chart displayed at the WTP did not contain the correct site specific alarm and time delay setpoints that protect critical processes at the Cranford WTP. The Incident Communication Response Guidance chart at Cranford WTP displayed different alarm settings to the settings on the HMI.</p> <p>2. On the chart, CL002 (chlorine residual monitor after contact time) is alarmed at 0.65 mg/l (low) and 2.0 mg/l (high) with 15 minute time delay. The chlorine validation calculation sheet submitted with the pre-audit information stated a minimum free chlorine concentration of 0.8 mg/l, and the HMI at the time of the audit had a target of 0.8 mg/l setting for CL002.</p> <p>3. This 15 minute alarm time delay is not in accordance with the <i>EPA Water Treatment Manual: Disinfection</i>.</p> <p>4. CL003 meter had a sticker stating 'Low Chlorine Alarm 0.5 mg/l'.</p> <p>5. On the chart, CL004 (the chlorine dosing meter) is alarmed at 0.65 mg/l (low) and 2.40 mg/l (high).</p> <p>6. The chart should be updated to ensure all the correct site specific alarms and time delay setpoints (including all new monitors/alarms recently installed) are displayed for Cranford WTP.</p>		

		Answer
4.2	Is there a chlorine residual monitor located after contact time for verification of primary disinfection?	Yes
<b>Comment</b>		
<p>1. There are dual validation chlorine monitors (CL002/CL003) after the reservoir. Both monitors were reading 1.37mg/l at the audit. The residual chlorine trend for CL002 was visible on the plant HMI and indicated stable trends. There is no automatic shutdown of the supply linked to the CL002 low or high chlorine alarms.</p>		

		Answer
4.3	Are the filters designed and managed in accordance with EPA guidance?	No
<b>Comment</b>		

1. There are 2 rapid gravity filters on site. On the day of the audit staff advised that the filter media was last replenished in 2015, the media depth in both filters is 725 mm (measured the previous week when the filters were cleaned) which is less than the recommended minimum depth specified in the *EPA Water Treatment Manual: Filtration*. There are no marker posts installed in the filters to allow visual observation of the depth of the filter media.
2. There is a turbidity alarm setpoint of 0.5 NTU on each of the individual filter which triggers automatic plant shutdown (15 minute delay). There is a turbidity alarm setpoint of 0.3 NTU (15 minute time delay) on final water turbidity, there is no final water turbidity shutdown for the WTP.
3. Manual backwashing of filters is undertaken on a timed basis every morning with each filter being backwashed on alternate days. Filter backwashing is not linked to turbidity or head loss. The backwash is run from the clean water tank. There is no return to waste facility available at the plant.



## 5. Site Specific Issues

	Answer
5.1	Were service/calibration interval stickers present on chemical dosing pumps?
	No
<b>Comment</b>	
1. Service/calibration stickers were missing from a number of chemical dosing pumps at the treatment plant including the chlorine dosing pumps and poly dosing pumps.	



## Recommendations

Subject	Cranford Audit 2024 - Recommendations	Due Date	24/06/2024
Action Text	<p><b>Uisce Éireann is responsible for ensuring a clean and wholesome supply of drinking water and should implement the following recommendations without delay.</b></p> <ol style="list-style-type: none"> <li>1. The discharge of water treatment sludge to receiving water, where practiced, should cease immediately. Uisce Éireann should submit a sludge management plan for Cranford WTP to ensure the protection of the Big Burn River. The plan should include interim management measures until sludge infrastructure is installed and commissioned on-site.</li> <li>2. Ensure that the Uisce Éireann Incident Communication Response Guidance chart displayed at the WTP contains the site specific alarm and time delay setpoints protecting critical processes at Cranford WTP.</li> <li>3. Review and implement alarm and shutdown time delay set points for turbidity and chlorine in accordance with site specific requirements and the <i>EPA Water Treatment Manuals: Filtration and Disinfection</i>. Ensure operational staff are briefed on amendments to the alarm and inhibit settings.</li> <li>4. Uisce Éireann should examine the feasibility of (a) increasing the depth of the filter media to meet the requirements of the <i>EPA Water Treatment Manual: Filtration</i> and (b) install depth marker posts at the filters.</li> <li>5. Uisce Éireann should carry out jar testing in accordance with the <i>EPA Water Treatment Manual: Coagulation, Flocculation and Clarification</i> to determine the optimum chemical coagulant dose and pH for the treatment of the water.</li> <li>6. Uisce Éireann should review all chemical delivery and storage arrangements at the treatment plant including fill points to prevent the potential for chemical spills, or discharge offsite. Refer to EPA guidance document “<i>IPC Guidance Note on Storage and Transfer of Materials for Scheduled Activities</i>”. The liquid residue in the chemical storage bund of the aluminium sulphate day tank should be removed and disposed of appropriately.</li> <li>7. Carry out monitoring of residual chlorine several (two to three) times per week at different points of the network to include network extremities.</li> <li>8. Ensure service/calibration stickers with appropriate service interval dates are affixed to all chemical dosing pumps.</li> </ol> <p><b>Actions required by Uisce Éireann</b></p> <p>During the audit, Uisce Éireann representatives were advised of the audit findings and that action must be taken by Uisce Éireann to address the issues raised.</p> <p>Uisce Éireann should submit a report to the EPA on or before 24 June 2024 detailing the actions taken and planned, with timescales, to close out the above recommendations.</p> <p>The EPA advises that the findings and recommendations from this audit report should, where relevant, be addressed at other public water supplies.</p>		